hands on

contents

Plug-ins are the order of the day in November's *Hands On*, used both for stunning **3D graphics** from Benjamin Woolley [p264] and **sounds** from Steve Helstrip [p260].

And lest you should think that the contributors to Hands On are blessed with **perfectly functioning** computers, both Chris Bidmead [p245] and Mark Whitehorn [p242] are on hand this month to reassure you that sometimes even the experts have problems with their systems.

You'll also find information on how the **Millennium Bug** is likely to affect an aspect of computing you may not have considered [p222], as well as tips on **managing databases** [p254] and dealing with foreign characters in your **word processing** [p250], plus in-depth advice for web developers and programmers [p234].

Whether you want tips to improve your productivity, solutions to tricky problems, or just advice and inspiration, *Hands On* is the place to find it. And, as ever, questions and suggestions are welcomed by all the contributors and by myself.

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Getting personal

MONTHS TO GO!

Mark Whitehorn on how the Millennium Bug will affect hand-held machines.

It would be an impossible task to cover the year 2000 compliance of every PDA in detail, so we'll stick to the big three – Psion, WinCE and Palm – and SMS messaging. Each of the companies connected with PDAs has released details of their Y2K compliance. However, this is a complex issue and, inevitably, the statements that companies release are long and detailed. You should, therefore, visit the relevant websites and read all the available information if you are concerned about your PDA.

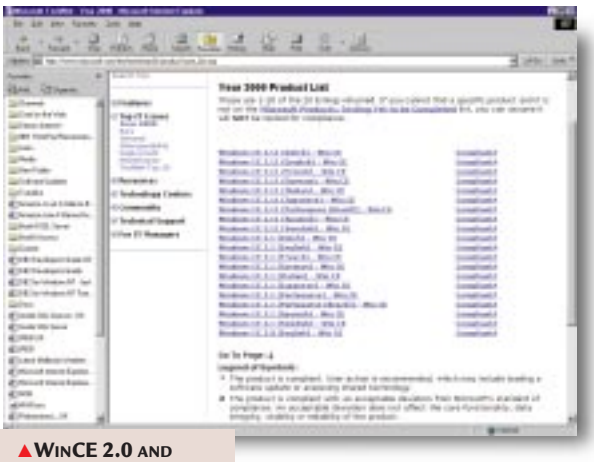
Palm

Palm has stated that on and after 1 January 2000, the Pilot 1000, Pilot 5000, PalmPilot Personal Edition, PalmPilot Professional Edition, Palm III, Palm IIIx, Palm V, and Palm VII devices will continue performing properly with regard to the date change. This applies to both the hardware and the companion desktop software for the PC and Macintosh.

However, there is a proviso that all other products used in connection with the Palm Computing products – including hardware, software and firmware – must accurately exchange date data with them. This is a fair statement to make, since Palm can't reasonably be responsible if you move dates to another platform that fails to handle them properly. See www.palm.com/custsupp/helpnotes/palmapps/year2000.html for more details.

Psion

All Psion palmtops are Y2K-compliant. There are, however, compliance problems in earlier versions of the software that links them to desktops. For example, PsiWin 2.0/2.01's non-compliance extends only to the synchronisation and back-up functions. All other general connections and operational aspects of the hand-held are unaffected. These versions of PsiWin shipped with the first Series 5 machines, commencing in June 1997. They were superseded by PsiWin 2.1, which is freely available from Psion.com. Visit www.psion.com/year2000 for the company's Y2K readiness disclosure.



▲ WinCE 2.0 and above is essentially compliant, but you'll need to check your hardware

PsiMac and MacConnect

Non-compliance of this software affects the Back-up/Restore function, which produces an error message. However, general connections and use of the computer are unaffected. The upgrade consists of a floppy disk, a conformance statement and a new barcode label that includes the version number.

The bad news is that some software on your PDA may not be Y2K-compliant

SMS products and Psion

For the three SMS products below, no operational aspects of the phone or the Series 3 are affected. Much of this software has now been replaced, either by upgrades or by different products, so the average user is unlikely to have any problems.

Orange Messaging Link (SMS)

The date stamping of messages is non-compliant.

Vodafone TeleNote Link (SMS)

Non-compliance causes the loss of messages.

Message Express (SMS)

Non-compliance extends to the date stamping and loss of messages.

WinCE

Windows CE 2.0 and above is essentially Y2K-compliant (*see above*) and the same applies to Windows CE services. Unlike Palm and Psion, Microsoft doesn't produce hardware for its OS, so you will also need to check that the particular WinCE device you have bought is itself compliant. However, since WinCE machines were developed after the Y2K problem came to light, your PDA is likely to be compliant. See www.microsoft.com/technet/year2k/product/product.asp for more information.

Summary

Essentially, there is both good and bad news. The good news is that your PDA itself is likely to survive the Y2K traumas. The software that you use to exchange data with your PC or Mac is likely to be fine, but it is best to use the most recent version. The bad news is that any additional software that you run on your PDA may or may not be Y2K-compliant and, since much of it is shareware, there are unlikely to be legally-binding guarantees available.

In addition, data sent to a PC or Mac can be moved accurately, but may be handled incorrectly once it gets there. However, the relatively recent arrival of PDAs means that there will be much fewer problems than on other platforms.

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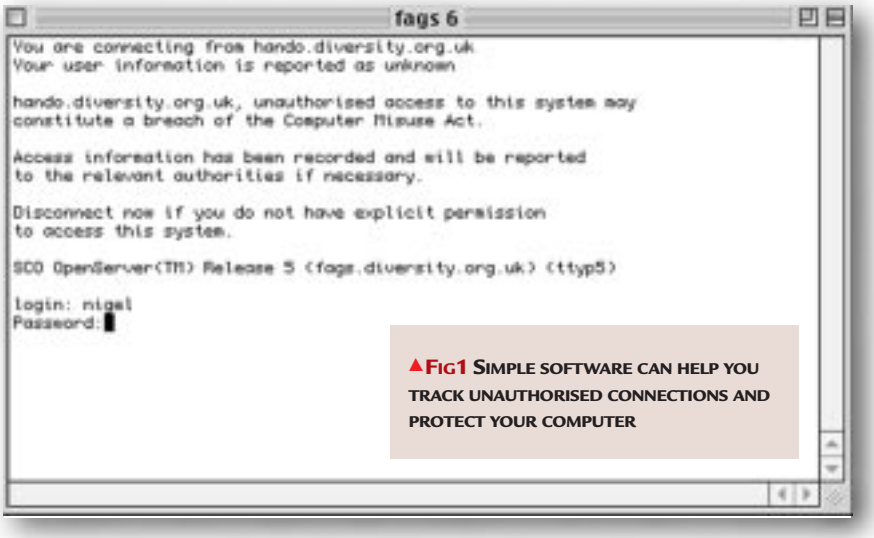
Running with a fast crowd

Connections to high-speed services will need extra security measures, says Nigel Whitfield.

Many *PCW* readers are waiting with bated breath for high-speed net services via systems like cable and ADSL, and a lucky few might even have been connected by the time you read this.

For many others, though, there's plenty of time to plan. What are you going to do with the connection? What will you connect to the end of it? And, what are the security risks?

The latter is something I've touched on before in this column, and it's well worth revisiting. Whatever operating system you're using, check to see what security updates you need – and not just ones for people running web browsers.



▲FIG1 SIMPLE SOFTWARE CAN HELP YOU TRACK UNAUTHORISED CONNECTIONS AND PROTECT YOUR COMPUTER

In the past, the tactic of attacking systems that are online has often been used on Internet Relay Chat (IRC), where it's easy to see if someone's connected. When you have an always-on connection, people don't need to see you online. They can attack your PC in plenty of ways – and if you're still running an original Windows 95 system, you're vulnerable.

Get the service pack, the password list update and the Winsock update, as well as all the browser fixes. And, unless you really need it, it's probably a good idea to turn off file sharing.

Mac users might need to prepare too – with a newer version of OpenTransport. There are problems in some versions with the Dynamic Host Configuration Protocol (DHCP), which is often used to allocate IP addresses on networks.

Unix users also need to go through the security on their systems and make sure it's patched – and consider installing security software to check inbound connections. It's far from clear yet whether people will be able to run servers and accept inbound connections on a home net link via ADSL or cable.

In fact, it's likely many companies will restrict your ability to offer things like web and FTP servers, unless you pay a premium for a business account.

Whatever system you're using, check to see what security updates you need

Technical and financial considerations lie behind that decision. Also, some home users will welcome the tight firewalls that prevent them running servers, since they will prevent users from outside being able to gain easy access to your computers. Some, however, won't be happy. So a brief digression into the reasons might be in order. On the technical front, an always-on connection is going to invite people to leave their systems on all the time, running things like ICQ (an internet tool that informs you who's online at any time and enables you to contact them).

Each machine that's connected will require an IP address allocated to it – and those are in short supply. At the moment, an ISP simply uses one address for each of their modem lines since not everyone will be connected at once.

With a permanent link, they'll need a lot more addresses, and shoehorning those into the current space isn't easy. So, instead, it's likely you'll be allocated an address in a private range, and a technique called Network Address Translation (NAT) will be used. This maps IP addresses on the fly, between the private and a smaller range of public ones.

Small ISDN routers, like the Zyxel Prestige, do this trick already, so that you can connect a network of machines to a single-user internet account. AOL does a similar trick, dynamically allocating an IP address when users connect to the rest of the net, rather than an AOL service.

The problem with NAT is obvious: it's easy for the router to know which machine on the private network is making an outbound connection, but when a connection comes into an address, how does it know which of the many private machines to route it to? It can be done, but it's not straightforward – so don't expect it for a bargain price, especially not when the ISP can charge you more for a fixed address. If you do end up with a link to the net that allows you to accept inbound connections, however, you need to think carefully about what you'll allow on your system. You might even want to re-appraise what operating system you'd run.

There will be many who'll disagree, but I'd be very reluctant to run Windows on a system that, potentially, anyone could access. Now may be the time to investigate running Linux or a flavour of Unix, either as your desktop machine, or configured to act as a proxy server. This

◂FIG 2 DOWNLOAD THE LATEST UPDATES TO SECURE YOUR SYSTEM BEFORE JOINING THE HIGH SPEED NET SET

would cache web pages and protect important information on your PC from prying eyes – effectively a firewall within any protection offered by the net provider. You might think that's unnecessary, but there have been stories from the US of cable modem owners being able to browse the drives on neighbours' systems where file sharing is turned on with no passwords.

Users going down the Unix route will need to think about what they want to be able to do through a server, and how to protect it. A web proxy server is easy to configure, but what about other things?

First, I'd recommend a copy of 'tcpd'. You'll find this as standard on many Linux systems, and it allows you to specify which hosts are allowed to connect to different ports – it's part of a package called tcp_wrappers. By default, configure it to reject all connections, and then allow a selected few through.

You can also configure a banner. Fig 1 shows the login banner presented on all my Unix systems, giving a clear warning about the Computer Misuse Act.

At the same time as it displays the banner, tcpd records the host name and, if possible, the user name of the person connecting. Unauthorised connections result in a finger command checking to see who's logged on to the remote system. This information is usually enough to identify the user.

If you go for a firewall, bear in mind much of the software available blocks everything

It's simple to set all this up too. In the inetd.conf file, which controls services such as telnet daemons, comment out anything you don't need running, and add:

```
telnet stream tcp nowait ↙
NOLUID/usr/local/etc/tcpd ↙
telnetd
```

This runs tcpd with telnetd as a parameter, instead of telnetd direct. Depending on your flavour of Unix or Linux, the line might look slightly different.

The /etc/hosts.allow file controls who's allowed access, and what happens when it's denied. Here's the line for telnet and the global denial message:

```
telnetd: ↙
hando.diversity.org.uk ↙
comet.diversity.org.uk : ↙
banners
/usr/local/etc/notices : ↙
ALLOW
ALL : ALL :spawn ↙
(/usr/local/etc/safe_finger ↙
-l @%h | /bin/mail -s ↙
fags\:%d-%c ↙
nigel) & : banners /usr/ ↙
local/ etc/notices : DENY
```

(Key: ↙ code string continues)

Finally, a message in /usr/local/etc/ notices, called telnetd, provides the text that's displayed, with % substitutions for the name and host name of the incoming connection. You can similarly protect services such as FTP and NNTP ports, ensuring that only those people you nominate can access your system. I can connect to my servers from the offices of certain clients, for example, but not elsewhere. Remember that if you go for a firewall, much of the software available blocks everything, and forwards TCP/IP packets you specify. For many things that's adequate, but sometimes it's not.

Some programs use the User Datagram Protocol (UDP), rather than TCP, so you need extra work to make them operate through a firewall.

A part of the TIS Firewall Toolkit, <www.tis.com> called plug-gw, allows you to specify that when a connection comes in, it's routed to a specific port. I use this to allow connections, for example, to pass through a firewall on port 5003 for FileMaker Pro, connecting to a server on a private IP address. Plug-gw, however, doesn't pass UDP, and that's what FileMaker uses to look for the server and get a list of databases.

Fortunately, a handy little program called udprelay does the trick, and allows you to redirect UDP requests too. Run it on the same port, alongside plug-gw, and you have a complete system for controlling access to your FileMaker server, or any other similar program.

If you're thinking of taking the plunge into a high-speed net link – or just setting up a server – you need to think about the security. And while there are Windows firewalls and other precautions you can take, the most flexible solution is very likely to be a Unix or Linux system, controlling access and running whatever services you want to host.

So, dig out your *PCW* CDs, brush up on Chris Bidmead's Unix and Linux advice, and start to plan for the high-speed revolution.

But, for the sake of security, update your system now rather than later.

PCW CONTACTS

Nigel Whitfield welcomes your feedback on the Internet column. Contact him via the PCW editorial office or email: internet@pcw.co.uk

Screen break

Tim Nott finds that if Win98 Second Edition isn't funny, you should try a mauve screen of death.

If you've been itching to read all about Windows 98 Second Edition here, then I'm sorry to disappoint you. There really isn't that much to get excited about, especially if you already have most of the Windows 98 updates and don't need to connect more than one PC to the same ISP account with the new Internet Connection Sharing software. The bad news is that TweakUI has been removed from the CD-ROM. At the time of writing, the Windows 98 version of the latter was not to be found on the Microsoft website either. UK users can get the upgrade – which includes IE5 – by filling in a form at: www.microsoft.com/uk/windows/win98_2nd.htm. Have your credit card handy as the 'free' upgrade carries a charge of £16.82 to cover postage and packing.

Blue screen spoof

It's been ages since we had a really good laugh in this column. Usually, computer-related jokes are excruciatingly unfunny, but I felt this ***spoof*** press release worthy of a wider public:

'In a surprise announcement today, Microsoft President Steve Ballmer revealed that the Redmond-based company will allow computer resellers and end users to customise the appearance of the Blue Screen of Death (BSoD), the screen that displays when the Windows operating system crashes.

'The move comes as the result of numerous focus groups and customer surveys. Thousands of Microsoft customers were asked: "What do you spend the most time doing on your computer?"

'A surprising number of respondents said: "Staring at a Blue Screen of Death". At 54 per cent, it was the top answer, beating the second-place answer – "Downloading pornographic images" – by an easy 12 points.

'"We immediately recognised this as a great opportunity for ourselves, our channel partners, and especially our customers," explained the excited Ballmer to a room full of reporters. Immense video displays were used to show images of the new customisable BSoD, which appeared side-by-side with the older static version. Users can select from a collection of "BSoD Themes", allowing them to instead have a Mauve Screen of Death or even a Paisley Screen of Death. Graphics and multimedia content can now be incorporated into the screen, making the BSoD the perfect conduit for delivering product information and entertainment to Windows users.

'The Blue Screen of Death is by far the most recognised feature of the Windows operating system, and as a result, Microsoft has historically insisted on total control over its look-and-feel. This recent departure from that policy reflects Microsoft's recognition of the Windows desktop itself as the "ultimate information portal". By default, the new BSoD will be configured to show a random selection of Microsoft product information whenever the system crashes. Channel partners can negotiate with Microsoft for the right to customise the BSoD on systems they ship.

'Major computer resellers such as Compaq, Gateway, and Dell are already lining up for premier placement on the new and improved BSOD. Ballmer concluded by getting a dig in against the Open Source community: "This just goes to show that Microsoft continues to innovate at a much faster pace than Open Source. I have yet to see any evidence that Linux even has a BSoD, let alone a customisable one."'

Have your credit card handy, as the 'free' upgrade carries a charge

▲ Fig 1 Transparent icon text – do it with SeeThru

Transparent tip

The screenshot accompanying August's tip on stretching tiny bitmaps to use as wallpaper produced a flurry of enquiries asking how I managed to get a transparent background to the icon titles. Well, I've mentioned Mike Strong's SeeThru [Fig 1] before, and we've also had it on the CD-ROM, but that was two years ago, so here it is again – this time on the PCW website. STUP102V.ZIP includes the runtime Visual Basic files required. If you already have MSVBVM50.DLL and COMDLG32.OCX, then the file you want is STUP102.ZIP.

All thumbs

One problem that crops up regularly in my mailbox is the failure of Windows 98 to display a thumbnail or 'Image Preview' of a selected graphic file when using Web Page view in Explorer. Despite being an FAQ, this subject hasn't made the Q&A because I could find sweet FA about the

A. As with its predecessor, QuickView, this feature seems very fragile and liable to stop working properly at any time. Typically, it will refuse to display .jpg files but continue to show .bmps [Fig 2].

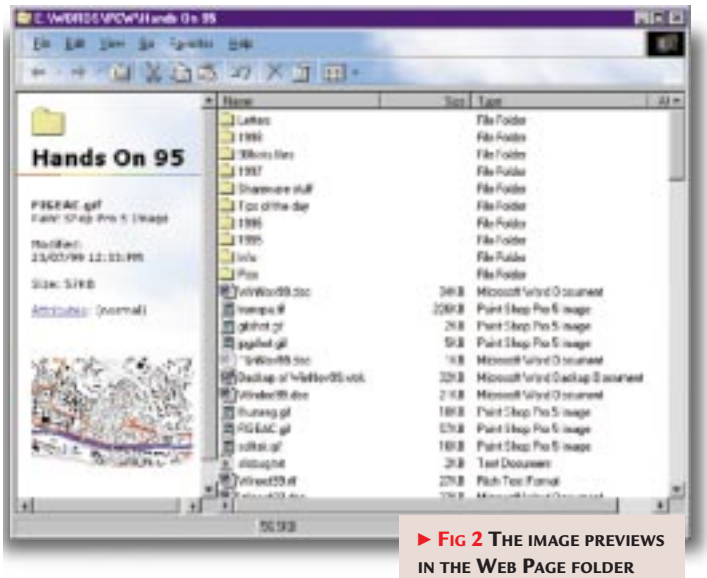
At long last, I've managed to find some information on the Microsoft Knowledge Base. Usually, this problem is a consequence of installing software that modifies the file extension properties – some versions of QuickTime have been fingered as a likely culprit.

According to the Knowledge Base, this affects the following file type extensions: .art, .bmp, .dib, .gif, .jfif, .jpe, .jpeg, .jpg, .png and .wmf. To rectify the problem, you need to edit the registry, so make sure you have a back-up first.

The keys you need to edit are in the first section, HKEY_CLASSES_ROOT. Look for each of the keys bearing the extensions listed above, including the dot. There should be two string values (with an 'ab' icon) in the right-hand pane of Regedit at the highest level of each key. These point to a general file type that determines the program that opens the file – such as Windows Paint or PaintShop Pro. Don't alter these entries.

This feature seems very fragile and liable to stop working properly any time

Repeat the process for the other errant file types, and the thumbnails should be restored. Some other graphic file types may also be previewable, but this is down to other software (such as the Microsoft Office import filters) and although the same key names may be present the values will be different.



► FIG 2 THE IMAGE PREVIEWS IN THE WEB PAGE FOLDER VIEW MAY NOT DISPLAY ALL TYPES OF FILES

■ Another folder tip

In last month's issue, my tips included sorting folder contents by clicking on the headers in 'Details' view. Rob Saville has since mailed me a related tip. Double-click on the join between the column headers, and the column to the left will automatically re-size itself to the exact width of the longest entry.

■ Toolbar tips

Ian Maddison came up with some interesting tips on Windows toolbars, which should apply to Windows 95 and IE4 upwards. Ian notes that if you enable the Address bar (right-click on taskbar and select Toolbars), you can then type in the path to a folder to open it, either by pressing Enter or accepting one of the Autocomplete entries.

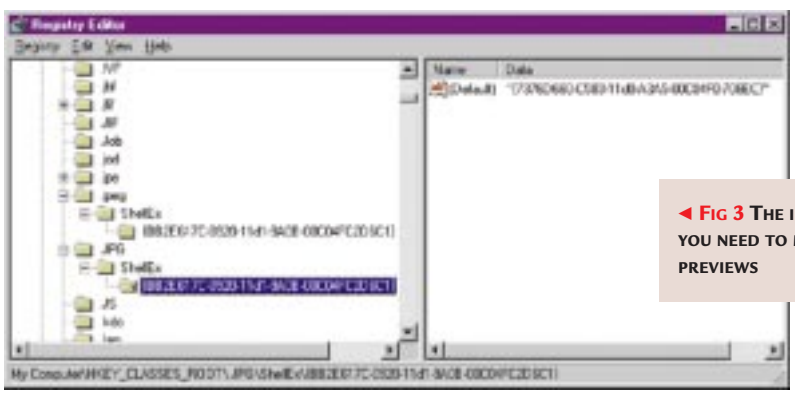
The interesting bit is that if you the drag the folder icon out of the Address window on to the word 'Address', you will get a new toolbar of shortcuts added to the contents of that folder. Similarly, dragging to the desktop will create a shortcut to the folder or file in the Address bar. Dragging the icon for an HTML file will create an Active Desktop item.

Dragging the icon from the top-left corner of a folder window on to a spare piece of taskbar will also create a toolbar of shortcuts. Finally, Stephan Freeman helpfully adds that dragging the My Computer icon on to the taskbar also creates a toolbar of its contents.

And finally... this column couldn't exist without your feedback. And, although I can't guarantee a personal reply to every email and letter, I do try to answer as many as possible.

There are two things which would both help me greatly and increase your chances of a cogent reply.

First, please don't send attachments without prior arrangement. That 2MB screenshot of your desktop may be fascinating, but I really don't want to download it over my relatively slow dial-up connection. Second, please, please keep your email messages in plain text rather than HTML. To configure Outlook to do this by default, go to Tools, Options, Send and select the 'Plain Text' options. I look forward to reading your plain-text messages.



◄ FIG 3 THE INCANTATION YOU NEED TO MEND IMAGE PREVIEWS

Questions & answers

Q Shortly after installing IE5, my Temporary Internet File cache reduced the 'Amount of disk space to use...' from 75MB to zero. It's now impossible to make any alteration to this. Consequently, I have no cache and each time a page is accessed it downloads afresh.

IAN SAWYER

A *According to the MS Knowledge Base, this can be caused by a damaged History, Cookies or Temporary Internet Files folder, or a file therein. First back up any cook[redacted]site pa[redacted] M[redacted] co[redacted]*

Windows will restart, IE will recreate the deleted folders and you should be able to specify the cache size once again.

Or can I do the same thing using another OS?

N V PRASHANTH

A *It's possible with Windows 98 Second Edition, which has a new feature called Internet Connection Sharing for precisely this purpose. Alternatively, you can install third-party proxy server software, such as Wingate – there is a trial version available at www.wingate.com or the freeware Hhproxy, available from http://home.t-online.de/home/sog-luebeck/hhproxy.htm.*

Q I'm sure the Windows 3 version of Solitaire used to have animation on some of the card backs, but this doesn't seem to work in Windows 95. Am I dreaming or did the sun in the picture of the palm tree really used to put on dark glasses and stick its tongue out every so often?

ADRIAN DIMENT

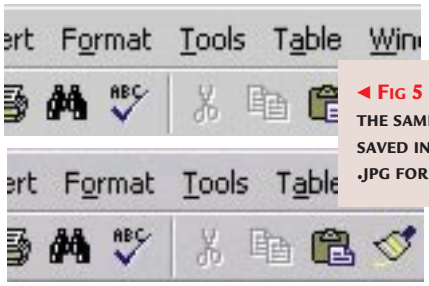
▲ FIG 4 THE SUN HAS GOT HIS SHADES ON – BUT ONLY FOR TIMED GAMES

Q I have two networked Win98 machines, one of which has access to the Internet. Now I want the other machine to access the Internet through that first machine. Is this possible?

A *Don't worry, you are not dreaming. The animated sun with the shades still works [Fig 4]. As with Windows 3, you must have 'Timed game' ticked in the Game, Options dialog.*

Q Recently our business acquired a second-hand PC allegedly running Windows 95. However, this is nothing like our other Windows 95 PC. Despite having Win95 startup and shutdown screens, it behaves more like Windows 3, with the old Program Manager and no desktop icons or task-bar. Tell me, have we been 'had' or is there a perfectly rational explanation?

TREVOR SHIFNAL



◀ FIG 5 FUZZY BLEEDER – THE SAME SCREENSHOT SAVED IN .GIF (TOP) AND .JPG FORMATS

A *It sounds as if Windows 95 was installed with the Windows 3.x interface – an option available for those who couldn't take the excitement of change.*

Fortunately, this is easy enough to rectify. Open the file SYSTEM.INI, which you will find in the Windows folder (or directory in Win 3.x-speak), in Notepad. In the first section, headed [boot], look for the entry:
Shell=progman.exe
And change it to:
Shell=explorer.exe

When you reboot you should find yourself back in the 32-bit world we have all come to know and love so much. You will probably need to do a little bit of work on the Start menu shortcuts, but help is at hand.

If you double-click on each of the Program Manager Group files (.GRP) in the Windows folder, these will get converted to sub-folders of the Start menu Programs folder. Then you're back in business.

Q I want to create my own training manuals and would like to know how I can capture the menus and tool bars in Windows and Office 97. I see in your magazine that you do this regularly. Can you tell me how you do it?

GILL LEVY

A *Most of the time I use the Alt + PrintScreen keys which copy the active window or dialog box to the clipboard. I then paste this into PaintShop Pro. You could, at a pinch, use Windows Paint, but PaintShop has various advantages.*

First, PaintShop makes a good job of reducing file sizes by letting you reduce the number of colours to 256 and then saving as a .GIF. This gives satisfactory results on most screenshots except those containing shaded fills, which appear banded.

Second, it has its own built-in screen-grab utility which offers such refinements as including the cursor, or capturing 'objects' such as toolbars or menus. This saves a lot of fiddly work cropping images down.

One warning – don't save screenshots as JPGs. Even though this format is excellent at storing photographic images in compressed format, it can't handle hard-edge stuff very well. Images such as menus and toolbar icons will become fuzzy and 'bleed' onto the background as demonstrated in Fig 5.

PCW CONTACTS

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Divining Perls of wisdom

Tim Anderson gets started with Perl, and looks at how to put your Access data on the web.

Perl is the ideal language for server-side scripting, particularly as it is so widely supported. One snag is that it does not come with Microsoft's Internet Information Server or the Personal Web Server.

A common scenario is that you want to design your website on Windows, before uploading it to a Unix-hosted web server at your ISP. The answer is a free download, called ActivePerl, from ActiveState's website. It is currently about 5MB, and installs Perl not only on your web server but also on the Windows scripting host, so that you can use Perl from anywhere in Windows.

If you are running Unix, Perl may already be installed, and if not you can easily find it on the web. Just to warn you, there are some issues which mean that a script which runs on Windows might not run on Unix, but compatibility is still reasonably good.

The Perl interpreter is called PERL.EXE. Once it is installed, you can run a Perl script from the command prompt like this:

```
perl myscript.pl
```

ActivePerl has an installer that configures IIS and Windows file associations for you. If you need to tweak the installation manually, note that you must not put PERL.EXE or PERL.DLL (the ISAPI version) in cgi-bin or any other directory accessible from the browser. To do so can allow hackers access to a command prompt and would be risky.

◄ ACTIVEPERL IS THE ANSWER IF YOU WANT TO RUN PERL ON WINDOWS

Creating a Perl script

A typical Perl script will have three basic tasks. First, it needs to access parameters derived from some event in a web browser. Second, it will perform some action based on those values, such as querying a database. Finally, it will generate a complete web page and print it to the standard output stream, which gets fed straight back to the browser. A minimal Perl script might bypass the first two steps as in Fig 1.

This code has some interesting features. First, it uses Perl's here-doc feature to spare you the trouble of inserting multiple print statements or quote marks. The statement

```
print <<EOF;
```

tells Perl to print everything until the given identifier, 'EOF' in this example, appears by itself on a terminating line. Second, note the $ENV code used to retrieve the value of an environment variable. Third, you will notice the obscure 'hash-bang' statement which forms the first line. This is unnecessary on Windows, but on Unix it tells the system how to execute the script – a loose equivalent to a Windows file association. The filename shows where the Perl interpreter is located and on some systems it may need to be modified, for example to point to 'perl5' rather than 'perl'.

Overall, what the script does is generate an HTML page. This is a basic feature of any dynamic website, whatever technology is used to drive it.

To try out the script, save it in the cgi-bin directory on your web server as 'hello.pl', for example, and then point your browser at it using the web address: http://yourserver/cgi-bin/hello.pl? The query at the end of the address may not be strictly necessary, but it tells the server that you want to execute the file rather than loading it to the browser. All being well, you will see a simple web page telling you what web server you are using.

Note that on Unix systems it is not enough simply to place the script in the cgi-bin directory. In addition, you have to mark the file as executable using the chmod command. For example,

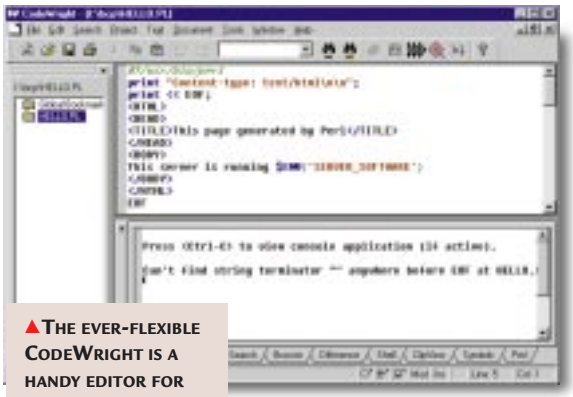
```
chmod 755 hello.pl
```

This tells the system to grant read, write and execute permissions to the owner of the file, and read/execute permissions to others.

This is a good start, but to do anything useful the script will need to take some parameters. These will be provided by a form completed by the user and sent to the server with Submit. Next month I'll look at how to do that.

[FIG 1]

```
#!/usr/bin/perl
print <<EOF;
Content-type: text/html
<HTML>
<HEAD>
<TITLE>This page generated by
Perl</TITLE> </HEAD>
<BODY>
This server is running
$ENV{'SERVER_SOFTWARE'}
</BODY>
</HTML>
EOF
```



▲ THE EVER-FLEXIBLE CODEWRIGHT IS A HANDY EDITOR FOR CODING AND DEBUGGING PERL SCRIPTS

Database publishing

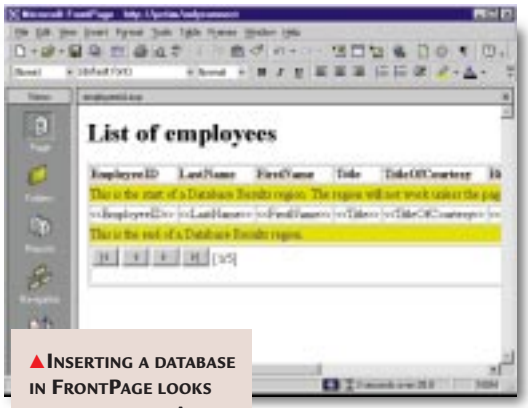
Bara Mustafa writes: 'I have been trying to get a database on the web using Microsoft FrontPage 98. My ISP supports FrontPage extensions but not CGI scripts. Would it be possible to do this using FrontPage or JavaScript, either with the .mdb file or with a .csv file?'

Most web-authoring tools claim to make it easy to include data access in a web page, but when it comes to doing it you often run into problems. The reason is that most solutions involve running some sort of data-access code on the web server, and a typical ISP-hosted website does not allow this.

The FrontPage extensions are not going to help. These extensions have two main functions:

First, they assist with authoring and maintaining a website by providing extra features such as FrontPage web themes, a task list, and a hyperlink map of the entire site. These are only useful to the author or administrator.

Second, they support FrontPage components, also known as WebBots, which provide things like a hit counter, a full-text search function and support for online discussions. Most of the features on the Insert Component menu in FrontPage need the extensions. If the ISP does not support them, you can often obtain the same or similar features by using a different technique, such as a CGI script provided by the ISP.



▲ INSERTING A DATABASE IN FRONTPAGE LOOKS EASY, BUT NEEDS ACTIVE SERVER PAGES TO RUN

In database publishing the key decision is whether to do dynamic or static publishing. Static publishing is just a matter of exporting your data to HTML. Many database managers will do this automatically. Access, for example, has an Export-HTML option that creates an HTML document from a table, query or report. You can use a template to provide some basic formatting. Or you could write a routine in Visual Basic to query a database and build an HTML document from that.

Static database publishing is all very well, but it is only of any use with small databases – nobody wants to browse a web page with several thousand lines. Larger databases can be broken down into small pages, with a navigation page using hyperlinks or script-driven controls, but the fundamental problem is that the site lacks any intelligence. To get proper searching and sorting, dynamic database publishing is the answer. That means running server-side scripts, using Perl, ISAPI, Active Server Pages, Java servlets or some other technique.

An Access database has some special requirements. The Access data format has no published specification so it can only be read by Microsoft's database drivers, which run solely on Windows. If you want to use Access, you will need to use an ISP that runs Windows NT and that allows you to use one or other of Microsoft's data-access technologies – such as Data Access Objects or Advanced Data Objects. The appealing Insert Database option in FrontPage uses Active Server Pages, a type of server-side scripting supported by Internet Information Server. Generally that means finding an ISP that provides NT servers and specifically supports Active Server Pages. I will look at how to use Active Server Pages in a future issue.

◀ VISIT WWW.TOPHOSTS.COM FOR A VARIETY OF US-BASED WEB HOSTS THAT PROVIDE DEVELOPER FEATURES

PCW CONTACTS

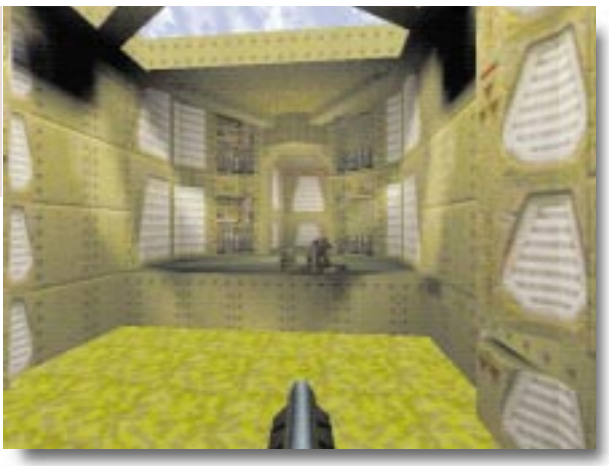
Tim Anderson welcomes your web development questions and comments, via the usual PCW address or by contacting: webdev@pcw.co.uk

- *If you are looking for an ISP to support database publishing, the best value choice is a US-based ISP. A good source of information is www.tophosts.com, which at the time of writing features ISPs offering full database support from just $12.95 (£8.09) per month*
- *Find Perl for Windows at www.activestate.com. This comes with very extensive documentation*
- *You might also want to look at the classic Perl book,* Programming Perl, *written by Larry Wall, Tom Christiansen and Randal Schwartz (O'Reilly, ISBN 1565921496), as well as* Perl in a Nutshell, *written by Ellen Siever, Stephen Spainbour and Nathan Patwardhan (O'Reilly, ISBN 1565922867)*
- *Finally, check out the main Perl website at www.perl.com*

Restoring the faith with NT

Andrew Ward says you don't need divine intervention to retrieve critical .lnk files and lost data

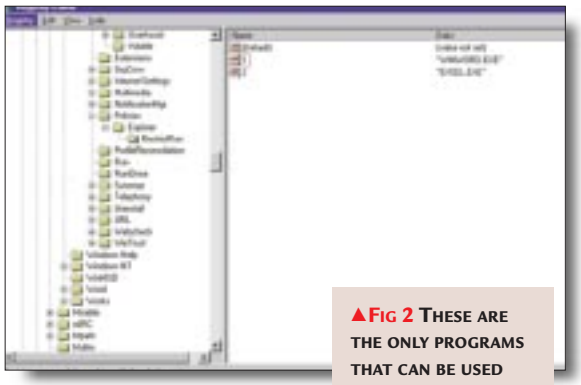
Steve Ward was puzzled by my mention of Quake in a previous issue, since the original version of the game doesn't work under Windows NT. Of course, he's right, it doesn't – at least, not as shipped. However, on the Internet there is an add-on program called WINQUAKE, which allows Quake to run under NT [Fig 1]. You can download it from ID Software's own ftp site at ftp://ftp.idsoftware.com/idstuff/quake/wq100.zip. Installation is easy, and you just run WINQUAKE.EXE.



▶ FIG 1 JUST BECAUSE YOU'RE RUNNING NT DOESN'T MEAN YOU SHOULD STOP QUAKING

Service Pack 6

Microsoft intends to bring out service packs on a more frequent basis in future, and it's likely that Service Pack 6 will already have been released by the time you read this. But, as I have mentioned before, service packs will no longer include major new features, but only product fixes. These will usually be fixes to security problems and cures for various bugs, including those introduced by Service Pack 5. So don't expect anything new and exciting in Service Pack 6, and it should only really be contemplated where you have a specific problem that it fixes. Don't automatically deploy it on a widespread basis: instead, read the service pack documentation to see if it's really relevant to you.



▲ FIG 2 THESE ARE THE ONLY PROGRAMS THAT CAN BE USED WITH NT – IN THEORY

Windows 2000

With the release of Windows 2000 imminent, or possibly even having taken place by the time you read this, some of you will be wondering if and when this column will start to feature the new operating environment instead of its current focus on Windows NT4. The answer to that is simple: they will appear as soon as people start sending in problems related to Windows 2000 that a wider audience would find relevant. I suspect this is going to be some time down the road.

Take Compaq, for example. Thanks to a major worldwide intensive training programme, Compaq now has more engineers trained in the deployment of Windows 2000 and migration from NT4 than anyone else – including Microsoft itself. Indeed, Microsoft uses training courses and material prepared with Compaq's help for its own staff training. Yet the magnitude of the Windows 2000 migration task is so great that Compaq expects to take 18 months from the launch of Windows 2000 to complete the migration of its own servers and applications. So, don't hold your breath.

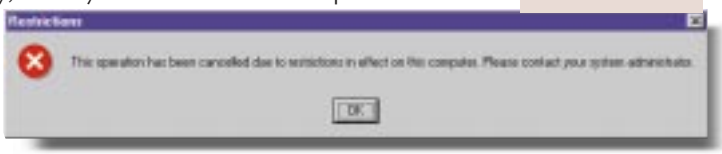
Feeling insecure

Kevin Stuttard pointed out a loophole with the Windows NT system policies that, in theory, allows you to restrict the programs people can use [Fig 2]. In principle, you can specify a list of executable files, such as WINWORD.EXE, that users are permitted to run. Then, when a user clicks on an icon or otherwise invokes Explorer in order to run an unpermitted application, Explorer will deny the request [Fig 3]. But Kevin has discovered that this mechanism is easily circumvented by an astute user, simply by renaming dastardly_network_trasher.exe to WINWORD.EXE.

That isn't the only way to get round this rather simplistic security device. If CMD.EXE is on the approved list, then the user can just run that and type the name of an executable. Of course, you can overcome that by not putting CMD.EXE on the approved list.

Another way to circumvent the security is to write a three-line Word macro to launch the unpermitted program. Once again, this is fairly easily stamped on, by using something like the Reflex Magnetics technology, which prevents people from running any unauthorised Word macros.

But really, this should only be viewed as a very superficial level of security. If you want to stop people running unapproved programs, you have to prevent them



▼ FIG 3 STOP USERS RUNNING UNDESIRABLE APPLICATIONS

introducing the executable into the organisation in the first place.

Something like Disknet from Reflex Magnetics will prevent any floppy that isn't approved from being used. Also, products like MIMEsweeper (and its component WEBsweeper) can be configured to prevent introduction of executable files via the Internet. Disknet is currently also being updated to provide the same level of security for CD-ROMs.

Nevertheless, if you want to press ahead and try the built-in Explorer protection, you need to create a DWORD entry at: HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer called RestrictRun and set the value to one. Any attempt to run any program thereafter will result in an error message.

Then you need to create a list of programs that the user can run at: HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer\RestrictRun. Each entry is a string value whose name is a sequential number – the first one is called one, the second is two, and so on. The string should contain the name of the executable, for example WINWORD.EXE.

Broken links

Tony Franks almost certainly isn't the only NT user to have done the following, but so far he's the only one to admit it. What he did was to accidentally associate .lnk files with an application; then, realising his mistake, he broke the association.

Thereafter, Explorer can no longer run .lnk files, which basically means that programs will cease to be able to run fr[illegible]ur Start menu or fr[illegible] a[illegible]

remedied by creating a text file LINK.REG using the code in Fig 4. Simply double-click the file to repair your registry with the .lnk information.

Alternatively, if you have access to a working NT system, run REGEDIT and then navigate to the

▶ **Fig 5 TV cards can be used to set the time for NT, as well as watch cricket**

and thus [illegible] this general pr[illegible] other instance[illegible] becomes dam[illegible]

As seen on

Paul Webster [illegible] between two r[illegible] other readers [illegible] Windows NT [illegible] Anyone who's bought a video recorder recently will have realised that it sets its own time automatically.

Assuming that this isn't some form of magic, my guess is that it takes the time from Teletext pages. You can apply the same principle in the NT environment, says Paul, and take the time from the Teletext page via a TV display card such as the Hauppauge Win/TV system [Fig 5].

A[illegible], Ha[illegible] W[illegible] in[illegible] co[illegible] to[illegible]

The file contains the following script:

[illegible]US SCRIPT

▼ **Fig 4 Restoring functionality to your .lnk files is easy with this code**

[illegible]

TVSTATION BBC1
SET SYSTIME
EXITAPPL

Paul implements this as a simple icon on the desktop, but of course you could schedule it to be executed at regular intervals, such as once a day, if

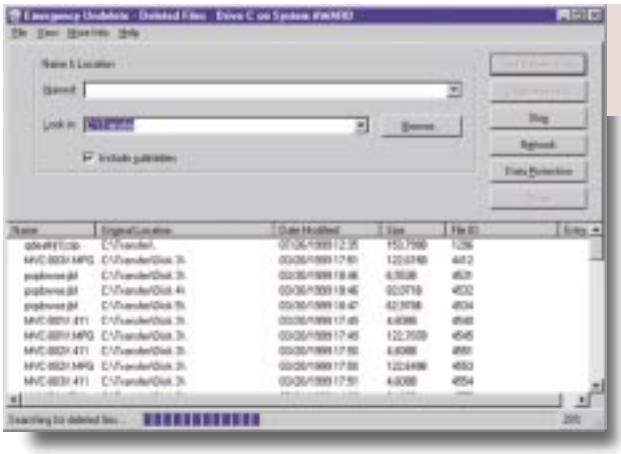
Tracey Clerkin writes in with a problem that must affect many users. I suspect that few people raise it because they don't realise that anything can be done. Tracey says a user accidentally deleted some critical files on a Windows NT4 SP4 workstation and she wants to know if there's any way of quickly undeleting such files, to avoid another fun evening spent searching through backup tapes.

The first port of call is the recycle bin, but [illegible]e are many instances where [illegible]elete[illegible] files don't end up there. Some [illegible] (myself included) are in the habit of [illegible]ng shift-delete in Explorer, which [illegible]s immediate deletion, or simply [illegible]g DEL in a command prompt window. Some files are too large for the recycle bin, or you may have the recycle feature turned off altogether. There are numerous other ways that files are deleted immediately.

Of course, there are deletion protection tools that offer a little more sophistication than the recycle bin, but these only work if you already have them installed, and are no help in an emergency.

With Windows 98, or even with FAT drives and Windows NT, undeleting files isn't too much of a problem. There are plenty of utilities to do this, and if you know enough about the file structure you can even do it manually (albeit somewhat painfully). NTFS is a different issue altogether and conventional wisdom says it can't be done.

[illegible]e string continues)



◄ FIG 6 UNDELETING FILES ON AN NTFS VOLUME IS POSSIBLE

Actually, there is an answer even for NTFS drives, and what's more, it's freeware and downloadable from the web. If you have an emergency, it takes just a few minutes to download and install the product (it's just under 1MB) and undelete the file. Emergency Undelete from Executive Software <www.execsoft.co.uk> works like the Norton Utilities of old, in that it produces a list of deleted files and asks you which ones you want to restore [Fig 6]. I've tried it, and it works. I don't know whether it's by accident or design, but the file most recently deleted quickly appeared at the top of the list, whereas the full scan of the drive was clearly going to take some time.

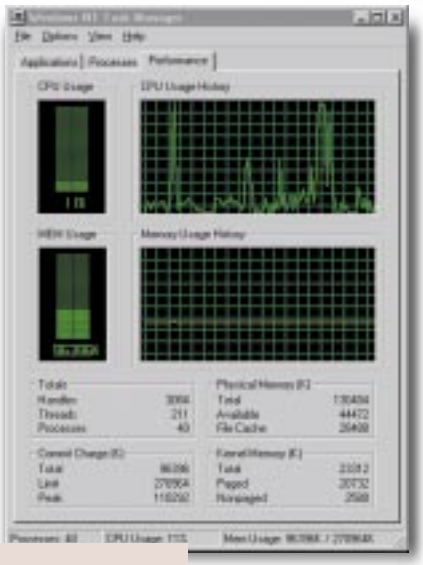
Of course, without full deletion protection, any deleted files are constantly in danger of being overwritten by subsequent hard disk usage. I tried emergency undelete on WinZip files, which are easily checked for integrity, and I didn't actually run into an overwriting problem – but maybe I was just lucky.

Performance tuning

Much of my mailbox traffic is taken up with requests for help with sizing Windows NT systems. With Windows NT Workstations, this is a difficult challenge, since you'll be running a mix of different appli-cations. At times the video performance will be the bottle-neck, on other occasions it will be the hard drive performance, the CPU, or maybe the amount of memory. Unless you have an unlimited budget, you'll have to accept some areas of compromise.

For servers, sizing is more important, but in some ways easier. If you are running an Exchange mailbox server, for example, then user response time will be a critical factor. But because the server is running much the same set of processes all the time, whatever performance constraint there is, if any, will be fairly predictable and consistent. Most software vendors will be able to provide specific recom-mendations on sizing NT systems for their applications. In reality, you won't always have the luxury of being able to specify a complete new set of hardware for every server, so the problem becomes an issue of tuning an existing system for optimum performance.

The first thing you should do is to remove any unnecessary software that could be impacting performance. Your first visit should be to the Services Control Panel to disable anything that isn't essential. In particular, many applications, including Microsoft ones, fail to remove their services after de-installation. Your next port of call should be to the Protocols and Services tabs in the Network Control Panel. Once again, remove anything that's no longer in use, but please do be careful to avoid removing anything important.



▲ FIG 7 TASK MANAGER CAN PROVIDE USEFUL PERFORMANCE MONITORING INFORMATION

You may also have leftovers in the Startup group. I must re-emphasise that if you see FastFind anywhere you really should remove it immediately, although you shouldn't have Office installed on a server anyway.

After that, you can turn to the built-in tools that come with Windows NT for checking and optimising performance – the Task Manager [Fig 7] and the Performance Monitor. Although the Task Manager is a great deal easier to use than the Performance Monitor, and can provide a quick check on which process or processes are hogging CPU and memory, it can't really get to the root cause of a problem. An apparently CPU- or disk-bound system, for example, could be suffering from a lack of memory, causing excessive swapping.

Using performance monitor is a science in itself. If you want detailed instructions on using it to get to the root of performance problems, write to let me know.

PCW CONTACTS

Andrew Ward welcomes your comments on the Windows NT column. Contact him via the PCW editorial office or email: NT@pcw.co.uk

Catch the Phenom Express

LG Phenom Express upgrade is up for grabs for the most interesting email, says Mark Whitehorn.

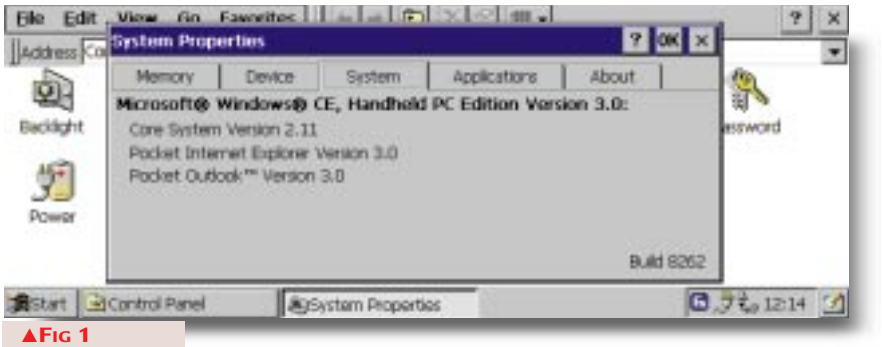
In the September issue I wrote about how to upgrade your WinCE machine to CE Pro, using an LG Phenom Express as the sample machine. I also managed to coerce LG into providing two more upgrade kits as prizes to give away in the column. However, only one is left since Alan Johnson <alan_johnson@amdahl.com> has just won the prize for initiative with the following email:

'I'd like to ask how you got hold of the upgrade, as my attempts to find a supplier which will sell me the upgrade have come to naught.

'I contacted LG's customer support (from the information on its website), which gave me the names of the distributors of the upgrade. However, those distributors refused to deal with me (being Joe Public), saying that I should go back and place the order with my retailer. Unfortunately, I bought my Phenom from Dixons, which doesn't seem to know about an upgrade being available.'

It seemed only fair to send him one of my upgrade kits. The other is up for grabs for the most interesting email from an LG Phenom user who hasn't already upgraded. It can be about anything, but don't forget to say that you have a Phenom running version 2.0. Incidentally, LG has replied that suppliers are unlikely to have the upgrade in stock, but they can order it from LG.

If you aren't sure which version of CE your machine came with, and are therefore in the dark as to whether you need to upgrade, go to the Control Panel, open System and select the System tab. This process can be seen above in Fig 1 and also introduces another little feature. The screen shot was taken using a built-in feature of the Phenom Express running CE Pro – pressing the Function key and the right arrow brings up a screen capture program. Neat, but not gaudy.



▲Fig 1 Checking out what version of CE you're running

The range of shareware and freeware that is available for PDAs is extraordinary

■ The good old days are alive and well

PDAs are all about software – and the range of shareware and freeware that is available is extraordinary. It nostalgically reminds me of the early days of the PC, before 'big business' decided that it was profitable to move the suits in. A while ago, we published a list of URLs, and these seem worth repeating because we are constantly asked for the location of sites with good information.

Top of the list for all PDAs is, in my opinion: http://hensa.pdacentral.com. This is a mirror of a website called PDACentral, held at an academic site in the UK. In fact, given that the web is, well, a web, this could be the only URL you need, because it must be possible to reach all of the others I am about to quote from there. However, also worthy of note are:

■ Psion

http://3lib.ukonline.co.uk
This is a great site, run by a genuine enthusiast, Steve Litchfield.

www.palmtop.co.uk
I like this site and it leads to a great source of information about Psions – both current and past.

www.psion.co.uk
Naturally, this site has some very useful information about products from Psion.

http://ourworld.compuserve.com/homepages/martin_guthrie
This site was recommended by Dave Summers <davesummers@csi.com> who says: 'Can I give a plug to Martin Guthrie's website? There is everything anyone needs to know about using a Series 5 with Compuserve. There are also ISP scripts for many other service providers all over Europe. I found the help invaluable and, as a 747 captain, use my Series 5 to send and receive email from hotel rooms round the globe.'

He's right, it is a great site. Nice one, Martin.

■ WinCE

Two good sources of Windows CE information are:
www.microsoft.com/windowsce and www.wincecity.com.

■ Palm

Sadly, the excellent site mentioned last time <www.pilotlibrary.org> is shutting down, but try: www.memoware.com instead. The following are also excellent:
http://palmpilot.org
www.palmcentral.com
www.palmpilot.com.

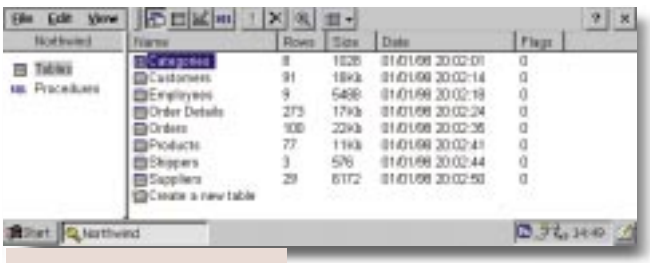
■ Help!

There has been an increase in the number of people using PDAs and most are coming up against problems of one sort or another. This has led to a major increase in the number of emails that I get. The good news is that some can be included in the column, but sadly most cannot – mainly because they are just too specific. For example:

'I recently purchased a Sharp HC-4100 with 8MB of memory. I would like to set it up to connect to the Internet using a Nokia 6150 mobile phone, using the infra-red ports. If I need any special software, could you tell me where I would get it. I would be grateful if you could help me because I am stuck.'

It isn't that I don't want to help chris@hames.freeserve.co.uk (if you know the answer please email him). The problem is that even if I spend time finding the answer, the number of people with the same kit who read the column is likely to be too limited to make it worth including. This is why I try to keep the info in the column as generic as possible. However, I always feel guilty when I can't help, so please try to keep my stress levels down by asking questions that will benefit the largest number of people.

Something that is extremely welcome is email about generic or specific problems that readers have already solved. These are often too long to include in the column itself, but I am always delighted to include them as a text file, when I can, on the CD-ROM or website. For example, David Robertson has worked out the settings required to connect a Series 5 with an Ericsson DI 27 modem to Virgin Net. Tim Amphlett, on the other hand, found a work-around for his ISP:

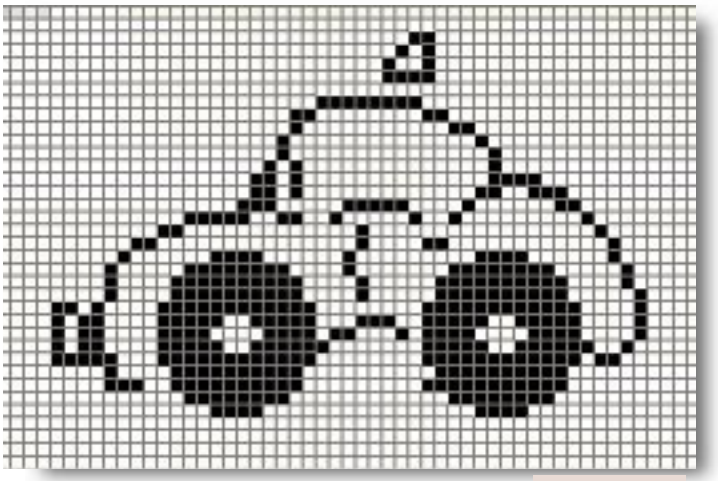


▲THE MAJOR ADVANTAGE OF UPGRADING TO CE PRO IS THAT YOU GET A COPY OF POCKET ACCESS

'My ISP (LineOne) only supports Java-enabled browsers – this rules out the CE version of Explorer. (At least on my HP 360LX it does!). My fix was to set the home/default web page to Yahoo and let it get the Portal Advertising benefits.'

■ Opportunity doesn't knock

I don't have opportunities any more, I just have problems. For the same kinds of reasons, I usually don't discuss my own problems with PDAs in this column. I assume that, in the main, you aren't concerned that I had a bad day connecting A to B, where A and B are specific bits of kit. On the other hand, I discovered recently that this can give the wrong impression. At the WinCE developers' conference I had my ear severely bent by a reader who felt that I gave the impression that PDAs are trouble-free, or worse, that I was so clever that I never had any problems. Would that it were so! Just to counteract that impression, here is an extract from a day (or two) in the life of a PDA columnist. You probably won't learn anything from this Pournellian saga, but it might make you feel better.



▲THE EVER ILLUSIVE TAXI, CAUGHT ON FILM FOR ALL THOSE WHO DENIED ITS EXISTENCE

I've just had a really bad two days. I wrote part of this column on a Jounada and normally I transfer this to a Win95 games machine that is running WinCE services. However, I decided instead to install WinCE services on my IBM laptop, which is running NT4 (Service Pack 4). I thought it would be useful to be able to transfer data to the machine that I normally take with me on my travels. This failed because of complexities with the port allocations on the IBM – which is a saga in itself – but let's not digress. Worse still, installing the WinCE services blew away my internet connection from the laptop. No problem, I thought, I'll just de-install the services. Still no dial-up. OK, I'll re-install Service Pack 4 because that is advised after software installation. Still no dial-up, and now no network connection.

OK, so I de-install the re-install of SP4 (which still leaves the machine rated at SP4!). Good, the network connection is back, but now I get a message that some of the NT services aren't starting up. I spend an hour playing with the services – and eventually I get it down to just one service not starting up (something to do with the IR port, which is disabled in any case). Dial-up is now working and I still have a network connection! Great. This feels like success until I realise that most of a day has been spent getting almost back to where I was in the morning.

Next day, I decide simply to transfer the words from the Jounada to the Win95 machine. I know that this works – except it doesn't, it has mysteriously stopped working. It complains that the cable is faulty, but it claims exactly the same for a totally different WinCE machine and cable, so I suspect it is lying. I spend an hour swapping ports, baud rates, cables and WinCE machines – and still nothing will work. I decide to re-install CE services, but the install process demands a Win95 disk.

After finally locating one in an obscure cupboard, the installer complains it is dirty. I take a look and, surprisingly, it is filthy, so I clean it. Then the installer tells me that the files on the machine are newer. Ahhhh, so this is a Win95 disk, but perhaps not the Win95 disk used for this particular machine. Locate another 95 disk which looks newer (and cleaner). Do the disks have version numbers? Do Penguins like lettuce? (That is a big 'No', in case you have never tried feeding a Penguin). Try the 'new' disk and the install program crashes. Re-boot and try again. The install of CE Services apparently succeeds

(without asking for a Win95 disk at all!), but the connection still doesn't hook up.

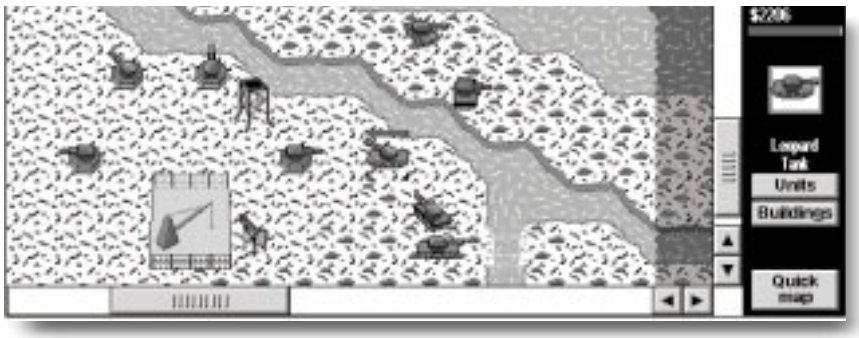
However, just in case I was getting bored, the error message has changed. I re-boot the machine interminably, fiddle with every parameter I can find and finally get a connection working at 19,200 baud. Should I try for a faster connection, or just move the file while the connection is there? No contest, I move the file.

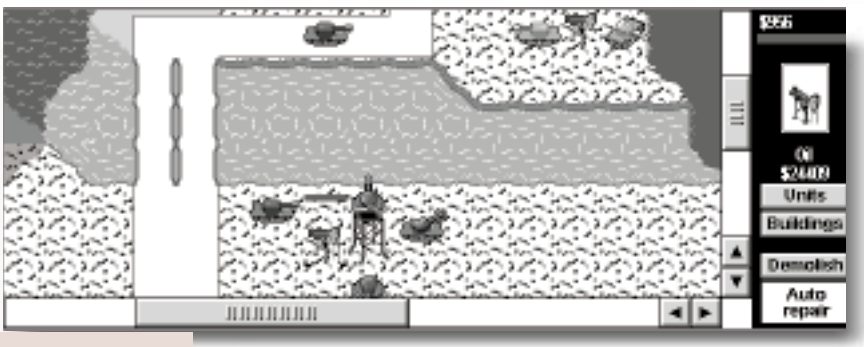
It is now lunchtime. That's about one and a half days to carry out the simple task of transferring 650 words. I could have carved them in stone faster.

If there is a take-home message here it has to be that we are being sold PDAs as commodity items and, in the main, that is exactly what they are.

However, a more accurate view is that, to use a PDA for productive work, and to have a pool of knowledge that extends outside WinCE into the rest of the computing world, you are still going to have to work hard.

▲RELIVE THE EIGHTIES WITH DEVENDER FOR THE PSION 5





▲MOBILE WARFARE TAKES ON A NEW MEANING WITH NO MAN'S LAND FOR THE PSION SERIES 5

■ Defending the faith

On a happier note, Mark Wheadon's Defender, which we carried on the CD-ROM for the Psion 3, is now available for the Psion 5 – although this version is known as DeVender (*see above, top*).

Both versions (DeVender and Defender) will soon be appearing on a CD-ROM in zip files, and will include text files describing the installation. Mark has also managed to convert the sounds from the original game for the Psion and the appropriate zipped files will also be on the CD-ROM. Be warned, however, the sound files take up an extra 68KB of memory.

And while we are on the subject of games (not that I waste my time with them, of course) those interested in real-time strategy games might like to check out www.greatape.com.

This company has produced a game called 'No Man's Land' (don't email me if you think the name is politically incorrect).

■ Easter all year round

This column has been Palm-light for a while and that's because no-one is emailing me with Palm problems or tips. To try to encourage participation from the Palm community, what about an Easter egg?

The Palm has several, but my favourite is one that has foxed people for some time.

Very occasionally, people would see a taxi cab run across the screen. This event was so rare that people who hadn't seen it (but were avid Palm users) called into question the veracity (and, indeed, sanity) of those who claimed to have been visited.

All in all it began to sound like alien abduction territory before Dale Gass, using Copilot's disassembler and debugger finally tracked it down. He then wrote a utility called Taxi, which enables the phenomenon to be seen. This comes with a set of instructions that works, but requires the date to be altered.

The following is an adaptation that seems to work on my Palm V without the need for date changes:

Open up Preferences and choose General.

Draw a small anti-clockwise circle on the screen, just above the calculator silkscreen button. If you make it small enough an Easter Egg should appear on screen.

Swap to another application, press and hold the Page Down button and draw a line from the middle of the Graffiti input area to the left-hand edge of the screen. Your pen should pass between the Applications and Menu silkscreen buttons.

Now it has to be admitted that the taxi is a little small, so we've shown an enlarged version so you know what to spot (*see previous page*).

Taxi and Dale's text file will both be appearing on a future cover disc.

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the PDAs column. Contact him via the PCW editorial office, or email pda@pcw.co.uk

The KISS of life after death

Chris Bidmead finds solace in the philosophy underpinning Unix as he begins to rebuild his network.

I'm more than usually late delivering the column this month. This is basically because I've just suffered a death in the family – the family of servers on my network, I hasten to add.

I don't want to bore you with all the details, but a faithful old Novell NetWare machine that had been steadily running since mid-1994 finally took a dive, and sunk my text-retrieval database with it.

Yes, I'm fully backed up, thanks. But rebuilding the data into something workable can take a sizeable chunk of time.

Actually, I will bore you with a few details, because the exercise gave me a practical insight into some of the philosophical underpinnings that justify this column's existence.

The original justification for running a NetWare server on my Unix-based network was that I'd be able to write about how Unix interacts with other environments. And the older 3.x version of NetWare I'd loaded certainly did a great job of making use of old 486 hardware with a mere 16MB of RAM.

Well, as we discovered in this column about five years ago, the Unix-to-NetWare link turns out to be simple to set up (rather easier than connecting a DOS machine to NetWare, in most cases). Indeed, it was so trivial that I can't recall getting any email enquiries about NetWare for a very long time. So, not much to write about there.

As far as possible, Unix works on the KISS principle (Keep It Simple, Stupid)

As to the hardware economy of NetWare, it's true that the AST Premium SE 4/33 server was only modestly endowed, but it was also very large, hot and noisy. Back in the days when this was a catch-all '32bit' column, the AST had been the playground for my preliminary ventures into Unix. (Incidentally, it was then, in early 1994, that I first wrote in this column about what I called 'The Linux Conspiracy'. There's been a sudden spate of letters from readers around the country asking me why I've said nothing about Linux.)

At the time, the AST's 'roomy 512MB hard disk' was plenty for what I was doing, but for NetWare I augmented it with a 'gigantic' 1GB DEC SCSI drive, thoughtfully donated by James Wickes, managing director of Ideal Hardware. That's the drive that took a dive last week. I should have been warned by its steadily rising noise level.

▲ A Unix-to-Netware link is simple to set up

The only reason I put up with the AST/NetWare combination for so long was that it has been utterly trouble-free, a tribute to AST's build quality, and to a Mormon from Utah called Drew Major.

Drew was the team leader of a group of three programmers known as 'The SuperSet' that put the Novell network operating system together back in the early 1980s.

I met him in Geneva in 1991 and we had an afternoon-long chat about operating system design in general, and how and why he'd come to write NetWare. I understood how it was that NetWare achieved such a magnificent performance.

On an architectural level, Drew had decided to dispense with any semblance of virtual memory, running everything in RAM rather than augmenting the memory with swap files or partitions. Very unfashionable, that. The rival network operating system, LAN Manager from Microsoft, regarded virtual memory as canonical and paid for it with a limp performance that earned it the industry nickname the 'LAN Mangler'.

Similarly unfashionable, NetWare ran everything in the supervisor mode of the processor, giving every process intimate access to the whole system. Yes, there was a password-protection system designed to prevent users messing with the entrails, but this was only a layer on top of what was, effectively, one big kernel that hooked applications (NetWare Loadable Modules, or NLMs as they were called) inside it.

Drew had also hand-coded the core kernel code at assembler level, thinking the execution path through instruction by instruction in a way that tied NetWare remorselessly to the Intel processor. Again, this was against all the best practices of operating system design. But the thing worked magnificently, and dominated the server side of the PC industry for a decade.

Arguably, it went wrong for Novell when it began dispensing with Drew's eccentricities. NetWare 4, for example, introduced protected mode NLMs,

▲KDE runs KMid arguably a very classy MIDI-player

which slowed down the operating system dramatically.

The Unix column isn't the appropriate place for a eulogy to NetWare, but I believe in credit where credit is due. By the way, my *Chambers Dictionary* gives 'eulogy' as 'speech or writing in praise of a person, etc, esp funeral oration...'

This may not, however, be NetWare's funeral as far as this column is concerned. Yesterday I re-established my text-retrieval data on the Windows NT server, which is running the Topic database software from Verity. Rather than haul the data across the network, the Verity software can now digest it locally.

You might think that this ought to speed things up. Actually, it doesn't. Fetching the data from Windows NT's local drive D: seems to take literally more than five times as long as when it previously collected it down the thin Ethernet cable from the old 486 NetWare box. Drew certainly knew a thing or two about fast file delivery.

So? Philosophically...

You'll gather from the above that NetWare 3.x was the almost exact antithesis of Unix. But arguably they had one thing in common. As far as possible, Unix operates on the KISS principle (Keep It Simple, Stupid).

NetWare 3.x was inherently very simple indeed – like Linux, the core fits on a single floppy disk with room to spare. This was a problem for Novell CEO Ray Noorda, who was trotting it off to market for something like $2,000 (£1,250) a shot.

Noorda's genius was to dress up NetWare not merely as 'a product' – a heavy red box packed with an armful of serious-looking manuals – but also as a way of life, with the invention of the Certified NetWare Engineer – CNE), backed by an elaborate exam system and certificates to stick up on the wall. The whole thing became bigger than Scientology (which it closely resembled) and it made Noorda a billionaire several times over.

Novell's genius was to dress up NetWare not just as a product but as a way of life

Does any of this sound familiar? It should. Bill Gates re-ran the entire NetWare story when he got his hands on what became Windows NT at the turn of the decade.

And this is why Linux is so worrying for Microsoft. It's not that Linux is somehow 'better' than Windows NT (as Microsoft has shown, it's not hard to rig up a benchtest that demonstrates Windows NT's superior performance, although you have to juggle with some rather unlikely parameters to do this). It's not even an issue of the relative product costs to the end user. It's that Linux is how we do software in the Internet-informed, cast-your-bread-on-the-waters 1990s.

It strikes me that Windows NT and all that MCSE (Microsoft Certified System Engineer) paraphernalia belongs to the disconnected, competitive spirit of the 1980s. And customers are starting to catch on.

Router outage

I'd love to tell you that the NetWare fiasco was the only trouble I had last week. But that wasn't as bad for an aggressively active Unix adventurer as my Internet connection going down and resolutely staying down for the next four days while I scrabbled away trying to rig up a solution.

Divine punishment, probably, for a rather pleasant press conference at the

Box 1

Name: gpm Relocations: (not relocateable)
Version: 1.17.7 Vendor: (none)
Release: 1mdk Build Date: Mon Apr 12 20:08:36 1999
Install date: Mon Jul 19 18:12:19 1999
Build Host: vador.mandrakesoft.office
Group: System Environment/Base
Source RPM: gpm-1.17.7-1mdk.src.rpm
Size: 454112 License: GPL
Summary: A mouse server for the Linux console.
Description: gpm provides mouse support to text-based Linux applications like the emacs editor, the Midnight Commander file management system, and other programs.
Gpm also provides console cut-and-paste operations using the mouse and includes a program to allow pop-up menus to appear at the click of a mouse button.
Gpm should be installed if you intend to use a mouse with your Linux Mandrake system.

beginning of the week with the nice people from Altec Lansing. It ended up with me walking away with a 'press sample' of the ACS45.1 PowerCube Computer Speaker system.

It's a three-piece system, with two small satellite speakers for a crisp stereo image and a powerful sub-woofer to give you a solid, rounded base. It's the closest to real hi-fi I've ever heard from a computer system of mine. (I'm sitting here wrapped in Beethoven's Opus 132 in A minor as I write this – and the wife's just come in to complain it's too loud.)

Altec Lansing's timing was great because I'd just got round to installing the new sound stuff that comes with the Linux 2.2x kernel. Well, to be strictly accurate, my mate Robert Kusi, the one-time window cleaner, turned Unix guru, who has starred in this column before, did the installing. The new satellite speakers go either side of my monitor, and I decided to put the sub-woofer on my desk some way back from the monitor. I perched my ZyXEL Prestige 2864I ISDN router – another long-time star of this column – on top of the sub-woofer, just nicely in my line of sight so I can keep an eye on the LEDs which tell me what's connected and when.

An hour or so later the router lights twinkled out and the thing went into 'Norwegian Parrot' mode. Happily, Paul Lynch and his wife Liz from P&L Systems who'd set me up with the router originally, back in October 1997, came to the rescue with a spare the following day. The spare mysteriously failed again within hours of my getting it going.

I'll conclude that particularly painful story next month. In the meantime, if you have a three-speaker system with a sub-woofer – put the sub-woofer on the floor as the manufacturers suggest. And keep floppy disks and delicate electronic equipment – particularly if it relies on FlashRAM – well away from the sub-woofer's powerful magnetic field.

Linux is Unix, which means it's not like Windows. It needs a different mindset

Notes for neophytes

I'm still being inundated with enquiries from beginners struggling with Linux, who'd just like a handle to get them started. Believe me, I still remember the feeling from my own early ventures when I first installed Linux five years ago.

Linux is Unix, which means it's not like Windows. It needs a quite different mindset – two different mindsets, in fact: one for Unix and one for free software. Rather than wander off on more philosophical ramblings, I'd better just direct you to a splendid, long article on this general subject by Charles Mann at http://theatlantic.com/cgi-bin/o/issues/99aug/9908linux.htm.

For a practical appraisal of what you're up against Unix-wise, there's a nice one-page introduction to Unix at http://www.dartmouth.edu/~unix/classes/unix1/slides/print_pages.html.

◄MAXWELL IS A FREE SOFTWARE WP BUT IS STILL IN BETA

'What?'

A frequent question that crops up is: 'What have I got installed on my system, and what can it do?' This can be a 'Big Question', and you might need to know rather a lot about your system to find out (a Catch-22 of the kind Unix folks refer to as 'Fun with Recursion').

But if you've installed Caldera's OpenLinux or Red Hat or SuSe, or any of their variants you're in luck. The standard package installation method for these distributions is RPM, and there are some very nice things you can do with it. The command 'rpm -qa' will query all the packages in the installation database and list their names.

Of course, it's not a lot of use knowing you have, say, some package mysteriously called gpm-1.17.7-1mdk on your system – you want to know what it does.

That's easy. Just enter the command 'rpm -qi gpm' (you don't need the version numbers or distribution ID), and you get something like *Box 1*.

But where exactly does it get installed, and how many files are involved? You can find this out easily by using the '-l' switch like this: 'rpm -ql gpm'.

By the way, you'll notice I've installed Mandrake (from www.linux-mandrake.com) on my main Linux workstation. This is an enhanced version of the standard Red Hat distribution, with a bunch of extra stuff. If you have room on your hard disk you can just install everything and then mosey around with RPM whenever you have a spare moment to find out what you've got.

One package RPM unveiled for me on my Mandrake system is Maxwell, a free software word processor that works in a way that should be familiar to Microsoft Word users. It claims to be able to read Word 6 files, but I couldn't get this feature to work. Maxwell is still in beta (and this is the debug version – hence all the error messages in the terminal window to the right of the screen). Things may have improved by the time you read this.

The Mandrake distribution (and Red Hat) comes with a choice of Gnome, KDE and a couple of other GUIs. Page 246 shows KDE, running KMid, the classy midi-player put together by Antonio Larrosa Jimenez <larrosa@kde.org>.

PCW CONTACTS

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

Warp feels web's weight

Terence Green mourns the passing of Warp development as IBM focuses on web-based applications.

There's been such a lot of talk about what will happen in the year 2000, but one thing that seems clear is that we won't see IBM releasing another Warp client.

Michael Cogman writes to say he hopes my premonition that Warp 4 is the last of the OS/2 clients won't come to pass. If only IBM can raise the profile of Warp a little, he adds.

Sadly, this isn't likely to happen. I went to IBM's annual developer bash, Solutions 99, where a company spokesperson made it clear that IBM's priority for OS/2 lay with the server versions which keep many of the world's largest businesses going. If you're wondering who these customers are, have a look at the large OS/2 customer list <http://rover.wiesbaden.netsurf.de/~meile/los2cl.html>. It makes for some interesting reading.

For IBM and its customers the Warp client is less important, so IBM isn't investing in any new development other than keeping it up-to-date with Fix Packs and device driver updates (By the way, a new policy of separating device driver upgrades from Fix Packs, allowing you to upgrade drivers without applying a full Fix Pack, should be in operation by now).

There are always rumours in the newsgroups about a new OS/2 client, but I've stopped believing in the possibility. From the presentations at Solutions 99, where IBM was at pains to convince ISVs everywhere that it could be everyone's 'plumbing company', it's clear that IBM sees its future as providing the services and applications that link web-oriented clients to servers. In this new eworld, a client can be almost any device, provided it supports common standards such as Java and XML – which, of course, the existing Warp client can do.

▲IBM DEVELOPERWORKS IS A NEW IBM PORTAL AIMING TO ATTRACT INDEPENDENT SOFTWARE DEVELOPERS

If you want to see where IBM is going the best starting point is the new IBM developerWorks portal at www.ibm.com/developerworks. Click on the AlphaWorks logo down in the lower right-hand corner. AlphaWorks acts as a clearing house for new technology from IBM research labs worldwide. The aim is to get emerging technologies out into the developer community and to gather feedback. If you're a developer and you like something that you see on AlphaWorks, you can contact the research team and get involved in the development process.

Even if you're not a developer, AlphaWorks is still a good place to see what's new. Web developers, for example, should look at Wapsody, an example of what IBM calls 'transcoding' technology. The Wapsody codename is a play on WAP, the Wireless Application Protocol, which is a set of common standards for wireless applications being developed by the WAP Forum.

Transcoding takes the standard HTML stream from a normal web page and adapts it to suit the small displays and limited bandwidth of devices such as mobile phones. It saves the web developer from having to code separate web pages for a variety of formats. IBM is a big WAP cheerleader – it was a founder member and has a seat on the board, but others are catching on. Microsoft joined the Forum recently.

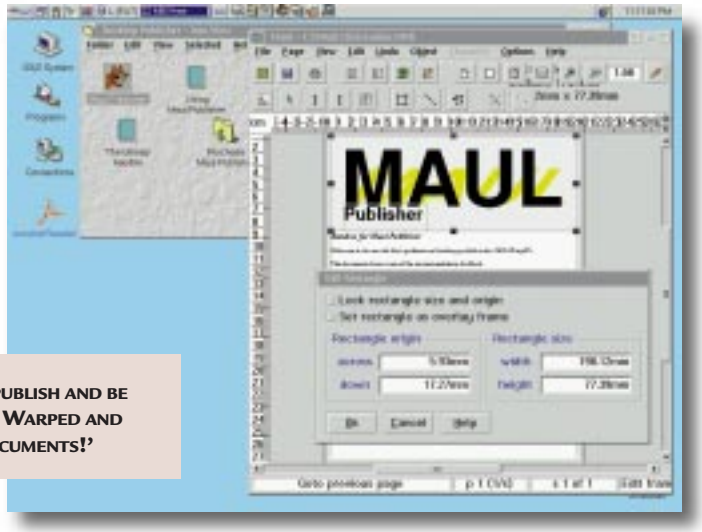
At the moment, the buzz around WAP is focused on mobile phones but the standards will apply to all wireless devices, and we can expect a plethora of application-specific appliances to emerge before long. Since Wapsody is a codename and has not yet been released at the time of writing, it may not appear under that name, but you can find it by searching for transcoding.

◄ ALPHAWORKS IS THE HOT SITE FROM IBM FOR COOL TECHNOLOGY SUCH AS TRANSCODING

Code pointers

Way back in June 1997, before the column's second birthday, Peter Koller sent me a diskette of OS/2 utilities, which were placed on the *Personal Computer World*

cover CD. Then, in May, Peter popped up again to say that he has produced the first ever DTP program specifically for OS/2, Maul Publisher. Check it out at www.bmtmicro.com or on Peter's website, La Maison des Anglais, at www.manglais.claranet.fr. However, I'm not entirely sure about the slogan that Peter appended to his email: 'Don't just publish and be damned... Get Warped and Maul your documents!' It might benefit from a bit of polishing.



▶'Don't just publish and be damned... Get Warped and Maul your documents!'

Getting GUI

Yet another GUI file manager, the Larsen Commander, is making its way towards version 1.0. This one's for the folk who fondly recall Norton Commander. Now up to its eighth public release, version 0.98, you can find it at http://home.sol.no/~leilarse/lcmd/index.html.

The fat lady has sung

If you have been wondering what happened to the OS/2 version of the Opera browser mentioned in a previous column, the original project went bang. Now the program has been restarted by OS/2 Netlabs <www.netlabs.org> – a co-operative effort which also works on Project Odin, the effort to get Win32 code working on Warp.

The end result of all this, says Adrian Gschwend, the webmaster at OS/2 Netlabs, is that: 'We're no closer to an OS/2 port [of the Opera browser], but it means Project Odin (aka Win32-OS/2) is more important than ever.'

Wheely useful

Got a wheelmouse? You need SCROLLMS.EXE which you can download from the Device Driver Repository at http://service.software.ibm.com/os2ddpak/index.htm. This only works with the mouse plugged into a real PS/2 port (not with any adaptors and a serial port). Make sure your mouse is plugged into the PS/2 port and working under OS/2 Warp 3 or Warp 4 before installing SCROLLMS.EXE.

▲Snowblind Open Source for Rio MP3 player control for OS/2

Looks okay, sounds okay

I've long wanted to do a round-up of audio/video support for Warp, but a lack of suitable hardware has prevented me from doing it. So, as a cheap alternative, here are several links to websites offering sound and video support. You can now get to the SoundBlaster AWE64 site from the Notebook/2 site at www.os2ss.com/users/DrMartinus/notebook.htm.

If you have a CD-R or CD-RW drive and want to use it under Warp, and you have $248 (£155) to spare, try RSJ CDWriter from www.rsj.de/stage/en/cd_os2.htm. A demo version can be downloaded from the website.

Proud owner of a Diamond Rio portable MP3 player? Want to use OS/2 as its host system? Look for the file RIO006-2.ZIP on Hobbes <http://hobbes.nmsu.edu>. This is an OS/2 port of the Ashpool Rio control program. More information about the program can be found at www.world.co.uk/sba/rio.htm.

Owners of Hauppage WinTV and Wincast PCI cards can go to www.wdi.co.uk/os2tv/download.htm to download the Abbottsbury Software WinCast OS/2 driver.

T&V HappyPlayer works for TV cards built on the Brooktree BT848 chip. Find it at www.os2.spb.ru/russian/projects/happyplayer/index_e.html under the name tvh_xxxx.zip. It's PAL/SECAM only for now and has been tested with the AIMSlab Video Highway Xtreme, FlyVideo 98 and AVER TVPhone98 cards, but it should work with others too.

Still in beta, but it could be out by the time you read this, the MIDI Station Sequencer offers Digital Audio Sequencing using SEAL (no relation to the Monty Python musical mice sketch – I hope!), waveform editing, special effects, multi-track sequencing, and a rhythm editor. Download it from www.dinosoft.it/~midistation/.

Looking for a music database? Have a look at MusicBase/2 'EarlyPreview'. Not all of the features are included yet, according to the author, and the preview version has a German interface <www.warphouse.de>. We're told that the released version will be in English.

Last call

We apologise for the absence of material on the cover CD. Last-minute changes by people in suits leaves us with no space for OS/2 stuff again this month. But watch this space!

PCW CONTACTS

Terence Green welcomes your feedback on the OS/2 column. Contact him via the PCW editorial office or email: os2@pcw.co.uk

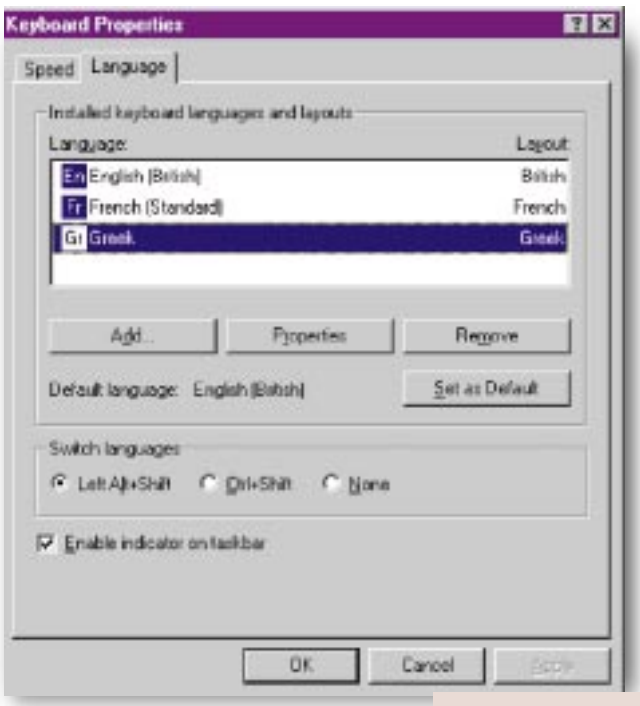
There's no place like Word

Tim Nott on Place Bars, Visual Keyboards, creating calendars and the SDI vs MDI debate.

Sometimes I don't know why I bother. In August's column I mentioned that I'd found a macro to customise the Place Bar in the Word 2000 File Open/Save dialog, but that it had time-expired. So I then explained how to do it with a spot of rather tedious registry meddling. Since then, Kris Larner has kindly emailed to inform me that the Microsoft Office website now has the WOPR 2000 Place Bar Customiser available for download. So, it seems that someone at Microsoft now realises that customising the Place Bar is rather a useful feature. Perhaps they've been reading this column. But if you want to customise without getting your anorak muddy, then go to: http://officeupdate.microsoft.com/downloadCatalog/dldWord.htm.

While I was at the Office update site, I took the opportunity to download the Microsoft Visual Keyboard. Regular readers will know that multi-lingual typing is a regular topic in this column. Just to recap, the core TrueType fonts in Windows 95/98 do not just have the Western European character sets, but Greek, Cyrillic and Eastern European as well. Some fonts also have Arabic and Hebrew characters. To gain access to these you can place them a character at a time from Word 97's Insert, Symbol menu. While this is fine for, say, putting the odd Pi in a maths treatise, it does make it rather tedious to quote chunks of Aristotle in the original. The other approach is to install the relevant Windows keyboard driver. Go to Control Panel, Keyboard, Language and you'll find you can add languages, and with the 'Enable Indicator' option ticked, switch between them when typing. You'll get a little icon by the Windows clock that pops up a list of available languages. This works in Word and WordPad, but I have yet to try it with any other word processors.

The only snag here is that having switched keyboard layouts, you can have an exciting time guessing which characters are mapped where. In Greek, for example, Alpha and Beta are obligingly mapped to the letters A and B, but Omega and Theta take some finding. The Microsoft Visual Keyboard shows all the alphanumeric keys on screen, corresponding to the currently selected language and layout. You can either use this directly with the mouse, or as a map-to-keyboard input.



▲ ADDING LANGUAGES AND LAYOUTS TO YOUR KEYBOARD

Creating calendars

I don't know if you ever have the need to create simple calendars, but reader Chris Kirby has created a useful macro that asks for a start date, a finish date, and the number of days per page. It then creates a table with the date and day in a narrow left-hand column, and plenty of space for writing in appointments or whatever in the right-hand column – all neatly formatted and ready to print out.

It seems someone at Microsoft now realises the Place Bar is a useful feature

SDI vs MDI

In August's column I asked if anyone out there liked the new single-document interface (SDI) in Word 2000. Much to my surprise, several people do. Thurstom McDougle points out the advantage of the SDI when using multiple monitors. Andy Baker likes it on the grounds of elegant use of the taskbar, consistency with Internet Explorer, document-centred thinking and ease of use. Peter Johnson concedes that it helps inexperienced users who wonder where

▼ THE ALPHA AND OMEGA OF KEYBOARD UTILITIES

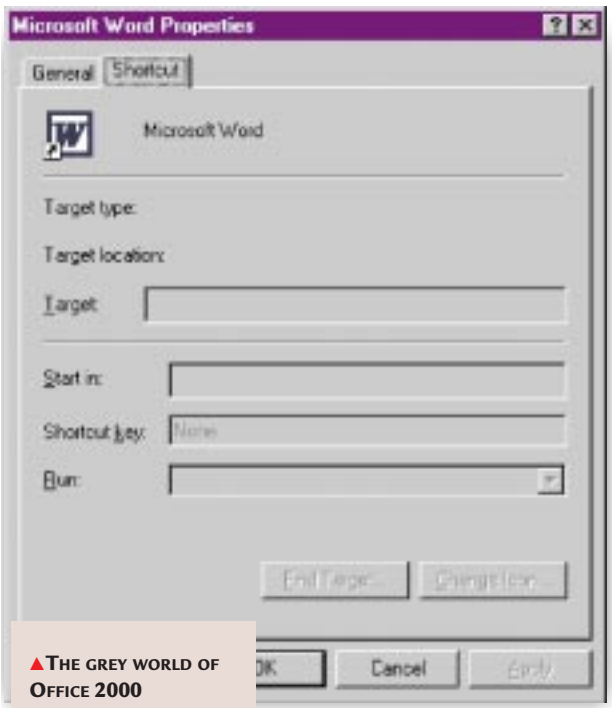
Questions & answers

Q Having at last decided to upgrade from my trusty old version 2.0 of Word, I installed Word 97, but I was startled to find that my documents quadrupled in size. My new 6GB hard disk doesn't seem so big now. Looking at the files with Notepad, however, most of the extra seems to be empty space. Any ideas on how to keep files down to size? Is there an option I have failed to find?

JOHN NUTTALL

***A** First, bear in mind that, in general, application data-file sizes can only go up as new features are added. Second, you've skipped two generations, so the increase is going to be accentuated – though experimenting with some of my old Word 2 files shows a just-under-threefold increase when saved in 97 format. Third, one reason that Word 97 files are substantially bigger than Word 7 and earlier, is because of Unicode support. Unicode characters, such as the euro symbol and the Greek character set, take two bytes per character rather than one. Finally, (and I quote a Microsoft spokesperson) Word files are 'mostly air'.*

On a more positive note, file size needs to be taken in the context of disk cluster size. If the latter is 32KB, as with a 2MB hard disk partition formatted with FAT 16, then any file under that will take up the same amount of disk space. Any file over 32KB, but under 64KB will occupy 64KB of disk, and so on. Two actions you can take to minimise file size are: to link, rather than embed, graphics files (particularly if the graphic is re-used in the same or other files); and to turn off 'Fast Saves' from the Tools, Options menu.



▲THE GREY WORLD OF OFFICE 2000 SHORTCUTS

Q I've recently installed Office 2000, and noticed that the shortcut for Word that gets installed to the Start Menu has its properties either blank or greyed out – as are the other Office program shortcuts. This is a pain, as I've always used the /n switch for starting Word to avoid getting a blank document.

ROGER BECKNER

***A** I agree, and I too have always used the /n switch. Practically all my new documents are based on a template other than Normal.dot, so it's a nuisance to get a superfluous blank document when starting Word. The new-style shortcuts are necessary for the Install-On-Demand and Detect-And-Repair features of Office 2000, and route their commands via the Windows Installer. There is a way of customising these with the Custom Installation Wizard, which comes with the Office Resource Kit. A simpler method is to create new shortcuts by, for example, right-dragging Winword.exe on to the Desktop or Quicklaunch bar then selecting 'Create Shortcut here' You'll then be able to edit the properties as usual.*

Q When I open a new blank page in Word 97 it is always in full page mode whereas I like to work in page width. Despite trying to save Normal.dot as I want it, I cannot make Word do what I want.

LASER BILL

***A** Word stores the view settings in two ways. The default view is stored in the Windows registry – or, in earlier versions of Word, in WINWORD.OPT. In addition, view settings are saved with each document. The settings saved in the registry are those current when Word was last closed. So the simple answer is to create a new, blank document, get the view settings the way you want them, then close Word. They should then 'stick' for the next Word session.*

Q Can you tell me how to save values in Word envelope printing? I can change the position of the address on an envelope, but every time I print a new envelope the default 'auto' is back in place.

ROGER TERRY

***A** The best line of attack is to edit the Envelope Address style (Format, Style, List All Styles, Modify...). As well as being able to change the font and spacing, you can also redefine the indent and frame positioning. Make sure the 'Add to template' box is checked if you want the changes saved.*

their work has gone when they open a second document over the first, but reckons it should be an option. Meanwhile, Mark Puddephat likes SDI as it lets him switch between documents using the Alt + Tab keys.

However, Mike Woods is a staunch multiple document interface (MDI) man. He suggests that Microsoft uses the taskbar to show just one Word icon, which pops up a list of open documents when clicked. I rather like that idea.

PCW CONTACTS

Tim Nott welcomes your comments on the Word Processing column. Contact him via the PCW editorial office or email wp@pcw.co.uk

Excelling at work

Stephen Wells says that the best way to summarise your Excel worksheets is with a PivotSheet.

Richard Gowthorpe has recently emailed me with a question about summaries: 'I have 100 Excel 97 workbook files, each with 12 worksheets, one for each month of the year. Each worksheet has a list of names down column A and items across row 1. At the end of each workbook there is a summary of the worksheets with names down column A and months across row 1.

'This summary of the sheets in the workbook is easy to produce using one formula in cell B2, which I can drag out across the table.

'My problem is I need a summary of the 100 workbooks and when I drag out the initial formula it doesn't increment properly.'

The answer to that, Richard, is that Excel doesn't have enough information to complete the task. May I suggest you approach it in another way?

First, create your list as in Fig 1. Create a database field for each piece of information: the names, the items, the months, and the data (I've used sales recorded in pounds). Don't total or summarise anything on this worksheet.

Now create a PivotTable. Just click in the list and choose Data, PivotTable Report, and then follow the directions of the PivotTable Wizard.

In Step 3 you'll find a button for each of your fields stacked on the right and places for them to go on the left. You can then drag the field names into the places of your choice. If you drag Name to Page, Item to Row, Month to Column and Sale to Data, you'll automatically produce the PivotTable shown in Fig 2. Then simply add your choice of formatting.

The figures shown are the totals for all the names. If you want the results for just one person, pick the name from the automatically-created dropdown list of names.

The beauty of using a PivotTable is that you can summarise your data in so many different ways. And you don't have to create a single formula to produce the results.

FIG 1 IT IS EASIER TO MAKE SUMMARIES OF DATA IN EXCEL IF YOU FIRST CREATE A LIST WHICH INCLUDES ALL OF THE INFORMATION YOU WILL NEED

	A	B	C	D
1	Name	Item	Month	Sale
2	Peter	A	Jan	110.10
3	Richard	B	Jan	65.10
4	Robert	C	Jan	95.10
5	Bill	D	Jan	150.10
6	Harry	E	Jan	25.10
7	Henry	F	Jan	85.10
8	Peter	B	Feb	25.00
9	Richard	C	Mar	150.00
10	Robert	D	Apr	95.00
11	Bill	E	May	65.00
12	Harry	F	Jun	85.00
13	Henry	G	Jan	110.00
14	Peter	C	Feb	65.30
15	Richard	D	Mar	65.30
16	Peter	A	Jan	76.06
17	Richard	B	Feb	74.86
18	Robert	C	Mar	73.65
19	Bill	D	Apr	72.45
20	Harry	E	May	71.25

The beauty of PivotTables is that they summarise data in so many ways

FIG 2 A PIVOTTABLE PROVIDES SUMMARIES OF THE INFORMATION IN FIG 1 IN MANY DIFFERENT WAYS

	A	B	C	D	E	F	G	H
1	Name	(All)						
2								
3	Sum of Sale							
4	Item		Feb	Mar	Apr	May	Jun	Grand Total
5	A							£166.16
6	B		99.86					£233.79
7	C	95.10	132.93	223.65	61.62			£513.30
8	D	150.10		131.73	167.45	60.41		£509.69
9	E	90.33				136.25		£226.57
10	F	85.10	64.02				155.04	£304.17
11	G	110.00		62.62				£172.82
12	Grand Total	£850.73	£296.81	£418.20	£229.07	£196.66	£155.04	£2,146.51

(All)
Bill
Harry
Henry
Peter
Richard
Robert

Running a macro

Trevor Birkett writes: 'I have some experience of programming and have designed a user form and written code for the various controls on the form. But the only way I can activate the form is by going into the VBA editor to run it.

'There must be a simple way of activating the form from a button, but I cannot work out how.'

All you have to do, Trevor, is right-click on your button (or other drawn object). On the short menu choose Assign Macro. You have then assigned the button to your macro.

Another year, another sheet

If you work regularly with databases, the chances are that you'll soon need to create some new worksheets with years across the top row – 2000, 2001 and so on. Here's a little macro for Excel that's easy to adapt to your needs. Open a new workbook and save it. Then press Alt + F11. In the drop-down box at the left of the toolbar, select Module. Then in the new window at the right of screen enter:

```
Sub SetUpTable()
ActiveSheet.Activate
For theYear = 1 To 5
Cells(1, theYear +
1).Value = 1999 + theYear
```

Questions & answers

Q Is there a limit to the number of functions (like IF, MIN, SUM, and so on) which I can nest inside each other?

A *In Excel yes, the limit is seven functions. But it's not a problem. Just break your formula down and put parts of it in different cells. Then refer to the cell addresses in your ultimate formula.*

Q For my Excel invoicing worksheet, how can I calculate the last day of next month?

A *If you haven't done so already, install the Analysis ToolPak Add-In from your Excel or Office CD to make the EOMONTH function available. Then enter =EOMONTH(TODAY(),1). If the last argument is zero, it gives the last day of the current month. Minus 1 gives the last day of the previous month.*

Q How can I define the title headers for a long Excel worksheet?

A *Choose File, Page Set-up and the Sheet tab. Select 'Rows To Repeat At Top' and then, on the worksheet, highlight the row to use as titles. You can select multiple adjacent rows. You can also do the same for columns using the next option on that dialog box.*

Q What's the fastest way of seeing a list of defined Names on an Excel worksheet?

A *Actually, Names are used throughout the whole workbook. You can only use a Name once. But to see the defined Names, click the Name Box down arrow. This is to the left of the formula bar and by default displays the address of the cell where the mouse cursor is – unless that individual cell has a Name.*

Q How can I enter stock prices using fractions without having to paste in symbol characters?

A *The easiest way is to just leave a space between the number and the fraction. If you enter 12 7/8, Excel will display that, providing you remember to include the space. If you want a fraction to appear on its own in the cell, enter 0 (space) 7/8, or Excel will assume that you want to display a date and show,*

Click the floppy disk icon (Save) and close the whole VBA window. Back on the first worksheet, choose Tools, Macro, SetUpTable, Options. In the Shortcut Key box, enter a cap Y. Then close the Macro box.

If you click on your new worksheet and press Ctrl + Shift + Y, the macro will enter 2000 to 2004 in cells B1 to F1. Obviously to add more years, you can increase the number five in the third line of the macro.

Similarly, to change the starting year, substitute another year for 1999. To alter the font colour, use another RGB set. The first number is red, the second green, the third is blue. Hence the function name, RGB.

THE WORD ABOUT OFFICE

Woody Leonhard is the publisher of *Woody's Office Watch*, the Microsoft Office information service available on email subscription, and Ed Bott is the senior editor of the US magazine *PC Computing*. Together they have authored an encyclopaedic 1,500-page work covering all the applications in Office 2000.

Even though you may not have Excel 2000 yet, at £29.49 *Special Edition Using Microsoft Office 2000* is still good value, for two reasons.

First, the last major change in Excel was from Excel 95 to Excel 97. Excel 2000 includes extra help and online facilities, while the PivotTable features have also been greatly improved. Apart from that, it's important to remember that any hints, tips, shortcuts, workarounds, and insights into Excel 2000 apply equally to Excel 97. Woody is the recognised source for this kind of information and this book is packed with it.

Second, the price includes a CD which has a complete searchable electronic copy of the book, plus special chapters from Ulrich and Blattner's book on Excel 2000, lots of clip art, a trial version of MS Project 98, Excel recovery software and other utilities.

At the time of writing, Computer Manuals is offering a discount, which makes the package even better value.

PCW CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Contact him via the PCW editorial office or email:
spreadsheets@pcw.co.uk

◆ *Please do not send attached files unless they have been requested.*

Computer Manuals can be found at
http://computer-manuals.co.uk

Solving mobility problems

Conflicts from having disconnected data on mobile databases can be resolved, says Mark Whitehorn

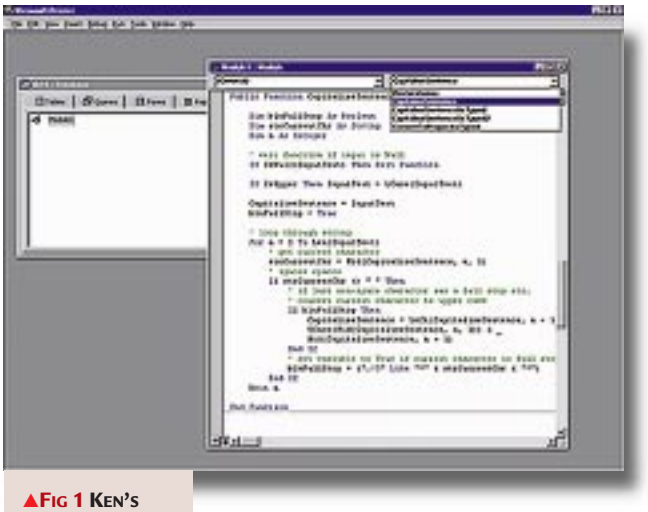
We've been looking at mobile databases and the final area I'll cover is how to resolve conflicts which result from having disconnected data. I once wrote a 4,000-word paper on the different classes of error that can occur under these circumstances; it was rather stuffily entitled: *Supporting Data Integrity in the Mobile World*. I can either duplicate that here (which would, trust me, be very boring) or provide a few examples to give you the flavour.

Let's say a travelling salesperson finds a new customer and prepares to take the first order. On the server back at the office, there is a set of complex business rules that 'validates' a customer as acceptable. These rules involve processes such as connecting to a remote database and performing a credit check. The problem is that, at the PDA, we cannot get confirmation that the customer details are acceptable, although experience suggests that most customers pass the checks. So what can you do?

One answer is to split a transaction into separate stages. Salespeople are allowed to add a customer to the CUSTOMER table and take the order without the credit check. When the data is synchronised back to the server, the check is performed. Only if a conflict occurs is the matter flagged back to the salesperson the next day, perhaps instructing them to contact the customer and ask for payment before the goods can be delivered. The order can then be held until the payment is cleared. This solution requires that the RDBMS on the PDA is intelligent enough to implement these additional business rules.

As I say, there are lots of potential problems like this. However, when you look at them you discover that the solutions tend to concentrate on four main areas:

- Where the business rules are held
- Record vs field level uploads



▲FIG 1 KEN'S CODE IN A MODULE

- The way in which the data is partitioned
- Vendor tools.

Record vs field

Some systems detect which records have been edited on the PDA and move each edited record in its entirety to the server. Others move only the data from the specific fields in each record that has been edited. The latter sounds more sophisticated and leaner (less data moving around means faster uploads), but field-level uploads permit a range of new problems to become possible, particularly when two people edit different parts of the same record. The optimistic way of looking at this is that if you have control of the upload mechanism you can fine-tune the system to provide the results you want.

'Replication' means data is stored and manipulated in more than one location

The way the data is partitioned

'Replication' means that data from a database is stored and manipulated in more than one location (for example, on the server and on PDAs). 'Partitioning' means splitting the data up so that not all PDAs receive all of the data that is stored on the server. Render unto Caesar that which is Caesar's and unto the salesperson in the east, those sales records which refer to the eastern region. Intelligent partitioning can reduce your synchronisation problems dramatically.

Vendor tools

If the PDA, for example, is used to create new records, it is very helpful if the RDBMS engine on the PDA is capable of generating primary key values that are guaranteed to be unique. Some do, some don't – it depends on what the vendor has provided.

Just like last month, there are no simple answers to these challenges; on the other hand the challenges are genuinely interesting. The most important tool you have is your common sense.

Some news is no news...

SQL Server for WinCE (Microsoft's answer to Oracle Lite, DB2e and so on) was announced at the WinCE developers' conference in Denver, but the details were horribly sketchy and no-one was willing to provide more. So I waited for Tech Ed and cornered Cynthia Sample who works on SQL Server in Seattle. She said that the first beta is expected in Q1 next year, and that the specifications for the product haven't even been frozen, so there really is no news as yet, we'll all have to wait and see. However, she did let slip that Microsoft is sensitive to accusations of 'software bloat' so the SQL Server team is very keen to keep it as trim and slim as possible. Whether they can get it under the 50KB of DB2e remains to be seen...

...Other news is interesting

Did you know that IBM is the official 'Information Technology Supplier and Consultant' for the annual Wimbledon tennis championships? OK, maybe you

did. But you may not know that this year DB2 for Linux was employed on-site for 'the scoring and tabulation of the match statistics, complete with live scores, draws, completed matches, and player bios'. I knew some players were like machines, but I didn't know that any were fitted with a BIOS.

Beware the politically autocorrect

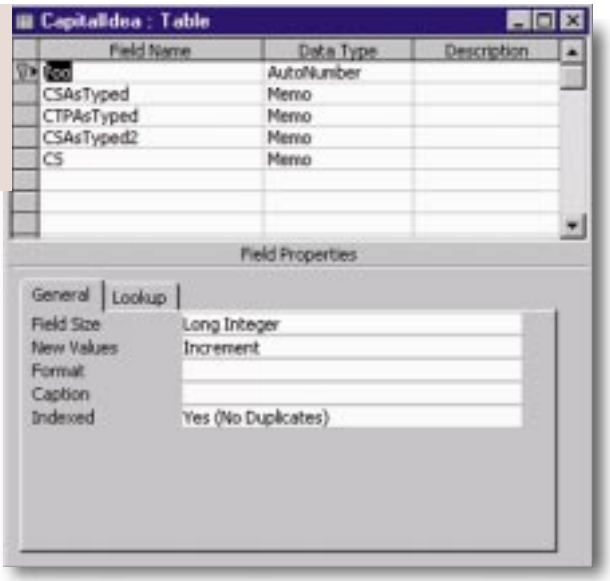
The following was sent in by the ever-helpful Ken Sheridan <KenSheridan@compuserve.com> and is worth knowing about. He writes: 'A contact used a structured primary key field in a table where one of the elements was a three-character group separated from the rest of the ID code by a space. One of the codes was ACN, but as soon as this was entered it became CAN. Setting the control's AutoCorrect property to False cured it.'

Until then I'd never thought about this property when designing forms and had always left it as the default of True, which is usually fine for free text fields, but could be disastrous in cases such as the one above. With a long string of characters I'll bet nine out of 10 people wouldn't even notice that two or three had changed.

A capital idea

Ken is a regular contributor to the column and also sent the following advice: 'A while ago you published a function for capitalising characters as typed. Someone asked me if I could come up with a variation for capitalising the first letter of each sentence in memo fields. To do this, try putting the code in a module and calling it from a control's KeyPress event handler [Fig 1].

▶ LINKING SECTIONS OF CODE TO MEMO FIELDS



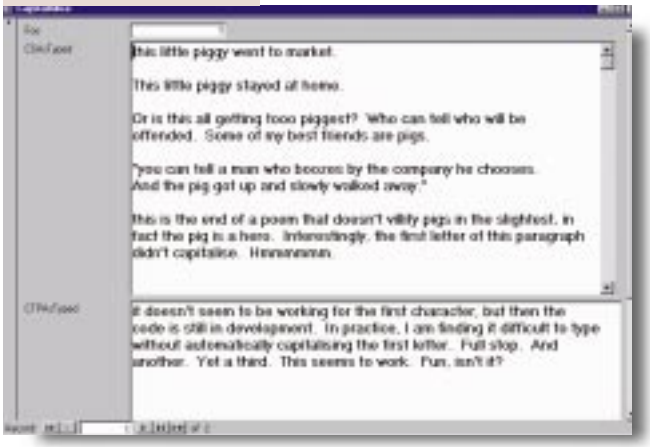
It works pretty well but has one peculiar piece of behaviour I can't fathom at all. In some circumstances, when you are editing existing text, the first character of a sentence is only capitalised when the next full stop or space is entered. I can't for the life of me work out why. It makes no sense whatsoever, as the KeyAscii value should only be passed back to the current character, not one several places before it.'

Ken eventually sent four sections of code, together with more information, all of which will be on a forthcoming CD-ROM as a text file and are also included in a working Access 97 file – DBCNOV99.MDB. The first two have been linked to two memo fields.

I knew some players were machines, but I didn't know any were fitted with BIOS

Those who are so inclined can have a play and try to work out what is wrong. I will admit to not having done so yet, I just cut and pasted the code and got it working. But it looks interesting.

▼ ILLOGICAL: AT TIMES ONLY CERTAIN LETTERS GET CAPITALISED



Working days

Yes, this topic is still running, but this time one of the solutions is in Delphi. I'm always delighted to get solutions to problems produced in RDBMSs other than Access. Dave Albiston's solution will also be in the text file on a future CD-ROM.

Neville Kuyt came up with an alternative that uses a table called calendar, which has two relevant columns: date and working_day. Date is a date, and working_day is a flag which is 1 if it is a working day, and 0 if otherwise. He includes code as well – wait for the text file. His solution is based on SQL Server but his approach is applicable to any RDBMS, including Access.

A temporary home

Most people are aware that splitting an Access database into two MDB files (one for the tables, the other for the forms, report, etc) is often a good idea. If you have multiple users, then the former can be placed on a file server and a copy of the latter can be stored on each user's machine. Even if the database is single-user, splitting can still be an advantage because you can tweak the interface without disturbing the data. It also means that the MDBs have a greater chance of staying small enough to transfer to floppy disk.

However, if your database uses temporary tables, there can be some advantage in splitting the database into three MDB files and placing the temporary tables in the third. The MDB file can then be compacted regularly, perhaps every time it is opened. This process should be much faster than if the same tables were in a folder with the data.

PCW CONTACTS

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

Seeing the dots for the eyes

Gordon Laing stops your head exploding when trying to get the best out of your scanner.

Scanning images has never been easier, with scanners incorporating automatic exposure, along with presets for colour and resolution settings. However, as anyone who is into photography knows, automatic settings may make life easier, but they're rarely foolproof. One day, sooner or later, an image will come along which demands a little manual intervention.

Once you've got your hands dirty, you'll also realise there's very little to it, and your results and satisfaction will improve by leaps and bounds. To coincide with this month's scanner group test, we've looked at how to get the most out of your scanner, particularly when it comes to capturing photographs for inkjet printing.

Resolution basics

If you had to name just one scanner specification, it would have to be its resolution. Measured in dots per inch (dpi), this literally refers to the amount of fine detail that can be captured. Surely it makes most sense to shop for the scanner with the highest resolution, or perhaps match this number with the resolution of your printer?

Sadly, it's not that simple, and manufacturers rarely help by emblazoning often meaningless numbers on their advertising material, just to give an impression of quality.

The key figure to look out for is optical resolution, and this will typically be 300, 600 or 1,200dpi for an A4 flatbed. Most scanners, however, quote resolutions of over 2,400dpi, and some up to 9,600dpi. Reading the small print, these usually refer to interpolated figures.

Interpolation is a technique used to increase digital resolution by averaging adjacent values and inserting this new number in between. Let's say your digital file has a 10 and a 20 next to each other. Two times interpolation would average them both and typically insert the number 15 in the middle. Five times interpolation would insert the average numbers 12, 14, 16 and 18, significantly increasing the original resolution.

◀HERE ARE THREE 3 X 2IN IMAGES, SCANNED AT DIFFERENT RESOLUTIONS: 300, 150 AND 75PPI, WITH RESULTING FILE SIZES OF 1.69MB, 432KB AND 108KB RESPECTIVELY – AT WHAT POINT CAN YOU TELL THE DIFFERENCE IN QUALITY?

This is fine in theory, but in practice interpolation is guessing numbers that may never exist in the original. In scanning terms, it's inventing detail that was never captured. The final effect can be variable.

With simple graphic logos interpolation tends to work very well, usually smoothing the edges of predictable shapes and lettering. However, in colour photography it tends to have little to offer. It's always worth experimenting, but in general, take interpolated resolutions with a pinch of salt and seek out genuine optical resolution.

The optical resolution of a flatbed scanner refers to the actual resolution of the imaging charge coupled device, or CCD. An A4 flatbed can capture a document eight inches wide, so an optical resolution of, say, 600dpi, would result in the CCD having 4,800 imaging sensors along its length. The CCD is fitted to a motorised conveyor, which passes it along the length of the document window.

By gearing this motor down, you can increase the vertical resolution and indeed many scanners are described as having 600 x 1,200dpi optical resolution. Again, the first figure is the one you should be looking at most closely. You can gear the motors to infinity, but they're of little use if the CCD isn't keeping up.

Which resolution?

If you've splashed out on a 600 or even 1,200dpi scanner, it's tempting to use its highest optical resolution settings – you've paid for them after all. However, this is rarely necessary. When choosing a scanning resolution you only need to know three things: the size of the original

image, the size you'd like it to end up, and the properties of your printer.

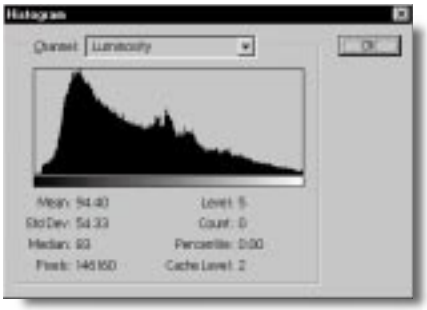
Starting with the third, it's worth running a few quick tests on your printer to see how many scanned dots it can actually make use of. A typical colour inkjet may be described as having 720 or even 1,440 dots of resolution, but in reality, these dots can only ever be one of a few tens or hundreds of different colours. Your scanner, however, is producing genuine full-colour dots, in potentially millions of different shades.

In order to simulate these full-colour scanner dots, a printer has to put several different dots of ink very closely together. When viewed from a distance, they appear to blend into one. Just look closely at any magazine and you will see how smooth multi-colour images are actually made up of a handful of coloured dots printed at different sizes.

So perhaps it's best to reconsider the ambiguous dpi rating. Printers genuinely deal with dots, so they can stick with it, but scanners should be described as having resolutions measured in pixels per inch (ppi). Many upmarket models already use this terminology. But if a printer needs to use many of its 720 or 1,440 dots to simulate just one coloured scanner pixel, what scanning resolution should you use?

The answer lies in experimentation. Make a 600ppi scan of a photo, and print it. Now make a 300ppi scan of the same photo and print that. Repeat with lower and lower resolutions until you begin to see pixellation on the output.

In our tests, we've found that most colour inkjet printers don't know what to do with more than between 150 and 200ppi scans for photographic output. Try it yourself and once you can't see any improvement with higher scanning resolutions, stop and remember the



▲A FAIRLY WELL-EXPOSED SCAN, WITH THE HISTOGRAM REVEALING AN ALMOST COMPLETE RANGE OF TONES, WITH ONLY THE DARKEST SHADOWS MISSING

measurements we mentioned. Let's say you have a 6 x 4in print, which you want to scan and output at the same size. In this instance, scan at 150ppi. However, if you want to double its printed size to 12 x 8in you'll need to double the scanning resolution to 300ppi. Similarly, if you only want to output it half its original size, halve the scanning resolution to 75ppi.

With most online images you can get away with very low scanner settings

Clearly, high scanning resolutions are only of use when making big enlargements. Consider a 35mm transparency, measuring only an inch high. With a 600ppi setting, you'd still only be able to enlarge it four times to 4in high. That's why dedicated 35mm film scanners concentrate all their imaging sensors across only one inch, and therefore typically boast resolutions of 2,700ppi.

Then again, flatbed owners could always employ interpolation to eliminate the jagged pixellation – although again, remember this will only smooth the image and not increase detail.

A quick note to web publishers: your output device is a monitor, typically running at around 75ppi. Since most online images are rarely bigger than a couple of inches across, you can get away with very low scanner settings.

Finally, another note on image scaling. Most scanner drivers have a resolution and a scaling percentage setting. The tips above apply with the scaling left at 100 per cent. You could achieve the same result by leaving the resolution at your output device's desired setting (for example, 150ppi for an inkjet or 75ppi for web publishing) and then adjusting the scaling setting to work out the rest.

Using a resolution of 150ppi at a scaling of 50 per cent produces the same quality file as a resolution of 75ppi at 100 per cent. Since scaling works with the physical input and output dimensions, it's often a better route to take as there'll be no nasty surprises when it comes to printing. A 35mm film scan at 2,700ppi may have the potential to become an A3 poster, but if you don't scale it for output, then you'll still only end up with a print one-inch high.

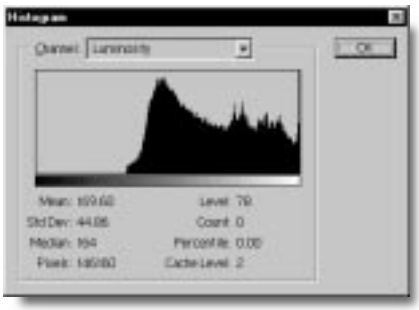
■ Colour and tone

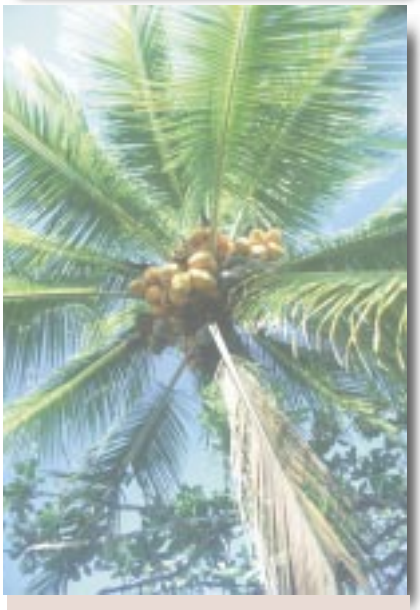
The second most important scanner setting refers to its tonal range. This is normally left at automatic, but a little manual tweaking here and there at the scanning stage can make a world of difference to your final image quality.

The idea is for you and the scanner to agree on what is pure black and what is pure white. Too much of one results in clipping, with areas of lost detail in bright highlight and dark shadow. Too much of the other could again result in reduced detail and undesirable banding in smooth graduations.

The trick is to know what kind of tonal range your scanner is capable of capturing, and to recognise what are known as black and white points on your image.

The best place to start is with an existing scan. Open it in any image manipulation package, such as PaintShop Pro or Adobe PhotoShop and check out its histogram. The histogram is a graph, which shows the distribution





▲ AN OVER-EXPOSED SCAN SHOWS A RIGHT-SHIFT OF THE TONES IN THE HISTOGRAM – NOTE THE LACK OF ANY MID OR SHADOW TONES, AND CLIPPING IN THE HIGHLIGHTS

of tones in an image. On the far left is pure black, on the far right (typically 256 steps later) is pure white, and in the middle are all the shades in between. For colour images you can look at the red, green and blue channels individually, or together as a mixed grey representation.

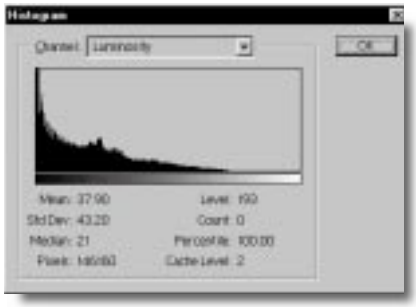
The histogram takes each tone level at a time and vertically plots the number of pixels in the image at that point; if the image is a pure black square you'd just get a tall line at the zero point on the far left-hand side.

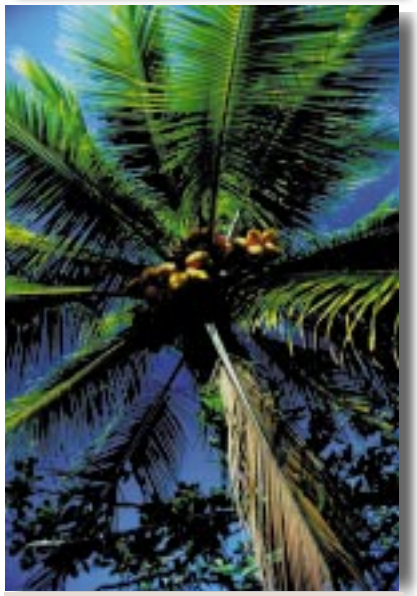
Typically, a histogram for a colour photo looks like a wavy line, and there are warning signals to watch for. First, check where the wavy line falls down to the zero count at both ends – ideally, it should just peter out as close to the left and right extremes as possible. Where it falls short on the left and right is an indication of lack of detail in the shadow and highlight regions respectively. Any areas where it is cut short indicates clipping and again lost detail at that side.

Histograms also give a good general indication of over- and under-exposure, with the bulk of the pixels concentrated to the left and right sides respectively. Any gaps literally reveal tonal areas which have not been captured. These, of course, may never have existed in the original picture, but it's worth a check.

Now you can start adjusting brightness and contrast to shift the tonal values – or better, use the automatic level controls to stretch a shortened histogram chart to reach both edges.

Be warned, every tonal manipulation you make post-scanning results in lost quality. Stretching levels may mean that you now have pure whites and blacks, but by doing so, you may have lost some





▲ AN UNDER-EXPOSED SCAN SHOWS A LEFT-SHIFT OF TONES IN THE HISTOGRAM – NOTE THE LACK OF ANY HIGHLIGHT TONES AND CLIPPING IN THE SHADOWS

in-between greys. Each time you make a post-scan adjustment you lose precious pieces of information. Modern 30bit or 36bit scanners may have information spare for adjustment and still end up with a good 24 bits for printing, but the trick is to identify any problems and fix them before actually making the final scan.

Most decent scanner drivers offer histogram analysis, along with level correction, brightness and contrast controls and adjustable tone curves. They should also allow manual eyedropper selection of desired white and black points on the preview scan window.

Always try to optimise your image at this pre-scan point and the scanner will then throw its entire resources in the direction you're after. For instance, if you find your particular printer makes everything too dark, compensate for it before scanning, and you'll get better output as a result.

Advanced settings

It's worth having a quick word on scanning from magazines, books and newspapers. If you look closely at their printing process, you'll see all the shades have already been turned into lots of different-sized dots. The problem comes when you scan them, particularly for later reprinting.

Your printing process will also try to simulate shades with lots of dots and that's where the confusion begins. The result of scanning and printing something that's already been printed using this 'halftoning' technique is an undesirable, patchy effect called *moiré*.

Ideally, always scan original photographs, but if you must scan an already halftoned image, use the scanner driver's descreening tool which eliminates *moiré* with various degrees of success. Make sure you know the 'screen' value of the magazine, book or newspaper, and feed this into the descreening option. Typically, newspapers will be screened at 75 lines per inch (lpi), while a high-quality art book will be 150lpi; *PCW* is screened at 133lpi. If you do descreen, be aware the scan will take much longer and, most importantly, ensure you deactivate the setting when scanning normal images again.

PCW CONTACTS

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

Filter, synth and distort

Steven Helstrip moves to North Pole to mix tracks

Over the next few months I'm going to be writing about some of the techniques I use regularly when producing my own music and remixes for other artists. The tips and tricks are in no particular order, but nonetheless they should give you a few ideas to try out on your own productions.

Although I've steered clear of mentioning my own releases since starting this column some five years ago (blimey, has it really been that long?) I think a small plug is justified at this point so you can hear how these techniques have been applied. For those who are interested, I work under the guise of *The Thrillseekers* and you can hear my latest tune *Synaesthesia* on both the Ministry of Sound's *Ibiza Anthems* and *Gatecrasher Wet* compilations. If you can borrow a copy of either from one of your mates, I'd welcome any feedback. Don't forget, this is your column as much as mine, so any tips you have are always welcome for publication.

◄ **Fig 1** North Pole from Prosoniq is one of the best-sounding filter plug-ins available. And it's free to download

■ Plug it in

With so many high-quality plug-ins available for little or no outlay via the Internet, we're going to start by looking at some creative ways of using them. One of my favourite effects right now is Prosoniq's North Pole filter [Fig 1]. If you haven't got it, I'd highly recommend you pay a visit to www.prosoniq.com and take advantage of the free download.

The effect is described as a virtual analog synthesiser filter. It works inside any VST-compatible application and sounds just wonderful.

Many synths and sound cards have built-in filter effects, but they often have a harsh, digital quality to them. Sometimes this will be exactly what is needed, but if you're looking for a warm, rich sound, I suggest you give North Pole a try. Before recording the part into your sequencer, ensure the synth's filter is fully open; this will give the plug-in more frequency content to play with. Usually, the effect is best used as an insert. This approach ensures only the output from the filter is heard, rather than a mix of the effect and the original, dry signal.

Many sound cards have built-in filter effects but often have a harsh, digital quality

As a starting point, kill the resonance, set the cut-off to 99 (fully open) and turn the envelope follower right down. If you want to use the post-filter delay, set this up accordingly. You can work out the exact time in milliseconds for this by dividing 60 by the tempo of your track. Now we're set.

Start by looping, for example, an eight-bar section of your synth line and have a good fiddle with the frequency cut-off. Increasing the resonance will produce rich harmonics around the cut-off frequency point.

Your synth line should be sounding more lively already, but we've only just begun. The envelope follower, when switched in, tracks the input level of the signal to filter cut-off. This creates a kind of 'wah-wah' effect. Adjusting the attack and release parameters determines how quickly the filter is opened and closed. Experimentation is the key, so don't be afraid to try extreme settings, however outrageous they may seem.

Synth lines are one thing, but North Pole works a treat on practically anything you throw at it – everything from basses through to returns from other effects.

► **Fig 2** Setting up a group track in Cubase

Questions & answers

Q I read your piece on burning audio CDs (June 1999, *Do the write thing*) with some enthusiasm, as I have so far had no luck with my own set-up. The problem is this: although I can hear sound coming into my PC via the line input, when I try to record it I get nothing. I've tried Wavelab, Wave Studio and Sound Recorder. What am I doing wrong?

TIM STARK

A ***With some sound cards (including the Live!) you need to select which input you want to record from. Although you can hear sound coming in, your card is probably set up to record the CD audio channel.***

It's not obvious at first but this setting can be changed via the Windows mixer applet. Go to Properties, select Recording and click OK. The mixer should now display the input channels (as opposed to monitor channels) available. Simply select line in.

Q I have recently bought a SoundBlaster Live! Value card to replace my old AWE32. I must say that although the Live! Value is very powerful, some games still don't work well with the SB16 emulation.

I thought I would have a go at re-installing the AWE32 alongside my Live! Value, but before messing things up I wanted to ask you if there's any risk of hardware conflicts or other problems.

BRYAN GRECH

A ***Installing two sound cards in a PC used to be fraught with problems, but since plug-and-play came on the scene there isn't much that can go wrong.***

However, since the AWE32 isn't a true plug-and-play device, I would first get it up and running in your system without the Live! Value card. Once you have done this, pop the Live! card back in. All being well, plug-and-play should then assign the card to whatever resources are left free.

▶FIG 3 RECORDING FILTER AUTOMATION IN CUBASE

We'll be looking at this subject more closely in a future column, but until then you may want to try some of the following ideas.

One of the parameters I haven't touched upon yet is distortion. This can work particularly well on a vocal, giving it that 'Underworld' sound which you may remember from the track *Born Slippy* in *Trainspotting*. Combine distortion with the envelope follower and you can produce some truly amazing results. This is particularly useful if, like me, you can't sing that well – everyone sounds roughly the same when treated in this way!

Combine distortion with the envelope follower and you can get some amazing results

Returning to the synth idea, it can be really effective to have your part playing on two tracks, each with different moving filters. Panning them to opposite speakers will invariably help to keep your mix sounding clean. However, if there's just too much going on, you may need to delay, or offset, one of the tracks between 10ms and 20ms. This technique creates a wide stereo image and works equally well, for example, on hi-hats as it does on backing vocals.

In full effect

Using a filter on your finished two-track mix, or sub-groups within it, might appear a tad over the top. But if Norman Cook (aka Fat Boy Slim, among other things) can get away with it, so can you.

So, how do you go about it? First we'll deal with grouping, which involves processing two or more tracks with one effect. Although I'm using Cubase in the following examples, the principles are the same for whatever sequencer you have.

You can send any track to a group by clicking in the output field below the track channel, as shown in Fig 2. The output from that channel will now appear from the selected group return. These are coloured blue to distinguish them from standard channels. Since any number of tracks can be routed to a group, they can be processed together using a group insert. These are set up in the same way as standard mixer channels.

The best way to handle filtering the overall mix is to first create a two-track master (see June's Sound column, *Do the write thing*). Load this into a new arrangement and configure an insert in the normal way.

To record your filter movements, simply enable the Write button on the mixer [Fig 3]. Then, when the track plays, all the parameters you tweak will be recorded to a special mix track. If you make a mistake, just snip out the bar containing the error and have another go. To play back the automation, you'll need to enable the Read button, which is just below the Write button.

PCW CONTACTS

Steven Helstrip welcomes your feedback on the Sound column. Contact him via the PCW editorial office or email sound@pcw.co.uk

Compose yourself

Benjamin Woolley proves that a little film theory goes a long way with 3D animations.

Last month I looked at some of the basic features of the virtual camera (the object used in 3D graphics software to determine the point of view from which a scene is rendered). This month I shall look at how you can exploit some of those features.

The most common practice when creating a 3D project is to build up the scene and then plonk a camera somewhere inside it for the final render. What you should really be doing is pretty much the opposite. The scene should be regarded as a collection of objects arranged for the benefit of the camera. 'Frame composition' – how you arrange those objects to produce the desired effect when it is 'filmed' (ie rendered) by the camera – is crucial to a project's success and it should be taken into consideration from the beginning.

There is no hard and fast theory for determining how scenes should be composed, but there are issues worth focusing on from the beginning of a project that might help. First, you have to establish what the scene is for: what do you want the viewer to experience when they look at the image or animation?

Let's take some examples from drama to explore this idea. In most drama scenes, you are concerned with one or more characters (which could be human, mechanical, alien or whatever). You want to establish the relationship these characters have to their location and to each other.

How you arrange objects to produce the desired effect is crucial to a project's success

If you want to emphasise a character's relationship with its location, you would tend to use a wide, static shot. Imagine a car driving along a road [Fig 1]. The car is the main character in the scene and you need to suggest, through its position and movement, why the audience should be interested in it. Placed on its own in the middle of an open landscape, far away from the camera, it looks tiny – suggesting isolation and vulnerability.

▲Fig 1 The long and winding road – a wide shot of a distant car emphasises its remoteness and its relationship with the setting. The image was created using 3D Studio MAX and Bryce

In fact, the audience might not notice it at all. However, in an animated version of this scene the car is the only moving object so attention is immediately drawn to it. Of course, you can only achieve this effect if the camera remains locked off, that is, if it isn't animated. The camera in Fig 1 is set high up, but this position seems acceptable, as it is possible to imagine a human having this vantage point if they are standing on one of the surrounding hills.

Being so far away, the audience will probably feel little concern for the car – it is just a curiosity – an ant crawling across the desert sand. But it is approaching in our direction, which hints that we are about to become more engaged with it, that it is entering the story. You could achieve the reverse effect (at the end of a film, for example) by having it drive off in the opposite direction.

Of course, this is just one way of introducing the car. An alternative might be a tracking shot, with the camera fixed alongside the car and following as it drives along the road. This emphasises the audience's engagement with the car but plays down the importance of the surroundings, which are just a blur in the background.

Another way to increase the audience's sense of engagement with the main character is to put as few objects as possible between the viewer and the character. If you wanted to introduce a note of alienation, perhaps because you do not want the audience to identify with the main character, you could introduce some sort of foreground action (for example, in the case of our car, a railway track running perpendicular to the road, with a train trundling along it).

If there are a number of characters in the scene and you want to emphasise their engagement with each other, you would want them all to appear close to one another, which could be done using a long – rather than wide-angle – lens, which reduces the depth of field. You might also use more close-ups. A series of close-ups unrelieved by intercutting with mid or wide shots would increase the sense of engagement – if you framed the characters in the picture so that parts of them were cropped (off-picture) you might even start to create a sense of claustrophobia.

▲Fig 2 Bombs away – a demonstration of the power of the plug-in by 3D artist Dean Scott

Much of the above assumes a fixed point of view. But one of the great advantages of the virtual camera is that you can animate it. The simplest movements are those of the camera head and lens: pans, tilts, rolls and zooms. Tilts (up and down) and rolls (twisting so that the horizon is no longer horizontal) increase a sense of disorientation and are rarely used. Pans and zooms are more common and to make them work you have to get the speed right. The temptation is often to make them too abrupt. In *Inside 3D Studio MAX* (New Riders, £49.95), the authors (who can usually be relied upon about such matters) suggest that in an animation running at 30 frames per second (fps) you should allow 22 frames for a quick pan of 45 degrees. For a more gentle turn they suggest three times as long: 66 frames. If you are panning with the lens on a long zoom setting, you will have to go even slower, unless you want a 'whip-pan' effect, in which everything becomes a blur – a technique often used in film and TV as a transition device to denote a jump to another time or location.

Moving the whole camera (tracking) opens up a host of new possibilities – and complications. In general, fast, sweeping, roller-coaster camera movements are one of the signature features of computer-generated imagery, as they are so difficult to achieve in the real world. I'll take a look at how to set them up next month.

Establish what the scene is for: what do you want the viewer to experience?

A plug for plug-ins

Nearly all 3D graphics packages boast of having an 'extensible architecture', that is, they can use plug-ins from other companies to add features. Adobe popularised this idea but it is now almost universal in the graphics field. The trouble is that some packages are not as well supported as others. Three have now emerged as offering a reasonably wide choice. Two are names you would expect in such a list, the mainstream professional packages Lightwave and 3D Studio MAX. But another name has now joined the list, one which brings the power of plug-ins developed for professional graphics houses within the reach of a much wider range of users: Truespace. Caligari has a list of plug-ins that will work with Truespace 4 <www.caligari.com/tsx/tsx_plugins98.htm> and it is impressive.

The extraordinary images in Fig 2 of a nuclear explosion were generated by 3D artist Dean Scott <www.tir.com/~dscott> using a powerful procedural texturing plug-in called DarkTree from Darkling Simulations <www.darksim.com>. The 3D package he used was Lightwave 5.5, but a Truespace 4 version of DarkTree should be available by the time you read this.

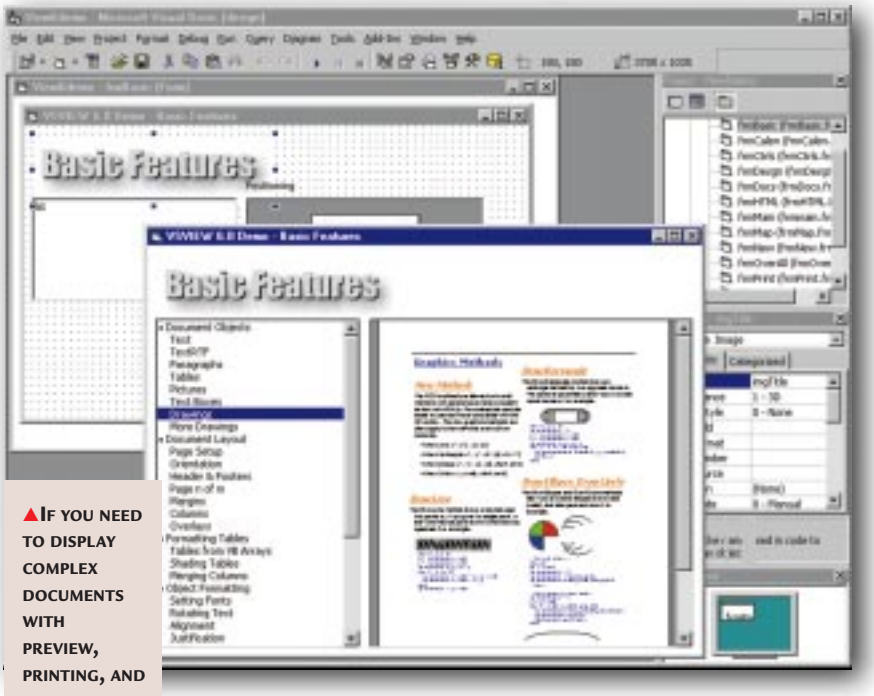
There are now innumerable plug-ins, not just for textures but for all sorts of specialist effects. The problem is that they can be expensive – DarkTree is relatively cheap at $270 (£169) – and can also be difficult to get hold of, so you will probably have to order them online from America. However, recognising that its users are unlikely to be able to afford the prices that MAX and Lightwave users can, Caligari has recently launched a useful collection of plug-ins called Pluspacks, with a list price of £99.

PCW 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 view to assist

Tim Anderson finds that vsView is reaping the rewards of Microsoft's work on web development.



▲ IF YOU NEED TO DISPLAY COMPLEX DOCUMENTS WITH PREVIEW, PRINTING, AND EXPORT TO HTML, VSVIEW IS THE IDEAL SOLUTION

Microsoft's efforts to conquer the web have had spin-off benefits for Visual Basic (VB) users. Before the web, most ActiveX controls used MFC (Microsoft Foundation Classes), and depended on the large MFC runtime files. To have any chance on the web, ActiveX controls needed to get slimmer, so Microsoft came up with ATL (the Active Template Library), which lets you easily build ActiveX controls without using MFC. My hunch is that Videosoft has used this technique for version 6.0 of vsView, which is said to be twice as fast as the previous version and free of MFC dependencies.

There are three controls in vsView: vsPrinter, vsDraw and vsViewPort. They are intended to address a common VB problem: where you have some data which you want to present formatted nicely with, for example, a chart, a table, and some explanatory text. Traditional report writers are great at presenting huge lists of records with groups and summaries, but can be inflexible when you want to present data in other ways. Another option is to use Word and Excel by automation, but this is a heavyweight and expensive solution.

vsView is said to be twice as fast as the last version and free of MFC dependencies

The more efficient approach is to print directly to a form or picture box for the screen, and the printer object for paper output, which gives complete control at the expense of additional coding effort. Unfortunately, it also means a do-it-yourself approach to things like margins, page breaks and headers and footers.

If any of this strikes a chord with you, you probably need vsView, which provides the excellent vsPrinter control. This control is a canvas on which you can output your data using the Text property, along with methods like DrawPicture, DrawLine and AddTable. The Text property in vsPrinter behaves more like a method, and simply prints at the current position without deleting any existing text. Unlike VB's printer object, vsPrinter is a visible control that gives you instant print preview, as well as a built-in printing capability. It includes support for headers and footers, multiple columns, rich text format, tables, page numbers and export to HTML. The SaveDoc and LoadDoc methods allow you to paste the current document to a file and load it back later. There is also an Append option to let you add a document to the end of an existing one rather than replacing it.

The HTML option, new in this version, is significant. You need to bear in mind that a vsPrinter document is essentially a metafile graphic, not a word processor document. In previous versions, if your users wanted an export facility, for example to Word or Excel, you would have to write custom code to regenerate the report in another format.

Now you can have vsPrinter build up an HTML document on the fly, so that when you call the EndDoc method to tell vsPrinter to render its content, either as a preview or direct to the printer, it will also create an HTML version on disk. Because HTML is widely understood, it gives you an immediate document file that can be imported by other applications or, of course, published to the web. There cannot be a perfect match between the HTML and the native vsPrinter version, because the formats are fundamentally different, but it is still a useful option. A snag is that although tables are exported, graphic objects are not. You can overcome this by inserting your own HTML snippets into the document as it is being created.

Two other controls are bundled with vsPrinter. The vsDraw control lets you build up standard Windows metafiles, which you can print, save in .WMF format, or add to vsPrinter documents. Next, vsViewPort is a scrolling container

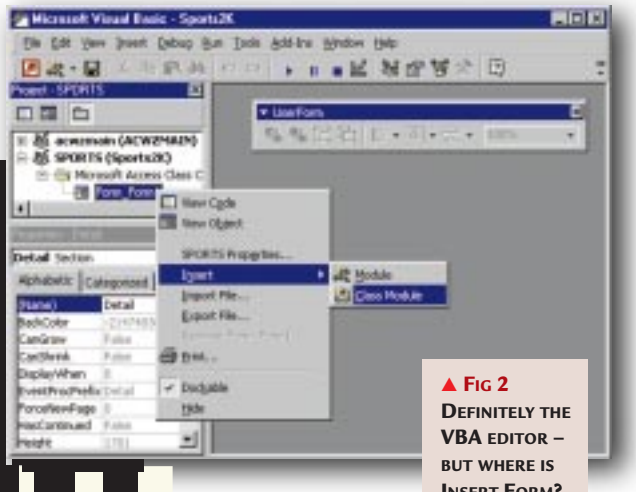
to handle forms that are larger than the view area. The bundle also contains vsDataLabeler and vsDataReporter, components built with vsView and vsFlexGrid and compiled as ActiveX dlls. These components let you easily add label printing and ad-hoc reporting to an application, using ODBC or OLEDB data sources. Overall this is a great package, which will save a huge amount of time if you need this kind of custom presentation.

CodeAssist

Unlike most of Sheridan's products, CodeAssist is not a VB add-in or an ActiveX control, but a standalone code generator. It is based on the fact that most developers spend a lot of their time writing tedious and repetitive code. In particular, if you are writing a database application, you probably spend time declaring variables to match field names, writing code that builds up SQL commands, or building a Visual Basic class module – which includes private variables, Property Let and Property Set

all

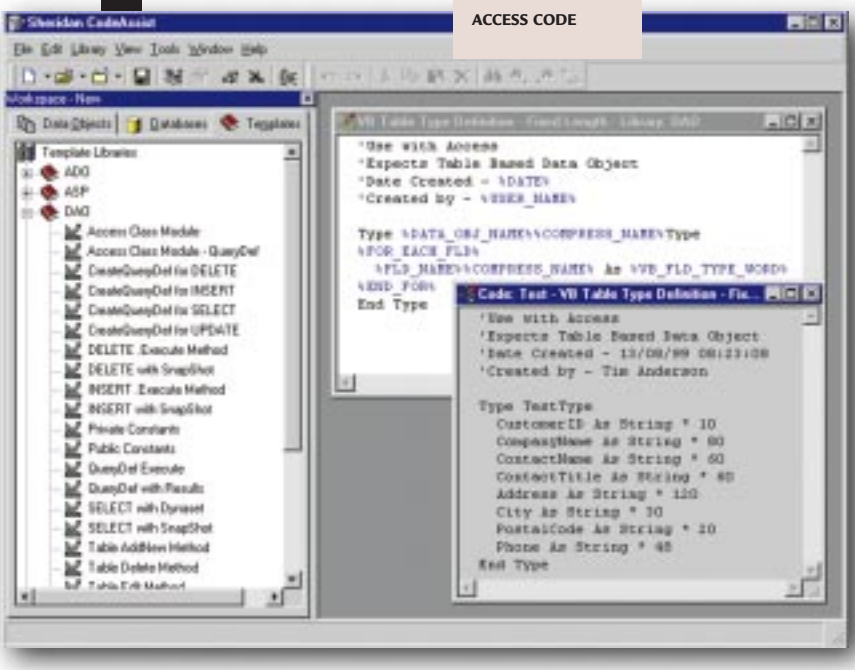
The next step is to open a database connection in CodeAssist, select a data object such as a table



▲ FIG 2 DEFINITELY THE VBA EDITOR – BUT WHERE IS INSERT FORM?

In other words, CodeAssist replaces template fields like %FLD_NAME% with the actual field names from the chosen data object. Initially, this may seem like no big deal, but in fact the productivity benefits are considerable. For example, you might have a database with 40 tables, where you need to create a VB class module for each one. With CodeAssist this is the work of a few moments, and prevents spelling errors or omitted fields. The advantage of the template-based approach is that you can decide exactly what goes into the generated code, unlike most data wizards that make assumptions about how you want to do data access. CodeAssist is language-independent (in that you can tailor the templates for any language) and comes with hundreds of pre-built templates for VB, Delphi, C, ASP (Active Server Pages), ISAPI (Internet Server Application Program Interface) and others. It is less flexible about database connections, supporting only Access and Microsoft SQL Server. A free update will add support for Oracle 8 and Sybase SQL Server, and will also run as a VB add-in if required. The package is well-designed, and worth considering if you do a lot of database coding.

▼ CODEASSIST COULD SAVE YOU HOURS OF WRITING REPETITIVE DATA ACCESS CODE



Fun with Internet Explorer

This one is easy. A little-used feature of Internet Explorer 5.0 lets you convert a web page into an application. Open up Notepad, and make a simple Dynamic HTML page, for example with a button and an on-click event handler. Save it with a .HTA extension and double-click to run it. This opens the page, but in a traditional application window rather than in a browser. You can add an <HTA:APPLICATION> tag that gives options to set caption, application name, icon, window appearance, and more. HTML applications (HTAs) have special features. One is that all security is turned off, unless you include a frame that accesses web pages from elsewhere. This means that HTAs have read-write access to files on the client machine, and can run scripts, ActiveX controls and Java applets without restriction.

As the web development model slowly takes over software development, the ability to present web pages as Windows applications may prove useful.

Access form mysteries

John Clifford writes: 'Your article in August's *PCW* says it is easy to change the back and fore colour properties of a command button on a VBA form. I've been trying for months to change the back colour of a command button on a form in Access 97. How do you do it?'

John's question exposes a problem in Microsoft's VBA technology. You probably think that Access uses VBA, because that is what it says. This is true, but Access uses the VBA language, and it has its own form engine. You can see this causing some strange effects when you edit code in Access. For example, open an Access database and then choose Tools, Macro, VB Editor. The VBA environment opens as you would expect. Now go to the Insert menu and choose User Form. Bad luck – it isn't there (*see previous page*, Fig 2). Switch back to Access, and open a form in design mode. Right-click the form or a control, choose Build Event and then Code Builder. Now you are back in the VBA environment, in the code editor for the form that previously you could not insert. If you right-click the form in the project explorer and choose View Object, you mysteriously arrive back in the Access application environment.

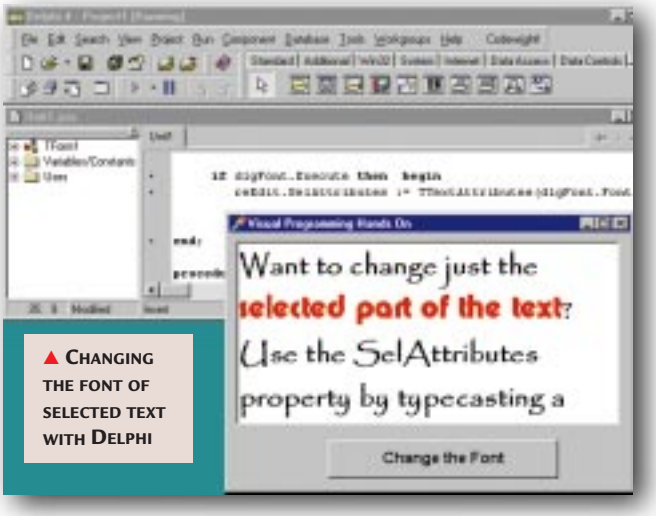
In all honesty, this is no more than a hack. You can tell something is not right, as in my installation a UserForm toolbar appears in the Access VBA environment, with all its options greyed out. When I was playing around with this, the VBA configuration got so scrambled that other Office applications would crash whenever I tried to open the editor. The solution was to delete the VBA configuration from the user profile, since the Office 2000 automatic repair was unhelpful.

When VBA 6.0 was released, Microsoft said there would be language parity between VB and VBA. While these different forms engines are in use, it is hard to justify the claim. The truth is that the full VB uses yet another forms engine, making at least three in use by the typical VB developer. The biggest problems are to do with data binding. The VB and Access forms engines include special code to allow design-time data binding, and this throws up other anomalies. Put a Microsoft DataList control, for instance, on a VB form, and you have DataSource, DataMember and DataField properties. The same control on a VBA form has those properties mysteriously omitted from the list in the properties window. They do exist, and you can set them in code, but not at design time. Microsoft has made headway in unifying its development technologies, but there is still a lot to do.

For a year or two many PCs were shipped with both types of floppy disk

Changing selected text in Delphi

Steven Graham is using Delphi 2 from the *PCW* cover disc. He asks: 'I have hit on a [redacted] in ch[redacted] ge[redacted] se[redacted]



▲ CHANGING THE FONT OF SELECTED TEXT WITH DELPHI

Steven is right: the Font property of a TRichEdit control is not much use as it changes the font of all the text. Instead you need to use the SelAttributes prop[redacted] at[redacted] Se[redacted] TR[redacted] w[redacted] wi[redacted] T[redacted]

It would be tidier if TRichEdit had a SelFont property – but I guess Borland didn't want to make it too easy.

▶ CONVERT WEB PAGES INTO WINDOWS APPLICATIONS WITH INTERNET EXPLORER 5.0.

PCW CONTACTS

Tim Anderson welcomes your Visual Programming comments and queries. Contact him at visual@pcw.co.uk or via the PCW editorial office.

◆ *vsView is £233.83 inc VAT. CodeAssist costs £246.65 inc VAT. Both are available from Contemporary Software 01344 873434 www.contemporary.co.uk*

◆ *For more information about HTML Applications, see the MSDN library or search www.microsoft.com*

Singing translucent blues

Cliff Joseph found that there was more to life than Apple's iBook at this year's MacWorld Expo.

Apple's iBook may have stolen the show at this year's MacWorld Expo, but there were quite a few other announcements that were worth a mention. The most noticeable thing at the Expo was the vast amount of translucent-blue plastic on show at various stands. It seems like just about every peripherals manufacturer in the world was showing off iMac-style versions of their printers, scanners, mice, and assorted USB adaptor doodahs.

Pushing through such ethereal matters was the announcement that both Epson and Canon were preparing to launch multi-function systems, which combine printer, copier and fax machines in a single USB device. A few months ago products like these would have been Windows-only, but their Expo appearance is a sign that peripherals manufacturers are backing Apple again.

There were quite a few other USB devices floating around as well. At long last, the Mac is getting some reasonably affordable CD-RW drives, including ones from Sony, QPS and Mitsumi. QPS also came out with the first DVD-RAM drive for the Mac, complete with ghastly blue-translucent casing. Entrega finally produced Mac versions of some of its USB adaptors, including a handy USB-to-SCSI adaptor and a multi-port hub that provides USB, serial and SCSI ports.

Surprisingly, there weren't many major software releases on show. Adobe was demonstrating InDesign – as it has been for about the last six months – but the software still wasn't finished and on sale. Even so, arch-rival Quark seems to be sulking over the prospect of actually having some real competition for XPress, and was noticeable by its absence.

My vote for best software release at this year's Expo goes to Unreal Tournament

On the emulation front, Connectix showed a new version of Virtual PC. The good news is that it supports USB. The bad news is that it doesn't support the 3D acceleration in the ATI Rage 128, which ships in the current range of G3 Power Macs. The problem, apparently, is that the Rage 128 provides both 2D and 3D acceleration in a single card. This means that there's no way to separate the 2D and 3D functions so that Virtual PC can make use of the 3D acceleration while leaving the 2D part of the card for the Mac operating system.

This means that you'll need to have a separate 3D card, such as a Voodoo 2 card, if you want to use Virtual PC to play games. Virtual PC 3.0 won't support Voodoo 3 cards, though, which is a shame as the first Mac-oriented Voodoo 3 cards were on show from Macally and IX Micro.

Connectix didn't have the monopoly on emulation software. A company called Emulators Inc surprised people with a new version of Gemulator. This is a Mac emulator that allows PCs to run the Mac operating system. It's been available for a while, but earlier versions were very slow and only ran 7.x versions of the MacOS. The new version can run OS 8, but only emulates a Motorola 68040 processor.

However, my vote for best software release at the Expo goes to Unreal Tournament. The developers at MacSoft, which produced the Mac version of Unreal Tournament, told us that their main problem in finishing the game was working with the drivers that ATI provides for the Rage 128 card. Rumour has it that Apple's been none too happy with ATI's drivers as well, especially since it has been relying on ATI to help develop Mac drivers for OpenGL. There was no sign of ATI at the Expo, which wasn't a good omen. Apple needs to support the OpenGL 3D standard in order to encourage games companies to produce Mac versions of the games, so it's vital that ATI sorts the problems out.

AIRPORT TAKES OFF

▲ THE AIRPORT BASE STATION INCLUDES BOTH AN ETHERNET INTERFACE AND A MODEM

One of the surprises of the Expo was Steve Jobs' demo of the new Airport wireless networking system. The most amazing thing about Airport is that Apple actually managed to keep it secret for the entire 18 months that it was working on the project. That aside, Airport is a real step forward.

Airport is based on an existing wireless technology known as IEEE 802.11. However, Apple has made a few improvements. The main difference is that it provides data-transfer rates of up to 11Mbit/sec, which is much faster than the original 802.11 standard. That puts it in the same league as many Ethernet networks. The base station includes a conventional modem as well as an Ethernet interface, so people who want to use Airport as an extension of an existing network can do so without any loss in performance.

European telecoms regulations mean that Airport will be unavailable in a few countries, such as Belgium. The company hopes to have Airport available here in the UK shortly after the European launch of the iBook in September.

PCW CONTACTS

Cliff Joseph welcomes your feedback on the Mac column. Contact him via the PCW editorial office or email: mac@pcw.co.uk

Identity crisis

Bob Walder looks at how digital signatures and certificates provide authenticity and non-repudiation.

Last month we looked at the basics of encryption, covering the concepts of secret and public key cryptography. This month we move on to cover digital signatures and certificates, as a prelude to next month's piece on implementing email security.

Digital signatures

Once we have our data encrypted, to prevent snoopers discovering its content, we still have to prove who we are to the other party involved in the communication. In a real-life scenario, the most important piece of evidence available to one party is the other party's written signature.

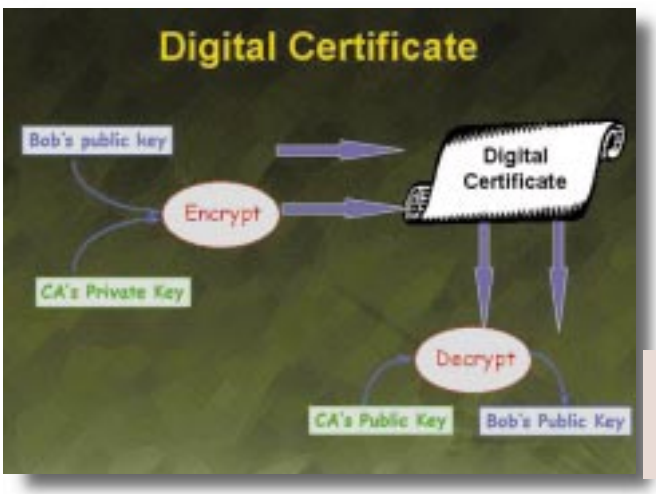
We therefore require an electronic equivalent – a 'digital signature'. This useful device not only provides positive proof of ID, but also offers complete non-repudiation (that is, we can prove who signed it and that the contents have not been tampered with in transit).

▲ DIGITAL SIGNATURES OFFER THE HIGHEST LEVELS OF SECURITY

As with encryption, there are a number of common algorithms available for digital signatures – RSA (Rivest-Shamir-Adleman) being the most popular. Suppose Alice wishes to send a signed message to Bob. She uses a 'hash function' to create a uniquely concise version of the original text – known as a 'message digest' – which serves as a much smaller 'digital fingerprint' of the message. Once again, there are a number of algorithms available – MD-5 (Message Digest algorithm) and SHA-1 (Secure Hash Algorithm) being the most common. Overall, SHA-1 is probably the preferred method. It is unfeasible that different documents will have the same message digest, and even small changes in a document will cause significant changes in the digest.

Remember that signing only guarantees integrity and authenticity not privacy

Next, Alice encrypts the message digest with her RSA private key (or a secret key, if preferred) and this becomes the digital signature, which she sends to Bob along with the message itself (which may or may not be encrypted).



◀ A DIGITAL CERTIFICATE CONTAINS THE PUBLIC KEY

Bob, upon receiving the message and signature, decrypts the signature with Alice's public key to recover the message digest. He then hashes the message with the same hash function Alice used and compares the result to the message digest decrypted from the signature. If they are exactly equal, the signature has been successfully verified and he can be confident that the message did indeed come from Alice. If, however, they are not equal, then the message either originated elsewhere or was altered after it was signed, and he rejects the message.

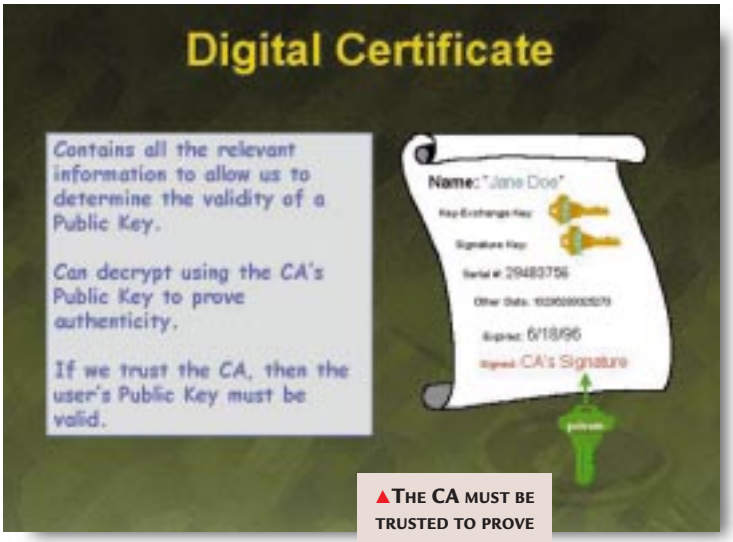
Note that, for authentication, the roles of the public and private keys are converse to their roles in encryption, where the public key is used to encrypt and the private key to decrypt.

Also remember that signing only guarantees integrity and authenticity, it does not guarantee privacy – encryption of the actual message content must be performed separately if that is required.

Digital signatures provide the highest levels of data integrity, since any tampering after signing invalidates the signature. They also provide irrefutable proof of origin that is impossible to forge, since they are based on the sender's private signing key and authenticated by the public verifying key.

Note too that in most Public Key Infrastructures (PKI) today, two key pairs are generated for each user – one pair for

encryption/decryption and the other for signing/verification.



▲THE CA MUST BE TRUSTED TO PROVE AUTHENTICITY

■ Digital certificates

A digital certificate is a small block of data which contains the public key, together with a confirmation of authenticity from a third party – in the form of that party's digital signature. The third party is the 'Certification Authority' (CA), and it is vitally important that the CA is trusted so that the certificate can be considered genuine.

Probably the best known CA at the moment is VeriSign, although other systems are being introduced, such as IBM's World Registry and GTE's CyberTrust. Even the Royal Mail has established a PKI, using Nortel's Entrust technology.

As things progress, it should be possible (and desirable) to have a hierarchy of CAs, going from banks or other reputable organisations at the bottom, all the way up to government bodies and even the United Nations.

This means that if you don't trust the first CA you can check the certificate on its digital signature with the next CA up the tree, and so on up the hierarchy until (if you are really paranoid) you reach the 'root' CA.

As things progress, it should be possible to have a hierarchy of CAs

To communicate securely, Bob and Alice will first separately establish certificates with a trusted CA by providing concrete proof of identity (perhaps even being required to appear in person). Sometimes the signing and encryption key pairs are generated at registration, and sometimes they are generated separately and transported using a secure token such as a smart card. After registration, Bob and Alice's public keys are bound to their respective digital certificates, which are then signed by the issuing authority.

Once the certificates are created, they are published in a directory. This allows anyone to look up Bob or Alice and obtain their authenticated public keys for secure communication. Another option is that the sender always includes their digital certificate with any secure communications – this is frequently the most convenient way of working.

Bob encrypts and signs his message and sends it to Alice along with his digital certificate. Alice's mail application will check the signing authority on the certificate to ensure that it is trusted and will check the expiry date to ensure the certificate is still valid, following which it will go through the procedure for verifying the signature that we detailed earlier.

Certificates based on the X.509 standard (the most commonly used type) incorporate an expiry date to ensure that certificates and their associated key pairs are renewed automatically after a given period. This should happen for security purposes, although for some organisations it is simply a means to generate a revenue stream as users are forced to buy new certificates each year.

■ CRL checking

One thing that is also supposed to happen, but for which there is very little support in off-the-shelf applications today, is Certificate Revocation List (CRL) checking. The CRL is maintained by the CA. Occasionally, it is necessary to revoke a certificate in advance of its expiry date, perhaps when an employee leaves a company or if it is suspected that the private keys have been compromised. This is done by placing the certificate's serial number on the CRL where it can be checked by applications that support this function (limited to the Netscape browser at present, although manual checking is also possible).

If Alice wishes to purchase a PC from Acme Computers over the Internet, she digitally signs the order and provides a copy of the certificate. Acme Computers checks the certificate with the CA to ensure that it has a genuine copy of Alice's public key – it will also check to see that the certificate has not expired or been revoked (the equivalent of a credit card company freezing your card).

Once two parties have exchanged digital certificates (or acquired them from a directory) they can then begin communicating, safe in the knowledge that they have genuine copies of each other's public keys and can thus effectively encrypt and digitally sign all future transmissions between them. This ultimately provides for complete 'non-repudiation', whereby digitally-signed messages can be proved authentic to a third party (such as a judge), allowing transactions to be legally binding.

The ability to 'extend' a certificate is also inherent within the X.509 standard, providing the means to hold additional personal information – such as a credit limit – within the certificate itself.

In the future, as we move towards an increasingly cashless society, public key certificate details could be stored securely in devices such as smart cards, providing a truly portable and secure (providing you keep your smart card safe) means of performing electronic transactions.

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