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The Software Developers' Magazine

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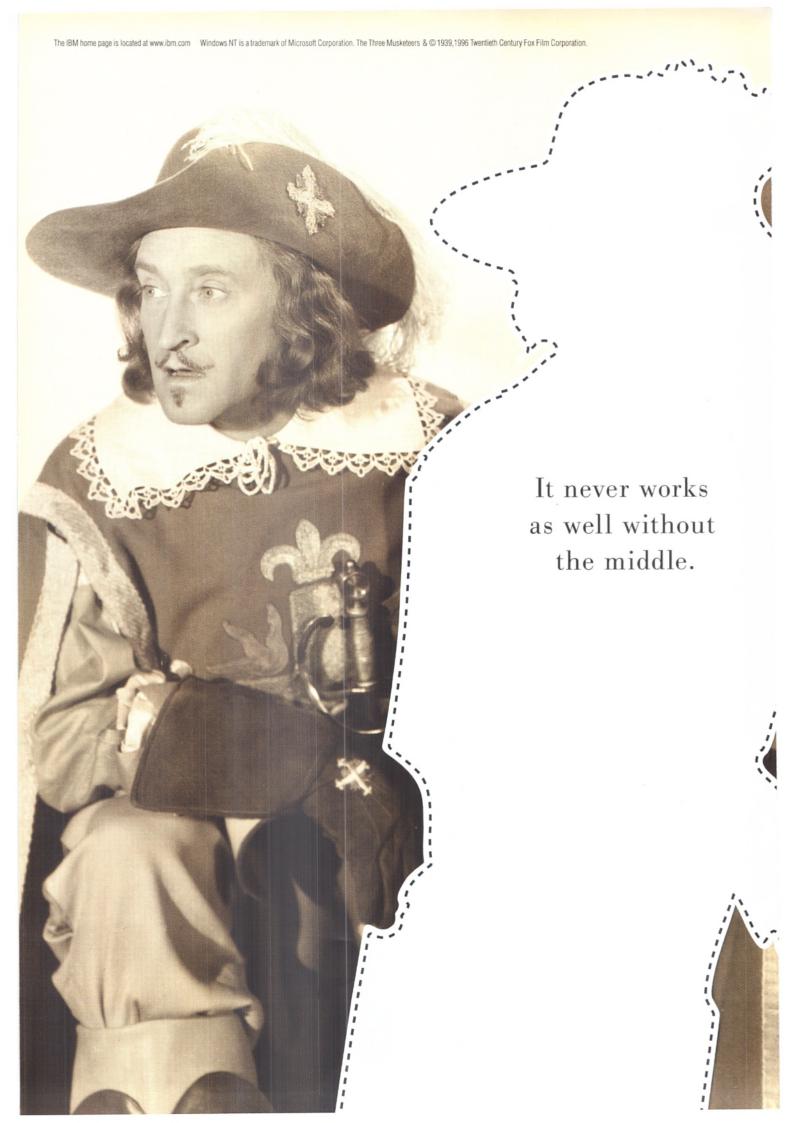
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# Parallel processing and SQL – a happy marriage

kind of innocence bordering on cynicism pervades thought about parallel processing, particularly among the elder statesmen of the system world. They feel inclined to categorise this technology with the bright ideas of yesteryear – the Distributed Array Processor, the Content Addressable File Store, and other anachronisms. Nothing could be further from the truth.

### Why parallel?

Parallel processing has long been recognised for its great potential to solve very large problems. However, given any problem and any parallel machine, translating the combination into an effective solution is a difficult challenge. Various attempts have been made to provide vehicles to make parallel processing available to the masses, but all have failed – all but one.

Several years ago someone realised the set-oriented nature of SQL made it a natural for a parallel implementation. The approach avoids the pitfalls of parallel solutions to other problems, since the customer (the SQL user) need not be aware that parallel processing is involved. As with other database implementations the problems are simply formulated in SQL, and the parallel database server provides the answer — with one very noticeable difference. Answers to complex questions involving very large databases are returned in seconds or minutes, instead of hours or days as it is with typical merchant databases.

The purveyors of these merchant systems would have us believe parallel implementations are unnecessary. They argue that the technology of single processors (and

their first cousins, SMP) is moving so fast that parallel processing is pointless. However, when we examine that premise a different picture appears.

Discussions with people interested in 'decision support' or 'data warehousing' invariably uncover the fact that the current activities are not what is desired. People are working with summary data because they simply cannot get information out of detail data in a timely fashion. They would prefer to mine the detail, but can't. They have been taught by their friendly merchant database sellers that what they are doing is the best that can be done, but some are starting to ask questions.

The motivation of the merchant database providers is clear: to supply database software that runs on many different hardware platforms. Most are similar enough that the support problem is manageable, but providing the same system for parallel platforms is another story. A proper job there calls for close integration of hardware and software.

The argument that parallel processing is unnecessary does not bear close scrutiny. In fact, pent-up demand is growing faster than the technology curve, and shows absolutely no sign of slowing.

### Why SQL?

SQL is naturally suited to parallel. It is highly adaptable and can be moulded to fulfil all sorts of needs, and is beginning to look and feel like a 'bespoke' solution. It is so user sympathetic that the person at the terminal doesn't need to know what is behind it, because the solution fits the thinking processes of those driving the database.

The evolution of interface standards reveals what is happening. Decades ago, the important standard was the instruction set (IBM/360). This moved up over the years to the operating system level, which is much

more sensible. But now it is clear that in database processing the important interface standards are SQL and ODBC. What happens behind that standard is unimportant, as long as the job is performed in a timely, cost effective manner.

The recent challenges to SQL fail in comparison. One is the object oriented database. It is very nice for some kinds of processing, images, for instance, but fails on the performance curve when large amounts of data are involved. Another is the multidimensional database, which tackles data manipulation by preprocessing the data, then summarising it. This is excellent for speed when examining summarised data in ways previously conceived. However, one can't always think of the relationships beforehand, and even more important, they don't allow drilling down to the detail. Data mining, which is all about digging for gold (or the more modern analogy - drilling for oil) is impossible with this technology. Can you imagine a wildcatter with only a seismograph and no drill?

An SQL/ODBC implementation on a parallel hardware/software vehicle – faster than any other method – is the clear solution.

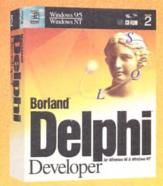
Doug Heying is the minister who regularly presides over parallel | SQL marriages for White Cross Systems. Contact him at 76470.3411@CompuServe.com, telephone 01344 300770.

# Scaling the object wall

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# COMMENT



based, object-oriented development tools on the market. Delphi, Visual Basic, Power-Builder, and the rest are great for developers moving into objects and developing GUI based front ends, but they don't scale. With all the hype and promise of objects, with encapsulation and component-based development, OO should enable applications to scale, but in today's client/server environments, we are seeing far too many fat clients.

The UK market is poised to dip its toes into company-wide deployed object technology, but two things might prevent this. First is the lack of truly server-oriented development tools. Second is the dearth of skills and strategy within most companies to support such growth. These pitfalls were identified at the end of last year when Admiral Software commissioned a survey of some 6,000 UK businesses to find out their attitudes about the adoption of object technology. The results were interesting, if not surprising. Over 50% of the respondents were actively involved in object technology. However, most of these projects were on a tactical level, which prevents scaleable application development, because companies don't have the structure and culture in place to benefit from 'reuse' another object buzzword.

That's the bad news. The good news is that strategic use of OO is growing, and so are the tools to support it. Terms like 'three tier client/server architectures' and new products such as GemStone's Object Application Server are emerging to support distributed applications and to enable legacy systems to be seamlessly connected into new client/server environments. It is amazing to think that a few years ago vendors expected us to write off our massive investments in legacy systems to replace them with unknown client/server OO environments!

In this three-tiered approach the middle tier is the object server that connects to a back-end legacy system, and the first tier is the client, a GUI-oriented front end. Such systems are being successfully implemented by companies including JP Morgan, Ford, American Express, and Bird's Eye Walls. To further endorse the approach of a three tier client/server architecture and application partitioning IBM recently carried out a benchmark on a GemStone based system over 30 GB in size and supporting over 1,000 concurrent users. It received sub-second responses. The test demonstrated the unquestionable potential of these architectures.

Gone are the days of buying a tool that says 'objects' on the box and expecting a corporate revolution. To be successful with objects, and to reap the true benefits of reduced costs, increased performance, and code reuse, organisations have to make the investment in cultural and structural change, retraining, and rethinking. The object wall might be difficult to climb, but the pot of gold awaits those who climb it with open eyes, the right tools, and long term vision.

Robert Da Costa began his career 10 years ago as a C and C++ programmer, and now is managing director of hi-tech marketers Communicating IT (with clients including GemStone Systems). He can be reached on (01280) 821400 or email 100416.1521@compuserve.com.

# HTML: open standard or closed shop?

t is hard to remember, but there was a time when HTML worked properly with more than two browsers. No extensions, no enhancements, no little icons proclaiming 'this page best viewed with Netscape Navigator 2.0'. Back in those days, when Web pages were rarely more than text blocks with hyperlinks to other documents with an occasional image tossed in for good measure, you could use any browser, even the Lynx text browser, and get more or less the same results.

Much has been made of HTML as an open standard for the Web, in the same way as Java is being promoted as the programming language of the Web. Multi-platform support – which should mean multi-browser support – was the key to the Web's initial success, and the fuel for its phenomenal growth in the 1990s. On the PC platform alone it wasn't unusual to find people using Mosaic, Cello, or Lynx. Now using anything other than the latest 32-bit all-singing, all-dancing Netscape Navigator or Microsoft Internet Explorer means that, more often than not, you can't get the best out of any Web site.

Some people argue that Netscape's (and more recently, Microsoft's) policy of unilaterally extending the HTML standard is destroying the earlier continuity of the Web. Others are thankful that someone was prepared to short-circuit the lengthy World Wide Web Consortium (W3C) standardisation process and provide Web content providers with what they want: better graphics and layout. Both camps are equally vociferous, but there's no doubt who is winning: Netscape's extensions have been adopted more or less verbatim into HTML 3.2, the latest W3C standard, together with most of the Microsoft extensions that appeared in Internet Explorer 2.0. Microsoft and Netscape are touting their latest browsers as HTML 3.2 compatible right out of the box.

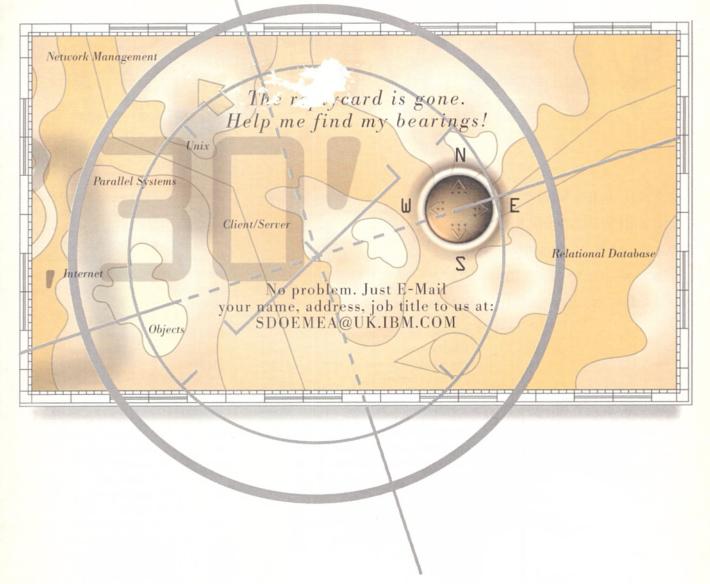
How will this affect the average Web user? In truth, it can probably only benefit those who are already using the latest 32-bit versions of the big duos' browsers. Web pages will be more colourful, graphical, and interactive than ever before. Web page designers will have unprecedented control over the look of their documents, and with tools such as Java and JavaScript, it will be possible to go far beyond what even the HTML 3.2 specification envisages. As for the future, we can expect to see TrueType fonts in Web pages, increasing use of sound and video content, and the emergence of HTML as a richer language more along the lines of PostScript. Web pages would be much more like magazine pages than they ever have been, but with the advantages of animation and interactivity.

### The unholy trinity

The future looks bright indeed, but dangers may lurk in the unholy trinity of the leading browser developers, content providers, and the standards body itself. The HTML standard may become a mere rubber-stamp of approval for the features designed and forced upon the public by the browser developers. As each company vies to come up with newer, better enhancements to try to convert users to their particular browser, the prospect of a new 'format war' like the great VHS/Beta conflict arises. Content providers will dither over which enhancements to support in their pages, while users will sit frustrated, unable to access pages fully with their 'industry standard' browser.

The Web may prove to be the greatest cooperative venture yet seen in computing. For this to happen, it is crucial that the HTML standard remains in the hands of an independent body that can dictate a common denominator and curb the excesses of over-enthusiastic browser developers. The contribution of companies such as Microsoft, IBM, and Netscape to the HTML 3.2 standard is to be welcomed, but I hope that these giants are not intent on bringing their own concept of 'open standards' to this promising new medium that is the Web.

Neil Hewitt



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# Mayhem

Sceptical, Jules May goes along with the concept that the customer is always right, and learns to close the window on convention.

'I don't hold with these new-fangled Windows thingys', he said, emphatic. 'Give me something that works just like the old one, only much better.'

Remarks like this were common five years ago, but are now almost extinct. Few people can really believe the sentiment, and those that do generally have more respect for their future careers than to speak it aloud. But here he was, uttering the unutterable, blaspheming Saint Bill. Alas, there's only one way to cope with an opinionated client like this - humour him.

'OK, show me what you're doing now', I said. He showed me. Over here was the telesales crew, taking orders when the phone rang and typing them into the computer. Over there were the packers, putting stuff into boxes when the computer told them to.

Downstairs was a buyer, who was told about his stock in terms of time remaining. Upstairs was the receiving department, connecting cheques and drafts to their respective accounts. At the pinnacle, on the top floor, was a pretty, coloured screen displaying graph after graph - anything at all, so long as it was rising.

'If there's nothing wrong with what you've got now, why do you want to replace it?', I asked. The question seemed simple enough to me.

'It's too small. My screen upstairs isn't tall enough to show the graphs rising.' (Whoever thought of that trick, I raise my hat to you.) It was fine when it went in', he said. You should see all the paper it replaced.' He showed me all the paper.

Then, light dawned. He was right. These



multi-tasking and documents blocks him up. You see, in his operation each station has one function – exactly one. Via terminals, one big machine shows each user exactly what that user needs to see. His metaphor is transactions: you only do one transaction at once.

While everybody else was being carried away by user interfaces and macro languages and multi-tasking, certain parts of the computer industry continued oblivious. Some machines have very little or no user interface, such as engine management systems, air conditioners, and toasters. Other machines (ubiquitous video recorders and cash dispensers come to mind) have

more complex

interfaces. As I looked at these I started to understand his problem.

Like the warehouse machine these devices have only one function each, but their interfaces permit the user to activate those functions in different ways. At the cash dispenser users formulate one request at a time. In the context of banking those requests are simple and well-understood. The machine offers a simple hierarchical menu which anyone who reads the local language can understand and use.

However, unlike many of my client's abhorred new-fangled Windows thingys, each subfunction of the cash dispenser monopolises its screen. The user is returned to the main menu only when the actual transaction is complete. Additional context is not required because the context is the cash dispenser itself. Far from being a good thing, multi-tasking in a cash dispenser would be a

definite liability – even more dangerous than a human teller who serves two customers concurrently.

The warehouse man has a similar situation. Giving the packer the ability to enter an order would provide no advantage whatsoever. Indeed, it would create a liability. Security questions aside, each and every time he packed an order he would have to make at least one additional gesture to ask for the next. There's no point.

Consider the tele-sales people. Each has two jobs: cold calling and receiving orders. Their quiescent screens could show the list of cold-call targets; by clicking on one they could select a call. Alternatively, the simple and necessary act of picking up the phone could cause the system to dial the next target number automatically. Similarly, the tele-sales crew doesn't

need a button to inform the machine that someone is taking an order. Answering a ringing phone could instantly switch the screen to the appropriate mode.

What happens when a customer is reading numbers down the phone? Using a standard Windows approach, the assistant would have to identify what kind of number is being given

before taking it. In a transaction based system, the number could simply be typed. It would go to its correct location after the computer itself determines what type of number it is. If a customer mistakenly gives a dispatch number instead of an account number, the machine would notice the mistake immediately, recognise the number type, automatically load the associated customer number, and could possibly pre-empt the caller's inquiry by proffering automatically the information sought ('Your package is en route to Birmingham, sir').

Of course popup windows are not useless in such a system. If a customer doesn't know his number, or requires a new one, a gesture at an appropriate point would bring up a dialog box. The important difference is that controls are not receptacles for data, they are the tools used to form the query — in themselves almost minimised subprograms.

Frankly, it struck me that Windows is the ideal tool to create such a system. It has most of what the programmer needs right there. But the client doesn't like it. All he ever sees of Windows is on his secretary's desk: multi-tasking, documents, in general, loads of the very paper he's spent so much money to get rid of. He also sees something else; he sees the programs sitting there, stupidly, having to be told every little thing, in boxes designed expressly for the purpose. Windows claims to have destroyed the tyranny of the computer being in control of the session, but it has gone too far. The user must take complete responsibility. In the case of the tele-sales station, where the user is really the customer, it is the assistant who must take full responsibility.

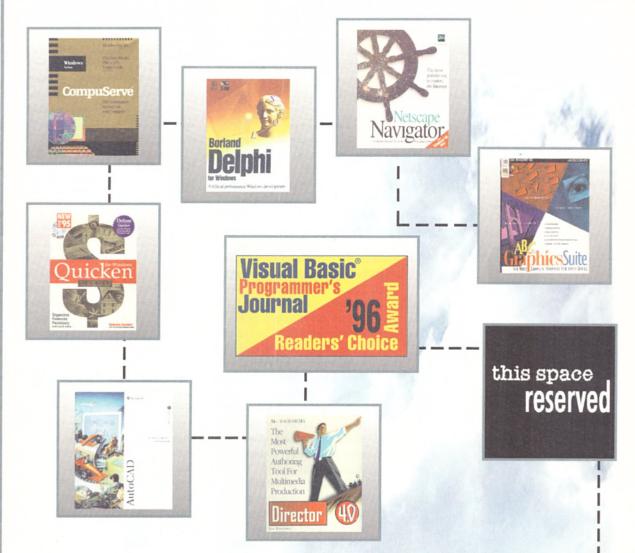
No technical barriers prevent Windows from being more proactive. It's not even difficult to write such programs. Yet we've all been sold the ideas of documents and multitasking so successfully that most of us can't even recognise the occasions when they are undesirable. We have been able to build single-function stations since the release of Windows 2, but few of us ever do.

I blame the applications. Microsoft wanted us to see how applications should be written, so it bundled a whole bunch of them with Windows. If they had sold a 'Windows lite' with no applications at all, not even a program manager, I think we would have noticed sooner – and I wouldn't have to explain to my client why I'm buying a product and throwing away 90% of it.

Jules is a programmer. When he isn't doing that, he sometimes writes database applications for money. He can be contacted on 01707 662698 or on Cix as jules@cix.compulink.co.uk.



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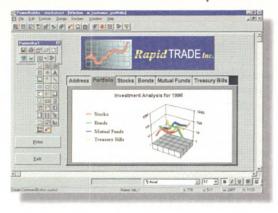


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Phone: (01707) 278300
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# PowerBuilder 5.0 focuses on Internet client/server development

The latest release of Powersoft's PowerBuilder, version 5.0, was previewed in mid-May. It implements a number of features designed to support distributed applications.

Version 5.0 extends the object-oriented base of version 4.0 by adding function overloading and parameterised events. The object browser can be used throughout the design environment. Non-visual PowerBuilder objects can be executed remotely across the Intranet or Internet; Powersoft claims this provides users with 'practical partitioning'.



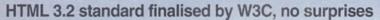
PowerBuilder 5.0 can be used for building n-tier applications.

Performance issues have been addressed by a binary compiler sourced from Watcom – acquired by Powersoft some time ago – which can optionally replace the p-code interpreter of earlier incarnations of the software. Developers will be able to use the new PowerBuilder to build OLE servers as well as Netscape plug-ins. Existing OCXs can be incorporated into PowerBuilder projects, making it easier to carry over pre-existing Visual Basic or even C++ programs to the new system.

An extended selection of native database drivers are included along with improved ODBC support. The DataWindow presentation is provided as an ActiveX control and Netscape plug-in, in addition to a Power-Builder object. This makes it easy to use in a client/server environment with a browser as the client.

PowerBuilder 5.0 is available in three editions priced from £195 to £3,295. Powersoft says these packages will be available from June.

You can reach Powersoft on 01628 597100 URL: http://www.powersoft.com



The World Wide Web Consortium (W3C), the Web standardisation body run by the Computer Science lab at MIT and the French INRIA, has dispelled uncertainty about the current direction of HTML by releasing the 3.2 specification of the language. Adopted in co-operation with major industry players including Microsoft, Netscape, and IBM, HTML 3.2 is an attempt to reconcile the 'official' language with the various extensions created by the major browser developers. The previous standard, HTML 2.0, was written under the direction of the Internet Engineering Task Force (IETF), but was rapidly overtaken by the extensions which some developers, notably Netscape, incorporated into their browsers.

HTML 3.2 contains nothing new or radically different from the current 'state of the art'. It simply sets in stone the features – such as tables, text flow around images, custom colour, and background image support – that Netscape and Microsoft have successfully launched into use throughout the Web. It also endorses previously unofficial tags for incorporating Java applets into Web pages.

W3C says future revisions of HTML will be written in conjunction with the browser developers. This suggests that developers will be free to extend the language as before, then have their extensions incorporated into the HTML standards. This may be unpopular with some who feel developers have too much leeway already, and that it should not be necessary to update your browser every month to view the latest pages. However, with both Microsoft and Netscape providing some (if not all) of their browser software free of charge, this argument seems to be increasingly irrelevant.

For more information on W3C or HTML 3.2, point your browser at http://www.w3.org

# Java to be incorporated into forthcoming operating systems

SunSoft, the software development arm of Sun Microsystems, recently concluded deals to license the Java Virtual Machine (JVM) and Java libraries to Hitachi, IBM, Microsoft, Novell, SGI, SunSoft, SCO, and Tandem Computers for the purpose of building JVM support into their products. The OS developers will expose the JVM directly to applications running on the system, permitting native binary applications to call Java services or execute JVM instructions. Java applets will run under the OS as normal applications.

Opinion is divided between the licencees as to the aim of this venture. Some, including Sun, are suggesting that entire applications could be written in Java, then run without performance hits on multiple platforms. Others see the role of Java as complimentary, with certain parts of applications written in Java, or in more conventional binary code issuing calls to the JVM or Java code on the system. Microsoft is deviating. In a separate statement, the company emphasised that its plan is to enable developers to use ActiveX controls with Java to exploit Windows-specific features and build Windows-only applications. At one stage Microsoft referred to 'Java's cross-platform subset of functionality'. If Microsoft is serious in dismissing so lightly the cross-platform nature of Java then the future may hold a major shift in the new language.

• Contact Sun on 01494 472900 • URL: http://www.sun.com. • Microsoft is on 01734 270001



Infomodeler 2.0 from Asymetrix is a visual client/server development tool based on Object Role Modelling. The new version supports dynamic reverse engineering of databases, and provides tools for tracking revisions and synchronising changes made within the team. Price £399. URL: http://www.asymetrix.com

A new compiler for the Motorola 68HC11 embedded controller from IAR Systems implements several new keywords and nine-levels of size/speed optimisation. The ICC6811 compiler includes macro assembler, linker, and librarian, and is available in DOS and Windows versions. Price POA. Call 0171 924 3334 for details.

NetX:Window 7.1, a remote access tool for AIX servers, has an HTML gateway built-in allowing clients to be ordinary Web browsers on any platform. It can be used for remote access to AIX machines over the Internet. Price POA from S2 Systems International on 0171 562 4200.

Users of UIM/X, the Motif development tool, will welcome release of the Cross Platform Toolset from Visual Edge.
Distributor Protek claims that a new 'novice mode' will make users familiar with the product in record time. The price is £1,750.
Protek: 01628 75959

Cosmic Software has a great IDEA - Integrated Development for Embedded Applications. IDEA is a multi-platform integrated editor, project manager, compiler, linker, and debugger which builds for all major controllers. It runs on Windows 3.x or 95. Call Cosmic on 01734 880241 for pricing.



GLpro enables you to create small multimedia presentations for Windows. The runtime takes only 190 KB. Get it from www.gmedia.net, or call 01734 344666. Registration costs £299 for one licence.

OrbixWeb is a CORBA implementation written in Java from IONA Technologies. Its developers hope that it will enable true OO client/server interaction over the Web. Better still, it can be licensed free of charge. Call IONA on 00 353 1 6625255 for details.

Windows 95 users can now get a 32-bit version of the Alpha Five database from Alpha Software. Alpha Five 2.0 features a revamped interface. A developer's edition with an XBasic programming module will be available later in the year. The 'home & business' version costs £59.95. Call Guildsoft on 01752 897100

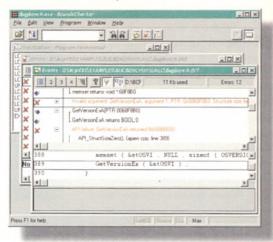
DataViews Corporation has announced DV-Centro 1.2, a tool for building graphical programming languages. Unlike 'visual' languages, these graphical languages rely solely on graphical interaction with symbols and diagrams to build applications. Prices from \$15,000. Get more info on 00 1 413 586 4144

3D Studio Max, the popular 3D animation software, is now available for Windows NT. It uses Heidi, a software graphics accelerator from UK distributors Autodesk, for what its developers, Kinetix, claim is 'full workstation-class performance' at £2695.
Autodesk: 01483 303322

# BoundsChecker 4.0 supports ActiveX and Delphi 2.0

Bounds Checker, the bug-tracking tool from NuMega Technologies, has been updated to include support for Microsoft's ActiveX, and should be shipping now.

BoundsChecker 4.0 can be integrated into Microsoft Developer Studio, the crosspackage IDE for Microsoft development tools. When used with Visual C++ 4.x, the software adds its functions onto the menus and toolbars of the Developer Studio, hooks into the standard debugging routines, and works transparently behind the scenes to enhance ordinary debugging capabilities. NuMega's Senior VP for Marketing, David Holroyd, said that Bounds Checker 4.0 is now capable of trapping calls to the common Windows add-on APIs



such as WinSock, URLMON, and HLINK, plus the entire Win32 API.

Outside the Developer Studio environment BoundsChecker 4.0 can be used with other C++ compilers including Borland C++ 5.0, Watcom C++ 10.5, and Symantec C++ 7.0. This version features support for Borland's 32-bit Delphi 2.0, a departure for a product that previously worked only with C/C++ systems. Holroyd said that this was the first step in a programme to make BoundsChecker work with as many languages and development systems as possible. Java support may appear next.

Also from NuMega is a new version of the SoftICE debugging tool for Windows NT. SoftICE is unique in its ability to do kernel-mode debugging on the system it is running on, with which developers can debug system-level services and modules, including device drivers and even the NT code itself, on the same machine their software is running on. By loading itself as a boot device driver SoftICE can gain access to the whole NT system and make the necessary links while the OS is loading. Both Win32 and Win16 applications can be debugged, as well as DOS applications.

NuMega is on 001 603 889 2386 Fax 001 603 889 1135

# Comdex UK '96 gets off to a slow start but finishes well

Comdex is the biggest and most popular IT event in the United States, with hundreds of thousands of visitors to several annual shows. This year the show came to the UK for the first time.

Attendance on the first day of the show was disappointing. The exhibition hall, in the small building at Earls Court, was virtually deserted for most of the day. However on the second day the numbers increased significantly, and by day three the show was almost crowded.

The exhibition catered to hardware developers and other professionals, particularly those in buying and marketing; many attendees commented on the dearth of major software companies. Incontext was there showing the latest version of Spider, its Web editing tool, and WebAnalyser, a new product for mapping and exploring Web sites graphically. Microsoft, IBM, Lotus, and Borland all stayed away.

A number of new hardware products were announced at the show. Motorola showed its PowerPC-based PowerStack systems running Windows NT 4.0, and Pioneer launched what it claims to be the world's first 10-speed CD-ROM drive.

# For developers only: Comdex II

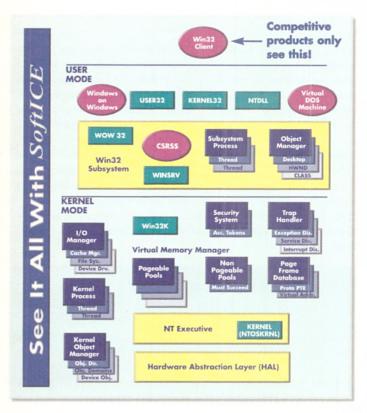
Of particular interest to developers at the Comdex UK were the seven sessions of the Software Development conference, which this year was sponsored and chaired by *EXE*. Mark Quirk, product marketing manager from Microsoft, and Onno Kluyt, technical evangelist from Apple, got together on the same stage to debate the relative merits of OLE and OpenDoc. Kluyt executed a particularly impressive demonstration of CyberDog, Apple's OpenDoc-based Internet technology, running over a live ISDN link. David Shickle, Netscape's Northern European technical manager, and Guy Martin, Borland's senior product marketing manager (and a mean programmer himself) debated with the audience and *EXE* staff on the future of the Internet, Java, and the Netscape browser. Martin gave conference attendees the UK's first brief peek of an early alpha of Borland's new Java development environment, Latté. Based on the Delphi interface but with some significant enhancements, Latté promises to make Java development just as easy, and will feature Borland's Just-In-Time (JIT) compiler.

Another product shown to the UK general public for the first was the Windows NT 4.0 beta, which Mark Quirk used, together with Visual C++ 4.1, to build an OLE component from scratch live on stage. In other sessions, Martin Gudgin from QA Training showed how to build shell extensions for Windows 95, Stuart Frost, Managing Director of Select Software, gave a presentation on OO design techniques, and *EXE* columnist Francis Glassborow, with QA Training's Kevlin Henney, gave a talk on C++ techniques.



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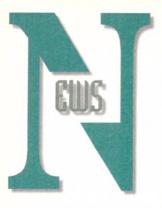
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For those who really do program in PostScript, Quite Software has PSAlter, a PostScript debugger, viewer, and converter. The product is available for Windows 3.x and 95/NT, for £200. Call 0181 257 1044

Interactive Software Engineering is at it again. This time it has BONCase for Windows NT/95, OS/2, and Unix. It's an OOAD and Object Notation. Price \$395. ISE: 001 805 685 1006

Helping Hand for Delphi 1.0 & 2.0 is a help file development tool with a difference. Following on from the Visual Basic version the help file source is stored within the Delphi source itself, and extracted later into a help file. Price: £149.95. For either version call 01926 850909

INTRAnet Jazz is a gateway which lets 32-bit WinSock 1.1 applications work over Netware networks and permits Intranets. You don't need to 01260 296200

# vCard 2.0 specification released with serious support

The second version of vCard, the electronic business information data structure proposed by Versit, has the support of a number of leaders companies in the computing and communications fields. Versit - set up as a joint venture by IBM, Siemens, Lucent Technologies (formerly AT&T), and Apple (which is no longer involved) - has proposed a number of Computer/Telephony Integration (CTI) standards including Encyclopaedia, a definition for a single cross-platform API for all CTI applications.

vCard is the other major standard which Versit is developing. The plan is to have a single standard for recording and



transmitting personal information over all electronic media. With vCard desktop computers, laptops, PDAs, 'wallet PCs', even digital watches and electronic organisers could communicate these personal details to each other using the Internet, local networks, radio frequency, or infra-red links. vCard details could be attached to electronic mail messages or Web pages. Simultaneous voice/data transmission, telephones could be programmed to send vCard data on demand to a computer (or another phone) at the other end. PIMs, contact managers, Internet applications, and databases could use the common format to work collectively on the same information.

Versit is trying hard to convince developers that adopting the vCard specification will make their lives easier and, more importantly, sell their applications. Judging by the industry support for this release, which unsurprisingly includes Apple and IBM, as well as Netscape, a number of telecommunications companies, and PIMs vendors (including Starfish of Sidekick fame), they are succeeding.

Developers can obtain a free SDK CD from Versit which contains full documentation and an entire source-code implementation of vCard in C++ to run under Windows 95 and OS/2 Warp.

URL: www.versit.com

▶ e-mail: info@versit.com

# ActiveX templates make Internet development easier

rollowing the success of Microsoft Foundation Classes (MFC), the operating system giant is providing another software framework to isolate developers from the complexities of building Windows components: Active Controls. Known generically as ActiveX, the software is based on the new C++ feature, templates. Unlike heavyweight MFC, ActiveX does not require a large dynamic link library to run.

The ActiveX Template Library (ATL) is a collection of lightweight function templates for implementing COM objects of minimal size. Because template functions do not need to know the data types with which they will be used until run-time, ActiveX can use the same generic functions to handle all OLE interface types and built-in or user-defined data types.

The aim is to produce small and fast COM objects which can be used in Internet applications. These controls should be downloadable in the same timescale as Java applets, and could enhance applications in the same way. The disadvantage may be that as binaries rather than byte-code these controls would not be portable between platforms without re-compilation, and then only on Microsoft operating systems.

Some suggest ActiveX controls could be written in Java; the language itself is destined to become part of future versions of Windows. The two technologies will certainly have to interoperate, and the new Library is a step closer to the vision of having the Internet integrated into all Microsoft products,

ATL is available to developers free of charge from the Microsoft WWW site.

http://www.microsoft.com/devonly | Call Microsoft on 01734 270001

# Eiffel gets interoperability with C++

The Eiffel language is well respected as a pure object-oriented development tool, and for being the only ■ such language with a published, non-proprietary language specification. In spite of this, it is not widely used within the commercial software development industry.

In an effort to boost the Eiffel market, Interactive Software Engineering (ISE) has engineered a set of interoperability tools for Eiffel which allow developers to reuse their existing C++ code and classes in Eiffel projects. Included in the package are an encapsulation tool to generate Eiffel code which wraps an entire C++ class in such a way that Eiffel objects can inherit from it; special extensions to the standard Eiffel external keyword to permit C++ preprocessor directives and macros to be used; support for calling C++ class constructors and destructors within Eiffel, and for dealing with scope problems; and methods for calling C++ functions from Eiffel and Eiffel objects from C++.

DISE: 001 805 685 1006

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# The C++ and JAVA Worlds go Visual



JFactory is the Visual Builder for JAVA. It enables developers to quickly create Java applications by dragging-and-dropping typical controls such as buttons, list boxes and menus. JFactory provides a single design environment to manage all aspects of user-interface development and includes a Project Manager, design windows, property sheets, a palette of drag-and-drop controls as well as providing the ability to test an application's interface, generate code, compile, and run the application.

# ReportClasses 4.0

A New C++ Class Library from ESKA Software, ReportClasses speeds up the creation and maintenance of reports for C++ developers. It divides the two tasks of sourcing the report data and designing the layout of the report so that developers and users can each focus on their own part of the report. The ReportData-Editor allows developers to produce multiple views of the data source(s), from which the user can then create their own layouts with the easy-to-use Report Designer. Both the report structure and layout are implemented as C++ objects providing portability among data sources, GUIs, compilers and operating systems.



The Visual Builder for Cross-Platform C++ development. zApp Developer's suite is a toolkit combining the zApp Application Framework, Interface Pack, Factory, and Help system to provide single-source cross-platform portability. Visual programming with zApp makes it possible to quickly build and test different designes and then generate fully commented C++ code.



"We add class to MFC!" ™

New versions of Stingray Software's MFC extensions C++ class libraries bring more enhancements to MFC. SEC++ 1.1 increases library to over 40 classes and Objective Grid 1.1 adds DAO and UNICODE/MBCS support.

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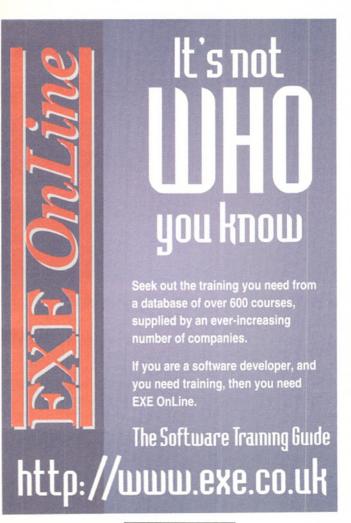
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Mike Cowlishaw, inventor of the Rexx language, is working on NetRexx. It is a 'dialect of Rexx which retains the portability and efficiency of Java, while being as easy to learn and to use as Rexx'. NetRexx programs are translated in Java. More at http://www2.hursley.ibm. com/netrexx/

The development of Virtual Pascal for OS/2 started three years ago in Ukraine and was mostly developed on one 486 PC running OS/2 2.0 and shared by 10 programmers! It has been written purely in 32claimed to compile about 300,000 lines of Pascal code per minute! VP/2 1.0 supports all of the Borland Pascal language extensions as well as the ones from Delphi. The visual part of VCL is planned on 0181 563 2359 or browse http://www.fprint.co.uk/ vpascal.

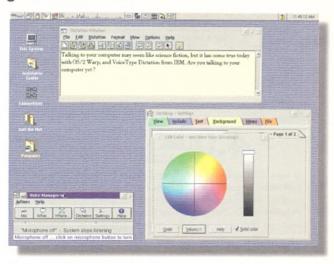
Coming this summer:

Domino, a Web Advanced
Development Environment
integrating the Notes server
with an HTTP server providing
real-time Notes access via the
Web (it will support ActiveX
and Java, and the Notes API
will be accessible via a URL
syntax). Bart, VisualAge Basic
for NT and OS/2. VA Basic and
LotusScript will be merged.

Coming in the second half of '96: VisualAge Java. VA C++ will integrate Taligent's support of OLE on OpenDoc. The Visual Age family will support OS/2, Windows 3.x/95/NT, Unix (AIX, HP, Solaris), OS/400 and MVS.

# A Merlin spotted during the conference

Tany rumours circulate in the software industry. Two recent ones were about operating systems: the death of Windows 95 and a similar fate for OS/2. Microsoft - relatively unconvincingly - dispelled the first. During the Technical Interchange, IBM presented Merlin (as the next version of OS/2 is codenamed) as the guaranteed large scale success OS/2 has been looking for. Very few ever criticised the technical quality of OS/2. The problem was more with IBM's marketing effort. Mer-



lin is breaking with tradition: IBM has designed nice 3D icons with dropped shadows (three of these can be seen on the screen capture, one of the few released by IBM so far), a new background, and fonts that are supposed to be very readable on both CRT screens and laptop LCDs. The shell sports a seamless integration with the Internet, and URLs (whether for FTP or Web access) can be placed on the desktop or in any folder. Lotus SmartCenter has been incorporated (spot the top of the screen). OpenDoc and Java will also be in the base operating system.

The major novelty of Merlin is speech recognition. For it to work, it does need a powerful PC, like a Pentium, but no hardware other than a SoundBlaster 16 compatible sound card. The build that was shown was number 12, the first one to integrate the voice dictation feature. The demonstration worked! Navigation in the workplace shell and the WebExplorer can be done directly by voice commands like saying 'go to Yahoo'; in applications speech control can be used to go through the menus. The standard dictionary contains 10,000 words, there will be an option to upgrade it to 22,000 words. If you want to adapt your application for direct manipulation by voice you won't need to wait for the specific SDK as the API will be compatible with IBM's current Voice Type Dictation product.

Is speech recognition just a gimmick for computer-phobic users? Not according to IBM. Jeff Dean, Merlin Project Lead, finds that he uses the mouse for graphics interaction, the keyboard for text, and speech for when 'I know what I want to say' and for all Internet control.

The wide beta should be available sometimes in June and the final product is expected to ship during the second half of '96.

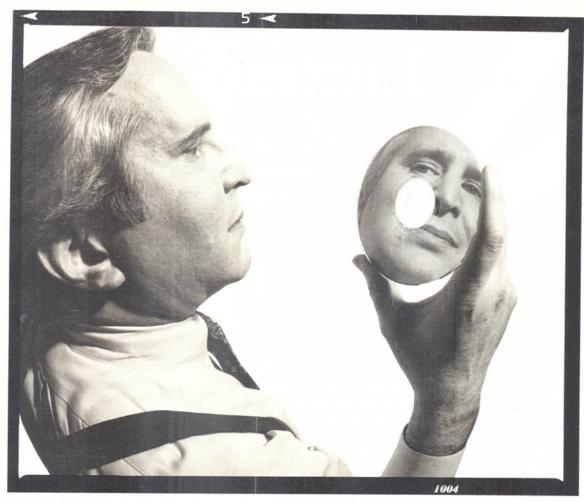
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# An elephant awakens in Nashville

IBM staged its annual Technical Interchange in Nashville, Tennessee in April. During his introduction Gian Carlo Bisone, the new General Manager of Software Marketing for the IBM Software Group, said of his company 'IBM might be a sleeping elephant, but beware of a stomping elephant'. He defined his strategy with the catch-phrase 'less is more!' hinting that IBM will focus on products that are 'cross-platform, innovative, reliable, responsive, easy to use, and accessible'. Everything else should be considered a dead branch. He clarified these statements by explaining that IBM is not interested in niche markets and that 'one million copies is a niche market'. Hence OS/2 for the PowerPC architecture quietly disappears. OS/2, AIX, and NT are the three operating systems IBM will focus on.

# Sometimes DAPI, sometimes DAX, sometime to support MFC?

The Developer's API Extensions – sometimes called DAPI, sometimes DAX – are a set of APIs intended to ease the life of the developer wanting to write an application for both Windows and OS/2. The latest revision covers a little over 700 calls and is compatible with Win32 v1.25A. It doesn't yet support the MFC. Art Olbert, Director of Product Planning for PSP, has said that DAPI will never support the MFC. Jeff Dean, Merlin Project Lead, was not as clear cut, and explained that no decision has been made. He gave the feeling that it was improbable. Wally Casey, Vice President Personal Software Products, was more positive, saying that IBM is looking into it, and that it was a very definite possibility. Not content with all this spectrum of answers, EXE asked Skip McGaughey, Market Manager VisualAge Family. He said we should believe Casey's answer. Some internal communication might still be needed inside IBM, even though all the OS/2 teams have moved to the same location in Austin, Texas.



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Letters

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Your letter will be considered for inclusion unless it is marked 'not for publication'.

# **Playing at God**

Dear Sir,

What is all this \*\*\*\*\* about consciousness? None of the authors (or those they quote) can take one meaningful step in the direction of producing a vaguely adequate definition of consciousness (I know, I have read all the books). In light of this how can mathematical, psychological, or even philosophical theory have any relevance to the issue?

Let's be clear. I know I am conscious (a statement more of existence than faith, but acceptably untestable). I find it convenient to assume that you and other people are conscious because that way, I can make intelligent guesses about how you will behave. It also suits me to apply the concept to some animals for the same reason. By extension, I could choose to apply the concept to computers if I want to. The point is, it is up to me.

We don't know what consciousness is. We use the word in the same way we use words like love, democracy, and intelligence. They help us to carry out our lives, without needing to define them 'objectively' (which is inherently impossible because they are 'subjective' terms). The act of attempting a definition usually gets into trouble - like discussing absurd concepts such as the relationship between consciousness and noncomputability. (Jules: on the subject of 'idle musings, fashionable theory, and persuasion', there is nothing sacred about falsifiability - it is not 'the single measure of validity of a theory', it is just a measure applied by falsificationists. Dare I suggest you are betraying a 'religious persuasion'?)

We have an 'everyday' understanding of what consciousness is, and we should not destroy this useful human concept by pointless intellectual anthropomorphism. Can we stop playing at philosopher, stop playing at God, and get back to the point ... er ... what was it again?

Rob Macdonald rob@isa.co.uk

I'm sure, as a conscious entity, you would wish to have normal human rights extended to you. Because you see it as convenient to assume that I, like you, am conscious, you presumably would have these rights extended to me. When we talk about animals, those that also have a consciousness of sorts, rights are extended to them on similar grounds. That was the point.

I agree that few authors have injected even one iota of rigour into their scientific arguments, but the social arguments (which underpin legislation) need something to work with. Those arguments may, in the near or distant future, have to be broadened to include machinery. A lack of mathematical rigour is not a reason to suspend all thought or musing on the matter. On that note, if philosophical or psychological theorising can have no relevance to the matter, what on earth could?

A theory which says 'Had I sat on my chair last week it would have wobbled' is worthless, because it is neither falsifiable nor predictive. It's not a theory at all – it's either an observation or a fiction. On the other hand, a theory which

says 'All chairs with a certain property will wobble' and 'since my chair has that property it would have wobbled' is easily falsifiable (provided the properties are testable), and is consequently predictive. What other measure of validity could you have?

You suggest that I'm displaying a religious persuasion, but you're wrong. My belief in falsifiability is the consequence of a great deal of thought, analysis, and honing through use. Very little of that thought was mine – it has been the result of 2000 years of intense reflection and debate. Yours is the first whiff of dissent since the decline of creationism.

Jules May

# A bone of contention

Dear Sir,

A number of us here read your magazine every month from cover to cover. We find it very interesting and useful.

One of the first articles I read each month is Francis Glassborow's column. Generally this is interesting and thought provoking, but I find it hard to read. The problem is his attitude to ordinary programmers – he seems to despise them. I quote from April 1996:

'Many programmers have problems...'

'...you are all getting what you deserve'

"...one of the majority of programmers who do not know..."

Every month there are many similar statements. Surely this is not the best way

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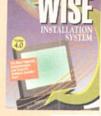
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to communicate with your readers, given that they are mostly ordinary programmers.

Here is a suggestion for his column. How about discussing the benefits and pitfalls of C++ exception handling?

> John Mears Software Development Manager Research Instruments Division Oxford Instruments Ltd

I am glad John and his colleagues read *EXE*, and that he reads my column despite his distaste for my style. However, he is finding meanings there that I haven't intended.

In my experience - many hours in the training room, cries for help by telephone, email and post, reviewing books, providing pre-publication technical reviews, etc - many programmers do have difficulty moving to a new language. I am not despising them, though I do get angry with academic authors who have clearly not done their research. I do despise journalists who fail to correct their mistakes, but fortunately they do not get invited to write for EXE. How are 'ordinary' programmers, who must deliver product to a deadline, expected to cope when so much uncorrected garbage is published in the guise of authoritative information?

The second quote is out of context. It was addressed to corporate employers, many of whom treat their programmers disgracefully by providing inadequate tools, training, and support, yet they always demand unattainable deadlines. The individual programmer is powerless against managers with the 'never mind the quality, feel the width' attitude. Ironically, if you fail to meet a deadline because of a bug in the compiler that your employer insists you use, it some-

how becomes your fault. Most programmers I have encountered do not write compare functions correctly for use by qsort(). Those that do are found in clusters, because the one that knows how has passed the knowledge on to those around her. Again, this is not a symptom of my attitude to programmers. The blame lies

agers who refuse to provide training opportunities.

Far too many programmers think they know all they need to know. Readers of EXE Magazine are clearly wiser. However, only a very small percentage of programmers in the UK even read

firmly on poor teachers, and on man-

EXE, let alone buy their own copy. Finally, by an odd coincidence, I have just finished drafting a column on a use for exceptions [see page 41 - Ed].

Francis Glassborow

## EXE then and now

Dear Sir.

I shall not be renewing my subscription to *EXE*, which expires shortly, because I am no longer directly involved with software development, and hence the magazine has become increasingly superfluous to my needs.

This is despite your kind publication of a letter of mine [Search engine, Letters, March '96 EXE]. In response to the editor's reply, the following is my summary of the difference between EXE then and now.

When I subscribed about eight years ago the difficult central part of a software program was considerably shorter. Hence this could be fully described in a magazine article, and a machine code or short C program was sufficient to completely describe a problem area. It could be then experimented with. However, development environments expanded and multiplied. Inevitably, many articles are of no interest to certain individuals since they refer to non-relevant systems, and what was once possible in two magazine pages may now require several feet of manuals!

This reflects the general development of the industry, but I preferred the original hacker's mentality where coding involved modifying instruction codes directly via the front panel key switches of a PDP-11. It may not have been as productive, but it was more fun. At least you didn't have to worry about obscure (and not so obscure!) operating and compiler faults.

I hope that *EXE* continues to flourish, even minus one subscriber.

Robert Allan Surrey

# Technically challenged

Dear Sir,

Just think of it. Many highly qualified professionals – surgeons with your life in their hands, doctors, lawyers, pilots – are classed as Dummies and Idiots. Imagine not knowing that double-clicking left mouse buttons is intuitive, not understanding minute hieroglyphs without tooltips on, or being unable to setup TCP addresses and firewalls.

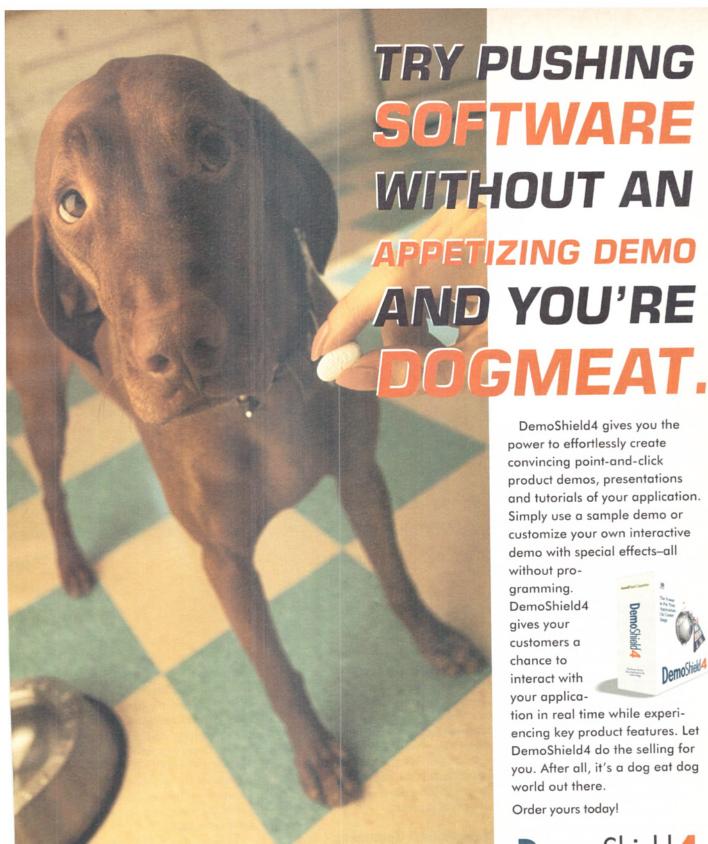
When I first started working in IT (when it was DP) numerous articles were written on the obscure terminology that made the computer industry seem more like a priesthood. Mystical rites and obscure incantations were needed to gain access to the all-powerful and all-mighty Big-Blue.

I had hoped that with the advent of cheaper PCs and more computer literacy, things would have changed for the better. I am therefore disappointed and disgusted that publishers perpetuate the outrageous myth that computers require Mensa level IQ's and are difficult to use. I think all the books with titles which include Idiot, Dummy, or any other derogatory term should be burned. What is most annoying is that from the reviews I have read, many of the books are well written and deal with their subjects clearly and intelligently. Why do they have to insult the reader? Are all PC developers and users who cannot tell a rip-saw from a crosscut, flaps from ailerons, or ventricle from atrium, equally idiotic or stupid?

Computers are spreading into all aspects of our lives, and will one day be as easy to use as telephones and video-recorders. Can we not then accept that, although there will obviously be a different levels of usage between operating system programmers and casual users, this is not a scale of intelligence?

I will never buy or recommend such books. Too many people are frightened of computers for no good reason. The crass, commercial, egotistical stupidity on the part of authors and publishers in playing with alliteration is a counter-productive tasteless joke gone wrong.

Michael Cowles Crowthorne Email address supplied



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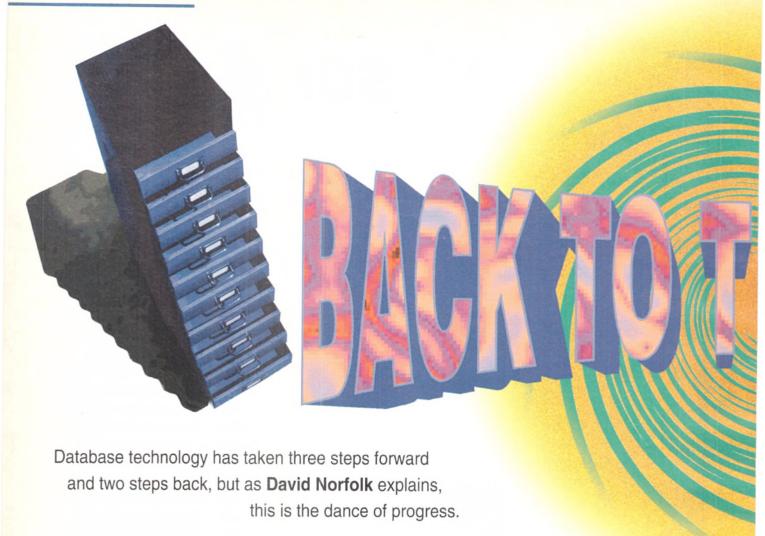
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echnology usually follows a highly Darwinian process of evolution, with faster, more flexible, and more useful applications eclipsing their ancestors and surviving only until something better comes along. At first glance database technology appears to be evolving in this way. Relational databases have replaced older navigational designs, and fashionable object databases have arrived and are beginning to nudge relational databases down the line.

However, I don't see this as a simple example of natural selection. In many ways, the latest object databases appear to be shifting us backwards to a place we were before relational databases thrust us into the realm of mathematics and set-theory. As a result, the optimal choice of database in the new world of object technology is far from obvious. Selecting an option because the manufacturer has managed to get the word 'object' into its product name is not enough.

Today databases are fundamental to the operation of most critical business systems. Underlying each is a database management system (DBMS), the application that makes it a 'real' database. A DBMS looks after data storage, integrity, security, and other funda-

mentals. Without it, a simple piece of application code which goes GET WIDGETS WHERE COLOUR=BLUE IF NOT-FOUND THEN... (OR GET NEXT WIDGET IN STORE ON BOTTOM SHELF; IF COLOUR = BLUE THEN... for a navigational database) would require an additional mass of application logic to deal with logging changes in case of hardware failure, transaction processing to ensure a set of related updates are either all applied or all rejected, password protection of confidential data, and all the other procedures which are necessary to maintain the integrity of the data.

# Navigational databases

Many original DBMSs use pointers to maintain an efficient physical hierarchy that matches the expected pattern of processing. IBM's famous (infamous?) IMS mainframe database is typical. It is optimised for very fast processing of large amounts of data, with disk I/O – which is slow – kept to an absolute minimum. A throng of IMS databases have been optimised for different uses. Some, for instance, use indexes instead of pointers, but a typical example used for processing random on-line transactions looks like the one shown in Figure 1.

The data is divided into independent entities (such as 'customer'), attributes, and dependent entities (such as 'customer name', 'address' and 'account balances'). Since it doesn't encapsulate a behaviour, the customer entity with its hierarchy of dependants isn't an object. Still, it should map quite neatly into an object technology system that uses, for example, IMS DBOB-JECT technology.

To access a particular customer in IMS, the customer number is passed to a routine which converts it to a number M between 1 and N, where there are N physical blocks in the database. This is known as hashing, since calculations are much faster than reading an index. You then go to block M, read all of it (typically four KB) into memory, and read the customer parent segment. Some data, such as name and customer number, will be in the root. The program will follow or 'navigate' pointers to optional data or repeating groups in additional segments in the same block.



The

physical

structure of the

database is specialised for par-

ticular applications, since an ad-hoc query on, for example, the total value of negative

account balances in Guildford would be inef-

ficient. Such a query could not go straight to

account segments, but would have to read

the whole database, customer by customer.

The net result is that access to all the infor-

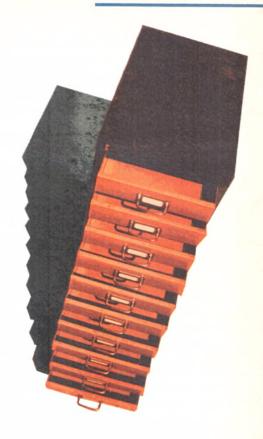
mation about a customer is very fast and

involves, at most, one I/O, and could require

simplified explanation are, in summary,

The essentials of this admittedly over-

even fewer if you have database buffers.



to handle tremendous amounts of data efficiently. The Canadian National Railway Company runs over 500,000 terminal transactions each day against an IMS database.

However, such operations require a skilled (read expensive) Database Administration (DBA) team to design databases that match the application access profile and successfully keep most of the child segments in the same block as their parent.

However, even the best DBA couldn't design a navigational database that is adequately efficient for all possible ad-hoc accesses as well as for concurrent, specific, high-volume updates. As clients requested minimum 'time to market' and maximum 'flexibility' - like the futures trader who wants a system tomorrow to exploit some loophole in the regulations which would be closed next month - old-fashioned 'navigational' databases like IMS were deemed too unwieldy. Application designs that follow pointers are dependent on physical database designs, so database changes cause unreasonable application maintenance overheads. Business changes kept DBAs working all night and every weekend to reorganise databases. Been there, done that, didn't enjoy it.

that all the data associated with an entity tends to be physically clustered in one place; that applications have to know and navigate the physical structure of the database; and that the close match of the physical storage

of the data with specific applications can make access very fast indeed.

IMS, which also provides sophisticated ways to address the shortcomings of this simple view, is still used by some businesses

# Out with the old

To overcome this, many recent databases are based on the more flexible relational database model. In such systems changes to the database, within reason, don't affect applications, and vice versa. Unfortunately, the term 'relational database' has been hijacked by the marketroids, especially in the world of dBASE and other PC databases. The term does not mean that you can have several files open at once, or even that records in one file can be linked to another. If it did, all serious databases, including IMS, would be relational.

'Relation' is the mathematical term for a table. It is applied to this group of DBMSs because a true relational database is based on mathematical set theory. The technique was first brought to bear on the problem of data management by Dr E. F. Codd at the San Jose Research Laboratory in 1968, and subsequently published in a seminal paper A Relational Model of Data for Large Shared Data Banks (Communications of the ACM, Volume 13, No 6, June 1970). Codd placed DBMS design on a firm mathematical footing for the first time. Earlier designs (and, I suspect, some PC database designs today) lacked this grounding.

To explore relational theory further, I recommend An Introduction To Database Systems by Chris Date, Addison Wesley, ISBN 0-201-82458-2. The volume is fairly heavy to be described as 'an introduction', but it does stop just short of mathematics.

In practice, few databases conform to relational theory precisely. This may increase their apparent functionality, but it also compromises 'data independence'. Programs are locked in, to a greater or lesser extent, to a particular database design,

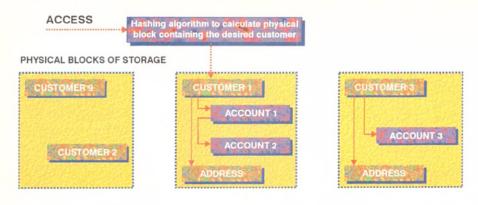


Figure 1 - Navigational database: a good fit to the code and to the physical storage

DBMS design, or vendor. With a true relational database, moving between vendors would be trivial – which is perhaps why we don't have them. Typical of relational-based database products are IBM's DB2, Oracle, and Computer Associates' Ingres.

# Relational databases

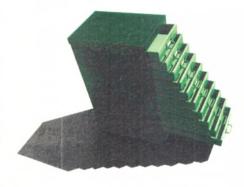
A true relational system is very simple and has two main characteristics:

- The data is perceived by the user as tables and nothing but tables. No other structures – no hierarchical trees or even ordering – are available to the user. However, the underlying physical structure can be crammed with efficiencies and hierarchies.
- All operations available to a user result in tables. A data item cannot be retrieved on its own. Instead, a set of rows and columns (which might, of course, contain only one row and one column) can be retrieved. Users certainly can't retrieve items sequentially, although rows can be sorted afterwards with an ORDER BY clause.

Such systems offer many practical advantages. Integrity is managed automatically by the relational DBMS (RDBMS). Coding is simple; SQL, which is an approximation to a relational query language and is the standard for relational database retrieval, needs only about 14 commands. Finally, the program is independent of the data. Only the desired rows and columns need to be specified, and it makes no difference to the program if new columns or tables are added. This is illustrated in Figure 2.

The performance of such systems is often criticised. Bad database designs or poorly constructed queries often let the user pull data out of every table in the system, which returns a set with thousands of rows for processing on the client PC. This action often kills both server and network performance.

However, it is the job of a good optimising RDBMS and properly user-friendly frontend to deal with these issues. Too often RDBMS designers think that the underlying physical storage of the data must mirror the logical table view presented to the user, and therefore tend to skimp on the front end.



For most purposes relational-based databases such as DB2 and Oracle are now fast enough to replace their navigational predecessors in enterprise-wide business systems. However, with the rise of rich multimedia and online document- and object-based systems, a more fundamental problem is emerging. Relational databases don't handle unstructured information very well. Most now include a BLOB (Binary Large Object) data type, which can hold data such as pictures, programs, and magazine articles, but pattern matching or full-text retrieval within BLOBs doesn't fit very well with simple relational queries.

A philosophical question pertaining to RDBMSs also arises. Assume CUSTOMER and ACCOUNT information are always retrieved together, as a natural hierarchy. Why bother to disaggregate the pair into tables, only to re-aggregate it into a hierarchy upon retrieval? If ACCOUNT is never visited as an entity in itself, why bother providing the flexibility to do so?

The solution is obvious – at least to the sort of people you find in marketing departments. If you're now working with objects (and who isn't?) just throw away your old relational database and buy a new one, the kind that stores whole objects directly until they are needed again. Clearly this idea is unique to people that have never tried moving large amounts of data from one DBMS to another, while 'just' rewriting all the applications along the way.

Yet, object oriented DBMSs (OODBMS) have some real advantages, especially if you're starting from scratch using object technology. As Mary Hope pointed out in *The rewards of persistence*, (EXE, February 1996), an OODBMS can integrate rather smoothly with OO programming.

# Back to the future

It seems OODBMSs are most often selected as a way to return to pre-relational ways while avoiding the pain of feeling unfashionable. Unlike RDBMSs, which split customer databases into separate tables that don't match the usual vision of the world, OODBMSs allow a more realistic representation. The Customer object and its state are permanent. The system (conceptually) dumps all Customer information in one place, including photographs, the file of complaints she sends in, and even code which describes her behaviour. The OODBMS does this with he same intuition as you'd use to stick all that stuff into a filing cabinet - or a navigational database - and without the hassle of mapping it into tables.



CUST-ID-1	ACCTUDA
CUS1-ID-1	
CUST-ID-1	ACCT-ID-2
	Condition to the
CUST-ID-1	ACCT-ID-3

ACCT-ID-1	BALANCE
Control of the Contro	ALC: NO SECURITY OF
ACCT-ID-1	BALANCE
Control of the Control	Street Street
ACCT-ID-1	BALANCE
The second second	Sea Sales

 $Figure\ 2\ - Relational\ database\ tables: flexible,\ because\ tables\ can\ be\ joined\ to\ suit\ any$   $query,\ but\ not\ always\ very\ intuitive.$ 

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# FEATURES

This should make programming easier and processing faster, but the advantage is limited by the 'no free lunch' rule. An OODBMS should be lovely on small systems with few users and a well-defined working pattern, especially since it integrates directly with C++ code, avoiding clumsy query languages which tend to get in the way. But as system capacity is scaled up, the exclusive use of OODBMSs for OO programming becomes somewhat less obvious. As with the old navigational databases, design can be critical. A project leader who told us an OODBMS was essential to real-time revaluations in a financial dealing system (proving an OODBMS does have a place) also volunteered that 'We discovered (to our cost) that an object database is worse than a relational one when no thought is put into the design, or when one attempts to use it as a relational database'.

Are we getting back to the situation we had in the days of navigational databases, when a particular design supported a specific set of data access profiles, and we learnt not to try the others? It seems that, in their essentials, object databases perform by clustering data, allowing related objects to be brought into memory efficiently (see Figure 3). It is this that may make OODBMS-based designs critically sensitive to object partitioning and optimisation for particular patterns of processing. Similar concerns apply to an RDBMS, but its mathematically-based rules tend to keep the table structure inherently neutral, unlike the real-world view of object partitioning, and optimisation is at least partially automated and independent of application design.

This isn't to say that OODBMSs aren't very useful, even in some very large and business-critical systems. Objectivity/DB is being used by Motorola for the satellite con-

# Web Sites for further information

IMS DBObject: http://www.software.ibm.com/data/ims/dbobjext.html

IONA ORB: http://www.iona.com

Object Database Management Group: http://www.odmg.org

Objectivity DB: http://www.objectivity.com

ObjectStore: http://www.odi.com

OMG and CORBA: http://www.omg.org

UniSQL: http://www.unisql.com



trol database of the Iridium global cellular network. Objectstore is being used by the financial securities house Nomura Research Institute Europe to cache real time changes in financial trading systems. Object databases are being used to manage Web sites. They are well suited to these applications, because they are designed to store a rich range of multimedia objects. However, Geoff

Doubleday, Managing Director of Information Systems at Nomura, is still storing his permanent back-office data in relational databases so he can keep his dealing stations updated in real time. He relies on an object database as a cache. As he said at the *Objects in Business Conference* in March '96, 'we are not yet convinced of the reliability and performance of object database technology' for general database applications, although the OODBMS vendors are certainly working hard at addressing this.

In an effort to widen their applicability, object databases are borrowing features like transaction processing and security management from established RDBMS products. Of course, RDBMS databases are madly trying to incorporate support for the storage of rich multimedia objects on their side. One possible future sees both technologies evolving into a hybrid DBMS that adopts the features of both RDBMSs and OODBMSs. This process has begun with the UniSQL database, which has been designed from scratch as a hybrid DBMS by treating RDBMS as a unique general OODBMS approach.

It is sometimes said that storing an object in an RDBMS is like disassembling a car every night before parking it in the garage. On the other hand, storing the company data in an OODBMS is like an auto parts firm storing all its parts as assembled cars. There is no absolute answer as to which approach is better. It is unlikely that OODBMSs will replace RDBMSs, not, at least, for a long time. A large amount of data is already in relational databases, and would be expensive to move elsewhere. Further, RDBMSs really do outperform OODBMSs in some ways. An RDBMS usually copes with multi-user client/server access better, because many OODBMSs run methods on a fat client, which adds to network traffic and concurrency problems. An RDBMS will support a general purpose query language like SQL, meaning data items can be searched by value instead of by object. It usually supports a sophisticated security model with fine-grain control over data access.

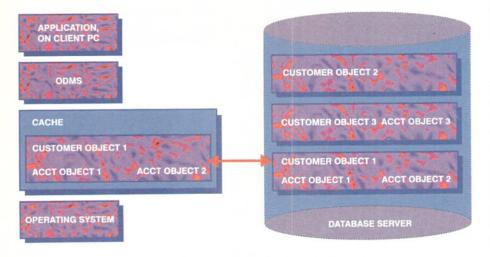


Figure 3 - OODBMS: performance comes from caching and physical clustering of related objects – but physical clustering may only suit one application

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# The equaliser

Finally, a significant development in database interfacing may make a war to the death between OODBMS and RDBMS pointless. CORBA 2, Object Management Group's Common Object Request Broker Architecture, is potentially the most important standard in object technology today. CORBA 2 defines a robust language- and platform-neutral transport mechanism. The public interfaces in Interface Definition Language allow an object running on one platform to send a message across the network to an object running on another platform, which may be written in another language. Thus, CORBA is a lot more than a simple Object Request Broker (ORB). It defines standards for the infrastructure services which distributed business objects need to call on (such as naming, transaction management, and security) and even accounting architecture and other vertical market facilities. You can buy CORBA 2 ORBs today - Iona's ORBIX for example. Such important object models as IBM's SOM and Sun's NEO are already CORBA compliant and either meet the version 2 specification (which supports distributed objects) now, or will soon.

Persistence is very important to distributed objects, which unlike C++ objects are mostly expected to retain their state even after the conclusion of the program which creates them. Thus, CORBA incorporates a service called the Persistent Object Service



(POS) which allows you to retain and manage the persistent state of objects but abstracts the actual physical storage mechanism. This means objects can be stored in anything from an object or relational database to a file system. If you want full details of the Persistent Object Service and its implications, read *Object Persistence: Beyond Object-Oriented Databases* by Roger Sessions (Prentice Hall, 1996, ISBN 0-13-192436-2). I have seen a pre-publication copy of this book only briefly, but Sessions was one of the principle architects of the Service. His book is about the 'mystery, drama and

romance' of standards-making and presents a controversial view of OODBMS. At the recent IBM Technical Interchange held in Nashville, Sessions admitted the title 'was purposely chosen to annoy the object-oriented database vendors'.

To clarify POS, look at the diagram in Figure 4. The PID describes the location of a persistent object's data in a datastore and generates a string ID for it. The PID must be distinguished from a standard CORBA object ID – it identifies only data. The client creates the PID and passes it, along with the associated object, to the Persistent Object Manager (POM). The POM acts as a router, and sends storage requests to the particular Persistent Data Service (PDS) that supports the protocol/datastore combination required.

The ODMG-95 specification mentioned by Mary Hope in her *EXE* article describes a PDS that allows connection to a standard OODBMS, but a mapping to a relational database is just as easy, using a PDS which that employs the POS CLI (Callable Level Interface). The POS CLI encapsulates the ODBC, IDAPI, and X/Open's CLI database connectivity standards, so it makes most RDBMSs accessible. Other PDSs provide access to file systems such as POSIX or Apple's Bento.

Mercifully, the CORBA POS will free us from another pointless technology battle which would distract us from actually building things. Those hoping for a natural progression towards Nirvana in DBMS design, from navigational through relational to object databases, will be disappointed. Relational database theory is still based on sound mathematical principles that make it the most flexible way to store structured data. Object databases are something of a return to the old ways, with a datastore that links more directly into the application code and deals with real-world aggregations of data items as hierarchies, complex relationships, and unstructured data. Each has its uses. No business benefit will be gained by converting a legacy datastore into a newer DBMS, if that is all that's done. The CORBA Persistent Object Service lets us write perfectly good distributed business object applications, the ultimate in dynamically partitioned client/server applications, without getting involved in the DBMS fashion industry.

David Norfolk had a long and misspent career in database administration, quality assurance, security, and networking, mostly for big merchant banks, until the 'wodge and burn' style of the City finally got to him and he retired to rural Wiltshire as a journalist. He can be contacted at drhys@cix.compulink.co.uk.

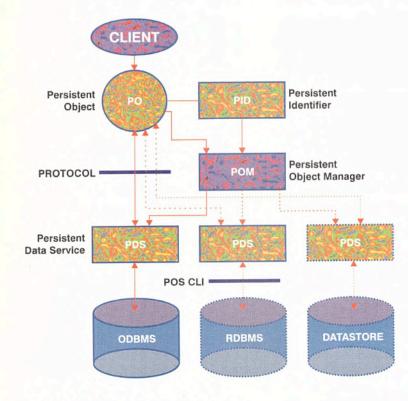


Figure 4 - CORBA persistent object service

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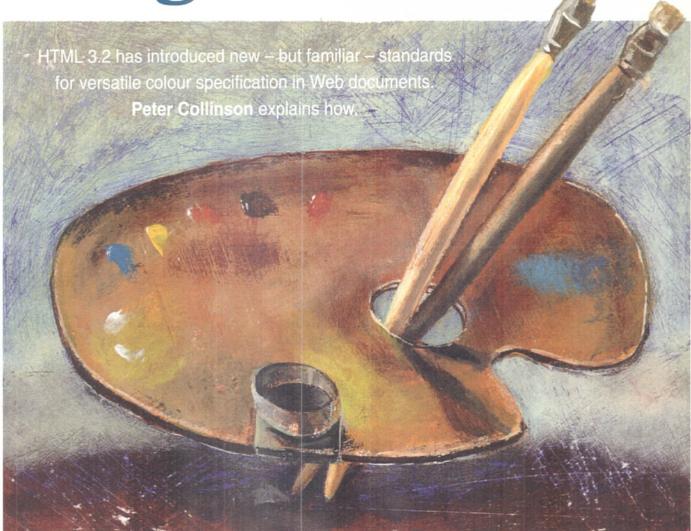
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The colour of things to come



Dorothy and Toto away from the drab monochrome of Kansas to the technicolour Land of Oz, version 1.1 of the Netscape Navigator gave Web authors the ability to specify the colour of their pages. Until that time, page rendering was under the complete control of users, who had the ability to alter colour settings from the browser's defaults. Netscape perceived the need of authors to supply colours on their pages, and imple-

mented a scheme to allow just that. Though

colour sometimes interferes with readabil-

ity, more often it enhances the variety of

ike the tornado that whisked

individual page layouts on the World Wide

Initially the creators of Web standards did not embrace Netscape's innovations. They pursued a different course, intent on keeping page markup separate from page rendering instructions, with page rendering information supplied by a *style sheet*. The initial standard for style sheets is not finished yet, although some browsers can use them. Meanwhile, as we waited for style sheet standards to emerge, many thousands of page authors began to use the new Netscape features to deliver enhanced colour on their Web pages.

For me, a WWW service provider, the Netscape enhancements had posed a dilemma. Should I go overboard to promote the one vendor's browser by using their private facilities? Should I force my readers to use a certain browser? Surely open access to all is a fundamental tenet of the net, and I should not compel people to use any specific product. To meet this ideal shouldn't I carefully follow the published Web standards? As a precautionary measure I prefer to stay within the standards. They should make my pages accessible by all.

My concerns over this issue are now moot. In May the keepers of the HTML

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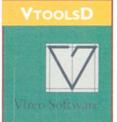
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# TECHNIQUES



markup standard, the World Wide Web Consortium, announced HTML 3.2. The new standard incorporates many changes to the HTML 3.0 draft, and seems to whole-heartedly endorse several of the original Netscape enhancements for colour.

# **Backgrounds**

So what about colour? HTML standards and Netscape have long agreed that you can specify a bitmap to tile the viewing area of a browser. In the BODY tag at the start of a document, you can specify:

<BODY BACKGROUND="image">

Here image is the name of a GIF or JPEG bitmap file on your server. You can use a complete URL if you wish.

Because the image is tiled in the viewing area it must be *seamless*. The picture must fit perfectly to itself on all sides. The image should flow smoothly across the edges, top, and bottom, but does not have to be a square. If you want a gradient colour pattern as your background make a bitmap that is just a few pixels in one direction, and large enough in the other to prevent tiling. The image will be fairly small, and will normally load with reasonable speed.

Many pages on the net are unreadable because the downloaded background blots out the text. The proud authors of these infuriating sites concentrated on the pretty background effects, and downplayed the primary purpose of the page: the information in the foreground. To ensure it is adequately visible, minimise the contrast and edges in the background but maximise the contrast between the text and the background. Page authors cannot control the size of the font being displayed, and if it is small, the background could interfere with the readability of type on the final page.

The size of the background image can be important. There are trade-offs between the speed of downloading the image and the speed at which it can be painted onto the screen: a small image will download quickly, but the browser will take time to tile the viewing area. Larger images will cost more

in downloading time, but will fill more of the screen. Drawing time may be faster, because it will happen in larger chunks. Of course, downloading time disappears if you use the same background on more than one page. The browser cache will retain the image and use it over again.

The tiling effect was more visible on earlier versions of Netscape, when the text was displayed before the background was obtained and loaded. More recent versions place the background and load the text over it, giving the illusion of a faster load time.

# Setting colours

To create a background you load a bitmap. It doesn't have to be patterned – solid colours are fine. But Netscape realised that background control was not enough: how do I, the page author, know what colour the reader has selected for text? If I set the background to black, will the reader fruitlessly try to read black text on a black background? It's only a short leap of logic to realise that the page author also needs control over the colour of the foreground.

Netscape came up with a general scheme where all the colour attributes of the foreground can be set in the Body tag. The scheme was implemented so that other browsers could ignore the markup and render the document using their own default colours. Four new keywords give access to the various foreground parts of the visible HTML document: the TEXT keyword speci-

fies the colour of the main text in the document; LINK the colour of links; VLINK the colour of links that have been visited; and ALINK specifies the colour of an active link. To complete the colour set, the BGCOLOR keyword allows you to provide a plain colour as the background.

These five keywords are followed by a colour specification argument. You can supply a named 'well-known' colour based on the PC VGA colour specification. The keyword can be followed by one of: aqua, black, blue, fuchsia, gray, green, lime, maroon, navy, olive, purple, red, silver, teal, white, or yellow.

It is more usual, but more difficult, to give the selected colour expressed as a 24-bit hexadecimal number:

TEXT="#rrggbb"

The pairs of hexadecimal digits give values for the red, green, and blue components of the final colour. White is produced with all the colours fully on, so white is #ffffff. Black is #000000. RGB colour mixes are not always obvious. For example, pure yellow is #ffff00, which puts the red and green fully on and the blue completely off.

Now the fun begins. You should first work out what colours you would like to use in your document, then determine their values. The method for this task depends on the platform you are using. Several helpful resources can be found on the net itself. Probably the best place to start is the Yahoo Backgrounds index page (see the box for URLs and references), which points to several sites that allow you to choose colours.

I like the Body Colormaker page by Sam Choukri shown in Figure 1. It presents a grid of 216 colours to choose from, and asks you to enter your selections into a set of boxes. You can then try out the look of the page. A supplied BODY line creates the effect. The choice of the 216 colours isn't random: they are the colours that a 256 colour Windows PC can display without dithering.

If you have a UNIX-based colour workstation using X, selecting colours is an old problem. When I added a colour screen to my Sun, I was surprised by the general lack of tools designed to help me select colours and colour combinations. Since then I have trawled the net, and now I have a small set of display tools. The first of note is xco,

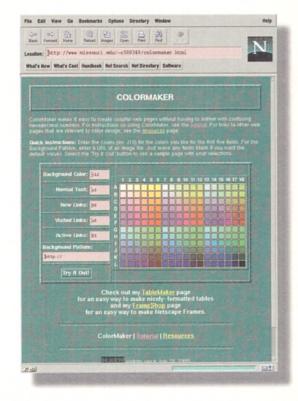


Figure 1 - The ColorMaker Web page

# TECHNIQUES

which is actually an old program written in the early days of X. It presents an image (Figure 2) that allows you to cycle through the colours in X's standard colour list stored in rgb.txt. You can set the foreground colour using the left mouse button and the background colour with the right. I use xco to get an idea of what colour goes with what.

The second tool is cpicker by Mike Yang. It has a close friend: pixedit. Both programs show the same output, but use different mechanisms to obtain an initial colour. The cpicker program loads the installed colour map for a window that you choose, displays it and lets you click on a colour. The pixedit program asks you to select a pixel to use as a source for the colour.

Both programs then display control screens that provide ways to make temporary changes to the colour map. You can use horizontal sliders to set-up a particular colour from numeric values, or you can click on a cell in the 8x8 array of colours to select a new colour. The content of this array is changed by clicking the two buttons on its right. The output that I find most useful is shown in Figure 3. The array contains a graded set of colours, so you can get the shade nearest to the one you desire. Another interesting option is to click on the match button and obtain a set of close colours from

the standard rgb.txt file. The name of the colour is displayed in a box that conveniently materialises under the four buttons in the bottom left of the window.

Many more tools for different platforms are available for generating foreground and background colours. Use them carefully: many people on the Web don't appear to be capable of displaying colours created on certain other platforms.

It is important to consider readability when choosing colours. I prefer to work in a window with a dark background and light foreground colours, since the physics of the cathode ray tube make letters clearer in this combination. These words are being typed into an editor running on a dark blue background. The letters appearing under the cursor are white.

I am at a loss to explain why so many systems drive the screen the other way around, producing black letters on a white or light coloured background. Perhaps the designers of these ubiquitous systems were striving for a model of the real world, where black printed words appear on white paper. However, screens are not like paper, which reflects light. Screens emit light.

The draft HTML 3.0 standard did not incorporate the various colour setting attributes Netscape developed for the BODY tag.



Also missing was an extension that appeared with Netscape 2.0, the ability to change the colour of a piece of text 'inline'. The code

<FONT COLOR="#00FF00">Green</FONT>

would make the word 'Green' appear green. Additionally, the FONT keyword allows you to control font size. HTML 3.2 blesses the colour changes and the FONT keyword.

# Style sheets

The people forming the next generation of HTML standards prefer not to have explicit rendering information, like colour settings and font sizes, as part of the markup within the document. They hope to retain a distinct split between document markup and its visual appearance. To achieve this, the code defining the appearance of documents will be supplied by <code>style sheets</code>. These will describe how a document should look, independent of its content.

There are two major proposals for style sheet implementations. The Cascading Style Sheet (CSS) is a firm proposal; some people are already implementing browsers that employ it. The style sheet can draw specifications from several sources and combine them to generate a rendering style for the document. CSS also specifically preserves the reader's right to alter the style. The proposal suggests that menu operations within browsers could be used to turn off some style components at will. In theory, CSS will combine the 'suggestions' from both page authors and readers to generate documents on the screen. The author's decisions will prevail unless the reader takes specific action.

The second proposal is the Document Style Semantics and Specification Language (DSSSL). As the 'L' in its acronym denotes, DSSSL is a language for creating style sheets, not a style sheet specification. It is an ISO standard which comes from the SGML community, and it sets out a body of rules for creating style sheets for documents that follow the SGML structuring conventions. (SGML is a set of rules for creating document markup, while HTML is one of the languages derived from those rules.)



Figure 2 - The xco program

## BoundsChecker, 4.0 and SoftICE for Windows NT.

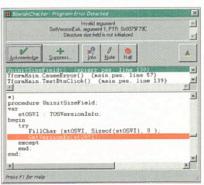
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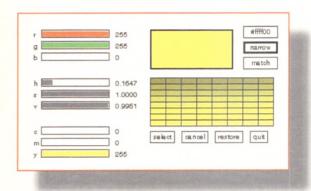
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#### TECHNIQUES

In March '96 various large vendors, including Netscape and Microsoft, announced they would support CSS for style sheets. The CSS specification dictates how HTML text elements should be formatted. For example:

H1 { color: blue: font-size: 12pt: line-height: 14pt; font-family: helvetica; font-weight: bold; font-style: normal }



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Figure 3 - The cpicker program

This code supplies various characteristics of the H1, or large heading element. It specifies how each of the H1 elements within the page will be displayed.

CSS has the notion of property inheritance based on context. A document element inherits characteristics from another element that encloses it. For example, if a document uses the H1 definition above and contains <H1><EM>The</EM> heading </H1>, and no colour has been assigned to the EM element, then the emphasised 'The' will inherit its blue colour from the parent. Other properties are inherited, like fontsize and font-family. To change the

> inheritance, you must give a specific style directive to change the colour of any text tagged with EM. There are also ways of defining style for an EM element embedded within an H1 element.

> The CSS specification defines a new HTML attribute CLASS used to select particular settings for HTML elements. With it I can define a private style for headings.

```
H1.hillside {
   color: green
```

and invoke it in my documents using:

<H1 CLASS=hillside>Green heads</H1>

The CLASS element lets me generate a house style and enforce it on my pages. It's likely to override anything that the user has set up in his local style sheets, because he is unlikely to have specifications for the hillside class. Nothing would stop him from defining hillside settings, but few people will do this. I am somewhat dubious that the CLASS feature counters the idea of cascading style sheets. We shall see.

To deal with the browser requirement of changing the colour of links to reveal their usage history, CSS defines what it calls 'pseudo-classes'. For example:

A:link { color:red } A:visited { color:blue } A:active { color:yellow }

All A elements with HREF attributes will use the pseudo-class specification. Notice it is much more general than the Netscape tags. You can change other aspects of the link depending on its state, and can replace the colour names by hexadecimal values.



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#### Websites for further information

Yahoo backgrounds page:

http://www.yahoo.com/Computers\_and\_Internet/Internet/World\_Wide\_Web/Programming/Backgrounds

ColorMaker page: http://www.missouri.edu/~c588349/colormaker.html

Web style sheet descriptions: http://www.w3.org/hypertext/WWW/Style

Find xco and cpicker at ftp.x.org

The notion of pseudo-classes also contains the ability to change parts of the displayed object, so you can make all your paragraphs start with a double-sized letter by specifying:

```
P:first-letter {
   font-size: 200%
```

As usual, I have only enough room here to give you the flavour of my topic. If you want more information on style sheets, consult the ultimate authority: the Web Style Sheets pages on www.w3.org. Several of the examples cited in this article were taken from that document.

The CSS proposal is easy to understand

and use. Some sections, like page layout, are less intuitive than they could be, but using CSS is no more difficult than writing HTML with a text editor. It does appear to satisfy the criteria that everyone should be able to be a publisher on the Web.

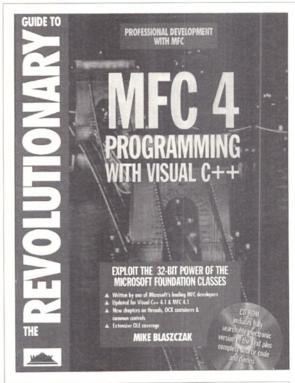
Document markup is considerably more user friendly with style sheets than without. Examine the way Netscape does section headings on its own pages: headings are shown in capitals, and initial capital letters are enlarged with the FONT tag. The page authors are trying to achieve a small capitals font. With a style sheet this is trivial:

```
H1 {
    font-style: small-caps
}
```

Enter the text without embedded markup. Style sheets should make the text of HTML documents easy to read, and eliminate obscure markup that breaks up words and sentences. In reality, this issue will be less of a problem as time goes on. More and more WYSIWYG HTML editors are emerging (see Going visual: a web editor review on page 55 of this issue); with such tools page authors need not be as aware of the actual text stored in HTML source files.

HTML 3.2 is a big endorsement of the Netscape way of doing things, and it makes me wonder if style sheets will ever come into wide-spread use. With the new standard we all know where we stand, which is good, but 3.2's versatile specification for colour, font size, and other formatting may have rendered the style sheet option redundant. Unless, of course, the switch is forced by a big player — Netscape, perhaps, could impose changes that would compel all the Web sites operators in the world to alter their files... time will tell.

Peter Collinson is a freelance consultant specialising in UNIX. He can be reached electronically as pc@hillside.co.uk, by phone on 01227 761824 or on the Web at http://www.hillside.co.uk.



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# An exceptional exception

ost current C++ compilers support exception handling (EH). The standard versions of the dynamic memory allocation operators, new and new[], throw an out-of-memory exception. This means that your compiler not only supports EH, but charges you all the overheads for doing so. Some offer the option of switching off exception throwing by new and new[], but this feature is an illusion. It will not work reliably, and unless you use a compile time switch to turn off the overhead for EH, you will still pay. Pressured by the strong urgings of those writing code in which the exception throwing potential of new and new[] is unacceptable, the Standards committees came up with a special placement version of these operators that take extra parameters.

We now have compilers that support exception handling, but we should use them with care. Throwing an exception, perhaps skipping an intermediate function, is *not* intended as an alternative way to return from a function. Almost always, throwing an exception should occur because the code has detected an event that cannot be handled locally by the code writer. In such circumstances the problem must be transferred (thrown) to a place where the problem was anticipated, but could not be detected.

One of the characteristics of catching an exception is the calling of destructors for all auto objects between the throw point and the catch point. When writing code we should ensure that all dynamic resource allocation is encapsulated in objects with destructors.

Throwing an exception can help in just one normal situation. The performance hit imposed by catching an exception is acceptable only at the end of a program.

Regular readers and those familiar with C++ will know that the popular way out of C programs – exit() – does not work reliably in C++. Nor does it work well in an event driven environment. If you call exit() in C++ the stack is just rolled up, no destructors are called for auto objects. Neither are they called for dynamic objects, but you expect that from your C experience. In an event driven environment such as MS Windows there is no return to the event handling switch statement. That introduces the possibility of creating a ghost program – one that continues to run and cannot be controlled from the external environment.

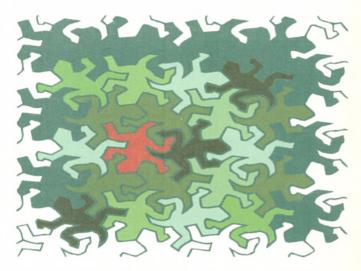
A method to unthread the stack is needed. That is exactly what exception handling does. Consider the following code:

```
class EndProgram {
    static char * message;
    EndProgram (const EndProgram &) //inhibit copying

public:
    EndProgram (const char * mess) {
        mess = new[strlen(mess)+1]
        strcpy(message, mess); }
    ~EndProgram () { cout << message << endl; delete [] message;}

char * EndProgram :: message = 0; //define class static data

main () {
    try {
        // your normal code
        catch (EndProgram e) { };
        return 0;
}
```



**Francis Glassborow** throws out some suggestions on ending your C/C++ programs with finesse.

Finish your program by replacing the old call to exit with: throw (EndProgram ("Stop the World, I want to get off."));

Normally this will cause your program to close down correctly.

Note that in the code only one EndProgram object can exist (until we have to deal with multi-threaded code). I am always careful to create my EndProgram object exactly where it is needed. If I do so early, and throw an already existing object, I may get unwanted copying behaviour, as exceptions are always copied to the catch clause. If there is the slightest risk of this, I must resort to some form of counted copying with a defined copy constructor.

Note also that I have not derived this code from any of the available standard exception base classes, since a standard exception class hierarchy is still a point for some debate, and EndProgram is not a normal exception. EndProgram is, indeed, an exceptional exception, because a program will normally throw it. Normal exceptions are not normally thrown.

The third thing that may strike you as odd is my use of static class data to avoid object data. If I want to rework my EndProgram object for use in environments where memory might be tight at program termination time, I can change my static data to a fixed size array, and change my constructor to use strncpy().

If you want to keep close to the way exit behaves, try the code at the top of the next page.

I strongly recommend C++ programmers to use either EndProgram or Exit objects — or a variation of their own — in all their programs. It will familiarise you with using exceptions, restore your ability to end a program at any level on the call stack, and motivate the desire to develop exception-safe code.

Yet this method presents one small problem, the construct catch(...), which catches everything. When you need to build a firewall into your application it is essential. Programs running in critical

#### TECHNIQUES

```
struct Exit {
    static int i;
    Exit(int errorcode) {
        i = errorcode;
    }
};
int Exit::i=0;
main() {
    try {
        // your normal code
    }
    catch (Exit) {};
    return Exit::i;
}
```

environments must be able to handle anything, so they need to contain exceptions at points where fault recovery is possible. In general, such firewalls should be part of an application and not part of some library code. However, if an ignorant or thoughtless programmer uses catch(...) in library code, then fails to rethrow from the body of the relevant handler, the program may not be able to get out normally.

The C++ Standard Class Library does not provide this method for getting out of programs because the potential of catch(...) means that it cannot be guaranteed to work in all circumstances – and because it is very easy to write for yourself.

I hope you agree with the latter reason.

#### Last month's problems

What should you consider when using qsort() in a C++ program? Think carefully as this is far from being a trivial question.

The first problem with qsort() is that it is an ISO C Standard Library function, so its name should not be mangled. Therefore we should effectively have:

Nothing wrong with that, is there? Now one must ask what sort of function is the compare function? Is it a C function, or a C++ one? You could assume that since it is passed by pointer, the name-mangling does not matter.

If all that extern "C" did was turn off name-mangling, the issue would be dead. But extern "C" is a linkage specification, and thus makes the calling sequence for the function a C calling sequence – effectively, the arguments from the call are passed in the order that C specifies. This is not necessarily the calling sequence for C++, because C++ allows more latitude.

It gets worse, because the natural place for a compare function is inside a class as a member function. But that will not work, because the parameters will be wrong. The end result is that you have to wrap up any member function that does the comparison in a global extern "C" function. This just about guarantees that you cannot use templates to meet this requirement.

Incidentally, extern 'linkage specification' is not currently part of the type system. That means that pointers to functions in C++ are always pointers to C++ functions. There is no such thing as a pointer to an extern "C" function, which means if your C++ compiler uses a different calling sequence from C, you cannot consistently pass a function pointer to qsort().

This is one of those minor problems that is still being worked on. I understand that IBM compilers have a vendor extension that allows pointers to include linkage specification information, because their mainframe compilers actually have different calling sequences for C and C++ functions.

In all probability your uses of qsort() (and bsearch()) will work quite happily in your C++ programs, but you would be unwise to expect this to be the case every time. Attempts to keep things simple sometimes have exactly the opposite effect. Most people



shudder at the idea of making linkage specification part of the type system, but if it is not, you cannot pass C++ function pointers to C functions. There is no problem if we simply said 'C++ supports C source code'; the problem is trying to provide link time compatibility. To be brutal, even C does not provide that level of compatibility. We have no right to expect code compiled by different C compilers to link, so why should we expect code produced with a C and a C++ compiler to do so?

The coding problem

Here is the code again. Why is it defective?

```
/* various included headers */
enum BOOL (FALSE, TRUE); // line A
int main() {
            cout << 0>1 ? FALSE : TRUE; // line B
            return 0;
}
```

The major error is in line B, because << has a higher precedence level than >. The program will output 0, then compare the state of cout with 1 to decide whether it is going to 'not use' FALSE or TRUE. I deliberately wrote the code exactly this way, because the output appears to be correct. Getting expected output is not enough, you need to get it for the right reasons.

But what about the subtle defect? Look at line A. Every once in a while your code will fail to compile, and you will get obscure error messages. If any of the words BOOL, FALSE, or TRUE have been defined as pre-processor identifiers, the resulting substitution will generate uncompilable code.

I have frequently come across programmers who argue that enum labels should be in upper case. That is a mistake. The convention dictates that things in upper case are those that the pre-processor may replace. Unfortunately C has broken its own conventions, which is enough of a clue for this month's problem.

#### This month's problem

Look at the following class definition and decide why it will sometimes fail when you include certain header files. Is there anything you can do to rescue the situation if it is not your header file and you therefore cannot change its contents?

```
class Problem {
    int * ip;
public: Problem (int size): i(new int [size]) { }
    ~ Problem () { { } delete [] ip; }
    void release (int i);
    //replace the memory ip point to
    // other member functions
};
```

If you want to respond directly to me I am happy to receive email at *francis@robinton.demon.co.uk*.

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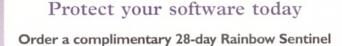
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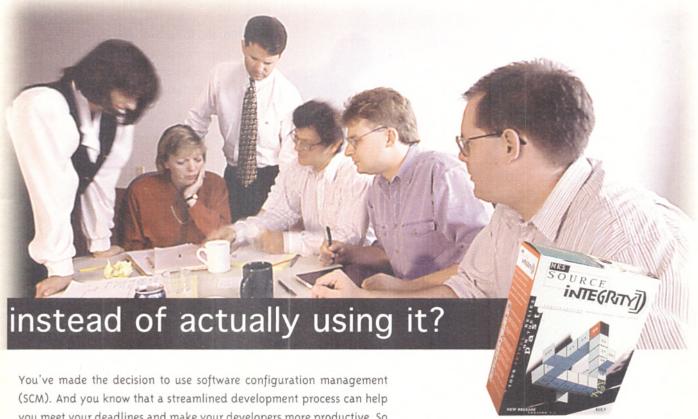
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# Where no man has gone before...



n the April '96 incarnation of this column I described how Delphi 2.0 makes an ideal tool for exploring the inner workings of the 32-bit Windows API. Since then a number of readers have asked me what tools and strategies can be used for reverse-engineering a 32-bit Portable Executable (PE) file, so this month I have endeavoured to describe the techniques I use when poking around inside the guts of Windows.

#### PE vs NE...

New Executable (NE) files are segmented executables that first saw the light of day with Windows. Portable Executable (PE) files are the newer, 32-bit files used by Windows 95 and Windows NT on the various Want to go spelunking in the belly of Windows95? **Dave Jewell** has been there already.

platforms on which it resides. The PE format, which is designed to support the flat memory model, is described very thoroughly by Matt Pietrek in his seminal article Peering inside the PE: a tour of the Win32 portable executable file format, which can be found in the March '94 issue of

MSJ and on the Level 1 MSDN CD (search for 'PE' and it's the first item listed).

Unfortunately, despite being well documented, relatively few tools are available for poking around inside PE files. The best, somewhat counter-intuitively, are those provided by Microsoft! Even after you have managed to produce a disassembly of a PE file, you'll often find that it's inherently harder to get to grips with than the equivalent 16-bit code. By default a PE file will contain only one code segment (the .text section), forcing you to look through an enormous chunk of code. 32-bit compilers are often far more aggressive at optimisation and register reuse than their 16-bit counterparts, because 32-bit instructions often occupy more bytes than 16-bit code. Along-

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side all this, 32-bit calling conventions differ from the 16-bit variety. When you call a 32-bit API routine, parameters are pushed from right to left, the order C/C++ programmers are accustomed to. In contrast, 16-bit API routines expect their parameters pushed from left to right, the 'Pascal' calling convention. Last, but by no means least, most mainstream 32-bit compilers, if they can, will pass arguments to local (non-external) routines in registers. This speeds up execution and often eliminates the need to build a stack frame. With all this going on, disassembling a section of 32-bit code can be an interesting intellectual challenge!

To figure out what calling conventions are being used, first look at the calling routine. If it loads some value into the EAX (and possibly EDX and ECX registers) immediately before making a call, register-based conventions are in use. If one or more parameters are pushed onto the stack and the calling routine cleans up the stack after the CALL instruction, then CDECL calling conventions are being used. If there's no stack cleanup in the caller, then you should be able to see the cleanup being performed in the called routine by appending an optional 'pop value' to the RET instruction. In this case, the Pascal calling conventions are likely being used. You should interpret parameters as being pushed left to right. Finally, if an external routine (DLL) is being called, it's most likely using the STDCALL, so parameters should be interpreted right to left.

#### Disassembly basics

The lack of available disassemblers is the first major problem PE file explorers will encounter. V Communications, makers of the popular Sourcer product, is promising a Sourcer add-on which will cope with the disassembly of 32-bit executables. However, at the time of writing, this is still due 'real soon now'. Fortunately, Microsoft has provided help in the shape of the DUMPBIN utility, which forms part of the 32-bit SDK. You can pass the name of a 32-bit executable or DLL to DUMPBIN, and it will obligingly gener-

```
119 DefDlgProcA
000aaaf4
000aaaf8
          516 SetWindowLongA
000aaafc
         493 SetMessageQueue
         195 ExitWindowsEx
000aab00
         539 SystemParametersInfoA
000aab04
         451 SendDlgItemMessageA
000aab08
         586 wvsprintfA
000aab0c
         348 IsWindowEnabled
000aab10
          548 TrackPopupMenu
000aab14
          261 GetMenuItemCount
000aab18
          80
              CreateMenu
000aab1c
```

Listing 1 - Output from W32DUMP

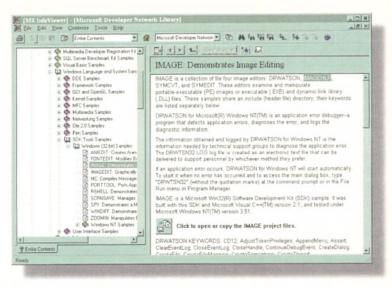


Figure 1 – If you scan the MSDN Level One CDs (there are two of them now) you will find the source code for several interesting utilities including most of the IMAGEHLP library code

ate a disassembly of all the machine code in the file. Redirect it to a text file for a code listing you can examine further.

However, DUMPBIN is merely a 'wrapper' around Microsoft's linker. When called it simply spawns the linker program to do all the real work. At first sight, this seems like a weird approach - what business does the linker have in disassembling files? - but it is a very reasonable way to arrange things. In the portable, processor-independent world of Windows NT very few utilities need to know the details of the machine code used on a particular platform. The compiler must, and the linker. Localising this knowledge into the linker makes it the 'fount of all wisdom' for PE files, and allows the DUMPBIN wrapper to be platform-independent. The NT development team has one less nonportable file to worry about.

Although DUMPBIN does the job of creating a code listing, it has a number of woeful deficiencies. When calling a Windows API routine it appears simply as a procedure call in the code listing, without mention of the name of the routine, nor even an obvious indication that a call is being made to an external procedure. If you use the /IMPORTS switch in conjunction with DUMPBIN, you'll get a nicely formatted list of API names imported by the executable, but there is no indication of where those calls 'slot' into the code listing.

Borland's 32-bit TDUMP utility is equally poor in this respect. It produces a nicely formatted listing of all the imports referenced by the executable, but with no indication of where those calls are made in the code. Happily help is at hand in the form of a small utility, W32DUMP, which comes with Andrew Schulman's book *Unauthorized Windows 95*. This utility will produce a complete listing of all the API routines used by an application *and* an address that indicates where that routine was called in the code. Hallelujah! An example of the output from W32DUMP is shown in Listing 1.

You'll notice that the addresses from which these API routines were referenced are consecutive and increment by four bytes, because 32-bit executables often reference API routines through a series of jump instructions located at the end of the code proper. Although fix-ups can, and do, occur part way through the code segment, the vast majority of API references are placed at the end of the code as part of this series of JMP statements. Elsewhere in the code the references to this API call are CALL instructions which point to the appropriate jump instruction. This reduces .EXE file load time, because for every API routine that's referenced from the executable, only a single fixup is applied to the code segment when it is brought into memory.

```
1.012E C8 0098 00 enter 98h,0
1.0132 83 7E 04 00 cmp word ptr [bp+4],0
1.0137 0F 84 00A1 je loc_0004
1.013B C7 46 8C 0094 mov word ptr [bp-74h],94h
```

Listing 2 – 16-bit code present at the beginning of a routine

#### REVIEWS

To determine the contents of the DGROUP segment (in 32-bit PE terms, the .data section) use Microsoft's DUMPBIN program, specifying the /ALL switch. This will cause a hexadecimal dump of all the sections in a PE file including the data segment, which should be easily recognisable from its contents.

#### Er... where's my frame pointer?

When running in 32-bit mode the processor can use any of the general-purpose registers as an address register, resulting in a more orthogonal, consistent instruction set. This, in turn, makes life easier for compiler writers, but not necessarily for would-be hackers and disassemblers!

Consider the role of the humble BP register. When looking at 16-bit code, it would almost invariably be used as the frame pointer. You would generally see something like the code in Listing 2 at the beginning of each routine. In this example, 98 bytes of local storage get allocated on the stack, and the BP register is initialised to point to the beginning of the local storage area. All this happens in the ENTER instruction. Any local variables are lower in memory (further down on the stack) than the frame pointer, while parameters to the routine are higher in memory. The important point is that you can determine what is a local variable and what is a function parameter simply by checking if the displacement from BP is positive or negative.

In the listing 2 code fragment [bp+4] is therefore a parameter to the routine, whereas [bp-74h] is a word of local storage. This makes it dead easy to discriminate between parameters and local variables. Later versions of V Communication's Sourcer will tell you if a parameter or a local is being referenced for each instruction that's disassembled.

Not all 16-bit compilers work this way, but the vast majority do. 16-bit routines which don't use BP as the frame pointer were rarely found except when inspecting a procedure that didn't have any local variables or parameters, or used the newer register-based calling convention for passing parameters.

```
004150C8: 53
                                     ebx
                             push
                            push
                                     esi
004150C9: 56
                                     edi
004150CA: 57
                            push
004150CB: 55
                            push
                                     ebp
                                     esp, OFFFFFF78h
004150CC: 81 C4 78 FF FF FF add
004150F8: 6A 00
004150FA: 8B 44 24 08
                                     eax, dword ptr [esp+8]
                             mov
004150FE: 50
                             push
                                     eax, dword ptr [esp+8]
004150FF: 8B 44 24 08
                             mov
00415103: 50
                             push
                                     00424F2F
00415104: E8 26 FE 00 00
                             call
00415109: 83 C4 OC
                             add
```

Listing 3 – Beginning of a typical 32-bit routine

Figure 2 – Borland's TDUMP program is great for poking around inside PE files and it will demangle all Borland symbols. This is an extract from one of the Borland C++ 5.0 DLL's that comprise the new, configurable IDE (reviewed last month). TGTPiles?

Sounds rather painful...

Enter 32-bit code. Things are suddenly much more difficult. Both Borland and Microsoft 32-bit compilers (and maybe others, but these are the two I have most experience with) will keep the EBP register free for use as an ordinary register variable, provided the potential penalty in terms of execution time or code size is minimal. If it makes sense to do so, both compilers will employ EBP just like any other register variable – even where a routine has both parameters and local storage.

For its frame pointer the compiler uses ESP – the stack pointer itself. If you think this through, you'll quickly realise that it represents a nightmare for the code disassembler. When using the BP register a particular variable or parameter was always at a *fixed* location relative to BP. This, of course, was because BP itself never changed within the scope of the routine. However, the ESP register is jumping around all over the place according to how many words of information have been pushed onto the

stack at any given point in the code sequence. Consequently a particular local variable or parameter will have a *variable* offset relative to ESP. The only way the disassembler (and this means you!) can determine exactly what is being referenced at a specific time is by keeping track of what's been pushed onto the stack.

An example will make this clear. The code fragment in Listing 3 shows the beginning of a typical 32-bit routine. Four registers are pushed onto the stack, then the stack pointer is adjusted to allocate the number of bytes of local storage required by the routine. Although this appears to be adding something to the stack, it is a negative value – \$88 is being subtracted as the size of this routine's stack frame.

This is followed a little later by a call to a routine at address \$424F2F - located within the current program (not a DLL or API call). The compiler generates code to fix-up up the stack after it's been called, suggesting that it is a cdecl routine. As I've already mentioned, the new 32-bit calling conventions push parameters from right to left - the same order as is used by 'classic' C programs. The only real difference between stdcall and cdecl is that the former cleans up the stack for itself, while the latter expects the caller to clean up the stack.

Because parameters are being pushed right to left, the last parameter pushed onto the stack for the routine at \$424F2F is actually the leftmost parameter, as it would appear in the source code. However, we can't just decompile the above as:

424F2F (p8, p8, 0);

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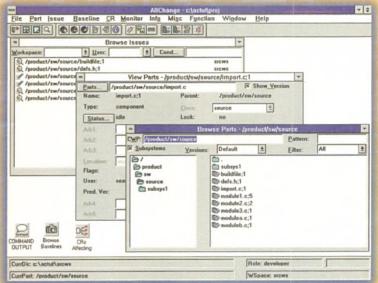
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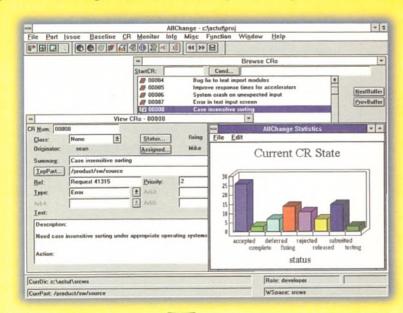
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(Note that I use a naming convention of 'px' to indicate a parameter to a routine where 'x' represents the positive offset from the routine's frame pointer.) This won't work because of the floating stack frame effect I've been discussing. Instead, you have to keep track of the current stack 'bias' (the number of bytes of parameters currently on the stack) and subtract this bias from each 'esp+xxx' reference that you see. When the first zero is pushed (at location \$4150FB) the stack bias is zero. When the next instruction is encountered, the stack bias is 4, so the value being accessed is really [esp+4] not [esp+8]. This raises the stack bias to 8 so that the next instruction references [esp+0], not [esp+8]. When the call to \$424F2F has taken place and the add esp, OCh instruction has executed, the stack bias is reset to zero. Thus, a correct decompilation of the above code fragment would be

424F2F (p0, p4, 0);

#### Other optimisations

The 'floating frame pointer syndrome' is an example of a cunning optimisation which 32-bit compilers make in order to free up the EBP register for other uses. However, other optimisations are equally cunning. You will often encounter something like that shown in Listing 4.

In this code fragment the Microsoft compiler has detected that the GetEnvironmentVariable API call is being made several times in succession. Rather than making a series of explicit calls (which would cost six bytes each time) the compiler loads up the EBX register with the address of the API routine (remember, strictly speaking, this is simply the address of the JMP instruction at the end of the .text section) and calls through that register. Using this technique it only costs an additional two bytes for each successive call to the routine – a significant

saving. In this case making three calls costs 12 bytes, including the initial load of the register, compared with a figure of 18 bytes if this optimisation hadn't been applied. The savings get better each time the target routine is called. Calling through a register is also faster, because no memory access is required to fetch the target address.

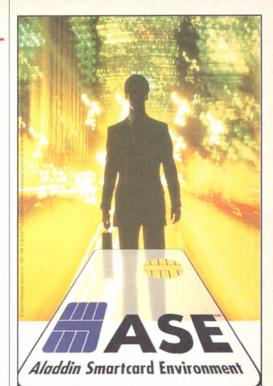
I have even seen a case where the compiler detected the frequent use of two API routines and held two different API addresses in two registers simultaneously. Since 32-bit code is inherently 'bigger' than equivalent 16-bit code such space-saving techniques are very popular with 32-bit compiler writers. The downside is you need as many spare registers as possible. This is why 32-bit compilers try to free up the EBP register.

With C++ usage increasing, another problem is the dreaded name mangling. Back in the old days you could get a pretty good idea of what an exported routine did simply by looking at the name. In a sense C++ is a step forward for the would-be disassembler, since the mangled name also encodes the class (if any) to which the function belongs, as well as the name and type of any parameters. The big question, of course, is how do you 'unmangle' the name? If the executable you're interested in was written using Borland C++ you can use TDUMP to perform automatic name unmangling, but Microsoft has always been very coy about the scheme it uses for encoding a mangled name, and has deliberately distanced itself from the word 'mangle', perhaps believing it doesn't sound professional enough to be associated with the Visual C++ development system! Instead Microsoft refers to 'decorated names'. How, then, do we strip the decoration and get back to bare plaster?

The answer, once more, is the all-singin', all-dancin' DUMPBIN program which will happily display undecorated names, provided they were originally decorated by a Microsoft C++ compiler. I had a poke around in Microsoft's LINK program, and found it calls

```
push
7721703A: 6A 00
7721703C: 8B 1D 28 31 22 77 mov
                                    ebx, GetEnvironmentVariable
77217042: 6A 00
77217044: 68 4C 11 22 77
                                   7722114Ch
                            push
77217049: FF D3
                           call
7721704B: 8D 78 02
                                   edi, dword ptr [eax+2]
                           lea
7721704E: 6A 00
                           push
                           push
77217050: 6A 00
77217052: 68 38 11 22 77
                            push
                                   77221138h
                           call
77217057: FF D3
                           add
                                   edi.eax
77217059: 03 F8
7721705B: 6A 00
                           push
7721705D: 6A 00
                           push
                                   7722112Ch
7721705F: 68 2C 11 22 77
                            push
77217064: FF D3
```

Listing 4 - A cunning optimisation generated by the Microsoft 32-bit C++ compiler



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a subsidiary DLL, IMAGEHLP.DLL, to do the actual 'undecorating'. There's a routine in this DLL called UnDecorateSymbol-Name, which — I believe — actually does the business. Unfortunately I haven't figured out how to call this routine, because it is written in a somewhat obfuscated manner. It takes 12 bytes of parameters which I suspect correspond to:

- a pointer to an input buffer containing the decorated name,
- a pointer to an output buffer to receive the undecorated name, and
- the size of the output buffer.

The proof of this particular pudding is left as an exercise for the reader. If you are interested in the IMAGEHLP.DLL you can find the source code for it on the MSDN CD. Microsoft has thoughtfully provided the UnDecorateSymbolName function in object form only... Oh well, it was worth a try...

I don't claim that the way I go about things is the best approach. I'd be interested in hearing from anyone who has any better ideas. However, I am certain that the new 32-bit executable file format and the advanced code generation techniques adopted by the new compilers contribute to a

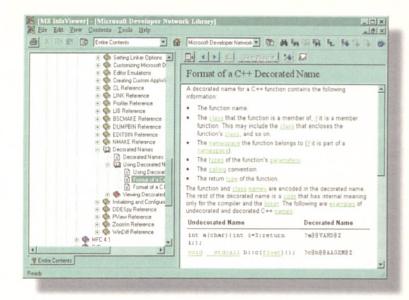


Figure 3 – Microsoft provides some information on how their name mangling (sorry – decorating) scheme works, but it leaves a lot of questions unanswered

number of interesting challenges for those who like to get in there and find out what makes things tick. Is it the end for books such as *Undocumented Windows*? Are we ever likely to see *The Secret Life of the Windows NT Kernel?* Stay tuned...

Dave Jewell is a freelance consultant, technical author and general information scavenger. When not peeking at Windows 95's naughty bits, you can find him lurking on CIX as djewell@cix.compulink.co.uk or else surfing the Web at DSJewell@aol.com.

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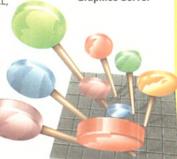
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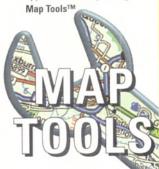
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# Going visual



#### A WEB EDITOR REVIEW

ot long ago the Webmaster toolkit comprised little more than a text editor, a paint program, and a copy of the HTML 1.0 draft specification. But nothing stands still in this market. Already HTML 3.2 is here. Web pages can have more graphics than text, plus buttons, check boxes, Java applets, tables, multicoloured backgrounds, and most recently, TrueType fonts. Today's professionally-designed Web pages bear as little resemblance to those early hypertext documents as laser-printed PostScript document does to a 9-pin dot-matrix one.

The Web is evolving faster than any other part of the Internet – and the Internet itself is evolving too fast for most to keep up. The early generations of HTML design tools were primitive. The HTML specification was a moving target, and the battle for adding proprietary extensions to the language, slugged out between Netscape and Microsoft, (see SoapFlakes, page 6), did not make life easier for our Webmaster.

In recent months at least seven companies have released products intended to make the process of designing HTML pages visual. They aim to isolate Web designers from the realities of HTML in the same way that DTP packages hide PostScript from publishers. None of these products has completely achieved that goal, but each has succeeded to a greater or lesser extent.

As part of the ongoing re-design of EXE's WWW site (http://www.exe.co.uk) I have been experimenting with some of these new tools. What follows is a round-up of the packages based on that experience, replete with comments on the features, advantages and shortcomings of each.

In the test I considered four major attributes: general ease of use, ability to display all elements of a page accurately, range of features covered as standard, and provision for testing pages before publication. No consideration was given to common gateway interface

programming or other strictly server-side features, since, with the exception of Microsoft FrontPage, none of the tools reviewed offers any server-side functionality.

Some of the software has not been commercially released; some is not really commercial software at all. WebEdit is a shareware program, while the versions of Netscape Navigator Gold and FrontPage were evaluation versions downloaded from the Web. FrontPage should be commercially available at the time of publication, while Netscape Navigator Gold Atlas, the version I tested, is an alpha of the Gold version of Netscape 3.0. At the moment, Atlas is more or less Navigator 2.01 with extra plug-ins. I also tested SoftQuad's HoT-MetaL Pro, which has been commercially available for some time, currently in version 2.0, with v3.0 due soon.

With new authoring tools,
HTML doesn't have to be
slow and laborious.
Neil Hewitt tries out four
of the latest packages,
and asks 'does it do forms?'

#### WebEdit 2.0 Professional Beta 3

Ken Nesbitt's shareware Web authoring tool has been around since the early days of the Web. Version 2.0 is the first for the 32-bit Windows platform. WebEdit takes a different approach to the other tools in this test:

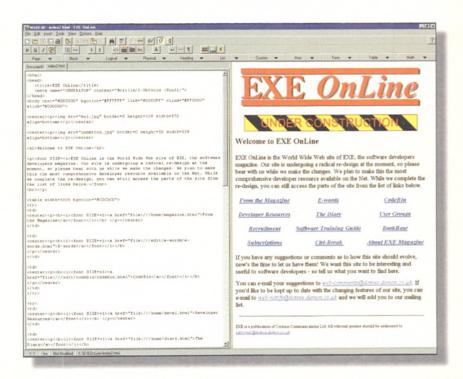


Figure 1 - WebEdit's previewer makes viewing changes easier

#### REVIEWS

you work on raw, text format HTML files, then view the results in the browser of your choice. This is a less than ideal arrangement. In previous versions you couldn't see your changes without stopping to preview the page in a browser. However, versions 1.4 and above feature a fully integrated previewer that runs in a panel alongside the HTML editing window (see Figure 1). It can be set to update itself with every keystroke, which provides a clear idea of what your changes look like as you make them.

Previous versions of WebEdit suffered under their 16-bit only status. The lack of long filename support and the inability to work with documents over 32 KB in length, a legacy of the 64 KB DOS segment size limit, were both serious impediments to using old versions on Windows 95 or NT. The new version will run only on these operating systems, and will not run on Windows 3.x under Win32s. For 16-bit users, the latest version is 1.4c, a recent update sporting many of the features of version 2.0. Bear in mind that version 2.0 is still in beta, however, and while it appears wholly stable, it is not gold code and should not be relied upon for important work. This beta is freely available for download from Ken Nesbitt's Web site, http://www.nesbitt.com, on a 30day evaluation basis.

The WebEdit interface is fairly standard for a Windows 95 application. Toolbars are provided to access the main functions, while the menus duplicate this functionality and add a few options not available on the toolbars. The toolbars are not dockable. A series of buttons along the top of the screen drop down additional menus. Considering the vast number of available HTML tags, and

the limited screen space available to all of us who don't have 21" monitors, this is a neat solution to a difficult problem.

The 2.0 interface is much improved by Windows 95-style context menus and tabbed dialogs. Another new feature is HTML syntax highlighting. It is basic compared to C/C++ syntax highlighting, as featured in many compilers, as there are far fewer elements in HTML to assign colours to, but it is useful nonetheless.

The WebEdit document editing process is relatively simple. You edit the raw text, then add the tags. This is simply a matter of highlighting the text concerned and selecting the appropriate tag or style from the toolbar. If you have the previewer running in 'instant update' mode you will see the change immediately. The previewer is quite comprehensive, too. It displays form elements such as buttons and list boxes, something which most editing tools still can't handle. It supports Netscape's colour enhancements and background features (see The colour of things to come, on page 31), but it doesn't support the latest tags for colouring table backgrounds. However, you can configure an external browser (such as Netscape) as a viewer, which lets you see any features supported by the browser. If you prefer the Microsoft way of doing things, a home page Wizard is available to guide you, step by step, through the process of creating a standard page.

The variety of tags supported in WebEdit is bewildering. You'd have to be an HTML expert to use all of them properly. Should you find a tag which WebEdit doesn't support automatically – and I doubt you will – you can define your own tags and store them in WebEdit for use directly from the toolbar.

Tables are fully supported, as are images, including embedded AVI movie files and a



full set of math symbol tags. WebEdit supports both Netscape 2.0 tags and the full complement of Microsoft Internet Explorer 2.0 tags.

The help file provided with WebEdit is comprehensive, although not quite to the standard of Borland or Microsoft. It is well-written, with illustrations where necessary, and plenty of HTML code fragments. An HTML reference is included, which covers the whole HTML 2.0 standard, Netscape and Microsoft enhancements, and tags from the recently ratified HTML 3.2 standard. Although I'd advise care when using some of the non-standard tags, since many people will have browsers that don't support them, you should be on safe ground with the Netscape tags, which are supported by most browsers currently popular.

Although some reviewers consider WebEdit the best HTML authoring tool in existence, and despite its wide range of functions and excellent previewer, it is seriously flawed by its inability to work directly in a Web browser view. However, it is certainly the most versatile of the packages tested, and has the widest possible support for tags, including Java tags. The interface is helpful and intuitive, more in the new 32-bit version than ever before. For the work of one man it is thoroughly impressive.

WYSIWYG editing is now absolutely standard in the word processing world, and it should be the same for HTML. Technical limitations do not prevent Web page editors from working directly on the page in exactly the same way as Word or WordPerfect. Some people may not consider this a problem; if you are one of them, and you simply need access to the widest range of tags available, WebEdit is the product for you. Otherwise, consider the other products in this review.

#### Netscape Navigator Gold 3.0 Alpha

Ask yourself: what is the ideal environment for designing Web pages? The answer must be the browser. The ideal Web design tool would be a browser that could view pages and edit them if required, all on the same page, in a fully visual way. Netscape Navigator Gold is just such a tool.

Released quietly last year at the same time as the Netscape 2.0 browser, Gold is effectively Navigator 2.0 with a full-feature Web page editor tacked on. As Navigator evolves, so will Navigator Gold. The version I tested is the Atlas Preview, an early alpha of Navigator 3.0. At this stage, Atlas is



Figure 2 - Editing pages with Navigator Gold

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essentially Netscape 2.01 with built-in support for Live3D, Netscape's 3D Virtual Reality Markup Language (VRML) variant, and CoolTalk, an Internet conferencing and whiteboard program. Gold versions of Navigator are only available for 32-bit Windows platforms, Macintosh, and Unix.

When Gold runs, it looks just like Navigator 2.01, with the exception of an 'Edit' button on the toolbar (see Figure 2). You can replace your existing Navigator 2.01 with Gold and continue to use it as your browser. All the functions of Navigator 2.01 remain, but click the 'Edit' button and everything changes. If you are working on a local Web page, Gold will edit it without further ado. If you are working on a remote page, Gold downloads the page and any associated images. You can opt to have the program adjust the links in the page to be relative rather than absolute - but this only works well if the images on the server are in the same directory as the page.

The first time I used Gold I was impressed, because unlike WebEdit, Gold's editor is WYSISYG. You can work on the page in the browser as if it were a word processor document. A toolbar provides buttons to align text, change point size and style, insert images, links, and horizontal rules, and manipulate colours. Toolbars are dockable. Unsurprisingly, Gold supports all the Netscape colour tags including coloured table backgrounds and multiple colours for text. Many functions can only be accessed from the menus, such as the table manipulator.

Instead of listing a huge number of tags, Gold encourages the user to forget about HTML and interact directly with the editor. For example, to add an image just click the image button and select the desired file. Gold supports the same image formats as Navigator – GIF and JPEG, the two most commonly-used formats on the Web. To change some aspect of an image, table, or indeed any body of text on the page, you need only to place your cursor somewhere on it and right click – entirely in line with the Windows 95 way of doing things.

Yet Gold is not perfect. One or two omissions may make it unsuitable as a primary HTML authoring tool for many potential users. Most seriously, the editor cannot display form elements. Instead, small yellow icons appear which bear absolutely no relation to the layout of the form, and which tell you nothing until you click on the icon to bring up a properties box. That, at least, gives you the text of the tag. Forms are very common in Web pages, although Java applets may begin to take over as the obvious means of interaction with remote sites. At present Gold's inability to see and edit forms severely handicaps its usefulness. The only way you can add form tags to pages in Gold is to manually enter the tag using a dialog. If and when Java applets displace forms, Gold will still come up short: considering that Navigator 2.01 is a Java-enabled browser, I find it surprising that you cannot embed a Java applet into your pages using the Gold editor.

Welcome to EXE OnLine

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Figure 3 - HoTMetaL Pro shows HTML tags graphically

Microsoft Internet Explorer 2.0 tags are not supported in Navigator Gold or any other



version of Netscape Navigator. To use these tags you must add them manually then test your pages using Internet Explorer itself. If you plan to use Internet Explorer tags extensively, you might be better off with Microsoft's FrontPage, investigated below.

One useful aspect of Gold (and some of the other products reviewed here) is the 'publish' feature. Gold can automatically upload pages to your server via FTP or HTTP, amending the links and references in the pages on the way to suit the arrangement of your remote site. Provided you keep the same directory structure on the local and remote sites, this should work without need for manual intervention.

Like all Navigator products, Gold can be downloaded from Netscape's FTP site for a 90-day evaluation and does not come with help files. However, Netscape has put a wide range of documents, including help for the program, HTML reference, and Web page design advice, onto their own WWW site. This help can be accessed transparently from the Gold menus, provided your Internet connection is up and running.

If it supported forms, Java, and Explorer tags, Navigator Gold would be a near-perfect HTML authoring tool. It is entirely visual, has an intuitive interface, is fully integrated with the *most* popular browser, and supports the *most* popular set of proprietary HTML extensions. If your Web page needs don't run to forms, but you need good control of layout and excellent handling of images, then Navigator Gold is well worth checking out.

#### SoftQuad HoTMetaL Pro 2.0

Like WebEdit, HoTMetaL Pro has been around for a while. Version 2.0, which I examine here, has been available for less than a year and version 3.0 is imminent.

Visually HoTMetaL Pro, as you can see in Figure is 3, a sort of halfway house between WebEdit and Navigator Gold. Pages are displayed with the correct point sizes and effects, and links are displayed in the proper colour. The package inserts visible tags into the document, showing each tag pair along with the text it encloses. This can be quite useful for getting an overview of a document, but gets thoroughly annoying after a while. I was thankful that I could opt to hide the tags and just show the page itself.

HoTMetaL Pro has several very serious flaws in the way it displays pages. When it encounters a tag or attribute it doesn't recognise it cannot display the page at all, and defaults to a simple text-only view as in

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Package	Visual Editing	Netscape Tags	Microsoft Tags	Forms in Editor	Price (incl.)	Contact
WebEdit	No	Yes	Yes	In preview	£61	Grey Matter 01364 654100
Navigator Gold 3.0	Yes	Yes	No	No	Free beta. (V2.01 - \$79)	Netscape 01753 622061
HoTMetal Pro 2.0	Limited	No	No	No	£124	Grey Matter 01364 654100
FrontPage 1.1	Yes	Yes	Some	Yes	£99	Microsoft 01734 270001



Table 1 - Package features and contact details

WebEdit. This is staggering behaviour — it means you cannot work on documents which have been customised with proprietary tags. To compound the problem, version 2.0 has no support for tags which are relatively commonplace today, including those for background and text colour. It can handle forms, but in an unusual manner: the software cannot display the form elements in its editing window, but lists the parameters and attributes of the form tags in the text. At least you know what kind of form element is there. The range of tags available in HoTMetaL Pro is the smallest of any package reviewed here.

The program happily displays inline images, so long as they are in GIF format. However, it doesn't seem to know about JPEG, which can be a problem since more and more sites are moving towards this compression technique. Place a JPEG image in your page and you will see a caption claiming 'image not available' – not very helpful.

Assuming you can get your page to display in the editing window, the editing procedure is much the same as in the other packages. Buttons on the extensive toolbars insert tags of various types in the text, with appropriate

dialogs popping up where options need to be set. To edit the properties of an element on your page you must seek the 'Edit SGML attributes' option on one of the menus, because the toolbar button for this does not exist. HoTMetaL Pro is a 16-bit application, so right-button context-menu support is missing. Most developers need to tweak the properties of the elements on their pages on a regular basis; I was disappointed to discover that it is such a convoluted process. Nor are the dialogs satisfactorily intuitive. Almost all rely on the developer's knowledge of SGML attributes and tags, with little or no explanation within the dialogs.

HoTMetaL Pro 3.0 will be a 32-bit application, which will add the ability to work with long filenames and other standard Windows 95 features like right-button context menus. This is good news – HoTMetaL Pro 2.0 is not a joy to work with.

Testing pages is another let-down. The editing window cannot be used to test links, and there's no way to pipe a page to an external viewer like Netscape, short of manually saving the file and re-loading it into Navigator. A publishing option lets you change the

links to local documents and images in your pages to correct links for the remote equivalents, but unlike Navigator Gold, HoTMetaL Pro cannot FTP your pages to the server. HoTMetaL Pro 2.0 does have some useful options. You can set up your own macros for frequently used functions, for example. This is standard with word processors, but I've yet to see the feature in any other HTML tool. However, set against the more recent releases, this package lacks features. The real problem is that the HTML 'standard' doesn't stand still for long, so to survive for more than a couple of months an authoring tool has to be able to take new and extended tags in its stride. Refusing to work because of one unknown tag is simply not good enough.

Version 3.0 of the program may improve the situation, but I could not get any useful work done with HoTMetaL Pro 2.0. Unless their HTML needs are very unsophisticated, I doubt that any other users will either without much frustration.

#### Microsoft FrontPage 1.1

Since its acquisition FrontPage has been in development behind the scenes at Microsoft for several months, and the gold code for version 1.1 was released only last month. Unlike the other packages reviewed here, FrontPage is not only a Web page editing tool. It includes the FrontPage Explorer and Personal Web Server, which between them provide all you need to set up a small Internet or Intranet Web site.

The FrontPage Editor (shown in Figure 4) is a joy to use. Of the four products, it displays the widest range of HTML styles, including all the Netscape enhancements to version 2.0 and most, but not all, of the Microsoft Internet Explorer enhancements. It functions far more like a word processor than any of the other tools, with dialogs to control paragraph and character formatting, and to set colours and text attributes. It offers a wide range of styles, including the rarely-seen blink and citation. It is the only editor I've seen which allows you to compare the HTML text sizes with the equivalent point sizes. The toolbars are dockable, and contain buttons to access virtually all tags and functions, including forms. The editor supports forms fully, and displays them properly on the page, in the correct position.

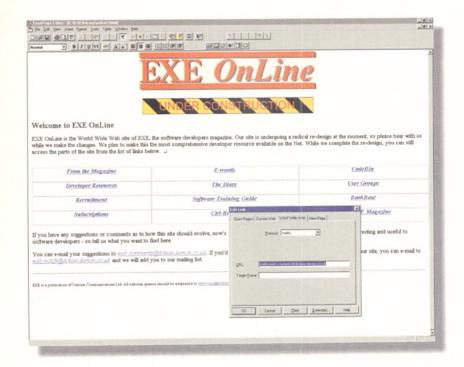
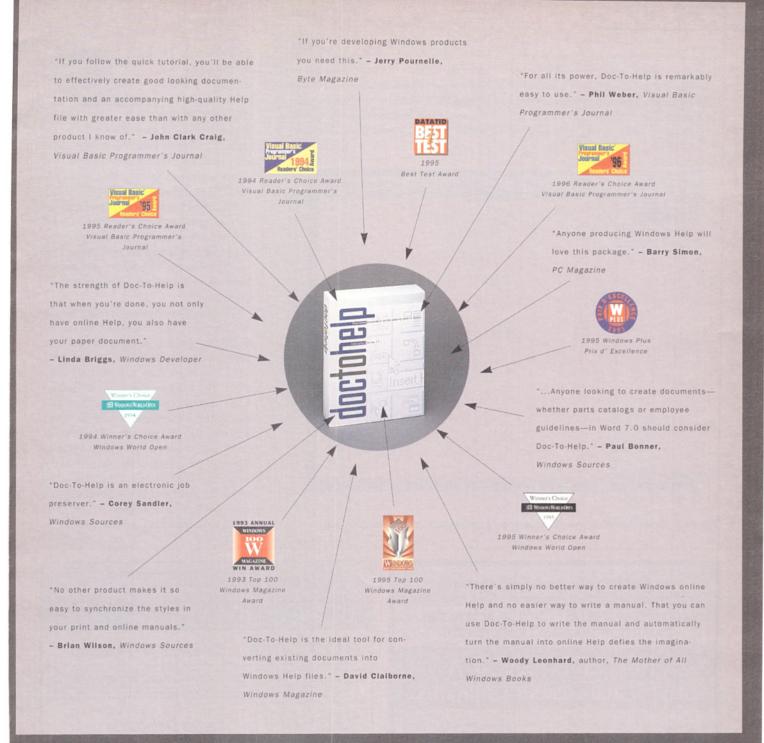


Figure 4 - The FrontPage editor shows all page elements accurately



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#### REVIEWS

As it is a Microsoft application, any Word or Excel user ought to feel at home. Editing the properties for an object is just a matter of right-clicking and selecting 'Properties' from the context menu. This is the way an HTML editor ought to work. A very wide range of

image formats is catered for, rather larger than the average browser can cope with, including exotic formats like Targa and varieties of TIFF. Colour – with the exception of coloured table backgrounds – is fully supported. Especially good about this editor is its support for unknown tags and attributes. The editor takes the very civilised view that



unknown tags and attributes should be left alone. It is even possible to edit these unknowns from within FrontPage, as the program provides an 'extended attributes' dialog for that purpose.

The editor is not a 'live' browser and cannot be used to test forms, but if the Personal Web Server is running you can test any link which refers to a page on the current Web site. Through the Web Server you can use Netscape or Internet Explorer to test the pages directly.

The FrontPage Personal Web Server is an HTTP server which runs under Windows 95 or NT. The setup is rather primitive – you have to manually edit the configuration files – but once that's done, it works very effectively. Tell it where web pages are located and you can retrieve files on your own machine (or, if appropriately configured, on a local network). The FrontPage Explorer (Figure 5) is, as it sounds, a bit like the Windows Explorer. On one side of the main window is an alphabetical listing of the Web pages within the current web, with all their references and links to other pages. On the other side is a diagrammatic representation of the

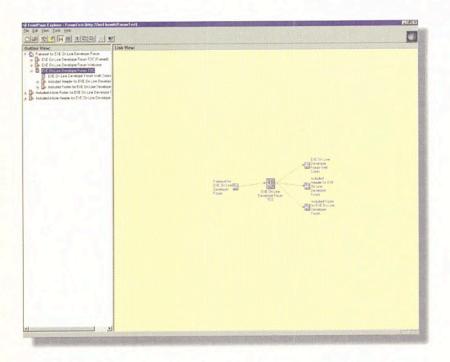
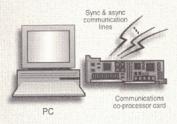


Figure 5 - FrontPage Explorer displaying a diagrammatic view of the EXE site

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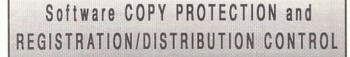
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web structure, which enables you to see easily where all your pages go to, local Web site or remote. Once the Explorer has analysed the Web site, you can use it to navigate down to the pages you want to edit. Double clicking launches the FrontPage Editor.

If you need to publish a small Web site across an Intranet, FrontPage on its own may very well suffice for your requirements. You would need to be running a TCP/IP network over a Windows NT server, and to run the Personal Web Server on the NT machine. If your server was called netserver, for example, you would point your browser at http://netserver/ from within the Intranet. If your corporate LAN was connected to the Internet as domain jbloggs.co.uk, you would point your browser at http://netserver.jbloggs.co.uk/. Personal Web Server takes care of the rest, as long as you are running a DNS service on your local network. If not, you can access the Personal Web Server using the IP address of the machine. Internet access for individual machines will work only if the machines in your LAN have unique registered IP addresses and not internally allocated ones.

Even developers using a Web service provider to publish pages will find Front-Page useful. We maintain a mirror of the *EXE* Web site here on our server, with exactly the same directory structure and filenames. By configuring Personal Web Server to point to those files it is possible to test the static pages of the Web site directly from a browser, without making any changes to the links in the pages themselves. Only when changes have been fully tested do we have to upload the files to our site.

One thing FrontPage cannot do is FTP pages to a remote site. It also falls down in that, unlike Netscape Gold, it doesn't support all the enhancements introduced in Internet Eplorer 2.0, but since unknown tags and attributes are handled by Front-Page without difficulty, it is easy to add these enhanced tags by hand.

Of the four products, FrontPage Editor is clearly the best in terms of the elements it can display as standard. The interface is the easiest to use. It is fully visual, and just as intuitive as Netscape Navigator Gold – or perhaps more. Like Gold, it lacks direct support of Java applets. With the extra benefits of a small-scale Web server and the organising abilities of the FrontPage Explorer, this package is exceptional for corporate and personal Web development.

#### Which should I use?

My experience with these packages taught me there is no perfect Web authoring tool. Each of the four reviewed has advantages and drawbacks. Their main features and details are summarised in Table 1, but here, briefly, are my findings:



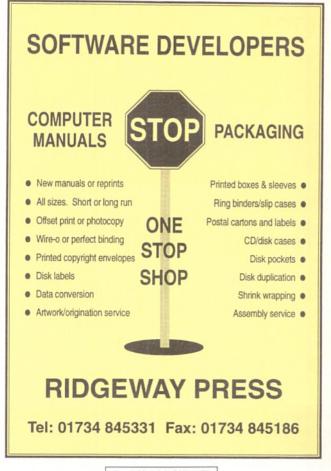
WebEdit is a comprehensive tool, ideal for the HTML expert who is happiest working directly with the code. It features a huge range of supported tags and a good previewer – not to mention the attractive shareware price. WebEdit is a well-established program with excellent support from the author, but sorry, no visual editing.

Netscape Navigator Gold has the distinct advantage of being integrated into the most widely-used browser, and has full visual editing. Lack of support for forms is a potential problem, but if you have no need for them Gold could be the package for you.

HoTMetaL Pro 2.0 is showing its age. Its lack of support for common tags and JPEG images is a big let down. The interface is idiosyncratic and sometimes unfriendly. It can't handle anything it doesn't understand, forcing the Web designer to conform to its standards. I'd suggest you wait for version 3.0.

FrontPage 1.1 is another solid Microsoft product, and easier to use than most of its rivals. The best all-round editor of the four and a Web server included as standard could well make this *the* one-stop Web publishing solution for small companies.





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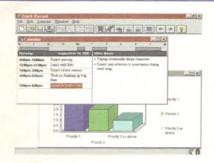
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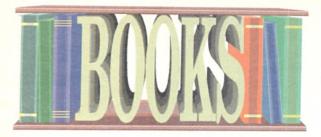
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# & CD-ROMS

#### Networking Personal Computers with TCP/IP reviewed by Mary Hope



ike an anorak, the style of this book is easier to recognise than describe. I associate books from O'Reilly & Associates with Unix, and this book has a 'Unix style'. It tends to be techy, infor-

mal, and positive. Author Craig Hunt obviously prefers the directness of the command line to pull-down menus. Networking Personal Computers with TCP/IP is a companion book to TCP/IP Administration, which covers the protocols and setting up of TCP/IP Unix workstations and servers.

Probably because of its 'other half' status Networking is a bit thin in some areas. It lacks background, and presents no discussion of why and whether to adopt TCP/IP.

The book is geared toward the network administrator who is at home with his Unix network, but must now absorb PCs into a TCP/IP network. The assumption is that the reader is going to go down this road with PCs; the book aims to ease the journey.

Networking assume readers will be more familiar with TCP/IP than with PCs, so it starts with a clear description of PC hardware and operating systems. The bulk of the volume looks at how to link in PCs that run under a DOS, WFW, Windows 95, Windows NT, or Novell Netware operating system. In each case a general discussion about implementing TCP/IP under each operating system is followed by a brief description of some popular products. Good explanations of the terminology and the underlying concepts are provided.

Each chapter contains some package-specific instructions, but the purpose is more to illustrate a concept rather than to replace the installation manual. The philosophy is that 'the knowledge needed for trouble shooting is conceptual in nature'. The level of detail is enough to convince the reader that the author knows what he is talking about - and borders on hand-holding. Hunt manages to stay between the extremes of drowning us with detail and over-arching concepts with readable ease.

This book will enable network administrators to draw up a specification for a TCP/IP package for a PC and will help them install it.

It also provides some troubleshooting pointers. Adding PCs to a TCP/IP network involves not only modifying the client PCs but also preparing the (usually Unix) servers. These processes are clearly described.

The final chapter covers the integration of Novell Netware into a TCP/IP network. Although only 25 pages long, the section covers the theory of combining the protocols with the practical detail needed for it to work, which is not a simple proposition.

Enthusiasm for the Internet is showing no signs of abating, so the need for a book on this topic is growing. However, this book does not appear to have been dashed off to cash in on a market opportunity - it is simply in the right place at the right time.



#### Verdict: Recommended

Title:

Networking Personal Computers

with TCP/IP Craig Hunt

Author: Publisher: O'Reilly and Associates

ISBN: 1-56592-123-2 Price: £22.50 Pages: 381

#### Mastering Microsoft Visual Basic 4.0 reviewed by Colin Smith



s if dominating the world of operating systems is not enough, Microsoft has shifted some of its massive resource of cash and expertise to the business of producing interactive training

materials. The first in a series of CD-ROMs for developers are Mastering Microsoft Visual Basic 4.0 and Mastering Visual FoxPro 3.0, with Mastering Visual C++ 4 and Mastering Microsoft Access to follow. The packages are explicitly targeted at experienced developers, and are geared towards preparing programmers for the relevant Microsoft Certification Exams.

The material in Mastering Microsoft VB is structured in two ways. One component is a course which mixes conceptual information with video demonstrations (AVI files), lab exercises, and self-checks. The other is a library section which gives access to the course components and sample applications, and points to other resources.

The hierarchical contents and topic views of the CD-ROM are loosely based on the proven Microsoft Developer Network (Library) design. However, the interface is not as slick as the MSDN rendition, perhaps because it was written in Visual Basic 4.0 (16 bit!).

The video demonstrations, which occupy approximately three hours of video files, are accompanied by a running commentary delivered by multiple narrators. They rattle through the material quite quickly, so viewers will find themselves frequently fiddling with the slidercontrolled zapper. The demonstrations and sample applications have been kept short and simple, ensuring that the concepts of each topic are introduced with clarity, but at the expense of any in-depth coverage.

The course is heavily biased towards Visual Basic's database and OLE functionality. Those familiar with VB will find the first three chapters wasted on elementary fundamentals. However, these early chapters provide a sufficient introduction for total VB novices to get a feel for the program before the advanced topics.

Four chapters concentrate on VB's database features, and provide some grounding in

database terminology, but it will help to have some previous database design experience. Next up on centre stage are OLE servers and automation, and a whole chapter is dedicated to showing how to create add-ins for VB.

The final chapter presents a mish-mash of topics that includes the VB code profiler, using SetupWizard, invoking help, using resource files, and using SourceSafe.

The video demonstration segments are the natural way to present VB concepts, but more use of this powerful tool would have made the title more enjoyable and valuable.

Mastering Microsoft Visual Basic 4.0 has too little content and not enough depth to lead anyone to say rightly that they have mastered each of the topics. It does offer sufficient clarity to provide a good introductory grounding in the database and OLE technologies of VB.



Verdict: Recommended for intermediary VB developers

Mastering Microsoft Visual Basic 4.0

Publisher: Microsoft £79.00 Price:

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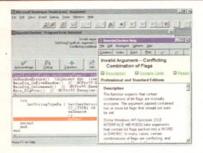
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#### **Programming Windows 95** Unleashed

By Peter Belew et al Normal Price: £46.95

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This invaluable reference manual comprises over 1,000 jam-packed pages focused on application development for Windows 95. Programming Windows 95 Unleashed presents a list of characteristics and

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Hewitt in the April issue of EXE Magazine.

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As above, with less emphasis on the system development but with good team management and customer interfacing skills. Programming skills are definitely required although more exposure and experience at general application development would be an advantage.

#### The Role

You will be expected to liaise with and provide technical support to both customers and consultants to assist in the design and development of solutions. As well as possibly manage other developers in this role and liaise with any third party developers or software providers.

If you are interested then please send an up-to date CV to:

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Tel: 01628 533143 Fax: 01628 533145

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JOB		JOB		JOB	
'C'/C++ UNIX DEVEL	OPER	'C'/UNIX/TELECOMN	MS	'C'/UNIX	
LOCATION	SALARY	LOCATION	SALARY	LOCATION	SALARY
Berks	To £23K	Cambs	£18K - £25K	Home Counties	£18K - £32K
A rapidly expanding supplier of EIS solutions is now investing in new development products targeted at the UNIX and 32bit Windows platforms. Suitable candidates must be educated to degree level and have in excess of one year's 'C' and/or C++ under UNIX (HP-UX or SunOS of added interest). Any familiarity with TCP/IP or NFS would be advantageous. Challenging technical work and the opportunity to be part of a highly successful organisation are on offer.		Our client is searching for highly professional and committed Software Engineers with a minimum of one years experience of writing 'C' code under UNIX. Any experience of C++ and OOD would be advantageous. The ideal candidates will have experience of working in a large, well structured development environment. There are also opportunities for those Software Engineers with experience of real-time embedded software systems. Successful candidates will be working on leading edge network management systems. There is also the opportunity for limited European travel. REF: DE/2		High calibre Software Engineers are required by our client, a leader in Open Systems Technology. Suitable candidates will have at least two years 'C' programming experience in a UNIX environment. Knowledge of UNIX operating system development (kernel, utilities), assembler level programming or compiler writing, although not essential, will be highly desirable. Working in a small, dynamic team, you will be involved in the development of new products and the support of existing products by investigating problems and creating solutions.	
JOB		JOB		JOB	
'C'/UNIX PROGRAMM	MERS	UNIX SYSTEM ADMI	NISTRATOR	'C'/C++/UNIX/FINANCE	
LOCATION	SALARY	LOCATION	SALARY	LOCATION	SALARY
Cambs	£15K - £25K	City	To £30K	London/Surrey	£20K - £28K
the development of medica rently searching for Progra UNIX skills. Any experien working protocols or of O advantageous, but is not es	oftware house, specialising in applications. They are cur- immers with strong 'C' under ce of communications/net- dracle or Sybase would be sential. Working in a friendly opportunities for career pro-	ment for a UNIX Systems A have a sound UNIX system along with some networki Any banking or other finar would be advantageous, bi in the Internet would also	ant brokerage has a require- Administrator. Candidates will as administration background and skills, preferably TCP/IP. acial applications experience ut is not essential. An interest be useful. A flexible working eact quickly in a fast moving	These positions will appeal to developing systems for the toldeally a graduate, you shout UNIX programming skills gain ment. Additional experience (particularly Oracle, Sybase of essential, will be of interest. development environment, the tact, so candidates should be.	rading room environment uld have strong 'C' and/or ned in a financial environ- with relational databases or Powerbuilder) whilst no Working in a challenging ere will be some client con-

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REF: JK/6

confident

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#### WINDOWS DEVELOPERS

Visual C++ Development

Up to £32,000 + bens Farnborough The Company: One of the world's leading business and

The Position: Working within the business centre you will be designing and developing advanced systems including reservation and travel systems

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Ref: T.I/411

#### 'C', C++ MS-Windows SDK for Financial Exchange

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#### OLE/WINDOWS NT DEVELOPMENT

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systems with development division in the heart of the

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The Person: At least 4/5 years' experience as a developer

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The Position: To contribute to the whole development life

cycle from design and specification to implementation using

The Person: Both junior and senior software engineers are

required with a minimum of 1 year up to 4 years experience

Visual C++ 32-bit Windows Development

The Company: Software company producing virtual reality systems for use in both Home entertainment and industry.

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The Person: One year's minimum experience of Visual C++/MFC and Win 32 for 32-bit Windows development. Any

further experience of Multimedia or graphics libraries would

the latest technologies.

Hants/Berks Border

be very beneficial.

#### Windows NT & Visual C++ £25,000 to £35,000 + benefits

City The Company: Developers of NT based component based

ystems for leading city based blue chip clients. The Position: Analyst programmer required to undertake the opment of Windows NT applications using Visual C++

and utilising Object Oriented Technology.

The Person: Degree educated with experience of Windows NT, Visual C++/MFC and Visual Basic. Any further experience of SQL Server, Component development (OLE) or client server

#### £18,000-£28,000 Peterborough

BORLAND C++, OWL £20,000-£28,000 + bens

0

The Company: Young but expanding software supplier of leading MIS and manufacturing software.

The Position: Analyst/Programmer with a PC background to take responsibility for development projects from initial concept

The Person: At least one year's computing experience, ideally 2/3 years with a Windows/PC background and some devel opment exposure to Borland C++ and OWL. Ref: PH/413

#### VISUAL C++ RISK DETECTION SOFTWARE Windsor/Slough c£23,000 + bens

The Company: Leading independent company developing the latest in currency risk management software available via the Internet

The Position: Working in a small team you will be working on the next generation of MSWindows software across the

The Person: You will have gained at least 1 year's experi ence of Visual C++ with some MFC experience. An interest or knowledge of the Internet would be an advantage



These are a small selection of our current vacancies. Please call or send/fax a CV for more information.

Ref: DL/312

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#### Microsoft Windows 'C++' Programmer

Pacific Solutions Ltd (PacSol), a market leader in Imaging software for the AS/400, is looking to expand its team of dedicated development engineers.

Applicants should have at least two years Microsoft Windows programming experience using C++. Familiarity with Microsoft's Visual C++ 1.5x development environment will be a distinct advantage.

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PacSol develops and markets the ImageView and CaseView systems which have over 100 installations world-wide with an international distributor network. Employees are encouraged to use initiative and imagination and have a 'can-do' approach to their work.

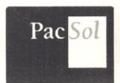
Remuneration is negotiable and the company offers a range of employee benefits.

Please send details about yourself to: Richard Blyth.

Pacific Solutions Ltd, Kingfisher 170, Frimley Business Park, Camberley, Surrey GU16 5SG

Tel: (01276) 808860 Fax: (01276) 808972 E-Mail: gbpacrjb@ibmmail.com

No Agencies



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We are an engineering software and consultancy firm developing operational and engineering software mainly for the offshore oil and gas industry. We are looking for 2 software engineers to work within a small team and to be able to make a contribution to all stages of the software development process.

#### C/Visual C++/MFC/Windows NT Central London

- degree in a numerate discipline.
- 2+ years experience in Windows design and development.
- any previous exposure to shipping or offshore industry or additional experience of real time data acquisition, comms, network programming or FORTRAN would be an advantage.

Salary will be in accordance with age and experience.

Send your CV to:

Barry Miller, Global Maritime Technical Services Ltd Maritime House, 12 Craven Street

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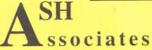
They need your in depth experience of both MS-Windows and X-Windows GUI development using C/C++ gained in an OOD environment, Windows-SDK and OSF/Motif. Any experience of Macintosh systems an advantage.

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Neither a borrower nor a lender be!

was the night before the Visual Tools show (September 11, 1995, if you must know), and all through Microsoft, nothing was stirring - except Mike Pryke-Smith, the UK development product manager. When Bits Per Second's general manager Robin Flowers received an urgent call from the MS man begging for the loan of a Visual Basic 4.0 CD - Microsoft US had somehow neglected to send any to Microsoft UK- Flowers generously sent his CD over. Ctrl Brk understands the CD-ROM has yet to be returned. It remains to be seen whether this is evidence that Microsoft UK still has no copies of VB 4.0, or just that no-one is telling Mike they do...



oticing the flurry of letters that was provoked by Jules May's recent piece on computer consciousness, Ctrl Brk can only hope that they never teach 'it' how to trim hedges.

#### Brian and Betty by Neil Kerber MIND STAYING IN TO LOOK AFTER THE KIDS WHILST SHE'S OUT ? SEE --SHE LOVES ME! WE GOT AN E-MAIL FROM YOUR WIFE. IT'S HER BIRTHDAY AND SHE WANTS TO GO DUT FOR A ROMANTIC MEAL .....

Send your rants and raves and interesting tales to: EXE Magazine, 50 Poland St London W1V 4AX editorial@dotexe.demon.co.uk

#### Mr Scissorhands, I presume

Tore developments on the robot Lengineering front. Together with University of Strathclyde, BT has been developing a robot which lives [sic] in Glasgow. Using Virtual Reality technology and (naturally) telephone wires, operators in other parts of the country can see another environment through the robot's eyes. Further plans for '96 include giving their little protégé some arms and hands.



#### Social malaise

Information overload comes to mind as soon the 'Information superhighway' is mentioned. According to Winn Shwartau, the expert on Information Warfare, this is not the only social malaise which can be exploited in cyberspace. Watch out for binary schizophrenia, digital addiction, or even worse, approximation anxiety.

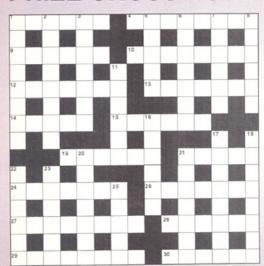
#### What's in a name (server)?

The IBM OS/2 Memorial Award for Shooting Yourself in the Foot this month must go to Chris Cain, ex-Technical Directory of the Internet Service Providers Association and Director-designate of

resigned.

NomiNet, the company which will administer the .co.uk Internet domain. Mr Cain accidentally managed to bring down the name server at NomiNation, a rival company which manages .uk.com, by bombarding it with IP packets until it rolled over and died. NomiNation at first believed it had been the victim of a malicious attack, but now classifies the incident as an 'avoidable accident'. Cain's account on a Southampton University computer, through which the packets were directed, has, it is said, been closed. He has since

#### PRIZE CROSSWORD



#### ACROSS

- Transparent part of desktop (6)
- Change some initial format with those changed (7)
- Delete? Au contraire! (6) 9.
- 10. This curve is steep when easy. despite what folk say (8)
- 12. Concatenating in a friendly fashion (7)
- Such a pursuit hardly bears thinking about (7) 13.
- 14. For many programmers a snack if that (5) 15. No chant about querying inquisitively (6)
- The simplest tree (6) 19.
- 21. Ruined some new and fashionalble units initially (5)
- 24. What a cpu does, or just one task (7)
- 26. Get out the digit or the right data (7)
- 27. Weak radiation between some computers and their peripherals (8)
- 28. Storage system may be a happy one (6)
- 29. Items in a chemical array (8)
- 30. I hear you are in the end consumer, one who makes loans (6)

#### DOWN

- Of 28 to which you can add data (8)
- Having a cuddle with a chick (8)
- Aquatic inhabitant making a row maybe (7) 3.
- Non-secret set of balls to start (5)
- Software edition with fewer bugs? (7)

- Endlessly pulling up dried fruit ... (6)
- ... and wisely working with a common system (6)
- 11. Things to do list for information in language (6)
- 16. Different approaches to field gates it seems (6)
- 17. casual technique not that of a roundhead (8)
- 18. Internal or external: just as important a user (8) 20. Go round and round a tree (IT) in confusion (7)
- 21. Dogs (red?) crossword compilers (7)
- 22. When the computer's working ... (6)
- this is an essential fuel for us (6)
- 25. White as an array of numbers (5)

#### SOLUTION TO MAY'S CROSSWORD

ACROSS
1. TRACE 4. ATTRIBUTE 9. BOOLEAN 10. BIPOLAR
11. OWL 12. LATENCY 13. ECLAIRS 14. TIDAL
16. NOISELESS 20. RECEIVERS 23. AGREE 25. ADAPTER
27. LOCKOUT 28. ADA 29. MANAGED 30. TUITION
31. DELIRIOUS 32. EAGER

1. TABULATOR 2. ABORTED 3. ETERNAL 4. ANNOYANCE 5. TABLE 6. IMPULSE 7. UGLYIRE 8. EARNS 15. AXE 17. INSULATES 18. LOG 19. SWEETENER 21. CHANNEL 22. INTEGER 23. ARCHIVE 24. ROOTING 25. ARMED



#### The All-New Adventures of Verity

#### How the problem was solved

Some people like to mull over programming projects in the bath, but Ms Stob does her best work 'on the hoof', as she puts it. 'On the trotter' might be nearer the mark.

f I can place the pump, I'm sorted. The pump mimic is the key to the whole simulation. If I show pressure in the main pipe at the top as a bar graph, then I can squeeze in the pump animation like, like, like the crack in that paving stone where it goes up to the wall. So we could do

PavingStone.X := Sin(CrackAngle1) +
Radius\*Sin(Crack.Theta);

PavingStone.Y := Sin or do I mean Cos(CrackAngle2) + Radius\*Cos(the other thing)

only that's not going to work, because they can resize the wall by changing the flow rate. Hmmm. I wonder if this shop happens to sell those Mars bar ice creams. Oh, it does. How interesting.

Of course, I could move the whole pump mimic to another dialog, but we have got too many dialogs already, and I should think that they would want to leave it runaaaaaargh aaaaaaaargh oooooaaaa eeeeeek aaaaaaargh. Ice cream headache alert! Come friendly bombs, and at least take out the Mars factory, for devising such torture! Yeeeeeeowww. Oooof. Phew.

Mmmm, that was nice.

Come on get on with it. Parameters affecting pump speed are density of slurry + back pressure and of course the Boolean whether it is switched on. I suppose we shall have to do a fastish Fourier on the monitor output so that they can pick up important frequencies. Oh look there is another newsagent. Parameters affecting purchase of a second Mars are NUMBER OF CALORIES, a floating point constant represented by a special bit pattern that the IEEE people have designated as plus infinity, guilt and can you give me five

pounds more, please I think you will find I gave you a tenner, thanks. Yes I did shut the freezer.

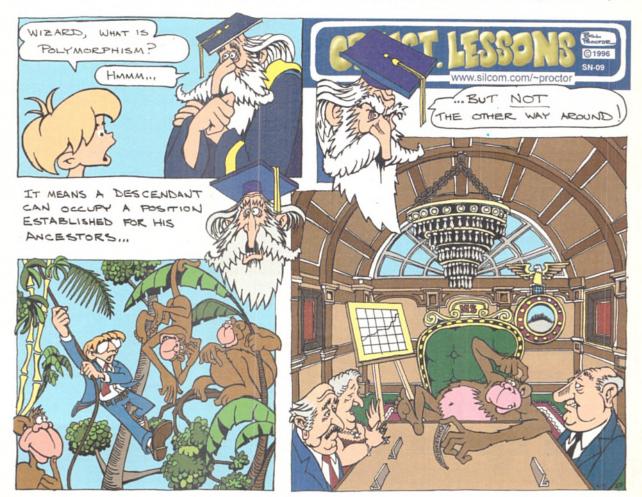
Walk a bit faster to work it off. Of course back pressure is a lagging indicator — will only appear after pump has been running for a few minutes. Whereas current consumption of motor peaks very early. It's going to be fun logging all this. Will have to do rescalable time series graphs, I suppose. That can be the reporting module.

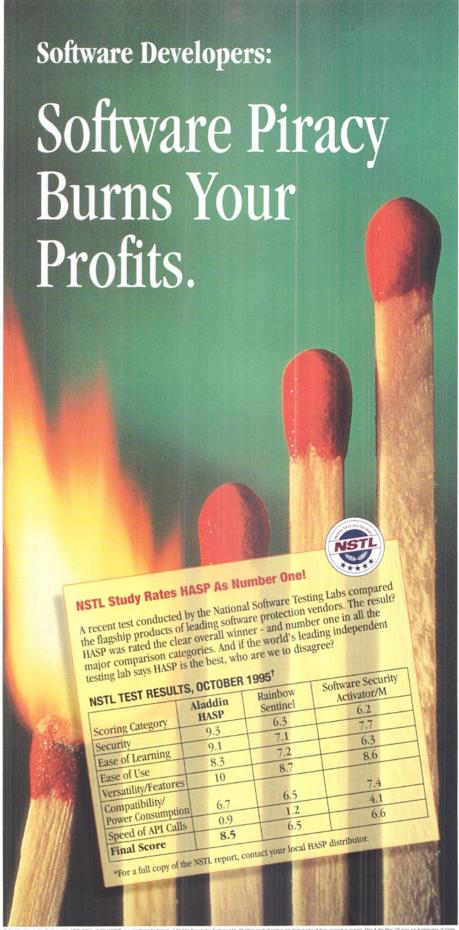
Another lagging indicator is recklessness. I could, if I wanted to, turn down this road and buy a third from that corner shop. Just like that. Whereas guilt definitely peaked at ice cream #2, and is now falling off, and greed is hanging in there. No that's all right, I don't need a bag, I'm going to eat it now. Gosh. That's outrageous. That's probably a world record. I bet even Her Former Royal Highness The Duchess of York, during her little known sojourn as a programmer, has never ever ever eaten three Mars ice creams on the trot. Must stop stuffing my face and do some work.

Think about data structures. The pump is an obvious object, keep all its instance data private. A classic state machine, just like Meyer says. Anticipation is a state machine with two instance fields: practical and metaphysical. Anticipation.Practical is for what is about to be enjoyed, whereas Anticipation.Metaphysical is for things never likely to be enjoyed. So while I could go in here and buy another, because I have now eaten so much any more won't make any difference, it is actually more pleasurable to contemplate the act without doing it. Assert (queasiness equals zero). No exception. See, I could handle another, I choose not to.

Mind you could murder a Diet Coke.

Thanks to Dave@AIS for the idea. Verity Stob weighs 16 and three quarter stone.





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