hands on

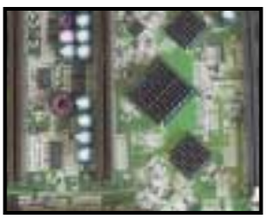
On this month's cover disc you'll find the Personal Edition of BeOS 5. If you've never tried another OS, now's your chance. You really have nothing to lose as BeOS installs as a file under Windows, and if you don't like it you can simply remove the OS in the same way that you would uninstall any other application. Once you've tried it, though, we think you'll like it and to get you started, this month's **Workshop** [p240] offers a helping hand.

If new OSs aren't your thing then we've got plenty of other expert advice. Tim Anderson checks out what Netscape 6.0 will mean for **web developers** [p274] and Ian Waugh in the **Sound** column [p262] shows you how to avoid gaps between tracks when burning audio CDs.

Over at **3D** central, Benjamin Woolley gets all graphical about graphs [p266], and in the **Unix** [p250] column Chris Bidmead breaks free of Windows to get his ADSL connection up and running with Linux. And, as ever, all our experts chip in to help you solve your problems in the **Q&A** section [p236].

NIALL MAGENNIS, FEATURES EDITOR
NIALL_MAGENNIS@VNU.CO.UK

contents



Advice from our experts

Got a problem? Our *Hands On* columnists answer questions and solve your problems.

Windows

Q *When I switch on my PC, I get an error half way through booting: 'VMM32.VXD Missing. Unable to load'. If I hit the Restart button, then Windows usually loads normally. This seems to have started ever since I installed a Umax scanner.*

Graham Berry via email

A This is almost certainly down to the scanner drivers. Umax has a fix for this on its website at (http://support.umax.co.uk/technotes/f108B.htm).

Q *More and more PC suppliers' websites are letting you read their manuals in PDF format online. I would much prefer to download the file and read it off-line, but I can't find a way of downloading the file or recovering it from a temp file, even if I wait for the whole thing to be shown on the screen. Is there a way of doing this?*

Colin Pape via email

A This is a common problem: it doesn't just happen with PDF files and the answer isn't hidden within the options of Internet Explorer, but in Windows Explorer.

Go to View, Folder Options, File Types. Select Adobe Acrobat Document from the list and hit Edit. Check the box marked 'Confirm open after download' in the next dialog. OK out of both dialogs, and in future you will get a prompt asking where to save the file when you go to download a PDF.

Q *How can I increase the text size in Windows 98 Help? Windows 95 had this in the Options menu, but it seems to have disappeared in 98.*

Jane Alexander via email

A Indeed, the option has disappeared. There are two ways round this, but neither is really satisfactory. The method that the Help file itself recommends (search for 'help font') is to go to Internet Explorer Properties, General, click on the Accessibility button and then tick the 'Ignore font sizes specified in web pages' box. However, this increases the font size in the right-hand pane only, but has the side-effect of increasing the text size in the left-hand pane of folders when in web-page view and – as you might imagine – changing the font size used in web pages. This can make the latter difficult to read, as lines of text start to overlap.

Increasing the Help text size...

...in a roundabout way

You can create even more havoc by ticking the 'Ignore font style...' option, then choosing a different typeface from the Font button in the main Internet Explorer properties dialog.

The other approach is to open any web page in Internet Explorer and then change the text size from the View menu. This will also affect the Help text (but again, only the right pane) and the text on web pages will resize in a far more graceful manner.

Finally, the only way to increase the text size in the left-hand pane seems to be by selecting 'Large fonts' in Control Panel, Display, Settings and Advanced.

Q *Do you know of a utility (preferably freeware) to synchronise the clocks on two networked PCs?*

John Beale via email

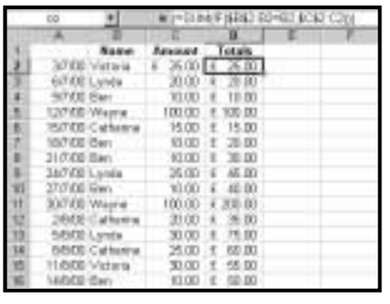
A Open a DOS window, type NET TIME \\name /SET/YES, followed by <Enter> where name is the name of the computer to which you want to synchronise.

Spreadsheets

Q *I have a list of people I slip bungs to when they give me a lead. To keep a running balance, I can add every new amount to the existing total. But using the same format, how can I quickly keep running totals for each person in Excel?*

Mark Wagman via email

A One way is to use an array formula. If the names of the people are in column B and the amounts are in column C, then in cell D2 enter =SUM(IF($B$2:B2=B2,$C$2:C2)).



As this is an array formula you then press Ctrl & Shift & Enter instead of just Enter. Excel will add curly brackets at each end to acknowledge it understands. Now drag this formula down column D to the end of your list. In the example given, cell D16 will have the formula {=SUM(IF($B$2:B16=B16,$C$2:C16))} and Ben shows a total of £50 as he has had five payments of £10 each so far.

Q *When using the Find option from the Edit menu in Excel 2000, is it possible*

to search across several sheets within the workbook rather than each sheet individually?

Russell Jenkins via email

A Yes, it is. First Group the worksheets, then do the Find. To Group the sheets, hold down Shift and click on the first and then the last tab in the workbook. To Ungroup the sheets afterwards, click on any tab.

Q *How can I create weekly column headings in Excel?*

Ruth Wriggly via email

A Enter the first date in cell B1. In C1 enter =B1+7, then drag the Fill Handle (in the lower right-hand corner of the cell) to the right. Format to taste.

Word Processing

Q *I frequently need to list websites in Word and other applications. Is there a way to copy URLs from the Favourites folder (or elsewhere) and paste the addresses in as text?*

Peter Lynch via email

Grabbing the text of a Internet Shortcut in the Favourites folder

A As you have doubtless found out, copying the link from the Favourites will only insert a hyperlink or Shortcut Object: there is no Unformatted Text option in Paste Special. One way to get the text is to right-click on the link, and select Properties.

The property sheet that appears will have the URL already highlighted (see above), so you can copy it from here. If you copy items from the History folder, however, you will find that Word gives you an Unformatted Text pasting option.

Q *I'm having real problems with Word in Office 2000, in that its Artificial Unintelligence seems to think it knows what I want better than I do. For instance, I set up a letterheading, centred, 12 point, Times New Roman in Bold. I then save it, but when I open it again it is in 10 point, Times New Roman, left-justified and a page of junk always ending in 'Word.Document8'.*

Martyn Taylor via email

A What's happening is that Word is extracting what it believes to be the text content of the file. While this can be useful for unknown file types, it makes a mess of Word documents. It's a sticky setting in the Open dialog, which is how many people get caught out. If you set the 'Files of type' back to 'All files' or 'Word documents', then all will be well.

Hardware

Q *I am unable to get my new home-made PC to display anything. It doesn't even beep on pressing the power button. Also, when pressed, the power switch will not turn off the computer.*

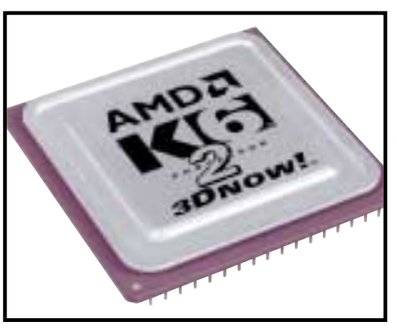
Nicholas Kirby via email

A Make sure everything is correctly seated in the slots – AGP graphics cards, memory cards and even CPUs sometimes slightly pop out, preventing a PC from starting up. Also, to power off an ATX system outside of Windows, you will need to press and hold the power button for about four seconds.

Q *I'm currently looking for a motherboard that supports dual AMD K6-2 500s.*

Dino via email

A Sadly, the K6-2 does not support dual configurations.



The K6-2 can't be used in dual-processor configurations

Q *I have a USB port and am considering buying a hub with a parallel port socket. I know that USB is faster than parallel, so does this mean I will get a significant speed improvement with data transfer, or will the parallel port on the USB hub limit the speed to normal parallel transactions?*

Brendan Smith via email

A USB is indeed much faster than parallel, but such a converter in or outside a hub will be limited to the speed of the standard parallel port spec.

Q *I bought a couple of TMC PAT486SN motherboards recently and can't seem to get into the BIOS SETUPs because they are password-protected. The password appears to be stored in non-volatile memory, as battery removal has no effect.*

Jim via email

A You need to reset the BIOS. This can normally be done by either shorting the correct jumper on the motherboard (see the manual, which will be available on TMC's website), or by removing its power source.

The BIOS tends to remember its settings without battery power for some time, so try removing the battery for a few hours before replacing it. If all else fails, humans can be unimaginative creatures, and many BIOS passwords are simply 'password' or 'bios'.

Q *I still use DOS a great deal and would like to be able to write CD-ROMs under DOS 6.22 for backup purposes. I have searched the web, but have not discovered any software, free or otherwise.*

Richard Pankhurst via email

A Unfortunately, we couldn't find anything either. Does anyone have any suggestions?

Q *I remember a feature in* PCW *about an IrDA connector which plugged into PC motherboards to make them infra-red aware. I have a Psion 5mx which I'd like to connect to the PC without having to fiddle with cables.*

Gordon McLennan via email

A We found that the Asus Pent II 440LX/BX IrDA module, available from Dabs Direct's website (www.dabs.com) for £15 (ex VAT), could be connected to many non-Intel

motherboards, equipping them with infra-red capabilities. Check your motherboard manual for details of an infra-red TX/RX jumper, usually five or six pins in length.

You will also need to change one of your serial port UART settings in your BIOS to offer infra-red capabilities but, if all works well, Windows 98/2000 will recognise your new hardware and install the correct drivers: note, it will only work at up to 115Kbits/sec.

We have had success with motherboards from Asus, Abit and Supermicro, but you will have to manually mount the transceiver or, like us, have it messily dangling out the front.

Databases

Q *In my Access 97 database, some extra tables have suddenly appeared. These all have names such as MSysACEs, MsysModules and so on. However, they aren't mine. Help!*

Barry MacDonald via email

A Don't panic (but also, don't mess about with them!). These do actually belong to you in the sense that they are part of your Access database. They are the system tables where Access stores information about the database itself: the so-called meta-data. These tables are normally hidden, but you can make them visible and, in your database, it appears that they have become so by mistake. To make them invisible again, select Tools, Options and de-select System Objects.

Unix

Q *Linux is turning into a nice GUI system, but a lot of what appears in your Unix column is still stuck down at that old DOS-style command line. The Unix incantations are bizarre and no mere human could ever be expected to learn them. Do you really have to rely on the command line?*

Bobby Lonsdale via email

A People tend to find that the better they get to know Unix – however well-decorated their version may be (and Linux is looking pretty sexy these days) – the more they value that old character-based shell. And, by the way, 'DOS-like' is a rotten description: the power of the Unix command line is orders of magnitude greater than anything DOS had to offer.

TkWorld can be a great introduction for those new to the world of the Unix command-line interface

Any GUI-addicted readers who fancy a gentle introduction to the command line might like to try Wes Bailey's TkWorld which can be found at www.tkworld.org.

This puts GUI upholstery around the sometimes starkly incomprehensible Unix command line interface. It makes a great introduction for beginners who would like to get a feel for the real power that lurks beneath the fancy front end.

Graphics and DTP

Q *Every time I scan an image into Adobe Photoshop 5.5, a progress bar appears that says, 'detecting watermark'. Is there any way to turn this off?*

Mark Smith via email

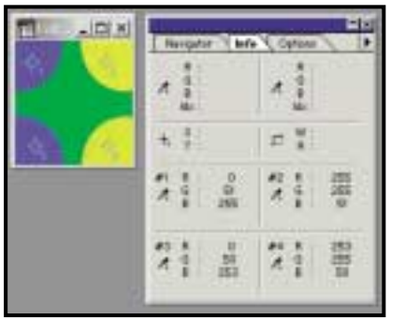
A Remove or rename the Digimark directory in the Photoshop plug-ins folder.

Q *I have noticed something peculiar when using Image Ready to prepare graphics for the web. Even when the websafe hex code for RGB colour in an image is identical to that of the background colour in a web page, the on-screen colours of the image and the background don't always match, so the square outline of the image is clearly visible. Have you any idea why this might be? (One solution I've come across is to alter the background colour hex code slightly until a match is achieved).*

David Watson via email

A What optimisation settings are you using when saving the file? If you are saving a JPEG, then it's possible that the file compression is the cause of the colour shift. This is particularly likely if you are using high-compression, low-quality JPEG settings.

As you can see from the screenshot below, the top two colour quadrants are from the original, unoptimised file, while the bottom ones are from a lowest-quality JPEG optimised version. The colour-sampler readouts in the info palette demonstrate a clear shift in the colour values, which would show differently on a flat-colour HTML page background, defined with the (pre-optimised) RGB values from the original.



The same thing can happen with GIF optimisation, where reducing the colour palette can sometimes produce dither or colour switches, depending on the Image Ready settings. The solution to this is to use GIFs and optimise with the full 216-colour web palette, or reduce the palette, making sure that the optimised palette contains a swatch with the colour value you have defined as the HTML background.

CONTACTS

All of our experts welcome your queries: simply respond to the appropriate address at the end of their *Hands On* columns.

BeOS beginnings

You'll find BeOS 5 Personal Edition on this month's cover disc. Here Dave Fearon gets you started.

BeOS 5 is the latest release of perhaps the most modern of all available desktop operating systems for the Intel platform. The Personal Edition of the OS is a fully working version which you can continue to use indefinitely for free, for personal non-profit use. Naturally, we couldn't resist putting it on this month's cover CD.

The company itself, Be Inc, is the brainchild of Jean-Louis Gassée, and was formed in 1990 after his departure from Apple. He's still the man in the driving seat, as is evident from his short column in the *Be Developer* newsletter. Subscribe by hopping over to www.be.com/aboutbe/mailinglists.html.

From the start, one of the central ideologies behind BeOS was that a modern OS should be able to take advantage of the potential power of multiple processors, exploiting the fact that several mid-range CPUs can cost less and possess more computing power overall than a single high-end processor.

Initially, the OS was developed in tandem with custom hardware and even the very earliest incarnation of this, which appeared in 1991, used dual AT&T Hobbit microprocessors. The first retail offering of the BeOS was in 1995 when Be released the BeBox, based around Motorola's PowerPC CPUs. The BeBox ultimately failed, and after Apple's decision not to license or develop BeOS for its own systems in 1996, the Intel build was created.

If you're already a Linux user or have a second OS on your machine and you're put off by the thought of yet another round of partition creation, resizing and general faffing about to be able to try BeOS, don't worry – the Personal Edition version of BeOS 5 doesn't require any partition manipulation at all. Running the setup.exe file simply installs the OS to an existing FAT partition within Windows, where it exists as a standard application. The OS itself simply lives in one 500MB disk image file, which can be accessed and used as a standard local volume by the OS once it's running. To get it going you need to reboot, of course, and if you've installed the OS from NT4 or Win2000, you'll need to create a boot floppy (the installation process prompts you to create one).

Not only is BeOS Personal Edition available to use for free, there's no need to worry about partition manipulation when installing it

Starting the OS from within Win98 should simply drop you out of Windows and reboot the system into BeOS. There have been some problems reported with the reboot process though, so if you find the machine just hangs, create a boot floppy and try again.

One of the limitations of Personal Edition is that the size of the disk image file that's created – and thus the size of your BeOS root volume – is fixed at 500MB. You can create new Be volumes by initialising existing partitions on a given volume using the Drive Setup applet from Preferences, but you can't manipulate the partition on a mounted volume from within BeOS.

Don't forget, you can mount FAT16 and FAT32 volumes for full read and write access

Don't forget, however, that you can mount FAT16 and FAT32 volumes for full read and write access, plus you can now mount NTFS volumes for read-only access. Just right-click on the desktop and move down to the Mount option, which will give you a list of mountable volumes on the system.

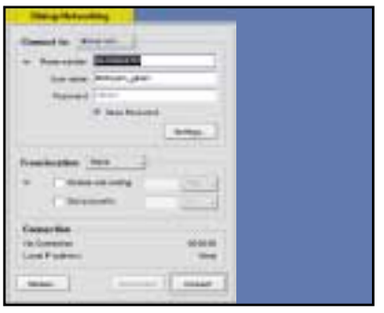
The fixed 500MB limit on the BeOS volume also means that if you install pretty much anything on this volume you'll run out of space for the virtual memory swap file, which can only reside on the BeOS root volume. You need to maintain 357MB free to be able to use virtual memory. The good news, however, is that the efficiency of the OS means it'll run happily without it, as long as you have plenty of RAM.

One of the things that's missing from BeOS 5 PE is a Network Neighborhood-style network browser. If you've previously been using r4.5 but couldn't get the network support going at all, you may not be aware that there's an unsupported experimental network browser called WON (world o' networking) buried on the r4.5 CD in packages/extras/optional/experimental/WON. This seems to work fairly reliably with version 5, too. Just double-click on the WONSetup file and configure it with the name of your workgroup and so on. You'll need to restart networking, after which you should be able to see all the local machines on your LAN by opening up the WON icon on the desktop. It is a little bit flaky and fairly slow, but it's good enough to provide you with a means of transferring the odd file across from another machine.

Rather bizarrely, the readme file that's installed when you set up BeOS says that because of technical limitations, the

Step-by-step guide to hooking up to the web

1 There's no point in having an operating system these days if you can't hook up to web or other machines, so setting up BeOS' networking, whether dialup or LAN, is the first thing on the priority list. There is, in fact, very little to it. Both dialup networking and LAN settings are accessed from the Preferences menu, in much the same way as Windows.



2 For modem access, open the Dial-up Networking preferences box. You'll see that there's not much difference between this and the equivalent Windows dialog. You can't edit any of the text boxes until you choose to make a new account via the button at the top of the box.

3 Click on the Modem... button at the bottom left of the Dial-up dialog and choose your modem from the list or click Custom... to set up your own. As with Windows, take care when the 'Make connection when necessary' checkbox is activated, if you don't want any nasty fiscal surprises from BT. When you're done, just hit Connect and off you go.

4 Setting up version 5's LAN networking is, like DUN, exceedingly simple, and one of the beauties of BeOS is that having made changes, the networking system can be restarted without having to reboot. Version 5 now autodetects your network interface card (NIC), so to connect to the Web via your LAN, you only need to check a couple of things.

5 If your BeOS machine shares the network with a NAT server – that includes Windows 98SE's Internet Connection Sharing – just click the Settings button from the main Network preferences dialog and check 'Obtain settings automatically'. If you don't have DHCP facilities you can run winipcfg from a Windows machine to get the relevant settings. When you're done the system will prompt you to restart networking.

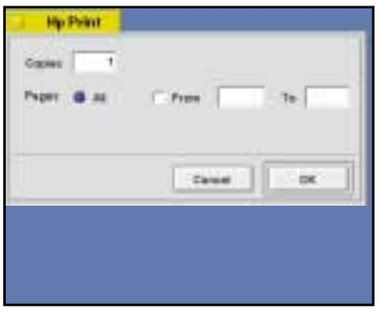
6 While you're at it, you can set up your BeOS machine as an FTP and/or TelNet server, which is useful since there's no inbuilt facility with BeOS 5 PE to browse network machines. Always bear in mind, however, that running FTP and TelNet servers, particularly on standard ports, represents a potential security risk.

Personal Edition doesn't support multiple processors. However, this is not totally correct. If you run BeOS from a Windows session, only one processor will be used (this is because Windows 9x does some jiggery pokery to turn off the second processor and it can only be restarted via a cold boot). However, if you create a boot disk and boot from that, then both processors will be enabled.

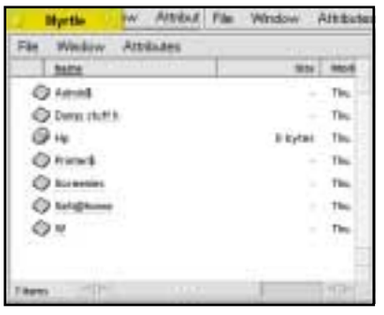
You can test the effect of dual CPUs by starting the Pulse application from the Applications menu and then starting up, for instance, the GLTeapot and Charts demos. Pulse allows you to switch either one (but not both) of your CPUs on and off on the fly: switch one off and watch the frame rate counts decrease.

Of course, an OS isn't much use without applications to use with it, and this is the situation with which BeOS is battling. If you're into 3D, try Blender from NaN software (www.blender.nl), which is also on the cover CD. It's a great – if quirky – 3D-modelling app that's also popular on Windows and Linux. Resources for other apps and the various freeware

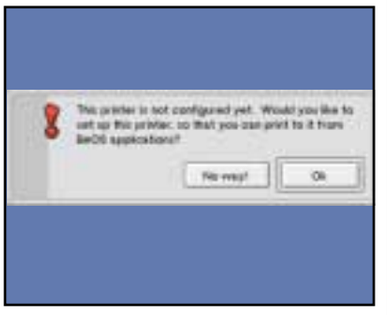
Setting up network printers



1 If you're not new to BeOS and have a copy of the r4.5 CD, you can make use of the WON (world o' networking) widget in the experimental folder. You'll find it buried on the CD in packages/extras/optional/experimental/WON. It seems to work fairly reliably with version 5. WON allows you to print to machines sharing a single printer over a Windows network in the usual fashion.



2 With WON up and running, open a window onto the network and browse to the relevant machine. What we're after here are network printers to allow us to share a single printer among a number of different machines. Any shared printers should be visible from this window. Double-click the one you want and BeOS will lead you onto the next screen.



3 BeOS should recognise the fact that you haven't used the printer before, and start its equivalent of a wizard. As happens often with BeOS, you'll get a nice, jovial dialog box. This is one of the best things about BeOS – its user friendliness.

4 The network path to the printer should be filled in automatically when the wizard starts. Again this shows just how user friendly BeOS can be in comparison to the often command-line interface of, say, Linux.

5 There are very few specific drivers for BeOS, so you'll just get a list of generic types and languages from the Printer Type drop-down. For most units, PCL3 should work OK – I tested it on an ancient DeskJet 540 inkjet and it was fine. Give it any name you like and hit Add.

6 If you're successful you'll get a status dialog listing the printer's type, language and a job list. Just like Windows, in fact. Now you should be able to share the printer across the network without any problems. If you do run into difficulties, go back and check all your settings carefully.

and shareware widgets out there can be found at www.bedepot.com.

BeOS is strongly geared toward making life easier for developers, and to this end there's an integrated development environment, BeIDE, as well as various tools that are available for free. They're not included with the standard BeOS 5 PE though, you'll need to download them separately from the FTP site at ftp.be.com/pub/beos. The download is 20MB, and includes an implementation of GNU C++, as well as the full set of API classes, including those for driver creation, MIDI, networking and OpenGL, along with documentation. The jumping-off point after unzipping the tools is <installation directory>/beos/documentation/Be_Developer_Resources.html.

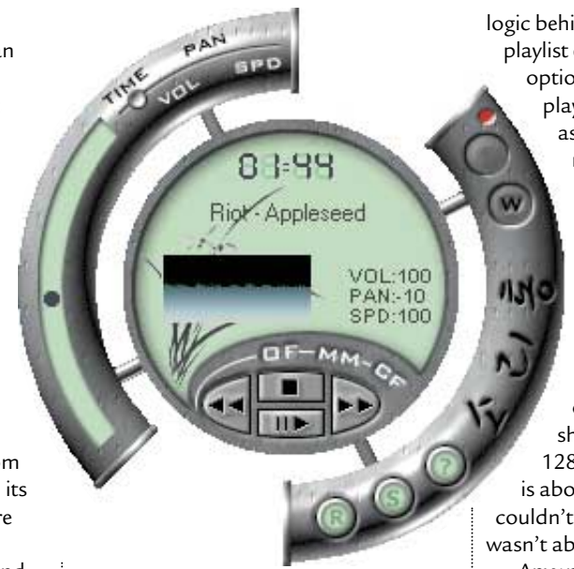
CONTACTS

David Fearon welcomes your comments. Contact him via the *PCW* editorial office or email **davidf@pcw.co.uk**

Redmond skins up

Tim Nott tests the latest beta version of Media Player and finds Microsoft has gone skin crazy.

Last month I briefly mentioned 'skinning' – an activity made popular initially by music players (aka jukeboxes) such as WinAmp and Sonique, where the shape and look of the application is nothing like the Windows norm. Since then, being something of a collector of these things, I've discovered more skinnable juke boxes for playing digital media such as MP3 files or audio CDs. For sheer elegance, the Korean Soritong takes the prize – it looks like something totally unaffordable in a Zurich hi-fi shop. In fact, it's free, from www.sorinara.com. Should you find its elegance too restrained then there are plenty more skins, including some delightfully cheesy anime creations and one modelled, somewhat bizarrely, on a Sims living room.



Soritong's cool metal elegance...

The shock news is that Microsoft has now got into the skins game with the latest version of Windows Media Player. At the time of writing, this had reached the beta stage (known as a 'Technology Preview') and was freely available for download. A rather bewildering interface offers you the choice of playing from your Media Library, CD Audio, Radio Tuner or Media Guide – the last two involving an Internet connection. I did try very hard at this, but although several of the pre-set radio stations opened as web pages in Internet Explorer, everything else stayed silent. I also had a lot of difficulty getting a CD to play. At one stage it made a spirited attempt to play the Oxford English Dictionary on CD-ROM in another drive (not to be recommended for listening pleasure) but finally I managed to get a CD playing. Performing an Internet track look-up was something of an adventure. After a lot of faffing about, a wizard eventually shuffled along, but failed to find a track list for the album – something that MusicMatch jukebox can do instantly.

...or how about a head from Microsoft?

Moving on to MP3 format was a little more encouraging, I managed to play tracks on my hard disk by dragging them into the Media Player, but the logic behind Microsoft's conception of a playlist eluded me. There's also an option to copy music to a portable player – which, alas, I couldn't try as I don't have one; and also to record CDs to your hard disk in compressed format. Nothing new there, you might think, but this is not MP3, it's Microsoft's own-brand format – Windows Media Audio (WMA). This claims to offer twice the quality and compression ratio of MP3 but, confusingly, the Options dialog shows that a CD recorded at 128Kbits/sec needs 56MB, which is about the same. However, since I couldn't get it to copy anything at all, I wasn't able to check this.

Anyway, enough of this churlish nit-picking. What really matters is that Microsoft has embraced skins with all the enthusiasm of a gamekeeper turned poacher. Among the available sample skins are a cute little cartoon character called Toothy, whose single tooth moves across his mouth as the track progresses; and a truly amazing green head, with ears that pop-out to reveal the playlist and a graphic equaliser.

There's also a range of 'visualizations' – graphic effects that respond to the music, as seen in WinAmp, Sonique and other players. You can even create your own skins, though this isn't for the faint-hearted, as you need to write the configuration file in XML. For those brave of heart and stout of anorak there is an excellent guide available – the Media Player Software Developers' Kit. This is also available as a free download and features a hefty help file giving the low-down not just on creating skins, but also on using ActiveX controls to play media in web pages and on designing custom visualizations.

Let's hope by the time Media Player 7 ships for real – expected to be with Windows Millennium Edition later this year – Microsoft will have sorted out the minor details, such as actually getting the thing to play music. At the time of writing both the Media Player and the SDK were

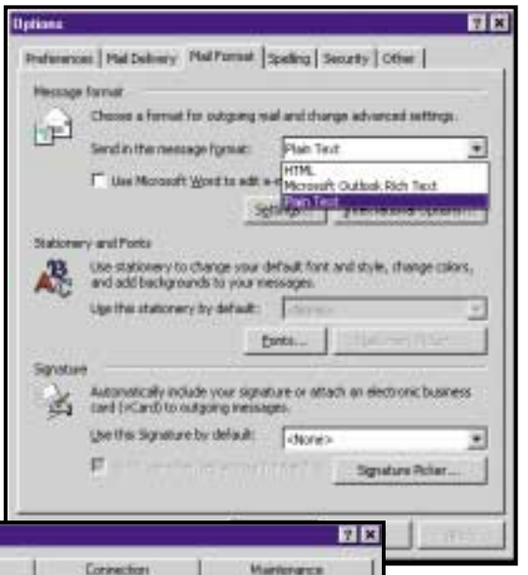
available to download at www.microsoft.com/windows/windowsmedia.

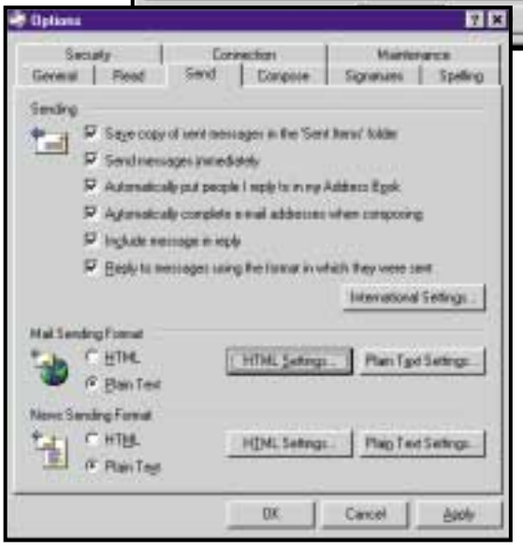
What's DAT?

If you've ever received a mystery attachment to an email message, with the .dat extension, then the chances are you won't have a clue what to do with it. A recent newsgroup discussion came up with various ideas: 'It's a Mac format' and 'It's a collection of multiple files' being two of the more sensible suggestions. What it is, in fact, is a file created by Microsoft Outlook. And to make any sense of it, you need... Microsoft Outlook. Outlook Express won't, it seems, read these files, and nor will most other email applications.

This brings me neatly to my seasonal lecture on email etiquette. If you are using Outlook (or Outlook Express) as your email client then you will win friends by keeping your messages to plain text. Otherwise, at best your message is sent twice – one version in plain text, and another with HTML formatting that will roughly quadruple the size of the message. At worst, you'll be sending people useless .dat attachments.

Either way, it takes longer to upload and download, and takes up more storage space. Multiply this by the thousands of emails that are in transit at any moment and it adds up to a lot of squandered bandwidth. Furthermore, most users are paying for their connect time, so it's downright rude to abuse this. Many people who wouldn't dream of sending an unstamped package, expecting the recipient to pay the postage, have no compunction in saddling them with long, expensive, downloads. In Outlook you can set plain text as the default format from Tools, Options, Mail Format. You can also set the option for individual messages (in the Format menu) and individual contacts (check the box under the email address). In Outlook Express the global option is under Tools, Options, Send; the per-contact option is in the Name tab of the Windows Address Book; and the per-message option is once more in the Format menu of the message-editing window. Note that if you choose a 'Stationery' from the New Mail button, this overrides the Plain Text default.





Top: Brush up on your Internet etiquette with a little plain speaking in Outlook...
Above: ...and in Outlook Express

Most users pay for connect time, so it's rude to abuse this with hefty HTML emails

Magnificat

Being of reasonably sound body, if not mind, I've never had occasion to use the Windows 98 Accessibility options. But if anyone does have difficulty seeing the screen, hearing system sounds or manipulating the keyboard and mouse, there's considerable help available here, with a wizard to guide the way through the considerable list of options.

One accessibility tool that really deserves a wider audience is the Magnifier. This sits at the top of the screen by default, and shows a double-size view of the area around the mouse pointer or text-editing cursor. You can, however, drag it into a normal window and there are a number of other options, such as varying the magnification level and using high-contrast or inverted colour schemes. It's very useful for all sorts of things, such as checking the details in bitmaps, or font smoothing, but where it really earns its keep for me is in selecting portions of screenshots, such as toolbars or individual buttons. Rather than the hit and miss attempt of trying to locate a pixel at normal resolution, it means that I can crop or select a region with pixel-perfect accuracy.

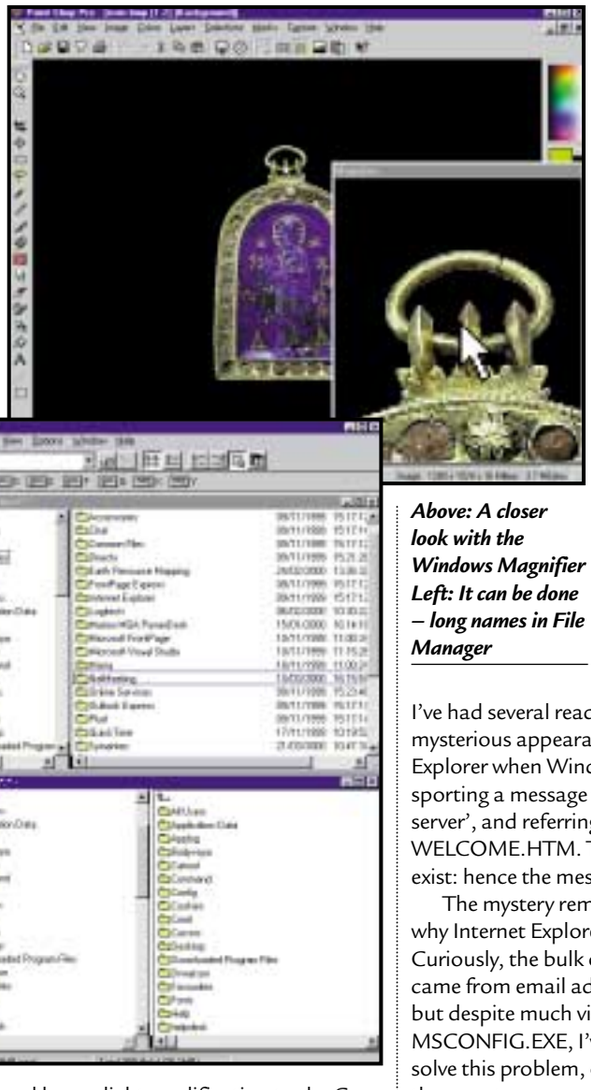
Taskbar tip

Every so often, someone stumbles upon one of those tips that are so obvious – and so useful – that you wonder why you never heard about or realised it before. As you doubtless know, you can select more than one file in a folder by holding down the Control key as you click on them. What I'd never realised, until Michael Farrow informed me, is that you can do the same thing with buttons on the Taskbar. So, for example, you can save a few clicks at the end of a heavy day by Control & clicking each task, then right-clicking Close. Even better is that you can select two (or more) buttons, then right-click Tile. The selected Windows will tile 'on top' of all other open Windows. This is especially useful if you are trying to copy files between folders – it's almost as good as the old File Manager multiple-pane view.

Speaking of which, I've always had a soft spot for File Manager, for this very reason – you can set up multiple views in the main window, and if you tick the appropriate option in the View menu, it will save those settings. This makes it excellent at the job of, well, managing files. There are also all sorts of view options – you can have one pane showing just file names, for example, with a tree-and-full-details view of another location beside it. It will also tell you the plain truth about special folders, and I've often used it to winkle out junk files that have become 'invisible' to Windows.

It does, however, have its limitations. Some versions are not Y2K-compatible, but this is easily fixed with a visit to the Microsoft website. It doesn't support right-button dragging, but the Shift and Control modifiers work as per Windows Explorer, forcing a move or a copy respectively with the left button.

What is harder to live with, however, is the ugly duckling approach to long file names, which truncates, for example, 'program files', to 'progra~1'. If you have several folders with the same starting letters, then identifying these becomes pure guesswork, eg 'micro~1', 'micro~2', and so on. There is, however, a shareware utility to add long file name capabilities to Windows File Manager, written by Dieter Prifling of Neutraubling, Germany, and costing £6.06 (or 15DM) to register.



Above: A closer look with the Windows Magnifier Left: It can be done – long names in File Manager

I've often used File Manager to winkle out junk files that have become invisible to Windows

It goes under the snappy name of FmLfns, and is at www.wincorner.com /home/ fmlfns.html.

Kernel blimp

Another oldie but goody came up trumps this month. I recently changed my keyboard from the original Microsoft Natural to the Microsoft Natural Elite. Both have a similar domed construction, splitting the keys into two angled banks, but the latter is rather more compact, and has a slight modification to the Caps Lock key that seems expressly designed to ensure thAT I KEEP HITTING IT BY ACCIDENT. This was driving me so mad that it rang a distant bell. The Microsoft Kernel Toys – sibling to the more famous PowerToys – is a free set of goodies that appeared shortly after Windows 95, and came with a keyboard-remapping tool. Sure enough, they are still available for download from the Microsoft website (and many others). Although I have not tried the other toys under Windows 98, Keyremap works fine. What it does is add another page of options to Control Panel, Keyboard, properties. These let you map the action of any of the Shift, Control, Alt and Caps Lock keys (on the left-hand side) or Windows, Menu, Control and Alt keys (right-hand side) to another key in the same set. So having mapped Caps Lock to behave as Shift, I have stopped this involuntary shouting.

Not welcome

Hats off to John-Dawn McHugh, who appears to have solved a long-running mystery. I've had several readers complain of the mysterious appearance of Internet Explorer when Windows is started, sporting a message that it 'cannot find server', and referring to a local file named WELCOME.HTM. This file does not exist: hence the message.

The mystery remains, however, of why Internet Explorer is trying to find it. Curiously, the bulk of these complaints came from email addresses at Freeserve, but despite much vicarious fiddling in MSCONFIG.EXE, I've not been able to solve this problem, or even reproduce the symptoms on my own PC.

Anyway, John-Dawn spotted the culprit in Internet Explorer properties. On the Advanced tab, there was an option to 'Show welcome message each time I log on'. This was ticked – but, as we've seen, there is no welcome message to show. Hence the error message. Unticking the option cured the behaviour. And the reason I was unable to diagnose or reproduce the problem was that not all versions of IE5 have this option.

CONTACTS

Tim Nott welcomes your comments on the Windows column. You can contact him via the *PCW* editorial office or email **win@pcw.co.uk**. Please do not send unsolicited file attachments.

Tricky manoeuvres

Thinking of moving? Terence Green shows you how to take your Documents and Settings with you.

I have been trying to locate all the places in which Windows 2000 Professional stores personal data, in particular My Documents, Internet Explorer files, and, although I don't use it for mail myself, the Outlook Express message store. I do this in order to locate my data on a different logical drive from the system files as a safety measure to protect my data against the occasional disaster caused by inveterate fiddling. It ensures against loss of data if I need to vapourise the system drive and reinstall.

It's easy to move My Documents through its Properties settings, as mentioned in the April column. Similarly, Outlook Express data can be moved using Tools, Options, Maintenance, Store Folder; and Internet Explorer temporary files can be relocated with Tools, Options, General, Settings. Moving other files, Internet Explorer Favourites and backup logs, for example, is a different kettle of fish altogether. These are stored in a directory tree called 'Documents and Settings' on the Windows 2000 Professional system drive. If you try to move this directory Windows 2000 will politely refuse. An article on Microsoft's KnowledgeBase says that 'this behaviour is by design', but goes on to give directions, accompanied by dire warnings of doom and disaster as to how it can be moved.

Top: With care, the Documents and Settings folder can be moved to a new location
Above: The move has succeeded if you can delete Documents and Settings from its original location on the system drive

Please note that this only applies to standalone Windows 2000 Professional systems. If your computer is part of a Windows 2000 network running Active Directory, there is an established procedure using Group Policy to move the user profiles stored in Documents and Settings. Don't use this procedure unless you have complete authority for your computer. If you're in any kind of shared or group environment or network you will probably mess up something and may even destroy someone else's data.

Option one is to rename Documents and Settings when Windows 2000 Professional is being installed. But this requires an unattended install which, for most home and small business users, is more trouble than it's worth. And it can't change the location post-install. Option two, accompanied by exceedingly dire warnings, involves editing the registry. I'm not going to mention the article number which explains this procedure because it's a confusing document that appears to contain some incorrect or misleading information. When I misread it, it quickly led me into a disastrous loss of all my settings. If you decide to do this and locate the relevant KnowledgeBase document, you should follow the 'Entire Folder' option with the following important provisos and exceptions.

You must use an administrator account for this process. But consider creating a new temporary administrative user account (I called mine Temp Admin), which you will only use for this operation and can then discard. This will mean a bit more work but may save you some grief if your first attempt misfires. When you come to steps eight and nine in the 'Entire Folder' process, don't follow it literally. If you do as it says and simply copy the current user's profile to the new location, you'll overwrite and delete the other profiles you copied in earlier steps. What step nine should say is to create a folder named after the current user, Temp Admin in my case, and then copy the current user profile to this folder.

If you decide to move Documents and Settings, and Microsoft strongly recommends that you don't, PLEASE take the utmost care, make a full backup of your registry, and update the Emergency Recovery Disk before starting. If possible, try doing so immediately after a fresh install of Windows 2000 when you have not yet begun to use it and establish personal settings. This at least will minimise the damage if it goes wrong.

If, after all these warnings, you still want to do it, then read on. Open Windows Explorer and navigate to Documents and Settings in the System Folder. Change its properties under Folder Options, View, Advanced properties to show hidden files and folders. Clear the check boxes next to Hide File Extensions and Hide Protected System Files.

Now copy (NOT move) all the named

Accessibility options inaccessible

Pota Kalima wanted to remove Accessibility Options and the associated programs from Windows 2000, but they don't appear in the Windows Components section of Control Panel's Add/Remove Programs tool. Even trying to work around the problem by installing and uninstalling them didn't work. As it happens there is an easy answer which doesn't seem to be mentioned in the standard Windows 2000 Pro release documentation or help files.

I hate to give away my trade secrets, but whenever I can't find the solution to a problem I turn to the Microsoft KnowledgeBase for an answer. For preference I use Microsoft TechNet, a subscription service delivered on CD that includes the latest service packs and updates, lots more technical data and the complete KnowledgeBase. But if you can't justify the subscription, you can access the KnowledgeBase on the Microsoft website. Click on Support at the top of the page and select KnowledgeBase from the drop-down list or, to see more of TechNet online go to www.microsoft.com/technet.

Your Windows 2000 questions are answered online in KnowledgeBase's TechNet section

A quick search of the KnowledgeBase from TechNet on the web threw up the answer to Pota's problem in the form of Article Q223182. Accessibility Options (along with several other components including games, Outlook Express, and multimedia components that are all installed with Windows 2000 by default) aren't listed in the Add/Remove Windows Components list in Add/Remove Programs. To unmask them, log in with an account which has administrative privileges and use Search to find the SYSOC.INF file. It's in the INF subfolder of the Windows 2000 System folder. Open SYSOC.INF in Notepad and edit the section shown in Fig 1.

FIG 1

```
; old base components
Games=ocgen.dll,OcEntry,↙
games.inf,HIDE,7
AccessUtil=ocgen.dll,OcEntry↙
,accessor.inf,HIDE,7
CommApps=ocgen.dll,OcEntry,↙
communic.inf,HIDE,7
media_clips=ocgen.dll,↙
OcEntry,mmopt.inf,HIDE,7
MultiM=ocgen.dll,OcEntry,↙
multimed.inf,HIDE,7
AccessOpt=ocgen.dll,OcEntry,↙
optional.inf,HIDE,7
Pinball=ocgen.dll,OcEntry,↙
pinball.inf,HIDE,7
MSWordPad=ocgen.dll,OcEntry,↙
wordpad.inf,HIDE,7
```

(*Key:* ↙ *code string continues*)

Remove the ',HIDE' from the items you want to surface in Add/Remove Windows Components so that:

```
AccessOpt=ocgen.dll↙
,OcEntry,optional.↙
inf,HIDE,7
```

becomes:

```
AccessOpt=ocgen.dll↙
,OcEntry,optional.↙
inf,7
```

You must also remove ',HIDE' from the second line, AccessUtil. This is the category heading for the other components which you can access by clicking on 'Details' when Accessories and Utilities is highlighted in Add/Remove Windows Components.

Accessibility can be made accessible again by editing the SYSOC.INF file

folders, EXCEPT the one for the current user (eg Temp Admin), under Documents and Settings to the new Documents and Settings location. If you name the new location Documents and Settings you'll save yourself a bit of time as you'll soon discover. Now comes the fun bit. Start up the Registry Editor (Start, Run, Regedit), open the Find window (Edit, Find) and enter 'documents and settings' as the string to find.

You MUST find and replace every single reference to the old Documents and Settings with the new location, including Keys, Values, and Data. For Keys, right click on them to rename them. For Data and Values double-click on the Key to open the edit window. In most instances you'll be dealing with direct references, eg D:\Documents and Settings. However, you also need to change some of the references to %SYSTEMROOT%\Documents and Settings variables, to point towards them the new location, eg E:\Documents and Settings. You'll also come across a few references to \HarddiskVolumeN\ where N is a number. These are sequential numbers. In other words if Drive D: is HarddiskVolume2, then E:\ is HarddiskVolume3.

Once you have changed every reference, close Registry Editor, log out, and log in again with an administrative account. You may see a brief reference to All Users not being found. Don't worry – it will be recreated. The proof of the pudding is if you are able to delete the original Documents and Settings folder and all its subfolders. If not, try running Registry Editor again and check that you have changed all references to Documents and Settings to the new location.

Where's the boss?

I must apologise to Nicholas Jenner who could not find the Boss Key for games that I mentioned in May. Although it was present in the release candidate, it seems to have been excised from the final shipping version.

CONTACTS

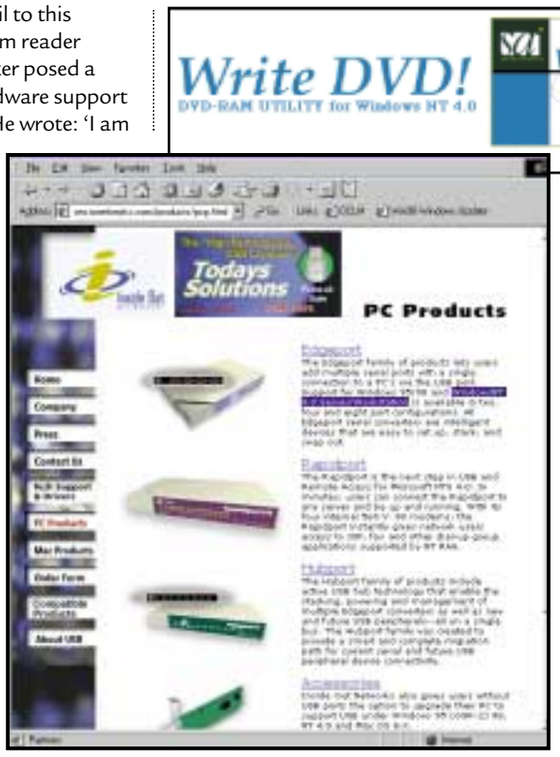
Terence Green welcomes your comments on the Windows 2000 column. Contact him via the *PCW* editorial office or email **win2000@pcw.co.uk**

Support group

Stop thinking NT is the poor brother when it comes to attaching hardware, says Roger Gann.

A recent email to this column from reader Robin Tucker posed a simple hardware support question. He wrote: 'I am running NT4 on a laptop with a DVD drive. Could you inform me of the existence (if any) of software that will enable me to use this technology under the NT4 operating system?'

This got me thinking about Windows NT4's support for hardware in general and how well it fares, bearing in mind the number of new hardware technologies that have emerged since Windows New Technology was launched. It's true, Windows NT4 has never had the kind of hardware support enjoyed by Windows 9x and has a reputation for supporting only 'bread and butter' hardware devices – to use some exotic multimedia card then, generally, you had to go downmarket and use Windows 9x.



Top : You can run a wide range of DVD drives under NT4 using Software Architect's Write DVD!
Bottom: USB drivers and adaptors are available from Inside Out Networks' Edgeport range

However, if you dig beneath the surface, you'll be surprised at just what hardware you can attach to your Windows NT4 box – the advantage enjoyed by Windows 9x isn't that significant any more. After all, many high-end notebooks have been shipping with NT pre-installed and NT4 isn't the most laptop-friendly OS on earth. So, solutions to the lack of support for things such as DVD, USB, power management, and infra-red are available.

OK, back to Robin's problem. You probably know this, but NT4 has no native support for DVD-ROM drives – you need drivers from the drive manufacturer before the drive will work. DVD-ROMs are recognised as CD-ROM drives under NT4, unless you have the correct drivers. If you have an ATAPI DVD drive which is recognised as a CD-ROM, you can download the freeware Universal Disk Format (UDF) Reader driver from Adaptec. The UDF Reader installs support for UDF 1.5, a superset of the UDF 1.2 file system, which is used to record DVD-ROMs.

UDF is a file system with support for the current generation of CDs and DVDs, such as CD-RW, DVD-ROM and DVD-Video. There are two versions of UDF. UDF 1.02 is the version used on DVD-ROM and DVD-Video discs. UDF 1.5 is a superset which adds support for CD-R and CD-RW. Adaptec's UDF Reader for Windows 95/98/NT also enables some MultiRead CD-ROM drives to read UDF-formatted CD-RW discs (such as those written with DirectCD) under NT4 SP3 or higher. Get it from www.adaptec.com/support/advisor/cdrupdates/udfreaders.html.

So far so good. Now this driver will let you recognise a DVD-ROM disc when inserted into your notebook's drive, but playing back a DVD movie is another matter entirely. If you have a desktop PC running NT, you could fit an MPEG decoder card, such as the CoolDVD from Dooin Electronics (www.dooin.co.kr/eng/product/dvdnt.htm). It supports the full DVD specification, including MPEG-1, MPEG-2, and Dolby Digital (AC-3).

If you have the Creative Labs PC DVD Encore drives, these have always supported NT4. You can download drivers for it from the Creative website – for example dvd5xreg.exe, which you can download from http://support.soundblaster.com /files/download.asp?OS=NT&prod= encore, includes drivers for NT4.

DVD-RAM support is another matter entirely. To format DVD-RAMs for an NT system, you must use third-party software, which typically doesn't ship with the drives. DVD-RAM manufacturers usually pre-format DVD-RAMs as FAT16, at the cost of restricting compatibility with other operating systems, should you want to exchange discs with other PCs. You can use Disk Administrator to format DVD-RAMs as NTFS to give you added data security.

To reformat a FAT16-formatted DVD-RAM, open Disk Administrator, which allows a signature to be written to the disc, save the configuration changes, and exit Disk Administrator. You can now format the disc by selecting the drive in My Computer and selecting NTFS as the file system in the Format dialog box. It takes less than 30 seconds to format one side of a DVD-RAM.

As far as I can tell there are only two third-party suppliers of drivers (Windows NT4 and 2000) for these vast removable media drives. The first is Software Architects (www.softarch.com/) with its WriteDVD! for Windows NT4 package. It supports all SCSI and ATAPI DVD-RAM

drives, including Hitachi, Panasonic, Toshiba, AOpen, Creative Labs and Pinnacle Micro. In the UK, its products are sold by 'Mac and More' on 01442 870 300. The second is Microstaff with its SCSIkid Wintool NT (www.microstaff.co.jp/english/wintoolnt.htm).

USB support

There's some light at the end of the USB tunnel, too. USB is another useful technology, conspicuous by its absence from NT4; but to be fair, it's only really been around since Windows 98. Microsoft has stated that 'There are no plans to provide USB support in NT4 in a future service pack.'

However, there are one or two companies that make USB adaptors and drivers for NT4. Inside Out Networks (www.ionetworks.com/) makes the Edgeport range of USB devices. Its EdgeUSB driver stack adds Microsoft-compatible USB support to Windows NT4 and NT Embedded. It emulates the Windows Driver Model (WDM), Plug and Play, and USBDI interfaces provided by Microsoft in Windows 98 and 2000. It's fully hot-swappable, Plug and Play compliant and is compatible with USB v1.1 specifications. You can use the Edgeport/4 and Hubport/7 to connect multiple high-speed serial devices to a single USB connector using NT4 Workstation. These include PDAs, modems, scanners, cameras, and any other serial-connecting peripheral that has support for NT4.

The punchline here is that, as ever, enabling the interface is only half the story – many USB devices come with software that doesn't support NT4 because it 'doesn't support' USB! So, you may have a fully functioning USB hub on your workstation, but what you can plug in to it is unnecessarily restricted.

Enhanced IDE support

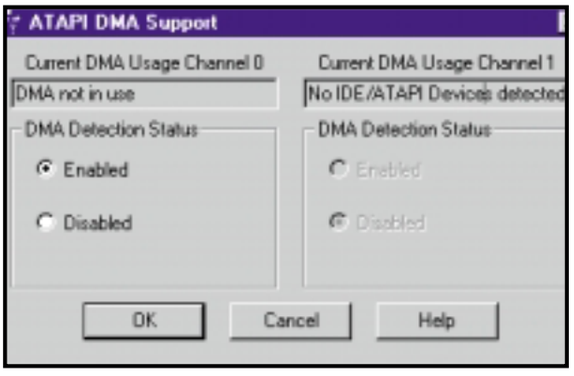
Finally, here's a free upgrade that'll definitely boost performance if your NT box has Enhanced IDE drives. When Microsoft released NT4, back in July 1996, some industry experts criticised the company for supporting only the low-end IDE Programmed I/O (PIO) modes: the default NT IDE drivers support a maximum transfer rate of Mode 2 on IDE drives, ie 8.33Mbits/sec. Bus-mastering drivers support the full range of drives including Ultra IDE Direct Memory Access (DMA) Mode 2 or 33.3Mbits/sec.

However, few users realise that Microsoft addressed this concern with Service Pack 3. On the CD-ROM version of SP3, go to the \support\utils\i386 folder to find DMACHECK.EXE. Or you can download it from the Microsoft Downloads Center at www.microsoft.com/downloads/search.asp.

You can use this utility to activate a little-known DMA bus-mastering capability that Microsoft added to the ATAPI.SYS driver in SP3. When the utility initially starts, radio buttons indicate the current settings for each channel. To change the detection status, click the preferred setting and it is saved when you exit DMACheck.

By enabling this capability, you let ATAPI invoke the higher-performance, multi-word DMA mode found in most PC chipsets (Intel's FX, HX, LX, and BX chipsets all have this capability). Service Pack 4 went one better – the ATAPI.SYS included here features native support for bus-mastering Ultra IDE drivers.

The results of using this utility are impressive: in addition to a sizeable performance boost (anything from 15 to 30 per cent), you will also see a drop in the CPU overhead needed to service disk I/O operations.



Once you've enabled the DMA mode, you can expect a serious improvement to your PC's performance

DMA bus mastering works by offloading responsibility for most disk-to-memory transfers from the CPU to the DMA controller. This transfer of power frees the main processor to concentrate on more important tasks (such as running the application with which you're interacting).

A caveat: by default, when DMA is enabled it is enabled for all devices on that IDE channel. This is the Registry entry DMACheck makes:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\atapi\Parameters\Device 0 DriverParameter "DmaDetectionLevel=0x1;".

And if you have devices connected to the secondary IDE port and you enabled DMA support for the secondary IDE port in the DMACHECK utility they will have a second entry labelled:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\ATAPI\Parameters\Device1 DriverParameter "DmaDetectionLevel=0x1;".

However, you'll experience problems if your CD-ROM is not capable of DMA transfers. To enable bus mastering for one device and disable it for the other, edit the following Registry key:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\ATAPI\Parameters\.

To turn DMA off, change the value of DriveParameter to 0x0. '0x1' is DMA on, '0x2' is DMA forced on. Don't forget to take the usual safety/backup precautions when editing the Registry – making mistakes here can seriously ruin your PC's health! I'll be returning to this subject in a forthcoming *Hands On* column, as there is a lot more meat to chew on here!

In addition to a sizeable performance boost, you'll see a drop in the CPU overhead

CONTACTS

Roger Gann welcomes your comments on the Windows NT column. Contact him via the *PCW* editorial office or email **nt@pcw.co.uk**

Permanent connections

Chris Bidmead checks out a BeOS installation and gets his ADSL connection running with Linux.

Windows users will find BeOS for Windows (beospe.exe) on the cover CD this month as well as a BeOS workshop on page 240, but Linux users needn't feel left out – there's also a Beos4Linux.

Alas, there wasn't enough time to get the Linux version on our CD, but if you have a reasonably fast Internet link Beos4Linux.tar.gz is a 40MB download from http://be.com/products/freebeos. This is a way of trying out BeOS without having to mess up your existing Linux installation. When you unpack the download, the output is just three files: a readme, a floppy disk image and a huge, 500MB-plus file that actually contains a ready-built BeOS, installed inside its own file system. Make a boot floppy from the diskette image (|dd if=floppy.img of=/dev/fd0|) and move the BeOS file system file to a directory under a root called /beos. Now just reboot on the floppy.

The result (after some easy-to-handle, BeOS-managed, manual, screen-resolution adjustments) is what you see in screenshot 1. However, after setting up the Internet connection and getting sound going (all very simple and intuitive tasks), I started to miss the power, versatility and familiarity of Unix.

BeOS lets you mount any existing Linux ext2 file systems, albeit read-only. And when I brought up the BeOS terminal window I immediately felt at home. Typing sh –version, the command line revealed that I was back in good old bash. From the terminal window I also found I could FTP and TelNet to any of the other machines on my network. So, under the bonnet, BeOS seems to be a lot like Unix.

Incidentally, you'll read on the Be website that the feature of loading BeOS from a single large file – without affecting your existing Windows or Linux installation – comes to you thanks to an innovative new technology from Be. Actually, Linux has had loop devices (files that can be mounted as complete file systems) for several years and this is the approach taken by WinLinux (www.winlinux. net) to allow Windows 9x users to try out and run Linux without risk.

BeOS Personal Edition is free and seems largely directed to persuading you to buy extra proprietary software (note the Software Valet window). But underneath it has a Unix feel, as the bash shell suggests

Continuous on

Last month I mentioned my ADSL connection installed on a Windows machine because the ISP, HomeChoice, won't support Linux machines. Ironically, HomeChoice – primarily a video-on-demand (VoD) supplier – actually runs its entire bank of video servers on Linux. The Internet service is a clever offshoot of this: the ADSL connection from HomeChoice has a total downstream bandwidth of around 2.4Mbits/sec. The video stream only uses about 2Mbits/sec of this, and the rest was originally reserved for software downloads to the set-top box (STB) and, upstream, to allow users to pause and rewind movies.

This control channel is 256Kbits/sec in both directions – overkill for what is mostly just remote control operations – so 115Kbits/sec of this is presented out of the STB as a modem-like serial Internet connection for your PC. This is slow(ish) by ADSL standards, but it is still almost twice as fast as a single ISDN channel. And the HomeChoice Internet service is cheap: £20 per month, rather than the £200 or so per month I had been paying for my single ISDN line.

I wouldn't dare mention this in the Unix column unless I'd managed to free the service from its initial shackles to Windows. It turned out to be easy, although I was distracted at first by an offer from a commercial UK router company to lend me hardware which would connect the HomeChoice Internet service straight into my local area network here. This is how I've been using my ISDN router for the past three years. One Internet connection to the router more or less automatically puts all my other machines – whatever operating system they're running – on to the Internet too.

For various reasons – some of them my own fault – the router company failed to deliver for the next three months. Eventually, I became fed up enough to start taking a look at how I might pipe the ADSL link direct to my favourite workstation. Not as good a solution as the router, but better than having to put up with a Windows-only connection.

Inspection of the Windows installation and some phone chats with HomeChoice technical staff revealed that the STB is doing more or less straight ppp-over-serial down to the PC. Excellent. So I plugged the connector into my Linux serial port, loaded the ppp.o module (which also needs the slhd.o module) and then tried to figure out what sort of handshake the pppd daemon at the other end was expecting. When I knew that, I'd know what parameters to pass to my own ppp daemon on loading, either through the command line or in the etc, ppp, options file. Bill Unruh has written an excellent primer on all this, which you can find

at (http://axion.physics.ubc.ca/ppp-linux.html).

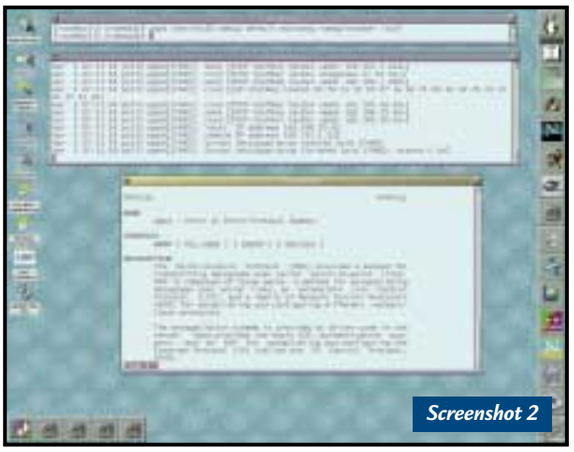
With an ordinary modem connection (and much of what follows applies to that), you might start by investigating what sort of chat handshake the other end of the serial line is expecting. The usual trick is to TelNet to the device at the far end – a standard modem will respond to ATZ with OK. But this particular device was positively Trappist in its responses. Then I realised that it doesn't need to dial, and probably doesn't need to do authentication either, as the STB already knows everything about me.

So I had three of my pppd parameters already. The comms port, the speed and the way to do authorisation: /dev/ttyS0, 115200, noauth.

However, some kind of initial chat dialogue, even senseless communication, seemed to be necessary to get anything at all moving along the line. This was the clue for my fourth parameter: local. Don't confuse this with local as in TCP/IP addressing. We haven't got TCP/IP going yet. This local just tells the ppp daemon to ignore the state of the serial control lines when establishing initial communication with the far end.

These parameters are all listed in the pppd man page – among many, many others. The huge choice was bad news, because the connection still wasn't working.

To find out more, I set up pppd to report to the syslog daemon, so I could watch its inner workings as it ran. The syslog daemon (syslogd) reads a file called /etc/syslog.conf and maintains log files according to instructions it finds there.



Run your pppd experiments under X (but as root, of course) and you can run tail -f in its own xterm, while starting and stopping pppd in another window

(All this is done as root, of course). In order to watch /var/log/ppp running live, I used the tail utility with the -f option (see screenshot 2). Tail says: 'Just show me the end of the file', and the -f option (brilliant, this...) says 'Keep showing me the new lines appended:

```
tail -f /var/log/ppp
```

as the file grows'.

I ran pppd again, adding debug as an extra parameter in order to see the whole show. Tail's view of the syslog output went something like this:

```
Apr  4 11:16:30 pc315 ↙
pppd[15468]: pppd 2.3.8 ↙
started by root, uid 0
Apr  4 11:16:30 pc315 ↙
pppd[15468]: Using ↙
interface ppp0
Apr  4 11:16:30 pc315 ↙
pppd[15468]: Connect: ppp0 ↙
<--> /dev/ttyS0
Apr  4 11:16:30 pc315 ↙
pppd[15468]: sent [LCP ↙
ConfReq id=0x1 \
<asyncmap 0x0> <magic ↙
0xd3eadd4b> <pcomp> <accomp>]
```

... and then, sadly

```
Apr  4 11:16:57 pc315 last ↙
message repeated 9 times
Apr  4 11:17:00 pc315 ↙
pppd[15468]: LCP: timeout ↙
sending Config-Requests
Apr  4 11:17:↙
00 pc315 ↙
pppd[15468]: ↙
Connection ↙
terminated.
Apr  4 11:17:↙
00 pc315 ↙
pppd[15468]: ↙
Exit.
```

I confess, I got excited when I saw Connect: ppp0 <-->/dev/ttyS0. But this isn't an end-to-end connection down the wire; it's just my pppd connecting with my com port. You can see it send out a confirmation request (ConfReq) to whatever pppd might be listening at the other end but, unfortunately, there is no answer.

The next thing I did was check in the pppd man page to see what that asynchmap and magic stuff was.

The asynchmap describes which control characters cannot be successfully received over the serial line. Pppd will ask the peer to send these characters as a two-byte escape sequence.

It seemed to me that perhaps we shouldn't burden the STB's pppd with async-map negotiations. Happily, there's a parameter default-asyncmap that tells your own pppd not to bother with them. Likewise that mention of magic. Unfortunately, nomagic, the parameter recommended to silence magic negotiations (whatever they might be) was greeted by my pppd with 'unrecognised option'.

And here's the point of open-source code. When things don't work, read the man pages. When the man pages don't work, read the code. You don't have to be a codester – I'm not. There will be comments in there, there will be at least something intelligible in the body of the code and, bottom line, there will almost certainly be an email address of the maintainer.

You may find the source code on the CDs that came with your distribution, or you can search (http://freshmeat.net) – a great repository of news about and pointers to free software. The options.c file in the ppp source-code directory suggested that nomagicnumber was the correct parameter (this was ppp version

Some kind of initial chat dialogue was necessary to get anything moving along the line

On my Mandrake Linux system I added the following lines to the end of the existing /etc/syslog.conf:

```
# Check up on ppp
local2.*        /var/log/ppp
daemon.*        /var/log/ppp
```

...and then restarted syslogd. There's usually an init script for this – on Red Hat-type systems you can do this by running:

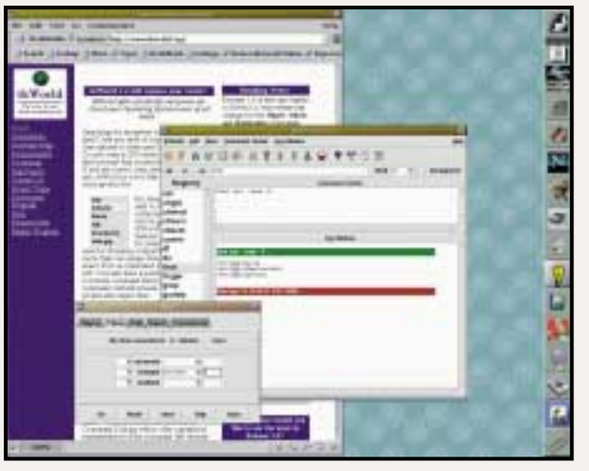
```
/etc/rc.d/init.d/syslog ↙
restart
```

(*Key: ↙ code string continues*)

Avoiding the command line with KDE's kppp

Above: If yours is a straightforward ppp connection to a dialup account, then kppp, which is part of the KDE desktop tools, can be very helpful. But bear in mind that it's just fancy upholstery, a guide for beginners in setting up the config files in /etc/ppp. If you want to understand what's really happening (hey, you're reading this column, aren't you), take a look at those config files

Below: The find command is a great way of discovering what files have been modified or created by a GUI utility such as kppp. Unix hackers will use something like find /etc -cmin -5 to show all the files under /etc that have been changed in the past five minutes. If you can't remember these command line switches for find, then you're probably a candidate for that other piece of fancy upholstery, TkWorld



2.3.8, but somebody was obviously on to this because now I'm writing this up I see that ppp 2.3.10 accepts either).

I was thrilled to discover that this worked and my /var/log/ppp started showing a response from the other end. In screenshot 2, you'll see the kind of dialogue a live connection produces. Note the way the STB hands my own pppd the IP addresses to be used at both ends of the line. The /etc/ppp/ip-up script that gets started is actually empty in this case, but it's an opportunity to run any initialisation once the TCP/IP connection is established.

One kind of initialisation you certainly need is to set up the correct routing. You want to make sure that any accesses from inside your own machine (or in my case LAN) that don't find their target locally are directed out on to the Internet. For example, my hosts file doesn't know of an address 199.183.9.107 and I need to say: 'Oh, well, in that case, default to routing out of here via the remote address my ISP has handed me.'

The code to do this might look something like this:

```
#!/bin/sh
/sbin/route route add ↙
default gw 158.152.1.222
```

But then, of course, I have the complication of having to grope through /var/log/ppp to find the remote address in order to feed it into the /etc/ppp/ppp-up script. Happily, the amazing ppp daemon (it's virtually a mini operating system in its own right) knows how to set up a default route for you – just add one more option defaultroute.

Once that was done, and I'd set up the HomeChoice nameservers in my /etc/resolv.conf file:

```
search cbidmead.home.edu
nameserver 10.3.11.1
nameserver 10.3.15.1
```

my machine finally became Internet-connected – continuously!

I find it hard to write – in any way that doesn't make me look completely smug – about the deep glow of satisfaction it gave me to have thought all this through and actually got it working. Of course, you might say, in a Redmondish sort of way, 'Hey guy, this is software in Y2K. Fill in a few dialog boxes and it should just work. You don't need to understand it. What's great about commercial software is they've done it all for you.'

First of all, let me acknowledge that indeed they (the guys who put together pppd) have practically done it all for me. But, as you'll see if you investigate the amazing bundle of source code, FAQs, readmes and what-have-yous that come with the pppd source, they have also taken the trouble to explain what they've done at whatever level I care to delve down to.

So, although I am riding on the shoulders of giants here, I get to feel more like a driver than a passenger. If this ppp link goes wrong, then I know how to fix it. And if I want to develop this ppp link into something even more wonderful, useful and interesting, the ground work I've done so far is something I can build on.

What could be more wonderful, useful and interesting? Well, how about a dedicated machine on my network which routes from my local Ethernet out through ppp to the STB and the world beyond – a homebrew version of that commercial router that failed to materialise. Yes, I've got that working, too. And next month I will tell you all about it.

CONTACTS

Chris Bidmead welcomes your comments on the Unix column. Contact him via the *PCW* editorial office or email: **unix@pcw.co.uk**

Greased chipsets

Price versus performance is the issue of the day as Gordon Laing compares chipsets and memory.

I promised you last month that I would be testing different types of memory running under a variety of chipsets. I was particularly curious to see how SDRAM performed on an ageing BX chipset compared with a new 820/840 chipset using the Memory Translator Hub (MTH).

I recently upgraded my main motherboard from an Asus P2B with a BX chipset to a Supermicro PIIIDME with an 840 chipset – both were fitted with a pair of 256MB PC100 SDRAM DIMMs. I tested them with the Wstream memory benchmark, which gives a good indication of data throughput (www.cs.virginia.edu/stream/).

Under Windows 98, I achieved around 10 per cent better performance from my SDRAM under the 840 compared to my BX. Venturing into the VNU Labs, I ran the same benchmark on a number of other systems. Superior quality SDRAM with lower latency fitted to another Supermicro PIIIDME motherboard saw an increase of around 20 per cent over my own DIMMs.

Early RDRAM tests showed that PC800 (also known as RDRAM) memory under an 820 chipset ran about 60 per cent faster than the PC100 SDRAM memory on my BX motherboard; not a bad result, but remember that RDRAM is four times the price. Most interesting of all, though, was a system with a BX chipset motherboard overclocked from 100 to 133MHz. Since it had been fitted with a CPU and decent SDRAM designed for a 133MHz FSB, the only thing that was being pushed was the actual chipset and the AGP bus, both running one-third faster than they really should.

Choose your graphics card carefully and keep the chipset cool, and you could have a winner on your hands. I measured memory throughput to be only around five per cent slower than the RDRAM on an 820, and at a fraction of the cost. Overclocking the BX to 133MHz is, of course, totally unofficial, but enthusiasts who couple it with the right components could enjoy a winning combination of price and performance!

Intel's top of the range 840 chipset, pictured here on a Supermicro PIIIDME motherboard. Note the 45 degree orientation of the chipset components to ensure track lengths are exactly correct, and MTH support for SDRAM DIMM slots on the right. Even with dual memory channels though, is the 840 the best chipset for SDRAM performance?

Dual-CPU problems

Since the Abit BP6 motherboard brought symmetric multiprocessor (SMP) awareness to the masses, it seems that everyone is talking about building dual-CPU machines. One of the most talked-about issues of recent months has been the SMP capabilities of new Intel processors, particularly the socketed FlipChip Pin Grid Array (FC-PGA) models. The big question is whether or not they will work in pairs.

Intel's official line is that the original core-stepping used on the first FC-PGA socketed Pentium IIIs was not validated for dual-processing configurations. However, Intel says that its new core-stepping is validated for dual processing, and claims that processors featuring it have been available for some months.

The old core-stepping was called cA2, and the new one is known as cB0, but how do you tell which one you have? For that answer, you'll have to do a little bit of investigative work. First, you must find out the S-Spec of your CPU. This is labelled as five alpha-numeric characters on the actual CPU itself: on Slot 1 CPUs, you'll find it written on the top of the cartridge, while on FC-PGA CPUs you'll find it written on the surface of the chip circuit board, which lies under the heat-sink. It will read something like SL49H.

Now all you have to do is go to Intel's website at http://developer.intel.com/design/PentiumIII/qit/ and click on the appropriate S-Spec to discover its finer details, including the core-stepping. You'll also find a downloadable Acrobat PDF with them all listed. For example, the FC-PGA 750MHz Pentium III is listed

Early tests showed PC800 memory under an 820 chipset ran about 60 per cent faster

as being available with S-Specs of SL3VN, SL3VC, SL3XZ and SL462, but only the last two have core-steppings of cB0, and hence validated dual-processing capabilities.

It's confusing stuff all right, and one wonders how readily a supplier will reveal the S-Spec of a CPU before you buy. The good news, however, is that by the time you read this, Intel claims all FC-PGA CPUs in the market should be using a core-stepping validated for dual processing. Finally, it's worth remembering that no Celeron CPU has ever been validated for dual processing, yet thousands of Abit BP6 owners are happily using pairs of them in such configurations. So, in theory, older cA2 core-stepped CPUs may also work in dual mode, it's just that Intel won't guarantee it.

Celeron's new coat

CPU speeds are always on the increase, but every now and then they change their outfits. Take the humble Celeron, champion of the budget over-clocker, and all-round good egg. When Intel dumped the Celeron's cartridge housing, it chose the Socket 370 Plastic Pin Grid Array (PPGA) to carry the product line forward.

With the release of the new 566 and 600MHz Celerons, Intel has switched to the FC-PGA packaging for its socketed Pentium IIIs. The good news is that these new Celerons are made using the same 0.18micron process as the Coppermine Pentium IIIs and indeed share many similarities. For the first time, these new Celerons include the PIII's Streaming SIMD Extensions, which can significantly speed up applications that support them. In fact, the only difference between 0.18micron Celerons and PIIIs are that the former only run at 66MHz externally (compared to 100 and 133MHz FSB of current PIIIs) and that the Celeron still has 128KB of Level 2 cache compared with 256KB on the PIIIs.

It's worth looking a little closer at that cache, however. In the old 0.25micron process, the data-path between CPU and Level 2 cache was 64 bits wide, whether on-die with the Celerons, or off-die with the Pentium II and early IIIs. With the 0.18micron Coppermine process, Intel increased the (now on-die) Level 2 cache data-path to a width of 256 bits. This faster 'Advanced Transfer Cache' is now a welcome feature on the new Celerons, although remember that they only have 128KB of it compared to 256KB on the PIIIs.

It's not all good news, though. Anyone fancying a quick upgrade from one Celeron to another should remember that the new Celerons running at 566MHz or above are supplied in the FC-PGA packaging. This means they're not compatible with so-called legacy motherboards fitted with PPGA S370 sockets, and that includes the Abit BP6.

Instead, you'll need a new FC-PGA-aware motherboard, or use a Slocket convertor to pop the CPU in a Slot 1 motherboard. As mentioned in the

New Year resolution

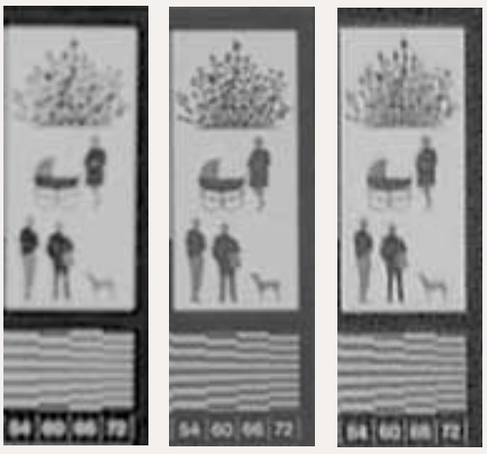
In last month's *Reviews* section we were lucky enough to get our hands on a pair of the latest and greatest, highest-resolution digital cameras yet: the Canon S20 and Fujifilm FinePix 4700. Boasting 3.3 and 4.3megapixel resolutions respectively, each claimed considerably greater imaging capabilities than existing 2.1megapixel models, but did they deliver the goods?

In terms of file sizes, they certainly did. While uncompressed 2.1megapixel images measure around 6MB, those generated from these 3.3 and 4.3megapixel cameras resulted in whopping 9MB and 12MB files respectively. However neither the S20 nor the 4700 offered uncompressed TIFF modes, instead forcing you to employ various levels of JPEG compression.

Interestingly, when set at the best quality, Canon's S20 produced typical file sizes of 2.2MB compared with images from Fujifilm's 4700 weighing in at 1.6MB. Remember that the Fujifilm started off with a bigger image than Canon did, so clearly even its best-quality compression mode is much more severe.

Comparing optical resolution tests from the S20 and 4700, it's plain to see that the Canon delivered more detail. In fact, Canon's 2.1megapixel S10 camera looks pretty close to the Fujifilm 4700. In briefings for its own 3.3megapixel S70 camera, Sony claims that the Fujifilm 4700 houses nothing more than a 2.4megapixel CCD. Fujifilm admits that this is the case, but says its new SuperCCD technology results in quality that is equivalent to a standard CCD which is 1.6 to two times higher resolution – hence it reckons a 2.4megapixel SuperCCD can be described as matching a 4.3megapixel conventional CCD.

However, the fact remains that whether through interpolation or over-compression, our optical tests revealed that the finest details were lost on the 4700, with an end result somewhere between a conventional 2.1 and 3.3megapixel camera. We look forward to testing Fujifilm's forthcoming '6.1megapixel' digital SLR, which includes an uncompressed TIFF mode and should at least show us what the SuperCCD is capable of.



A close-up of an optical test target shot by the Canon S10, Canon S20 and Fujifilm 4700 digital cameras. With resolutions of 2.1, 3.3 and 4.3megapixels respectively, we should see the level of detail increase. However, Fujifilm's higher compression, even using its best-quality mode, results in the finest details being blurred. Despite claiming 4.3megapixel resolution, our results from the 4700 lie somewhere between 2.1 and 3.3megapixels

Teaching the BP6 new tricks!

A bit's remarkable BP6 is truly the motherboard that keeps on giving. Many users, including several members of the *PCW* team, have discovered the joys that a pair of Celerons can bring, but wouldn't you know it, we always want that bit more.

When it was revealed that Intel was going to gradually replace all Slot 1, cartridge-based Pentium IIIs with a socketed solution, many Celeron owners were forgiven for thinking they may have a neat upgrade on their hands. BP6 owners got even more excited with the thought of a dual-socketed PIII system.

While the new socketed Pentium IIIs did indeed share the same physical Socket 370 interface as PPGA Celerons, Intel employed a new packaging design. Named the FlipChip Pin Grid Array, or FC-PGA for short, the actual CPU die faced upwards for direct contact with the heatsink. Sadly, Intel also changed a few of the pins around, which meant the socketed FC-PGA PIIIs were not compatible with legacy Socket 370 motherboards, including the BP6.

Over the past few months there has been great speculation as to whether someone would create a PPGA to FC-PGA adaptor, or if Abit had a dual FC-PGA project up its sleeve. Well, I'm pleased to say the answer is a big yes to both questions. As we went to press, PowerLeap was on the verge of releasing its NEO S370, a 4.4mm thick adaptor which sits in legacy PPGA sockets, yet claims to talk to FC-PGA CPUs; the additional height above the socket means you'll need a special heatsink and fan. The newly designed BP6 enthusiast's website has further information. Note that there are some issues in running certain FC-PGA CPUs in dual configurations – see main feature.

After several conversations with system integrators, we're also led to believe that Abit has created a dual FC-PGA motherboard which may use a VIA chipset with support for 133MHz SDRAM. Abit couldn't confirm or deny, but implied that such a product wasn't out of the question for PC OEMs or perhaps end users. We're hoping to see this and other innovative products are the upcoming Computex show in Taiwan.

www.bp6.com
www.powerleap.com

BP6 box (above), you could, in theory, also use the PowerLeap NEO S370 adaptor, which sits in between FC-PGA CPUs and conventional PPGA sockets, but this is as yet untested with the new Celerons. Note that Intel claims the new FC-PGA Celerons do not have dual-processing capabilities, but then again, the old Celerons were also not validated for such configurations, yet work happily in thousands of Abit BP6s around the world. The unofficial BP6 website (www.bp6.com) will no doubt have further information by the time you read this issue.

Can it go faster?

As over-clockers know, the 0.18micron process is capable of manufacturing CPUs running in excess of 1,000MHz. However, consider the clock multipliers of the new Celerons. With external front-side bus speeds of 66MHz, the 566 and 600MHz Celerons require clock multipliers of 8.5 and nine times respectively.

Celerons are a bargain – as long as your motherboard can take an FC-PGA processor

Doing the old trick of upping the FSB to 100MHz would then attempt to drive them at 850 and 900MHz respectively, which could end up being a bit too far. Some enthusiasts' websites have reported success, although we have not tried it yet. Bear in mind that newer Celerons running faster than 600MHz will have even higher clock multipliers, which pretty much rules them out for over-clocking.

So saying, at 566MHz and above, these new Celerons are still going pretty quick, and are set to go faster still. Don't feel too bad about the 66MHz FSB either. Most of the benefit of a faster FSB is in quicker memory transfers and some chipsets, such as VIA's 133A, allow the memory to be driven 33MHz higher than the CPU FSB. In fact, clock multiplier aside, the new Celerons are essentially just Pentium IIIs with half the Level 2 cache and as such, continue to represent an absolute bargain – as long as you've got a motherboard that can accept FC-PGA processors, that is.

At 566MHz and above, new Celerons are going pretty quick and are set to go faster still

CONTACTS

Gordon Laing welcomes your comments on the Hardware column. Contact him via the *PCW* editorial office or email **hardware@pcw.co.uk**

Farm hand

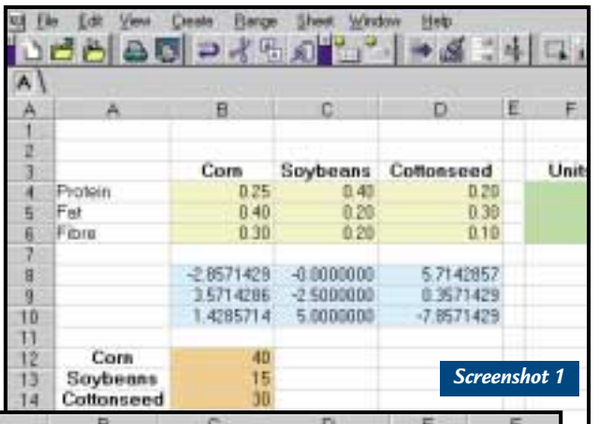
Stephen Wells helps feed the animals and solves the problem of recording pre-1900 dates.

Sean Mills, who is a farmer, has asked for help in developing a mix for animal feed. 'To take an example, suppose the feed is made up from corn, soybeans and cottonseed and I want it to contain 22 units of protein, 28 units of fat and 18 units of fibre. Using Lotus 1-2-3 97, how can I calculate the amount of each ingredient to be used?' Sean provided a table showing the average content of protein, fat and fibre in corn, soybeans and cottonseed. This can be seen in Screenshot 1 in the range A3:D6.

One quick way to calculate the correct mix is to use 1-2-3's built-in matrix macros. A matrix is simply a rectangular array of numbers related to algebraic equations. In this case, if a is the number of units of corn, b is the number of units of soybeans and c is the number of units of cottonseed, you could state the problem as: 0.25a + 0.4b + 0.2c = 22 units of protein; 0.4a + 0.2b +0.3c = 28 units of fat; and 0.3a + 0.2b + 0.1c = 18 units of fibre.

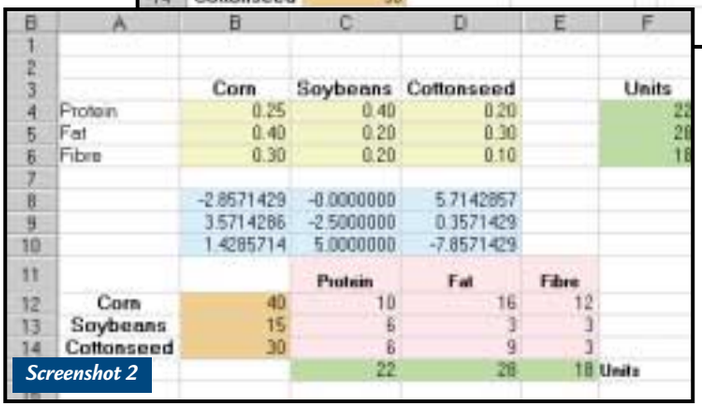
But you don't need any formulas to solve the problem. Just choose Range, Analyse, Invert Matrix. To fill in the From slot in the displayed dialog box, just highlight the range B4:D6. To fill in the To slot, click on cell B8. 1-2-3 will then create the inverted matrix shown in the range B8:D10 in the illustration. Now choose Range, Analyse, Multiply Matrix. In the new dialog box enter or highlight B8:D10 as the First Matrix; F4:F6 as the Second Matrix; and B12 as the Resulting Matrix.

In the range A12:B14, 1-2-3 gives the results. In this case, Sean would need a mix of 40 units of corn, 15 units of soybeans, and 30 units of cottonseed. If you would like to cross-check how the protein, fat and fibre content is split between the ingredients you can add a table as in the range C11:E15. Just multiply the mix results times the relevant figure in the first table. So cell C12 has +B12*B4 and C13 has +B13*C4 and so on across to cell E14 which has +B14*D6. Enter totals in row 15 and you'll see that the protein, fat and fibre results are 22, 28 and 18 respectively, as they should be (screenshot 2).



	A	B	C	D	E	F
1						
2						
3		Corn	Soybeans	Cottonseed		Units
4	Protein	0.25	0.40	0.20		
5	Fat	0.40	0.20	0.30		
6	Fibre	0.30	0.20	0.10		
7						
8		-2.8571429	-0.0000000	5.7142857		
9		3.5714286	-2.5000000	0.3571429		
10		1.4285714	5.0000000	-7.8571429		
11						
12	Corn	40				
13	Soybeans	15				
14	Cottonseed	30				

Screenshot 1



	A	B	C	D	E	F
1						
2						
3		Corn	Soybeans	Cottonseed		Units
4	Protein	0.25	0.40	0.20		22
5	Fat	0.40	0.20	0.30		28
6	Fibre	0.30	0.20	0.10		18
7						
8		-2.8571429	-0.0000000	5.7142857		
9		3.5714286	-2.5000000	0.3571429		
10		1.4285714	5.0000000	-7.8571429		
11			Protein	Fat	Fibre	
12	Corn	40	10	16	12	
13	Soybeans	15	6	3	3	
14	Cottonseed	30	6	9	3	
15			22	28	18	Units

Screenshot 2

Top: Calculating a mix for animal feed with the correct balance of protein, fat and fibre is possible using Lotus 1-2-3 97's built-in matrix macros
Bottom: As a cross-check, you could add another simple table which confirms that the mix contains the correct ratio of protein, fat and fibre

Grave problem

Rod Strong emailed to say: 'I need to record some data from a church burial register going back to 1812, but dates saved in Excel 97 are not recognised prior to 1900. I know that dates are stored as number values starting at either 1900 or 1904 but I want to use the Excel graph and data-crunching functions. I haven't found a fix (or an acknowledgement of this deficiency) on the Microsoft website. Can you help?'

Neither Excel nor Lotus 1-2-3 dates work before 1900. The best solution that I was able to offer Rod is to use Corel Quattro 8 which starts at 1 January 1600. The Corel office package is quite inexpensive. Excel and 1-2-3 are American, and apart from the Mormons, to whom genealogy is important, our cousins across the pond aren't into history much. Corel is Canadian.

By the book

Bob Monroe wrote in with a plea for help. He says: 'I can open a new Excel 97 workbook, but when I try to save it, the whole thing crashes. All I can do is open existing files and save them without a name change'.

I suggested that he delete Excel (via Control Panel and Add/Remove Programs) and then install it afresh. He wrote back to say that this worked and theorises that his problem may have stemmed from compacting his Registry with Norton Utilities. Who knows?

CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Contact him via the *PCW* editorial office or email **spreadsheets@pcw.co.uk**. Please don't send attached files until requested.

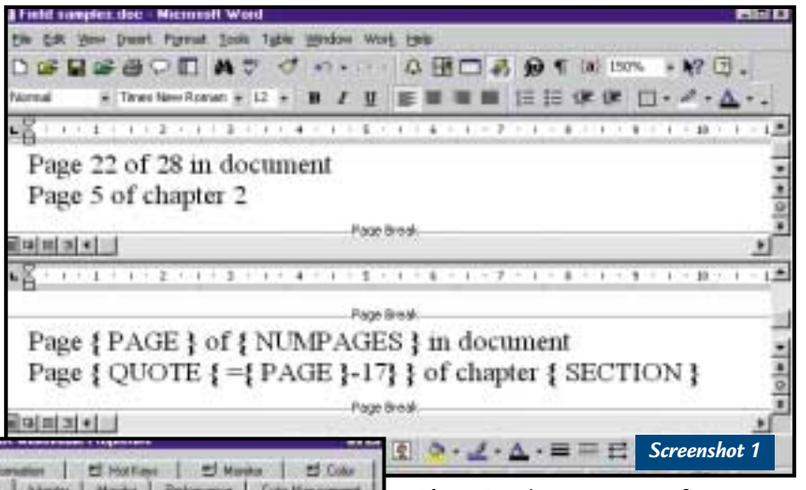
Number games

Tim Nott plays around with page numbering in Word and takes a few tips from readers.

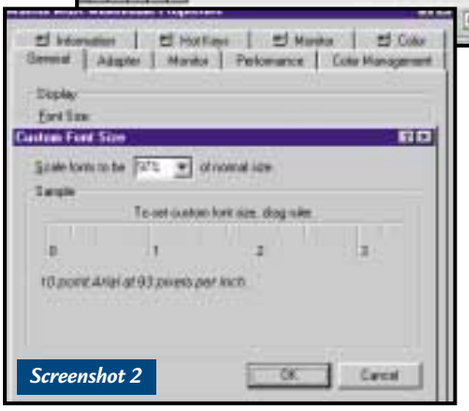
This month brought a new challenge. For reasons too boring to go into, I needed a Word document to have two systems of page numbering – one overall, and one restarting every chapter. Now, it's easy enough to switch between the two using the Format Page Number button on the header and footer toolbar. And it's possible to stick page numbers in both the header and the footer – or even more than one in each. But any attempt at changing the formatting on one, while preserving it on the other, is doomed – it's global or nothing.

However, page numbers are just fields, and readers of February's column may remember a trick used to get the name of the previous month into a field. And sure enough, the QUOTE field is again the one we want, as it enables us to display the result of calculations involving fields, operators and numbers.

So, if you QUOTE the current page number minus the number of the last page of the previous chapter, you'll get the result required. And had we but world enough and time there is probably some way of automating that further, but screenshot 1 shows the principle.



Screenshot 1



Screenshot 2

Above: Running two systems of page numbering is a simple field problem
Left: Inches rule OK for getting life-sized documents at 100 per cent zoom

Serendipity corner

In Word, what you see is – more or less – what you get. But it's the 'more or less' that can be irritating. I often find I want to see my text and images at the actual size they will print at, which doesn't seem too much to ask. However, Word's idea of 100 per cent zoom factor is a little woolly, and depending on the screen resolution it seems to vary by 25 per cent either way.

But while looking for something else, I found out how to get this exactly right. It's a Windows setting, but since most other applications seem to ignore it (with the honourable exception of Windows Paint) I make no apology for including it here. First find a plastic ruler marked in inches. Then go to Control Panel, Display; turn to the Settings tab, then click the Advanced button. In the Font Size list, choose Other, and a Custom Font Size dialog will appear, which is equipped with a ruler. Drag the latter until it matches the real thing. Press OK, and restart your PC (see screenshot 2).

There are a few provisos: you get a warning that some applications may display incorrectly (though I haven't had any problems so far). If you're viewing at 640 x 480, you don't get the Font Size option. Finally, if you change resolution, you'll have to recalibrate as the setting is global, and hence can only be accurate for one resolution at a time.

Return to RTF

My thanks to Paul Herber, among others, who pointed out that there is a flaw in the strategy of avoiding macro virus transmission by using the RTF file format for email. If you rename a .DOC as .RTF, Word will still open it without protest. In fact it will bypass the 'Confirm conversion' dialog, if you have this option enabled, unlike a real RTF file. It won't, however, get past the macro security check, so ensure you have this set to medium or high when opening DOC or RTF files of uncertain provenance.

Back at the office

Further to March's item about installation problems with Microsoft Office, Keith Grayson wrote in to say he had a problem with 'DLLs failing to register'. He cured the problem by going to Control Panel, System, Performance, File System, CD-ROM and temporarily setting the Supplemental Cache to 'Small' and the Optimise Access Pattern to 'No read-ahead'. This would seem to indicate a media manufacturing problem, as I've never had another CD-ROM require this.

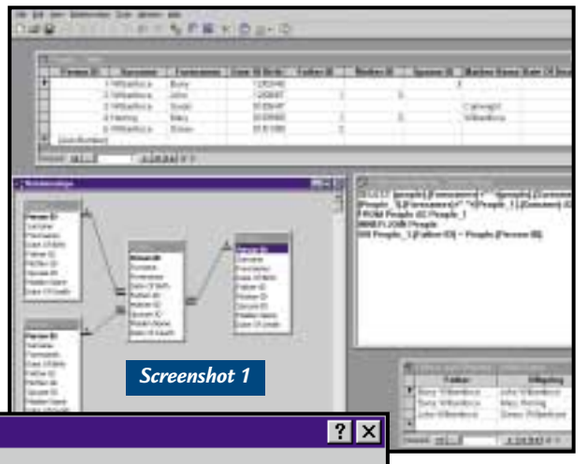
CONTACTS

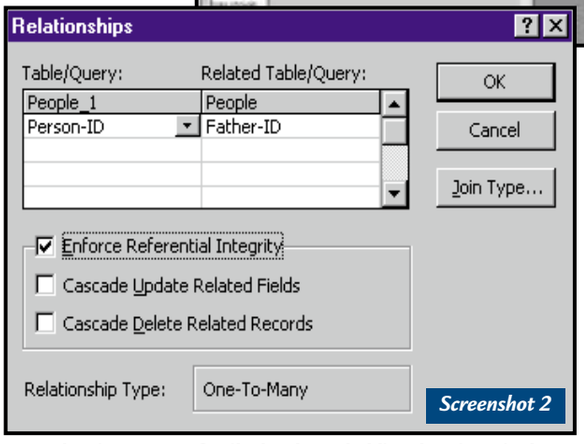
Tim Nott welcomes your comments on the Word Processing column. Contact him via the *PCW* editorial office or email **wp@pcw.co.uk**. Please don't send attached files unless requested.

Keep it in the family

Mark Whitehorn trims a few family tree problems and keeps you from becoming your own dad.

In May I asked you to vote whether you wanted more or less SQL problems/solutions. The answer was clear – all the votes cast were for more SQL, which means no-one wanted less. Well, that's comforting. I had feared I was alone, so it is good to know that there is a small band of us being cared for in the community. However, if you hate SQL and didn't bother voting, feel free to do so now. The column is always open to steerage from the readers.


Screenshot 1



Screenshot 2

Top: Showing a proto family database, holding data in a single table. I've set up relationships (small pun) between the fields (bottom left), entered some data (top left) and shown a query (top right) that extracts some data (bottom right)
Bottom: Enforcing referential integrity between a table and itself will protect against invalid figures being entered

Family tree

Tom Brown (acasia@totalise.co.uk) wants to create a database to hold a family tree. In his table, the Fields Father-ID, Mother-ID and Spouse-ID are destined to hold references to Person-IDs in the same table. As he points out, most people only have one father and one mother, but fathers and mothers can have multiple offspring, so he wants the relevant controls in place to ensure that all works properly. Tom uses Access 97, but the problem is generic, as is the solution.

In fact, the only thing that makes this problem look tricky is that we are dealing with one table, rather than multiple tables. If we held, say, all the father information in one table and all the child information in the other, then it would be simple, but also inefficient. So the trick is to store the data in one table, and simply behave as if there are multiple tables when you need them, as demonstrated below.

The trick is to store the data in one table and to behave as if there are multiple tables

Screenshot 1 shows some sample data in the table (top window in the screenshot). The database structure that Tom has already suggested ensures that the relationship between any child (in the biological sense) and its father is correct. Each record can have only one pointer to a father (the pointer will be located in the Father-ID field), because there is only space in the record for a single pointer.

This means that the database can only ever show one father for each person. So, all I had to do to indicate that Barry Wilberforce is the father of Mary Herring was to enter the value 1 into the Father-ID field of her record. However, we need to apply the normal integrity constraints on the values that are put into Father-ID. For example, we must protect against the user entering an invalid figure such as 26, because there is no person with an ID of 26.

This sounds like a case for (cue trumpet fanfare) referential integrity! And so it is, but how can it be set up within one table? In Access 97, you open the Relationship window and add the table called People to the relationship editor, not once but twice. You will find that the second time it appears it is called People_1. Now simply create a one-to-many join between People_1.Person-ID and People.Father-ID with enforced referential integrity (screenshot 2). In the example I have roughed out I have added joins for the Mother and Spouse as well. If you are using another database engine, then you can set up this referential integrity in whatever way the engine prefers.

So far, so good, but we are still able to add nonsense data – for example, I can make someone his (or indeed, her!) own dad. I know that there is a song called *I'm my own Grandpa* which claims to prove this unlikely juxtaposition, but very few people would claim to be their own father (and if there is someone out there who does make such a claim, then I really don't want to know about it).

We can control this sort of invalid input using a 'business rule', which is often enforced at the form level (screenshot 3). This simply ensures that no-one is listed as their own father, but you can make it as complex as you like, checking date of birth, etc. If you add a field called 'Sex' to the table, you can ensure that the females don't end up listed as fathers and vice versa.

To extract information about the human relationships, again you treat the one table as if it were two. You make a join between the table and itself at query time, but you refer to the table by two different names. So, for example:

```
SELECT [people].↙
 [Forenames]↙
+" "+[people].↙
 [Surname] AS ↙
Father,
[People_1].↙
[Forenames]+" ↙
"+[People_1].↙
[Surname] AS ↙
Offspring
FROM People AS ↙
People_1
INNER JOIN People
ON People_1.↙
[Father-ID] = ↙
People.[Person-↙
ID];
```

(*Key:* ↙ *code string continues*)

...pulls out all the fathers, complete with their children. And...

```
SELECT [people].[Forenames]↙
+" "+[people].[Surname] AS ↙
Father,
Count([People_1].↙
[Forenames]+" "+[People_1].↙
[Surname]) AS Offspring
FROM People AS People_1
INNER JOIN People
ON People_1.[Father-ID] = ↙
People.[Person-ID]
GROUP BY [people].↙
[Forenames]+" "+[people].↙
[Surname];
```

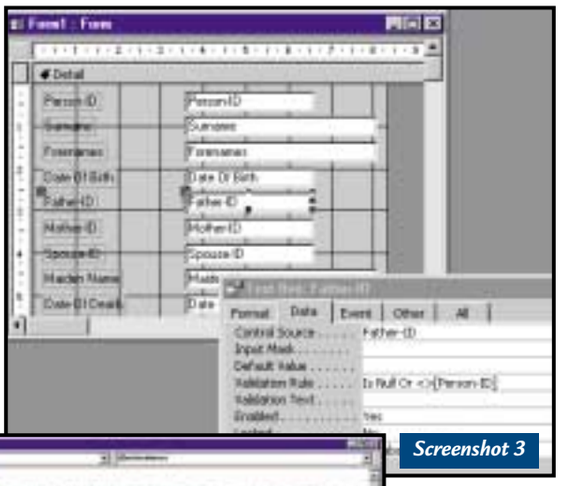
...lists the number of offspring for each father.

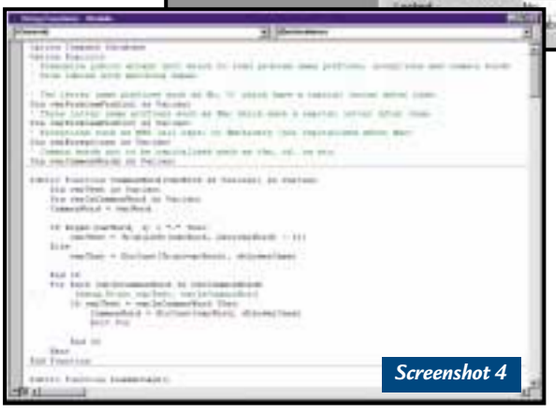
Note that this SQL happens to be using, as the name of the 'second' table, a name which I used in the relationship editor (namely People_1). However, these two names are not related. The SQL statement defines for itself which name it will use for the second instance of the table in the bit which reads:

```
FROM People AS People_4
```

It is left as an exercise for the reader (don't you love that expression!) to devise a query that will do the same for parents, not just fathers.

You'll find the sample database on the cover CD as Family.mdb.





Top: Using a business rule, we can ensure that no-one in this database is going to be their own Pa
Above: John McClenahans' code not only seems to work, it is even documented so that you can see how it works

Table teaser

Paul Edwards (pedwards@e-promotions.co.uk) wants more SQL and suggested this poser that has been bugging him for a year. He has two tables:

- tblSubject: SubjectID, SubjectName, ShowCount
- tblArticle: ArticleID, ArticleTitle, ArticleText, WhenCreated, SubjectID.

He wants a list of recent articles, but wants to see the 10 most recent articles on SQL, SubjectName = "SQL", ShowCount = 10; the five most recent on Windows NT, SubjectName = "Windows NT", ShowCount = 5 and only the two most recent on DOS, SubjectName = "DOS", ShowCount = 2.

He has tried this in SQL Server, but has been forced to use a cursor and dynamic SQL instead:

```
"UNION SELECT ↙
TOP " + ↙
@ShowCount + ↙
".......FROM ↙
tblArticle
WHERE SubjectID ↙
= " + ↙
@SubjectID
```

I haven't had a chance to play with this problem yet, but you are all welcome to give it a try and let me know how it goes.

The case of the proper name

In the May issue I offered a simple solution for capitalising proper names and touched on a more complex one which deals with names such as MacDonald.

John McClenahans (john@mcclenahans.freeserve.co.uk) sent in a very comprehensive solution that he recently developed for a name and address database (see screenshot 4).

This is provided as an Access 97 library database, ProperCaps97.mda on the cover CD. For those who haven't used a library, he has included instructions on how it can be used from your own mdb (see John.txt which you'll also find on the CD).

This particular solution is elegant because of its adaptability. He has included four tables in the database that contain four different types of exceptions to the normal capitalisation rules. The beauty of this approach is that you can edit these tables to suit the exceptions you hit, or modify his code and generate new tables for other variant types.

Access

Geoffgoddard@ouvip.com uses a routine for performing capitalisation that he found at Access Web (www.mvps.org/access) – a great source of Access stuff.

CONTACTS

Mark Whitehorn welcomes your feedback on the Databases column. Contact him via the *PCW* editorial office or email **database@pcw.co.uk**

Waste of space

Ian Waugh explains how to remove those unwanted pauses between tracks on your audio CDs.

Over the past few issues we've looked at the process of editing audio files, copying vinyl records to your hard disk and converting CDs into MP3s. Do it now before Big Brother (aka the music companies) tells us it's illegal to record your dog barking without three sets of licences, all in triplicate.

When converting LP tracks to CD or creating a 'best of' collection of your favourite audio tracks, a couple of situations can arise which are not always taken care of by the standard audio CD-writing process. These involve an unwanted pause or gap between tracks, and splitting a long recording, such as a live album, into individual tracks.

Inter-track gaps seem to cause a lot of problems. The Red Book format – which is the specification that audio CDs are based on – states that the pause time should be between two and three seconds. Other formats, such as the Yellow Book specification, upon which CD-ROMs are based, specify a two-second pause, so for compatibility reasons most audio software is happy to go with two seconds. Most software inserts this gap automatically, and what often confuses people is that even if they copy two tracks with no gap between them, when these are written to CD, the gap appears.

To get rid of the gap you must use DAO (Disc At Once) writing. As its name suggests, this involves writing the disc in one go as opposed to TAO (Track At Once), which writes a track, pauses while it does some housekeeping, writes another track and so on. It's during the housekeeping phase that the gap is inserted and with TAO there's not much you can do about it.

Top: Steinberg's WaveLab makes it easy to change the inter-track pause times and it's an absolute doddle to create several tracks from one large audio file
Middle: You can change the pause time in Adaptec's Easy CD Creator 4 Deluxe from a track's Properties dialog
Bottom: Steinberg's Clean offers easy access to the pause parameter and it can spruce up your audio recordings too

When writing audio CDs, you should always use DAO for several reasons. Apart from the fact that it gives you control over the gap, some CD players may click when playing TAO discs. If you're recording your own music and want to give the CD to a mastering house, it'll also need it in DAO format.

Do note, however, that not all CD-Rs support DAO – although the majority of modern machines do. Also note that not all software supports it but, again, most modern releases do. There must always be a gap of between two and three seconds before the first track. There's not much point in trying to change this as no-one hears it anyway.

Assuming you have the gear, all you do is select DAO writing, access the part of the program where the pauses are listed and change them. If they aren't listed, the software won't support changes, so you'll have to look for other software.

In the CD program section of Steinberg's WaveLab, for example, you can expand the individual track listing to reveal information such as the start and end times and the length of the pause. Double-click on the pause time, enter another one and Robert is your father's sister. You can increase, shorten or set the pause to zero. Other software which will also do the job includes Red Roaster from SEK'D and Sonic Foundry's CD Architect.

Okay, these are heavy pieces of gear, particularly WaveLab which weighs in at £399, but there are cheaper options. Adaptec's multi-purpose Easy CD Creator 4 Deluxe at £49 or less can do the job. After dragging the audio files into the layout area, right-click on one, select Properties and there's the pause time for you to change. Select DAO recording from the CD Creation Setup dialog box.

Steinberg's Clean at around £79 also allows you to change the pause time and it's right up there on the main page. Ahead's Nero can do it, too, and the pause is accessed from the track's Properties dialog.

If you're a bit strapped for cash, you can try CDRWin shareware (available from www.goldenhawk.com). It's fine for standard burning and although it can handle some of the more technical stuff, it's a bit of a pain to get your head around. You tend to get what you pay for, after all.

It can record in DAO mode and you can mess with the pause and other settings, but it involves manually editing the Cue Sheet which is a text file listing of the tracks and their settings. More than a touch anachronistic, I think you'll agree. If you otherwise like the program, surf to www.dcsoft.com/prod03.htm for a copy of CDRCue, which you may find eases the Cue List editing process somewhat.

Another common problem is that of dividing a continuous audio file, say from a live recording, into individual tracks. In fact, you can demonstrate your creativity by creating an album yourself consisting of one long file by cross-fading each track into each other. But, how do we tell when one tracks ends and another begins?

To do this we need to explore the murky world of sub-codes. We're going to have to get our hands a bit dirty, but the good news is there is software that lets you do what you need to do without having to look under the hood.

There are eight sub-code channels labelled P to W. Audio data is divided into frames (for the techies, a frame is 1/75th second) and the sub-code channels are small amounts of data in between these frames. The P and Q sub-codes store information such as the track start and sub-index information. There are a number of rules about setting PQ sub-codes, such as there should be silent frames before each track, sub-indexes should be early and so on. So, if you have access to the sub-codes from your CD-writing software and know the rules, all you've got to do is edit the codes.

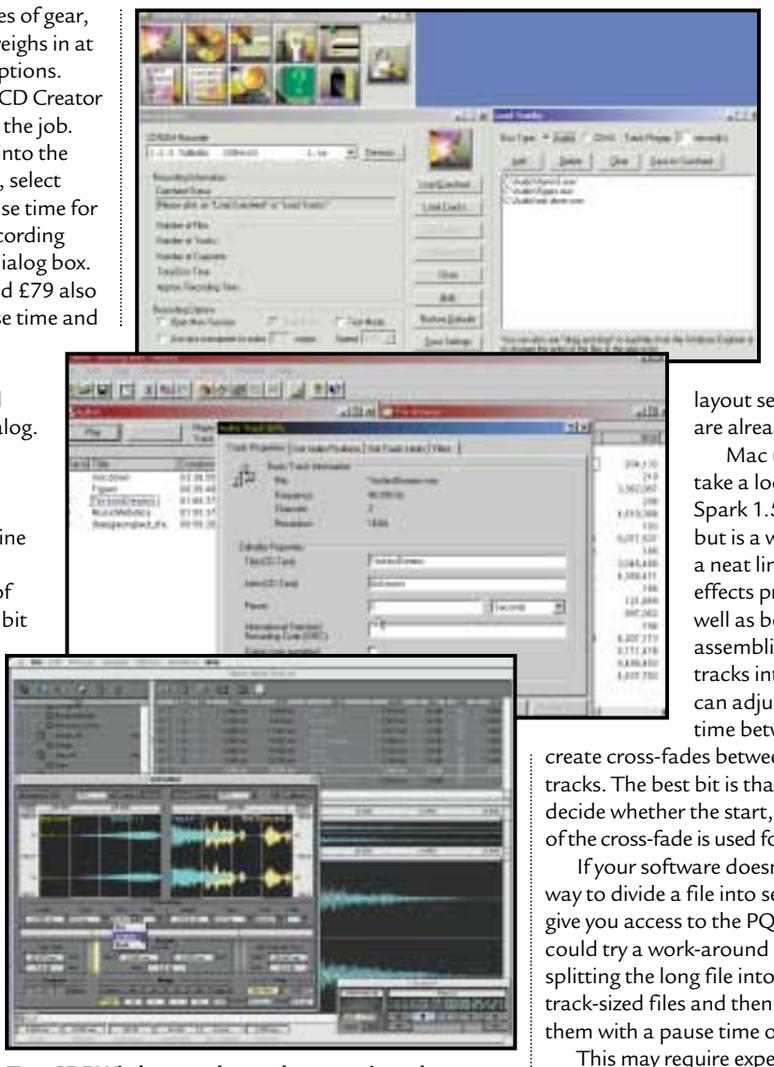
Fortunately, there is software that offers an easier solution. Sorry to hark back to WaveLab but it makes the job very easy indeed. You simply drop start and end of song markers into an audio file and save the file. When you import the file into the CD layout section, the tracks are already there.

Mac users should take a look at TC Works' Spark 1.5. It costs £299 but is a wave editor with a neat line in audio-effects processing, as well as being a whiz at assembling individual tracks into albums. You can adjust the pause time between tracks and create cross-fades between adjacent tracks. The best bit is that it even lets you decide whether the start, middle or end of the cross-fade is used for the track index.

If your software doesn't offer an easy way to divide a file into separate tracks or give you access to the PQ sub-codes, you could try a work-around by physically splitting the long file into several smaller track-sized files and then assembling them with a pause time of zero.

This may require experimentation and it may happen that some CD writers won't create a seamless join. Some CD players may not play it back seamlessly either, but that's the way it is with CD-Rs. Even though the technology has been with us for some time, all CD-R units are not the same. Even some combinations of CD-R drive and CD-R software can work better than others, although differences are generally more apparent in CD ripping than in writing.

If you're experiencing problems with your system or want to do some checks before buying a new drive, go to www.tardis.ed.ac.uk/~psyche/cdda.



Top: CDRWin lets you change the pause times, but you have to edit a Cue sheet in a text editor and it's a bit clunky Middle: The Track Properties dialog in Nero shows the pause time between tracks and can be easily altered Bottom: With Spark on the Mac you can specify whether the start, middle or end of a cross-fade will be used as the track index

CONTACTS

Ian Waugh welcomes your comments on the Sound column. Contact him via the *PCW* editorial office or email **sound@pcw.co.uk**

Hunt the picture

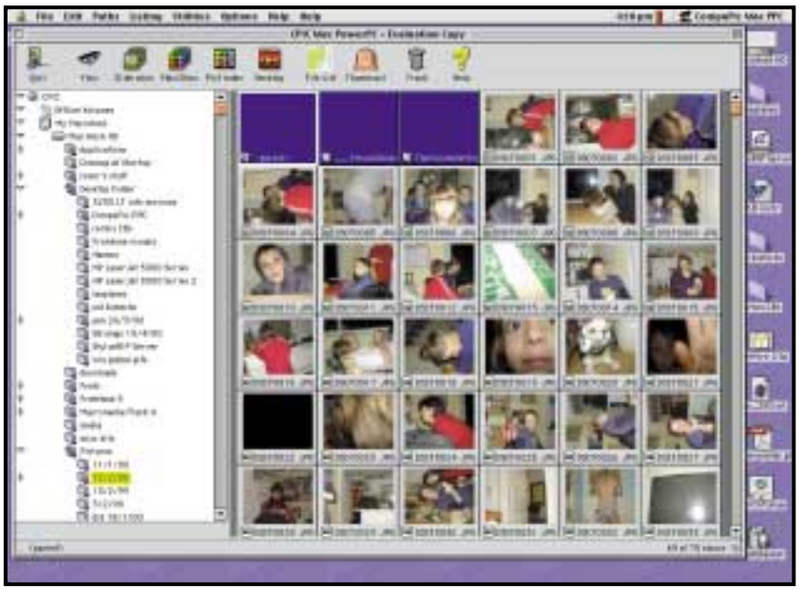
Ken McMahon looks at software that helps you keep track of your growing digital photo collection.

Keeping track of pictures has become a frustrating business for me, both at home and at work. While digital imaging – everything to do with the creation and manipulation of photographs – has come of age, keeping track of these pictures has taken a back seat.

At home, a kitchen drawer containing children's birthday cards from three years ago, bicycle parts and miscellaneous photos from the last decade of summer holidays has been replaced by a kitchen drawer containing children's birthday cards from four years ago, bicycle parts and a CD containing all the photos from last year's summer holiday.

At work I no longer have to hunt through plan chests, filing cabinets and in the gap between the light box and the answering machine for a transparency I last saw 12 months ago. Instead, I can happily spend an entire morning browsing CDs for an image I vaguely recall having skipped past while looking for something completely different.

In the professional arena, those who need to maintain large collections of pictures rely on picture database applications such as Extensis Portfolio. While they're not cheap, if your image library consists of thousands of pictures and you need to search it by keyword, this is the only sensible way to do it.



With Compupic's browser, Photoshop users can view their photos as thumbnails, making it easy to locate individual shots or perform batch conversions

I don't have thousands of images to search and my problems are more mundane. Usually I gather together pictures for a project from a number of sources – CDs and online, royalty-free collections mainly – and chuck them all in a single folder. The problem then becomes one of browsing. I need to see thumbnails of all the pics at once to decide which ones I am going to use.

Even assuming you have a viewable thumbnail, scrolling down the file list in Photoshop's Open File dialog box is a tedious process. Both Paintshop Pro and Corel Photopaint have excellent browsers. However, if you're exclusively a Photoshop user, a better alternative might be Compupic – a nifty browser application from Photodex.

Compupic displays thumbnail views of all images in a folder and also has slide show, preview and batch conversion features, as shown above.

My problem is how to organise the torrent of digital pictures from my Fujifilm MX600 Zoom

Back home, my problem is how to organise the torrent of digital pictures that flows unabated from my Fujifilm MX600 Zoom. The first thing is automatic naming. Most digital cameras number images sequentially, the MX600 format prefixes each filename with DSCF, followed by a four-digit number with leading zeros. Hence you get DSCF0001, DSCF0002, etc.

If you're going to use a database to keep track of images, it's essential that you rename them. This is vital if you have numerous directories all containing pictures with the same name, otherwise both you and your database are going to become severely confused.

I've been using PhotoSoap 2 for organising my personal photo library, because in my opinion it has got the best combination of database, viewing and editing facilities. One useful thing that Soap can do is automatically rename all your images. Once I've downloaded a card full of pics, I create a new desktop and open a folder of images onto it. Selecting Rename and entering a descriptive title will rename each pic with that title, followed by a two-digit number with a leading zero. The leading zeros are important, because without them number one would appear in the file list after 11, etc.

Another useful Soap feature is its ability to batch rotate. In any given batch of my shots at least 10 per cent are portrait and need rotating by 90 degrees. It helps if you always take your portrait shots with the camera turned in the same direction, then you don't have to do both clockwise and anti-clockwise rotations.

I used to do this with a Photoshop action, but it's much easier in Soap – you just Shift-Select all the portrait pics and select Rotate from the View menu. When you come to save the desktop, Soap tells you how many images have been rotated; you tell it to Apply and Resave into the same folder replacing the originals.

So what about searching for photos? Soap allows you to caption pictures and there's also a keyword field. But searches are limited to the currently open desktop. If you want to find all the pictures in your collection with the keywords 'needle' and 'haystack'; well, you need something more sophisticated.

Extensis Portfolio is used by photo libraries to organise and search picture archives and, though it might be considered overkill for your holiday snaps collection, provides powerful search tools to help you locate the right image.

When you import files into a Portfolio database, it automatically adds the filename and path as keywords and can thus track down images even when the originals are on unmounted volumes.

While Portfolio can't search across catalogues, you can create quite large catalogues with gallery views for parts of that collection. So you could keep adding to the catalogue for, say, an entire year and create a new gallery for each session.

Intellihance has lots of filters and effects and it's online

Portfolio doesn't have the image-editing capability of Soap. You can rotate thumbnails but not images, for example, but you can launch your image editor from Portfolio to carry out the rotation then update the catalogue. For this to work satisfactorily you must check the 'regenerate thumbnail' box, which can be found in the Rules tab of the Cataloguing Options dialog. Needless to say, this whole process is much quicker and simpler if scripted.

With PhotoSoap 2 you can batch rotate portrait shots, so your pics are the right way round

I'm torn between Soap's good looks and simplicity and Portfolio's power features. One critical factor with Soap is support, being one of the casualties of MetaCreations reinvention (see *Hands On*, *3D Graphics*, *PCW* May 2000). It needs bug fixes and improved cataloguing features to complement its excellent retouching features and superb interface, but it remains to be seen if new owners Scansoft will come up with the goods.

Enhance your image

In January last year I showed how you can quickly make big improvements in image quality using the Intellihance plug-in from Extensis. Even a moderate outing with the digital camera results in too many images to make individual tweaking an option and you can run 20 images through the enhance filter in under a minute.

You can now try Intellihance online at www.creativepro.co.uk/. Last year Extensis turned itself into a 'dot.com' company and was recently taken over by Internet printing company ImageX.com. It is now offering most of its software as online services. As well as Intellihance you can preflight, frame and add special effects to your images. Other features of the site are a file format converter, RGB to hex converter, a stock photo library search engine and directories of design studios, output bureaux and printers.

Online image processing is faster than you would expect. I managed to browse for, enhance and save back to disk a 300KB image all in less than a minute (the actual enhancing took less than 10 seconds. All the same, I wouldn't recommend it for your entire photo library. It does give you a chance to try it out though, and when cheap, high-bandwidth Internet access (ie ADSL) becomes a reality, I wouldn't mind betting this is how most, if not all, image processing will be done.

Panoramas – the last word

Yes, I know, I'm becoming obsessed with panoramic photography, but I promise that after this month I'll give it a rest. I just had to tell you about www.hotspots.hawaii.com/wrinkleintime where you can find what must surely be some of the most outstanding QTVR panoramas ever created. It's all part of something called Wrinkle 2000, a project involving 'panographers' all over the world who spun their cameras through 360 degrees on New Year's day. This has captured some stunning views (with the exception of Hastings and a particularly dull road somewhere in Argentina) from all over the globe at the dawn of the 21st century.

CONTACTS

Ken McMahon welcomes your comments on the Graphics & DTP column. Contact him via the *PCW* editorial office or email **graphics@pcw.co.uk**

Abstract constructs

Benjamin Woolley finds that building 3D images from data sets can take you out of this world.

One of the attractions of 3D is that you can use it to explore places and phenomena that would otherwise be inaccessible. This applies particularly to the realm of science.

This month I want to look at two areas where science and 3D can come together, even in the modest setting of a graphics enthusiast's PC.

The first concerns an email I received a couple of months ago from Dr Stuart Leask, a clinical lecturer in psychiatry at Nottingham University. He is investigating the relationship between parents' weight and the birth weight of their offspring, and was looking for a way of plotting the results in three dimensions to compare particular parents against national averages.

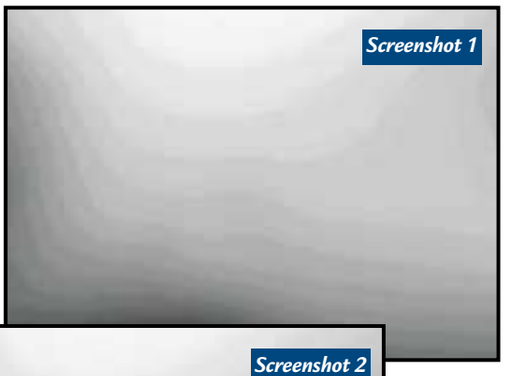
Dr Leask produced a basic chart illustrating his results generated by a statistical package called S-Plus from Mathsoft. Being a dabbler in 3D with access to a copy of Caligari's Truespace, he was interested in seeing if there was any way of converting this chart into a 3D model.

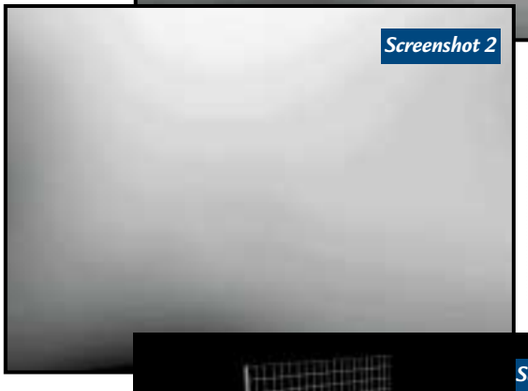
In the trade, they call this kind of application 'scientific visualization', and there are lots of very complex and expensive packages available for doing it. However, Dr Leask wanted something simpler, which relates not just to the sort of work he is doing, but to anyone who wants to turn data into 3D models. All spreadsheet and statistical packages, after all, offer a form of 3D charting. All he wanted was a way of getting it to produce a chart that could be exported to a general-purpose graphics package such as Truespace.

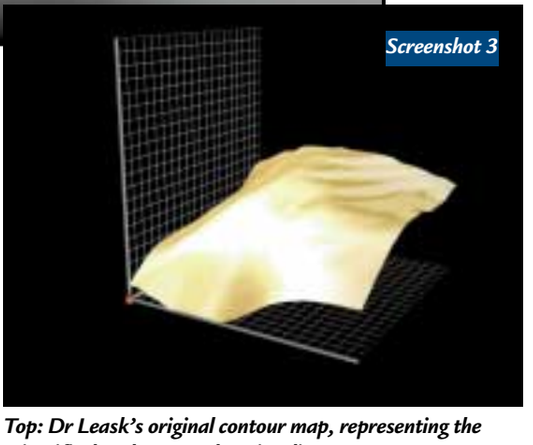
No problems, I thought. There must be an easy way, a handy utility, a simple plug-in.

A web search showed that there is plenty of visualization software around, but nearly all of it is highly specialist and aimed at running on Unix workstations. I tried the various 3D graphics sites in the hope of discovering a conversion utility, but could find nothing.

So, I wondered if there might be a homebrew solution to the problem. Various renderers (notably POVRay) use a scripting or 'scene description' language to describe the models and textures they render. The models are usually described by means of a numerical array, containing a list of co-ordinates. Such arrays look very like the sort of spreadsheet of sample data that Dr Leask had sent me, so I wondered if it would be possible to convert one into the other.







Top: Dr Leask's original contour map, representing the scientific data he wanted to visualize
Middle: A version of the contour map softened using the Gaussian blur facility in Adobe Photoshop
Bottom: The finished result. The gold lamé finish is optional

My cunning plan was to use VRML. A VRML wrl file is a text file containing a scene description. The idea was to use a 3D package to create a plane or 'quadpatch' with a vertex for each point in Dr Leask's data, export it as a wrl file, then cut and paste Dr Leask's results (appropriately scaled) into the array of coordinates in the VRML file.

Suffice to say, the result looked like something that had come out of a car crusher, and nothing like the curved surface I required. The problem was that in VRML there are two arrays describing the quadpatch, one comprising the co-ordinates that specify the position of each point in the patch, and the other the 'IndexedFaceSet', which as far as I could work out, represented the position and orientation of the faces that linked up the points of the plane.

Having failed with VRML, I had to resort to a less sophisticated, but more practical, solution. It transpired that Dr Leask's software could output the data as a 'contour map', with the distribution of values represented by different shades of grey. Unfortunately, the output image produced by his software (see screenshot 1) was not particularly promising. It not only used too few shades, creating a stepping

effect, but attempted to compensate for this by 'dithering', mixing lighter and darker shades to produce an overall effect somewhere in between.

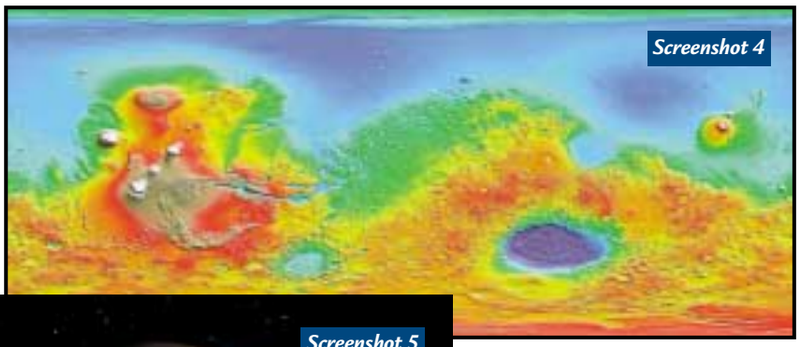
In order to produce a smoother image, I used a filter called Gaussian blur in Adobe Photoshop (screenshot 2), which overcame some of the problems, although no doubt at the expense of accuracy. Still, the result was an improvement.

The next step was to turn the greyscale contours into geometry. To do this I used 'displacement mapping', a facility offered by many 3D packages. This is similar to bump mapping. The image is applied to a surface, such as a texture, and then the luminance of each pixel is used to determine the height of the corresponding section of the surface. The big difference between displacement and bump mapping is that the former actually changes the geometry of the surface, whereas the latter only changes its appearance once it is rendered.

The surface to which I applied screenshot 2 was a simple, flat plane. However, I had to decide how many faces and vertices it should have. The more faces, the more accurately it would reflect the colour contours of the bitmap, the fewer, the better it would average out such artefacts as the greyscale banding. In the end I opted for a plane with 800 triangular faces. I then added a simple gold texture for effect, and placed copies of the original plane along the X and Y axes, which I rendered using a wireframe texture (a 3D Studio feature) to get the mesh effect. The final result can be seen in screenshot 3.

Within a few days of first experimenting with this technique, I got an email from Dr Leask informing me that a colleague had access to software that could generate a surface from the sort of data he was using – a bit of a setback after a lot of hard work. However, it turns out the software in question comes bundled with a laser scanner and costs around £5,000 on its own. My solution cost a lot less than that.

Anyway, having started down this road, I am keen to hear from any other readers in the scientific world who have tried to combine their research data with 3D, successfully or otherwise.



Top: Elevation map of the surface of Mars, generated by the MOLA instrument on the Mars Global Surveyor
Bottom: Slap Screenshot 4 as a bump map onto a simple sphere, add a star field to the background and you've got Mars

By applying the image as a bump map to a sphere, you get an accurate model of Mars

NASA

The problems faced by Dr Leask evaporated when it came to using scientific data, or at least one form of it, from another source: NASA.

NASA may have had a bit of a bumpy ride with its Mars missions recently, but at least one of its probes is performing properly: the Mars Global Surveyor (MGS). This has an instrument on board known as the Mars Orbiter Laser Altimeter or MOLA, and it is producing some quite stunning results, many of which have been reproduced in the form of JPG image files. You can get access to many of them through the MGS website at the Jet Propulsion Laboratory (mars.jpl.nasa.gov/mgs/), including the one used in screenshot 4.

Screenshot 4 is a medium-resolution version of one of the elevation maps generated by MOLA. The colours represent the altitude of surface features. So, by applying the image as a bump map to a sphere, you get an accurate model of Mars, based on data taken directly from scanning the planet's surface.

There is a series of MOLA images and data files which you can download from NASA. They are available free of charge, although NASA places conditions on their use. Also, as you would expect, it's not NASA's job to provide texture repositories for 3D enthusiasts, so you will have to do a bit of hunting around to get hold of them. If you do, it is at least theoretically possible to download incredibly detailed images, based on MOLA data, and then use them literally to explore the surface of another planet.

CONTACTS

Benjamin Woolley welcomes your comments on the 3D Graphics column. Contact him via the *PCW* editorial office or email **3d@pcw.co.uk**

A trip to the C-side

Tim Anderson explains how to create cross-platform C in Visual C++ and salivates over Kylix.

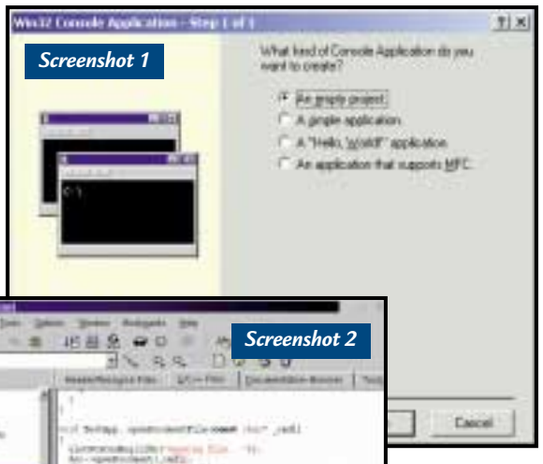
I had an interesting email recently from Alastair Grant. He wanted to produce C programs (not C++) using his copy of MS Visual C++ 6. 'I have clicked here, there and everywhere, but I still can't seem to create a bog-standard command-based interface C program,' he complained. True, Visual C++ is bewildering at first, but creating a C application is not too difficult. From the File menu, choose New, Projects, Win32 Console Application.

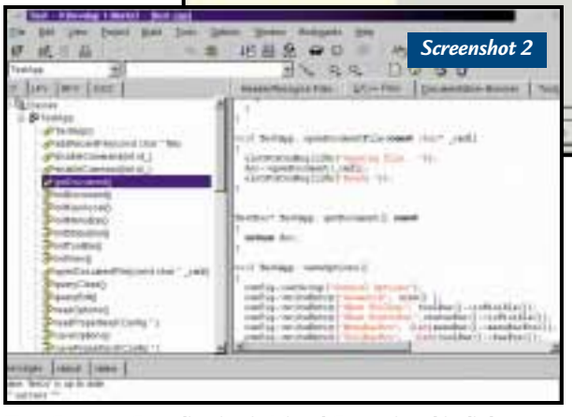
In the next dialog, choose Empty Project (screenshot 1). You will end up with exactly that. Now go to File, New, C++ Source File, but for the file name use a .c extension, for example stuff.c. Then you can get coding. The simplest C application is just a few lines:

```
#include ↙
<stdio.h>
void main()
{
printf('Refreshingly easy\n');
}
```

(*Key: ↙ code string continues*)

Now the Build menu offers to compile an .exe from your project. On my system the debug build is around 150KB, while a release build comes down to 28KB, which makes a nice change from MFC applications.





Top: Create a C application in Visual C++ using this dialog Bottom: KDevelop offers an interesting Linux development environment reminiscent of Visual C++

And in Linux...

The great thing about standard C or C++ code is that it opens the door to cross-platform usage. It's interesting to note that while Java has grabbed attention as a cross-platform solution, key cross-platform applications such as Apache, Netscape Navigator or WordPerfect are written in C++. If you have Linux installed, including Gnu C++ (which comes with every Linux distribution I know), you can easily get started. From the command prompt or a terminal window, create stuff.c using your preferred text editor – vi, pico, kedit or whatever. Then type:

```
gcc stuff.c
```

You can usually use cc instead of gcc, as this is the standard name for a C compiler. Assuming a successful compilation, this creates a file called a.out. Run it by typing:

```
./a.out
```

and you will see the output of your application.

If you want to work in C++ rather than C, simply use a .cpp extension.

Visual Linux

Whatever its advantages, compiling console applications from C code is not visual programming. Creating GUI applications on Linux is not so hard though – for example, you can use KDevelop, currently in beta but usable nevertheless (screenshot 2). It has a distinct Visual C++ look to it, although KDevelop is free software. There is a New Project wizard that creates skeleton KDE, Qt or console projects. The IDE has a split screen, with a left-hand panel offering a class view, two file views, and a documentation view that gives easy access to extensive documentation and tutorials. Qt, by the way, is a multi-platform C++ GUI toolkit that lets you build cross-platform Windows and Unix applications. If you can work with MFC and Visual C++, picking up Linux development with KDevelop should not pose a huge challenge.

Kylix is coming

A tool such as KDevelop, along with well-designed class libraries, makes it easier to do GUI development on Linux, but it is still a far cry from the drag-and-drop visual programming you get with Visual Basic, Delphi or JBuilder. The tool that is going to change all that is Kylix, the forthcoming Delphi/C++ Builder clone from Borland/Corel, availability of which is promised this year (screenshot 3, opposite). The core features of Kylix are a new native-code Linux compiler, together with a Kylix VCL (Visual Component Library) and a Delphi-like IDE (Integrated Development Environment). Both Object Pascal and C++ will be supported.

This means that Linux will have a development tool that is the equal of

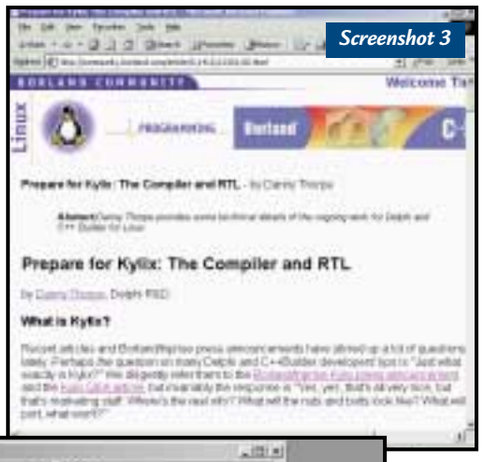
Linux will have a development tool that is the equal of Delphi, one of the best under Windows

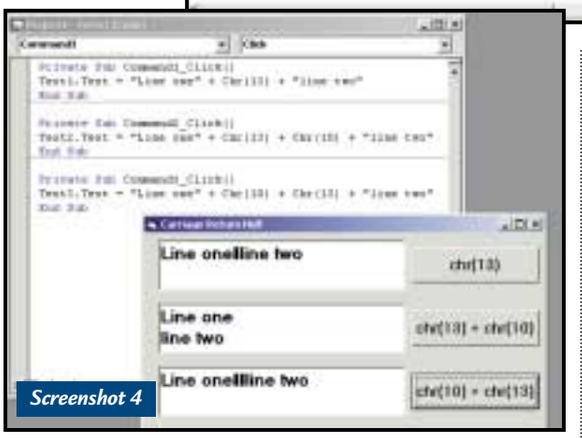
Delphi, one of the best under Windows. You will able to drag a button onto a form, double-click to open its event handler, and write code that manipulates visual objects through properties and methods.

Linux is currently a great web platform and ideal for anyone who wants a feature-rich operating system for free. However, it is still difficult to recommend it for general-purpose use. The average business user would hate to be excluded from Windows applications, while non-technical home users would be cut off from most of the software they want to use. Dual-booting and emulation works, but is no real solution for those who want an easy life. With Kylix and Linux though, developers will be able to create custom applications for Linux as easily as for Windows, and at a significant price advantage.

The question on everyone's lips, though, is to what extent existing Delphi or C++ applications will port to Kylix. While details are not yet known, the broad answer is that it depends on your coding approach. If you want to build an application that ports easily, the answer is to avoid anything Windows-specific, such as direct API calls and COM/ActiveX components. Even the BDE (Borland Database Engine) may disappear, although classes such as TDataset will not. Borland has indicated that for database work both MySQL, covered in April's *Web Development* column, and Interbase will be supported.

No real-world application is going to move seamlessly from Delphi to Kylix, and Unix is just too different. There is, however, an excellent prospect of a smooth porting process and, if it happens, it will be a first for VB and Delphi developers. The closest equivalent I can think of was VisualAge Basic for OS/2, which was a disaster.





Top: Prepare for Kylix: Linux is to get true RAD
Bottom: Carriage return hell in Visual Basic

Preparing for the new era

Last month's *Visual Programming* column looked at COM development with Delphi. The month before was about JBuilder and this month highlights Linux possibilities. The common theme here is that successful applications in the new era will make few assumptions about what client they are running on. It is not the end for Windows, far from it. Windows 2000 is an outstanding operating system, and Microsoft has some great web technology as well. However, it means the end for the assumption that everyone will be using Windows, whatever the outcome of legal challenges to Microsoft's market dominance. Change is being driven not by the law courts, but by the web, by the spread of technology towards new kinds of clients, and by the obvious attraction of open-source or low-cost software that works well.

The problem is the computer industry is inconsistent about how to end a paragraph

Carriage returns

It may seem a minor detail, but the humble carriage return is a constant irritation to developers. Reader A Davidson has written with the comment: 'The label recognises a chr(13) and puts a carriage return in – the text box, however, does not – so now I am stuck.'

Similarly, Peter Buxton asks: 'I have started to use Visual Basic 6.0 to create a Windows version of a text adventure, originally made in QBasic, but every time I use a text box for my output box the chr(13) doesn't give a carriage return, it gives a little black blob instead.'

The problem is that the computer industry is inconsistent about how to end a paragraph. Windows takes the view that a carriage return (which means 'go to the beginning of the line') is distinct from a line feed (which means 'go down a line'). In Windows, therefore, it is generally right to use the combination chr(13) + chr(10) and you should use them in that order (screenshot 4). A VB text box doesn't know what to do with a line feed followed by a carriage return, nor indeed a line feed on its own. You must also set the Multiline property to True, another trap for the unwary.

Unix takes a different view, and typically uses a single line feed character. The web has highlighted this, as many Windows users have experienced downloading something like a log file from a website, opening it in a Windows application, and getting one long line of text. A programmer's editor such as Premia's CodeWright is great for this kind of problem, as it understands Unix line endings and also has a hexadecimal view so that you can see exactly what's in the file. In this view a line feed appears as 0A and a carriage return as 0D.

The Mac, which Apple markets with the advertising slogan 'Think Different', uses the carriage return but not the line feed, giving maximum confusion potential.

MIDI development

Steve Berry wrote in to ask: 'I am new to visual programming (the last programming I did was on an Atari800XL

using Turbo Basic!), and I'm hoping to write an editor/librarian for my aging Yamaha FB01 sound module. Unfortunately, I just can't find any way to access the MIDI ports of my sound card (it's a SoundBlaster Live, but I'd like to be able to access any manufacturer's MIDI ports as I hope to make this freeware when it's finished). Most of the books I've read don't even mention MIDI.'

The sea-change in programming since 8bit Atari days is all about object orientation and the associated concepts of encapsulation and abstraction. The Windows API itself was not very object-oriented in its early days, but did use important ideas such as wrapping the details of printer drivers behind a device-independent API. As Windows and its API has evolved, it has gradually introduced greater levels of abstraction and encapsulation, making it easier to do multimedia programming, among other things.

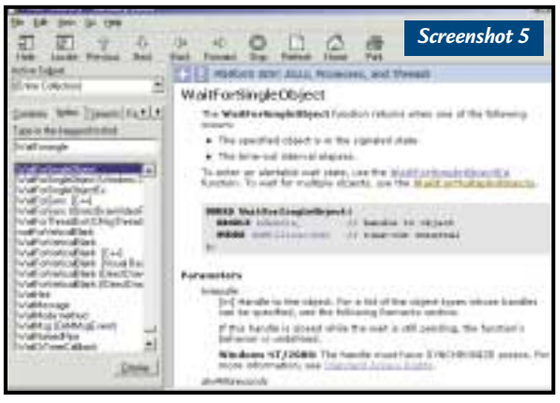
There are three different approaches you can take for MIDI. The simplest is MCI (Media Control Interface). This is a simplified multimedia API that includes some MIDI functions. The Visual Basic Multimedia Control wraps MCI, but to get deeply into MIDI, MCI is inadequate.

A separate range of MIDI API functions offers low-level control and most of these functions begin 'MIDI...', so you can easily look them up in a Windows API reference. Finally, the up-to-date approach is DirectX, a COM interface to the multimedia features of Windows, including MIDI. This is the preferred route if you can find what you need in the DirectX API.

These things are not well documented from a VB perspective because, like all advanced Windows programming topics, there is an assumption in Microsoft's documentation that you are using C++. However, that does not mean you can't use VB or Delphi, but it does mean that you are stuck with C++ documentation.

Execute and wait

David Stern writes: 'I was interested in the short section on running apps from VB in your May 2000 issue. This looks fine, but it may not be what everyone needs. For some of my work I wanted to run another application and then know when it had completed so I could pick up some results from the other app. The Shell command seems to run asynchronously and, as far as I know, cannot do this.'



Above: The Microsoft Developer Network Library is the essential reference for API functions including WaitForSingleObject

Stern goes on to give some example VBA code which he uses from Excel. The code is of particular interest because it uses Win32 synchronisation features, rather than alternative hacks such as having a Do Events loop iterate through top-level windows until the one you are interested in no longer appears.

The key to it is the WaitForSingleObject function (screenshot 5), for which the C declaration looks like this:

```
DWORD WaitForSingleObject(
  HANDLE hHandle,       // ↙
handle to object
  DWORD dwMilliseconds   // ↙
time-out interval
);
```

The time-out is self-explanatory, however, the handle is not. This can be a handle to a number of synchronisation objects, including a mutex, a process, a semaphore, a thread, or console input. In order to use this with an executable, you need a handle to a process object. This is obtained by a call to CreateProcess, another API function.

The only really tricky part to this is satisfying the demands of the 10 parameters required by CreateProcess, which handle such things as security attributes. Once this is achieved you can call WaitForSingleObject, using the handle of the process object obtained by CreateProcess, and your VB code will simply pause until the process has completed.

There are a couple of problems with code such as this. WaitForSingleObject really does pause the thread and, as VB is more or less single-threaded, that means your application stops as well. This is poor user-interface design, as users expect to be able to do things like moving windows about their desktop irrespective of how busy the application is.

In the worst case, the called process might need a response from your application before it can quit, leading to deadlock. I realise that in most cases the intention is that the user is focused on the shelled process, rather than on the calling application, but it still strikes me as poor design.

One way to get around this is to use WaitForSingleObject with a timeout of zero. If it returns WAIT_TIMEOUT, then the process is still busy, otherwise it has completed. Now, once you have got the process handle, you can call WaitForSingleObject from a timer event. In your application, you will need to do the work of disabling invalid activities until the process completes. This also makes it possible to provide a way out, such as a Cancel option, in case of problems.

Stern's code is included on this month's cover CD in the Visual Programming section.

JBuilder example

In the May 2000 issue of *PCW* there is a JBuilder example application. Unfortunately, this featured a hidden challenge in the form of a line of code that was omitted. The line you need to add is the line beginning 'DefaultListModel'. The first line is given below for context:

```
public class ↙
InterestCalcFrame extends ↙
JFrame {
  DefaultListModel ↙
ResultsListModel = new ↙
DefaultListModel();
```

CONTACTS

Tim Anderson welcomes your feedback on the Visual Programming column. Contact him via the *PCW* editorial office or email **visual@pcw.co.uk**

Better browsing

Tim Anderson takes a first glance at Navigator 6.0 and offers a complete guide to Mime.

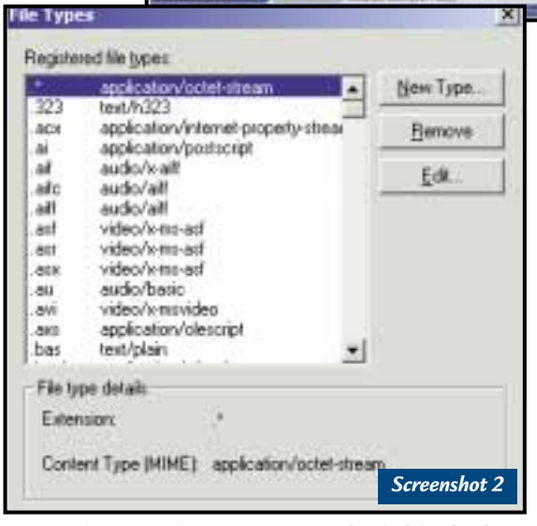
Everybody knows that Netscape Navigator used to be the most popular web browser by far. Then Microsoft competed aggressively for market share, in part by producing a superior browser, Internet Explorer 5.0. The great thing about IE, from the developer's perspective, is its rich support for a DOM (Document Object Model) and for Dynamic HTML, enabling a high degree of programmatic control over the contents of a web page.

By contrast, Netscape Navigator 4.0 is weak in its support for these same technologies. Furthermore, Navigator's <layer> tag, a key part of its DOM, appears to be a dead end. Web developers have the choice of either creating lots of conditional scripting code, supporting only Internet Explorer, or sticking to basic HTML 3.2 code that renders successfully on IE or Navigator 3.0 and higher.

The browser said to change all this is Netscape Navigator 6.0 (see screenshot 1). The alleged reason for the jump from 4.0 to 6.0 is that version 5.0 was an unreleased upgrade to the current 4.x range, while 6.0 is based on entirely new code from the open-source Mozilla browser project.

Mozilla provides 'Gecko', an embeddable cross-platform layout engine. The thinking behind Gecko is to support W3C (World Wide Web Consortium) standards for key features including HTML, XML, DOM, Cascading Style sheets and JavaScript. Another interesting feature is the OJI (Open Java Integration), which lets you easily update the JVM (Java Virtual Machine). Along with Microsoft's stated intention to support these same standards, with the contentious exception of Java, this should make life easier for web developers.

Screenshot 1



Screenshot 2

Top: Navigator 6.0 is a great prospect, but judging by the preview there is a lot still to do
Above: Configure Mime types in Internet Information Server using this dialog, found in the Internet Service Manager

The two key issues are: first, whether Microsoft will really support these standards to their fullest extent, and second, how long it will take for a usable Gecko-based browser to appear. Netscape has made a preview of Navigator 6.0 available for download and, while it is a fascinating product, it is also something of a marketing disaster, being slow, ugly and buggy. On Windows 2000 it was so bad that I resorted to using Internet Explorer 5.0 to peruse the online documentation.

The problem seems not to be Gecko, but XUL, an XML-based mark-up language for defining a user interface. This has great potential for enabling cross-platform applications, not only for browsers, but more generally as well. XUL has been developed by Netscape and is used for the GUI in Navigator 6.0. Unfortunately, it has resulted in a clunky interface, in this release at least, suggesting it may not be ready for general use.

Netscape Navigator, in both 4.x and 6.x versions, has one killer feature – cross-platform support. There is an IE for Unix, and version 5.5 has been well received on the Macintosh, but they are all different and come out at different times. By contrast, Netscape is using technologies that are cross-platform from the ground up. A cross-platform browser supporting the latest web standards is a mouth-watering prospect, but the Navigator 6.0 preview release is not a good advertisement for the project.

Mime and Freeserve's error

Mime stands for Multi-purpose Internet Mail Extension, so called because it was first used to describe email attachments. The idea is that a browser needs to know what sort of content it is receiving in order to render it properly. For example, a JPEG image is sent with a header that states 'Content-Type: image/jpeg'. The browser can then decide whether to render it, pass it to another application or plug-in, or offer to download it as a file.

For this to work, two things must be set correctly. First, the web server must be configured to send the correct header information. For IIS (Internet Information Server), this is a setting called Mime Map, found in the properties dialog for both the IIS service and individual websites, the latter taking precedence so that individual sites can have different settings

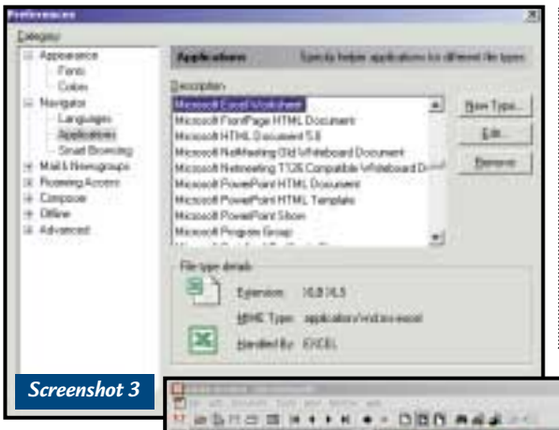
(see screenshot 2, opposite). With Apache, there is generally a configuration file called mime.types that lists the content types and associated file extensions.

Apache has a range of additional Mime options, including an AddType directive, ForceType, which automatically treats the contents of a given directory as being a certain type, and an optional extension called mod_mime_magic, which lets you check the actual contents of a file to determine its type. This is important if you have files that have the same extension but are of different types, for example, not all .doc files are Microsoft Word documents.

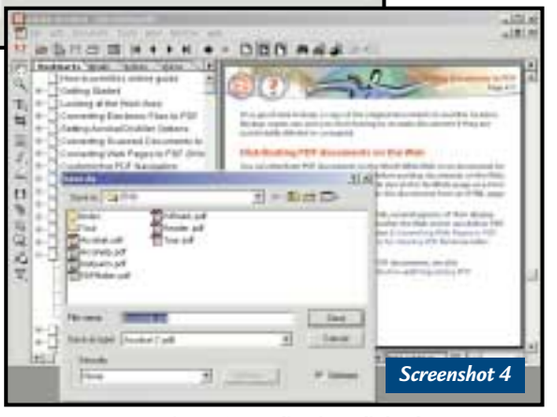
All this does no good unless the browser understands the Mime type. In Netscape Navigator you can configure this through the Edit, Preferences, Navigator, Applications dialog (screenshot 3). Internet Explorer, on the other hand, bases its decision primarily on registered file types in Windows. There is an API function called FindMimeFromData which runs though an elaborate set of rules to determine the Mime type, taking into account the data itself, the type proposed by the web server, and the information in the registry at HKEY_CLASSES_ROOT. Clearly this is also influenced by what is installed on the computer. It's no use identifying a WordPerfect document if WordPerfect is not installed.

Reader Darren Scourfield has a Mime problem. He placed some Excel files on his Freeserve site and found that, although Internet Explorer opened them correctly, in Navigator they filled the browser with rubbish. Darren contacted Freeserve and explained that while Word documents were correctly delivered at Content-Type 'application/msword', Excel spreadsheets were being sent as 'text/plain'. IE treats this as an ambiguous description and overrules it, but Navigator does not.

Freeserve told Darren: 'This must be a Netscape issue as IE works perfectly. We do not provide any support for that browser.' On the contrary, it is a web-server configuration issue that only Freeserve can resolve.



Screenshot 3



Screenshot 4

Top: Netscape Navigator's Applications dialog lets you configure the way the browser handles different Mime types Above: Don't forget to check Optimize when saving Acrobat files for smaller, faster web documents

Acrobat on the web

Alex Godden writes with a similar query about Adobe Acrobat PDF files, asking: 'How do I get these files on and access them?' PDF files should be delivered with a Mime type of 'application/PDF'. In your HTML you can either link a .pdf file directly, with an <a> hyperlink, or embed it in the page using the <object> tag in IE, or the <embed> tag in Navigator. Using <object> (but not <embed>) means you can access the .pdf from script, which enables features such as a Print button on the web page. Another tip for displaying .pdf files on web pages is to ensure that the document is optimised for the web. This is an option in Acrobat's Save As dialog (screenshot 4).

For the best results with PDF documents on the web, use the page-at-a-time feature, which displays the first pages before the whole document has downloaded. There are three requirements for this to work. First, the web server must support byte-serving, as indeed most do, or else you can use a Perl script that Adobe offers on its website.

Second, the PDF must be optimised as described above. Third, the browser must have the plug-in or ActiveX control for Acrobat installed. With the exception of the optimisation step, all this happens pretty much by default. All you need to do is to upload the .pdf files to the web server and link to them in your web pages.

The snag with all this is that PDFs viewed seamlessly in the browser are only saved as temporary files. If you later want to view the same PDF, there is no guarantee that it will still be there. In other words, you might end up downloading the same large PDF time and again, which is a waste of time. For this reason, a lot of people prefer to right-click a PDF link and choose Save As, which overrides the Mime type and downloads to disk as a file. A common question is how to enforce the Save As dialog, rather than having the PDF open in the browser. This is not particularly easy, but one possibility is to send a false content type, say 'application/octet-stream', which would normally raise a Save As dialog. This would mean either reconfiguring the server, or else sending the file from a script with full programmatic control over the header. This is arguably poor practice, and it is better simply to give clear instructions about how to right-click a link.

CONTACTS

Tim Anderson welcomes your comments on the Web Development column. Contact him via the *PCW* editorial office or email **webdev@pcw.co.uk**

Find Netscape Navigator 6.0 at www.netscape.com/browsers/6/

Find information about Gecko at www.mozilla.org

For Acrobat information see www.adobe.com.

The Internet media type registry is at ftp://ftp.iana.org/in-notes/iana/assignments/media-types/

RFC 2045-2048 and 2077 deal with Mime types www.rfc-editor.org/

Mad for the Microdrive

Mark Whitehorn confirms his love of IBM's tiny drive, and sees the miracle of folding keyboards.

My initial evaluation of IBM's Microdrive was wildly enthusiastic, but a long-term view is often useful to gauge the true value of new technology and allows the early enthusiasms to be tempered by experience.

But I still love it! The Microdrive has proved to be fun and extremely useful. The main reason for this is the ease with which it can be moved between devices. Every piece of kit I've yet slotted it into has readily recognised it as well as the file system that it uses, be that a laptop, Pocket PC, Hewlett-Packard Jornada, Canon digital camera or various Psions.

This file system is the common denominator. It enables files to be shared but doesn't, of course, mean that the files themselves can be used on the different machines. For example, JPEGs appear to be universally recognised, although exchanging documents between a Psion and a Jornada is somewhat more problematical.

You can't, of course, read Word documents on a camera, but all devices can dump their files to the Microdrive and, where appropriate, these can be read by other devices.

IBM's Microdrive can be moved between devices very easily

IBM went all-out to achieve the small size, perfecting the mechanics of the tiny head...

When it launched the Microdrive, IBM went all-out to achieve the small size and concentrated on perfecting the mechanics of the tiny head, motor and platter. The data density on the platter was very conservative. Last November, one of the designers told me that a Microdrive with a storage capacity of 1GB could be developed without any trouble, but IBM later pulled back from this stance, apparently on marketing grounds. This decision has been overturned recently and the latest story is that a 1GB Microdrive should be ready in the summer, not too long after you read this article. It seemed to me a crazy notion to suppress a larger-capacity drive and I'm really delighted to hear of this change of heart.

IBM also recently announced technological advances that make it possible to increase current data density by about 100-fold. If you're interested in a really techy explanation, look at www.sciencemag.org where, for a small fee, you can download a detailed scientific paper from Volume 287 dated 17 March 2000, page 1,989. In a nutshell, it's a new technique for laying down a regular grid of very small magnetisable particles. That should eventually give us 100GB of storage in a PDA.

Palmtop GPS

I know this isn't the first time I've waxed lyrical on the heavenly union between Global Positioning System (GPS) units and Psions, but the two go together so well that they form one of my favourite play things. Whenever I've mentioned the subject, a flurry of email arrives, due to the problems associated with first connecting and then persuading various combinations of kit to work together.

Up until now it has been the preserve of the confirmed gadget-head and tweaker because it often involves getting out the soldering iron to make up a cable.

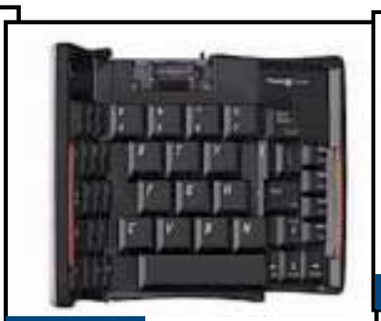
Happily, Palmtop Software has produced a GPS unit that comes with everything you need to get up and running, so you don't need to reach for the soldering iron. The device works with the Psion 5, 5mx, 7 and netBook, as well as the Ericsson MC218. Palmtop's Route Planner Millennium (Europe) software is also included.

The GPS unit itself is a small, sleek, not-quite-square black box, about the size of a tape measure, with a connector that plugs into your car's lighter socket and another that plugs into the PDA. The unit has a magnetic pad so you can sit it on the roof of the car.

The major plus point of the Palmtop GPS is the ease with which it all works: you simply plug it in and away you go. It does have a few limitations, the first being that it won't work outside the car so you can't take it walking.

The anorak side of me wants to say that, given a 12v gel battery and a cigar lighter-type connector, you could wire it up so that it did work elsewhere. And then, of course, you could fit a resistor to drop the voltage down so that a separate feed could be used to

Screenshot 1



Screenshot 2

Screenshot 3

Screenshot 4

Screenshots 1-4: A folding keyboard for the Palm caught in the act of unfolding

run the PDA, but that's getting back into the realms of amateur electronics, so I won't bother.

The satellite signal is still wobbled by the US Government and the effect of this, coupled with the vector graphics used in the mapping software, means that you can be driving along apparently several fields away from the road. But this problem isn't limited to the palmtop GPS. Off-roading of this sort doesn't bother me a jot – moving maps are simply great fun.

The current price is a steal at £169.99. For more details, check out the company's website at www.palmtopsoftware.com.

On the GPS theme, I heard from Dave Bagshaw (davidbagshaw@vodafone.net) regarding GPS equipment for yachts. He says that 'the GPS system had its own rollover date in August 1999, when the almanac week was set back to one from 1,023, I think. This has caused problems with older kit in the yacht-grade equipment.' Let's hope that all this resetting of almanacs is finished for a while.

Add on, plug in, roll up

I've been carping on recently about power supplies and this has led me to an interest in the selection of hardware gizmos that people also carry around. At a presentation given recently by Microsoft in Seattle, I sat next to an American journalist who had the new Palm 7 plugged into a foldable keyboard. Sitting there, in the presentation, he could take notes and, using the wireless capabilities of the device, file his story via email. I'm still working out whether it all looked cool or nerdy, but for those Palm users in the UK who fancy a foldable keyboard, check out www.thinkoutside.com or www.palm.com as Palm is now also selling the keyboard under its own brand name. (see screenshots 1-4)

I have also just started seeing adverts for roll-up keyboards, but I presume these don't plug into PDAs – not yet anyway. I'll do some investigation and let you know – or if you already know, please drop me a line. The roll-your-own keyboard can be found for £50 at The Gadget Shop (01482 626 400).

Speed tests

I received an email from Brunel Merleau-Ponty (ponty@phullphatt.i12.com), who has been performing further research into Psion speed benchmarking, a hare which I started last December with the following results:

His old Organiser II XP, which is an earlier variant of the LZ, with only a 2 x 16cm display, a slower processor and a different display chip, crawled in with a despicable 978 seconds for the screen test, and 611 for the processor.

He also pointed out that the test used floating-point variables, which really only test the quality of the floating-point unit (FPU) emulation rather than the CPU, as none of the Psions have dedicated FPUs. He ran the same tests with long integer variables. The screen write tests were much the same (just a couple of seconds faster), but the Series 5 blazed in with seven seconds and the Organiser II with 100 seconds on the processor test!

To save you looking up the original data it is shown in figure 1 below.

Playtime

Last month I raved about Shadowgate, a successful port of an old DOS game to the Pocket PC platform. Pocket PC is being touted as the Palm killer because of its graphics (ie games) and sound capabilities, but there are some satisfying

FIG 1

Machine	Write 1,000 statements	Perform 100,000 increments	Processor
3	149	231	3.84MHz, 16bit
3a and 3c*	150	139	7.68MHz, 16bit
5	50	51	18.432MHz, 32bit
3mx	44	42	28MHz, 16bit
5mx	27	13	36MHz, 32bit

* The 3a and 3c performed identically. Since the screen and processor specs are identical for these two, this seems perfectly reasonable.

Of chemistry, five fingers and Osaris

Periodic Table

One of the great joys of writing this column is the way in which the email I receive about it enriches my own life. For example, given a normal existence, I would never have received an email from a Mr Toast regarding the Periodic Table of Elements. You know, the big chart that hangs on the wall of every chemistry lab in every school in the land.

Mr Toast has computerised the Periodic Table and put it on to a Psion 5. The download (from http://mrtoast.home-page.com) is only 13K and the table works fine. It's even interactive; you can highlight an element and put up extra information about it. I thoroughly recommend it, so much so that it is on this month's CD-ROM to save you the download time.

But you don't care about that, do you? Just like me, you are more interested in knowing why the author uses the name Mr Toast. I didn't ask him, but I suspect the answer lies somewhere in his real name, Crispin Semmens.

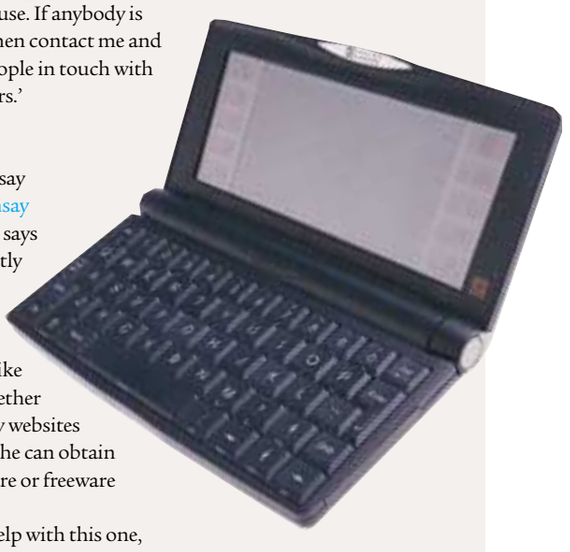
Five-finger exercise

Ian Baker (macsales@imagian.demon.co.uk) wrote in on the topic of the Microwriter. He said: 'For those who liked the five-fingered keyboard, there is one available to connect to Macs and PCs. The Infogrip BAT uses different chords to the Agenda, but it is still a joy to use. If anybody is interested then contact me and I will put people in touch with the importers.'

Osaris

Simon Ramsay (simon_ramsay@mail.com) says he has recently bought an Osaris palmtop and would like to know whether there are any websites from which he can obtain any shareware or freeware for it.

I can't help with this one, but does anyone else out there think they can do better?



games available for existing PDAs.

One that appeals to me is a game I first mentioned in the November issue, No Man's Land for the Psion. It's a battle strategy game, but your first task is to sink oil wells to generate the revenue that you will spend on your army.

The ensuing conflict is controlled entirely from an overview of the battlefield, but that overview is unusual because what you see is what you get. In other words, what you see of the enemies' activities is determined by the landscape and by the intelligence you've gathered. Tanks can be sent in for reconnaissance, but when your troops move in the buildings may still be there but the enemy force may have decamped.

The game reminds me of my misspent youth, playing a board game called Tanks, which was designed by Lieutenant-General Sir Brian Horrocks. I wonder what his email handle would have been.

Top: The armchair warrior strikes again in No Man's Land
Above: Great Ape, where the games hide

The game is driven entirely with the pointer and I found it challenging, especially once past the first few levels. Visit www.greatape.com for details.

If you're the type who prefers a parlour game, there's an excellent five-pack available from Purple Software, containing Checkers (Draughts), Enigma (which is modelled on the Mastermind board game), HomeRun (a form of Patience), Theole (aka Reversi) and Yacht (aka Yahtzee). The latter is a game that should appeal to anyone interested in probabilities: five dice are rolled three times and you can choose not to re-roll any that have fallen to your liking.

This is where probabilities first come into play. Your aim is to get the highest possible score in 13 hands, but your scores must fit into pre-defined slots – and scoring your hands is the second manifestation of probabilities. Head over to www.purplesoft.com if we've whetted your appetite.

CONTACTS

Mark Whitehorn welcomes your comments on the PDA column. Contact him via the *PCW* editorial office or email **pda@pcw.co.uk**

Safety first

Roger Gann has a round up of the defences you could and should employ to protect your network.

Over the past few columns I've looked at the threat posed to individual PCs connected to the Internet and the steps that can be taken to minimise the exposure to risks. This month I'm going to wind up my foray into security by looking at network security in general.

Risk is increasing all the time and companies now have less and less control over their networks, thanks to factors such as outsourcing and third-party service providers. But despite this, while the headlines might lead you to believe that assaults on your network originate from socially dysfunctional teenagers with too much spare time, the most recent computer crime statistics indicate that the majority of computer attacks are carried out by insiders – employees and associates of an organisation.

Back in the mainframe days, network security was simple – it meant locking the room the computer was in and only allowing authorised individuals in. The perimeter was easily drawn: it was the room enclosing the central computer.

Today, with networked PCs, the perimeter is less well defined. Connecting an enterprise network to the Internet made the perimeter even fuzzier. With the potential for modems on every desktop, the network-security perimeter becomes even harder to discern. 'A crunchy shell around a soft, chewy centre' is a good analogy, but sadly, few enterprises today actually have a provably crunchy shell.

If it's constant updates on security alerts you're after, mosey over to www.bugnet.com

Many believe the proliferation of the Internet has spawned the current rash of attacks. Not so – some 74 per cent of these security breaches come from the inside, usually perpetrated by employees and competitors, according to the American Society for Information Security. Nearly two-thirds of security breaches are accidents and not malicious.

The corporate network remains an easy target for the simple reason that so few have any sort of formal security policy: a recent Forrester Research report slammed extranet security, saying that 'firewalls are crude; passwords are a hack; DMZs (demilitarised zones) are a bear; and point products are a stop-gap'.

Given the business-critical nature of corporate information and the cost of security breaches, it's surprising that so many organisations, particularly small to medium-sized companies, have such poor network security. The lack of complete, multi-platform solutions capable of handling every variable on any given network is one factor, cost is another: spending on security is a cost centre, not a profit centre – after all, the best that can happen after you invest in expensive security is nothing.

However, few realise that reactive (rather than proactive) spending on security invariably works out more

Firewalls and the enterprise

As a breed, firewalls are being downsized and becoming more affordable to small to medium-sized networks. However, setting up a firewall still requires a strong technical understanding of the principles of TCP/IP and other networking protocols and technologies. Despite their initial complexity, most of the simpler firewall packages have preset security policies, but let you develop your own network security policies, as you grow more familiar with them.

The firewall market leader and collector of the most 'Best Buy' accolades is undoubtedly Check Point Software Technology's FireWall-1. This product originally employed 'stateful packet inspection' techniques, but its architecture has begun to incorporate aspects of proxy-based products. In cases where scanning a packet's data field is necessary, FireWall-1 passes the packets to a Content Security Server, which basically acts as a proxy. By using stateful inspection and proxies in concert, FireWall-1 can take advantage of the former's speed and the latter's security. The software provides the best security and most flexible administration and monitoring in its class. Its event-logging capabilities are also first-class and no other firewall offers a true single point of management for multiple firewalls.
www.checkpoint.com/products/firewall-1/

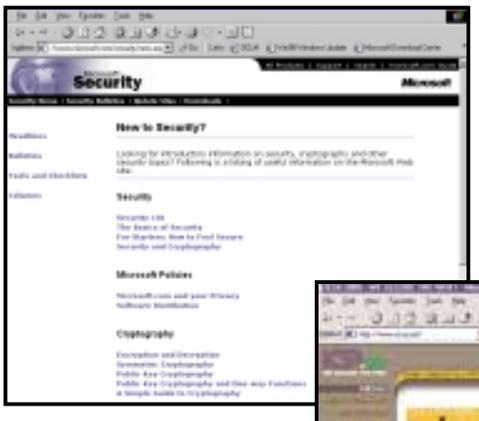
But the market is awash with good alternative firewall solutions, including:
Cisco Secure PIX Firewall
www.cisco.com/warp/public/cc/cisco/mkt/security/pix/
SAFEsuite from Internet Security Systems
www.iss.net
Gauntlet Firewall
www.nai.com
Sidewinder Security Server
www.securecomputing.com/index.cfm?skey=232
Raptor for Windows NT4
www.axent.com/AXENT/Products/RaptorFirewall

expensive, even allowing for the cost of the clean-up operation after the damage: it seems that companies have to suffer a significant breach of security before they take the issue seriously.

Effective network security is not a technology issue; it's a management one. Companies that consider information as an asset and not just a stock item in a data warehouse have a positive approach towards security. Good practice starts with companies identifying their security needs and establishing a formal security policy. Such a policy can't exist in a vacuum; it has to be all embracing, including things such as sexual harassment or protection of intellectual property.

Top 10 security threats

- Casual mistakes
- False sense of security
- Disgruntled employees
- Viruses
- Email
- Hackers
- Unauthorised modems
- Third party connections
- Portable PCs, which expose data in a public environment
- Dial-up connections



Left: Another must-visit website is Microsoft's, at www.microsoft. com/security Below: www.icsa.net is a top online security resource, covering the whole spectrum of security issues

Once a security policy has been determined, it's important to make sure it's effective. Every organisation should also set up their own computer emergency response capability; create roles and responsibilities, points of contact and procedures to follow when a security incident occurs. HR has a role to play in security, too: experts say most security breaches can be avoided through training, by fostering a security-conscious culture within a company.

A complete enterprise-security solution must provide the ability to:

- Grant selective network access to authorised remote and corporate users
- Authenticate network users with strong authentication techniques before granting access to sensitive corporate data
- Ensure the privacy and integrity of communications over untrusted, public networks such as the Internet
- Provide content security at the gateway to screen malicious content, such as viruses and malevolent Java/ActiveX applets
- Detect network attacks and misuse in real time and respond automatically to defeat an attack
- Protect internal network addressing schemes and conserve IP addresses
- Ensure high availability to network resources and applications
- Deliver detailed logging and accounting information on all communication attempts

Security components

No single network product offers a complete security solution – this typically derives from a combination of products. A firewall is often the first mechanism deployed (see previous columns). Mainly used to insulate networks from the outside world, some companies are now deploying firewalls at internal perimeters as well, to compartmentalise networks; after all, why should the HR and Finance departments be accessible to say Sales?

Content screening, courtesy of products such as MIMEsweeper, is becoming a popular feature in Internet firewalls. The traffic logs they generate can make for interesting reading – a multinational customer of Content Technology recently monitored its email traffic over an eight-month period and typically found 600,000 emails per month contained some 'profanity' while a further 200,000 had binary attachments.

At the other end of the spectrum is anti-virus software, which is primarily a detection-and-response mechanism. This desktop software, even with less than complete coverage in an organisation, is extremely useful and effective in stopping the spread of computer viruses throughout an enterprise.

Another family of prevention-and-response systems is the class of products called intrusion-detection systems (IDSs). There are two types of IDSs: monitors and scanners. Monitors, or vulnerability checkers, are static analysis tools. They look for known problems such as bad passwords or missing security patches. They also can check for changes to important system or data files.

Scanners are dynamic analysis systems that look at events as they happen, and there are two types. Anomaly detectors detect the abnormal and misuse detectors detect 'bad' events.

Another security technology is application-level encryption. With this kind of encryption, users can lock documents stored on a computer disk or messages sent via email. Easily integrated into software, and assigned for use to individuals, encryption software provides individual accountability, enterprise-wide authority, and confidentiality.

Finally, don't forget, the most elementary security needn't cost money. Ensuring that users employ non-obvious and frequently changed passwords costs nothing and will deter most hackers. All network operating systems allow you to set access levels for users – so make sure access control is properly implemented.

CONTACTS

Roger Gann welcomes your comments on the Networks column. Contact him via the *PCW* editorial office or email **networks@pcw.co.uk**