hands on

If you're into PCs, it's likely that you can't help tinkering about with hardware and software. Maybe it's a result of watching too much *Blue Peter* in your youth.

In this month's **Hardware** column you can relive those *Blue Peter* memories, as Gordon Laing shows you how a piece of string can come in useful for overclocking (p248).

There's more tinkering in our **Workshop** where Tim Nott explains how to personalise Windows using the WindowBlinds software (p234).

For those who are fed up of messing about with the compatibility problems of **Windows 2000**, Terence Green shows you how to safely retreat to the comfort of Windows 98 (p240).

Metacreations may have dumped its graphics products, but it's trying hard to establish its Metastream 3 plug-in as the Shockwave of **3D Graphics**. Benjamin Woolley takes a look and is impressed by its standards-based XML approach (p260).

In our brand new **Ecommerce** column, Nigel Whitfield shows you how to acquire and install a certificate for your web server to allow secure transactions (p269).

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contents

Advice from our experts

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

Windows

Q *How can I get Outlook to show – and print – the day as well as the date in weekly view? I've trawled through the Help file and countless unintelligible options, and can do everything except for this simple task.*

Sam Crowther

A Microsoft does give you a clue to this in the Help file, but as it's in a footnote to 'Displaying the Japanese year', I'm not surprised you couldn't find it. And it's one of those 'trick questions' so dear to Redmond, where the answer isn't where one would expect it to be. You have to go to Windows Control Panel, Regional Settings. In the Date page, set the long date style to 'dddd d MMMM yyyy'. Click on Apply and Outlook will display weekdays as well as dates. You can experiment with the date format – 'ddd', for example, gives 'Mon' instead of 'Monday', and 'dd' instead of 'd' adds a leading zero to a single-figure date.

Control Panel holds the key to Weekdays

Q *For no apparent reason, I can no longer start IE5 – when I click on the icon I get a message telling me that I am 'trying to install Internet Explorer version 5.0 or earlier on Windows 98. Internet Explorer is already part of the operating system. Installing an earlier version... will not allow the operating system to function properly'. I'm not trying to install anything – I just want to use the version that came with Windows 98 SE, as I have been for several months.*

Frank Davies

A This sounds as if something has made a half-baked effort to replace IE5 and has overwritten the shortcut. If you type 'Iexplore' into the Start, Run box, you should find that Internet Explorer starts normally and will also mend the damaged shortcut.

Q *On the context menu for all folders I have the entry: 'Add to playlist'. This was left by an audio player (Sonique) and was not removed when the program was uninstalled. It cannot be removed from the Folder options, File types, File folder entry, because the remove button is greyed out. Is there a Registry key that I could delete to get rid of this annoying entry?*

Khalid Hussain

A Yes – having made sure you have a recent Registry backup, run regedit and go to HKEY_CLASSES_ROOT\Directory\Shell. There you'll find the 'Add to playlist' key (a folder icon in the left pane) which you can delete.

Q *How can I stop my computer trying to dial up my ISP every 10 minutes?*

Steve Dickens

A This could well be because Outlook Express (or Outlook) is set to check for new mail at 10-minute intervals. You can turn this off from the Tools, Options, General dialog in Outlook Express, or Tools, Options, Mail delivery in Outlook 2000.

So THAT's who keeps phoning home...

Q *Is there any way to save the settings in the Find results box? It always seems to display the results in a box which is too short to see more than three results and too narrow to see the file details, and I grow weary of resizing it each time.*

Grace Mullen

A No – this is one of those irritations we just have to learn to live with.

Spreadsheets

Q *There must be a way to reset the working area in a similar fashion to selecting the print area, but I can't find it. Deleting 65,000 rows is not a viable option.*

Roy Gregory

A If you use any cell beyond your last active cell, Excel automatically redefines the work area. The normal solution is to delete all the columns, then all the rows, between your preferred bottom-right cell and the stray one far away. Then Save, Close and reopen the file. Alternatively you can clear that alien cell and then use this simple macro:

```
Sub ResetRange()
ActiveSheet.UsedRange
End Sub
```

Q *How can I make an Excel macro become available in any new or existing workbook that I open?*

Babs Lee

A Copy the VBA for Excel listing into a file called Personal.xls and save it in the \Xlstart directory which is probably in the path: C:\Program files\Microsoft Office\Office\. That workbook will automatically open when you start Excel and its macros will be available while this file remains open. Bear in mind also that, unlike Word, Excel does not maintain a link between a workbook and the template you use to create it. If you add or edit a macro in an Excel template, it's only available in workbooks you later create from that template.

To the max... shortcut to bigger windows

Q *I know about starting Excel using the startup switch /I, but how do I get a particular workbook launched via a shortcut to start in a maximised window?*

Ben Cuncliffe

A Right-click on the shortcut, choose Properties and in the Run dropdown box choose Maximised.

Word Processing

Q *Is there any way in Word to search for tabs followed by numbers (not characters) and vice versa?*

Jane Crookes

A Yes – you'll find these on the 'Special' list in the Find dialog – you may first need to click the 'More' button. Use ^t^# to find tab-number and ^t^$ for tab-letter.

Q *I need to create a Word document template where a person's name has to appear in several places. How can I implement this but only ask them to type it in once?*

Paul Anderton

A There are several ways to do this – the easiest and macro-free way is by using fields. Create a new template and add whatever standard text you need. For the first occurrence (in fact it can be anywhere in the document) of the name insert a FILLIN field with the prompt: 'Please type in your name'. This will produce a little dialog box containing a prompt and a space to type. Cancel it for now. Select the field, Insert, Bookmark, then give it a name – let's say 'Username'. Now go to the next place you need the name to appear and insert a REF field followed by the name of the bookmark, and repeat for subsequent occurrences. Save the template.

When any new document is created from this template, the 'Please type your name' box will appear – when the user does so, and clicks on OK, the name will appear at all the designated locations.

Never forget a name using REF and FILLIN

Hardware

Q *How do digital cameras fare when subjected to X-ray or similar security checks at airports? Also how well do they put up with unsympathetic handling or cold and wet conditions?*

David Bownes

A Putting digital cameras through X-ray machines is as safe as doing it to notebooks, so unless you see a 'no computer' sign, then there shouldn't be any problems. However, the digital camera's many electronic circuits do not like getting wet one bit – check with the manufacturer for humidity and temperature information. Remember also that batteries don't last as long in the cold and that most digital cameras only get a couple of hours per charge, even under ideal conditions.

Q *We have a large database system and are contemplating upgrading our pair of IDE drives to Ultra160 SCSI. What controller should I be looking at and are the devices as simple to fit as IDE drives?*

Matthew Hirst

A In terms of installation, SCSI is as straightforward as IDE. Just make sure each SCSI device has a different ID number and that the ends of your SCSI chains are terminated – the interface card will have instructions.

If you intend to boot from SCSI, your motherboard BIOS will need to know. With up to 15 SCSI devices talking at once, the higher bandwidth of Ultra160 SCSI over a maximum of four devices under UltraDMA66 becomes clear. For the greatest benefit, buy a pair of either Ultra2 or Ultra160 drives and connect them both to the LVD connector on, say, an Adaptec 29160 card. Connect any non-Ultra2/Ultra160 SCSI devices to the 29160's other ports as instructed.

Q *Can I upgrade the 500MHz Socket 370 Celeron that my laptop runs on? Also, can you change the FSB (front-side bus) speed on a laptop?*

Sebastian Guest

A The new 566MHz Celerons – and above – employ an FC-PGA design, which is probably incompatible with your notebook's PPGA socket, and it'll be too cramped for an adaptor. Also, even if you could increase the FSB, you would be overclocking your Celeron close to or beyond the limits of its manufacturing process. Consequently, it looks like you're stuck with your 500MHz chip.

Q *I have an ATA33 and ATA66 hard disk. Will the ATA33 hard disk affect the performance of my ATA66 drive on the same channel? If so, should I put my ATA33 drive on the same channel as my CD-ROM drive, which it is currently sharing with an LS120 drive?*

Peter M Pascoe

A Putting an ATA33 drive on the same channel as an ATA66 drive will force both to run at the ATA33 spec. Then again, this is still preferable to putting a hard disk with a CD-ROM drive on the same channel. Also, remember that even if both hard disks are going flat out, they'll still be comfortably within the ATA33 maximum bandwidth. If you've already got four IDE drives and fancy more, consider buying an UltraDMA66 PCI card, which will give you an additional pair of channels.

hands on

question time

Linux

Q *My company is interested in developing a specialist application around a free software operating system such as Linux or FreeBSD, used as an embedded platform. The problem I have with Linux is that – as I understand it – the licensing agreement demands that any application that is part of the system must also be supplied as source code. It would be out of the question for my company to sign up to something like this, as we are always careful to keep our proprietary algorithms secret.*

John Jury

A The licences for GNU/Linux and FreeBSD are very different. The FreeBSD licence is very loose and basically just insists on the copyright notice being maintained. The GNU licence is stricter (or freer, depending on your point of view), its main aim being to ensure that work contributed by volunteers isn't hijacked by commercial organisations distributing closed source software for profit.

However, whether the GNU Public Licence (GPL) applies to your own changes to GNU/Linux will depend on what you mean by 'part of the system'. If it's just something you're using in-house you can do what you like with it. If you're distributing a complete Linux system commercially, or offering software commercially that runs on Linux, any software of yours that incorporates GNU code will also have to be open.

Note that this doesn't apply to code that only uses existing GNU sharable libraries, most of which are now covered by a less strict licence (the Lesser GPL, or LGPL). And, of course, it's allowable to include independent software applications under the terms of your own licence in the way that WordPerfect, for example, is distributed with Linux.

FreeBSD just asks for copyright recognition

Two houses both alike in dignity, but with very different licensing terms and philosophies. The home of the GNU (GNU's Not Unix's) project is www.gnu.org and www.freebsd.org is the site of the closest free software competitor to Linux.

Windows 2000

Q *I'm a student in a shared house with four networked computers, but I've hit some problems since two Windows 98 computers were upgraded to Windows 2000 Pro. Now they can see each other but not the Windows 98 ones. Clicking on the other Windows 2000 computer in Network Places only produces a cryptic password request.*

Paul Urwin

A There are two ways to solve the password problem. Enable the Guest Account on Windows 2000 or add Create User Accounts for the Win 98 users on the Win 2000 computers.

To enable the Guest Account, open Users-and-Groups in Control Panel, go to the Advanced tab and click on the Advanced button under Advanced User Management. This opens the Local Users and Groups console. Click on Users and right-click on the Guest Account (it will have a red cross) to open Guest Properties. Deselect the 'Account is disabled' checkbox. Enabling Guest makes Win 2000 wide open like Win 98. If this is an issue, create user accounts for the Win 98 users on each Win 2000 Pro system. In the right-hand pane of Local Users and Groups/Users, right-click to create new user accounts for the people using Windows 98. Make the account name and password the same as those used to log in on the Win 98 systems.

NetBIOS is required for Win 98 and Win 2000 computers to browse together. On a small network such as this, NetBEUI will work fine but multiplayer games need IPX or TCP/IP. If either of these protocols is used instead of NetBEUI, enable NetBIOS from the respective protocol's advanced properties in Win 2000. All computers must run the Microsoft Client for Networking as well as File and Printer Sharing. On the Win 98 boxes, enable 'I want to share my files' (File and Printer Properties).

Graphics & DTP

Q *I've recently upgraded from Adobe Photoshop 4 to 5.5. I often do retouching work on quite large files, A4 and larger at 300dpi and progress can be slow. Version 4's Quick Edit feature let you work on a small section of an image and then import it back into the larger main image. But this feature isn't present in version 5.5. Is there a plug-in available, or a workaround?*

Isabelle Risner

A Quick Edit is still there, it's just been moved to the optional filters folder in the goodies folder on the Photoshop 5.5 CD. Just drag the QuickEd.8BP file into the Photoshop 5.5 plug-ins folder on your hard drive.

Quick Edit lets you work more efficiently on small bits of big files in Photoshop 5.5

Q *We use QuarkXpress 4.1 to produce an advertisement page for several publications with different page sizes. They don't vary by much, usually no more than 30mm on the depth or width of an A4 page. Is there a simpler way than manually adjusting the advert every time?*

Martin King

A Save the page as an EPS, create a new document the required size and use the rectangular picture box tool to draw a box the exact size of the page with the top left corner at 0,0. Get picture (Control & E) and then press Control & Shift & F to make it fit the box. You'll get slight squeezing or expansion if the new page size isn't the same proportions as the original, but nothing too drastic.

CONTACTS

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

Make it personal

Tim Nott shows you how to use WindowBlinds to customise the Windows desktop.

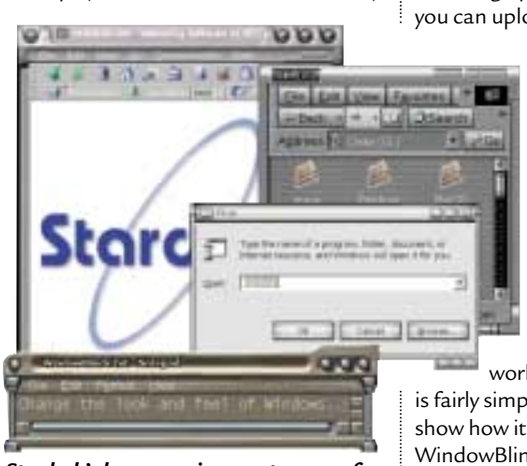
One of the most satisfying – and time-consuming – activities available to Windows users is messing around with the interface. Whether it's experimenting with the settings and colours in the Display Properties, or customising the look with Registry tweaks, it's a subject that seems to be a firm favourite with *Hands On*, *Windows* readers. Despite the possibilities on offer, you'll eventually run into the wall of limitation. Buttons have to look as Redmond ordained, title bars can offer no more excitement than shaded colouring and, most restricting of all, windows have to be rectangular.

This all started to change with the rise in popularity of digital jukeboxes. Not only did their creators design them to mix playlists of varied digital music formats and CD tracks but, in true musical style, they also broke away from the square. Players such as WinAmp, MusicMatch and RealPlayer are full of svelte curves and slide-out controls. Others, such as Earjam, Soritong and Sonique, look like pieces of alien jewellery. The common factor is that they can all use alternative 'skins'. In other words, they can be totally changed in appearance by anyone prepared to download these skins or design their own. Now, even Microsoft has joined in with Windows Media Player 7.

Stardock's WindowBlinds takes the skins concept and applies it not just to a single application, but to the whole of Windows. Practically anything you could want to customise can be customised, including window frames, dialogs, buttons, scrollbars, toolbars, the taskbar and more. It also adds extra functionality – if you want a clock, a button to start the screensaver or one to keep a window 'on top', then all these can be added to a window's fixtures and fittings. You can even animate components of a window or add buttons that play sounds. Best of all, it can add transparency to window components, so it's not a square world any longer.

In this workshop we're going to keep it relatively simple and show you how to create a custom window look.

A skin – also known as a personality – consists of a folder containing a set of bitmaps (and sometimes other resources), together with a UIS file, which is the glue that holds all the bits together in the correct positions. This is a plain text file that can be edited in Notepad.



Stardock's homepage is a great source of skins. You'll find one for every occasion

Much as in a Windows .INI file, section headings are enclosed in square brackets and each section consists of a series of entries of the form Keyword = value. There are two versions of the UIS standard – we'll be working in the later, more powerful UIS2, which has advantages such as a Preview feature.

Typically, each image file contains more than one version of the image: window components, for example, have both active and inactive versions, and button images can also contain several states. All of the image files, along with the UIS file, need to be stored in a subfolder of the WindowBlinds folder, irrespective of where the latter is located. This has two benefits: first, it means that you only need to specify the subfolder and file in the UIS entries. Second, it means that personalities are portable, as no absolute paths are involved. If you want to go public with your personality, you can upload it to www.skinz.org or www.stardock.com/wb/upload.asp. Put the UIS and all the graphic files into a Zip, which should have the same name as the UIS file.

Stardock also produces a utility called Builder Blinds to automate the production of the UIS file – again this is available as a free trial. We've stuck to plain old-fashioned text editing in this workshop as, first, our example is fairly simple, and second, we wanted to show how it all works. A copy of WindowBlinds trial version – together with all the files used in our workshop example – is included on this month's cover disc.

It can add transparency to window components, so it's not a square world any longer

Health and safety

WindowBlinds makes no changes to your system files and so has no impact on the system unless it is running: by default it is loaded on Windows startup but this can be switched off from the Startup Settings tab.

WindowBlinds – or a particular skin – may clash with certain applications and we found it could also cause display and performance problems at times. If you're experimenting with a skin, don't have mission-critical work going on at the same time and save your bitmaps and UIS file frequently.

Applications that don't get on with WindowBlinds can be added to an 'exclusion list' and will then run normally, remaining in their standard Microsoft uniform. You can stop a program from using skins on a one-off

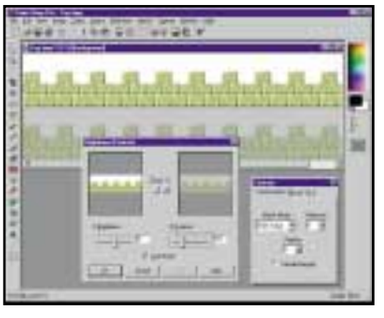
Step-by-step guide to customising your windows

1 We're going to create a simple personality that has a customised window title bar, frame and buttons. We'll be making the most of transparency, as this shot of both the components and the finished product shows. The window is made up of five bitmaps – the top, bottom, left and right sides and menu bar. Note that the top is sandwiched between the sides, rather than sitting on top of them. Five more bitmaps are used for the buttons.

2 Before we get down to the creative bit, there are a few formalities to observe. First, we need to create a folder to hold the skin. In this folder we need to create the .uis file in Notepad. For simplicity's sake these are both named Castle. We need to identify the personality in [TitlebarSkin] with the SkinName and SkinAuthor. These are both necessary for the skin to appear in the WindowBlinds list.

3 We can now start the artwork for the window title bar. First, we created a new image 252 pixels wide by 36 high, with 16 million colours and white as the background colour. Next, we drew a 12 x 8 pixel beige block, selected it and added Noise from the Image menu to give the block some texture. Then, using the Lighten and Darken retouch tool and a single-pixel brush, we traced over the edges to get a bevel effect.

4 With one block hewn, we can use the medieval technique of building the wall a stone at a time with the Paste as New Selection (Ctrl & E) command, then saving as TOP.BMP. We now need to create the inactive title bar, which needs to be a same-sized image below the original. To make room for this we set Paint Shop Pro's background colour to white, then went to Image, Add Borders and added a 36-pixel border to the bottom only.



5 Having selected the added area with the Magic Wand tool – making sure the tolerance is zero – we then went to Selection, Invert followed by Edit, Copy. We inverted the selection once more, then Edit, Paste, Into Selection. We now have two identical title bars. With the bottom copy still selected, we went to Colors, Adjust, Brightness/Contrast and changed the brightness and contrast so that the selection was suitably dulled for 'inactive' use.

6 The final touch is to apply the transparency. Having cancelled the selection, (Control & D) we double-clicked on the foreground swatch in the colour palette, and set its value to 255, 0, 255. This rather virulent shade will become transparent when displayed by WindowBlinds. Using the Flood Fill tool set to zero tolerance and flat colour, we filled the white and grey areas.

(Turn over for steps 7-12)

basis, by holding down the Control key when launching it.

Paint Shop Pro

In addition to WindowBlinds itself and Notepad, you will need an image editor. We've used Paint Shop Pro, which is widely available as a free trial. Although this isn't intended as a Paint Shop tutorial, there are a few essential tips that will make bitmapping a great deal easier and quicker.

● Don't be afraid to zoom – you really need pixel-perfect accuracy, especially when editing the buttons. Instead of constantly swapping between the painting and Zoom tools, use the + and – keys on the numeric keypad, or, if you have one, the mouse wheel.

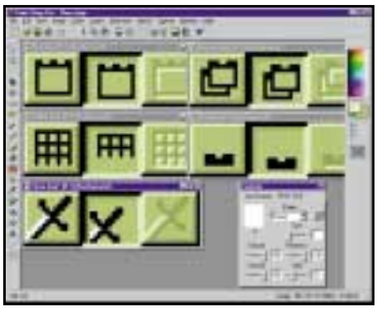
● The Dropper tool is excellent for changing the brush colour to one already in the same (or another) image. Again, you don't need to swap tools – hold down Control with a painting tool selected, and it will temporarily change

Customising your windows (continued)

7 We used a similar sequence of techniques to build the sides, starting with a 15 x 180 bitmap. To make the towers seem round, we shaded them by adding a new layer, giving this a linear white-to-black gradient, and then reducing the layer's opacity. Since the sides are handed, we saved LEFT.BMP, then used some judicious copying and pasting to create RIGHT.BMP, before adding the inactive versions (on the right) and transparency as per steps four, five and six.

8 Having created MENU.BMP (252 x 15) and BOTTOM.BMP (252 x 8) we filled these with plain colour and a single row of pasted blocks respectively, before repeating step five to create their inactive versions. Now we are ready to tell WindowBlinds what to do with these in the UIS file. In the [Personality] section we can now define the values of Top, Bottom, Left, Right and Menubar. Having saved CASTLE.UIS, we can now preview the skin in WindowBlinds.

9 As the preview showed, we have a few problems. We need to move the title text down into the non-transparent part of the title bar and stop the tower roofs repeating. TextShiftVert = 20 achieves the former: we've also forced the text colour to black with the ActiveTextR (GB) entries. The following section defines the areas of the bitmaps that won't be affected by resizing. Setting LeftStretch = 0 forces tiling, rather than stretching, of the remainder.



10 That gave us a much better preview – note that the TopTopHeight and TopBotHeight settings refer to the left and right portions of TOP.BMP and allow a more graceful repeat of the battlements. We now need some buttons. Buttons come in sets of three to a file, showing the normal, depressed and disabled states. We've used standard-sized buttons (16 x 14 pixels), so each bitmap is 48 x 14 pixels, split into three horizontally and suitably medievalised.

11 Next we add ButtonCount = 5 to the [Personality] section. Then each button has its own section. [Button0] has its top left corner positioned 36 pixels in and 21 down from the top right (Align = 1). Its image is CLOSE.BMP and it performs Action = 0, ie, closing the window. [Button1] and [Button2], which both have the Maximise/Restore action, occupy the same space but not at the same time, as the Visibility setting swaps them between normal and maximised windows.

12 [Button3] should now be self-explanatory, but [Button4] has a special WindowBlind action – it 'rolls up' the window into its title bar. To use this we need to define the rolled-up size with RollupSize = 36 in the [Personality] section. We've moved this special button left of the title bar with Align = 0 and Xcoord = 20: we've also had to add a TextShift = 30 entry to the [Personality] section to move the title text out of the way.

to the dropper. You can then 'pick up' a colour from anywhere you want.

● The Tolerance control is especially useful when using the Magic Wand, Flood Fill or Colour Replace tools. If you set it to zero, only pixels of the same RGB values will be affected. Increasing the tolerance increases the colour range – 100 per cent affects all colours.

● A fast way of copying and pasting a selection is to hold down the Alt key while dragging – this copies, rather than moves, the selected area.

● Many effects, such as the 'Add noise' and 'Brightness/Contrast' used in the workshop, have an Autoproof button. Check this for a preview of the effect.

CONTACTS

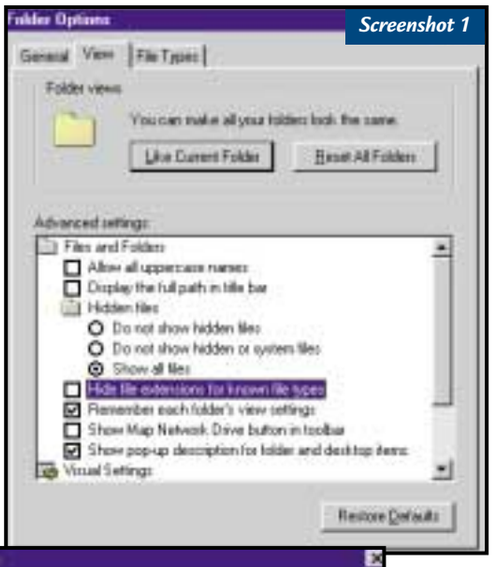
Tim Nott welcomes your comments. Contact him via the *PCW* editorial office or email **win@pcw.co.uk**

Breaking hearts

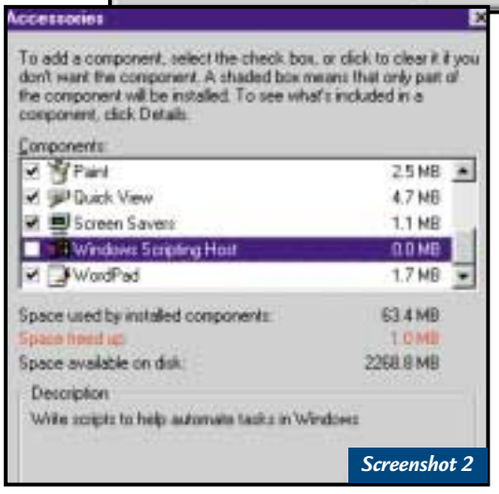
Tim Nott sidesteps the perils of love letters and other strains of the virus by disabling scripting.

At the time of writing, another email virus scare was doing the rounds – this time the ILOVEYOU virus. This one wasn't a hoax and perhaps because of its name – dubbed the 'Love Bug' – it was treated by the media with that kind of almost affectionate awe normally reserved for hurricanes, earthquakes and similar natural disasters. Within a day or two it had, allegedly, caused more than £6b worth of damage and copycat viruses, such as 'Mother's Day' and 'Joke', had rapidly joined the mayhem. The damage was done by an attachment described as a love letter, with the name LOVE-LETTER-FOR-YOU.TXT.VBS.

Regular readers with long memories might recall that in May and June last year we covered the Windows Scripting Host. To recap briefly, this optional feature of Windows 98 lets you use Visual Basic or JavaScript files to automate processes and carry out tasks that can't normally be done in Windows – one example we looked at was a sequential mass renaming of files. Script files (JavaScript files have the .js extension, Visual Basic have .vbs) can also do other, not-so-useful things, such as destroy data and propagate themselves. Note that LOVE-LETTER-FOR-YOU.TXT.VBS appears to have two extensions – it's the final one that counts and, depending on your settings, it may not be visible.



Screenshot 1



Screenshot 2

Top: Keep informed – don't hide file extensions
Above: Protect yourself from rogue scripts

At the simplest level, a script can create a text file. This might seem harmless – but scripts themselves are 'just' text files, albeit with a .js or .vbs extension. And any script file present in the Startup folder will be run the next time you restart Windows. As far as malicious code goes, this is just the beginning. The ILOVEYOU virus renames and replaces files, propagates itself by using your Outlook address book, and changes the home page in your browser in an attempt to download another executable file. The one thing it doesn't do is love you and, if you pass it on, the recipients certainly won't either. Like all attachments of uncertain provenance, it should be deleted unopened.

James Cross emailed me with a rather neatly targeted prophylactic measure. If you are using Outlook or Outlook Express, create a new message rule from the Tools menu, so that any message with ILOVEYOU in the subject line gets deleted unread. Some mail servers will also let you delete the mail from the server without downloading it, which is even better, and is again possible using Outlook Express rules.

Outlook 2000 users get a few more options – such as performing an action on all messages that have attachments. They can also set up a notification that the message has been received and deleted, but, rather paradoxically, unless you choose the 'permanent' delete option this notification provides a shortcut to opening the message (and attachment) from the deleted folder.

Even better advice is to take the simple precaution of never opening potentially unsafe attachments. It's a source of constant amazement that otherwise intelligent people who practise safe sex and refrain from using their fingers to test electric sockets will cheerfully unleash havoc on their own – and others' – computers.

There are other elementary precautions you can take. Using virus protection software is the obvious one, but don't rely on this: virus writers consider getting past such obstacles a noble challenge and, however often the checking software is updated, it can't hope to keep pace with new strains the moment they appear. Another sound strategy is to turn off 'Hide file extensions for known types' in Explorer, View, (Folder) Options, View. This way you have less chance of being taken in by a VBS wolf in TXT sheep's clothing, and also have a better chance of knowing the enemy (screenshot 1).

As already mentioned, anything with the VBS or JS extension should be viewed with extreme suspicion: if you have reasons for believing such a file to be harmless, you can check by loading it into Notepad (right-click, Edit NOT Open). Anything with the BAT, COM or EXE extension is also potentially harmful: these all run program code of one form

or another. Although you can't do a lot about the last three, if you don't need Windows Scripting, you can thwart the VB and JavaScript threat by uninstalling the Windows Scripting Host from Control Panel, Add/Remove programs, Windows Setup, Accessories (screenshot 2).

You should be safe with real TXT files, as with image formats such as JPG or GIF, and sound files such as WAV or MP3 – even if the contents aren't what they purport to be, the worst they could do is crash the program associated with them. However, at the risk of being repetitive, do check that these extensions are the real thing and don't precede another, hidden, extension. This is another trick of the ILOVEYOU virus: reproducing by copying itself over existing MP3 files.

Office documents, such as DOC, XLS and PPT files can all contain macro code: Office 2000 has options to disable macros in unknown documents, which you should use, and this safeguard is also available as a patch for Office 97.


Screenshot 3


Screenshot 4

Left: Everything you never wanted to know about your hardware setup
Below: Not the only game in town – Pyramid from 123 Free Solitaire

Don't assume that messages from friends are safe: this is exactly how viruses propagate

Screensaver (SCR) files are also potentially hazardous, as these consist of executable code: if you rename an EXE to the SCR extension it will still run. Finally, don't assume that messages from friends are safe: this is exactly how viruses propagate as victims unwittingly pass the infection on to people in their address book.

Star turn

Please don't try this if you're in a hurry, especially if you have a large hard disk and/or a slow PC, but selecting an item (such as My Computer) in the left pane of Explorer, then hitting the asterisk key on the numeric keypad, expands every nested folder below. Thank you, Ian Ratcliffe, for bringing that to my attention, and I was particularly impressed by the way the scroll bars animate.

Last month I mentioned both the Accessibility features of Windows and the annoyances of hitting the caps lock key by mistake. Alan Hitchin ties these neatly together by pointing out that there's an option in the former to sound a beep when the Caps lock, Scroll lock or Num lock keys are pressed.

If you would really like to get to know your Windows 98 hardware setup with clinical intimacy, then try typing HWINFO /UI from the Start, Run box. This will tell you everything you ever wanted to know (and probably lots that you didn't), from your CPU-PCI bridge to your joystick. This is all displayed in a range of designer colours – mauve for file Properties, green for Registry entries, brown for Configuration Manager, blue for warnings and red for problems (screenshot 3). Thank you, Philip Branley for pointing me towards this.

In May's Windows column I wrote about Direct Cable Connection and mentioned that you couldn't use DCC and Dial-up Networking at the same time. Not so, says Duncan Grant: 'All you have to do is to add another MS DUN adaptor and another TCP/IP protocol into your networking setup.

Using TCP binding, you allocate static IP addresses for the DCC and bind that TCP/IP setting to your DCC adaptor and bind the second adaptor to the second TCP/IP protocol (which should be set to dynamic).

Furthermore, if you do this and install a proxy server on the host machine, then configure the guest IE to use a proxy with the ports you have set, you can indeed share the Internet using only the modem on the host machine.'

Playing with yourself

If you want to achieve a record-breaking score at Minesweeper, then holding down both buttons and pressing the Esc key stops the clock: you can still continue playing. You can also cheat at Solitaire if you're set to 'draw three' and the card you really want won't come to the top. Hold down Shift & Alt & Control as you click on the pile, and the cards will turn over singly. Even more sad and pointless is the Freecell cheat. Control & Shift & F10 gives you the option to win or lose immediately.

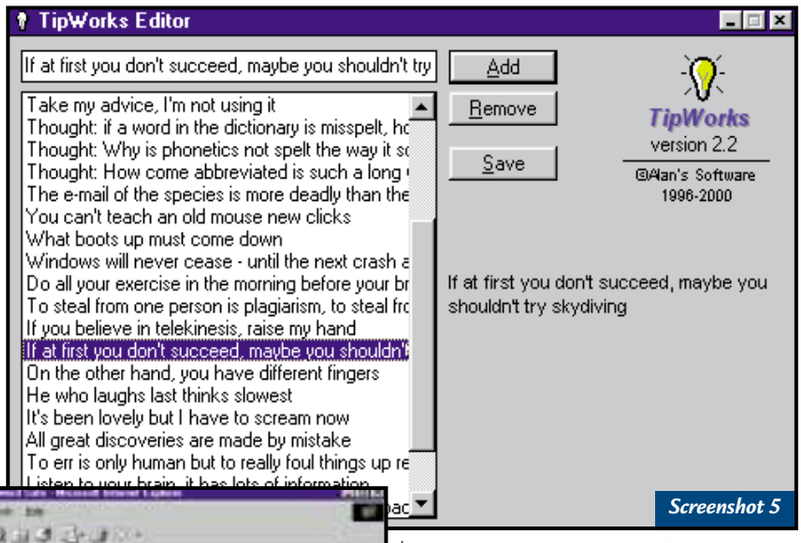
Which brings me to a related matter and some rather more interesting ways of wasting time: a reader wanted to know if it was possible to add custom bitmaps to the choice of card backs in Solitaire. I haven't been able to find a way – what you'd need to do would be to edit the file CARDS.DLL, which contains the backs – and fronts – of the Solitaire deck, including the animations.

You can also use this file as a resource

for your own card games that you've knocked up in Visual Basic, C++ or other programming language. On the other hand, why bother, especially as the Windows card games are somewhat dulled by age and custom?

While I was searching for an answer to the original question, I came across more free patience and other card games than you could shake a spade at. Two of my favourites are Midnight Sunitaire and 123 Free Solitaire. The first of these not only includes some truly dreadful jokes, but also a hidden ghost; the game itself is more interesting than most; champagne corks pop when you win. The second has less well-known patience variants and some classy backs, including the Mona Lisa (screenshot 4).

If you can stomach the in-game advertising, then try Free Solitaire (without the 123). This is a compendium of 10 games and has the feature we were looking for when we came in – using your own images as card backs. You'll find these (and many others) at www.freewarehome.com/games/cards.html and http://winfiles.cnet.com/apps/98/games-card.html.



Above: Welcome back tips of the day, courtesy of Alan Hitchin
Left: Online storage for all your passwords

Nostalgia isn't what it was

Remember the *Tip of the day*? Younger readers may not, but this was a feature that popped up with a hint or tip every time you started Windows 95 offering invaluable advice such as 'You can minimise neck strain by positioning your monitor at eye level' (where else?). When you'd got bored with this, you could turn the feature off, or better still hack the Registry and substitute your own tips.

At the time we had a lot of fun with readers sending in individual tips that ranged from the Pollyannaish ('If you see someone without a smile, give them yours') through to the cynical ('We are born naked, wet and hungry. Then things get worse') to the downright weird ('To err is human, to moo, bovine'). Others sent in entire collections, including several themed on cults such as *Twin Peaks*, *Discworld*, *Red Dwarf* and the inevitable *Star Trek*. And then along came Windows 98 and away went the tip of the day.

In a generous act of retro-development, Alan Hitchin has written his own tip-of-the-day applet, called TipWorks (sample: 'On the other hand, you have different fingers')(screenshot 5). Unlike the original Microsoft version, it doesn't store its tips in the Registry, but in its own folder and comes with a tip editor, so you can add your own favourites without enduring the horrors of Regedit. TipWorks is free, and at the time of writing, could be found at www.alanweb.co.uk/tipworks.

Safe keeping

In last December's column, I mentioned the problems of remembering and storing passwords securely.

If you go to www.passwordsafe.com, you'll find you can store all your passwords in a private, secure online safe (screenshot 6). Passwords are stored in category folders, such as Health, Email, Shopping and there is no limit to the number of passwords you can store. The service is free.

If, on the other hand, you have reservations about trusting a website with all your passwords, there are other utilities specifically designed to do this on your own hard disk. One such is Password Keeper, by Gregory Braun. This shareware product (registration is around £13) is available from www.gregorybraun.com, and has extra features such as launching a web browser with a password-protected site and generating passwords.

Either option leaves you with just one password to remember: as long as you can remember your user name and your mother's maiden name, Password Safe will email you a forgotten password from your personal safe. Which, perhaps, makes it rather less than secure.

CONTACTS

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

The devil you know

Terence Green explains what to do if you can't live with the incompatibilities of Windows 2000.

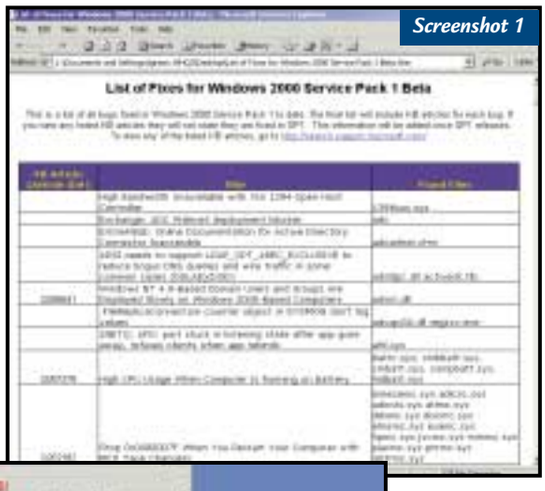
June's article on Windows 2000 upgrades hit a nerve with several readers. Tony Penney has also been spending money. 'I too have been having a torrid time. First my SCSI adaptor, then my Zip and now my NIC. Where will it all end?' In blissful, reliable, harmony of course!

Although Windows 2000 is stricter than Windows 9x, we're in the 'honeymoon' period of getting to know our new partner. Any new relationship needs some mutual adjustment. Fortunately, hardware vendors are coming through with drivers, Microsoft has punted out another compatibility upgrade, (mainly for gamers), and the first Service Pack (aka bug fix) should be out around now (see screenshot 1).

Windows NT Service Packs have resembled privatised trains: arriving eventually but haphazardly. Microsoft has promised to do better with Windows 2000. They should emerge on a six-monthly schedule and hopefully will address annoyances such as the Voodoo 2 problem and the lack of support for the Matrox G400 DualHead video card.

Video cards are a major source of irritation with upgraders, so I have borrowed a few – initially the ATi Rage Fury Pro and the Matrox, an Elsa Erazor is in the pipeline – to check them out. Although two monitors can be attached to the Matrox, Windows 2000 doesn't support any of the cool DualHead features. You get a bigger screen area, but both monitors run at the same refresh rate. Matrox has tried working around this, but to no avail, so we're all waiting for Microsoft to do the business.

As we've always said, it will take time for these general niggles to be worked out but when they are it will be worth the wait. Sadly, not everyone can manage with reduced functionality, or afford to upgrade their hardware. Some readers have asked about reverting to Windows 98. If you've upgraded from an earlier version of Windows to Windows 2000 your system folders are a mix of old and new and your best bet is to begin afresh with newly formatted drives and a new install of Windows 98.



Screenshot 1


Screenshot 2

Left: Service Pack, coming down the line, the answer to everybody's problems... Below: Free virus scanning software for personal use. Works great with Windows 2000

The situation is a bit better if Windows 2000 resides on a separate partition in a dual-boot setup. Removing Windows 2000 entails disabling the dual-boot system and either deleting the Windows 2000 system files (if installed to a FAT partition) or deleting the NTFS drive on which Windows 2000 is installed. If your Windows 2000 partition is formatted as NTFS, you won't be able to access the NTFS partition to remove it from Windows 98 after disabling dual-boot. You need either the Windows 2000 CD or a utility such as PartitionMagic to remove the NTFS partition and reformat it for Windows 98.

From Windows 2000 check whether the Windows 2000 system drive is NTFS by right-clicking on it in My Computer and looking at the General Properties. Still in Windows 2000, back up your data, remembering to retrieve any files which may have found their way into the Windows 2000 Documents & Settings folder. Export your Internet Explorer Favourites and cookies (IE/File/Import and Export) to the C: drive (assuming Windows 9x is installed there). Use Tools/Maintenance/Store Folder to move any Outlook Express message stores to the C: drive. Run a virus scan on the C: drive to make sure that you don't have a virus infection in the boot sector. You can download a free virus scanner from www.antivirus.cai.com (see screenshot 2) or time-limited demos from other vendors.

Boot into Windows 98 and make a Startup Disk (Control Panel/Add/-

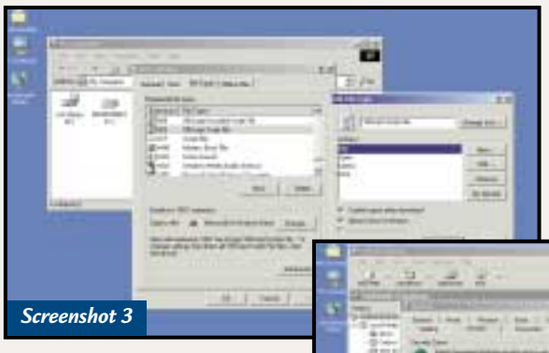
We're in the 'honeymoon' period. Any new relationship needs mutual readjustment

Fending off amorous advances of the viral kind

At the time of writing there's a lot fuss about the Love Letter virus. Although it may have gone quiet by the time this appears, it will still be on the loose posing a threat. The Melissa virus of a year ago and the Pretty Park virus of six months ago remain at large. Do ensure that your anti-virus software is up to date. Downloading new updates once a week should do it. I use AntiViral Toolkit Pro (www.avp.ch) which offers daily updates for the truly paranoid. Obviously you should never open suspicious attachments, but we all make mistakes. Even folks at Microsoft fell prey to Melissa and Love Letter, and if it can happen to them...

There are several steps you can take to protect yourself, in addition to always using real-time anti-virus scanning. The principal problems are caused by Active Scripting which, once it gets loose on your computer, can do just about anything. That's how Love Letter did its dirty work, once activated by opening the email attachment.

The trouble is, in some cases scripting is a good thing. Please don't use the following instructions without obtaining approval from your IT manager if you're on a corporate network. If you're home alone or in a small business, be warned, script viruses can activate from within Outlook and Outlook Express without any user action.



Screenshot 3

Screenshot 4

Left: Stop Love Letters by setting the default action for Script files to Edit
Below: Raise the barriers to entry – set Outlook/Express to Restricted zone and disable Active Scripting

One solution is to change file associations so that scripts (files with extensions VBS, VBE, JS, JSE, and WSH) open in the Notepad editor rather than executing. Do this from Windows Explorer/Tools/Folder Options/File Types. Scroll to each extension in turn, click on Advanced, select Edit, click on Set Default and ensure that Confirm Open After Download and Always Show Extension are both checked (see screenshot 3).

Scripts can also be contained within HTML email or web (HTML) pages. For this reason it is probably better to cover yourself by using the Security Zone feature in Outlook, Outlook Express and Internet Explorer instead. Use Tools/Options/Security in Outlook (and Outlook Express) to place them in the Restricted Zone. Now open Internet Options from Control Panel and go to the Security tab. Click on Restricted (it should show High security) and click on Custom. Scroll down and change Scripting/Active Scripting to disable (see screenshot 4). Think of it as a condom for email – not as much fun, but a lot safer.

For general web browsing safety go to Internet Options and raise the security level for all zones to High and disable Active Scripting. Please don't do this on a corporate network without approval. Now you'll find many websites won't function properly. Add those you want to use to the Trusted zone and use Custom to enable its cookies, Active Scripting and Java Scripting as necessary. It's a hassle, but there are monsters out there.

Remove Programs/Startup Disk). Boot to DOS with the Startup Disk. Load without CD-ROM support to save time. From the A:\ prompt, type SYS C: and press Enter to transfer Windows 98 system files from A: to the C: drive. This disables dual-boot; you can no longer boot Windows 2000. Remove the Start-up Disk, reboot to Windows 98. If the Windows 2000 system directory is on a FAT drive, delete it. If it's on a separate partition either use PartitionMagic to change it to a FAT partition or use the Windows 2000 CD as follows. (You must use the Administrator password that you selected when installing Windows 2000.)

Boot from the Windows 2000 CD. If you don't have a bootable CD drive, make the four boot disks by running MAKEBOOT.BAT from the BOOTDISK folder on the Windows 2000 CD. Hit Enter from the Setup Screen to open the next screen which asks if you want to install or repair and then hit F10 to start the Recovery Console. Log on as Administrator. Click on Run and type 'map' (without quotation marks). Make a note of the drive to reformat. Click on Run and type 'format d: /fs:fat' where 'd' is the letter of the drive to format.

Exit from the Recovery Console, reboot into Windows 98 and use Windows Explorer to delete the following files from the root of C:\ -: BOOT.INI, NTBOOTDD.SYS, NTDETECT.COM, and NTLDR. You may have to use View/Folder Options to Show All Files in order to see them. That's it. From here on in we're hard core about Windows 2000. No more talk about deleting it.

CONTACTS

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

Entering the games arena

Roger Gann looks at how DirectX 3.0 transforms NT4 from serious OS to gaming platform.

Here's a statement you won't hear too often: 'On many popular 3D games, Windows NT4 is actually a better gaming platform than Windows 9x, offering better performance (no, really) and more stable operation (of course).' How could this be? Isn't Windows 9x the ultimate PC gaming platform and NT4 a 'serious' operating system that has no place in the pursuit of fun? Well, there's a grain of truth in this, but so many gamers have ignored NT4 that it's high time a few myths were dispelled and the story was set straight.

'But,' I hear you say, 'A better gaming platform than Windows 9x? Surely not!' Well, it's undeniable that NT4 is considerably more robust than 9x – you generally have a much better chance of recovering from crashes and misbehaving programs. It's faster, too: an NT4 box that has at least 64MB of RAM and a P6 class processor (ie Pentium Pro, Celeron, Pentium II/III or Xeon) can run up to a third faster than the same system running Windows 9x. This translates into a significantly higher frame rate, the ultimate benchmark of 3D gaming.

If the NT system has a SCSI-based hard disk subsystem, then overall performance increases even more. SCSI subsystems perform much better under NT than Windows 9x. The end result of these two things is that games load faster and are less prone to crashing.

However, in the beginning it was true to say NT4 and games were chalk and cheese. But three things have happened since then to dramatically change that – the release of Service Pack 3 (SP3), the increasing use of OpenGL and growing developer support.

If strategy and role-playing games are your bag, then many of them, including Diablo, should run flawlessly under Windows NT

DirectX and NT

The introduction of SP3 in 1997 made gaming prospects considerably brighter as support for DirectX 3.0 was introduced. OK, DirectX 3.0 may sound old hat (after all, Windows 95 shipped with DirectX 5.0) but it actually opened the door for many games to be played on NT.

So many gamers have ignored Windows NT4 that it's time a few myths were dispelled

To recap, NT4 originally shipped with support for DirectX 2.0 (yawn). However, SP3 added almost complete DirectX 3.0 functionality to NT4, including DirectDraw, DirectSound, DirectInput, DirectPlay and software emulation for the Direct3D 3.0 API. This feature set has remained largely unchanged through subsequent Service Packs, though SP4 included DirectPlay 6 (for network/modem play), which was upgraded to DirectPlay 6.1a in SP6.

The inclusion of DirectX 3.0 in NT4 SP3 was a bit of a surprise. It opened the door for NT users to play some of the older gaming and multimedia titles that were previously unavailable, including most DirectDraw-based titles. In fact, most DirectDraw-based (or 2D) games run well under NT.

The main problem with DirectX under NT4 is the lack of Direct3D support. Most of the latest 3D-based gaming titles require the Direct3D support included in DirectX 5.0 and above. One other thing to note is that the current implementation of DirectSound under NT is purely software-based, so it doesn't directly support advanced 3D audio hardware, such as A3D and Creative Lab's EAX, unfortunately.

However, there is a way to bestow a 'kind of' DirectX 5.0 functionality to your NT4 box. Some clever clogs has posted an interesting file patch on the Internet which adds some DirectX 5.0 DLLs (probably pulled from an early NT5 beta) to your System32 directory, replacing some of the DirectX 3.0-based DLLs. Please note that this is NOT the same as installing the normal DirectX 5.0 or later distribution files. Needless to say, this dodgy stunt is not recommended or supported by Microsoft, *quelle surprise*! The file you need is NT4DX5.ZIP and can be downloaded from several sites on the Internet – I got the 2MB download at ftp://ftp.ixea.net/pub/dos-win/nt40/nt4dx5.zip.

So, what exactly does this hack give you? Direct3D is now available under NT, but sadly without hardware acceleration. However, even without the hardware acceleration, it's now possible to install and run more games under NT4, including Tomb Raider II and Jedi Knight. These are quite playable in software mode, depending on your

hardware configuration. However, some games are very picky and look for specific DLL versions before running.

OpenGL

Gaming under NT also benefited from schanges to NT4's graphics subsystem. With the release of NT4, Microsoft controversially moved the GDI into the kernel (aka Ring 0), thereby greatly increasing graphics performance, although at the risk of possibly compromising the stability of NT4. However, this proved to be a storm in a tea cup.

More importantly, a faster implementation of the OpenGL specification was added. Not only was it faster, but the introduction of the Mini Client Driver model made it easier for graphics card vendors to implement drivers for high-end 3D graphics accelerators, which, in turn, aided the cause of Intel-based platforms as viable, low-cost graphics workstations. It also meant that games which were based on OpenGL were now able to run under NT4.

Microsoft included the OpenGL API with NT4. This was a great idea, since a majority of existing tools were using the OpenGL specification. OpenGL, originally developed by Silicon Graphics (SGI) for its graphics workstations, lets applications create high-quality colour images, independent of windowing systems, operating systems and hardware.

Credit has to be given to two crucial software developers for promoting NT4 as a gaming platform, 3dfx and id Software. The latter's influence dates back to the enormously popular 3D shoot 'em ups Wolfenstein, Doom and Doom II. Quake, id Software's next title, changed the software scene with its breathtaking, state-of-the-art graphics engine. After its release, id went one step further by adding experimental OpenGL support, and this opened everyone's eyes to a brand new gaming experience.

Games that incorporate 3D engines such those found in Quake III and Unreal are among the many that can be played on NT4 with the help of DirectX 3.0

The bottom line back then was 'OpenGL game + Voodoo = ultimate gaming experience'

Coincidentally, 3dfx had released the Voodoo graphics chipset, which was found in the Diamond Monster 3D and Orchid's Righteous 3D. A major feature of the Voodoo graphics chipset was its GLIDE API, which made it easier for developers to take full advantage of the powerful hardware with minimal fuss. And, of course, GLIDE works under NT.

Anyway, the bottom line back then was 'OpenGL game + Voodoo = ultimate gaming experience', an equation that is still fairly valid today.

Getting it together

So, what do you need? Not very much really. The latest Service Pack will provide you with basic DirectX 3.0 support, among other bug fixes, as well as allowing for the installation of the latest 3D accelerators. You'll need a decent OpenGL-compliant video card, preferably based on the 3dfx Voodoo, Voodoo2, or Banshee chipset, as these are probably the best cards for gaming under NT4. In addition to OpenGL support via an MCD MiniGL driver, you also get GLIDE support which allows you to play a wider variety of games.

It goes without saying that you should download the latest video drivers for your graphics card. You'll also want to make sure you download reference drivers from 3dfx's website at www.3dfx.com.

Finally, of course, you'll need some games. If you're a big fan of any game that uses the Quake, Quake II or Unreal 3D engines, then you're in luck, as you'll have a wide selection of games to choose from. Also, if you're into DirectX 3.0-compatible, real-time strategy games, then NT will also work with many titles.

I can't vouch for all of these games, but the following titles are alleged to run flawlessly under NT4: Quake II, StarCraft, Delta Force, FreeSpace 1 and 2, HalfLife, HomeWorld, WarCraft II Battle.net Edition, Diablo/Diablo 2, Age of Empires 1 and 2, Unreal and Unreal Tournament.

However, the biggest problem would seem to be that, because NT isn't considered a 'gaming platform', device drivers for it aren't necessarily DirectX compatible, which will definitely be a game show-stopper. But give it a whirl.

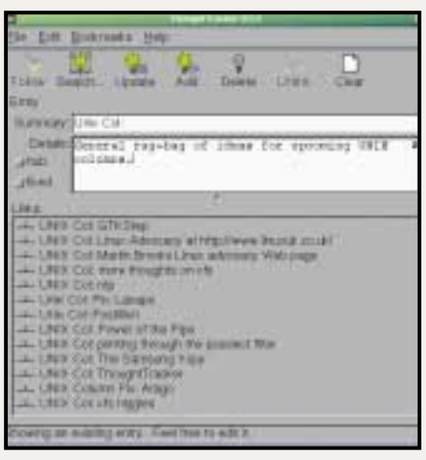
CONTACTS

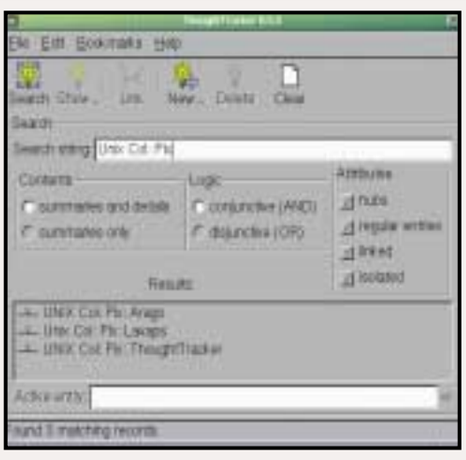
Roger Gann welcomes your comments on the Windows NT column. Contact him via the *PCW* editorial office or email **nt@pcw.co.uk**

Always-on for all

Not satisfied with an ADSL link from his ISP to his workstation, Chris Bidmead goes one better.

Last month I promised to tell you about stage two of the roll-out of my always-on ADSL connection: the process of connecting the whole network, rather than just a single workstation, to the HomeChoice Internet service. When I say 'whole network', I'm talking about a handful of mostly oldish machines, two of which are servers. Internet-wise, one server collects my mail and the other synchronises with a number of time servers and then feeds that time to the workstations.





Left: ThoughtTracker is a simple notekeeper with some smart features. This is the entry display/edit screen. The Unix Col: entry shown here is defined as a 'hub'; in the 'Links' box below is a list of all the entries linked to it. The data is stored in a GDBM (GNU database manager) file, so it's nicely robust and can be accessed by other standard GNU tools

Right: ThoughtTracker lets you search through the database for any particular string using simple Boolean logic. If you're careful about how you set up your links, the combination can be very powerful

From your email I know that many of you who have been into IT for a few years now have accumulated at least a couple of machines. So I hope there's something of general interest in the idea of routing an ISP service. I should probably mention at this point that at least one ISP (in the US) has objected strongly to customers routing a service that, it says, is intended only for a single machine (see below). I can understand why the newly conglomerated Time Warner/AOL/EMI monster (the ISP in this case) might be interested in squeezing every last cent from its customers, but I can't see any technical grounds for charging more for the same bandwidth, however the customer cares to share it. But let's not get into that now.

My router could have been one of the existing machines on the network. But it seemed to me sound practice to set aside a dedicated piece of hardware for this new departure, particularly as, in this case, the hardware was an old 486 machine accumulating dust. The Apricot Xen II made its first appearance in this column in the summer of 1994 (just a couple of months after our first discussion of Linux), but dropped out about three years later because the BIOS wouldn't support large drives and the Linux driver (apricot.o) for the built-in Ethernet connection stopped working with later versions of the Linux kernel.

At least one ISP has objected to customers routing a service intended for a single machine

The router software I used originates from the Linux Router Project (LRP) at www.linuxrouter.org. LRP is a Linux micro-distro, small enough to fit onto a single floppy. Like Tom's Root and Boot (www.toms.net), another micro-distro that regularly stars in this column, it sets up its modest file system wholly in RAM, which allowed me to remove the hard disk from the machine for silent, cool and economical running. By the way, there's a comparable FreeBSD project at http://people.FreeBSD.org/~picobsd.

The LRP implementation offers a ton of options, but all I needed was an Ethernet connection to my LAN, a PPP-style serial connection to the HomeChoice set-top box (along the lines we explored last month) and a kernel to route between them. I couldn't find anything ready-made for this rather unusual requirement (PPP to ADSL is unique to HomeChoice as far as I can make out), but a semi-commercial spin-off from the LRP, called Coyote Linux, took me a good step along the way. (See www.coyotelinux.com and follow the 'what's new' link from there to pick up the story of the ISP objecting to routers.)

Coyote Linux is a ready-made Linux-based system, designed to route between a couple of Ethernet cards. All I had to do was understand its basic mechanics (without, happily having to get into the intricacies of IP masquerating and such stuff, all of which has been pre-packaged by the LRP and Coyote) and then figure out how to take out the Internet-facing Ethernet connection and substitute exactly the same PPP connection as was already working on my ADSL-connected Linux workstation.

The free, open-source and

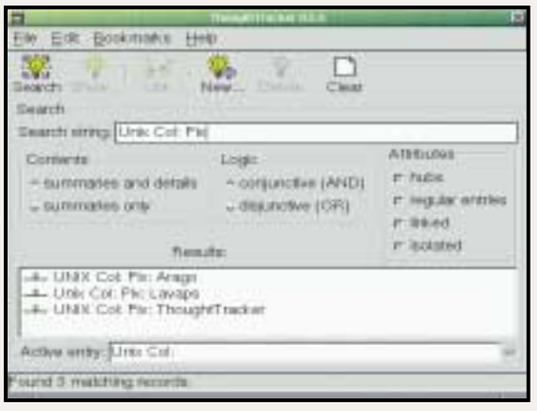
unsupported version of Coyote comes as a downloadable 2.3MB package called coyote-1.13.tar.gz. The double suffix indicates that it needs to be unzipped and then untarred, something GNU tar lets you do in one movement by running:

```
tar xvzf <filename>
```

In practice, I always run tar tvzf on the file first, 't' being the switch that tells tar to list the contents without actually expanding them. Polite tarballs (tar.gz packages) will tidily untar into their own directory below the one you're operating in, but some day sooner or later you're going to come across one that pukes its entire contents into your working directory and the mess will take some time to clean up. (In fact, a pipeline along the lines of:

```
tar tzf impolite.↙
tar.gz | xargs rm -r
```

(*Key:* ↙ *code string continues*) will automate the clean-up rather nicely).



The shots on the previous page show ThoughtTracker running with Ullrich Hafner's GTKStep library from http://ulli.linuxave.net/gtkstep, which adds a NeXTStep-ish look and feel to the typical plain Gnome/GTK+ look shown here. You can add GTKStep to your Linux system without recompilation; it just needs some mods to a couple of config files as described in the accompanying README

The effect of GTKStep can be dramatic, as shown by the above 'before and after' screenshots of the Gimp toolbox and filehandler. Notice how sliders are reorganised and moved over to the left-hand side, which (as any NeXTStepper will tell you) is where nature intended them to be

The Coyote tarball creates its own directory called ../coyote, at the top level of which is a shell script called makefloppy.sh. I ran this as root and answered some questions about the Ethernet hardware on my target device (the Apricot) and the IP addresses I would need. I'd stuck a 3Com Etherlink III card into the Apricot to compensate for the Linux-inaccessible built-in Ethernet port, so I told the truth about that one and lied about the second Ethernet card that the script assumed I must have. The script took me through some other irrelevant stuff about Virtual Private Networks and then asked me to insert a floppy, whereupon it wrote out a disk image.

The idea is to boot the target machine with the newly hatched floppy and bring up a fully working and configured router. But I knew the image I'd created needed further work and the first job was to inspect it and see what it was made up of. You don't need to boot the disk in the target machine to do this – a good way of speeding up the detailed inspection of a floppy is to copy the disk image back onto the hard drive and then mount it as a loop device.

```
dd if=/dev/fd0 ↙
of=coyote.image
```

does the copying, then it's probably a good idea to run:

One advantage of Syslinux is you can create and modify the disk from non-Linux systems

```
file coyote.image
```

on the image to see what kind of filesystem is being used. In this case I got the result:

```
coyote.image: x86 boot ↙
sector, system SYSLINUX, ↙
FAT (12 bit)
```

so I knew I was dealing with a DOS-style boot image, using the Syslinux boot system (see www.kernel.org /pub/linux/utils /boot/syslinux). One advantage of Syslinux is that you can create and modify the disk from non-Linux systems running DOS, and in fact the commercial version of Coyote comes as a setup script that runs under Windows and creates your floppy from a wizard.

To mount the disk image under Linux as a filesystem-within-a-filesystem using the loop device you run a command line such as this:

```
mount -o loop -t msdos ↙
coyote.image mp
```

having first remembered to create the empty directory, here arbitrarily called mp, as a mount point. Now, when you descend into the mp directory you'll be looking inside the disk image just as you would if you'd mounted the floppy, except that all operations will proceed at hard disk speed rather than floppy speed.

FIG 1 **Floppy disk directory**

-rwxr-xr-x	1 root	root	564	May	2	12:13	config.lrp
-rwxr-xr-x	1 root	root	23062	May	2	12:13	etc.lrp
-r-xr-xr-x	1 root	root	5860	May	2	12:13	ldlinux.sys
-rwxr-xr-x	1 root	root	425825	May	2	12:13	linux
-rwxr-xr-x	1 root	root	502	May	2	12:13	local.lrp
-rwxr-xr-x	1 root	root	639	May	2	12:13	log.lrp
-rwxr-xr-x	1 root	root	36604	May	2	12:13	modules.lrp
-rwxr-xr-x	1 root	root	695115	May	2	12:13	root.lrp
-rwxr-xr-x	1 root	root	191	May	2	12:13	syslinux.cfg
-rwxr-xr-x	1 root	root	44	May	2	12:13	syslinux.dpy

The floppy disk directory looks like figure 1, above.

The lpr files (confusingly known as lpr modules) turn out really to be tarballs in disguise. When expanded (which happens as part of the initial Syslinux load at boot time), these create the complete Linux file structure that will be running on the root RAM disk. It's tempting to make changes on the target machine's RAM disk, but of course these will be lost when you reboot. In fact, Coyote does provide a script to save some of these changes back to the floppy, but the safest way to proceed is to make mods to the stuff inside the tarballs. Next month we'll venture inside some of these tarballs and discuss how to make the manual mods necessary for whatever sort of router you want to set up.

Yet more power to the pipe

In the February issue I was rash enough to issue a challenge to readers to come up with the neatest pipeline for showing the newest file in any directory. As I reported in the May column, the response was huge, but amazingly, your ideas on the subject continue to flood into my mailbox.

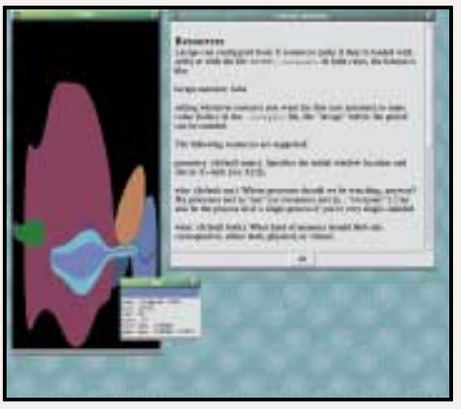
To recap, the idea was to demonstrate the general power of the Unix pipeline with a one-liner that sends the name of the newest regular file to stdout. My starting point was something like:

```
ls -t |  head -1
```

but this will also return a directory (if it's newer than the newest file), or indeed a named pipe, char or block device, or whatever. In order to filter for plain files I went off in the direction of:

```
ls -lt | grep  ^-
```

which of course then presented me with the problem of column-cutting the resulting long file listings. I've learnt a lot about Unix from all your responses and I'm only sorry that there isn't space enough here to explore the many interesting ideas you've come up with. Here's just a very small sample of the ones that caught my eye.



Lavaps is a little Linux utility that looks like screen decoration, but is actually a lot more. The coloured shapes float around inside the resizable window like globules in a lava lamp, representing processes in memory. The size of each blob shows the amount of memory it takes up (the big purple blob is the ld-linux.so shared library), and a right-mouse click gives you info on each process.
Search http://freshmeat.org for it

Tarjei Tjùstheim Jensen (tarjei@online.no) suggests:

```
ls -1t | ( while read aa; do ↙
test -f '$aa' && echo $aa && ↙
exit ; done)
```

which makes ingenious use of the bash read command. In a GNU environment, by the way, the -1 flag should be unnecessary, as ls is wise enough always to go into single-column mode when outputting down a pipe.

Another comprehensive solution comes from Peter Gathercole (peter.gathercole@virgin.net):

```
ls -tr | xargs -i find {} ↙
-prune -type f -print ↙
| tail -1
```

Suggestions such as this demonstrated to me that perhaps I was barking up the wrong tree with the long listing mode of ls, but Dave Reeve (dcr1@ukc.ac.uk) goes further, advocating find rather than ls:

'The use of ls in this kind of script can cause problems, because ls looks for an environmental variable that may contain additional switches. Which, of course, may cause a different output and hence upset scripts that rely on keywords (those that use grep), otherwise other version-specific output information will break. Again, this is why there is find.'

Dave suggests that find is inherently fast, and is 'designed to be of much more use in these situations by giving you much greater flexibility'. His own 'pure find' solution goes like this:

```
find ./ -type f ↙
-maxdepth 1 -printf ↙
'%T@ %f\n' | \
sort -r | head -1 | ↙
awk '{print $2}'
```

Sites to watch

I'm a total addict of http://slashdot.org, which keeps me bang up to date on all the latest gossip in the free software community, and also of http://freshmeat.net, a site that tracks all the emerging software from that sector.

While we're on the subject, Martin Brooks (martin@hinterlands.f9.co.uk) writes: 'I just wondered what the possibilities were for getting a gratuitous plug for a site I'm working on mentioned somewhere in the pages of your magazine. www.linuxuk.co.uk is a UK-oriented Linux news and articles site similar to Slashdot.'

Nah, sorry, Martin. I don't do gratuitous plugs... :-)

Martin also has a Linux advocacy site at www.hinterlands.f9.co.uk/runlinux.html which is worth a visit if you're trying to persuade your boss that Linux is a viable alternative to high-priced, hardware-hogging operating systems from, er, elsewhere...

CONTACTS

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

GigaHerz fun with a Slot 1

That old friend, the BX chipset, is doing it again for Gordon Laing, with the Slocket that rockets!

What do you get if you cross a Flip Chip Pentium III processor and a sneaky slocket converter? A new lease of life for your old Slot 1 motherboard! That's what I discovered in June's *Hardware* column after realising my ancient Asus P2B Slot 1 motherboard had a future beyond its theoretical ceiling of a 550MHz PIII.

Judging by the number of emails we received on the subject, you were as excited as I was, so this month's column is devoted to getting the most out of your old Slot 1 motherboard! And believe it or not, I've managed to beat the top-scoring 1GHz RDRAM Dell system we tested in June's issue, with the help of an old BX motherboard, some humble SDRAM, a few gadgets, a length of string (no kidding) and a bit of good fortune.

My humble Asus P2B motherboard keeping it real: the Iwill Slocket can handle FC-PGA CPUs and instruct the Asus to supply a lower voltage. Here I've got a PIII overclocked to 1GHz on a 133MHz FSB, with the help of PC133 SDRAM. Note the string used to keep the Slocket from leaning over the overclocked BX chipset in the absence of any Slot 1 retention guides.* Blue Peter *eat your heart out! The Titan fan attached to the chip is now available in the UK from Hills Components: www.hillscomponents.co.uk (01923 424344)

End of the road?

Intel's latest Coppermine process is used in all Pentium III and Celeron CPUs running at or above 650 and 566MHz respectively. It's also used on a handful of PIIIs running as 'slow' as 500MHz, but these are differentiated from older Katmai models running at the same speed, with an E suffix, for enhanced process.

Coppermine runs on a lower core voltage of 1.6v or 1.65v, compared to 2v for the older CPUs. Consequently, your motherboard must be aware of the new process to supply to the lower voltage. I checked the Asus website for information on my P2B motherboard. Unfortunately, I have revision 1.10 and need revision 1.12 to properly handle Coppermine.

Slockets that rocket

As I resigned myself to searching out a new motherboard to handle CPUs any faster than 600MHz, I got hold of a Slocket. These let you use a socketed CPU in a Slot 1 motherboard – they're just a card with a ZIF socket, which has an edge connector to pop into a CPU slot.

It was some time ago that Intel's Celeron shed its slotted cartridge in favour of the Plastic Pin Grid Array (PPGA) Socket 370 design and, ironically, a Slocket lets you pop it straight back into a Slot 1 motherboard. Intel's also gradually moving its Pentium III processors to socketed designs, with today's models available in both Slot 1 and Socket 370 form factors. All socketed PIIIs and new Celeron 2s employ a new Flip Chip Pin Grid Array (FC-PGA) design, which is incompatible with existing 'legacy' PPGA sockets. Instead you need a motherboard with a socket which is aware of both PPGA and newer FC-PGA processors.

I checked the BIOS to monitor the core voltage, expecting it to read a way-too-high 2v

Fortunately, the latest range of Slockets are also aware of both PPGA and FC-PGA CPUs, which allows a Slot 1 motherboard to access any Pentium II, III or Celeron processor, both young and old. There is, of course, that question of core voltage incompatibility with Coppermine, but curiosity got the better of me. I had a pair of Iwill Slocket IIs that sported core voltage adjustment jumpers. I set one to 1.6v, popped in a PIII 600E FC-PGA Coppermine processor, then slotted it into my old Asus P2B motherboard.

Almost unbelievably, the machine started up as normal. I checked the BIOS to monitor the core voltage, expecting it to read a way-too-high 2v, but remarkably, it calmly stated 1.6v. So, despite claiming it wasn't possible, the Slocket was persuading my Coppermine-unfriendly motherboard to be, well, Coppermine-friendly! This may not work on your particular combination of motherboard and CPU and, as always, we cannot accept responsibility for any experiments that go wrong.

Push it harder!

The overclocker is never satisfied, and news of a project on Tom's Hardware website (www.tomshardware.com) had got me thinking. In a test of different chipsets, the website concluded that anyone brave enough to overclock a BX chipset to 133MHz with PC133 SDRAM would enjoy superior performance to newer 820 and 840 chipsets, even when running expensive RDRAM. I decided to investigate further.

The BX chipset was Intel's first to handle a Front-Side Bus (FSB) of 100MHz, which could in turn support PC100 SDRAM memory. With the FSB set to 100MHz, the PCI bus was kept happy at its standard 33MHz, by using a 1/3 multiplier. The AGP bus was maintained at 66MHz using a 2/3 multiplier.

However, many Taiwanese BX motherboards arrived with settings that offered FSBs up to 133MHz, or even higher still. Not long afterwards, SDRAM rated at 133MHz turned up, which begged the question: what would happen if you fitted PC133 memory and overclocked the BX chipset to 133MHz?

Remarkably, the BX chipset itself appears to be a resilient fellow, happy to run at 33 per cent faster than it was designed to. Paranoid, or careful overclockers may, however, wish to remove the heatsink, apply a thin layer of Heat Transfer Compound, then pop it back on again, complete with a 486 fan screwed on top for extra cooling. The paste and fan (part LX51) are both available from Maplins (www.maplin.co.uk), and this process was described in March's *Hardware* column.

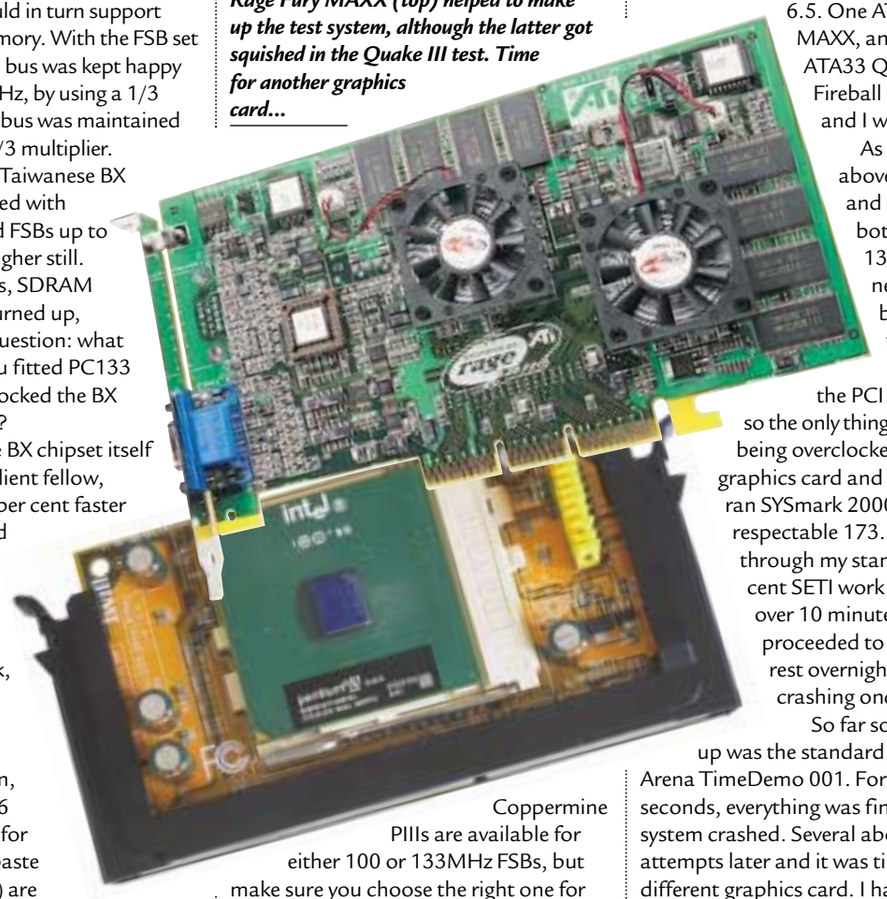
Juicing up the CPU speed

The CPU speed is derived by multiplying the FSB by a number Intel fixes on its retail chips. In other words, a 500MHz PIII, designed for a 100MHz FSB, has a fixed clock multiplier of five times. If you increase the FSB to 133MHz, you'll be driving this chip at five times 133, resulting in a speed of 666MHz.

Overclockers use this trick to squeeze extra juice out of their CPUs, but remember the limits of Intel's processes: if it's a Coppermine CPU, then 666MHz shouldn't be a problem, but older Katmai chips almost certainly won't want to run above 600MHz.

Then again, if you're not into overclocking your CPU but still want to try the 133MHz BX trick, then consider getting a CPU designed for a 133MHz FSB in the first place. Note that many Coppermine PIIIs are available for either 100 or 133MHz FSBs, but make sure you choose the right one for your system – an 800MHz chip could be eight times 100, or six times 133, so if you buy the latter, but install it on a 100MHz FSB, it'll only run at 600MHz.

An Iwill Slocket II (bottom) and ATi's Rage Fury MAXX (top) helped to make up the test system, although the latter got squished in the Quake III test. Time for another graphics card...



Trouble with buses

In my overclocking experience, the real troublemakers are the PCI and AGP buses, which can really throw a wobbly if asked to go even a fraction faster than their 33 and 66MHz specifications.

Do check your motherboard manual carefully though, as many allow a 1/4 PCI setting at 133MHz FSB, which keeps everyone happy – except for the AGP bus. Offering a 2/3 setting at best on most BX motherboards, a 133MHz FSB will result in your AGP bus running at 88MHz, 33 per cent faster than it was meant to. Will your graphics card be up to it? I found out.

How far can you go?

Keen to see how far I could push my Asus P2B, it became the heart of my test system. I fitted 128MB of PC133 SDRAM and an 866MHz FC-PGA PIII via my Iwill Slocket II; the 866 is designed for a 133MHz FSB, so I set my motherboard multiplier to 6.5. One ATi Rage Fury MAXX, and a 13.6GB ATA33 Quantum Fireball Plus KX later, and I was ready.

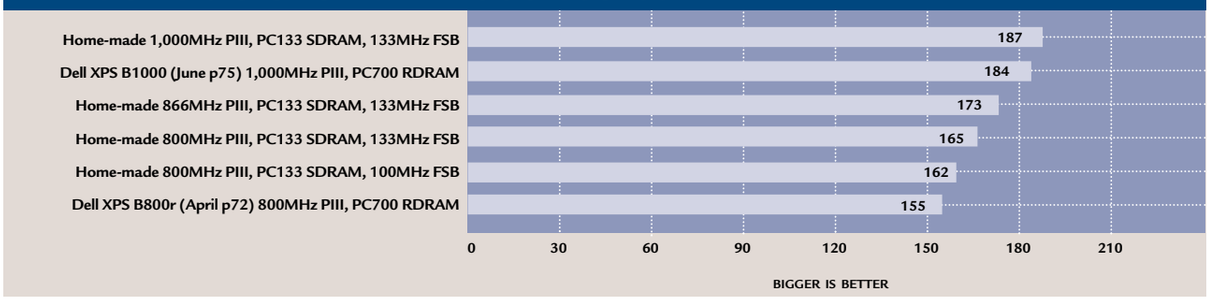
As explained above, the memory and CPU were both expecting 133MHz, so neither were bothered by the FSB setting. I'd set the PCI divider to 1/4, so the only things that were being overclocked were the graphics card and the chipset. I ran SYSmark 2000 and scored a respectable 173. It also ate through my standard one per cent SETI work unit in just over 10 minutes and proceeded to process the rest overnight without crashing once.

So far so good. Next up was the standard Quake III: Arena TimeDemo 001. For a few seconds, everything was fine, then the system crashed. Several aborted attempts later and it was time to try a different graphics card. I had better luck with a bog-standard GeForce 256 with plain SDR memory from Abit, which repeatedly ran Quake without complaint – for the record, it scored 70.1fps at the standard *PCW* settings of 1,024 x 768 in 16bit mode with maximum detail and no sound. Which graphics cards can handle 88MHz AGP seems to be trial and error.

More!

With this degree of success, it would seem rude not to try a little harder. Intel supplies PC magazines with CPUs bereft of fixed clock multipliers, which

Windows 98 SYSmark 2000 scores



can be handy for exhaustive testing. I increased the multiplier to seven, 7.5 and even eight times, resulting in speeds of 933, 1,000 and 1,066MHz, although to be honest, it wasn't particularly happy at the Battle of Hastings setting.

1GHz seemed fine though, with the SETI unit arriving 35 seconds quicker than at 866MHz, but an identical Quake score of 70.1fps, clearly limited by the card. Most impressive of all was a SYSmark 2000 score of 187. Impressive, since the first 1GHz Intel PC we tested (*PCW* June, *Reviews* p75) was from Dell with an 820 chipset and expensive PC700 RDRAM, yet it 'only' scored 184. So my result wasn't bad from a system using cheap PC133 SDRAM and a motherboard which claims it can't even handle Coppermine CPUs!

Less!

While undeniably happy with my new system, I was curious to see what difference the 133MHz FSB had made to the memory performance. The unlocked CPU gave me a perfect chance to benchmark the system at 800MHz, first using an eight-times 100MHz setting, then trying a six-times 133MHz setting. The only component that changed in this test was the FSB, which affected just the AGP bus and the SDRAM.

To be honest, it wasn't particularly happy at the Battle of Hastings setting

The SETI work unit is entirely dependent on the CPU speed, so both settings scored the same, fractionally lower result than the 866MHz configuration. As we've often said, 3D games performance is limited by the graphics card, with Quake again scoring 70.1fps at both FSBs. Had I used a faster card, I would have expected to see some benefit at 133MHz over 100MHz, but for this test, the SDR GeForce was the limiting factor.

After the euphoric result at 1GHz, the SYSmark 2000 score was slightly disappointing: 162 at 100MHz and 165 at 133MHz. Both highly respectable for an 800MHz system, but I was hoping for a greater difference.

Thinking that the memory wasn't being pushed hard enough by SYSmark, I knocked up a quick set of actions in Adobe Photoshop 5.5 which took a 30MB TIFF and performed various filters, rotations and mode changes. I ensured that the processes consumed all available system RAM, but never stepped into the realms of disk-based virtual memory. Rather infuriatingly, the tests took 128 and 124 seconds at the 100 and 133MHz settings, respectively.

Down memory lane

In choosing the cheapest PC133 SDRAM I could find, I'd missed out on the opportunity of using quicker CAS2 memory with lower latency. Memory prices fluctuate regularly, but to give you an indicator inclusive of VAT, in mid-May 128MB of PC100 SDRAM cost £80 or £95 for CAS2. 128MB of PC133 SDRAM came in at £90 or £105 for CAS2. The differences for 256MB DIMMs are higher, with PC100 costing £195 or £220 for CAS2, and PC133 costing £195 or £260 for CAS2.

I would always go for PC133 to give you the greatest flexibility, but real speed freaks may wish to try the CAS2 flavour for the ultimate performance boost. You're still not going to see anywhere near a 33 per cent increase over 100MHz though. We're doing our tests with better quality memory, but as a taster, Tom's Hardware ran SYSmark 2000 on a 600MHz BX system with 100, 133 and even 150MHz FSB settings, and got scores of 131, 137 and 141 respectively – not a massive difference, but perhaps justifiable to a dedicated overclocker.

So, with possible AGP incompatibilities, overclocking your BX to 133MHz just for fractionally better day-to-day memory performance may not be worth it, unless it lets you use a 133-FSB CPU, or successfully overclocks a 100-FSB CPU in the process. However, it's worth remembering those high BX/SDRAM SYSmark scores, which, even at 100MHz, are often higher than 820/RDRAM combinations.

Today, a number of new motherboards are available that are based around the BX chipset, but happily recognise Coppermine FC-PGA CPUs without the need for messing around with Slockets, such as Gigabyte's GA-6BX7+. If you are in the market for a Slocket, however, your nearest PC fair could be the best bet – see www.theshowguide.co.uk for listings, but remember to buy one which can recognise FC-PGA and preferably has manual Vcore jumper settings. Dabs Direct (www.dabs.com) normally has an Asus S370-133 model for around £15. There's also an excellent site listing a number of Slockets at (www.chu.cam.ac.uk/~RGA24/slocket/index.html).

CONTACTS

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

Cleaning up the litter

Tim Nott takes you behind the scenes in Word and has suggestions on getting chemical symbols.

Many readers seem bemused by the litter that seems to accumulate in their Word document (and other) folders, so here's a whistlestop guide to what's what.

When Word is started, it immediately creates two temporary files in the Windows TEMP folder – more are added with additional documents – the Visual Basic environment and the Office 2000 multi-clipboard.

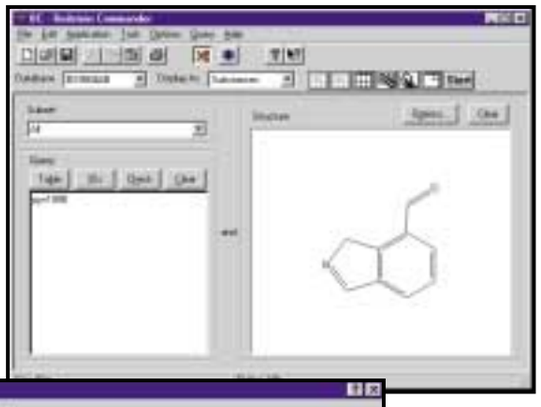
When you open a document another small file is created to show who is editing it; restricting others on a network to read-only access. This file's name starts with the characters ~$, plus the rest of the document name, and is created in the same folder as the document: a similar file is created for the template. Files with the .wbk extension are backups created each time you save a document: see the option in Tools, Options, Save. With Word 2000 this has the friendlier name of 'Back up of (filename).wbk'.

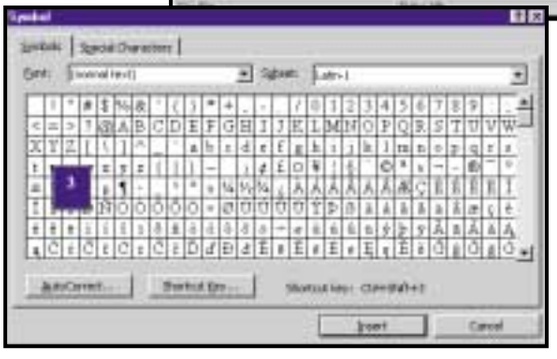
If you have Autorecovery enabled – and you should – then further files are created: again Word 2000 calls these 'Autorecovery save of (filename).wbk'. Default location is in Windows\Application Data\Microsoft\Word, but this can – and should – be user-defined from Word's Tools, Options, File locations.

It also creates a number of other files of the form ~WR*.tmp. Despite the extension, these are copies of Word documents and can be opened as such.

All these files (except for the 'Back up of...') are deleted when Word is exited normally, but will be left behind if the PC suffers a crash or power failure.

We'll look at Autorecovery in a future column, but unless you have lost data, you can safely delete any of these files that have survived a reboot.





Top: Drawing for chemists – Beilstein Commander
Above: Shortcuts to square and cubic quantities

Chemical brothers

In June's *Question Time* we mentioned two home-grown methods of drawing chemical symbols in documents: by using either ASCII symbols or the drawing tools. However, it seems a lot of chemists read this column; Stephan Bird and Frank Hollis both wrote in with details of applications specifically aimed at this task. ChemDraw (www.chemdraw.com) comes in several varieties and can handle anything from SMIRKS to stereocentres: the standard edition costs around £125. Isis Draw, on the other hand, is free for academic and personal home use and you can find it at www.mdli.com.

Matt Griffiths mentioned Beilstein Commander, a chemical database querying package that includes drawing software, which is again available free (www.mimas.ac.uk/crossfire/download .html) and ChemWindow (www.softshell.com), which is not free but does all sorts of drawing tasks including laboratory glassware and 3D molecular modelling.

Moving from molecules to metres, people engaged in producing documents for the building industry – surveyors, architects, contractors and such – frequently have to express quantities in terms of square or cubic metres.

Although one can use the cumbersome sq.m. and cu.m., the accepted abbreviations are m^2 and m^3, with the number being superscripted in each case, and with no space between the quantity and the unit. This isn't particularly difficult to do, but can get tedious if you have to do it many times. It came up in a recent discussion that someone had been using Word's Autocorrect to turn m2 and m3 into the correct forms. This worked well until she upgraded to Word 2000. And then it would only work if a space was left before the 'm'. Such is progress.

There is a simple method. Both the superscripted 2 and 3 exist as ANSI characters in their own right, and can be inserted in any text-producing application by keying in Alt & 0178 and Alt & 0179 respectively (using the numbers on the numeric keypad, not the number keys on the top row of the main keyboard). Nearly all fonts contain these characters, (although, paradoxically enough, not the Architecture typeface that ships with Corel Draw) and any word processor should allow you to assign a 'hot key' combination to them – in Word you can do this from the Insert, Symbol dialog.

CONTACTS

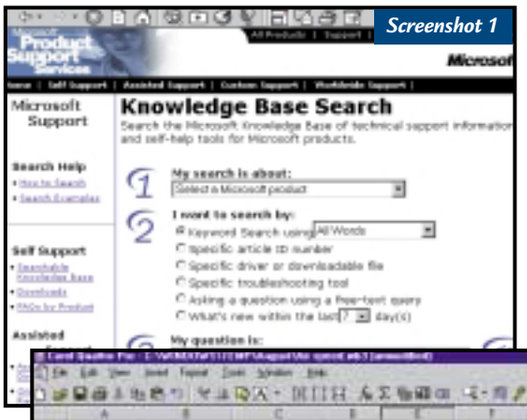
Tim Nott welcomes your comments on the Word Processing column. Contact him via the *PCW* editorial office or email: **wp@pcw.co.uk**. Please do not send unsolicited file attachments

Change the sheets

Alphabetical macros for Excel and calculating air speeds are on Stephen Wells' mind this month.

Andrew Cole wrote in to say that he has lists of materials entered in an Excel 97 workbook. Each worksheet is for a different supplier and these are added at random. He wants to reorganise the workbook and wonders if there is any way of sorting worksheets alphabetically.

There is no built-in method, but it's easy to create a macro to do the job. Open your workbook, then Alt & F11 will open the VBA for Excel editor. Double-click on Sheet 1. If there is already a macro listed there in the right-hand box you can still add another one after it. Either way, carefully type the macro shown in figure 1. Press Alt & Q to return to your workbook. Press Alt & F8 to open the Macro dialog box. Click on Options and you can assign a keyboard shortcut which will run your new macro, say Ctrl & Shift & S (for Sort). That's all there is to it.



Left: It's easy to find and quiz the online Microsoft Knowledge Base
Below: Calculating actual air speed of a journey given the distance, journey times and relative headwind or tailwind

FIG 1

Macro to sort Excel worksheets into alphabetical order by tab name

```
Sub AlphaSheets()
Dim A As Integer
Dim B As Integer
Dim FirstWSToSort As Integer
Dim LastWSToSort As Integer
Dim SortDescending As Boolean
SortDescending = False
FirstWSToSort = 1
LastWSToSort = Worksheets.Count
For B = FirstWSToSort To LastWSToSort
For A = B To LastWSToSort
      If SortDescending = True Then
      If  UCase(Worksheets(A).Name) > _
      UCase(Worksheets(B).Name) Then
      Worksheets(A).Move Before:↙
=Worksheets(B)
         End If
      Else
      If UCase(Worksheets(A).Name) < _
      UCase(Worksheets(B).Name) Then
      Worksheets(A).Move Before:↙
=Worksheets(B)
      End If
         End If
Next A
Next B
End Sub
```

(*Key:* ↙ *code string continues*)

Look it up

I've mentioned the Excel Knowledge Base in previous columns, but Sara Beckenham hasn't been able to find it. To reach the Microsoft Knowledge Base you need to go to http://support.microsoft.com/search/default.asp. You'll see the page shown in screenshot 1. Then, in the My search is about: box, pick your version of Excel.

I would also recommend that you open Excel, go to Help on the main menu and choose 'Microsoft on the Web', then Frequently Asked Questions. Once connected, this will offer to download a new Help file for your version of Excel that includes many current explanations and links.

Flying high

Tony Sprung emailed with a rather intriguing problem. He's a student pilot and, using Corel Quattro Pro, he wants to know how to calculate air speed allowing for a headwind or tailwind.

Screenshot 2 shows an example. Say the distance of your destination is 345 miles as entered in cell A2. Your outward journey time is 2.75 hours, in B2. The return journey takes 3.25 hours, in C2. The plane speed at this point is 1, in D2, and the relative wind speeds are 1, outward, in E2, and -1.75 (a minus meaning a headwind) in F2.

Enter =D2 in both cells B6 and B7. Enter =E2 and =F2 in C6 and C7 respectively. In B10 enter A2/B2 and in B11, A2/C2. Now choose Tools, Numeric, Invert and in the Source box enter B6..C7. In the Destination box enter E6..F7. Finally, choose Tools, Numeric, Multiply and in the Matrix 1 box enter E6..F7. In Matrix 2, enter B10..B11. In Destination enter F10.

In this example you'll see that, overall, your actual air speed was 118.44mph.

CONTACTS

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

Optimise this

It's a smart idea to put some intelligence into your database queries, suggests Mark Whitehorn.

For those who haven't, as yet, had the pleasure of playing with a back-end RDBMS (Relational Database Management System), a query optimiser is a fascinating part of the database engine. It collects a great deal of information about the database – information such as which fields are indexed, how big each table is, how the data is distributed within the tables and so on. Then, when a query comes in, the optimiser looks at it to see if the query can be rewritten to run more efficiently.

'How do they do that?' you may ask. Well, consider a simple example:

PENGUINS

ID	Name	FishPreference
1	Peter	Herring
2	Penny	Salmon
...	...	...
34634342	Paul	Halibut

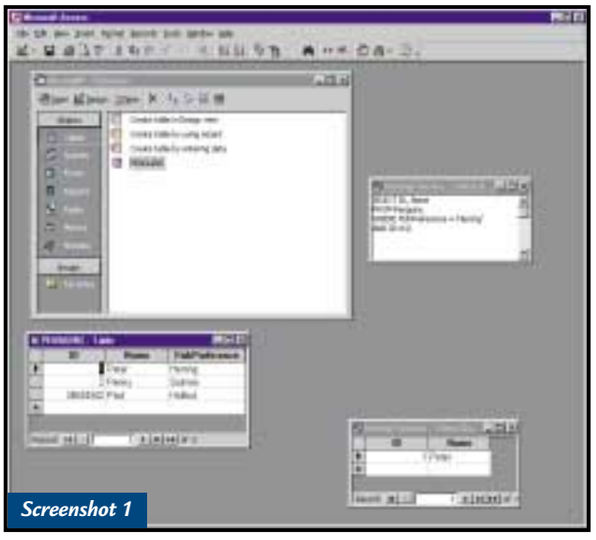
You run a zoo that has over 34 million individually named penguins and their fish preferences are stored in this table in which only the ID field is indexed (see screenshot 1). You run a query such as:

```
SELECT ID, Name
FROM Penguins
WHERE FishPreference = ↙
'Herring'
AND ID<10;
```

(*Key: ↙ code string continues*)

All optimisers will turn such a statement into a series of more basic operations which are then run in sequence. A really dumb optimiser will find all of the records where FishPreference='Herring' and then subset that list to find those records in which the ID field is smaller than 10. A smart optimiser will do those operations in the opposite order. The dumb one has just read all 34 million rows from the table, the smart one, only 10.

This is a really simple example, but consider a database that has a large number of tables. When a complex query that hits many of those tables is entered, the number of possible ways of running the query is huge.



Screenshot 1

Left: For those who want to open a zoo, this file is provided, free of all charges, on our cover disc

So, will a good optimiser examine every possible path, estimate how long each would take to run and then run the fastest? Well, you can probably see the problem with that. Suppose it takes two minutes for the optimiser to do the calculations and that the worst query takes one minute to run and the best two seconds. The time taken to get the answer is two minutes and two seconds, which is worse than the worst possible solution!

So, in practice, a really good optimiser has a difficult balancing act to perform – trying to find a good (but possibly not the best) solution in the shortest possible time. This means that optimisers are among the most difficult parts of an RDBMS to write.

It also means that good optimisers will show you (often graphically) the solution it has found so that you (as an intelligent human) can tweak the result by hand. In addition, such a paragon of virtue will also often suggest ways in which you can restructure the database to improve the result. The most obvious

Raiding the larder

We have looked at two solutions to the 'larder' problem (which we last visited in the May issue) where we want to know what recipes can be made using the ingredients present in our larder at any one time. Paul Phillips (paul@boothfields.demon.co.uk), who is a certified Oracle DBA (Database Administrator), recommends the use of 'not exists' in preference to the 'not in' clause for reasons of efficiency. He says that the replacement of 'not in' with 'not exists' is, in fact, a standard Oracle performance tuning tip. In any of the back-end RDBMSs such as SQL Server, DB2 or Oracle (assuming the obvious keys are indexed) and with a large number of records, this can make a big difference. The same may not be true in Access because the query optimiser may not be smart enough.

Paul's version of the required SQL is:

```
SELECT d1.dish
from dishes as d1
where not exists ↙
(select dishid
from [dish/↙
ingredient] as di1
where d1.dishid ↙
= di1.dishid
and not exists ↙
(select ↙
IngredientID
from larder as l1
where ↙
l1.IngredientID ↙
= di1.Ingredient↙
ID))
```

way in which this can be done is to add indexes to certain fields, but it may also, for example, involve splitting data from one table into several.

Optimiser design is difficult, so different companies guard their algorithms jealously. The better the optimiser, the better the database will behave in the all-important speed testing, which is often performed against well documented data, such as that used for the TPC-C (Transaction Processing Performance Council) benchmarks.

It has been suggested that certain products have optimisers which actually recognise such testing data and jump immediately to pre-programmed optimal solutions. This is a wonderful idea and I would love to believe it but, as with most stories of this type, hard evidence never seems to surface. And it would be easy to test the theory. You would run the TPC-C benchmarks and then begin altering facets of the data that shouldn't make a difference to the timings (such as table and field names) to see if the timings suddenly nose-dived. Has anyone ever tried this?

I really cannot imagine why anyone would be sad enough to want to try this out in Access, but I've also found that if I illustrate anything and don't include sample files, I usually get emails asking for them. So, for the benefit of everyone who is intending to run a zoo with 34 million penguins, the sample file is on the cover disc. And by the way, please invite me to the opening of your zoo.

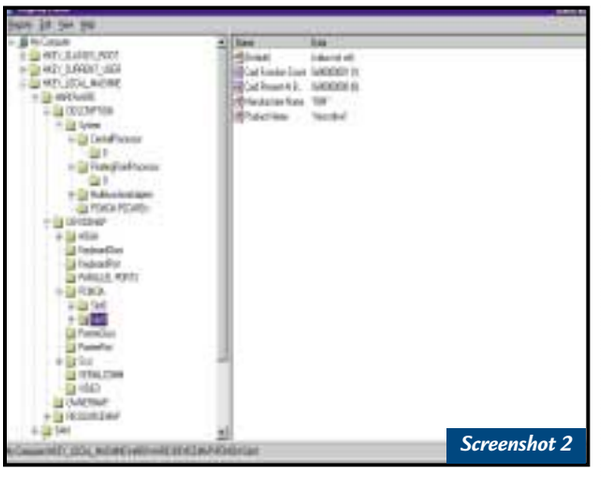
Sounds like Soundex

Back in the June issue we looked the Soundex algorithm, which is used to find words that sound like a search string. I asked for you guys and gals to submit your own attempts at coding Soundex and promised to put the best examples on the cover disc.

Nigel Bachmann (N.Bachmann@cardiff.gov.uk) was kind enough to send in his version written in Access Basic. Ian Hartas (ian.hartas@iclway.co.uk) has experimented with Soundex algorithms for a while and found a problem when they are applied to surnames. His own last name, for example, is a rare English name and he has found several variations, Hartis, Hartus, Hartass and even Artas. In the south, (where 'urricanes 'ardly ever 'appen) with dropped 'H's, the most common variant is Artis.

The standard algorithm, which assumes that the first letter is vital and correct, fails to match some of the variants, so he developed a version in C that doesn't assume an exact first letter match and also attempts to catch 'Mac', 'Mc' and 'O' prefixes. The letter 'W', he decided, also needs similar treatment to 'H'.

I haven't tried either of these, but I am grateful for both and they should come in useful for those of you who want to investigate the problem further. Both are in a text file on the cover disc as SOUNDEX.TXT.



Regedit shows a stack of redundant data in the Registry, but is that reflected in a non-normalised structure underneath?

He also asked about my comments that the Registry should be a 'real' database and wondered what other readers think the structure of such a database would be. He reckons all that is really required is a simple three-column table with probably a sizeable chunk of code.

In fact, my comments were more about imposing transaction control, logging and rollback in the event of a complete disaster. However, it is an interesting thought.

Regedit (screenshot 2) seems to suggest that there is a quantity of redundant information in there. While this tells us nothing about the internal structuring of the data, because Regedit may be using a view (or query in Access-speak) to show us the data, it does suggest that it might be more efficient to store the data in multiple tables. Does anyone have more specific knowledge of the data stored in the Registry and want to volunteer some info?

ISBN lookups

ISBNs (International Standard Book Numbers) are, for obvious reasons, often stored in book catalogues. The different parts of the number encode information concerning the country and publisher.

After much research and typing, Mike Green (100015.222@compuserve.com) has produced some tables that can be used for lookups for country and publisher numbers. He has also written some functions for returning those values. He has been kind enough to offer these to anyone who would find them useful. You'll find them on this month's cover disc in the *Hands On* section.

The better the optimiser, the better the database will behave in the speed testing

CONTACTS

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

Audio go slow

Check the driver before you jump on the Windows 2000 bus, Niall Magennis warns the PC musos.

With Be showing about as much interest in the desktop version of BeOS as most drummers I know show in keeping time, and Steinberg and Emagic both having announced that they have ceased developing for the platform, there's really only one serious choice for PC music bods in the near future and that's Windows 2000. But not all is rosy in the Microsoft garden either.

Those of you who share my kamikaze desire to try out all things new will no doubt already be aware of the brick walls you can hit as soon as you try to get your music applications running under Windows 2000.

It's not so much that the software won't work – most will at least install – it's more that once you get past this stage you'll find the software as stable as a one-legged camel.

Most of this is down to the fact that Windows 2000 is, as it says on the loading screen, based on technology developed for Windows NT. As we all know, Windows 9x has been the platform of choice for music software developers and most of this software never worked on NT, so therefore it's not going to work on Windows 2000, either.

Left: Find drivers for Echo products on its website Below: Sound Forge should work with no problems

Well, I can understand why it doesn't work on Windows 2000, but what I can't understand is why music developers have been so slow to respond to an OS that has been available in beta for around two years and offers such clear benefits to musicians.

So what should Windows 2000 mean to musos? Well, the first thing you'll notice about Windows 2000 when you switch from Windows 98 is that it looks almost exactly the same as previous versions of Windows. This is because most of the changes are hidden under the bonnet.

For example, Windows 2000 is much more mature about the way it deals with unruly behaviour from programs that refuse to play by the rules. If you're running a number of applications and one decides to execute the computer equivalent of a late tackle, Windows 2000 is far more likely to catch it in the act, pull out the red card and boot it out of memory, leaving the other players to fight it out for the fair play award.

This, naturally, is music to the ears of those who use their computers for audio, as a moment of unbridled creativity lost to a crash can never be regained.

Most of this software never worked on NT, so it's not going to work on Windows 2000

Driving test

The other major change is a new kind of driver architecture. This means that many peripherals are not currently supported, especially semi-professional sound cards and MIDI interfaces. On top of this, manufacturers are now supposed to put their drivers through the computer equivalent of a driving test. This involves rigorous testing of the driver on a number of different systems to make sure that they behave themselves in the company of other drivers for other cards. Microsoft reckons that this will guard against driver rage, where one driver starts bumping into the territory of another driver.

However, the new driver architecture means that most MIDI drivers won't work properly under Windows 2000. NT4 drivers will probably install and work to an extent, but you are likely to experience timing problems. What you really need is a Windows 2000 driver that supports DirectX 7's DirectMusic

MIDI driver (which may also be called a WDM driver).

This is the only type of driver that will offer satisfactory timing under Windows 2000; unfortunately, at the time of writing, these were pretty scarce on the ground. Steinberg's list of hardware with WDM MIDI drivers only had a single entry – the SoundBlaster 16. I think this may be a bit misleading, as Creative has posted Windows 2000 drivers for its Live! range of cards on its website. I don't have an SB Live! so I can't test whether it includes a WDM MIDI driver. The FAQ on Creative's site seems to indicate that it does, so if you're a SB Live! owner you may be in luck.

I own a Mark of the Unicorn MIDI Flyer Express MIDI interface, so I emailed Motu to check whether the company had a driver available for Windows 2000. It didn't, but the reply did say that the company was working on one, although it couldn't give me a date for when it would arrive. I'm not going to hold my breath, as Motu has only just released an updated driver for the device to fix some problems under Windows 98.

A similar problem exists on the audio side. Although my Ensoniq AudioPCI card is supported under Windows 2000, the card I really want to use – the Echo Darla – is not. Luckily, Echo is a bit more on the ball than Motu and drivers for Windows 2000 should be posted on its website by the time you read this. Windows NT drivers are also now available.

It may be some time before most of these drivers are certified. Microsoft has made a big issue of this new driver certification model, but how effective it will be remains to be seen. It's unlikely that companies are going to pay to put every release of their drivers through the certification programme. This is because only later releases are likely to pass, and by that time the hardware may have been superseded by newer devices on the market.

Audio apps

I've had a rare old time getting audio applications to run under Windows 2000. Some, such as Sound Forge, seem to work fine, but others, including Cubase, don't seem to be completely happy. I've heard of other people running Cubase under 2000 without any problems, so it probably depends heavily on the drivers for your audio and MIDI cards. If you're going to try it, then make sure you have the latest version of Cubase – 3.71 R2 – as that is the only one that Steinberg says will work.

Cubase version 5 is on the way and should have full DirectMusic support

There is a new version of Cubase on the way, version 5, which will have full support for Windows 2000. Steinberg says that this version should have DirectMusic support, but that the company is dependent upon the availability of beta DirectMusic drivers from the major MIDI interface manufacturers to be able to test the work it has done.

I've heard of other people running Cubase under 2000 without any problems

I haven't tried Logic under Windows 2000 yet, but Emagic recommends that you currently stick to Windows 98.

So why was I bothering at all with audio software under Windows 2000? Because I've got a dual-Celeron Abit BP6 motherboard and I don't like the fact that one of my processors is sitting idle under Windows 98.

I had hoped that updated software for Windows 2000 would include multiprocessor support, but now my hopes are starting to fade.

Windows 2000 supports multiple CPUs, but you really need each application to support the extra CPU as well. Applications with multiprocessor support are written so that different processes are split into independent threads of code that can run in parallel on different processors; Windows 2000 just has the task of managing the allocation of threads between the CPUs.

Apparently, this is reasonably easy to do with applications such as word processors and image-editing packages, but realtime applications – such as audio and MIDI sequencers – have to deal with some special problems.

When working with more than one CPU, a realtime application needs to sync together the actions of the CPUs. For example, if you've got two plug-ins running on separate CPUs and being used as insert effects on the same channel, then the output of the first plug-in feeds the second plug-in. In this case, the second CPU would have to wait until the first CPU has finished its job before it can start its processing.

Steinberg is working on optimising Cubase VST for multiprocessor systems, but it says that it will be an ongoing process that will span several releases.

The best advice I can give you at the moment if you're thinking of upgrading to Windows 2000 for music applications is don't. At least not unless you're sure all your MIDI and audio hardware has full WDM driver support.

CONTACTS

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

The A-Z of SVG

A new open standard for putting vector graphics on the web has arrived, reports Ken McMahon.

SVG is a new graphics format for the web. Don't we have enough of those with GIF, JPEG and PNG? Well, the exciting thing about SVG is that it's a vector format, whereas all those others are bitmaps. The advantages of vector graphics over bitmaps are already well understood by those working in print. They're scalable with no loss of quality – edges stay smooth no matter how big you enlarge them and file sizes remain small.

SVG has a number of other important advantages. It's an open standard, developed by a working group of the World Wide Web Consortium (W3C), which includes Adobe, Apple, Corel, IBM, Macromedia, Microsoft, Netscape and Quark. Adobe has included SVG support in the recently released Illustrator 9, Corel has a beta SVG export filter available for Draw and a number of companies, IBM among them, produce viewers and convertor filters. So support for the format is already growing.

SVG is based on XML (Extensible Markup Language). Images are entirely text-based, which means that text remains editable even after transformations and special effects filters have been applied. It can also be searched and indexed. SVG provides support for cascading style sheets and ICC colour profiles.

SVG images provide a much richer more interactive experience than animated GIFs and JPEGs. Adobe's SVG Technology Preview website has a wide selection of images which demonstrate the format's features. Pan and Zoom is shown to good effect using a street map of Moscow (screenshot 1). You can zoom in from a city-wide view to individual building detail. Street names, parks, rivers and other details can be hidden or revealed using check boxes. Vector scalability also enables you to print a high-resolution hard copy at 1:1 scale – if you have a printer big enough.

Animation and filter effects are combined, so you can watch type blur in and out of focus. Transparent text, text with drop shadows or glows, text used as masks, marbled, etched and text set on fire is still text, and can be searched for, found, cut, pasted, even edited.

SVG conforms to the Document Object Model (DOM), so programs and scripts can dynamically access and update the content of SVG graphics. Event handlers, familiar to anyone who has produced Javascript rollovers – onmouseover, onmouseout, onclick etc – can be assigned to any SVG object.

FIG 1

A circle with a red fill and a blue stroke

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE SVG PUBLIC "-//W3C//DTD SVG December 1999//EN"
 "http://www.w3.org/Graphics/SVG/SVG-19991203.dtd">
<SVG width="12cm" height="4cm">
  <desc>Example circle01 - circle expressed in physical ↙
units</desc>

  <circle cx="6cm" cy="2cm" r="1cm"
       style="fill:red; stroke:blue; stroke-width:0.1cm" />
</SVG>
```

Moving a triangle along a semicircular motion path

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE SVG PUBLIC "-//W3C//DTD SVG December 1999//EN"
  "http://www.w3.org/Graphics/SVG/SVG-19991203.dtd">
<SVG width="5cm" height="3cm"  viewBox="0 0 500 300">
  <desc>Example animMotion01 - demonstrate motion ↙
animation computations</desc>

  <!-- Draw the outline of the motion path in blue, along
        with three small circles at the start, middle and ↙
end. -->
  <path d="M100,250 C 100,50 400,50 400,250"
       style="fill:none; stroke:blue; stroke-width:7.06" />
  <circle cx="100" cy="250" r="17.64" style="fill:blue" />
  <circle cx="250" cy="100" r="17.64" style="fill:blue" />
  <circle cx="400" cy="250" r="17.64" style="fill:blue" />

  <!-- Here is a triangle which will be moved about the ↙
motion path.
      It is defined with an upright orientation with the ↙
base of
      the triangle centered horizontally just above the ↙
origin. -->
  <path d="M-25,12.5 L25,12.5 L 0,87.5 z"
       style="fill:yellow; stroke:red; stroke-width:7.06" >

    <!-- Define the motion path animation -->
    <animateMotion dur="6s" repeatCount="indefinite"
                path="M100,250 C 100,50 400,50 400,250" ↙
rotate="auto" />
  </path>
</SVG>
```

(Key: ↙ code string continues)

But Macromedia Flash does all of this and has for some time, so why do we need something new? The developers of SVG argue that because it's an open standard, based on XML and integrates with many other industry standards, it's better for developers of web content than a proprietary standard such as Flash.

In its favour, according to figures from researchers IDC, Flash has more than 248 million users (for the latest count go to www.macromedia.com); it is a sophisticated authoring application that is well ahead of anything available on the SVG front; it has a growing army of skilled practitioners and an impressive portfolio of dynamic Flash content for blue-chip companies such as Hoover, Nike and Ford.

Coding SVG

Figure 1 (opposite) shows what SVG looks like, taken from the W3C SVG 1.0 Specification Working Draft of 3 December 1999.

SVG defines six basic shapes – rectangle, circle, ellipse, line, polyline and polygon. The first example in figure 1 shows a circle with a red fill and blue stroke. As you can see, SVG looks a lot like HTML, with opening and closing tags. The first line establishes that what follows is XML, next the Document Type Definition (DTD) defines element attributes and XML document structure. Everything between the SVG tags is the graphic itself. The circle is displayed in a12 x 4cm image area. cx and cy are the co-ordinates for the centre of the circle which has a 1cm radius, the rest is self-explanatory.

It gets more complicated when you use the advanced features. The second example in figure 1demonstrates some of SVG's animation capabilities by moving a triangle along a semicircular motion path.

What SVG needs soon is an authoring application that will make complex animation effects as simple to create as they currently are with Flash. My guess is that Adobe is the most likely source of such a product, either as components in the next release of Illustrator and GoLive, and/or as a standalone product.

In the meantime, Illustrator 9 provides some SVG-authoring tools. Event handling features can be implemented from its SVG interactivity palette. You select an event from the popup and then either type your JavaScript routine into the window or browse for a JavaScript file to associate with the event (screenshot 2).

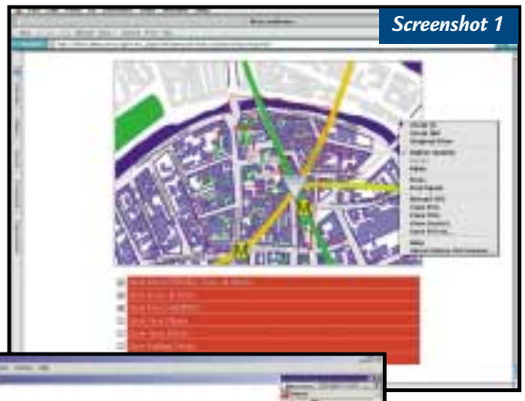
An SVG export plug-in provides options for font and raster-image embedding, encoding and CSS properties. A plug-in that SVG-enables your browser is also supplied and all of this can be downloaded from Adobe's website (see contacts box).

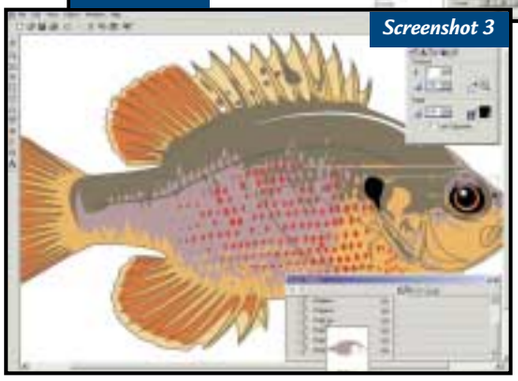
You can use the export plug-in with Illustrator 8.01 and the viewer is compatible with Explorer 4.x-5 and Navigator 4.0-4.7 on Windows, and IE 5 and Navigator 4.07-4.7 on MacOS. If you use both browsers you'll need to copy the viewer files (SVGview.dll and SVGviewer.zip) from the Explorer plug-ins folder to the Navigator one.

Mac users can't view dynamic SVG content using Explorer because communication between plug-ins and JavaScript is currently non-existent in either direction. So if you want to make the most of SVG on your Mac, Netscape Navigator is really the only option.

If you don't have Illustrator and unarmed combat with SVG in a text editor doesn't sound appealing, there are other options. A beta SVG export filter for CorelDraw is available from the Corel website and there are a number of converters that will take vector format files and turn them into SVG.

JASC, well-known for its Paint Shop Pro image-editing software, is ahead of the game. A 'preview' of its Trajectory Pro SVG authoring application can be downloaded for free from the JASC website (see screenshot 3 and contacts box).





Top: Adobe's SVG map demo in IE5 on the Mac
Middle: Ilustrator 9's SVG interactivity palette
Bottom: Trajectory Pro's interface

CONTACTS

Ken McMahon welcomes your comments on the Graphics & DTP column. Contact him via the *PCW* editorial office, or email:

graphics@pcw.co.uk

Here are some SVG links for you to try:

www.w3c.org/graphics/SVG
www.adobe.com/SVG
http://beta1.adobe.com/svgpreview_alpha/SVG/download/download.html
www.mayura.com
www.jasc.com
www.beatware.com
http://sketch.sourceforge.net/
http://venus.corel.com/nasapps/DrawSVGDownload/index.html
www.levien.com/svg/
www.geocities.com/wglunz/pstoedit/
http://sis.cmis.csiro.au/svg/
www.inria.fr/koala/jackaroo
www.SVGcentral.com

Getting in touch

Benjamin Woolley weighs up the potential for Metastream 3's interactive graphics online.

Proclamations of 3D's imminent emergence on the Internet are beginning to repeat like a dodgy vindaloo. Many who swallowed the idea are now discovering some of its less appetising side effects: bandwidth becomes constipated by the surging growth in traffic, systems become stuffed with indigestible plug-ins and bloated demonstration sites cause browser blow-out.

The release of Metastream 3 is another attempt to whet consumers' appetites. But don't be fooled by the understated increment in the version number, it disguises a fundamental revamp for this technology.

Where the listless VRML was designed to be the HTML of 3D, Metacreations' Metastream was to become the Flash or Shockwave. Nothing like that has yet happened. Even active web users making regular visits to online stores are unlikely to have found many Metastream objects, whereas they will undoubtedly have been regularly Flashed or Shocked.

However, the demand for 3D is apparently there. Metastream claims that research by Greenfield Online Research (www.greenfieldonline.com) has found that consumers 'are far more likely to purchase products that are presented in detailed 3D over those displayed as 2D photographs'. Furthermore, 'users are much more likely to visit and remain at an ecommerce site that contains high-quality, 3D product presentations' and are more likely to be satisfied with the products they subsequently buy.

It is difficult to assess how representative these findings are, but surely one major disadvantage of online shopping is that you can't handle the goods, and 3D may go some way to providing a virtual substitute. This is where Metastream 3 shows the greatest promise.

Technically, the most innovative aspect of Metastream 3 is that it uses XML (Extensible Mark-up Language), which is supported by Netscape Navigator and Internet Explorer versions 4 and above. XML turns browsers into an environment for running applications, which in Metastream's case means turning it into a tool for rendering and manipulating 3D objects. A Metastream scene (ie a set of 3D objects, textures and rules for manipulating them) comprises two files, a datafile (carrying the .mts extension), which contains descriptions of the objects and textures to appear in the scene, and an XML file. The latter is a series of plain-text 'tags' which can be stored in a separate file (carrying the .mtx extension) or form part of the web page where the objects are to be displayed.

A basic XML file would read something like this:

```
<?xml version="1.0" ?>

<MTSScene>
<!-- .... Scene Description -->
</MTSScene>
```

The scene description comprises a series of tags setting up parameters for the scene. See the example in figure 1.

The tags are in many cases quite straightforward and will be familiar to

Screenshot 1

Screenshot 2

Left: A mock-up of an online jewellery store shows how smoothly a 3D Metastream 3 model of a ring can be manipulated
Below: By incorporating XML, Metastream 3 turns the browser into a tool for interacting with 3D objects, allowing users to customise the ring with an engraving

FIG 1 **Example of a scene description**

```
<MTSSceneParms AntiAlias="1" DoShadow="1" BlendShadow="0" ↙
ShadowOpacity=".5" ShadowRadius="15">

<MTSObject Name="cylinder" Path="c:/demo" Geom="MTSCylinder" >

<Transform Type="current">
<Scale x="2" y="2" z="2"/>
<Shear xy="0" yz="1" xz="0"/>
<Rotate x="0" y="2" z="0"/>
<Position x="`" y="1" z="0"/>
</Transform>

<MTSMaterial Name="metalcyl" ID="0">
<MTSTextureMap Type="Diffuse" Name="metalcyl.jpg"/>
<MTSColor Name="Diffuse" r="0.2" g="0.2" b="0.2"/>
</MTSMaterial>

</MTSObject>

</MTSSceneParms>
```

(*Key:* ↙ *code string continues*)

anyone who has used scene description languages with renderers such as POVRay. For example, the MTSSceneParms sets the parameters for the entire scene, such as whether anti-aliasing should be implemented (if set to "1", the edges of objects will be smoothed unless the object is moving, in which case anti-aliasing is automatically suspended to speed up the frame rate) and whether shadows should be cast. MTSObject calls up the object data held in the .mts datafile and provides a pathname if required.

However, Metastream 3's use of XML allows for far more sophisticated features than these, notably a series of tags for adding animation and interaction. These are sparsely documented so it's hard to assess how powerful they are, but demos on Metastream's website (www.metastream .com) indicate that some pretty useful effects can be generated.

One example was a mocked-up jewellery store featuring a ring (screenshot 1). When the realistic-looking ring was manipulated using the mouse, it moved very smoothly. But the really exciting bit, possible only using Metastream 3's XML functions, was adding an engraving (screenshot 2).

Another demonstration featured a luscious Sony Vaio laptop (screenshot 3). By clicking on the power switch, the LCD can be switched on and off, and by clicking on the lid, it can be made to open and close. Metastream offered this as an example of how version 3 allows the user to 'touch' objects, ie make them respond to mouse actions.

The demo worked well enough to make me think I wanted a Vaio. However, it did reveal some possible limitations of Metastream, in particular the problem of combining 'touch' and other interactions with 'streaming'. The ability to stream objects, that is, display a model at increasing levels of resolution as the data is downloaded, is one of Metastream's most notable features. However, it adds a layer of complication to interactions such as 'touching' which, in the case of the Vaio demo, was apparently resolved by making the object inanimate until it was completely downloaded – which took some time even over an ISDN line.

Despite such issues, Metastream 3 is a clear step forward. Being able to play with a toy at a toy store or climb into a car at an online dealership will surely make choosing that much easier (and buying that much more tempting).

Metastream has claimed that many major companies have agreed to use Metastream on their sites, including AOL, Sony and Nike. However, its chances of becoming a standard depend on more than providing touchy-feely features and boasting blue-chip support. It depends on content and, in particular, on developers and designers having access to decent authoring tools.

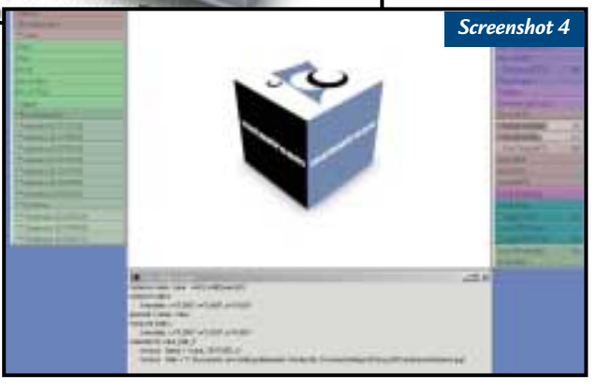
Metastream has produced a crude tool to encourage early adopters to try out the technology (screenshot 4), as well as a preliminary XML guide (both downloadable from the website). But until it becomes truly integrated with other 3D authoring products, graphics artists and web developers are unlikely to use it. It is hard to see how this will happen. Exporting objects and animations from a package such as Lightwave, 3D Studio MAX or Metacreations' Carrara should be comparatively straightforward. But scripting for interaction remains an undeveloped area in 3D, and most existing tools are too technical for designers and artists.

A new spin on 3D

Metastream is 80 per cent owned by Metacreations. As reported in this column in the May issue, Metacreations has decided 3D over the Internet is now its primary focus, and it has been divesting itself of its graphics products.

All have now found hopefully good homes. Poser has returned to its original developer Larry Weinberg, and Bryce has gone to Corel, along with some of Metacreations' 2D graphics products, where it should be safe. Canoma, the product for turning 2D pictures into 3D models, and Carrara, the brand-new 3D authoring package, have gone to Adobe.

The latter is particularly significant for Metastream, as Adobe has agreed in return to support Metastream 3 in all its ecommerce and web development products.



Top: Metastream 3 allows you to 'touch' and interact with the 3D images. This Sony Vaio can be opened and turned on with a couple of mouse clicks
Bottom: Metacreation's latest 3D authoring tool sees the company shifting its focus to the Internet

CONTACTS

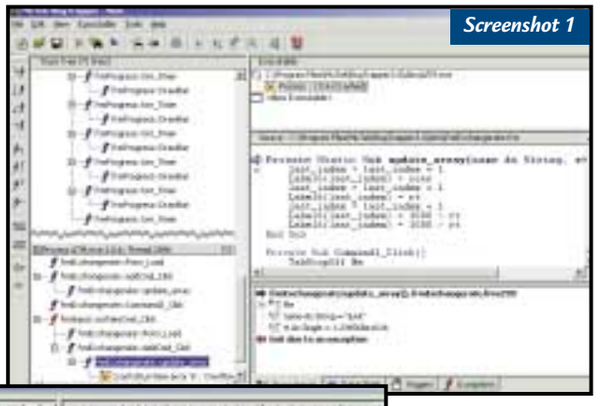
Benjamin Woolley welcomes your comments on the 3D Graphics column. Contact him via the *PCW* editorial office or email:
3d@pcw.co.uk

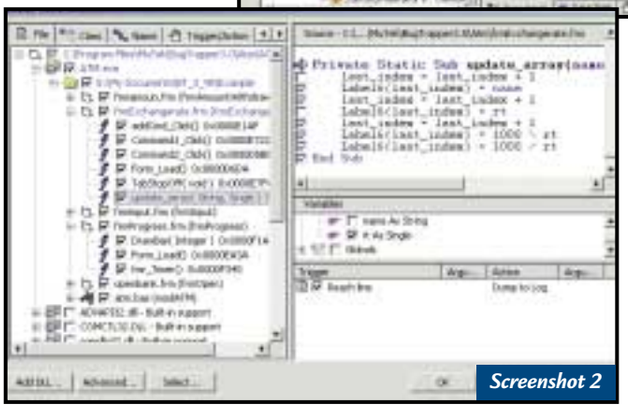
Genius fly trap

Tim Anderson goes bug tracking and sings the praises of timer events.

Debuggers make it easy to set breakpoints in an application and step forward through the code. The one thing you cannot do is to go the other way, and step back through code. At the same time, this is often what you really want to know. When tracking a bug, knowing the state of the application immediately before the bug appeared is usually important.

BugTrapper is a debugging tool based on one simple idea. If an application logs its progress as it runs, then you can trace back through the log as well as forward through a debugger. It also opens up possibilities such as having users email a log to the developer in the event of a problem. Then the developer can see exactly what code was running when the user hit a problem, rather than relying on vague descriptions such as, 'it crashed when I was doing the accounts'. BugTrapper 3 includes full support for Visual Basic for the first time.


Screenshot 1


Screenshot 2

Left: Tracing a crashed VB application with BugTrapper
Below: Setting trace options in BugTrapper

Screenshot 1 shows BugTrapper analysing the trace for a crashed VB application. The Trace Tree in the left panel shows the procedures that ran immediately before the crash. The source code in the middle right panel shows the source for the currently selected procedure. The variables panel below it shows the values of the variables immediately before the crash. The crash occurred in a procedure called update_array. The interesting point here is that the same procedure ran shortly before the crash without error. By selecting this previous occurrence in the trace tree, you can see the values of the variables as they were when the procedure ran successfully, and compare them to those in the instance that crashed. This is an example of how you can go back in time.

BugTrapper maintains a buffer which fills up after a time, so there are limitations. However, you can also log to a file for complete information, subject to available disk space. You can also ask BugTrapper to create a log only in the event of a crash or other specified event. When the crash occurs, BugTrapper dumps its buffer to a log. Most important, you can configure exactly what you want BugTrapper to trace, to avoid getting unnecessary information (see screenshot 2). You can include or exclude specific procedures, and even drill down to the line level to set options. These options can be saved to TCI (Trace Control Information) files. These are vital when you use another BugTrapper feature, the ability to do remote debugging. You can install a BugTrapper agent along with a TCI on a user's computer to create logs. The RCA (Remote Control Agent) is a more sophisticated agent that allows you to connect to it over TCP/IP. You can then connect remotely and watch the executable as it runs.

The developer can see exactly what code was running when the user hit a problem

In order to get full information from BugTrapper using Visual Basic, you have to compile with the Native Code, no Optimization and Create Symbolic Debug Info options selected. C++ users must also create .pdb files (the symbolic debug information), but can nevertheless compile in release mode. Commonly used system DLLs have built-in support, which means you do not need .pdb files to trace their code.

BugTrapper does not remove the need for other debugging tools. The ability to trace code is really its only feature, so you could not use it to catch memory leaks, for example. In some circumstances, though, it is extremely useful. The main downside is the price. In a professional environment, though, any effective debugging tool soon justifies its cost. A seven-day working evaluation can be

obtained from the BugTrapper site at www.mutek.com/download_frame.html.

Delphi and the Win API

Alan Hitchin asks: 'How do you launch other programs from a Delphi 3 application? I can do it in VB using Shell but I haven't been able to find an equivalent in Delphi.'

The easiest way is to use the API function ShellExecute. So for example, to run Notepad from a Delphi application:

```
ShellExecute(self.↙
handle,'open','notepad↙
.exe',nil,nil,SW_SHOW);
```

(*Key: ↙ code string continues*)

The only additional step you need for this to work is to add shellapi to the Uses clause of either the Interface or Implementation part of the Delphi unit. The reference to self.handle will work if you are calling the function from a form method, or alternatively you could use application.handle if there is no other convenient window handle to use. You can find the meaning of the other parameters in the Windows SDK help file supplied with Delphi.

In general, calling API functions is easier from Delphi than from Visual Basic. There is normally no need to declare the functions, as they are pre-declared in the supplied units. Note that the API uses pointers extensively. Delphi has full support for pointers but programmers just starting to do coding may not be aware of them. If you do not get the results expected, have a good look at the Delphi source files, such as shellapi.pas, along with the Windows SDK documentation. Some recent or rarely-used API functions may not have been declared, in which case you need to add your own declarations.

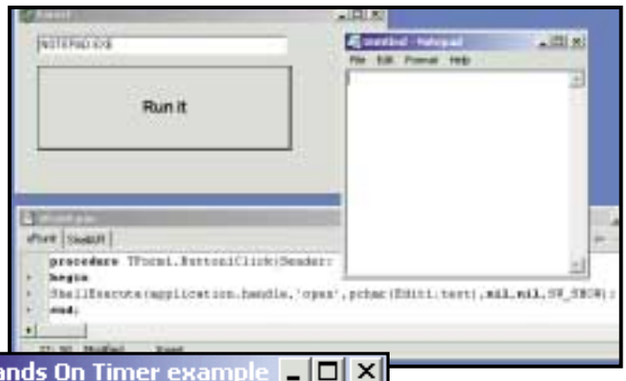
Tricks with timers

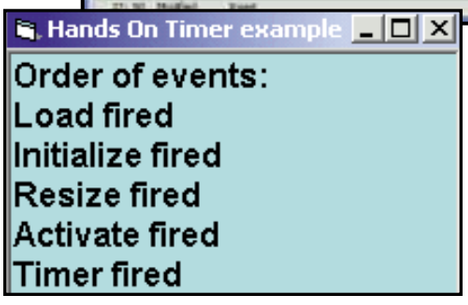
Windows is an event-driven operating system, which can lead to some tricky problems when you need to ensure that code runs at exactly the right time. A classic example is trying to validate values in form controls by handling focus events. It is easy to end up with nasty loops. Control A loses the focus to Control B, and fires its Lostfocus or KillFocus event. The Event Handler finds a problem and sets the focus back to Control A, thus firing the LostFocus event for Control B, which finds a problem and... you can guess the rest. In Visual Basic this is particularly awkward because of the unpredictable behaviour of GotFocus and LostFocus.

Another example is where you want to echo changes between two controls. For instance, you might have a Grid control and several Edit controls. You want the contents of the Edit controls to reflect the current row of the grid. If you modify the text in the Edit controls, the grid updates and vice versa. The snag is, the Change Event for the Edit control fires the Change Event for the Grid and disaster strikes.

A third case is where you want code to run immediately after an application has opened, perhaps in response to a command-line argument. If you have complex startup code, this can get tricky. In Visual Basic, forms have Initialize, Load, Activate and GotFocus events, any of which may seem good candidates for startup code. Delphi forms have OnCreate, OnShow, and OnActivate. Then there is the Resize event which often fires as well. How do you ensure that the code you add for the command-line argument, perhaps to open a document, really does run last?

In most cases, there is some combination of events and code that does what you want, but finding it can be a headache. You can often save much effort by using a timer instead. Timers are simple controls that fire just one event. They have two important properties, Enabled and Interval. The Interval property can be between 0 and 64,767 milliseconds, with 0 disabling the timer. Although it sounds fantastically precise, it is not, since the system generates only 18 ticks a second. The other precision problem is that if the system is busy, the timer event may not fire when you expect. In the above examples, this is not important. What matters is that the timer can run code that does not have unwanted side-effects.





Top: Use ShellExecute from Delphi to run other applications
Above: Timers are an easy solution to tricky event handling problems

If you are validating form controls, for instance, have the timer run validation code, pop-up alerts, and change the focus if required. If you want to echo changes between a grid and other edit controls, have the timer keep the two up to date at regular intervals. If you want to run code after an application opens, put it in a Timer event. To ensure that it only runs once, the first line of code in the event handler can disable the timer.

The main problem with the timer approach is that it can drain resources. Longer intervals reduce this, while it's better still to have the timer disabled except when necessary. For example, if you are validating data entry and concerned about performance, have the Timer event code disable the timer, but use the KeyPress event in each edit control to enable it again. Now the timer event will only fire if the user is actively editing. Used carefully, with one eye on performance, timers are an easy and elegant solution.

CONTACTS

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

BugTrapper costs from £440.63 (£375 ex VAT), details are at www.mutek.com

Unwrapping XHTML

How do you make X hit the spot? Tim Anderson explains and checks out client-side JavaScript.

Many people are not aware that the current W3C (World Wide Web Consortium) recommendation for HTML is not HTML 4.0, or even HTML 4.1, but XHTML. But what on earth is XHMTL? The answer is a variant of HTML that qualifies as a well-formed XML document.

All these mark-up languages are related, in that they all stem from SGML (Structured Generalised Mark-up Language). Broadly speaking, SGML and XML offer a set of rules for defining document types, while HTML is an already-defined document type. Therefore it should be possible for an HTML document also to be a valid XML document. Unfortunately it isn't, because HTML as used does not follow the rules. For example, in XML all elements must have opening and closing tags. In HTML, this is not the case. Tags like are understood to have an implicit , while
 and <img> are empty elements. <img> qualifies as an empty element because its content is defined by its own attributes, not by separate content that follows the tag.

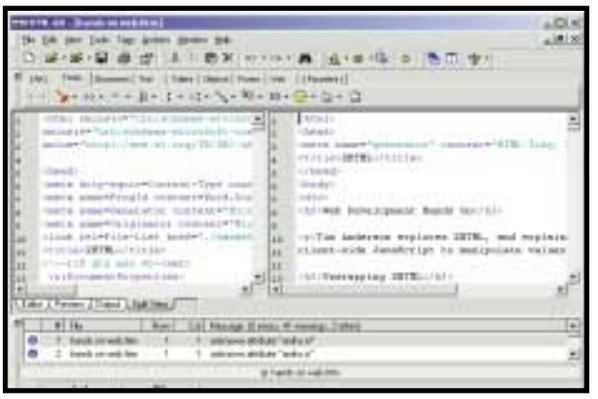
The idea of XHTML is to reformulate HTML as an application of XML. The clever bit is that carefully written XHTML should work satisfactorily in an HTML browser. Internet Explorer 5.0 and higher understand XML, but Netscape will not be XML-compliant until version 6.0 (there is no version 5.0). The W3C recommends that even now new web documents should be authored as XHTML.

Figure 1 shows a simple XHTML document. If you know HTML, it will look familiar. There are just a few points to note. The first line, beginning <!DOCTYPE, declares what type of XML document this is by referring to its DTD (Document Type Definition). The second point is that the <html> tag includes an xmlns (namespace) attribute. Namespaces are a key feature of XML. Since XML is by definition extensible, tags or elements are only understandable by reference to the DTD (or schema) where they are declared. On occasion though, you might want to use elements from several document types within a single document. XML namespaces let you identify which document type an element belongs to. The syntax is:

```
namespace:element
```

To avoid having to qualify every element, you can declare a default namespace. In XHTML, the root element is html. Declaring the namespace for this sets it as the default for the document.

After that what you see is pretty much standard HTML. That does not mean you can convert HTML to XHTML simply by changing the header details. XHTML is stricter and more disciplined. All tags, for example, must be in lower case and attribute values must be in quotes. In most browsers you can get away with



HTML-Kit and HTML Tidy extract HTML from a Word export

```
<img src=mypic.png>
```

but this is illegal XHTML. Another issue concerns empty elements. The results of constructs like
</br> are unpredictable, so the solution is to use the empty element syntax,
.

Part of the thinking behind XHTML is to clear up a fundamental problem in HTML. This is the way that content tags have become mixed up with presentation tags. For instance, is a content tag denoting a meaningful block of text, while <font> is purely a presentation tag. The correct way to handle presentation is through CSS (Cascading Style Sheets) or XSL (eXtensible Style Language), although the latter is not ready for prime time. The leap to complete abandonment of presentation elements is a big one, so the W3C has defined three levels of XHTML. The Strict level has no tags like <font> or attributes like bgcolor. Transitional XHTML includes these elements, while Frameset has frameset features. Currently the Transitional level is the most widely used, for compatibility with HTML.

Moving to XHTML

There are several tools to help you get the XHTML habit. HTMLTidy from the W3C site is a validation and conversion tool. TIDY.EXE is a highly configurable command-line application, and passing it the -help argument lists the options. You can also set up a configuration file. Tidy will clean up HTML exported from Word. It will also convert a document to

FIG 1 **Simple XHTML**

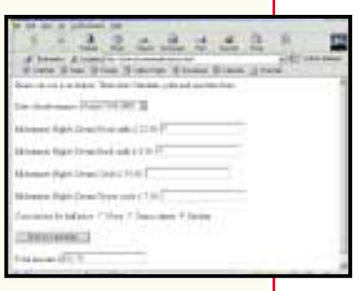
```
<!DOCTYPE html
    PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>Basic XHTML Example</title>
  </head>
  <body>
    <p>This is as simple as it gets.</p>
  </body>
</html>
```

(*Key:* ↙ *code string continues*)

FIG 2

Selling tickets online with client-side scripting

```
<html>
<head>
<title>Script calculations</title>

<script language="JavaScript">

<!--
function testValid(fieldObj) {
 if (isNaN(fieldObj.value)) {
 alert(fieldObj.value + " is not a valid ↙
number")
 return false}
 else {
 return true}
}

function numVal(sValue) {
 if (sValue == "") {
 return 0}
 else {
 return parseInt(sValue,10) }
}

function calcprices() {
 with (document.ticketform) {
 testValid(MNFStalls)
 testValid(MNBStalls)
 testValid(MNCircle)
 testValid(MNUCircle)
 }

var totalprice = 12.00 * ↙
numVal(document.ticketform.MNFStalls.value)
totalprice = totalprice + (8.50 * ↙
numVal(document.ticketform.MNBStalls.value))
totalprice = totalprice + (10.00 * ↙
numVal(document.ticketform.MNCircle.value))
totalprice = totalprice + (7.50 * ↙
numVal(document.ticketform.MNUCircle.value))
 if (document.ticketform.↙
concession[0].checked) {
 document.ticketform.totalbox.value = ↙
totalprice}
 else if (document.ticketform.↙
concession[1].checked) {
 document.ticketform.totalbox.value = ↙
totalprice/2}
 else if ↙
(document.ticketform.concession[2].checked) {
 document.ticketform.↙
totalbox.value = ↙
totalprice/2}

}

//-->
</script>

</head>
<body>
<p>Please choose your tickets. Then click ↙
Calculate, print and send the form.</p>
<form name="ticketform">
<p>Date of performance: <select ↙
name="perfdate">
<option>August 10th 2000
<option>August 11th 2000
<option>August 12th 2000
</select></p>
<p>Midsummer Night's Dream Front stalls ↙
&pound 12.00: <input type="text" ↙
name="MNFStalls"><br>
<p>Midsummer Night's Dream Back stalls ↙
&pound 8.50: <input type="text" ↙
name="MNBStalls"><br>
<p>Midsummer Night's Dream Circle &pound ↙
10.00: <input type="text" ↙
name="MNCircle"><br>
<p>Midsummer Night's Dream Upper circle ↙
&pound 7.50: <input type="text" ↙
name="MNUCircle"></p>
<p>Concessions for half price:
<input type="radio" name="concession" ↙
value="None" CHECKED>None
<input type="radio" name="concession" ↙
value="Senior citizen">Senior citizen
<input type="radio" name="concession" ↙
value="Student">Student
</p>
<p><input type="Button" value="Click to ↙
calculate" onclick="calcprices()"></p>
<p>Total amount: &pound<input type="text" ↙
name="totalbox" value="0.00"></p>
</form>
</body>
</html>
```



Client-side scripting used to calculate ticket prices

use CSS, but don't expect perfect results. To ask Tidy to convert to XHMTL, type:

```
tidy -asxml old.html > new.html
```

Tidy will also issue warnings and error messages, which you can optionally redirect to a file. The command-line Tidy is great if you want to include it in your own scripts or batch files, but not so convenient when you are working in an editor. There are a several other options. TIDYGUI.EXE is a Windows application that wraps Tidy. Configuration is via a tabbed dialog and you can load and save configuration details.

Another nice way to use Tidy is via the excellent free-to-use editor HTML-Kit. This can be extended with plug-ins, and one of these is for HTMLTidy. When installed, you can validate using Tidy simply by pressing F9. Under Actions, Tools, HTML Tidy other option include stripping surplus tags from Word 2000. When invoked, the converted document appears in a split view alongside the original. You can copy all or part of the converted document back to the original.

Online validation

You can validate XHTML online. If your web page is on the Internet, add a link to: http://validator.w3.org/check/referrer. If it is stored locally, visit: http://validator.w3.org/ and upload your page for checking. Sadly, the majority of web pages on the Internet would not get past the validator, and you can have some fun entering popular URLs to prove it.

IP addresses via ASP

Steve Scott asks if there's any way to trace the IP address of the client through ASP.

ASP makes it easy to retrieve this kind of information, via the Request object's ServerVariables collection. Figure 3 shows a script that outputs this back to the client, and screenshot 1 shows the results.

Script calculations

Louis Maule-Cole's website allows people to order concessionary and standard tickets for the local theatre. He would like the total price of the tickets to come up automatically.

This is the sort of problem that scripting is designed to solve. To make the ticket page, the neatest job would involve some server-side scripting. For example, using Active Server Pages (ASPs) you would have a Submit button on the form that would send it back to the server for processing. Then you could generate a confirmation page with the ticket summary and cost and return it to the browser for printing.

Many users, though, want something simpler that can be used on ordinary webspace without server-side scripts. In this case, you can use client-side scripting (see figure 2 on the previous page).

This consists of several elements. The starting point is a form, which in this case does not have any action or method attributes, since all the processing is client-side. Within the form are several input boxes, where the user enters the number of tickets required. There is also a drop-down menu for choosing the date, and a radio button for selecting a concession. When the form is complete, clicking the Calculate button runs a JavaScript function that is defined in the <head> section of the document. You must use JavaScript, not VBScript, or you are restricting users to Internet Explorer.

The form includes four object types: a select object, several input objects, a radio object, and a button. In each case, a name attribute allows reference to the objects in script. For the button, there is also an onclick attribute. This is how you attach an event handler to an HTML object. When the button is clicked, the calcprices() function is called.

This begins by testing the validity of the values that have been entered. The testValid function uses the isNaN 'Not a Number') function to check that the input boxes contain numbers. Next, the script calculates the cost of the tickets. In case the user entered a fractional value, the numVal function uses parseInt to return just the integer value of the field. Because parseInt may return NaN when passed an empty string, there is a separate test for this that returns zero.

The final stage looks at the value of the radio button, by treating the buttons as an array and inspecting the checked property of each element. It would be easy to give different discounts.

In JavaScript, everything is case sensitive. And be careful not to confuse the assignment operator (=) with the test for equality (==). For example,

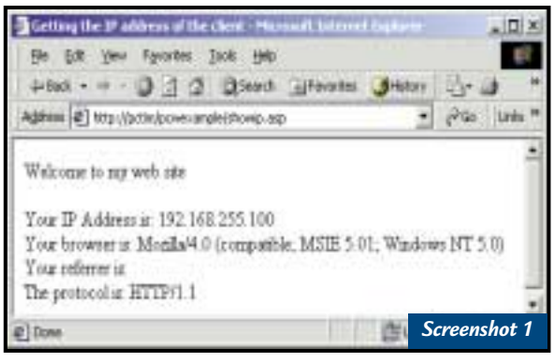
```
if myvar = 3
```

always returns true, meaning that the value 3 was successfully assigned to myvar.

The two main advantages of client-side code are that there are no repeated trips to the server, and that, since it is programming against the DOM (document object model), the results are smoother than with typical server-side programming, which returns a completely new page. The main problem is that IE and Netscape Navigator have substantial differences in the DOM they expose, but with the release of Navigator 6.0 this will improve. The simple code shown works in both IE and Navigator 4.0 and higher.

FIG 3 **Finding IP address through ASP**

```
<%@ Language=VBScript %>
<html>
<head>
<title>Getting the IP address of the client</title>
</head>
<body>
<p>Welcome to my web site</P>
<% Response.write "<p>Your IP Address is: " + ↙
Request.ServerVariables("REMOTE_ADDR")+ "<br />"
Response.write "Your browser is: " + ↙
Request.ServerVariables("HTTP_USER_AGENT")+ "<br />"
Response.write "Your referrer is: " + ↙
Request.ServerVariables("HTTP_REFERER")+ "<br />"
Response.write "The protocol is: " + ↙
Request.ServerVariables("SERVER_PROTOCOL")+ "<br /></p>" %>
</body>
</html>
```



Screenshot 1

Mystery of the IP address solved

CONTACTS

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

For the latest on HTML, browse www.w3.org

TIDYGUI: http://perso.wanadoo.fr/ablavier/TidyGUI/

HTMLTidy: www.w3.org/People/Raggett/tidy/

HTML-Kit: www.chami.com/html-kit/

Recommended XHTML reading: *Beginning XHMTL* (Wrox Press) ISBN 1-861003-43-9

Available from www.amazon.co.uk

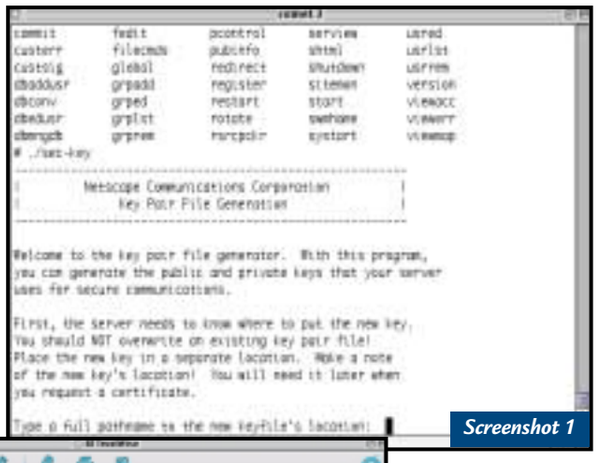
Security blankets

In his first outing as *Hands On*'s minister for ecommerce, Nigel Whitfield wins a certificate.

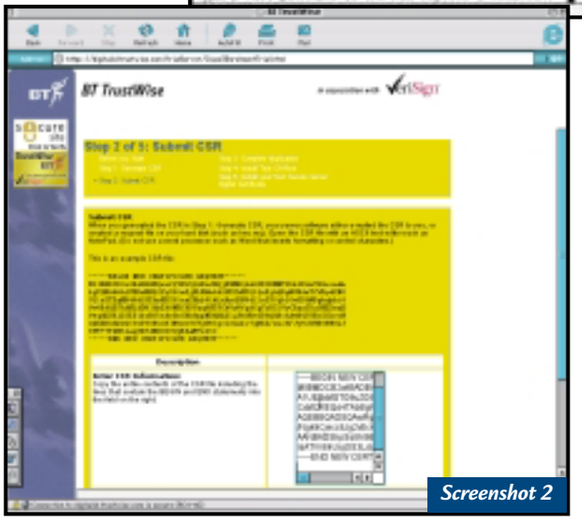
We cover a lot of Internet issues in the *Hands On* section, but the one that is really exploding at the moment is ecommerce, and that's why *PCW* has decided to introduce a dedicated column on the subject. Ecommerce – or 'ebusiness' as some prefer to call it – is likely to affect everyone in some way, whether you run your own company, manage the technology for a larger organisation, or just want to find an emergency plumber at 8pm on Christmas Eve.

So what will we be covering in this column? Ebusiness is more than just large websites processing thousands of credit card transactions. It's about using the technology of the Internet to promote your business, gain new clients, or deal with suppliers and customers more efficiently. Ecommerce could be as simple as a website providing people with an up-to-date check on stock levels and prices, or as complicated as full settlement of invoices between you and your suppliers, online ordering and secure transaction processing.

In this new section, we'll be covering a wide range of ecommerce solutions, but concentrating on the tools, products and techniques that are most useful to smaller companies and organisations. Hopefully, whether you want to use Internet marketing, or create your own online shop, you'll find help and advice here – and if you have comments or suggestions for things that you'd like to see covered in this part of the magazine, please send them in to the address at the end of the column.



Screenshot 1



Screenshot 2

Left: The first stage in getting a certificate is generating a server key

Your web server uses public key cryptography to generate a Certificate Signing Request for you

Are you certified?

Whether you want to provide a safe shopping environment, or just allow access to documents on a site without the possibility of anyone being able to intercept them, a secure certificate is vital. It gives people the confidence of knowing that any information they submit to your site, or receive from it, has been encrypted and can't be tampered with, or intercepted, along the way.

You can get a server certificate from a number of places, but typically you have to pay – and if you're just at the development stage of a project, you might not want to do that just yet.

BT Trustwise – which works with Verisign, one of the top authentication outfits – has a solution in the shape of test certificates, which are free of charge. Each one lasts for a fortnight, and you don't have to do anything more onerous than fill in a few forms on the website. However, you must not use them for a live application and to help ensure that they are just for testing, each web browser that you want to test a site with will need a special Verisign test root authority installed as well.

If you want to do ecommerce 'for real', then you'll still need to pay for a certificate and provide the appropriate information to have it verified, but this is a good way to let you test your site configuration in the meantime.

You can sign up for a test certificate at www.trustwise.com – it's largely a matter of filling in the forms, as long as you're using one of the servers that's listed. (In fact, you should be OK with some others – although the only Netscape server listed was Enterprise Server, we had no problems requesting and installing a certificate for Netscape FastTrack Server).

How certification works

Before going into the details of how to install and configure a certificate, let's look at the security model. Firstly, a secure server typically communicates via a different port – 443, rather than 80. The URLs people type will begin https:// to indicate that it's a secure link. All the information that passes between browser and server is encrypted in both directions. The website supplies a

certificate, which a 'root authority' in your web browser verifies as valid, and this is then used to encode and decode information.

As long as your web browser has root authority allowing it to verify the server's certificate, people don't need to do anything to see the site – and all up-to-date browsers will have the necessary certificates built in, barring a few that expired at the end of 1999.

Back on your server, there are two pieces of information. The first is a server key file, and the second is the certificate. The key file contains binary data, which can be unlocked with a password.

As the first stage of getting a certificate, you'll need to generate this key file. Screenshot 1 shows what you'll see when you use a Netscape server under Unix; the TrustWise site gives instructions for other servers and operating systems.

It would, of course, be foolish to send either the server key, or its password, to anyone via the Internet when you want a certificate. Instead, the server itself, or a utility program, turns the key file and information about your organisation, including the server's domain name, into a Certificate Signing Request, or CSR.

That request is just a block of letters, with a start and end line that you can copy and paste into the TrustWise website – some web servers will let you automatically email the CSR to an appropriate authority (screenshot 2). For the TrustWise trial, you can do everything over the web, so tell your server or its CSR- generating program to display the data, or email it to yourself, so you can copy and paste it.

When you've copied the CSR data into the form on the TrustWise site, click the Continue button. You'll have to supply some additional information about your site, including contact name and address. When you're applying for a real certificate, this is the sort of information that will be checked thoroughly to ensure that only trustworthy people have certificates. For the trial, you'll just see a few messages as your application is processed.

It would, of course, be foolish to send either the server key, or its password, via the Internet

The next stage is to install the test root authority in your web browsers; it'll be done automatically if you follow the steps on the TrustWise pages. Confusingly, when you've added the certificate, you'll still be stuck on the 'Step 4 of 5 page' with Step 5 tantalisingly unavailable. Don't worry – Step 5 is installing the certificate on your web server and that's not something that's covered on the BT website.

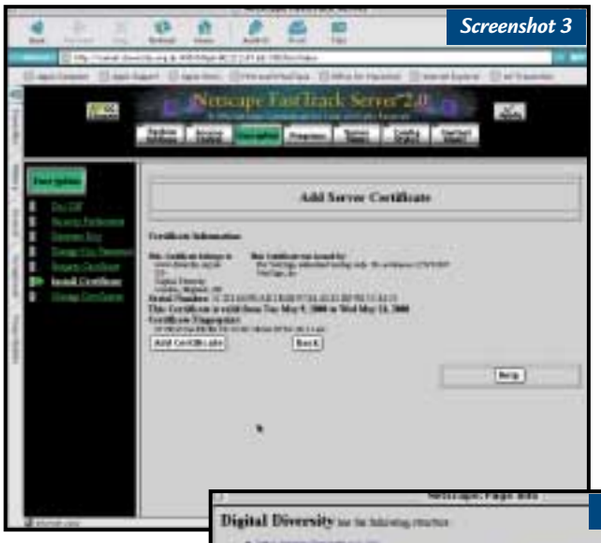
You'll receive the certificate via email instead. It'll look something like this:

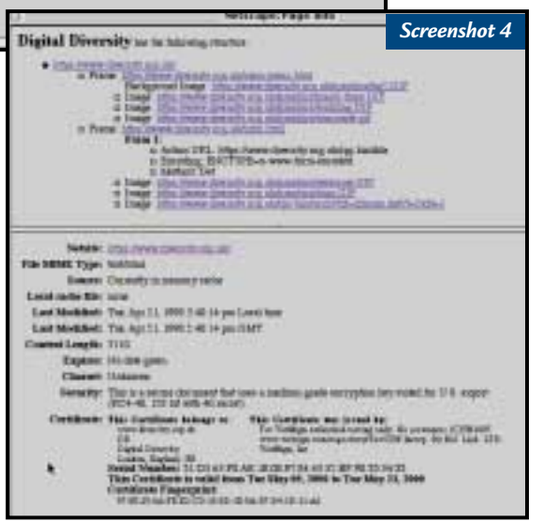
——-BEGIN CERTIFICATE——-
MIICGTCCAcMCEFHTY/CuHgiXhEMyv
5hVNFUwDQYJKoZIhvcNAQEEBQAwg
akxFjAUBgNVBAoTDVZlcmlTaWduLCB
JbmMxRzBFBgNVBAsTPnd3dy52ZXJpc
2lnbi5jb20vcmVwb
3NpdG9ye
S9UZXN0Q1BTIEl
uY29ycC4gQnkgUmVmLi
BMaWFiLiBMVE
QuMUYw

with a corresponding 'END' line. All you need to do is copy and paste the block into your server's configuration system; with a Netscape server, that's done via a web page, and others will have similar techniques – check the documentation for your secure server (screenshot 3).

Remember you'll also have to switch on encryption in your server if it doesn't happen automatically after adding the certificate, and if the server was running beforehand on port 80, it'll now be on port 443. And that's just about all there is to it – you should have a server that's now delivering documents and accepting input from forms over a secure link (screenshot 4).

Whether it's a test certificate free of charge from TrustWise, or a full annual certificate – at around £260 – it really isn't much work at all to make your web server secure – and that's the first step to being able to do business on the Internet with confidence.





Left: Adding the certificate to your server is a matter of copy and paste, then filling in a few details on the configuration form
Below: Netscape's Page Info shows the site is secure and gives details of the certificate

CONTACTS

Nigel Whitfield welcomes your comments on the Ecommerce column. Contact him via the *PCW* editorial office or email **ecommerce@pcw.co.uk**

Infra-red conundrums

Mark Whitehorn relives the pain of connecting Psions and PCs and trains a remote control device.

I know you've heard it all before, but someone has to keep saying it. Connecting Psions to PCs can still be painful. If a connection can be established, then backing up and restoring data is usually easy. However, synchronising data still seems to cause grief, both to me and to others.

For example, Graham Townsend (townsend01@clara.co.uk) used to have no problems transferring and converting files between his PC and Psion Series 5. However, he now gets messages that there are no file associations and no convertors loaded. He's tried reinstalling PsiWin and loading all elements of Office 2000 in case the convertors are there somewhere. None of this seems to have helped. The backup still works so he can protect his data but, he says, 'it would be nice to be able to work on it as well'. I've suggested upgrading to the most recent version of PsiWin, but my heart isn't in it because the version he has was working at one stage. Graham's is the second email I've received on the subject this month. Come on, Psion, some of us are really suffering – please look at this problem. Even a set of diagnostic programs (one for the Psion and one for the PC) to help work out where the problem lies would be a step forward.

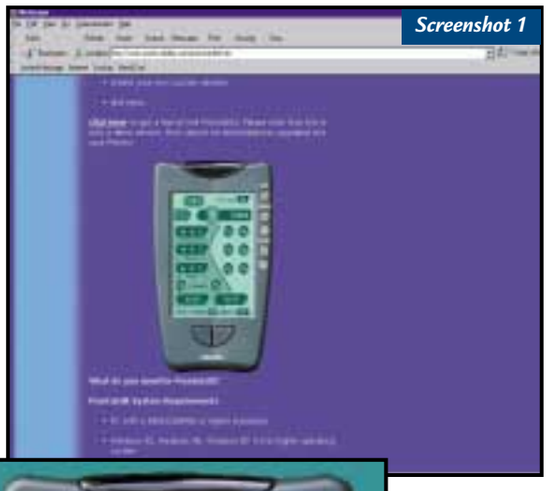
The strange thing is that the Psion community seems to split into those plagued by connectivity problems and those for whom connectivity is a trouble-free breeze. They must wonder what we are all crying about. So, to keep things balanced, we'll look at a positive aspect of the Psion connectivity toolset, IR (infra-red).

Seeing (infra-) red

All Psions since the 3c come with a built-in IR port – that's the good news – but all are not equally endowed, as only the Series 5 complies with the Infra-red Data Association (IrDA) standard.

Printers, mobile phones, laptops and PCs can all come with an infra-red port. Hewlett-Packard and Canon offer a range of printers with this option, and even if your printer doesn't have an IR port, it's possible to plug in a device that acts as an infra-red sensor. There are several around: the ACT-IR200L/220L from ACTiSYS (www.actisys.com) and the LiteLink from Parallax Research (www.parallax-research.com/litelink.html).

Some new GSM mobile phones from manufacturers such as Ericsson and Nokia support IrDA and the Series 5 can communicate freely with these to send faxes, emails and so on. Series 3 and Sienas, however, cannot. Adherence or otherwise to the IrDA standard also means that, while a 5 can only talk to another 5, the 3c, 3mx and Siena can converse among themselves.


Screenshot 1

Screenshot 2

Left: www.pronto.philips.com – home of the amazingly adaptable hand controller
Below: Using the emulator to generate a program for the Pronto

Communication with PCs and laptops is slightly tricky and you'll need software for the PC and for the Psion:

- Windows 98 users need the IrDA driver from the Win98 CD
- Windows 95 users should locate a copy of version 2.0 of Microsoft's IrDA driver
- Series 3 and Siena users with a technical bent may be able persuade PsiWin to work, but it's not an officially supported operation. Third-party software is available from Jim Pollock (www.geocities.com/siliconvalley/lakes/3947/) for copying, backing up or inspecting directories via infra-red
- Series 5 users have a somewhat easier ride, needing only the latest drivers from Psion, which come with Message Suite 1.52, though PsiWin 2.1 or later must also be installed on the PC
- Communication with Macs, including iMacs, is not supported.

Files can only be sent between machines singly or as fragments, such as a highlighted section of text from a word processor, an entry from an Agenda file or a block of cells from a spreadsheet. Infra-red communication has a short range: machines should be no more than a metre apart with a clear line of sight between the ports. The optimal distance, however, is around 15cm.

The good news is that the IR control does work well – and consistently, as far as I can see.

Couch potato

Since IR is also used to control household appliances, can you get your PDA to control the TV?

The answer appears to be 'no' at present if you use a Psion, but 'yes' if you

Screenshot 3

Left: Lights, camera, action

have a Palm device or a Mips-based CE device. Check out http://hp.vector.co.jp/authors/VA005810/remocon/premocce.htm for details. You can also now go the other way and turn your TV controller into a PDA.

Several months ago I wrote about wearable computers and how gadgets, such as mobile phones, GPS units and PDAs, were bound to end up all integrated into the same device. Never in my wildest dreams did I consider the inclusion of a TV remote controller in that grouping for the simple reason that most of us don't carry one around all day. But once again the world has been able to out-weird me.

Philips' Pronto, featured in June's *Gadgets* section (www.pronto.philips.com), started life as a single device that replaced the clatter of remote control handsets that hide themselves around our living rooms (under the sofa, in the dog's basket and so on). It has a touch-sensitive screen and IR port and can 'learn' the functionality of your existing handsets (screenshot 1, previous page). So far, totally un-weird.

However, it can also be programmed via an emulator, ProntoEdit, (screenshot 2, previous page) that runs on a PC and thus you can persuade it to perform all sorts of tasks that you wouldn't normally expect from a remote control, such as controlling your lighting (screenshot 3) and remembering your preferences (screenshots 4 & 5). But people have also written Agenda applications for it and you can even store recipes on it. Perhaps in the future, celebrity chefs will beam recipes to you from your TV... and you can beam the list of ingredients to your local supermarket... and you can emerge beaming from the kitchen with sun-dried balsamic Kohlrabi.

Personally, I think all this is wonderful: give us an adaptable tool and we'll adapt it 'til its pips squeak. Remember all those letters written with Lotus 1-2-3?

The emulation software is available in two flavours, as a fully-functioning package and as a demo version with which you can write programs, but with no means of communicating between the emulator and a hand controller.

ProntoEdit requires a PC with a 486DX/66MHz or higher processor running Win95/98/NT4 or higher, 16MB of RAM and a serial port supporting 115200 baud. Philips has supplied *PCW* readers with a demo version that you'll find on this month's cover disc.

Other sites of interest are www.remotecentral .com (screenshot 6) and www.prontoedit .com/.

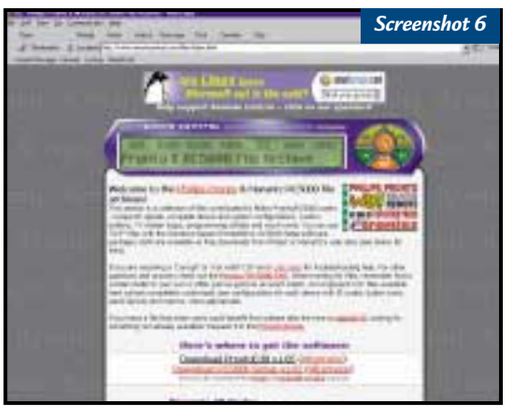
Harry Kyriacou, Philips' UK product marketing manager, said that the company was astonished (and delighted) by what was being done with the product. He was astonished all over again by the fact that the product was selling so well (almost exclusively) on the Internet. The combination of easy development and a band of enthusiastic Internet users seemed to be the main factor encouraging sales.

Screenshot 4

Selecting your personality...

Screenshot 5

I find this last point interesting. Here is a product, not an especially earth-shaking or ground-breaking product, that's developing a momentum from the enthusiasm of users by means of the Internet without much intervention from the manufacturer. In sharp contrast, Microsoft has employed people with the word 'evangelist' in their job titles to do just this. These people were perfectly happy to tell me that their job was to use the Internet to generate enthusiasm for the PocketPC. For some reason this makes me uncomfortable. I think Pocket PC is a good product, but I don't like being told to think so by a 'product evangelist'.



Screenshot 6

www.remotecentral.com offers all sorts of wares

CONTACTS

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

Primed for privacy

Secure connections over the Internet are cheap and needn't be complicated, explains Roger Gann.

A virtual private network (VPN) is a private data network that uses the public Internet to transport data, but uses a tunnelling protocol and other security methods to keep your data safe. A VPN can be used instead of a network of owned or leased lines that can only be used by one company.

The idea behind a VPN is to give a company the same capabilities as a leased line, but at a much lower cost, by using the shared public Internet, rather than a private network. They also let companies' network bods link multiple offices via the Internet both reliably and securely.

So how do VPNs work? A virtual private network consists of the two computers (one at each end of the connection) and a route, or tunnel, over the public or private network. Suppose, for example, you want to access the resources on your corporate LAN, but only have an Internet connection. With virtual private networking, you can 'tunnel through' the Internet to access those resources. Similarly, two physically separate LANs can be linked by a VPN 'tunnel'.

In Windows 98, virtual private networking is implemented using the Point-to-Point Tunnelling Protocol or PPTP. This allows you to tunnel through TCP/IP-based data networks to securely access resources on remote servers. It also supports multiple network protocols (IP, IPX, and NetBEUI). You can use PPTP to provide secure, on-demand, virtual networks by using dialup lines, LANs, WANs, or the Internet and other public, TCP/IP-based networks.

Because of its dependence on PPP, PPTP relies on the authentication mechanisms within PPP, namely password authentication protocol (PAP) and challenge handshake authentication protocol (CHAP). There is a strong tie between PPTP and Windows NT, so MS-CHAP, an enhanced version of CHAP, uses information within NT domains for security. Similarly, PPTP can use PPP to encrypt data, but Microsoft has also incorporated a stronger encryption method called Microsoft point-to-point encryption (MPPE) for use with PPTP.

Aside from the relative simplicity of client support for PPTP, one of the protocol's main advantages is that PPTP is designed to run at open systems interconnection (OSI) Layer 2, or the link layer, as opposed to IPSec, which runs at Layer 3. By supporting data communications at Layer 2, PPTP can transmit protocols other than IP over its tunnels. PPTP does have some limitations. For example, it does not provide strong encryption for protecting data nor does it support any token-based methods for authenticating users.

The networking technology of PPTP is an extension of the remote access PPP protocol. It's a network protocol that encapsulates PPP packets into IP data for transmission over the Internet or other public TCP/IP-based networks. Using a VPN involves encrypting data before sending it through the public network and decrypting it at the receiving end.

An additional level of security involves encrypting not only the data but also the originating and receiving network addresses. Microsoft, 3Com and several other companies developed the PPTP and it first appeared in Windows NT Server 4.0. Its initial acceptance was reinforced by the inclusion of a PPTP client in a service pack for Windows 95.

PPTP isn't the only VPN protocol kid on the block, there are three others: Layer 2 Forwarding (L2F), Layer 2 Tunnelling Protocol (L2TP), and IP Security Protocol (IPSec). PPTP, L2F and L2TP are largely aimed at dialup VPNs, while IPSec's main focus has been LAN-to-LAN solutions.

L2TP is being designed by an IETF working group as the heir apparent to PPTP and L2F, designed to address the shortcomings of these past protocols and become an IETF-approved standard. L2TP uses PPP to provide dialup access that can be tunnelled through the Internet to a site. However, L2TP defines its own tunnelling protocol, based on the work done on L2F.

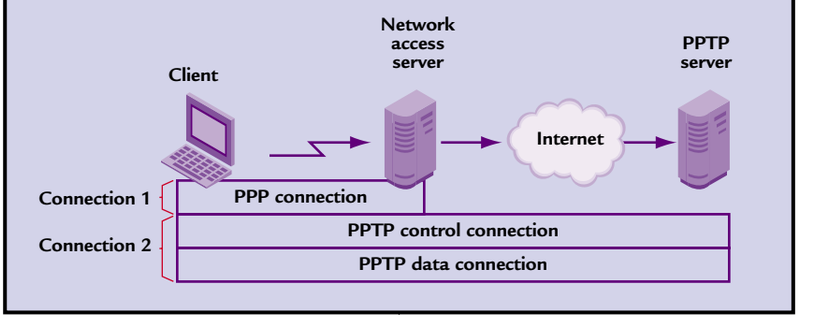
Planning for a VPN

A common VPN scenario involves a remote or mobile Windows 98 client that uses a local ISP to access the Internet. The client then tunnels through the Internet to a corporate LAN.

A Windows 98 client actually makes two connections to establish a VPN tunnel: one physical connection and one logical connection. This is why you see two DUN adaptors in your Network Properties when you install VPN under Windows 98: VPN Setup installs a second dialup adaptor and the 'network driver interface specification wide area network' (NDISWAN) protocol for the virtual private networking adaptor. The second dialup adaptor appears in the Network option in Control Panel as Dial-Up Adaptor #2 (VPN Support).

The diagram below illustrates the two connections. The client first uses Dial-Up Networking and the remote access protocol, PPP, to connect to the ISP. Once connected, the client can send and receive packets over the Internet.

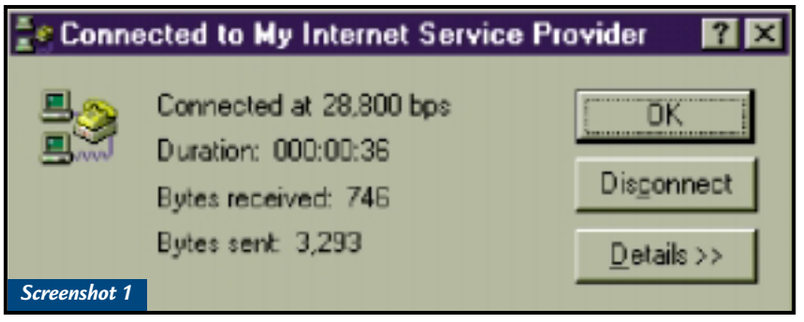
How Windows 98 connects to a VPN

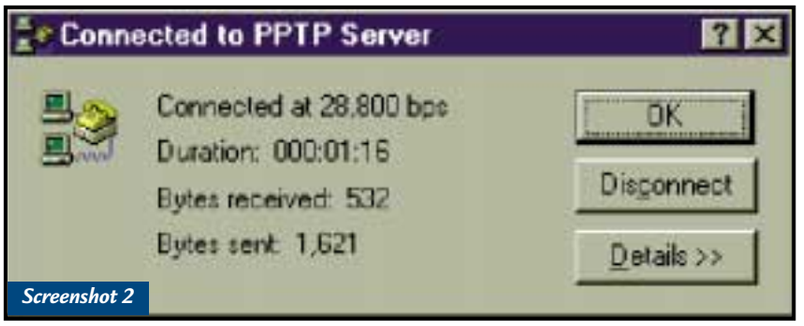


The client then makes a second logical connection over the existing PPP connection. Data sent using this second connection is in the form of IP data that contains PPP packets, referred to as encapsulated PPP packets. The second connection creates the VPN connection to a VPN server on the private enterprise LAN (for example, a computer running Windows NT Server 4.0 and configured as a VPN server). This connection is referred to as a tunnel.

When the VPN server receives the packet from the routing network, it sends it across the private network to the destination computer. The VPN server does this by processing the PPTP packet to obtain the private network computer name or address information in the encapsulated PPP packet. The encapsulated PPP packet isn't restricted to the TCP/IP protocol – it can carry multiprotocol data such as IP, IPX, or NetBEUI protocols.

A neat feature of VPNs is that they don't require any changes to existing network configurations or network-based applications – they allow you to retain your existing network protocols, network node addresses and naming schemes on the private enterprise network. For example, IPX or NetBEUI clients can continue to run applications on the private network that require these protocols. Neither are changes required for name resolution methods used on the private network, such as WINS for NetBIOS computers, DNS for TCP/IP host names and SAP for IPX networking.





Connecting a VPN server is a game of two halves – link to the ISP and then connect

PPTP isn't the only VPN protocol kid on the block, there are three others

Configuration

If you have a permanent TCP/IP connection, such as a LAN connection to a VPN tunnel server, and you want to connect to a remote network that is connected to your VPN server, you need only configure the connection to that VPN tunnel server.

However, it'll be necessary to configure two connections if you want to connect your workstation to a remote server by tunnelling through the Internet, the connection to your ISP and a tunnel connection to the VPN server on the target network. If VPN is not already installed on your Windows 98 remote PC, add it as a Network Component in the usual way – add a new adaptor, the Microsoft Virtual Private Networking Adaptor.

You create a VPN connection as you would a new DUN connectoid, except that you're actually going to create two connections, the first using a network adaptor, modem, or ISDN device to connect to a remote access server on the Internet or your intranet, while the second connection uses the VPN virtual adaptor to tunnel through the first connection to a VPN tunnel server and beyond.

So click the 'Make a New Connection' icon to launch the wizard. Fill in the usual details but make sure you select 'Microsoft VPN Adaptor' in the 'Select a device' list. The wizard will then prompt you for the host name or address of the VPN server.

With virtual private networking, you can connect your workstation to a remote network by tunnelling through the Internet to a VPN server on that network. To do so, you must make two connections. First, you must connect to the Internet through an ISP. Next, you must create a tunnel to the target network.

As you'd expect, connecting to the VPN server is a two-stage affair. First you connect to your ISP in the normal manner, eg double-click the appropriate DUN connectoid and enter your user name and password in the 'Connect To' dialog box. Once that has completed successfully, you double-click on the VPN DUN connectoid you've just created, entering the user name and password as prompted and clicking the Connect button.

You now have two connections, as shown in screenshots 1 and 2 above.

After you connect successfully to the VPN server on the remote network, the ISP routes all traffic sent from your workstation over the Internet to the VPN server. The VPN server then routes the traffic to the correct computer on the remote network. Consequently, you see only computers and servers on the remote network. You no longer 'see' the Internet unless the remote network itself provides access to the Internet.

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