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SEPTEMBER 1998

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Illuminating the enterprise



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Visual C++
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applications
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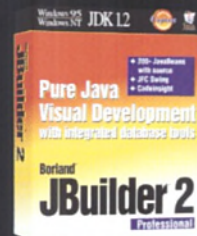
Tools survey

We ask the developers

DT 98
development tools



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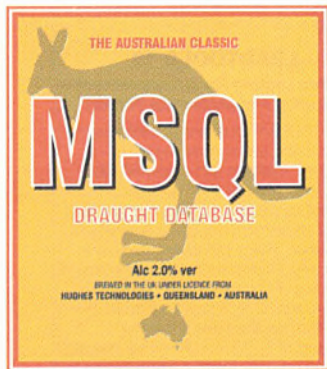
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News & Views

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We have full details and aggressive pricing on the new Microsoft development tools.

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For a limited time, PowerJ Enterprise is available at a very special offer of little more than 10% of the cost of the full product! Remember, this is the same state of the art Java tool that earned PC Magazine's coveted Editor's Choice award recently. The only restriction is that it does not include a commercial license.

Instant Basic for Java Standard - Free Edition

Would You Like a Free Basic Compiler?

Halcyon are offering the Standard Edition of their innovative Instant Basic for Java tool free of charge for a limited period. Instant Basic for Java is similar to Visual Basic but generates Java bytecode, so you can create Java Beans, applets and applications using Basic. There are no catches, although Halcyon are hoping that you will then upgrade to the Professional edition which is more powerful!

LEADTOOLS 10

Are You Looking For A Comprehensive Imaging And Multimedia Toolkit?

LEADTOOLS is an award winning imaging toolkit that provides more than 600 functions, methods and properties with imaging technology in 15 general technology categories including: scanning, colour conversion, display/ special effects, annotation, image processing (there are more than 60 different filters), compression (including JPEG, LEAD CMP, CCITT G3/G4, and LZW), image file format import/export filters (more than 50 including TIFF, GIF, and FlashPix), imaging common dialogs, Internet/intranet imaging (Internet enabled ActiveX and Netscape Plug-in), database imaging, optical character recognition (OCR), screen capture, multimedia, and FlashPix extension.

ProEssentials 2.0

Do You Need A Charting Control That Can Handle Hundreds of Thousands of Points?

ProEssentials 2.0 is a set of components that lets you quickly and easily add charting and interactive data visualisation to your applications. It excels above other charting tools in the areas of image quality, handling large amounts of engineering/scientific/financial data, data-monitoring/acquisition, historical data logging and viewing, flexibility (including annotations, multiple axes and combinations of plotting styles), speed, data-limits, and general ease of use and maintenance. It includes OCX, VBX, VCL and DLL interfaces.

Visual Intercept

If You Use Visual SourceSafe, You Need Visual Intercept!

Visual Intercept is a project-oriented bug tracking system that fully integrates with Visual SourceSafe, Visual Basic and Rational Visual Test. It has a sophisticated Project/Incident Browser, Project Wizard that can import existing Visual SourceSafe projects, is fully scalable (using any ODBC database for storing incident data) and has an easy to use query and reporting system using Crystal Reports (you can define your own reports if you have the Crystal Reports designer).

Fear and loathing on the Internet



If, like me, you grew up in the golden age of the Great British Micro (1981 – 1988 inclusive), you must have heard about the eternal battles which raged between owners of the Sinclair ZX Spectrum and the American-built Commodore 64 – disparagingly known as a ‘Commode’ in Sinclair circles. Nor can you have missed the even longer-running Atari ST vs Commodore Amiga battle, which legend has it goes on to this day in distant corners of the land.

Like me, you will remember that in the pre-Internet age, the only open forums for these battles were the letters pages of the UK computer press (the Internet didn’t yet exist in the UK, and few if any people had access to the academic networks or BBSs). And like me, you will remember the level of maturity and cogent argument with which these battles were fought: none. Basically, it boiled down to ‘my computer’s better than yours – so there’. I imagine Aristotle, the father of reason, was turning in his grave especially quickly during those years.

Sadly, the ‘mine’s bigger’ syndrome has survived into the Internet age, and is alive and prospering on Usenet and Web conferences all over the Net. The debate is equally infantile, the objectives unclear, but everyone seems to be having a jolly good time arguing about them. For me, it all started when I became involved in a discussion about dynamically-generated Web pages; someone (let’s call him User One) had asked how he could quickly and easily go about doing these for an in-house project. Someone (User Two) had replied saying that ASP was a good solution with minimal

learning curve. Then a third (User Three) weighed in slating User Two for recommending ASP because ‘it doesn’t run on Unix’ and ‘you would have to use VBScript’ which ‘no-one in his right mind would want to do’.

Aside from the fact that this is downright wrong – ASP is available on Unix from ChilliSoft, and ASP can use any installed scripting language including JavaScript and PerlScript – I was struck by the offhand dismissal of anything which was not Unix, and the

a few experienced people, now you can expect a deluge of ‘me too’ replies from two or more camps most of which will be slugging the other camp off with little or no factual evidence to back up their arguments. The assumptions some of these people make – and attempt to pass on to inexperienced developers – are staggering: Unix is always best. NT is always best. All Microsoft software is bad. All Microsoft software is good. Perl is the only language for Web development.

integration features. Quick reality check: I can’t speak for other people, but IE4 crashes on my machine a lot less often than Navigator 4.05, and I do like the shell integration features.

Confront the pro-Navigator people with inconvenient facts, like the fact that Netscape fails 32 separate items on the W3C’s Cascading Style Sheets 1.0 test suite when IE fails 10, or that Microsoft’s DHTML implementation in IE4 is already compliant with the W3C’s Document Object Model Core HTML draft standard, and they usually moan about Microsoft bullying the W3C into accepting its standards over Netscape – something which, as far as I am aware, has no basis in fact.

Increasingly, software companies are recommending that developers use Internet resources for support, saving them time and money. Yet these resources very often just confuse the issue. Obviously this is not always the case; sometimes you can get just the information you need on Usenet without all the time-wasters and ‘mine’s bigger than yours’ merchants. But more often than not you need to search the threads for nuggets of information between the flame wars.

Platform bigotry is nothing new: it’s been with us since the earliest days of computing. Nor is it always a bad thing – only the loyalty of dedicated and sometimes blinkered users (me among them for some years) kept OS/2 alive for so long, or helped bring Borland back from the abyss. But when developers go to discussion forums to ask questions what they need is helpful advice, reasoned opinions, and above all accurate information. Anything less does a disservice to our community. ■

Neil Hewitt

In these forums it’s taken for granted that IE4 always crashes your machine and that no one anywhere in the known world likes its shell integration features.

automatic assumption that no competent programmer would want to use VBScript. Remember that this is a forum where inexperienced Web developers can come to ask questions of those who have the experience, so the authority of the replies is taken for granted. Yet User One hadn’t mentioned whether his Web server was on Unix or NT, or which languages he already knew. For all User Three knew, User One could have been running on NT with IIS and could have had significant VB experience – which, as it turned out, he had and was.

It seems that increasingly the Internet discussion forums – particularly Usenet – have become the province of people with an axe to grind, whether that be pro-Unix anti-Microsoft or pro-MS anti-Unix. Where once you could post a question to a newsgroup – having read the FAQ first, of course – and expect a reasoned answer from

Java is the only language for Web development. VBScript is bad because it’s derived from VB which is bad because it’s from Microsoft and isn’t ‘open’. Or VBScript is good because it’s derived from VB which isn’t anything to do with Unix.

There’s almost as much rubbish talked about the rival browser platforms as there is about the operating systems. Netscape-advocates take every opportunity to gloat about bugs or security holes discovered in Internet Explorer, even when one or two of those holes applied equally to Navigator, and again many of these people – a lot of them Web developers – make sweeping statements to the effect that no-one in their right mind would use IE as if this were a fact rather than an opinion. In these forums it’s taken for granted that IE4 always crashes your machine and that no one anywhere in the known world likes its shell



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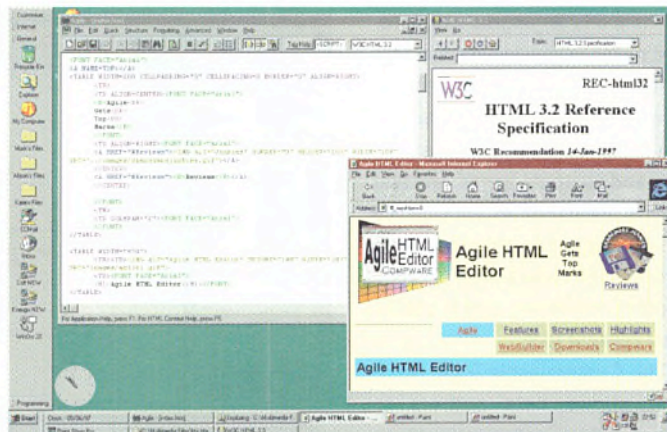
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The agile display of HTML standards

Compware has released the Agile HTML Editor for Windows 98. This represents version 1.20 of the shareware product. The main HTML standards and browsers are supported, and authors can switch from one standard to another. The editor will automatically reconfigure itself, updating its menus, error highlighting, and help hints. The case of inserted tags, syntax colouring, favourite colours, and menu terminology are under user control.

Compware claim that its rapid delivery of updates has enabled web authors to keep pace with development of the World Wide Web during the last year. The latest techniques supported include Dynamic HTML, Scriptlets, and style sheets.

The primary feature of the Agile editor is its use of the 'right-click'. This supports tag editing, with a right-click offering tag configuration. Colour selection, including the definition of your own colours, is also available using the right click menu. Other features include 'Snippets', which saves frequently used or complex chunks of HTML, making them available from Agile's



menu for quick reuse. Syntax colouring identifies tags according to their function, to ease navigation of unfamiliar HTML. Colours are updated as you type, and misspelled or incompatible tags are highlighted in red.

Agile is non-WYSIWYG. Compware assert no such thing can be possible with so many different browsers. Instead, the Instant Page Preview feature is designed to make previewing HTML in different browsers as easy as possible.

The editor supports an unlimited file size, multi-level undo/redo,

search and replace, print preview, save all and save modified.

In terms of standards, it fully supports HTML 4.0, HTML 3.2, and HTML 2.0. Agile knows about every tag and its attributes, and the standard that they apply to. Browser feature sets supported are: Netscape Navigator 4.0, 3.0, and 2.0; Netscape Communicator 4.0; and Internet Explorer 4.0, 3.0, and 2.0.

The Agile HTML Editor costs £50 and the full working version can be freely downloaded. It runs on Windows 95, 98, NT 3.51, and NT 4.0.
www.compware.demon.co.uk/agile

Informix Dynamic Server-Personal Edition is a single-user database server for a **Windows** 95/98/NT desktop. Providing complete compatibility with the enterprise version of **Dynamic Server**, it is designed to combine performance and enterprise features with simple installation and configuration.
www.informix.com

The **HAHTsite** National Language Support (NLS) Enterprise Solution Module (ESM) provides **multi-language** support for **web** applications. However many translations are required, there is only one set of code to maintain. The ESM is available free from the Web.
www.haht.com

A subset of **ClusterCATS**, the **website** resource management software from Bright Tiger, will be incorporated in future versions of Allaire's **ColdFusion**. Features for Cold Fusion 4.0 include application load balancing and server fail-over.
www.allaire.com

Transactions across the Internet

Inprise claims **Visibroker Integrated Transaction Service (ITS)** is the first complete, **Corba**-based transactional middleware to provide support for **Java** clients and servers and for **Sun's** new **Java Transaction Service (JTS)** architecture. It enables **Java** deployment with full transactional control.

The aim behind **Visibroker ITS** is to enable companies to deploy **Java** throughout their business, with the full transactional control to which they may be accustomed.

In addition to support for the latest version of the **JTS** architecture, it fully supports **OMG's** specifications for **Corba 2.0** and **OTS 1.1**. As well as providing the functionality of traditional **TP Monitors**, there are graphical administrative tools to monitor and control the status and completion of transactions, to terminate transactions, and to investigate problems in the error log. Finally, through an optional **ITS** extension, **ITS**-managed transactions can coordinate (as part of a single transaction) database resources and **TP Monitor** or messaging resources running in **IBM's CICS**, **IMS/TM**, and **MQ Series** environments or **BEA's Tuxedo TP Monitor** environment.

Inprise identify **Visibroker ITS** as a key component of its enterprise application server scheduled for delivery later this year.

Java Transaction Service JTS is a major requirement for **Enterprise JavaBean (EJB)**-based application servers.

www.inprise.com/visibroker/its

InstallShield for Solaris

InstallShield Software and **Sun Microsystems** have announced an alliance for the development of cross-platform installation, to make the **InstallShield** look and feel available to users of **Solaris**.

The two companies will co-develop **Solaris Web Start Wizards**. This is a set of **Java** classes which will be included in the runtime version of the **InstallShield Java Edition** tool and as an **API** in the **Solaris** operating environment. Users will be able to build cross-platform installations and allow administrators to install **Solaris** applications both locally and remotely across the network without additional coding.

Early access to the developer's toolkit is available for download at www.sun.com/solaris/webstart.

www.installshield.com/java

SELECT Software Tools, the producer of component-based modelling and management tools, has announced plans for integrating **SELECT Component Factory** with **Mercury Interactive's TestDirector 5.0**. This will enable developers to link **component** models and specifications to test plans and test cases.
www.selectst.com

The official vote on the **C++** Final Draft International Standard (**FDIS**), to make it an **International Standard**, was passed with a yes-vote of 20 against a no-vote of 0 (three national bodies failed to vote).
osiris.dkuug.dk/JTC1/SC22/WG21/

Visual authoring for Windows help

Web Query 2.11, from Cognos, is for the online exploration and navigation of **relational** data within a browser. It has new usability features for users and administrators and enhanced integration with other enterprise products from **Cognos**.
www.cognos.com

Visual DateScope 2000 v3.0 is Class Solutions's **Y2K**-ready VB toolset. Version 3.0 has an Office2000 add-in, which scans and converts **VBA** embedded in Access 97 and Excel 97, improved search facilities, and a set of management reports. A single user licence is £715.
www.componentsource.com

Sax Setup 98 is the latest upgrade to the Windows **installation** software from Sax Software. Supporting both 16- and 32-bit Windows platforms, it offers an enhanced design environment, and extra capabilities for the **setup** programs. It retails at £175.
www.contemporary.co.uk

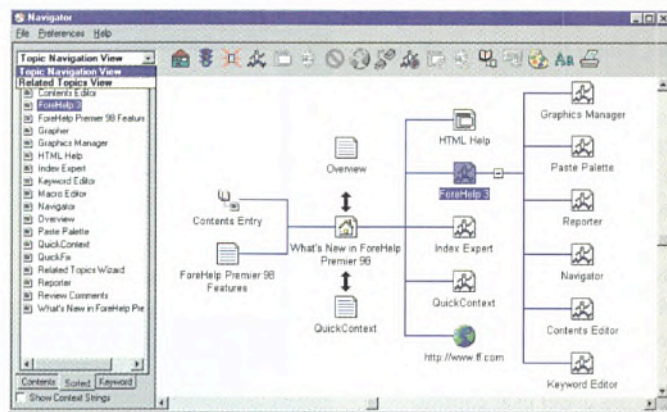
Intersolv will extend its DataDirect Sequelink ODBC and Java-based data access technology to include client applications on IBM's OS/390 **Unix** System Services. The agreement will complement the DataDirect Sequelink server access to **DB2**.
www.intersolv.com

Dialogic's SpeechWorks Host is a low-cost **speech recognition** system for computer telephony (**CT**) applications. It runs on standard **Dialogic** voice products within a Pentium-class PC, enabling developers to integrate additional speech technologies into existing applications. For Windows NT, from \$200.
www.dialogic.com

ForeHelp 3 is an upgrade to ForeFront's standalone environment for editing and testing help projects. It allows the developer to simulate help files, verify links, access the index and contents pages, and test macros. Features in version 3.0 include support for Windows 98, a customisable navigation panel, a graphics manager, and a conditional content tool.

The Customisable Topic Navigator allows help authors to explore and navigate a project (see screenshot). The topic list can be displayed in a table of contents and can be sorted in such ways as by index keywords and topic type.

The conditional content feature allows developers to create different versions of the help file from one project. Users can flag any content to be built only to Windows 95, Windows 3.1, or HTML help files, and can define their own conditions.



A graphics manager provides a preview of all project graphics, lists all topics where a graphic is used, and allows the user to globally edit and replace graphics.

Topic and project status reporting enables developers to track the status of projects by labelling them 'in development', 'needs review', 'complete', or 'out of date'. New categories can be defined.

Also from ForeFront, ForeHelp Premier 98 packages ForeFront's full line of help authoring tools into a suite for WinHelp and HTML-based help development. The suite contains the new releases of ForeHelp 3 and ForeHTML Pro and eight other add-on products.

ComponentSource price ForeFront ForeHelp 3 at £185.
www.componentsource.com

Databases for Linux

Both Informix and Oracle have announced Linux support for their databases. This will be available immediately, in the case of Informix, and by the end of the year, for Oracle. Computer Associates has already announced Ingres products for Linux.

Informix-SE and ESQ/C will now run on Linux. Informix Software sees Linux as a fast, high-quality operating system that offers the reliability of Unix and the price and performance of NT. Informix-SE is an SQL-based database engine for small to medium applications, which requires minimal database administration. Support has been introduced in response to user demand.

Linux application developers can download a free developer's kit that includes: Informix-SE; ESQ/C for Linux, Informix's SQL toolkit; and I-Connect, the runtime version of ESQ/C. Informix-SE and ESQ/C on Linux is immediately available, supporting commercial versions of Linux from Caldera and S.u.S.E on the Intel platform. Informix is committed to working with Red Hat Software for future releases to support Red Hat Linux and the multi-threaded Glibc libraries. For promotion, Informix is offering free development licenses for Informix-SE and ESQ/C to any Linux developer who registers with the company.

From Oracle, Oracle8 and Oracle Applications will be ported to Linux. This will enable Linux users to deploy enterprise-class applications. Again, Oracle quote customer demand for the platform as the reason for the initiative.

Oracle8 on Linux will be made available for a 90 day free trial via the Web by the end of 1998. Shipment of Oracle8 for Linux on the Intel platform is also expected by the end of 1998, while shipment of Oracle Applications for Linux is expected in the first quarter of 1999.

www.linux.org www.informix.com/jdn www.oracle.com

A window on process control

DataViews 9.9 is a tool for the development of real-time animated graphical interfaces. Enhancements in this version include a set of standard Windows controls that interact with the DataViews graphics, the automatic code generation of C++ code for DataViews graphics, and integration with VC++ Developer Studio for MFC development.

The Windows controls are accessible from a toolbar in DV-Draw, DataViews' point-and-click drawing editor. Once a control is selected it can be directly inserted into DV-Draw's workspace, existing alongside DataViews' graphical objects. The controls are accessible at runtime through DV-Tools, DataViews' C/C++ API. For DV-Tools, new C++ classes are available for MFC development.

Platform support: Windows 95 and NT 4.0 with MSVC++ 5.0. Cross platform versions are supported, including HP, SUN, IBM, and Digital. Prices start from \$11,700.

www.dvcorp.com



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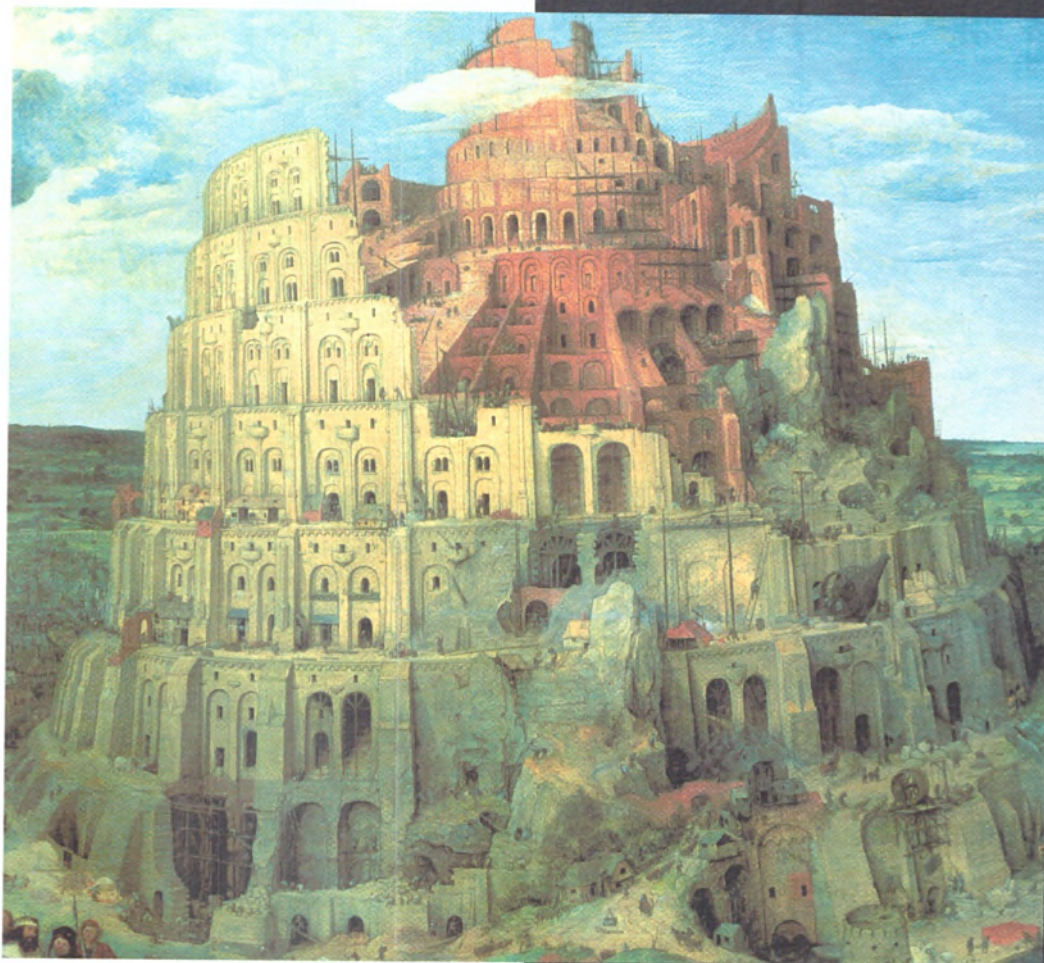
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*Technology Preview 2 will slip in the box with a free upgrade voucher for the final version of J++6.0, (available October 1998).

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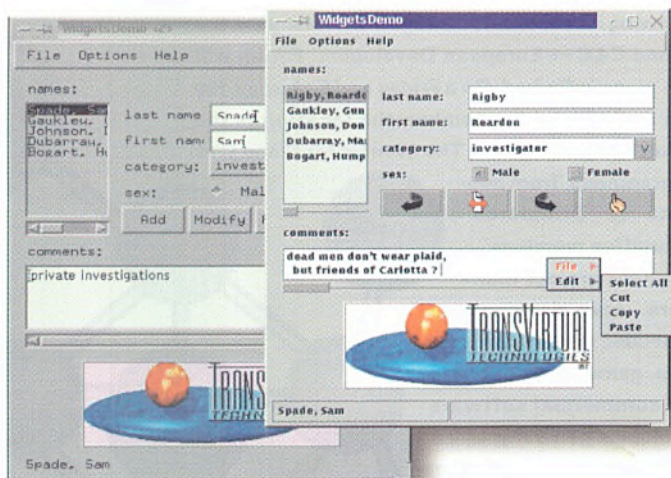
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A twin for PersonalJava

A beta version of a 'PersonalJava-like' development system is available from Transvirtual Technologies. This is Sun's version of Java geared towards handheld computers, set-top boxes, smart phones, and other embedded devices. Under the 'Open Source Initiative', Kaffe OpenVM includes a virtual machine, a just-in-time compiler, and 1.1 compatible class libraries (with AWT widgets).

There are two editions of Kaffe OpenVM beta 1.0. Transvirtual provides a 'Desktop Edition' under the GNU Public Licence, but its primary focus is on a 'Custom Edition', which is aimed at bespoke and embedded systems and comprises a customisable source base.

The specification for Kaffe Custom Edition is as follows: a complete virtual machine within a 100 KB footprint; a set of class libraries (confirming to the PersonalJava API 1.1 specification) including `java.lang`, `java.io`, `java.net`, `java.util`, `java.util.zip`,



`java.text`, `java.beans`, and `java.applet`; to run on a range of processors, including x86, Sparc, MIPS, 68K, and Alpha; support for most desktop operating systems, including Windows 95, 98, and NT, Linux, DOS, Solaris, SunOS, and SCO; support for embedded operating systems; support for kernel or non-kernel threads; ability for filesystem-less and network-less

operation; and support for windowing or non-windowing systems.

For the Custom Edition, Transvirtual provides, under commercial licence, full source code, customer support, and consultancy services to tailor Kaffe to a specific system. The Desktop Edition can be downloaded from the Web under the terms of the GNU Public Licence.

www.transvirtual.com

A model database

ER/Studio 2.6 represents the UK launch of the database design and modelling system developed by Embarcadero Technologies. In this release there is enhanced enterprise-level data modelling, improved usability and performance, and native database connectivity for MS SQL Server 6.x, Oracle 7/8, and Sybase 10/11 database platforms.

ER/Studio 2.6 is a multi-level database design tool that allows users to create enterprise-scale logical data models and to derive from them any number of physical database designs of the same or different DBMS platforms. Physical database objects for many SQL and desktop databases can be automatically generated or altered from physical designs. Comparison and synchronisation capabilities help the management of multiple design views.

Version 2.6 includes the following features. Metadata underlying data models can be exported to many SQL and desktop databases, so users can gain direct access to metadata for customised reporting and analysis. To support the reuse of business rule definitions at the enterprise level, users can now share data dictionaries between data models. Diagrams can be exported as Windows Metafiles, bitmaps, and Enhanced Metafiles. Finally, Embarcadero claim this release improves the performance of critical modelling tasks by up to ten times over previous versions.

ER/Studio 2.6 is available from Winsoft Products. It is priced at £2,219 per single user licence and runs on Win32 platforms. Supported databases include Oracle 7 and 8; Sybase 4.x, 10, and 11; Informix SE and OnLine; Microsoft SQL Server 4.x and 6.x; and DB/2;

www.winsoft.co.uk

Database wrapper

Select Database Wrapper is a new entry to the Select Component Factory product line. It is an add-on product for the enterprise data modelling tool Select SE, and it allows users to integrate relational databases with new component-based applications.

As a complement to Select SE, Select Database Wrapper allows database specialists to recover a data model of an existing relational database, rapidly design data service components which 'wrap' the database, and publish details of the new data service components in Select Component Manager for use in new component-based applications.

Version 7 of Select SE, a data modelling toolset, has also been released. It has facilities for partitioning large data models into subsets, improved maintenance of corporate data models and separate project data models, and enhanced database support.

www.selectsl.com

Rational Apex Ada 2.0 for Windows is an integrated programming environment for Ada 95. There is improved DLL support and language validation, enhanced project configuration, and it enables component-based development. For Windows NT. www.rational.com

Inprise has announced that the Visual dBASE RAD development product is being spun off to InterBase. This company was formed when Borland spun off its namesake embeddable RDBMS over a year ago. New releases of dBASE are anticipated. www.interbase.com

Objective Toolkit/X 1.1, from Stingray Software, provides Visual Basic 5.0 users with docking forms, docking toolbars, and a shortcut bar with the look and feel of the Microsoft Office Outlook Bar. For Windows 95 and NT. www.stingray.com

Novell's flagship product, Netware 5, moves onto the Internet. Currently in final testing, the Y2K-ready system allows users to extend their networks and manage distributed applications across the Web. It will be shipping in September. www.novell.com

'Arcnet - The first 20 Years Platinum Anthology' is a CD covering the history of the networking architecture, together with a technological overview, case studies on Arcnet applications, comparisons with competing technologies, executable software drivers, and sample Arcnet driver source code. www.arcnet.com

2nd C&C++ European Developers' Forum

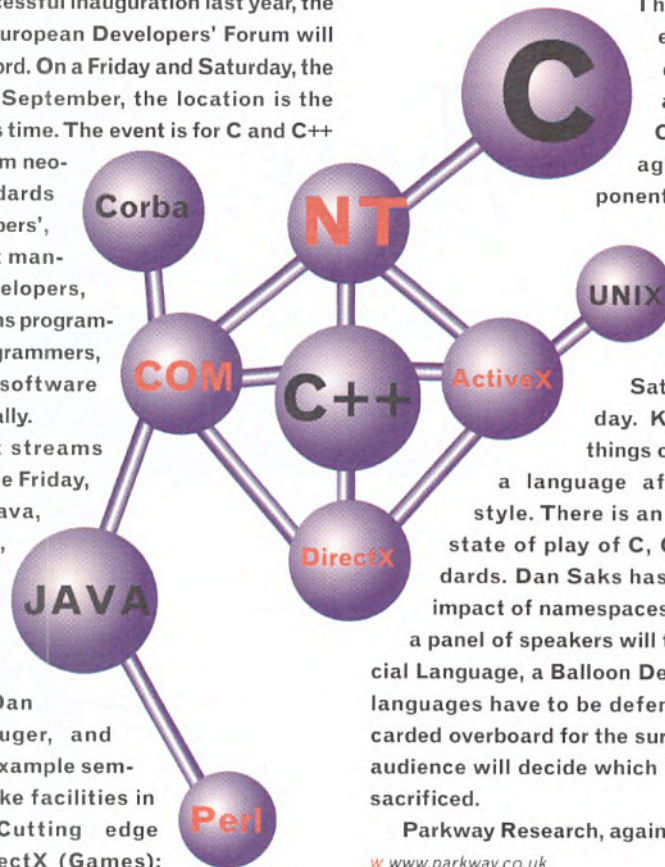
Interactive Software Engineering (ISE), a vendor of Eiffel, has publicly released the **source** for its **EiffelBase** library. Free to all users, the release includes the entire **Eiffel** code of the library, including the implementation, not just the specification. It is a general purpose library covering fundamental structures such as lists and queues. EiffelBase will continue to be officially supported and maintained. eiffel.com

Task **scheduling** and time management is provided by an **ActiveX** from FarPoint. **Daily PlanIt** is designed for flexible activity scheduling, including multiple appointments across any time period. Other features include binding the control to a database, for scheduling or verifying company-wide meetings, activating an alarm, and password-protecting certain entries. www.contemporary.co.uk

LeadTools version 10, from Lead Technologies, is a range of **imaging** ActiveX controls. The latest range comprises Imaging, Imaging Pro, **Multimedia**, Multimedia Pro, Document Express, and Medical Express. They cover scanning, colour conversion, display/special effects, annotation, image processing, compression, Internet/intranet imaging, database imaging, and optical character recognition. www.contemporary.co.uk

Following its successful inauguration last year, the second C&C++ European Developers' Forum will take place in Oxford. On a Friday and Saturday, the 11th and 12th of September, the location is the Oxford Union this time. The event is for C and C++ programmers 'from neophyte to Standards Committee members', software project managers, Java developers, embedded systems programmers, games programmers, and commercial software developers generally.

There are six streams of seminars on the Friday, covering Java, Games, C, C++, Components, and General topics. Speakers include Leen Ammeraal, Dan Saks, P.J. Plauser, and Mike Banahan. Example seminars are: STL-like facilities in Java (Java); Cutting edge games with DirectX (Games);



The challenge of embedded systems design (C); Patterns and techniques for C++ resource management (C++); Component-based development using COM (Components); and, Perl – an antidote to C and C++ (General).

Saturday is a conference day. Kevlin Henney kicks things off with a talk on how a language affects programming style. There is an hour devoted to the state of play of C, C++, and Java standards. Dan Saks has a talk entitled 'The impact of namespaces in C++'. And finally, a panel of speakers will take part in: 'Sacrificial Language, a Balloon Debate', where various languages have to be defended from being discarded overboard for the survival of the rest. The audience will decide which languages should be sacrificed.

Parkway Research, again, is running the event.

www.parkway.co.uk

Email made quick and easy

EasyMail V3.0, from QuikSoft, allows developers to add email functionality to their applications. Its SMTP and POP3 objects can be used to generate and retrieve email across the Internet for C/C++, VB, VBA, ASP, Perl, Access, Delphi, and PowerBuilder applications.

Email enhancements such as MIME formats and HTML/RTF formatted message bodies, UUEn-coded and Base64 binary attach-

ments, and custom headers, and priority levels are supported.

For version 3.0, the SMTP object includes support for an SMTP Express message queuing system. This intercepts messages created with the EasyMail SMTP object and queues them for transmission in the background.

There are new properties and methods for the mail objects, with more accurate renaming of existing items.

In terms of memory management, QuikSoft claims memory consumption has been reduced by almost 50%. CodeNet technology has been added, which is designed to prevent crashes in the event of aberrant messages. Finally, code samples for using EasyMail V3.0 are provided for Visual C++, Visual Basic, ASP, Access, and Delphi.

ComponentSource retails EasyMail V3.0 at £169.

www.componentsource.com

Books received this month

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Cambridge Univ Press	Component-based Software Engineering	Thomas Jell	0521648211	£29.95
O'Reilly & Associates	JavaScript: The Definitive Guide	David Flanagan	1565923928	£29.50
O'Reilly & Associates	Palm Pilot: The Ultimate Guide	David Pogue	1565924207	£21.95
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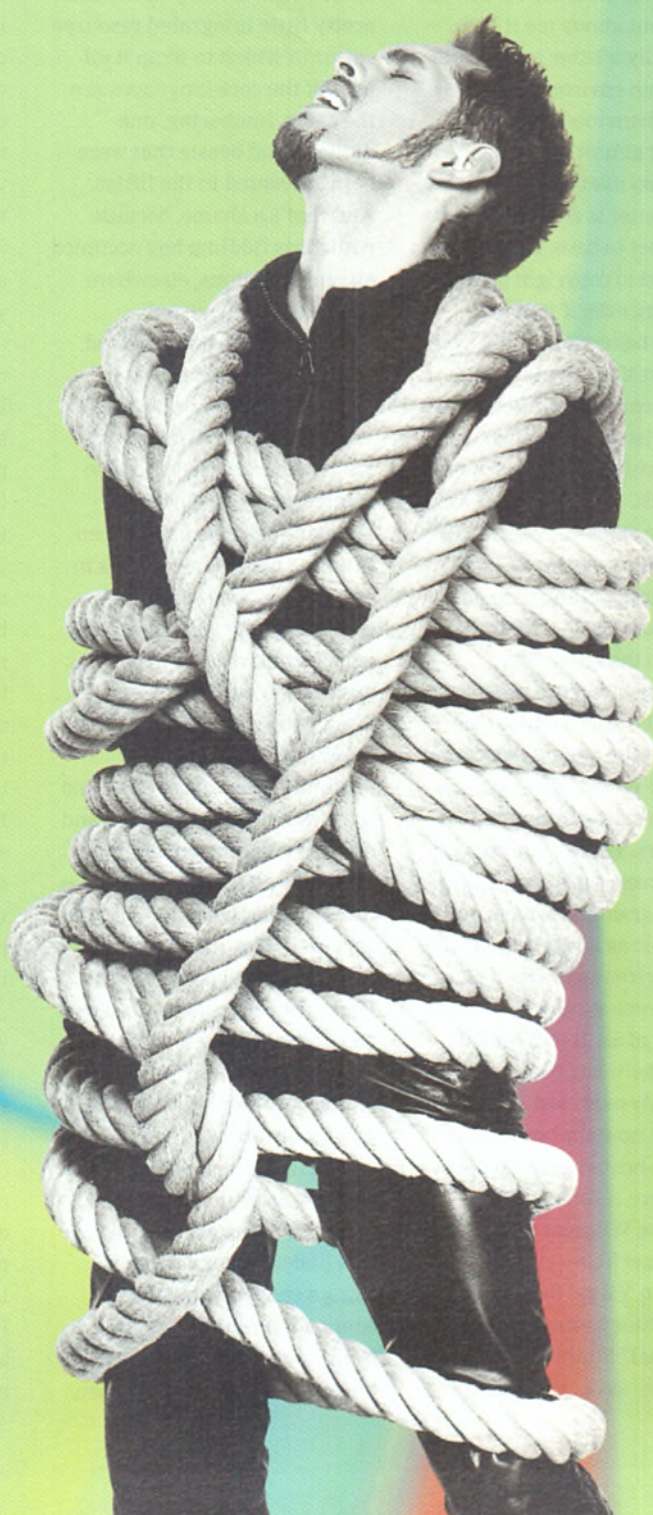
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The V in Visual

In spite of modern programming tools and languages being almost entirely Visual, there's not much to see. Jules explores why not.

Take the letter V; that really annoys me. You'd think, wouldn't you, that there would be enough to annoy anyone in this business without having to worry about little things like the letter V, but annoy me it does.

Actually, a letter isn't a little thing. In an environment where three of them together can represent almost any abstruse concept, no matter how complex, a single letter is actually a pretty major asset to have. That's why Zilog tried to copyright the letter Z (and why, even if it didn't, everyone believed it would have done). But V is not like Z. V always means the same thing. It means 'Visual' – or rather, it doesn't, which is the root of my annoyance.

Let me explain. Basic was a language that everyone knew and understood, and then along came Visual Basic – VB to anyone in the know. The component structure was new-ish, and the dialog editor was (I think) unique among Basics, but it was the Windows-hosted development environment that set it apart. There were buttons on the screen, with little pictures on them, grammar was as much geographic as it was textual: the whole environment was a place where speech synthesisers had no utility at all. It was Visual.

But, the V has been thoroughly overused since then, and now applies to any Windows-hosted development tool. Where before you'd get things like WPascal or WBDG, now you get VC++ and Visual J++ – even Visual Studio. (How can an editor be anything other than visual? Studio++, perhaps, because ++ saves having to

think of a new release number, but not Visual!)

Underneath, these V-enhanced languages haven't really changed – a bit of API here, a class library there, and a pretty little integrated resource editor in which to wrap it all up, but the core languages are the same, lumbering, one-dimensional beasts that were being invented in the fifties. And that's a shame, because while this fiddling has occupied all our attentions, elsewhere some genuinely visual languages have been created.

Since ICL launched the PERQ some fifteen-odd years ago (probably the first truly visual machine that was also commercially realistic), language designers have been thinking about conversions to existing languages and genuinely new languages, whose fundamental structures were graphical. Prolog seemed like a good contender for modification – it was a fashionable language then, and the nature of its predicates and the backtracking on which its evaluator relies both seemed as if they would translate into 2D very well. If truth be told, they did. But the old problem with Prolog raised its head: that real programs require lots of complex control structures laid on top of the knowledge base, and the resulting programs looked like ant colonies.

I saw another system based on a wiring model. You'd make up a dialog box or a window using a conventional dialog editor; then you'd pop up the fronts of the controls to reveal the internal wiring. You'd then

connect wires between the controls, possibly adding internal processing elements, and create real, live, working programs. It was quick, easy, and comprehensible, but what made it most effective was that it was completely devoid of events – it was like wiring up a hi-fi. You could put a test probe on any wire to see its value, whether the value was On: OnOrOff or whether the value was 'Hello World!': PlainText. You could even see the values changing as you fiddled with the controls.

Another quite different example: I saw a simulation language based on pulleys and levers. You could use it to model physical systems (and thus see the levers operating), but more importantly, because the system included things like integrators and differentiators, you could build a 'physical' model of a more abstract system – a temperature controller, for example – and animate it as a machine. Having played with this, I can vouch for the insight it can give you into a physical system, particularly when applied 'inverse', where you use the measured behaviour of a real system to estimate the internal constants of the model.

Visual languages in general, were they to be developed with any enthusiasm, would be received very well, particularly for small-scale programming (what VB does now). Normal people, who don't like text and don't like mathematics, are perfectly comfortable with the idea of wiring, or plumbing, or Heath-Robinson machines. The kind of care and skill that is needed to write a sequential

program isn't required when the program is inherently 2D, which is why when someone says, in exasperation, 'Give me a pencil and paper...' he almost always draws a picture, rather than writing an equation or a few lines of code.

Where are the visual languages? Actually, they're out there being used. When I'm wearing my hardware designer's hat, I usually express most of what I create using circuit diagrams, which are, precisely, visual languages. Even when code is placed inside a special-purpose chip, the programming for the chip is expressed, as often as not, using a visually-defined state machine or using yet more circuit diagrams.

Here's another visual language in common use: Yourdon. For the life of me, I can't understand why well-formed, provable programs in Yourdon are compiled into C++ by hand, but it does seem to go on quite a lot. A Yourdon compiler doesn't strike me as a major undertaking, and it's certainly a language that would benefit from the kind of static type checking that CASE was supposed to provide before it went out of fashion.

And finally, Access. In the dim and distant past, when I was still at college, I was taught to draw pictures of databases before attempting to program them. Now Access accepts the pictures (with, to be fair, some extra hints) and makes a database from them (which, to be fair, very nearly works). In fact, apart from Project, Access seems to be the only product from Microsoft that really deserves a V in its name, and it seems to be the only one without one. ■

Jules is a programmer with a lasting interest in languages and compilers. He can be contacted as mayhem@jules.cix.co.uk, or by phone on 01707 662698.



[Handwritten signature] 1998

286s are no fun

Dear Sir,

It is bizarre how Jules and cohorts seem to relish the prospect of Moore's Law coming to a screeching halt. Personally, I believe it will be a disaster. Imagine if Moore's Law had halted at 286 speeds. I cannot imagine that any amount of frugal programming would make a 286 box as exciting and capable as a modern PII system, even when it is running modern bloatware. These days 286s are no fun. Developers would not innovate as often because there would no longer be the urgency forced on us by accelerating machine speeds.

There is no substitute for chip power. Okay, most Windows programs are slow, but consider graphics programs and modern computer games. These and other speed-critical applications need every kHz of computer power they can get their mitts on.

Each ten-fold increase in computing power generates applications that were previously unfeasible. Personally, I believe surmising that we will be better off without Moore's Law is akin to saying that we humans were better off when we were living in caves or mud huts. As almost any historian will tell you, you are better off in the present. Intel and MS, through their selfish ways, are ironically actually doing us a favour in the long run.

Yours faithfully,
Jim Eadon
 Senior Analyst
 Scheduling Technology Group
 Limited
jamese@stg.co.uk

I'm not sure I was relishing the end of Moore's Law, but, given that it's happening, it makes sense to make the best of it. Companies, and



individuals, who are stuck in the mindset of limitless power forever are going to get hurt. They are the people who equate a lack of resource with a lack of development, and think, like Mr Eadon, that imposition of limits means we'll be returned to mud huts.

We won't go back to mud huts. Motor cars have been working with shrinking resources (fuel availability and acceptable emissions) for years, yet a modern car is streets better than a car of twenty years ago. Limitations do provoke invention. Even where modern electronics appears to be growing without limit, it is growing in very carefully selected directions. At a time when it was thought that real time 3D required a £6M flight simulator, Wolfenstein appeared and showed that clever programming can squeeze a quart into even a 286-sized pint pot – and showed that, contrary to Mr Eadon's belief, 286s are fun :-). Now nearly all graphics engines are based on the Wolfenstein tricks, and the same tricks are finding their way onto specialised silicon. At the same time as Wolfenstein was happening, the Lynx proved that even a 6502 could be fun, if it was programmed by someone who knew what he was doing.

We welcome short letters on any subject relevant to software development. Please write to:

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Developers do not innovate any more. Developers are working as hard as they can to keep up with the shifting platforms, and many developers of my acquaintance are complaining that they can't even take long holidays without being left behind in the technological torrent. If developers were innovating more, there would be more choice among software products, and better products, than there were. In fact, there are less, and what there is works worse.

Each ten-fold increase in power generates applications which *require* only about a two-fold increase in power. Technology is vastly outstripping our ability to engineer it. That's a very good thing, because when Moore's Law does finally (and mercifully) end, there will be plenty of fertile ground in which to grow genuine innovation.

PS What cohorts?
Jules May

Platinum code

Dear Sir,
 Am I the only person who is irritated by a phrase that seems to be increasingly common: 'gold code'. This is code that is, er, the actual final version... As opposed to the just-testing betas that have inevitably preceded this 'golden' release.

I can just about swallow the arguments for beta-code releases (I struggle with the idea of paying for the privilege of testing someone else's code), but 'gold code', for version 1.0! I think it is the marketing gloss that upsets me: it sounds so 'good', doesn't it. What is the inevitable version 1.1? Platinum code?

Just what sort of gold is it? Is it really the real thing? The idea of fools gold suggests itself to me.

John Williams
Msdlttd@btinternet.com

Searching for the expression 'gold code' on the Web and on Usenet, reveals surprisingly few occurrences. It seems most probable that it was introduced when near-final software started to be distributed on *golden* CD-ROMs. I couldn't find any reference as to when and for which software this expression was first used. Does anyone have a good memory, it can't be that long ago? It is unfortunate that this expression does have a very precise (and different) meaning in telecommunications: 'gold code: In spread-spectrum system, a code that is generated by summing, using modulo-two addition, the outputs of two spread-spectrum code-sequence generators' (from www.its.bldrdoc.gov/fs-1037) – Ed.

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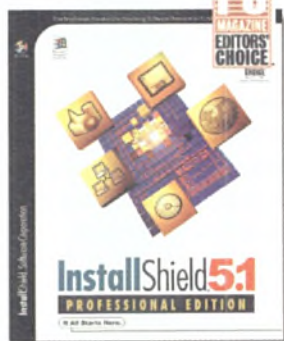
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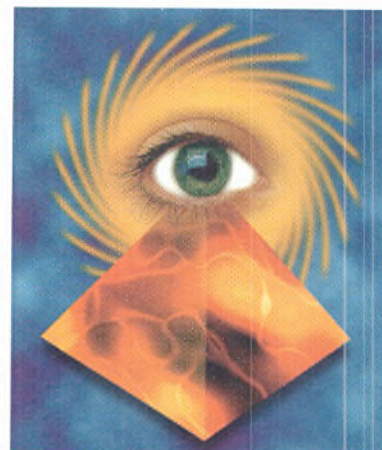


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Visual Studio 6.0

Microsoft wants developers to think of its latest development tools suite as an enterprise solution. But can the company shake off its tools' traditional desktop-bound image? Neil Hewitt and Murdoch Mactaggart have the answers in this comprehensive review.



It's just over eighteen months since Visual Studio 97 was launched upon an unsuspecting developer community. At the time, it seemed like a radical thing to do – bundling a variety of very different tools together, some of which were hardly complementary. Few FoxPro developers, for example, are VC++ developers as well. The strategy made more sense for the Enterprise version of the product, which added a number of additional tools intended for use with all the components of Visual Studio, such as the Visual Modeler written for Microsoft by Rational, or the unified help system based on the MSDN Library. Microsoft also made a key issue of interoperability, stressing that each tool could both use and create ActiveX controls.

Eighteen months on, the second major version of Visual Studio – confusingly version 6.0 rather than 98 – hits the streets in September. With this release it's easier to see where Microsoft has been going from the start: towards a unified suite of tools that work together rather than a mere bundle. The key issue for Microsoft this time round is enterprise development, where Visual Studio is intended to compete with the likes of Forte and SAP. To make this a realistic possibility, the Visual Studio development team has added a host of new tools to the suite and upgraded practically all the rest.

The roster of languages included this time round stays the same – Visual C++, Visual Basic, Visual J++, Visual InterDev, and FoxPro, each in version 6. Despite initial rumours, Microsoft has not managed to put all the tools into the same IDE this time round, but all the tools look and feel very similar to each other, and all have adopted a VB5-style interface. Visual J++ and Visual InterDev now share an IDE – called simply the Microsoft Development Environment – that appears to be the most

advanced of all the tools. I wouldn't be surprised if this turns out to be the unified IDE that Microsoft is promising for Visual Studio 7.

Although Visual Studio will be available in two versions, Professional and Enterprise, the cross-suite tools are available only with the Enterprise edition, which is what we will be looking at here. All the Professional edition applications will be available individually, and additionally Visual C++ 6.0 and Visual Basic 6.0 will be available in individual Enterprise editions including most of the tools and resources outlined here.

Visual Studio 6.0 Enterprise also includes a set of servers and features from BackOffice, dubbed BackOffice Developer Edition. The main components of the bundle are SQL Server 6.5, Internet Information Server 4.0 (which itself takes in Transaction Server and Index Server), and SNA Server 4.0. I don't propose to review these here, suffice to say that each is identical to the standard shipping product with the exception of the licence, which is for development only and does not cover deployment or runtimes.

All the tools in Visual Studio 6.0 are now fully ADO/OLE DB compatible – including Visual J++ and Visual InterDev – and ADO 2.0 is included with the suite. A number of cross-environment data manipulation and design tools are included in the suite. These include Data Environment Designer, Database Designer, Data Object Wizard, and Query Designer, which are described in more detail later. Before moving on to the individual applications in detail, let's take a look at the main Enterprise tools.

Visual Modeler 2.0

Unusually in an otherwise all-Microsoft suite, Visual Modeler – although exclusively distributed by Microsoft in Visual Studio Enterprise – is a product of Rational Software, better known for its Rose application development tools and Purify/Quantify testing packages. Visual Modeler is based on Rational's Unified Modelling Language (UML) and can be used to build application models that can generate Visual C++ or VB code (Figure 1). The initial design for an application can be done in UML with Visual Modeler and turned into code, which can then be worked on further:

With VB 6.0, Visual Modeler allows round-trip engineering, an application development cycle where the application is first modelled, then generated, then changes are made to the code, and a new model is generated from the modified code, which can then itself be changed and revised code generated from it. With Visual C++, Visual Modeler can only generate code from the model in a single direction.

In look and feel terms, Visual Modeler is a little idiosyncratic, diverging from the unified look and feel of most of the other tools and

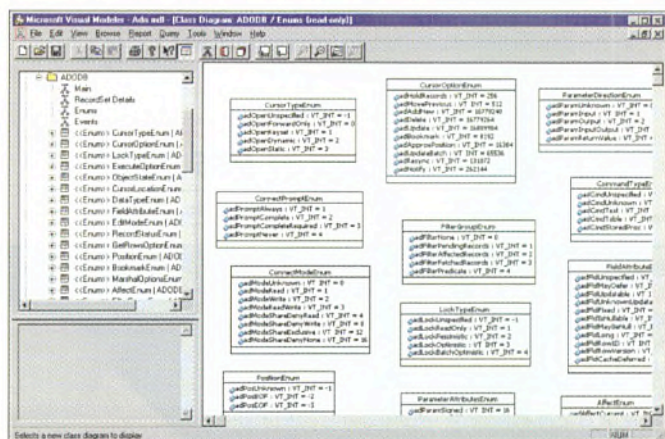


Figure 1 – The Microsoft/Rational Visual Modeler.

products in the suite. Undoubtedly, this is a result of its extra-Microsoft development, but it would have been so easily fixed.

If you already know and use UML, you're likely to have the modeling tools you need already, so Visual Modeler might not be of much use. If you don't, it's a useful way to learn about application modelling, which will undoubtedly be standard practice everywhere before too long.

Visual SourceSafe 6.0

SourceSafe has been around for quite some time now as Microsoft's entry-level version control and source management system, and was bundled in Visual Studio 97 as well. This latest version adds little in the way of new capabilities but does round off some of the rough edges from previous versions. For example, Archive and Restore functions are available through Wizards rather than having to use the command line, as was the case before. VSS can now perform difference compares across multiple projects rather than one at a time.

Microsoft claims this version of SourceSafe is up to two times faster at retrieving data as the previous version. It is also more closely integrated into some of the Visual Studio applications – Visual J++ and Visual InterDev – with menu options and Wizards available when the product is installed. Existing users of SourceSafe will, I suspect, be happy that the product is largely unaltered in this version. Those who don't currently use any source control may find it easier now that the common functions such as checking in and out, comparing, and retrieving old versions can be done directly from within the Visual Studio tools.

Visual Component Manager

It may not sound exciting, but the Visual Component Manager (VCM) is probably the most potentially useful of the Enterprise tools. Put simply, VCM is a layer on top of the Microsoft Repository into which you can put components, source files, controls, and pretty much any sort of object you like. The idea is to promote component reuse by creating a kind of component librarian.

It's important not to think of the VCM as a replacement for the file system – the Visual Studio tools will always store your local projects on the file system – but as a library for code or binaries that you want to reuse. VCM can address multiple repositories. You could, for example, have a local repository of development code and a shared repository elsewhere on your network where completed code is stored for use by the whole team.

The key advantage over using simple file system storage is that in VCM all objects can have labels, descriptions, and version information attached, and can be stored in a hierarchical manner. This makes it easy to find the component or resource you're looking for even if you don't know precisely what it's called. In addition, VCM knows how to add the components you select to your Visual Studio projects, and takes care of registering any COM classes you import automatically.

If you use large numbers of components in your projects – and if you don't now, chances are you will soon – then Visual Component Manager could well be an indispensable tool. It's certainly a good example of Microsoft (at last) becoming innovative with its developer tools again.

Visual Studio Analyser

Since the sale of Visual Test, Microsoft has had nothing in the way of performance analysis or code testing tools. This changes in Visual Studio 6.0 with the introduction of Visual Studio Analyser (VSA). To steal someone else's simile, Visual Studio Analyser is like Visual Test on steroids. It's a system-wide performance profiling tool that can be run against multiple machines on the network (Figure 2).

Rather than simply testing the application you are running, VSA allows you to track the performance of any process on any of the machines in your project. To achieve this, Microsoft has instrumented a whole bunch of system libraries – COM, MTS, the Java VM, the client and server-side scripting engines, SQL Server, to name a few – so that they will deliver performance data to VSA in real-time. I was unable to test VSA to its fullest extent because the COM instrumentation relies on the presence of NT Service Pack 4, which at the time of writing was not publicly available but will, I am informed by Microsoft, be available in the shipping product. However, what I was able to test impressed me.

VSA will present data in the form of a straight textual log, or a variety of diagrams including configurable charts, state diagrams, and process diagrams. Used in conjunction with the other Remote Debugging features of Visual Studio, it becomes possible to debug a distributed application with components running, for example, on a web server, and drop right into the source *on the client side*. This assumes you have the source code and Visual Studio knows that the component was published by you.

Although other profiling tools – notably Rational's Quantify – allow you to profile third-party components and DLLs, none of them have VSA's unique advantage in working with system components specially instrumented for the task by the people who wrote the operating system.

Whereas with most of the other Visual Studio Enterprise tools I would suggest that, if you already have a purpose-built tool for the job, you would probably want to keep on using it, with VSA I'm not so sure. If you are building multi-tier applications with Microsoft clients and servers, and using COM, it's easily the best profiling solution I've seen.

Application Performance Explorer

Existing as a kind of second cousin to the Visual Studio Analyser, the Application Performance Explorer (APE) is a rather unusual kind of testing tool. Rather than test actual applications, APE is intended for use before the application design phase and is used to test the intended machine/software configuration on which the application will be deployed.

Developers create a workflow simulation that equates to the kind of loading they expect their application to generate, then run tests on the deployment network to see what the loads will be at various points and across multiple tiers. The simulation can then be tweaked to see what impact it would have, say, if a certain component were run locally or on a middle tier server rather than on the bottom tier,

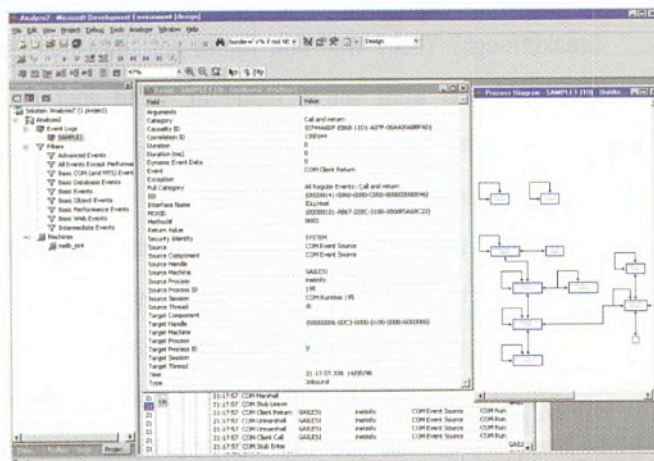


Figure 2 – The Visual Studio Analyser at work.

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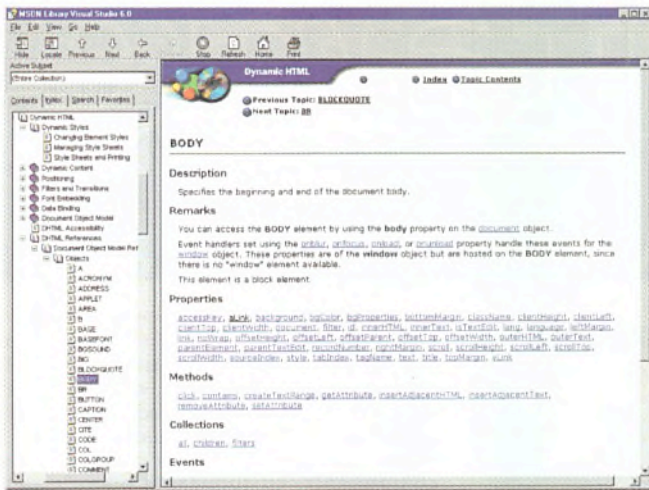


Figure 3 – Visual Studio's documentation is copious to say the least.

or if SQL connection pooling were enabled, or any one of a large variety of combinations and factors.

The simulation can be displayed in a diagrammatic form, which is particularly useful if your initial application design will be done in Visual Modeler. By making careful use of APE before actually sitting down to code, developers – particularly on the large enterprise-level projects that Microsoft is pitching Visual Studio 6.0 at – can save themselves time and money later down the line.

I found the concepts of APE difficult to get used to, but that probably reflects my rather desktop-bound thinking. After some testing it seemed to be making more sense, but I expect it would be a while before I could get any real use out of APE. Nonetheless it seems to be a useful addition to the Enterprise tool set.

Document overload

The help system in the last version of Visual Studio was somewhat schizophrenic. The three tools in the Developer Studio environment (VC++, Visual J++, and Visual InterDev 1.0) shared a common Help Viewer that was actually an implementation of the help viewer from the MSDN Library. Visual Basic sported a two-part help system consisting of normal Windows help and Books Online, which was taken from the Office 97 Books Online system. FoxPro had its own help system, too. All very confusing.

In Visual Studio 6.0 all the help is in the now de facto HTML Help format. A special version of the MSDN Library, pared down to include only Visual Studio-relevant documentation, is the primary reference document. This sports the HTML Help Viewer, which is actually a custom application built on IE 4.01 – and yes, that does mean you must install IE 4.01 for Visual Studio to work if you don't have it already (Figure 3).

There is still a certain degree of schizophrenia at work here, because although all the applications – and almost all of the tools with the exception of Visual Modeler – use the HTML Help system, the help tree itself has a huge range of different styles and conventions. Finding one useful piece of information can be difficult, especially as the search facilities are not particularly intelligent. This is not inherently a Visual Studio problem, as it has inherited an MSDN Library help collection that has not been completely overhauled for some time. All the information you want is contained here, regardless, although the context-sensitivity relies on performing a search in the Library, often yielding multiple entries that you are forced to choose between with no real idea whether or not they are the ones you want.

Nonetheless, the amount of information available is colossal. (I should point out that I can make no comment about the printed documentation, if any, which ships with Visual Studio, as the version I tested was not the boxed product, although it was the release code.) There is copious documentation and sample code for all the major products and tools, plus a good selection of Knowledge Base articles and technical papers. Compared with the poor excuse for documentation developers are often saddled with, this is an embarrassment of riches.



Be prepared

Maybe your PC happily coped with Visual Studio 97, despite the frankly ludicrous amounts of disk space it could consume and the memory-hungry Developer Studio. Will it cope with Visual Studio 6.0? The answer has to be a qualified yes. A full Visual Studio installation will take up significantly more than the 2 GB of its predecessor, but you can still fit it all in just under 3 GB, including the full help library. In reality, it's unlikely you'll need to install everything on any one machine, unless your skill set is frankly superhuman.

The memory footprint seems to have been trimmed appreciably – certainly I noticed a distinct increase in speed and a decrease in overall system load – but I still wouldn't run any of the main tools with less than 64 MB RAM, preferably 128 MB. With memory so cheap compared to eighteen months ago this should be no problem. If you don't have a fast Pentium (or preferably Pentium II) you might like to consider upgrading.

You should also bear in mind, if you want to use any of the BackOffice Developer Edition servers, that you will need to be running NT Server 4.0, and some of these – notably SQL Server – eat hard disk space like there's no tomorrow. If you want to do any serious work with the BackOffice components I strongly recommend that you have a dedicated NT Server set aside from your main development machine. This will also allow you to more easily evaluate the remote debugging and IIS-based deployment capabilities, and is a virtual prerequisite for any serious work with Visual InterDev.

All the Visual Studio tools should be fully backwards-compatible with projects from the earlier version. Certainly I experienced no problem converting over Developer Studio projects. If you're working in a team, however, you will want to upgrade all members simultaneously if at all possible, as once a project has been converted over it's not likely that Visual Studio 97 will be able to work with it again.

The final countdown

Is it worth splashing out the extra on Visual Studio Enterprise edition over the Professional version? If you need to do client/server development, work with databases, or build applications longer than a few thousand lines, the answer must be yes. The Enterprise tools go a long way towards making Visual Studio a serious contender in the large-scale application development stakes, and clearly Microsoft has pinned its enterprise colours to the mast. I would pay the extra just for the Visual Studio Analyser alone. (See *Pricing* boxout at end).

The Enterprise tools are just a part of the equation, however. The real question is how good the revised development tools themselves are. To answer this, we took a detailed look at three of the main development tools, probably the most commonly used (excluding Visual J++, which we covered in the May issue) – Visual Basic, Visual C++, and Visual InterDev.

For the full lowdown... read on.

Neil Hewitt

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Visual C++ 6.0

C++ has a strong core of programmers who pride themselves on understanding the complexities of the language and how best to tune it to maximum effect. For such developers the main thing that matters in any new release is usually whether the compiler is better, whether it produces faster, smaller executables, and whether the compilation process itself is improved. In each case, and more particularly with the latter, that's certainly true of this new version of Microsoft's Visual C++. Microsoft itself uses the product throughout the company in the development of the various BackOffice products as well as most of its applications such as the Office suite. One of the development team claimed recently that using Visual C++ 6 had led to a 30% reduction in compile times for NT 4. Although I didn't run any accurate timing tests the process does certainly seem noticeably faster. Microsoft claims that a typical speed increase in debug projects will be of the order of 30% and in non-debug projects around half that figure.

As far as Microsoft is concerned, however, the compiler speed issue and even the very useful feature of Edit and Continue, discussed later, are less important than other matters. Just as the company suddenly became a born-again believer in the Internet after a period of agnostic disdain, so it is building on that faith by concentrating on component reuse. Microsoft clearly sees the future in distributed computing. Fundamental to this strategy is the Component Object Model (COM), which runs through most of what Microsoft now delivers.

Starting some years ago with Dynamic Data Exchange (DDE) – a fairly crude form of Windows messaging – and Object Linking and Embedding (OLE), and following a confusing series of name assignments, COM is close to achieving critical mass. Many have suggested that this is yet another rerun of the VHS/Betamax saga, but it seems that COM has become firmly established at the expense of Corba. Iona, formerly strongly in the Object Management Group (OMG) camp, has recently released a COM/Corba bridge and an increasing amount of interconnectivity is likely, assuming that Corba remains viable. ORBs from both sides can communicate much more readily than before and although Microsoft affects not to notice Corba publicly it is determined to beat it in the middleware and messaging arena. Whatever happens, it's clear that COM will not disappear except following a Microsoft bankruptcy.

Microsoft is anxious to take over more and more of the territory traditionally handled by its heavyweight rivals. The key to success here is the ability to handle stored data efficiently irrespective of platform. And the key to efficiency, in turn, and not only in the area of disparate data handling, is to avoid special cases where possible, and to use and reuse tools and components appropriate to particular common tasks. Here Microsoft argues that although component reuse is extremely important it's also the case that the argument of 'horses for courses' applies and there's little benefit in supporting a write once/run anywhere solution if by doing so much of the capability or power of the application is lost. Which brings us neatly round to version 6.0 of Visual C++.

Work smarter, not harder

The main aim has been to increase programmer productivity over time. In the short term this is helped by improvements to the libraries, to templates and Wizards, and by aids such as automatic code completion. Over a longer time frame, and particularly in team situations, an even greater improvement can be achieved by reusing components

and by using different development tools and engines for different phases of a common project. This last might not be to the liking of skilled C++ programmers who pride themselves on knowing the language intimately, but it seems to me undeniably correct. What this means from Microsoft's perspective is that Visual C++, like Visual Basic, is less important in its own right than as a part of the tool chest known as Visual Studio.

Microsoft is working towards supplying common underlying technologies, like COM and COM-based interfaces such as OLE DB, and expecting developers to mix and match appropriately. Where a developer might previously have used C++ alone, a team might now use C++ to develop ActiveX components for use by VB front ends relating perhaps to data from both SQL Server and Oracle databases through OLE DB, perhaps using the common ADO interface. This data might then be used to produce reports using the Word engine and illustrated with graphs produced by calling Excel charting capabilities, the whole then delivered remotely, updated in real time and in response to user interaction, through HTML on an Internet site or in a company intranet.

Microsoft has been developing what it calls IntelliSense technology for some time. In part the results are highly irritating, leaning too far in the direction of taking away control. The Office 97 animated paperclip is a prime example.

Coding, however, is somewhat different and with the considerable complexity in terms of classes, parameters, methods, properties, inheritance, and so on, which characterises C++, coding IntelliSense can be of real benefit. Essentially, it's the same type of mechanism as was earlier introduced to Visual Basic and provides a range of options giving ready access to MFC, ATL, and Win32 language references. A popup window can display a list of valid member variables or functions for a selected class or of global scope, while the Quick Type option can be invoked by resting the mouse cursor over an identifier so that its declaration will appear in a tooltip.

You can even use the mechanism to complete code words once enough characters have been typed to identify the word unambiguously, or select them from a list, display parameter lists for functions, and display comments associated with members listed in the earlier mentioned window. As with VB and Visual J++, the code completion in Visual C++ extends to classes you define yourself without the need to compile first. Most people who have seen code completion in use seem to be impressed with the benefits it might bring. All these features can be turned off if required.

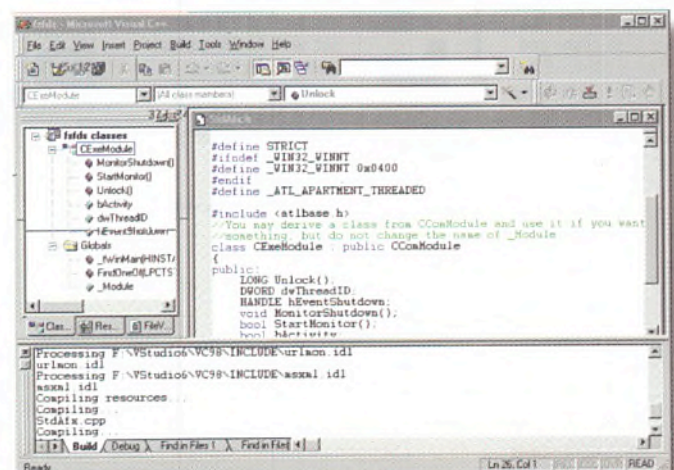
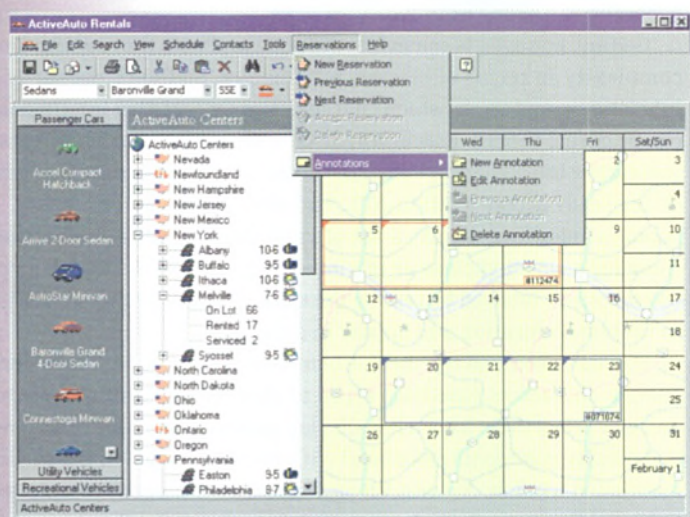


Figure 1 – The new look and feel of Visual C++ 6.0.

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Keeps on going... and going...

A new feature of Visual C++ 6.0 in this same area is the introduction of Edit and Continue (ENC) debugging. Projects, particularly large ones, which fail during or after compilation, can lead to a considerable amount of wasted time as the whole cycle is repeated. ENC is intended to reduce that waste greatly by allowing the developer to modify code and fix the bug while in the debugger itself and then to continue the compile process from that point. Code changes can be applied while the program is running or during debugging itself.

Both IntelliSense and ENC were apparently extremely difficult to add to Visual C++, in part because of the language's breadth and the rich complexity of the class libraries. There are, in consequence, some limitations on ENC. The total size of new variables that can be added to any function on the call stack is limited to 64 KB although there is no limit on such additions of variables to functions not currently on the stack. New data types can't be added, nor can changes be made to data types or related definitions. Global or static code cannot be modified. No changes can be made during debugging to resource files and code in read-only files can't be amended. Nevertheless, the enhancement is a welcome one and is very helpful in terms of cutting down the wasted time of repeating compiling cycles.

A new linker option supports the delayed loading of as many DLLs as specified until they're required to continue execution and is invoked as `/DELAYLOAD:dllname` where `dllname` identifies the DLL to be delayed. This may be useful where functions within particular DLLs are either not called at all or are only called late in program execution.

I mentioned earlier the compiler speed improvements. Additionally, a number of new keywords have been added including `inline` and `_inline`, which are hints to try to inline a function, while `_forceinline`, to mandate inlining rather than rely on heuristics, is also implemented. The new keyword `_assume` is used as a hint to the compiler that the expression passed as the argument is true until the expression is killed. This may allow the compiler to perform additional optimisations that would not have been possible safely without this indication.

Runtime error checks, designed to detect common errors, have been introduced, as has a `pragma` warning mechanism so that a programmer will not compile a header with a warning-level higher than intended.

Reworking the foundations

Quite a few changes to MFC have been introduced with this version. There are new member functions and new classes, many of them connected with the goal of improving data access or oriented towards Internet development. In some cases these may cause problems when applications using MFC 4.22 code are recompiled, although Microsoft claims that the two versions are binary compatible. A number of earlier bugs have also been fixed.

Deriving from earlier work in the Office suite, specifically in the area of implementing the Office Binder, MFC now includes an Active Document container, implemented as a set of extensions to OLE Documents. These additional interfaces allow an embeddable object to represent a complete document, with full access to all content and the user interface and command structure, rather than simply a single piece of content. A number of new, derived classes have been added to MFC to support this particular technology, whether in the area of Active Document containers, servers, or the documents themselves.

Inevitably, Internet development is supported with a new MFC class, `CHtmlView`, being added to provide the functionality of the Web-Browser control within MFC. This will allow an application to act as a web browser and access appropriate information over the Internet or in other suitable locations. The control can maintain a history list and

act as an Active document container so allowing, for example, the opening and editing in place of documents such as Excel spreadsheets, complex Word documents, or the hosting of any ActiveX control.

A number of member functions of `CHtmlView` are directed specifically at Internet Explorer 4.0 to return appropriate data. They can be used with other applications with the Web-Browser control, but in such cases will return neither information nor an error. ATL can be used to create a control with DHTML capability.

A number of new controls provide calendar functionality, IP addressing and, in the other important development area, OLE DB support for form views. This last is an optional MFC class to incorporate the OLE DB templates into the MFC. It's possible – provided OLE DB is installed on the system – to select within the AppWizard an OLE DB data source in addition to DAO or ODBC. Visual C++ also provides OLE DB Templates.

One related enhancement, available only in the Enterprise edition, is the ADO Data-Bound Dialog Wizard. This is designed to ease the process of creating an MFC data-bound dialog box. RDO is still supported but will not be developed further and it's suggested that new applications use OLE DB and, as necessary, ADO instead. OLE DB interfaces are reasonably complex and require the use of pointers and structures. Although it's quite possible to access them direct from Visual C++ they may often be handled more easily through ADO.

In keeping with the approach that places Visual C++ primarily as a specialised component within the Visual Studio toolkit, there are a number of tools available throughout that can variously be used by the different languages. Many of these are either newly enabled for Visual C++ or have enhanced features directed towards that language. The Component Manager, for example, is intended to let developers store and share components, tools, team information, and other resources. ActiveX controls, for example, might be developed under Visual C++ and registered with the Component Manager for subsequent use by Visual Basic or Visual InterDev or by other programmers in visual C++.

Microsoft, and others, are moving towards providing HTML-based help rather than the earlier Windows form of help files. Visual C++ now includes an authoring tool, HTML Help Workshop (HHW),

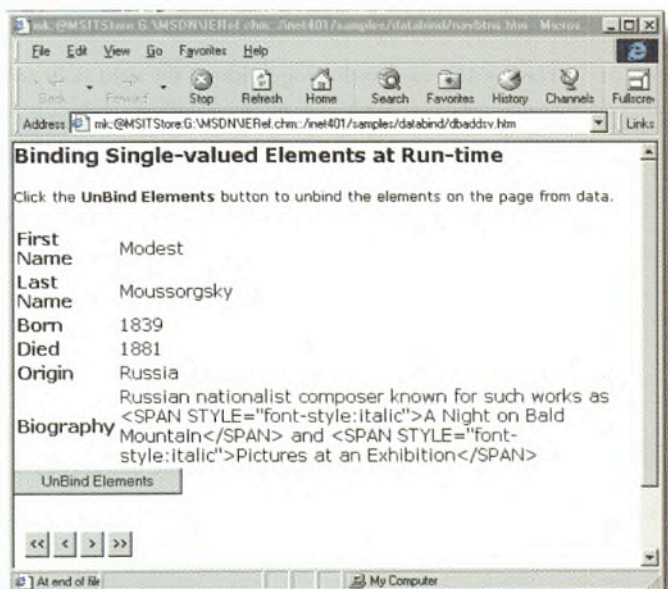
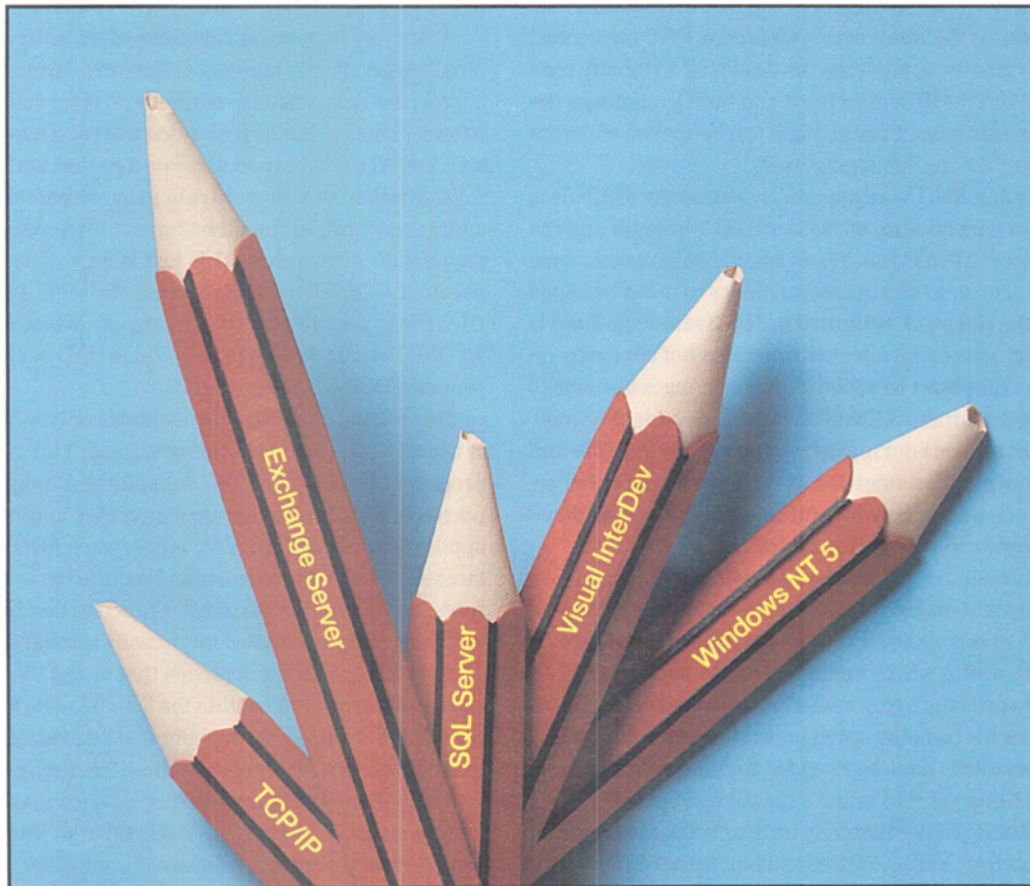


Figure 2 – Creating Internet applications with VC++ is easier in this release.

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intended to develop context-sensitive help in this form for applications.

Two specialist tools, available only with the Enterprise edition of Visual Studio, are the Analyser and the Visual Modeler (see the previous Visual Studio review). Although this can't yet be done with VC++ it's possible to use the Modeler to reverse engineer Visual Basic programs and components.

Extending the scope

In keeping with Microsoft's aim of consolidating its moves into what it calls Enterprise Computing, there are a number of features that make connectivity to remote ERP systems far easier. Microsoft appears to be targeting SAP, Baan, and especially, Oracle by providing tools to allow developers ready access. The Visual Database Tools, particularly the Database Designer and the Query Designer, have been enhanced to provide support for working transparently with MS Access, SQL Server, and now Oracle, taking the different characteristics of these platforms into account.

The Enterprise Edition includes the Windows NT 4.0 Option Pack, intended to provide application services for distributed network applications using NT 4.0 and NT 5.0, when released. Included is Microsoft Certificate Server, Index Server, Internet Information Server, Transaction Server, Site Server, Message Queue Server, and SNA Server as well as other components such as Front Page Extensions, Data Access Components, and Internet Connection Services.

Microsoft Transaction Server (MTS), in particular, now features widely in a number of development areas in keeping with Microsoft's commitment to the Internet and to company intranet technology.

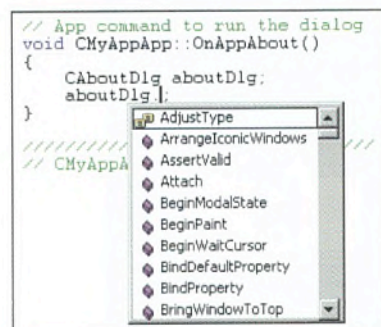


Figure 3 – Code completion in action.

It provides further support for access to other databases by supporting the XA transaction protocol, which allows MTS applications to work with DB2, Informix, and other XA-compliant databases through ODBC, while also providing native support for MTS applications to directly manage transactions with Oracle 7.3 upwards.

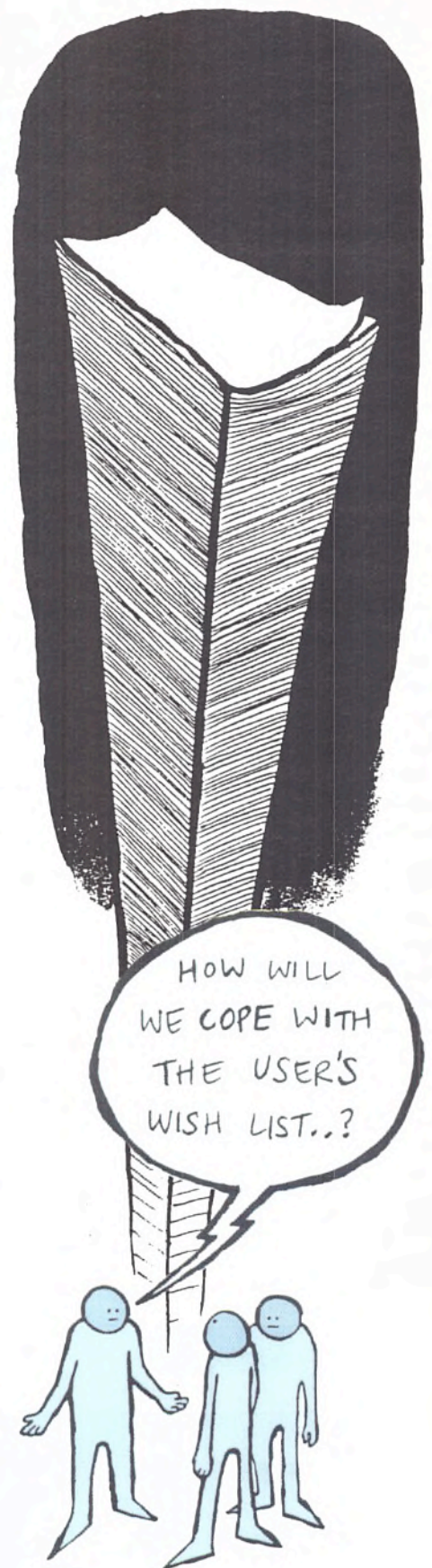
But does it add up?

Despite the claims that Version 6.0 is a major upgrade to version 5.0 of Visual C++ this view isn't really supportable in terms purely of language enhancements. Certainly there are significant additions to both MFC and ATL and these, coupled with the improved performance of the compiler, are well worth having. But there's not a great deal in that area which is striking and innovative.

Looking at the upgrade from the perspective of programmer productivity, however, and taking into account the shift in emphasis to enterprise computing the situation is different. Pure productivity as a measure of lines of high quality code over time should certainly be improved greatly by judicious use of IntelliSense, the benefits conferred by ENC, and the improved compiler speed. These improvements, by all accounts, took Microsoft a great deal of effort to implement and although sheer effort of this sort can't be a valid metric of benefit there seems a correlation of sorts.

Where a programmer will benefit, however, is by making use of the wider Visual Studio package and, in particular, of the various analytical tools available for use with Visual C++. Add to that the improvements in database connectivity through OLE DB, hidden where relevant by use of ADO, and things improve still further. As I mentioned earlier, COM is absolutely central to Microsoft strategy and permeates most of its current development work. Despite its limitations it's clearly working, delivering benefits, and being adopted and it's worthwhile for any developer interested in more than simply stand-alone systems to spend time understanding it.

Murdoch Mactaggart is a freelance writer and occasional consultant, who writes on software, development tools, the Internet, business computing, and the European single currency. He can be contacted at swc@swc.globalnet.co.uk.



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Enquiry No. Se16

Visual Basic 6.0



When VB was first introduced in 1991 it was seen, with some justification, as a toy language with few uses in serious programming. For real work you needed to use C or Pascal or – if you were determined to use Basic – one of its more powerful cousins such as MegaBasic or Comal. Partly this was to do with the inherent limitations of Basic itself, partly because PCs were considered of limited practical use for serious corporate installations.

Microsoft's strategy for some time now has been to interlock its products while offering low-cost products to developers in ways which reinforced a growing grip on the market. The VB engine powers the common macro language of the Office applications, for example. The expansion of OLE in VB4 allowed for much-enhanced application interoperability while giving developers facilities for producing specialised controls. This strategy has been highly successful for Microsoft, which is moving to extend its grip well beyond the areas traditionally associated with PCs. The change from VB4 to VB5 accompanied the development of COM and DCOM but involved developing the language considerably. The changes this time around are less dramatic and are intended to make VB6 easier to use while positioning it to take advantage of business and technological developments.

Internet development capabilities and data handling are the two main areas where Visual Basic has been enhanced. There are some new language features, enhanced controls, and additions both to its component creation capabilities and the Wizards, but these are collectively less significant. Having famously downplayed the significance of the Internet some five years ago Microsoft was quick to do a complete about-turn and now practically everything from the company is web-enabled in some way. This doesn't just mean Internet, of course, as a major reason for such attention is Microsoft's anticipation of the growth of company intranets and Virtual Private Networks (VPNs). Distributed computing over IP is seen as a significant growth area and Microsoft intends to remain a major player.

COM is absolutely fundamental to VB and the other development tools. At the same time, Microsoft is emphasising the interrelation-

ships between programming and associated analysis and support tools and targeting large-scale development. You can still buy Word or Excel on its own but Microsoft emphasises and promotes Office. In like manner, Visual Basic can still be obtained on its own but don't count on future versions being attractive as isolated products compared with the complete Visual Studio development package. VB6 is already just one piece in a larger development jigsaw.

As before, VB6 comes in three versions, Learning, Professional, and Enterprise. The Learning edition is of limited use, at least so far as development work is concerned, as many of the most interesting enhancements to VB are not included. The Enterprise edition, as before, is directed particularly towards teams of developers working on larger projects and so includes the features relevant to them.

Getting dynamic

While VB4 implemented Winsock and Internet custom controls, it wasn't until the release of VB5 that the language could easily be used for web development. That release saw the introduction of the `PropertyBag` object, allowing state information to be retained between invocations, and ActiveX Documents, essentially VB applications that could run in a COM container, such as a web browser. Although fairly straightforward to implement, there were problems with the approach partly because the VB browser control differed somewhat in functionality from other standalone browsers. At the same time, VB5 provided access to the Active Server Page (ASP) API and allowed for the creation of ISAPI filters, but developing database-handling server applications to deliver ASP was far from trivial.

VB6 can create two different kinds of web application – IIS applications and DHTML applications. The old Setup Wizard has been renamed the Package and Deployment Wizard and can be used to post packaged applications direct to a website. Combined with the enhanced data handling capabilities these are powerful improvements.

IIS applications are Visual Basic apps that run on the web server and respond to browser requests (see Figure 1). The user interface is pure HTML while compiled VB code is used to process requests and to respond to browser events. Where you would previously have had to use scripting of some sort, you now use VB code with its greatly increased speed and capability. This allows ready access to complex business processes and makes the development of rich websites relatively straightforward. Because all the processing is done on the server, and what's delivered to the browser is straightforward HTML, your pro-

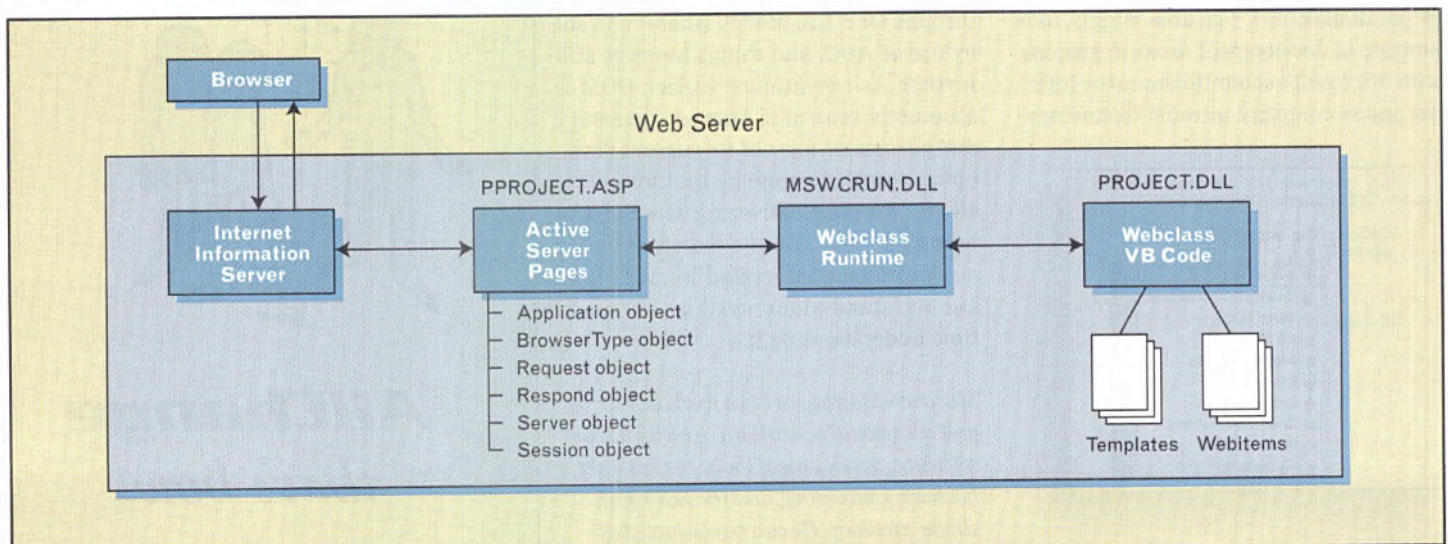


Figure 1 – The architecture of an IIS application.

jects can be browser independent or can be developed using advanced features available only on particular platforms if you prefer.

This facility to develop IIS applications depends on a new feature, the *WebClass*. This is a COM component that is hosted on the web server in an .asp file and which responds to browser input. WebClasses typically contain *webitems* and associated code to deliver these webitems to clients. Webitems are HTML template files designed to be filled out by the WebClass before being sent to the browser or are simply programmatic resources consisting of one or more event handlers that may generate a response or pass processing elsewhere.

Since IIS applications use HTML rather than traditional forms, you still need some way to build the interface. The HTML can be produced within VB itself using a simple editor now included, but it's usually better to create the pages using your normal external HTML editor and then link the finished pages to the WebClass.

The *WebClass_Start* event kicks in when the WebClass ASP file is requested. Serving up the template is very straightforward and needs only a single line of code such as:

```
Template1.WriteTemplate. Browser requests then fire IIS  
application events back to the WebClass.
```

Microsoft has for some time been promoting three-tier applications as part of its bizarrely named Digital Nervous System (DNS). The top tier is the user interface, the presentation of data and the dialogue with the user. The bottom layer is access to data, something which is further enhanced in this release of Visual Studio with OLE DB, the set of COM interfaces providing standard access to data. The middle layer is the component layer and it's here that WebClasses fit, providing the application logic accessible through HTTP or various forms of MS messaging and using ActiveX Data Objects (ADO) to interface with OLE DB.

The other Internet-related enhancement to VB is the Dynamic HTML (DHTML) page designer, which allows developers to mix compiled VB code and DHTML in the development of interactive web applications. One major problem here is that Netscape's implementation of DHTML differs from Microsoft's, making it far more difficult to deploy DHTML applications on the Internet than it should be. Conscious of this, Microsoft suggests that DHTML applications are particularly suited to intranet use where a particular browser, ie IE 4.x, can be mandated.

DHTML applications are groups of HTML pages designed to work together to carry out some business process. As with IIS applications, the HTML pages can be created within VB6 or by using an appropriate editor and then importing for linking and necessary manipulation. So far as VB is concerned, the pages are equivalent to forms and can have placed on them various elements corresponding to ordinary VB controls. Unlike standard forms, however, the pages are effectively unlimited in length with access to any data below the normal viewing area provided through the familiar scrollbars of ordinary web pages.

A feature of DHTML is that it can handle content dynamically, a facility whereby page content can be changed without requiring further server access. Although this is not yet built into the VB DHTML Application Designer, the inevitable increase in the use of the Extensible Markup Language (XML) will add powerful processing capabilities that can be exploited by the DHTML Application model. XML implementations are capable of shifting processing to the client and as IE 4 already includes an XML parser I imagine it's only a matter of time before the manipulation of XML web pages through VB becomes commonplace.

A major difference between IIS and DHTML applications is that the former are server-based while the latter will carry out most, if not all, of their processing on the client side. IIS applications require IIS

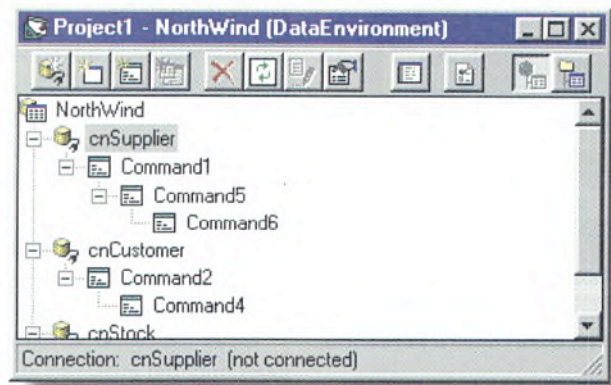


Figure 2 – The Data Environment Designer in action.

4.0 but are browser independent; DHTML applications require IE 4.01 but are agnostic so far as the web server is concerned.

This combination of DHTML with Visual Basic means that developers can take advantage of the best features of each in their applications. Mouse actions, fine positioning of elements, and resizing of pages can all conveniently be handled by DHTML with CSS and the connected capabilities of the browser. Conversely, access to and delivery of data can readily be handled using VB, greatly improving the sophistication of ordinary web applications.

Working with data

One of the serious problems facing developers of large applications is handling data held in disparate locations. It's frequently unrealistic to migrate data to a common storage location and structure. ODBC has been quite successful in this area but large-scale data handling is still extremely complex. Further, the lack of a general VB database interface layer meant developers had to resort to direct API manipulation except in those cases where DAO or another suitable object-based interface could be used. The original goal of ODBC, handling multiple database types transparently while retaining common application code, was not fully realised.

OLE DB is a set of interfaces that expose data from a variety of sources, using COM and supporting functionality appropriate to the data source, enabling it to share data transparently. OLE DB interfaces, however, use pointers, structures, and explicit memory handling and so are not suitable for calling directly from VB (or indeed from Visual J++). To get around this, ActiveX Data Objects provides a common object-based interface for both OLE-DB and ODBC.

Contrary to some early reports, support for Remote Data Objects (RDO) remains. It's just that ADO offers more capabilities and a leaner interface and so it makes sense for new data handling applications to use ADO where possible and for developers to look at migrating RDO dependent applications to ADO. ADO isn't restricted to VB but is integrated throughout all the Visual Studio development tools.

The Data Environment Designer (see Figure 2) replaces the VB5 ActiveX UserConnection designer. In keeping with the move to OLE DB, it allows access to both OLE DB and ODBC data sources. Further, it allows multiple ADO connections as well as direct data binding to new control types. Given the previous poor performance of bound controls, there's a question as to how efficient it might be to allow a wider range of controls to be bound in this way but it's certainly a useful feature for rapid prototyping. It may be that having a single Data Environment in a project, rather than a multiplicity of separately-bound controls as before, will mean that it becomes a realistic option for deployed applications.



Figure 3—The DateTimePicker control.

A completely new control that has been added is the ADO Data Control. This is a new OLE DB-aware design-time control that generates ADO code and allows developers to link easily to databases and develop suitable applications with minimal coding.

Other data controls have been updated either to extend functionality or, more particularly, to handle OLE DB connectivity.

These include the DataGrid, DataList, and DataCombo controls. An updated version of the FlexGrid control, the Hierarchical FlexGrid, can be used to display a hierarchy of ADO recordsets, each displayed as a separate band within the grid and capable of being formatted independently.

Linguistic legerdemain

There have been some changes to the language specifications, for example extensions to string handling. These are aimed at the international market. There are facilities to convert between Japanese Hiragana and Katakana character sets, while a number of currency, date/time, month, weekday, and numeric formatting functions have been added.

Functions can now return arrays, and resizable arrays can be assigned. Implementation inheritance has not been added but remot-ing of user-defined types (UDTs) has appeared as an enhancement to earlier remot-ing capabilities.

In addition to remot-ing UDTs it's possible to remote ADO recordsets, something of particular benefit for web-based client/server applications as it allows the application to be kept as small as possible. The following code, taken from the Microsoft documentation, shows an example of remot-ing ADO recordsets. The server-side code goes like this:

```
' This code is in a code module.
' Set a reference to the Microsoft ActiveX Data
' Objects 2.0 Library
Private MyADORecordset As ADODB.Recordset

Public Function GetCustomer(LastName As String) As
ADODB.Recordset
    ' Query the DB
    MyADORecordset.Open "SELECT * FROM Customers " & _
        " WHERE LastName = '" & LastName & "'", cn, _
        adOpenForwardOnly, adLockReadOnly
    Set MyADORecordset.ActiveConnection = Nothing
    ' Return the recordset.
    Set GetCustomer = MyADORecordset
End Function
```

While the code on the client-side would be:

```
Option Explicit
Private SomeServer As Object

Private Sub Command1_Click()
    ' Client can use the lighter ADOR library. Set a
    ' reference to the Microsoft ActiveX Data Objects
    ' Recordset 2.0 Library.
    Dim MyData As ADOR.Recordset
```

```
Set SomeServer = _
    CreateObject("foo.bar", myserver)
Set MyData = _
    SomeServer.GetCustomer("Smith")
' Do something with the data.
```

End Sub

A further addition is a CallByName function, a mechanism which can be used to get or set a property or to invoke a method at runtime using a string name. The following code, for example, can be used to invoke the Move method to move a given text box:

```
CallByName Text1, "Move", vbMethod, 100, 100
```

Bits and pieces

Some of the included controls of particular interest in this version are the Coolbar, the Flat Scrollbar, ImageCombo, and DateTimePicker controls. The Coolbar control is a container designed to produce user-configurable toolbars of the type found in IE4. (Every so often fashion changes and IE now displays what many users find attractive: flat, monochrome buttons that spring to life and colour when the mouse pointer passes over them.) In similar manner, the Flat Scrollbar control produces, well, flat scrollbars or 'elegant flat scrollbars' according to Microsoft.

The ImageCombo control allows developers to include images or icons, a welcome addition, while the DateTimePicker control is used to provide a drop down calendar that can be manipulated and from which dates can be selected (see Figure 3).

Possibly one of the more useful enhancements, at least in terms of putting some brake on resource use, is the introduction of so-called lightweight or windowless controls. It's sometimes not realised but every control – scrollbars, buttons, and the like – is a window, each with a window process. Whenever the user does anything all these windows have to be checked and with the current profligate use of such elements the resource cost can be considerable. Lightweight controls don't need to have a handle or a window procedure. Not all controls can be lightweighted and there are important design considerations to be taken into account (including, for example, message handling) but the benefits of judicious use look like being considerable.

A quick glance at VB6 might suggest that not a lot has changed, that what has changed may not amount to much and, further, that the changes seem to be targeted more at Sunday drivers than experienced programmers capable of tweaking their code to get maximum benefit. However, it's very important – as I suggested earlier – that Visual Basic be considered in context as part of an overall development structure oriented towards what is grandly referred to as 'Enterprise Computing'. The Visual Studio suite of tools is an important element in that strategy and Visual Basic is an important part of the jigsaw.

Data handling, particularly from remote, diverse sources is the key to success in this area. It will also be particularly useful in the arena of developing later generations of web-based applications, which are going to require much greater power and sophistication than is currently the case. COM (and DCOM) is central to this and now firmly underpins the development structure not only of Visual Basic but of the other tools in the suite.

VB6 is, therefore, an interesting move forward and an important one in the context of computing development and Microsoft's positioning. ■

Reviewed by Murdoch Mactaggart (biography on page 27).

See our regular VB column, page 59, for another view of VB 6.0.



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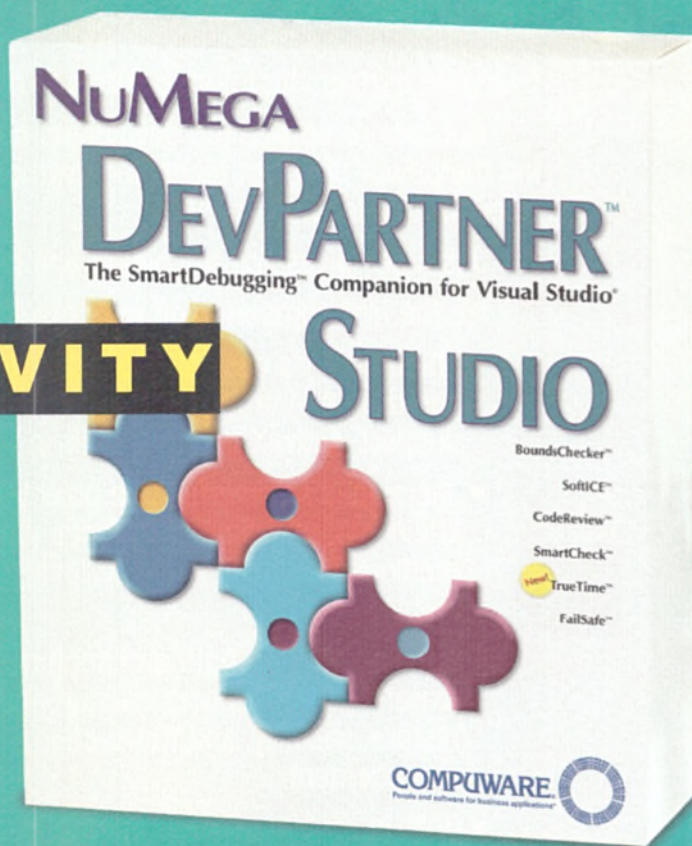
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Enquiry No. Se18

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Visual InterDev 6.0

No new medium has evolved quite as fast as the Web has in recent years. Its growth, from a little-known academic system to the global face of the Internet, has taken less than five years. Where web-sites used to be nothing more than interlinked stores of textual documents, now they are virtual storefronts, reference libraries, and entertainment sources. And yet it's still true today that a significant proportion of those who develop websites use a simple raw text editor to do most of their work.

More sophisticated approaches to web-building have traditionally taken one of two approaches. The WYSIWYG route, where what you see is not exactly what you get and your HTML code ends up looking like spaghetti, is best suited to designers rather than programmers, people trying to achieve a specific visual effect rather than create a dynamic web site. The hand-coded route involves writing most, if not all, of the HTML by hand, but adds lots of features suitable for developers, such as the ability to connect to databases, and retrieve and process data.

While Microsoft's FrontPage epitomises the former, Visual InterDev is a prime example of the latter. From the start, InterDev was promoted and sold as a programmer's web development tool. It was hosted in Visual Studio 97 in the Developer Studio environment alongside Visual C++ 5.0 and Visual J++ 1.0. But Visual InterDev 1.0 was far from perfect. While it was possible to write both client and server-side script with InterDev 1.0, there was very little in the way of help in doing so apart from the Design-Time Controls, which were not always the easiest things in the world to use.

Environmental issues

Visual InterDev 6.0 addresses these issues and a lot more. Hosted this time around within the new Microsoft Development Environment (MDE) alongside Visual J++, InterDev 6.0 shares all the benefits of this new environment. MDE looks and feels like Visual Basic 6.0 (Figure 1), with the usual configurable toolbars and dockable windows that you would expect. One notable enhancement is the ability to stack the environment windows – toolboxes, properties, project layout, etc – on top of each other in the same space, with tabs appearing to allow you to switch between them. This is a godsend if, like me, you used to have to open and close various toolbars and windows constantly just to do routine tasks.

MDE comes with a variety of editors built in for different content types. The source editor is the same for both HTML (including scripts) and Java, while a Cascading Style Sheets (CSS) editor and a WYSIWYG HTML editor are specific to InterDev. Rather than force you to choose between source and WYSIWYG mode, each editing window has a set of tabs at the bottom that allow you to switch seamlessly between the two and a preview mode. The preview mode doesn't do a round-trip to the server, however, and so you can't preview pages that use server-side scripting.

My verdict on InterDev's WYSIWYG HTML editor would have to be: don't use it. It's not as capable as the FrontPage 98 editor, and it mangles your HTML just as badly if you use it to edit a hand-designed page.

I get the impression it was put in the product simply to avoid having to use the FrontPage editor again. For simple work, where there will be no server-side scripting involved and you only want to use the supplied design-time controls to connect to data sources, it may be good enough, but if you want control over your code

you should stick with the source editor. One point worthy of note is that if you place ASP expressions within your HTML code the editor will refuse to switch into WYSIWYG mode anyway. It didn't do this in the beta versions, but it often ended up displaying garbage on the screen instead, so I'm happier with the final solution.

The source editor, on the other hand, is superb. It has all the usual features – like drag-and-drop editing, syntax colouring, and auto-indent – that you would expect in a modern editor, but in common with the other Visual Studio 6.0 tools it has code completion for client and server-side script code (not the HTML itself). Sadly, I found that it didn't work very well with server-side script, often losing track of variables and failing to prompt. As a case in point, take the following code:

```
set db=server.createobject("adodb.connection")
set dbrs=db.execute("SELECT * FROM Table1")
dbrs.movenext
```

Here, the editor prompts correctly on lines one and two, but at line three it fails to take note of the variable `dbrs` as a `recordset` and doesn't prompt. You can make it do so by explicitly declaring `dbrs` as a `recordset` before you use it, but there really is no reason why the IntelliSense couldn't work the type out for itself; it happily managed to do so for most other types. This said, code completion is still a must-have feature for anyone who programs a lot of script as it is fully aware of the DHTML object model. It also automatically analyses any script functions you might write and prompts with the right parameters for these as well. Its performance with client-side script was flawless.

Beware of using the InterDev Toolbox to add apparently plain HTML elements – textboxes, combo boxes, etc – to your pages; all the objects in the Toolbox are derived from the Script Library and will include a bunch of extra code into your page. This is in keeping with the philosophy of Visual J++ – which uses the same environment – where the interface elements actually translate into WFC classes rather than standard AWT elements. If you just want a simple form with a simple textbox, you will need to write it by hand. Since the

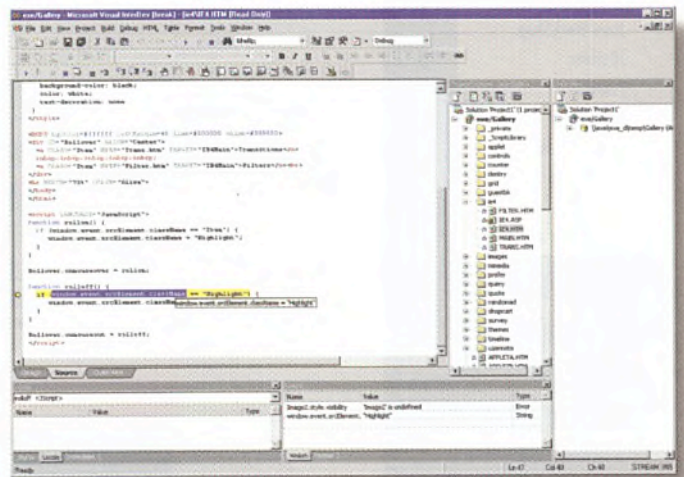


Figure 1 – InterDev 6.0 lives in the new Microsoft Development Environment (note code completion in action here).

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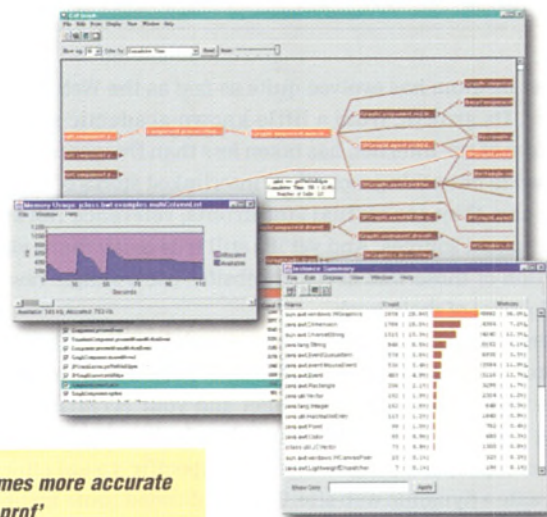
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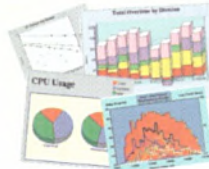
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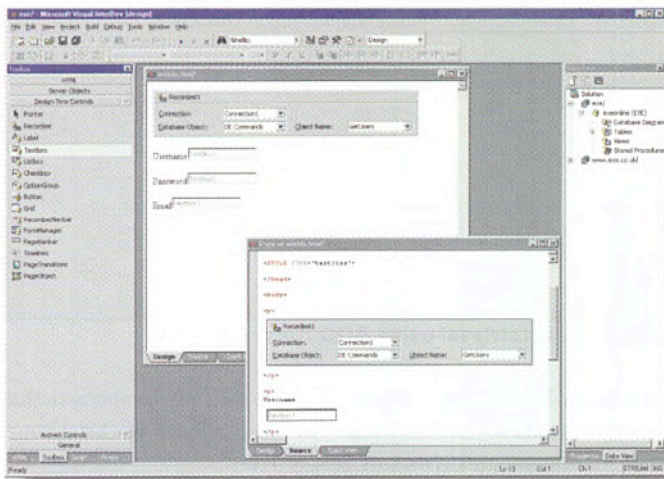


Figure 2 – Design-time controls now appear graphically in both WYSIWYG and source views.

visual editor is – in its current form – all but useless, I found myself using the Toolbox only for the data-bound controls.

Data, data everywhere

Visual InterDev 1.0 was very strong on database access, and version 6.0 continues this tradition. There are two main ways to get at data – via the data-bound HTML elements, which can be found on the Design-Time Controls (DTC) pane of the Toolbox, or using ADO Server objects. Either requires you to install the InterDev Script Library on your web server.

The library consists of a set of script functions each in two versions, one which runs on the server side as ASP code, and one which runs on the client side as DHTML (and therefore requires IE 4 or above). Each time you use a DTC you can specify whether it should run on the server or the client, so you could potentially have a mixture of both on individual pages.

In InterDev 1.0, running a DTC took you through a wizard process after which the control would write a stack of ASP code into the page – code which you didn't want to mess with unless you really knew what you were doing. In InterDev 6.0, DTCs appear on the page as graphical controls in both source and WYSIWYG mode (Figure 2), although you can still look at the code if you prefer. This makes it a whole lot easier to tweak the properties of your data controls. The presence of the Script Library means that your pages aren't filled with reams of redundant code.

To enable the DTCs you need to make use of the Data Environment, which for InterDev projects resides in a file called `global.asa`. This file specifies the data sources and common data commands to use in the project. You use wizards to add new data connections into the Data Environment, and to add data commands to the connection. A data command is a reference to a database object, stored procedure, table, or a SQL query (using the SQL Builder first introduced in Visual Studio 97 and largely unchanged in this version). Once you have one or more data commands you can simply drag and drop these onto your pages to create an instant recordset DTC. This is the same mechanism used elsewhere in Visual Studio, so once you know how to do data access with one product, you know how to do it with all of them.

The alternative to DTCs is the ADO Server object, which can be found – unsurprisingly – on the Server Objects pane of the Toolbox. Drop one of these onto your page and you get a simple line of HTML code containing an `OBJECT` tag, which instantiates a data object either on the

server or the client. You can then manipulate this object from script code as usual. Frankly, if you're using ASP it would be just as easy to invoke `server.createObject` from within the script, but nonetheless the ADO Server objects work well.

The amount of code produced by the DTC still seems unnecessarily large. By way of comparison, check out Listings 1 and 2. Both show a sample ASP script to retrieve a value from a database table and display it as HTML text. Listing 1 is the DTC version – converted to final code – while Listing 2 is the ADO Server object version. Note that Listing 1 requires several files to be included in addition to the listed code. For this reason I'm reluctant to use DTCs on the server side.

Using InterDev's Data View it's possible to browse directly into the data connections and commands in the Data Environment, where you can display, edit, and design tables and records, stored procedures, or database diagrams. This is a fabulous feature for websites that rely heavily on data stores for their actual content, as minor repairs and tweaks can be done directly from within InterDev without needing to write a single line of code.

Project paraphernalia

All InterDev 6.0 projects will maintain two copies of your web application files – one locally within your project directory, and one on the web server. Only files that are currently being worked on have local copies. You can choose to work either in Local or Master mode, however, and this affects how your changes get written. In Local mode, changes are written only to the local files, and synchronised with the web server on demand. In Master mode, changes are written to both locations simultaneously. However, even in Local mode you will need to have a connection to the web server in order to grab files you haven't worked on yet and hence don't have a working copy of.

The overall project architecture of InterDev has changed as well. Within the MDE, the base project unit is now the 'solution'. Multiple projects can live within a solution, so you could have a solution made up of web applications, Visual J++ projects, and Visual Analyser projects. Visual Studio 6.0 tools will read the old Visual Studio 97 project files, but projects must be loaded within the context of a solution.

In everyday use, I would suggest that to get the best out of InterDev you would need to have a permanent connection to your web server avail-

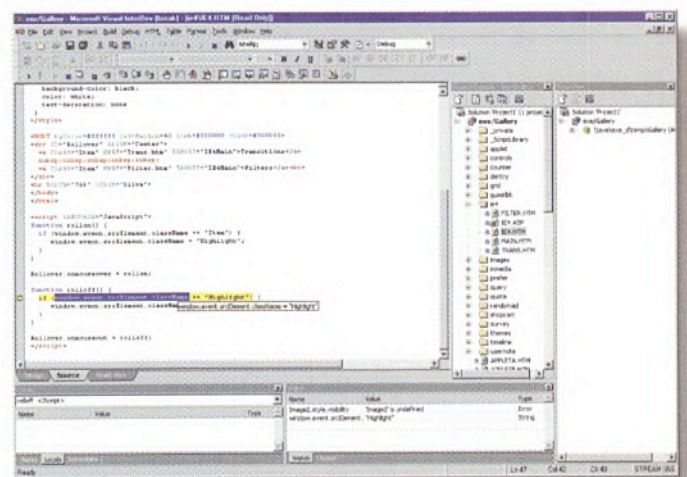


Figure 3 – The integrated script debugger is as comprehensive as any of the other debuggers in the suite.



able. Should this not be the case you will need to have a staging server available on which you can work directly.

For team development, InterDev now has a source control system, courtesy of Visual SourceSafe 6.0. This involves installing the Visual SourceSafe server on your web server machine, which is hardly a trivial

job. It helps to make a project source-control enabled from the start, because as I discovered trying to convert a large project over to source control can entail several hours of waiting while InterDev updates itself and creates a database.

Once SourceSafe is in place, however, things improve quite a bit. The SourceSafe client is supplied, although for everyday operations you don't need to use it, as a full range of facilities to use source control is built into Visual InterDev 6.0. In fact, you would probably never even notice the difference between the non-source-controlled and

```
<OBJECT RUNAT=server PROGID=ADODB.Connection id=conn1> </OBJECT>
<%
conn1.Open("LocalServer")
set MyRs=conn1.Execute("SELECT Username FROM Users")
%>
<HTML>
<HEAD>
</HEAD>
<BODY>
The value of field 'Username' in the first record is: <%=
MyRs("Username") %>

</BODY>
</HTML>
```

Listing 2 – Data retrieval using ADO Server objects.

source-controlled projects because all that initially happens is that the menu options to 'get working copy' and 'release working copy' become 'check out' and 'check in' respectively.

When you attempt to check anything out or in, InterDev pops up a dialog box asking you to confirm what you are doing and insert any comments you like. Depending on whether you check out files regularly or take a large number for a long period, you might find this intensely annoying. Thankfully, the default behaviour can be turned off, although you sacrifice the option to selectively check in and out files within a folder – unless you are willing to check each file one at a time, of course – and to make comments for other team members to read. Happily should you need to do so, the old dialog can be called back from the main menus.

On the whole, I trusted SourceSafe more than pure file-level control. Although at EXE only two of us are usually involved in modifying the website I felt better knowing that any conflicts would be detected and could be dealt with. Source control also allowed me to rescue old versions of files when (as occasionally happens) I got careless, although to make use of these more advanced functions and others, like performing a diff on versions of a file, requires the SourceSafe client to be installed. Frankly, I would have liked all functions to be available from within InterDev itself but this is a small quibble.

Trapping those bugs

Debugging a web application has never been particularly easy. This is because of the fundamentally client/server nature of the Web; a bug in server-side script has to be debugged at the server end, while a bug in client-side script similarly has to be dealt with on the client. To make matters more confusing, once you add in data connections, ISAPI filters, and CGI programs, the possible sources of errors, and the environments needed to deal with them, become legion.

InterDev 1.0 took the coward's approach to debugging – it didn't do it. You needed to run the separate Microsoft Script Debugger, which at the time was functional but hardly friendly. InterDev 6.0's debugging facilities are integrated into the larger debugging capabilities of the MDE, sharing them with Visual J++. It goes without saying that in keeping with the interoperability theme, which pervades Visual Studio, it is possible to debug not only client and server side script on a single machine, but also to debug any Java code, ActiveX controls, or other Visual Studio-created components that might be in the solution. Where necessary, you can invoke the other tools in the suite – notably the Visual Basic/Visual C++ joint debugging engine – to carry out this work.

All is not sweetness and light, however. Enabling remote debugging – where your local copy of Visual InterDev can debug applications and scripts running on the server – requires several steps to be performed, including installing additional server software and making changes to the DCOM setup on your server with the (previously unknown to me) dcomcnfg.exe. The documentation on how to do this was not easy to find. Once it's working, though, it is a joy to behold.

```
<%@ Language=VBScript%>
<% ' VI 6.0 Scripting Object Model Enabled %>
<!--#include file="_ScriptLibrary/pm.asp"-->
<% if StartPageProcessing() Then Response.End() %>
<FORM name=thisForm METHOD=post>
<!--METADATA TYPE="DesignerControl" startspan
<OBJECT classid="clsid:9CF5D7C2-EC10-11D0-9862-0000F8027CA0"
id=Recordset1 style="LEFT: 0px; TOP: 0px">
<PARAM NAME="ExtentX" VALUE="12197">
<PARAM NAME="ExtentY" VALUE="2090">
</OBJECT>
-->
<!--#INCLUDE FILE="_ScriptLibrary/Recordset.ASP"-->
<SCRIPT LANGUAGE="JavaScript" RUNAT="server">
function _initRecordset1()
{
var DBConn = Server.CreateObject('ADODB.Connection');
DBConn.ConnectionTimeout =
Application('Connection1_ConnectionTimeout');
DBConn.CommandTimeout =
Application('Connection1_CommandTimeout');
DBConn.CursorLocation =
Application('Connection1_CursorLocation');
DBConn.Open(Application('Connection1_ConnectionString'),
Application('Connection1_RuntimeUserName'),
Application('Connection1_RuntimePassword'));
var cmdTmp = Server.CreateObject('ADODB.Command');
var rsTmp = Server.CreateObject('ADODB.Recordset');
cmdTmp.ActiveConnection = DBConn;
rsTmp.Source = cmdTmp;
cmdTmp.CommandType = 2;
cmdTmp.CommandTimeout = 10;
cmdTmp.CommandText = 'Users';
rsTmp.CacheSize = 10;
rsTmp.CursorType = 3;
rsTmp.CursorLocation = 3;
rsTmp.LockType = 3;
Recordset1.setRecordSource(rsTmp);
Recordset1.open();
if (thisPage.getState('pb_Recordset1') != null)
Recordset1.setBookmark(
thisPage.getState('pb_Recordset1'));
}
function _Recordset1_ctor()
{
CreateRecordset('Recordset1', _initRecordset1, null);
}
function _Recordset1_dtor()
{
Recordset1._preserveState();
thisPage.setState('pb_Recordset1', Recordset1.getBookmark());
}
</SCRIPT>

<!--METADATA TYPE="DesignerControl" endspan-->
<HTML>
<HEAD>
</HEAD>
<BODY>

The value of field 'Username' in the first record is: <%=
Recordset1("Username") %>

</BODY>
<% ' VI 6.0 Scripting Object Model Enabled %>
<% EndPageProcessing() %>
</FORM>
</HTML>
```

Listing 1 – Data retrieval using Design-Time Controls.

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Almost everything you can do with conventional debugging can be done with the InterDev script debugger (Figure 3) – setting breakpoints, stepping in,

out and over code, setting watches, and inspecting and/or changing values. The context switches fairly effortlessly between client and server-side code, although there is often a slight delay when debugging a new server-side page as the full ASP code has to be downloaded to the client machine.

It actually took me quite some time to get used to debugging script the same way I used to debug C++ code. I've spent so long debugging script by hand, looking at cryptic error messages and putting in `response.write` statements to discover what went wrong (kind of the scripting equivalent of debugging by `printf`), that to suddenly have a serious debugger at my disposal was a little overwhelming. I suspect many Visual Notepad web developers may feel the same. In the long run, as web applications increasingly take over from traditional desktop applications, there is no doubt that a comprehensive debugging solution is required. This version of Visual InterDev comes close, but there is still some work to do.

The missing pieces

Despite the improvements in InterDev 6.0, there are still a few things missing. The Search and Replace tool will perform a find across multiple files, for instance, but it will not replace in multiple files. This is a crucial feature and to find it missed out yet again was infuriating. I often need to globally replace all instances of a particular word or tag sequence in all my pages, but I can't without using a third-party tool.

As I mentioned earlier, the WYSIWYG HTML editor is far from perfect. I honestly don't believe that by now Microsoft couldn't have come up with a visual editor that would leave your hand-written HTML unmangled, and use a slightly more sensible HTML code generation strategy. In fact, a Microsoft product manager confessed to me that FrontPage 99, due 'around the end of the year', would feature exactly this. I hope they come up with a patch to InterDev at the same time which makes the visual HTML editor a viable option. As much as I like to code HTML by hand a lot of the time, there are many times when WYSIWYG really would be more useful.

The Cascading Style Sheets editor leaves a lot to be desired. Granted, it's a first effort,

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and CSS uptake has hardly been enthusiastic so far, but it will be a very important technology. I felt that CSS editing ought to be built directly into the HTML editors, with the ability to assign style to page elements from within the properties in a meaningful way. Similarly, there is no specific support for Channel Definition Format (CDF) files. FrontPage 98 already has this, so there is no reason why InterDev could not.

Does it make the grade?

InterDev 6.0 is certainly a significant improvement over its predecessor. Where version 1.0 was weak, 6.0 is generally much stronger, and where the first version was strong already, InterDev 6.0 is as strong or stronger. Despite some slightly rough edges, this product definitely makes life easier for any web developer using ASP or Dynamic HTML.

And there, in fact, is the rub. If I were using a server-side technology other than ASP – Cold Fusion, say – then there would be little clear advantage in using InterDev. Clearly, the product is aimed at web developers who are already firmly in the Microsoft camp. These are the people who would be using Visual C++ to build ISAPI filters and CGI applications, and the people who will be using Visual J++ to write their Java applets and servlets. For these people, the integration that InterDev offers with the rest of the tools – particularly taking into account the remote debugging facilities, and the Visual Analyser facilities – may make life considerably easier.

The short answer is that if you are developing websites on Windows NT and you use – or plan to use – ASP as your scripting solution, then InterDev 6.0 is the best development environment there is. It might even tempt a few of those hardcore HTML junkies to abandon Notepad.

Reviewed by Neil Hewitt

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File Edit Record View Help Report Setup Window Help

Defect ID: 36 Priority: Medium Status: Closed Assign To: A.Lau

Product: DrawCAD Module: Display Version: 2.00 Submitter: G.Tam

Date: 03/01/94 Time: 14:36:43 Copy To: admin

Synopsis: Overlapping viewports can't be displayed

Detailed Description:

To reproduce:

- 1) Load DrawCAD by clicking it's icon
- 2) Create two viewports
- 3) Choose EDIT, OVERLAP command

Comments:

Attached Files: demo.jpg

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Mini SQL, or MSQL, is an off-the-net product from Australia. Running on Unix (and Linux), it provides a relational database accessed by a usable subset of SQL, along with a programming interface that permits scripts to be written in various languages. It comes with its own Perl-like scripting language, Lite, that integrates really well into your web server allowing easy construction of web-based lookup and update pages. Well, that's the executive summary, I guess. I've been meaning to write an article on MSQL for some time now, but as is usual, other things got in the way and the notion dropped to the bottom of the pile.

MSQL is another member of the 'originally free but now you license it' class of software. It first appeared on the Web as a private personal venture by David Hughes, and is now a licensable program suite, sold and supported by Hughes Technologies. If you use MSQL for more than 14 days, you should pay the licence fee, which is US\$250 for a single licence. This entitles you to use a major release, so if you buy a 2.0 licence, you can pull upgrades to this release for no additional payment. There are various categories of free licences: for educational users and the like.

MSQL has been designed to handle large databases rapidly, with a small impact on system resources. Its footprint is small – it doesn't use vast amounts of memory to do its job – and so it is suited for data management applications such as web databases. The documentation does state that the product has not been developed for use in critical financial environments.

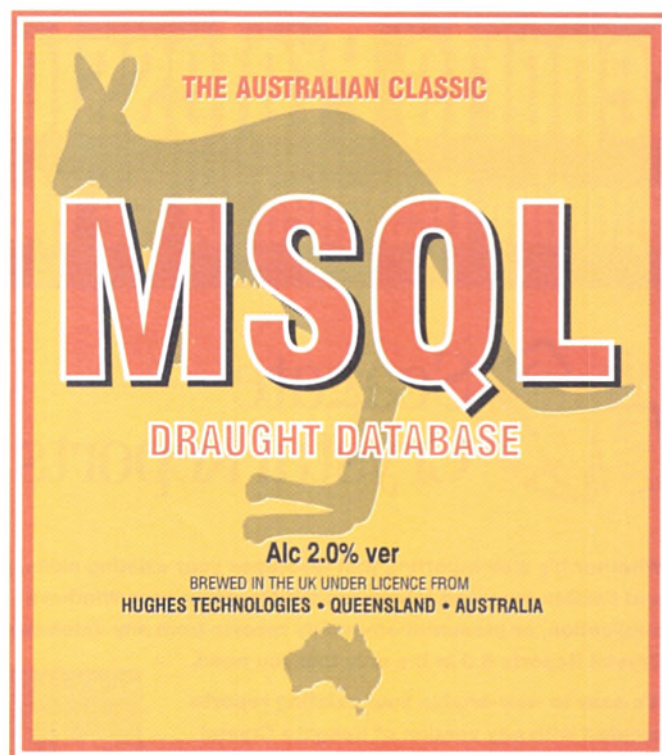
Designed to handle large databases rapidly, accessible by SQL, and with its own scripting language. Peter Collinson looks at the features to be found within Mini SQL.

A database for webmasters

I've been using MSQL for odd database applications for a little less than a year now. I seem to have periods where I don't think about it for new jobs, and then something pops up that warrants its use. I generally find that it's easy to pick up again, and it's simple to create quite sophisticated searches on a database.

Actually, this article was prompted by some current activity. We are engaged in creating a website for England's oldest brewing company, Shepherd Neame, based in Faversham, Kent. They have loads of pubs in south-east England that we wish to bung in a database, and then allow people to search – looking for pub location, or postcode, or features, or whatever. As I write, the site is under construction and not actually open for business, and the database is incomplete. It's unclear to me that some of the advanced search features will be available by the time you read this. However, one feature that will be present is the ability to send someone a pint – useful when you owe someone a drink.

I went looking for a relational database some time back, when we were putting our local Chamber of Commerce up on the Web. We wanted to present a search engine for address list data and provide different styles of searches, best done in a relational database. As one

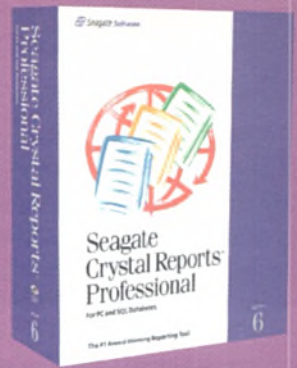


Field	Type	Length	Not Null	Unique Index
id	int	4	Y	N/A
company	char	64	N	N/A
address1	text	32	N	N/A
address2	text	32	N	N/A
town	text	32	N	N/A
county	text	10	N	N/A
postcode	char	10	N	N/A
phone	char	14	N	N/A
fax	char	14	N	N/A
contact	text	32	N	N/A
email	text	32	N	N/A
url	text	64	N	N/A
vendor_ix1	index	N/A	N/A	Y

Figure 1 – Output from the relshow program.

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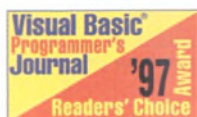
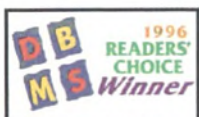
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Web resources

The official home for MSQL is <http://www.Hughes.com.au>. You can pull the release from here, submit bugs, and get some user-supplied software from the library. The John Wiley book, *Official Guide to Mini SQL 2.0*, comes with a CD, which presumably contains a release of MSQL.

I've mentioned CPAN, the Perl archive, in this article. The best way into that is via Tom Christiansen's <http://www.perl.com/CPAN>. You'll find yourself on a page where you can choose a mirror site nearest you (there are three in the UK).

does, I began to poke about on the net and stumbled across MSQL. The source comes as a gzipped tar image. Once unpacked, you create a target directory, type `make`, and you have a working version. Well, that actually happened to me on all releases but the current one (2.0.4.1), which bombs out with a C compilation error. I've reported the bug, and have heard nothing. If this happens to you, pull the previous release, and it should be trouble free.

The working parts of MSQL live in `/usr/local/Hughes`. When I've upgraded my software, I've generally compiled the new version and then moved `/usr/local/Hughes` to `/usr/local/Hughes.old`. I installed the new version, moved the database files from `.old` into the new tree and bingo, a new installed system. I killed the MSQL server (`msql2d`) while I was doing this, so any requests would be met with an error, but this has not seemed to be a problem at the times that I have chosen to engage in the upgrade activity.

Utilities and programs

The server daemon `msql2d` is started at system bootstrap time. It will handle a large number of simultaneous requests: it configures itself to work out how many connections it can handle, depending on the operating system and the way that the kernel is set up. MSQL documentation says that it will handle over 200 simultaneous client connections on a typical system. On my BSD/OS system, `msql2d` offers a maximum 214 simultaneous connections.

For web database applications, the maximum number of simultaneous connections is a big deal. Many relational database systems have quite low limits (20 or so) for the number of parallel connections, and these low limits have always put me off using the systems. The Usenix Association has used Sybase for several years to support its member database. I am webmaster there, and we are beginning to provide lookup functions for members to interrogate and change the information held by the Association. We've already had one instance where we've exceeded the number of database access slots, which looks bad to the user and is not good news for the page implementor either.

The MSQL system provides a program that acts as the primary interface to its server. This is `msql`, the monitor. The program can operate interactively, so you can type SQL at it, and get responses from active databases. The program is also used as the primary means of data entry, and other programs will create `msql` scripts. For example, there's a program called `msqldump` that generates a text file reflecting the state of a database. The dumped text file is suitable for later input to `msql`, recreating the database from scratch.

The `msql` program is not used to create or delete complete databases; the `msqladmin` program does that. You also use `msqladmin` to inform you about the system, and to perform administration functions like closing things down.

Once you've created a set of tables and indexes to tables, the `relshow` program can be used to see what you have got. Figure 1 is the output from a used car database that I started to play with.



The table is for storing vendor details – it has a bunch of information relating to a company. Note that there's a distinction between `char` fields, which are fixed length and indexable, and `text` fields, which are variable length fields. Their size is an indication of the usual string that will be stored here, but the string can be longer than that value. The database manages the overflow. The `text` fields are slower to access than `char` fields, and cannot be used for indexing or as a field for lookup.

The last line of the output tells me that I've created an index on this table. Indexes are added to provide fast searching into various fields or combinations of fields. Their use is transparent to the application program, which just initiates a lookup on some field, and is unaware that the field is indexed.

There is a pair of programs that allow you to import or export data in or out of databases. We've been using these to interface with Microsoft Access, moving CSV files between the two. The parameters used for record separation and quoting can be defined on the command line, so import/export is pretty flexible.

Lite

The final utility program of note is Lite, a scripting language that can be used to create intelligent programs to access the data in the database. Lite is a simple Perl-like language designed to be picked up and used quickly by C programmers. It has scalar variables that can hold integers, unsigned integers, real numbers, and strings. Variables are declared by their use, and take on the type of the values that are assigned to them. And arrays of variables are supported. Operators on variables are C-like, with the addition of string concatenation using the plus character. The language uses the hash character `#` as a way of determining lengths and sizes:

```
$string = "Hello, World\n";
```

```
$len = # $string;
```

gives you the number of bytes held in the variable `$string` (13), and:

```
$array[13] = 45;
```

```
$arlen = # $array
```

gives you the number of elements held in the array (46, arrays are numbered from zero like C). This latter use comes into its own when you make SQL queries and get values back in arrays.

The language has overly simple conditional and loop facilities. The `if` statement has C-like syntax. The test operators are familiar but allow for string comparisons. And all code that follows an `if` statement must be wrapped in braces, which means that the final result becomes somewhat bracket rich. There's an `else` statement, but no `else-if` construct, so multiple tests tend to march across the screen, indenting as you go.

Looping is supported only by the `while` construct, so you have to hand-code `for` loops. There are `continue` and `break` statements, permitting you to control the flow of execution in the loop.

You can define your own functions, which have formal typed parameter lists. Parameters are passed by value, and not reference. There's no indirection and pointers, so passing big arrays into functions means loads of copying. Functions, which return a single variable, must be defined before they are used, and variables inside functions are all local to the function; there is no concept of global variable scope. Incidentally, functions don't work as expected when Lite is



embedded in HTML (see below), you need to place them in a precompiled library file.

There are internal functions that interface to the operating system, routines for I/O and sockets, file management, string manipulation, process handling, time display, and network access.

Finally, there is a set of routines that allow access to MSQL itself. The routines map closely onto the MSQL C library interface. In general, accessing the server follows the standard pattern for communicating with database daemons. First, you open a connection to the server using a socket call. Next, you specify the database that you want to use. You are now in business to ask the server to do something. A query is built as a string and sent to the server, which replies with a success or failure indicator. Assuming success, you then pull the complete answer into an internal variable, and decode it with supplied routines. At the end of the day, you close the socket connection.

It's easy to see how to do things, and there are examples in the documentation that help. The system ships with a sample web application (actually, a more than simple bookmark storage system) so there's a lot of real working stuff to look at.

Web interface

You can interface to the server using C, or there is a standard Perl DB interface (which you need to pull from CPAN, the Comprehensive Perl Archive Network). The Perl DB interface does need the latest version of Perl (5.004). If you are a Perl or C programmer, these interfaces may be sufficient. You might not wish to get involved with yet another language like Lite. The incentive is the ease with which the language interfaces to your web server.

The cornerstone of the approach is `w3-msql`, a program designed to pull out and execute embedded Lite statements from inside an HTML source file. The following HTML:

```
<HTML><HEAD>...</HEAD>
<BODY>
<!--
    echo("<B>Hello World</B><BR>\n");
    printf("Your machine is %s<br>\n",
          $REMOTE_HOST);
-->
</BODY>
</HTML>
```

will be executed by `w3-msql` and will generate a page containing all the original HTML but with 'Hello World' on one line, and the name of the calling machine on the next. The example also demonstrates that Lite will import any name from the environment of the program directly into a variable, which makes it very easy to get information from the web server.

Actually, Lite does a similar trick with names of input boxes, so it is easy to create question/action pages. On the question page, there will be a form and, say, an input text box called NAME. You press the SUBMIT or SEARCH button and jump to an action page that contains loads of Lite code to access the database. On the action page, you can obtain the value of variables on the question page by writing Lite statements that use the variables named in the HTML, like \$NAME. All this means that there is very little baggage in the Lite scripts that process forms. All the boring stuff to decode the CGI environment is already done for you.

Of course, you cannot leave HTML files containing Lite lying around your web tree appearing to be regular HTML files because there's a chance that someone will pull them without running them

through the interpreter first. Since I run Apache, I've told it that any file called *something.msql* should be passed to `w3-msql` to be processed and dispatched to the user. This is done by including two lines in the configuration file:

```
# Add msql handler
AddHandler msql-handler msql
```

This tells Apache that all files with the suffix `msql` should be dealt with by the `msql-handler`. The handler is then added:

```
# Msql action
Action msql-handler /cgi-bin/w3-msql
```

I can place `.msql` files at the appropriate point in the web tree and I know that the interpreter will always be called to process them.

You may not always be able to set things up in your web server, and to access a page you will have to specify a URL of:

```
/cgi-bin/w3-msql/dir/file.html
```

and make sure that the user executes this. The `w3-msql` program uses the pathname to discover the file that is to be passed to the interpreter. There is still a problem with this approach: someone could still come along and pull the file by supplying its actual URL.

MSQL tackles this problem by supporting the notion of *private directories*. If `w3-msql` doesn't find the file in the web tree (if `dir/file.html` doesn't exist), then it looks for an external file, by default relative to `/usr/local/Hughes/www`. The web server cannot access this file, because it's outside its scope. Any direct access to the URL will fail because the file doesn't exist in the web tree. Output will appear only when the URL relative to `w3-msql` is given. On balance, it's much simpler to set up your web server to recognise `.msql` files, because it means that files for a particular part of your website have not spread to different parts of the real file system. The URLs for MSQL programs don't differ markedly from those for the HTML pages for the application.

I find that it's very easy to create Lite/HTML pages and get what are apparently complex lookup systems working very quickly.

Authentication

I must confess that I have never looked at the extensive authentication features supplied by MSQL. My technique has been to run a special server that is designed to support my customers directly. Any external access for a page update is done using password controlled entry to a set of special pages that are not accessible to the general viewing public.

However, if you are unable to do this, or want finer grained control, then you need to find some way to provide password controlled access to the database. MSQL provides the `w3-auth` package, which interfaces to the standard HTTP authentication protocol. Users in the system can be grouped into *namespaces*, and members of those namespaces can then be allowed access to query or modify a database (or both). You can also provide authentication based on IP address, so you can allow anyone on your local network to change things without registering users.

Finally, documentation for the system is in the form of a large PostScript file, which is best printed. It's also available as an HTML document, but this is effectively a conversion of the PostScript. The result is not really useful, to my mind anyway. There is a book, *Official Guide to Mini SQL 2.0* (Wiley), co-authored by Brian Jepson and David J. Hughes, but I've not managed to get a copy, so I cannot vouch for it. ■

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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Sorted



Francis Glassborow salutes the latest Knuth release, on sorting and searching, and shows why the Java interface is a powerful tool for handling objects, providing a clear divide between two concepts that older languages blur.

At long last Donald Knuth's *The Art of Computer Programming Vol. 3, Sorting and Searching, 2nd edition* (ISBN 0 201 89685 0) is out. It was originally scheduled for late 96/early 97 but, like much software, has been delivered late and is less than it might have been. Make no mistake, this book is a tour de force. But when a book quotes material that was not available until after its projected publication date you realise that the author is struggling to get the book to print against a barrage of new discoveries and ideas.

One thing that left me disappointed was that the author simply notes that there are a number of compound algorithms in use for sorting. He does not go into any details. I wish he had documented a little of what these have to offer.

One of the questions frequently asked by naïve programmers is 'Which is the best sort?' What this usually means is 'Which is the fastest?' Even when we rephrase it that way, the question still cannot be answered. For example, suppose that comparison was an extremely lengthy process then you would want to keep comparisons to a minimum. Assuming that you have unlimited memory and no duplicates in the data being sorted, you can often sort without comparisons by having an array large enough to have a unique location for every possible element. As this is usually unreasonable, smaller arrays can be used with a technique like hashing followed by special treatment for objects that want the same location.

However, suppose comparisons were cheap but moving objects was expensive. You would want to do something quite different. Possibly, you might use some form of linked list.

Then we have the problem of sorting data sets that are too large for simultaneous access. Or cases where we have to consider the latency of the backing store even though all elements are accessible at the same time.

I could go on, but I think it should be clear that there is far more to sorting than you might have guessed. The same range of problems applies to searching. Reading Knuth's book should open your eyes to the extent of the problem and the range of available solutions.

While *Sorting and Searching* is heavy on the theoretical side, Chuck Allison's *C & C++ Code Capsules* (ISBN 0 13 591785 9) is strong on practical experience. Though the author's expertise is very high, he sometimes gets caught in highly technical traps. For example, he assumes that the maximum value that can be stored in an `unsigned int` is not less than the maximum value that can be stored in an `unsigned short`. It came as a rude shock to members of WG14 & J11 (those responsible for drafting the new C standard) to discover that this is not required by the current C standard. Errors in this book are at this kind of deep theoretical level, which has little significance to anyone other than language lawyers. Anyone less than expert will gain a great deal from studying this book. Well worth adding to your essential reading list.

Interface

Several years ago, I wrote about the value of studying other languages because it extends your range of choice and develops your understanding.

Over the last couple of years we have endured a great deal of hype about a new kid on the block, Java. While I remain convinced that it still has a long way to go before it attains the kind of stable maturity that I require of languages used to write anything more than transient programs, it serves to focus attention on several aspects of programming. Earlier this year I showed how the clear division between Java's built-in and user-defined types helps programmers to understand the difference between an attribute (value) type and an object type. I do not know of any other language that makes such a clear distinction. However, once the distinction is clear in your mind you can use your understanding in C++, where the user can create the full range of types from the purist attribute types through to object types that support polymorphic instances. By the latter I mean types whose instances can change their behaviour to match changes in their state.

The Java `interface` keyword is another example of providing a clear divide between two concepts that older languages blur by providing them by a shared mechanism. Once again, the result is that a study of Java will enhance your ability to use other languages, C++ in particular.

The designers of Java recognised that their decision to reject multiple inheritance would cause experienced C++ programmers concern. While there are definite dangers in allowing inexperienced programmers use of MI, there are a few problems that are difficult to tackle without it. One of the most important of these in an OO environment is the 'can do' or 'can be used for' relationship.

Inheritance (or more precisely C++ public inheritance) provides the object-oriented concept of 'is a'. C++ provides a couple of other inheritance mechanisms that support such relationships as 'is implemented as' (private inheritance) and 'can use the behaviour of' (protected inheritance). This collection of inheritance mechanisms allows a greater degree of selectivity than that provided by languages such as Smalltalk. That in turn allows programmers more ways of writing badly designed code.

Consider what you need to use a screw. A Swiss Army Knife usually includes the property of being a screwdriver, but so, at a pinch, does a nail file. However, we would not want to establish an 'is a' relationship between a nail file and a screwdriver. A Swiss Army Knife is a screwdriver but it is also a number of other things and there is no linear hierarchy that can represent all these facets.

The concept of an interface is one of concern for specific behaviour. Different objects may provide this behaviour, each in their own way. More importantly, objects exhibiting a combination of behaviours can be handled by combining interfaces.



The Java interface facility allows you to establish commonality of behaviour. Anytime you need a screwdriver, use an object that implements the screwdriver interface. However, the implementation must be provided in a class: there is no potential for a default

implementation or a common data element. The Java interface is a powerful tool that allows us to handle objects by their declared behaviour while avoiding any potential for collisions between different behaviours.

In C++, it is possible to represent the relationship 'A Swiss Army Knife is a screwdriver' by deriving it from a concrete screwdriver class. We can also represent the use of a nail file as a screwdriver by deriving `Nailfile` from an abstract base class `basic_screwdriver` (which would also be a base for various concrete screwdriver types).

If you examine the C++ concept of an abstract base class, you will recognise that it can do exactly what a Java interface does but without the prohibition. C++ provides the mature, responsible programmer with the tool they need while allowing them freedom to do more than provide a pure interface. The price of that freedom is the potential for getting it wrong.

Last month's problem

With the increasing availability of C++ compilers that support exceptions, we are seeing adventurous programmers experiment with veritable hierarchies of exception types. Look at the following typical exception hierarchy and decide what the flaw is:

```
class Exception {};
class Out_Of_Bounds : public Exception {};
class Too_Small : public Out_Of_Bounds {
    string message;
public:
    Too_Small(string m = "No Data"): message(m) {}
};
```

There is one essential property of any type used for exceptions: its constructors must not throw exceptions. It is not enough just to assert this by providing an empty exception specification. The designer must do everything possible to ensure that an exception will not be thrown from either of the constructors.

Let me clarify that. The process of using an exception object will always involve at least two constructors. The original object thrown must be constructed not later than the `throw` point, and that object must be copied with a copy constructor to the `catch` point.

At first sight you may think that the above classes are robust and trouble free. Look again. The class `Too_Small` uses dynamic memory allocation. Hidden inside the `string` constructor there will be a call to `new` (which can throw `bad_alloc`) to provide storage for `message`'s data. Even if the programmer has anticipated the problem, and constructed an instance of `Too_Small` ahead of any possible `throw`, there will still be the copy constructor that will use `new` to provide storage for the copy of `message` at the `catch` site.

There are several ways of tackling this problem. The simplest is probably to provide a C-style array of `char` as a static member of `Too_Small`:

```
class Too_Small : public Out_Of_Bounds {
    enum {messagelength = 100};
    static char message[messagelength];
public:
    Too_Small(char * m = "No Data"){
        strncpy(message, m, messagelength);
    }
};
```

Now the storage for the message will be provided at program startup. If you anticipate passing messages like this, it is probably sensible to provide the memory resource as a `static` member of the base class. If your style generally uses this sort of mechanism, it is worth considering having a global allocation to hold messages. However, if you do that you must learn about `uncaught_exception` to prevent nested exceptions over-writing the outer message. For example, we might reasonably decide that we wanted to see only the outer message, and amend the above constructor to:

```
Too_Small(char * m = "No Data"){
    if(! uncaught_exception())
        strncpy(message, m, messagelength);
}
```

What about the other error? You did notice that there was no way of using the message? We must add a public function such as:

```
displayMessage(ostream & out = cout) const {
    out << message << endl;
}
```

Before relaxing you will need to consider the possibility that you are using an implementation of `ostream` that can throw an exception. Robust programming means that you must consider all the possibilities and deal with them effectively. Until you can do this you had better be very careful before taking responsibility for safety (or just mission) critical code. None of us want to be in a fly-by-wire aircraft that aborts its control program because of a double exception.

This month's (prize) problem

One problem with writing about the next version of C (the so-called C9X) is the lack of a compiler that implements it. As a result, it is easy to write code that perpetrates silly errors. In my July column I managed to pack two such errors into a single statement (actually there was a third, which the sub-editor spotted in time for me to correct). Here is the code in question:

```
enum Colour {red, green, blue};
struct ColouredText {
    char * text;
    enum Colour tint;
};
int main() {
    struct ColouredText ct;
    /* source code */
    if (ct == ColouredText{"example", red}) /* do something */
    /* rest of code */
}
```

The problem line is the `if` statement, and both problems are independent of the concept of compound literals that I was writing about. By way of expressing my thanks for responses to my column I will send a copy of *C++ Primer 3rd edition*, by Lippman & Lajoie, to someone who provides the correct answer. The draw for this will be on the Saturday of the ACCU Conference (details below). If the winner is present, they will also be able to choose a second title from several I have available. ■

Association of C/C++ Users subscriptions: individual £15, student £7.50, corporate £80, Overload & C++ SIG £30 (including ACCU membership). For further information and application forms write to Francis Glassborow, 64 Southfield Road, Oxford, OX4 1PA, ring 01865 246490, or email francis@robinton.demon.co.uk.

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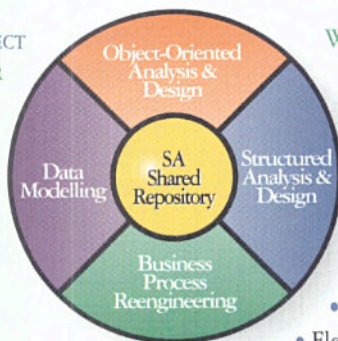
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Open for business

Need to deliver multiple configurations of an application?

Mark Smith creates an ApplicationServices API to incorporate

new business functionality, delivered in a DLL.



Last month I showed how to use the Factory Method pattern to simplify the selection and creation of diverse business objects at run-time. I offered no solution for where these business objects were to come from. In this month's column I show how to add an object-oriented API to your Delphi applications that makes them easy to extend. Using this API makes it easy to provide the *Creator* objects that formed the core of last month's article. Many of the ideas used here come from studying the Delphi 3 Open Tools API and reapplying the underlying ideas for business applications.

Modern development environments such as Delphi, VB, and Visual Studio can be extended by writing new code modules that integrate into the IDE. In the Delphi world, there are several well-regarded extensions such as GExperts and CodeRush. These add-ins or wizards give the IDE new features – in the case of CodeRush, changing the edit window so completely that it is hard to recognise as Delphi.

Traditionally, dynamic-link libraries provided the only way to add new functionality to existing applications. DLLs can either be *statically* linked by being specified at link time, or *dynamically* linked by being loaded by the application using the *LoadLibrary* Windows API function. Normal DLLs are not object-oriented; they contain functions and resources such as strings or bitmaps. With Delphi 3 there was the introduction of packages, which are a new kind of DLL, containing classes and objects. Normally, we think of packages as being statically linked, but they can also be linked dynamically using the Delphi *LoadPackage* procedure. COM represents another promising way of allowing the different parts of an application to interact, but the time and cost of converting an application into a COM server might not be justifiable. The techniques used here allow you to use objects in DLLs by providing a standard method for exposing those objects, and a standard interface for those objects to interact with the host application.

Why bother doing this for applications that are completely under your control? There are several good reasons. Most important, it provides a powerful way of delivering multiple configurations. If you

have three optional features in your software (A, B, and C for instance), then that gives rise to eight possible combinations: no options, A, AB, ABC, AC, B, BC, and C. More optional features give rise to an unmanageable number of combinations. Coding each option into an add-in makes the job of adding more options a linear task – one deliverable for the base system plus one for every option. For example, with three options, we need build only four deliverables – the base system and three add-ins (one for each option). It is conceivable that many development teams within an organisation could agree to use a common application shell and to deliver their functionality as add-ins that do not interact with one another. This would give the user the benefit of needing only one application, which provided many different services.

Specifying an ApplicationServices API

When writing Delphi IDE add-ins, your code interfaces with the objects exposed by the Delphi Open Tools API. The Delphi IDE is exposed by an object of class *TTToolServices*, which has about fifty methods giving you access to different parts of the IDE. When writing Delphi experts, you only need to think about what your expert is going to do within Delphi and how to achieve it. The number and type of services provided by the Delphi IDE are outside your control.

For our applications, we can specify what services are available to our business add-ins. The range of services required is usually a lot smaller than that provided by the Delphi Open Tools API. I have called the minimal implementation presented here the ApplicationServices API. This month's sample application is an extension of last month's broadcast budget application. We are going to add the ApplicationServices API and use it to incorporate new business functionality delivered in a DLL. To make the entire program more realistic, the sample application uses the *Creator* objects from last month (though you do not need to have read the associated article). As usual, the code is available for download from EXE OnLine. One

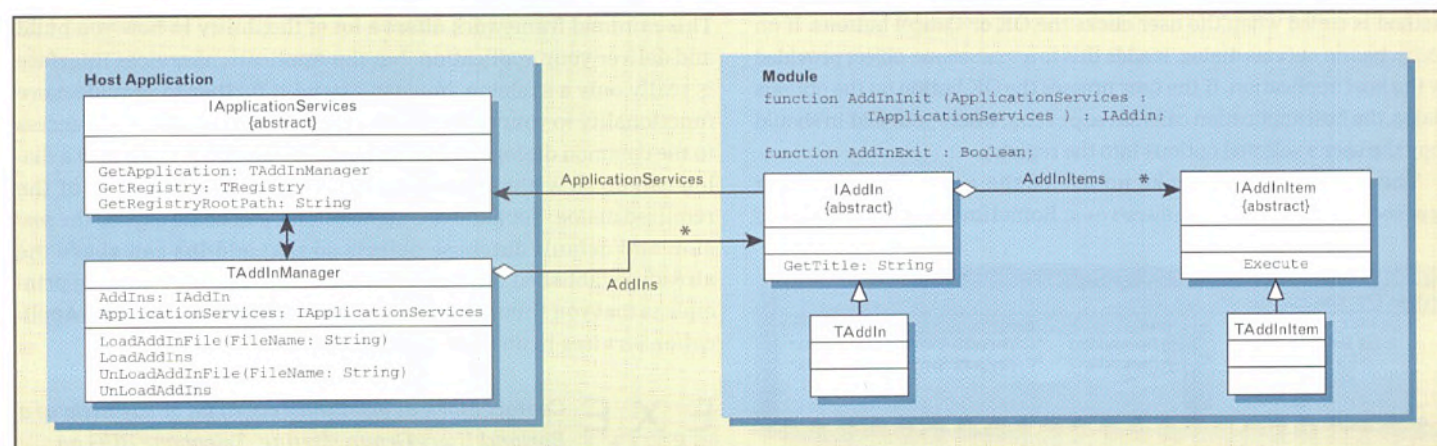


Figure 1 – The Applications Services architecture.



of the many improvements in Delphi 4 is the addition of project groups – super-projects that manage many different deliverables. I have used Delphi 3 and 4 to develop this month's samples.

ApplicationServices

Figure 1 shows the relationship between the parts of the ApplicationServices API. The host application is responsible for providing an implementation of the `IApplicationServices` interface, which provides the functions an add-in needs to interact with the host application. Another part of the host application, `AddInManager`, is responsible for loading and unloading the individual add-in modules and maintaining a list of the add-in modules currently loaded. `AddInManager` knows which modules to load by looking in the registry. Registry keys for the sample application are shown in Figure 2.

Each add-in module, whether it is a package or a DLL, publishes a pair of functions: `AddInInit` and `AddInExit`. The `AddInInit` is called when the add-in module is loaded. Usually, it creates an object that implements the `IAddIn` interface. This object allows the host application to query the add-in module to find out what it is, using the `GetTitle`, `GetVersion`, and `GetComment` functions. The class `TAddIn` provides an implementation of the `IAddIn` interface. This means that deriving from `TAddIn` gives you a jump-start when developing a new add-in. The `AddInExit` is called immediately prior to the add-in module being unloaded from memory, after the destruction of the `IAddIn` object associated with the module. The add-in can return `False`, which prevents it being unloaded. This can prevent the host application shutting down, so should be used with caution.

You can do whatever you like in the `AddInInit` procedure, though the examples here only create a `TAddIn` object. The `TAddIn` objects in the example projects register new `Creator` objects with the host application's `Factory` object, which is exposed through the `IApplicationServices` interface. The `Creators` add new budget classes and the forms required to edit them. The host application knows the objects added to the `Factory` are of type `TObj` and so can only call the methods exposed by `TObj`. In fact, since full type information for items in the add-in modules is not available to the host application, it has no ability to do otherwise. Within a given add-in module, you can use the `is` and `as` operators to cast objects to their correct types.

A common feature of most Windows applications is an options dialog that allows the user to customise the application. It makes sense to be able to customise dynamically loaded modules in the same manner, and each `AddIn` object has methods to allow this to happen. The `HasOptions` returns `True` if an `AddIn` has the ability to link into a tabbed options dialog, and `ShowOptions` implements the functionality. The `CloseOptions` method is called when the user clicks the OK or Cancel buttons. If an `AddIn` has an options dialog, it adds this to a `TTabSheet` object provided by the host application. If the user presses the OK button on the options dialog, the host application calls `SaveOptions`, where your add-in should copy the user's selected options into the registry.

The sample add-ins make no use of the `Application` object exposed by `IApplicationServices`. Sometimes you find yourself

using the `Application` object provided through `IApplicationServices.GetApplication` to gain access to parts of the application (such as the Forms list). This is a hint that you need to add to the `IApplicationServices` interface so that it remains your sole route into the host application.

AddIns and factories

The add-in browser shows a listing of the add-in modules maintained by the `AddInManager`. It could be extended to manage the list of modules specified in the registry and load and unload other modules. This could provide the ultimate in flexibility – you could email your user a new module that they could install and use without even needing to restart the application.

One of the more surprising differences between packages and DLLs is the behaviour of the `Application` object. A DLL gets its own instance of the `Application` object, while a package uses that of the program that loaded it. Because we always want DLLs and packages to use the `Application` object from the calling program, we must provide a reference to it. This is achieved if the DLL or package uses the `IApplicationServices.GetApplication` function call to get the application, rather than using the copy available from the VCL Forms module.

Last month's article used `Creator` objects held in a factory to manage the creation of business objects. The `Creator` objects were linked into the sample application, and while they offered flexibility in what kinds of object were created, you were stuck with what you had linked. Using the techniques presented here, you can replace the `Creator` objects built into the executable with ones you built later – to fix bugs or add functionality, without needing to deliver a full new executable.

The code for the add-in manager and application services objects is in the `IDEServices` directory. The demonstration application is split into three parts. The main application is in `AddIn/Application`, with the two add-ins in `DemoAddIn1` and `DemoAddIn2`. The main application has three menu options enabled – File|New, Tools|Options, and Help|Add-ins. The first gives the user a mechanism for creating objects drawn from the business domain using the factory browser dialog. The browser only shows objects that descend from `TDomainObj`, which is a direct descendent of `TObj`. `DemoAddIn1` adds `TV` and `Radio` objects to the application; `DemoAddIn2` adds extended `TV` budgets.

Tools|Options allows the user to customise the behaviour of the business objects. Help|Add-ins shows a list of all of the add-ins loaded. `DemoAddIn1` provides the standard `TV` and `Radio` budget classes with appropriate editor forms. `DemoAddIn2` adds the extended `TV` budget and is the only one that has an options screen.

Further expansion

This minimal framework offers a lot of flexibility in how you build and deliver your application, but the `ApplicationServices` interface is really only a skeleton. You can extend it further to provide more functionality to your add-ins. For example, you could provide access to the common dialogs so that any add-in that needs to display a dialog can do so without needing to create its own instance of the required dialog. For database applications, you could expose the session and default database objects so that add-ins can share the already established links with the database. The only guiding principle is that you should be able to reuse whatever you put into `ApplicationServices` in another application. ■

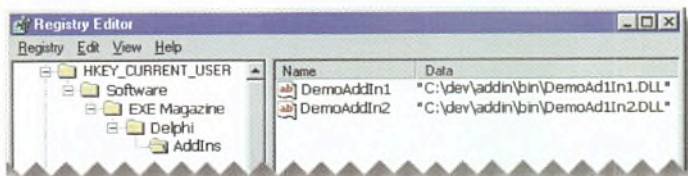


Figure 2: Sample registry settings.

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Send in the clones



Tom Guinther looks at cloning instances of objects, and shows how every Java class is given the opportunity to provide cloning support.

There has been a rash of interest in cloning in recent months. First, there was Dolly the sheep, soon to be followed by the 'rat pack'. If I have my way, the world will see the penultimate in cloning: me and my new friend, 'Me'. Because I have so many demands on my time I might be inclined to make it me, my friend 'Me', and my other friend, 'Me Too'. And since I am on a roll, why not add a 4th for bridge? We would call him 'forth' as an inside joke.

While the science of DNA cloning has many unanswered moral and ethical questions, cloning Java and C++ (judging from all the email) is much simpler in that it *only* has unanswered questions. In the interest of computer science, my friends and I are going to do our best to uncover the answers to the riddles of object cloning.

The politics of cloning

Cloning an instance of an object is conceptually simple: create a new instance of the object and copy all of the members. Unfortunately, the 'copy all of the members' part is where it can get a lot more complicated, depending on the data types of the members. The raging debate when C++ first started to emerge as a viable development language (carried over from Smalltalk and other OOP languages) was whether cloning involved making a 'shallow' or 'deep' copy. A shallow copy copies the value of each member to the new instance. A deep copy involves cloning each member of the original object into the new instance. A purist would argue that it isn't true cloning if you don't make a deep copy.

A basic example should suffice to explain the difference between shallow and deep. I'll use C++ because it makes the example easier, but we'll switch to Java a little later. C++ aficionados should note that the example is intentionally written to be Javaesque:

```
class Shallow {
protected:
    int m_justAnInt ;
    char *m_justAPointer ;
public:
    Shallow *clone() {
        Shallow *copy = new Shallow() ;
        *copy = *this ;
    }
};
```

This is a pretty straightforward example that helps illuminate some of the basic problems of cloning. The two members of the class are integral values (they are simple types, not objects) but the fact that `m_justAPointer` points to other data may present a problem. If you simply copy the value of the pointer (think reference), then any changes to the underlying data (the data that is pointed, or referred to) affects both the original and the shallow clone. To create a deep clone you would need to copy the underlying data also.

The following example shows a deep copy:

```
class Deep {
protected:
    int m_justAnInt ;
    char *m_justAStringPointer ;
```

```
public:
    Shallow *clone() {
        Shallow *copy = new Shallow() ;
        copy->m_justAnInt = m_justAnInt ;
        copy->m_justAStringPointer =
            strdup(m_justAStringPointer) ;
    }
};
```

The problem gets more complex as the data types get more complex, and data types that are not under your control (operating system objects, for example) can make cloning difficult at best.

Basic cloning

Writing code to handle cloning of instances in Java and C++ is a relatively simple task, although I find Java cloning to be syntactically terse. Once you have done it a few times, it just becomes a minor annoyance. Let's go over the simpler C++ case first.

Cloning is implemented using the copy constructor, or assignment operator, as follows:

```
class Foo {
protected:
    int m_foo ;

public:
    Foo(int foo) { m_foo = foo ; }
    Foo(Foo &other) { m_foo = other.m_foo ; }
    Foo(Foo *other) { m_foo = other->m_foo ; }
    Foo &operator=(Foo &other) { m_foo = other.m_foo ; }
    Foo &operator=(Foo *other)
        { m_foo = other->m_foo ; }
};
```

Honestly, this class definition is so basic that you don't even need to define and implement it. The C++ compiler will automatically provide a default copy constructor for your class if you perform an assignment operation such as:

```
{
    Foo foo1(23) ;
    Foo foo2 = foo1 ;
    Foo foo3(foo1) ;
}
```

C++, of course, introduces a variety of complexities into this scheme including dealing with `const` objects, references, private method declarations, base class oddities, and everyone's favorite, the virtual base class. One good thing is that C++ does member assignment, so that if class `Foo` contains an object `x` the appropriate copy constructor for `x` will be invoked to initialise the new member. In effect, you get a deep copy for objects within objects.

Java cloning

In case you have been waiting for some Java code to appear, without further ado, here it is:



```
class Foo {
    protected int m_foo ;

    public Object clone()
        { return new Foo(m_foo) ; }
    public Foo(int foo) { m_foo = foo ; }
}
```

This example is about as simple as it gets, but in case you aren't in the mood for deep thinking here is what we have; class `Foo` has a method, `clone()`, and a constructor. The `clone()` method returns a `Foo` object that is created by calling the constructor. It just so happens that class `Foo` is simple enough for this methodology to be sufficient. It is important to note that life is never this simple.

Method `clone()` is declared by class `Object` so every Java class is given the opportunity to provide cloning support. The method declaration in class `Object` is as follows.

```
protected native Object clone()
    throws CloneNotSupportedException ;
```

Notice that the method is declared `protected`. This prevents arbitrary code from calling `clone()` unless the object being cloned overrides the `clone()` method and provides public access to it. Essentially, this prevents an object from being cloned unless the class designer specifically permits the cloning operation. You should note that this is the opposite of C++, which allows any object to be cloned unless the designer explicitly forbids it. I think the Java design is flawed because more often than not you want to support cloning but you forget to provide support or you put it off and never get around to the implementation. In the case where you don't want to support cloning (eg security) you are much more likely to be proactive and explicitly prevent clones of your object from being created.

Method `clone()` returns an object of type `Object`, which means that almost every clone operation involves an upward cast to the actual object type. The following statement illustrates this:

```
RealObject theclone = (RealObject) aRealObject.clone() ;
Because method clone() is implemented in the root class of the hierarchy this is largely unavoidable. If you do a lot of cloning, or just to make it more convenient, you can add a meta-clone method that returns the correct type:
```

```
class Foo {
    protected int m_foo ;

    public Object clone() { return new Foo(m_foo) ; }
    // meta-clone
    public Foo FooClone() { return (Foo) clone() ; }
    public Foo(int foo) { m_foo = foo ; }
}
```

Method `clone()`, as declared in class `Object`, is defined to throw one checked exception, `CloneNotSupportedException`. Class `Object` is defined to throw this exception if the class being cloned does not implement the `Cloneable` interface (more on this later). This exception can be thrown by a derived class to prevent the cloning of a specific instance. That is, cloning can be supported in the general case, but selectively denied if circumstances warrant.

The final piece of the puzzle is interface `Cloneable`. The full definition of `Cloneable` is as follows:

```
public interface Cloneable {}
```

This means that `Cloneable` is an empty interface declaration, serving as a 'tag' or flag, to the native implementation of object `clone()` that the class does supports cloning.

Putting it all together, here is how class `Foo` might be defined to support cloning:

```
class Foo implements Cloneable {
    protected int m_foo ;

    public Object clone()
    {
        Object result = null ;
        try {
            result = super.clone() ;
        } catch (CloneNotSupportedException e) {
            /*should never happen */
        }
        return result ;
    }

    public Foo FooClone() { return (Foo) clone() ; }
    public Foo(int foo) { m_foo = foo ; }
}
```

First, we implement the `Cloneable` interface so that we can call `Object.clone()` without generating a `CloneNotSupportedException`. Second, we override method `clone()` declaring it public (so non-derived classes can clone `Foo` objects) and dropping the checked exception, `CloneNotSupportedException`, since this can never occur for `Foo` objects. It is important to remember that if you drop the throw clause then sub-classes of `Foo` will not be able to throw it either. In the body of the clone we call the `clone` method of the super class to create the newly cloned instance.

There is one case where it is useful to 'implement' interface `Cloneable` without providing an overriding implementation of method `clone()`. This is when you want to allow derived classes to implement cloning, and the super class can be safely cloned using a shallow copy. In this circumstance the derived class ends up calling `Object.clone()`, which makes a direct copy of the object's data. This is an important point to remember; unlike C++, Java does not provide member-wise assignment. Objects within objects will not be cloned. Instead, the reference value of contained objects is assigned in the new object, which means that both the original and the clone contain references to the same underlying object(s). If any of the underlying objects change, the difference will be reflected within both the original and the clone.

In Java, arrays are always treated as if they implemented the `Cloneable` interface making it easy to clone arrays using code such as the following:

```
newFoo.doubleArray = (double[]) (doubleArray.clone()) ;
```

Power to your classes

The semantics of cloning in Java are relatively straightforward and the basic issues should be clear. I encourage you to implement cloning in your Java classes because ultimately this makes your classes more powerful and complete.

A final subject on the word of DNA cloning; my wife is decidedly opposed, and as far as my ever being cloned she is vehemently against it. My mother-in-law on the other hand is decidedly for it, pointing out that they could use my extra clones for target practice. My editors at EXE are also pro cloning hoping that they might receive my column in a more timely fashion, and at worst, they could use the extra clones for target practice. ■

Tom Guinther is working for Vireo, a company developing device-driver tools. He can be reached via email at tomg@vireo.com.



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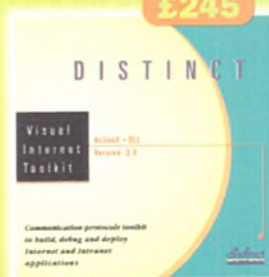
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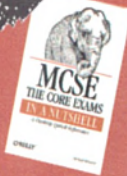
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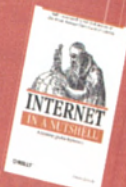
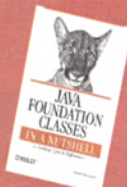
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Faster code, faster forms

Jon Perkins looks at the new features within the Visual Basic component of Visual Studio 6.



The version 5 release of Visual Basic delivered a few fundamental changes. The new Integrated Development Environment was the most obvious, while the 'true' compiler was one of the features hitherto most asked for. And there was direct support for Internet development. To reinforce the strength of the product, the Enterprise Edition shipped with SQL Server and Transaction Server. These new features gave the product specification quite a leap from version 4.

Version 6 is more of a maturation of the previous release. In this month's column I shall be discussing the new features to be found in the product. This review is based upon release candidate 1 of Visual Studio 6 Enterprise Edition. While I wouldn't expect any specification changes to creep in at this late stage, you never know what might be dropped or thrown in at the last minute.

My first observation is that the Visual Studio 6 product is much more of an integrated effort than has previously been the case. After the installation you will find that Visual Studio 6 is now under a single menu group on the Start menu, with one menu entry for each specific language product. Everything else is bundled under a common Tools submenu and, if appropriate, an Enterprise Tools submenu. Because the pre-release software (that I saw) appeared only in the full Visual Studio format I cannot tell how the standalone Visual Basic product will be packaged. However, it's quite apparent that Microsoft will be making a stronger-than-ever effort to get you to buy the full Visual Studio package. The splash screen that is displayed when the IDE loads has been updated to emphasise the fact that it's part of the Visual Studio family. There is also a healthy complement of BackOffice products for the developer to work with.

Despite the many new features one thing that still hasn't changed is the menu editor – it's still the same as in version 1! While the menus that it produces are completely usable, it is not possible to directly create Office-style menus. Apparently, Microsoft is not prepared to make the relevant libraries redistributable – it's necessary to resort to third party tools to achieve this effect. In next month's column I'll be giving some coverage to this very issue.

General features

Microsoft has, as usual, been promising faster code, faster forms, and even faster natively compiled apps in Visual Basic, and this does appear to be the case. The native code compiler is still the Visual C++ back-end, which itself is currently getting very favourable reviews – even in its beta state – for its performance increases (to the order of a 20% improvement in speed). Performance has also been refined for multi-processor targets.

This new version contains additional string manipulation functions that are really intended for grown-ups. The `StrConv` function has a new optional parameter that allows you to specify a `LocaleID` if you don't want to use the default one. A new `Filter` function returns a subset of a string based upon a filtering criterion. There are functions to reverse, join, and replace strings, new formatting func-

tions, and a couple of routines that give you the name of a weekday or a month that is derived from a date.

One feature that I really do like is the `FileSystemObject` that comes with all editions of the product. This option needs to be checked in the References dialog box under the Project menu – it's called the Microsoft Scripting Runtime. Once you've created a new instance of one of these objects you can do all sorts of useful things with folder and file objects, such as create and delete them, and get information about them. For example, if you want to be able to delete a folder and not have to worry about writing the logic to traverse the entire subtree and delete everything else first, then you can use the `DeleteFolder` method. To test this I created a directory called `c:\test` and then copied the contents of the nearest data CD into it. Because it was a CD, all of the files were marked as read-only. I ran the following:

```
Dim fso As New FileSystemObject
fso.DeleteFolder "c:\test", True
Set fso = Nothing
```

and it worked perfectly (the `True` parameter is to ignore any read-only flags).

The manipulation of controls has been improved somewhat. Many of the standard controls now have a `Validate` event that offers a better degree of control than the `LostFocus` event. If you set the corresponding `CausesValidation` property to `True`, then the validation event is fired when the user attempts to exit the control. The `LostFocus` event is fired only once the validation has been successful. You can programmatically add and remove controls to or from a form at runtime.

One feature that was sorely missing from version 5 has been addressed: user-defined types can be arguments or return types of public properties and methods. Similarly, functions and property procedures can now return arrays.

I was slightly surprised to find that Visual Studio 6 still displays the Help Workshop in the Tools menu. The newer HTML Help has been in circulation for a little while and Microsoft has stated that it is the way forward in terms of help technology. However, the HTML Help Workshop is on disk 1, so at least it's catered for. It's just not displayed in the Setup program. For new systems I would suggest that it's worth trying to get to grips with this help system, if only to keep your skills marketable.

The Application Setup Wizard has been enhanced and updated to become the Package and Deployment Wizard. The approach remains the same – you either want to create a Setup program or an Internet deployment pack. However, the files that go to make up the installation pack are now placed in a CAB file, as found in Microsoft's commercially available products. One useful addition to the wizard is that you get an editable mini-explorer view of the menu entry, which will be created for the Start menu, so you can configure this accordingly. The backdrop of the resultant setup program is still the graduated blue to black, which to me feels old-hat now, but overall the wizard is a useful and worthwhile product. I think that professional



Although Internet technologies continue to be implemented *ad nauseum* throughout everything that

Microsoft produces, there are two specific related features worthy of note here.

developers will still want to turn to a third-party tool (such as InstallShield) for their installation routines.

Databases and BackOffice

This is perhaps the area where the greatest improvements have been made. As has already been widely reported, Visual Basic 6 comes with ADO (ActiveX Data Objects). This is the logical successor to both DAO and RDO although both of these technologies are still present and supported. The strength of ADO is that it provides a common programming model for both local and remote data access. This comes about because it's actually an object wrapper around OLE DB, an architecture that exposes a set of COM interfaces to provide uniform access to data stored in diverse information sources. These sources could be hardware devices, conventional relational databases, or they could be a rich source of data such as an Exchange Server, the forthcoming NT5 directory services, or indeed some future source of data that has not yet been invented. The point is that it helps to provide a common method of accessing data wherever it is. Many corporate systems that are developed today often have to import data from different sources, often to a central location to simplify the design. With an OLE DB platform you should be able to access multiple diverse data sources from different locations in a tidy and consistent manner.

Several new and enhanced tools beef up the data access side of the product. The Data Environment Designer is an ADO replacement for the UserConnection designer (which is still included). Its purpose is to provide a design-time environment that lets you create a data access definition that can be programmatically manipulated at runtime. It provides support for the creation of multiple ADO `Connection` and `Command` objects within one `DataEnvironment` object, thereby supporting connections to multiple data sources.

The Data Report Designer provides the ability to create banded hierarchical reports. Fields can be dragged from a Data Environment Designer and dropped into the report design. When a field is dropped, a text box control will automatically be created that is bound to the relevant `DataMember` and `DataField` properties. Needless to say, the designer has the facility to publish reports in HTML format as well as directly to the printer. If you choose to use the print option, then you can generate a print preview window beforehand. However, this can work only if there is a printer driver already installed because the report engine needs to be able to reference a set of metrics.

Thanks to the careful design that has gone into ADO it is possible to pass a `RecordSet` object across process and machine boundaries, which is most likely to be used in passing data from one tier

of functionality to another. This `RecordSet` object exists within the full ADO library, but can also be found as a separate component (set the client to reference the Microsoft ActiveX Data Objects RecordSet 2.0 Library). The benefit of also providing a separate implementation is that much of the associated baggage can be discarded. Because the passed object is purely a `RecordSet` there are no `Command`, `Connection`, and `Parameter` objects and therefore the footprint is as unobtrusive as possible.

Integration with Microsoft Transaction Server (version 2) has been tightened, and there is support for the Microsoft Message Queue technology.

Internet

Although Internet technologies continue to be implemented *ad nauseum* throughout everything that Microsoft produces, there are in fact two specific related features worthy of note here. The first is that a new icon labelled IIS Application is visible in the New Project dialog when Visual Basic 6 is loaded. IIS Applications offer new elements called WebClasses, which are units of code that can be run from an Internet server. A WebClass is created with Visual Basic and compiled into a DLL. The DLL is launched at runtime by an Active Server Page (ASP) instance, and the WebClass and the ASP exist in a 1-1 relationship for the duration of a single client's connection. WebClasses have been developed by Microsoft to help developers who aren't familiar with HTML to get up and running with Internet server applications. Using Visual Basic as the underlying language lets the developer interface directly with the IIS object model, and hence be given the opportunity to write very efficient code. The WebClass, for its part, generates an appropriate stream of HTML derived from the underlying Visual Basic code.

The second item of note is the DHTML Designer. DHTML is still in the process of being agreed upon by the Internet community as a whole, but Microsoft implemented its version in Internet Explorer 4. A DHTML-based application is created through another new icon in the New Project dialog. Once in the design window, a page can be created from scratch or an existing page can be referenced and modified. DHTML allows you to write Visual Basic code that will result in a local response to user activity on a web page, without the need to pass the information back up to the server for processing.

Documentation

Further evidence of the integration with Visual Studio can be seen in the disappearance of the Books Online application. All of the documentation for each development tool has been assimilated into the MSDN library. Microsoft Press has announced the *Visual Basic 6 Reference Library* (ISBN 1-57231-864-3), which appears to come as three manuals, and the *Visual Basic 6 Programmers Guide* (ISBN 1-57231-863-5). Both are due in September. Microsoft has confirmed that it will be producing a Visual Basic 6 title in the *Mastering* series. ■

Jon Perkins is a freelance Visual Basic developer. He is a contributing author of a book by The Mandelbrot Set (International), which has been revised – Advanced Microsoft Visual Basic 6, published by Microsoft Press. This should be available soon. For details see www.jonperkins.com.

The Visual Studio 6 product set is due for release on 2nd September 1998, although at the time of writing the pricing had yet to be announced. Visual Basic 6 will come in Learning, Professional, and Enterprise editions.

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A wide range of books on software development, object-oriented technology and programming from authors such as Watts Humphrey, Erich Gamma, Fred Brooks, Donald Knuth and Bjarne Stroustrup.

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EXE

ONLINE

Course	Date	Days	Cost	Place	Company	Course	Date	Days	Cost	Place	Company
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CLIENT/SERVER

Introduction to Client Server Computing	Monthly	4	1425	London	LTREE
Microsoft Exchange 5 Server Administration: Hands-on	Monthly	4	1425	London	LTREE
Client/Server and Distributed Computing	Regularly	3	1095	Call	QA TR
Architecture and Design of Enterprise Systems	Regularly	4	1395	Call	QA TR
Software Testing	Regularly	3	1045	Call	QA TR
IT Infrastructure Implementation and Management	Regularly	4	1395	Call	QA TR
Architecture and Design of Enterprise Systems	Regularly	4	1395	Call	QA TR

COMMS

Wide Area Networking & Telecommunications	Monthly	4	1425	London	LTREE
ISDN for Telecommunications	1/9	4	1425	London	LTREE
Implementing Computer Telephony Integration	15/9	4	1425	London	LTREE

DATABASE

Oracle Courses	Monthly	5	1675	London	LTREE
Microsoft SQL Server: Hands-On	Monthly	4	1425	London	LTREE
Access 97	24/09	2	360	Reading	POPK
Hands-On Microsoft SQL Server System Administration	Monthly	5	1675	London	LTREE
Object Oriented Databases	Monthly	4	1425	London	LTREE
Visual Basic 5 and ActiveX for Enterprise Applications	Monthly	5	1675	London	LTREE
Microsoft Access	Monthly	4	1425	London	LTREE
Database Analysis and Design	Regularly	3	1045	Call	QA TR
Building a Data Warehouse	Regularly	4	1395	Call	QA TR
Microsoft Access Development	Regularly	3	875	Call	QA TR
Introduction to Microsoft Access	Regularly	2	550	Call	QA TR
Programming with Microsoft Access Basic	Regularly	2	595	Call	QA TR
SQL Language	Regularly	2	630	Call	QA TR
Microsoft SQL Server and Transact-SQL Programming	Regularly	3	945	Call	QA TR
Microsoft SQL Server 6.5 Administration	Regularly	5	1475	Call	QA TR
Implementing a Database Design on Microsoft SQL Server 6.5	Regularly	5	1475	Call	QA TR

GROUPWARE AND OFFICE SYSTEMS

Lotus Notes/Domino R4.5 Application Development 1	Regularly	3	1045	Call	QA TR
Lotus Notes/Domino R4.5 Application Development 2	Regularly	4	1375	Call	QA TR
Lotus Notes/Domino R4.5 Application Development 3 and LotusScript	Regularly	4	1375	Call	QA TR
Lotus Notes/Domino R4.5 System Administration 1	Regularly	4	1375	Call	QA TR
Lotus Notes/Domino R4.5 System Administration 2	Regularly	2	695	Call	QA TR
Introduction to LotusScript in Notes/Domino	Regularly	3	1045	Call	QA TR
Microsoft Exchange Server 5.5 - Concepts and Administration	Regularly	3	945	Call	QA TR
Microsoft Exchange Server 5.5 - Design and Implementation	Regularly	5	1475	Call	QA TR

Supporting Microsoft Exchange 5.0 - Core Technologies	Regularly	5	1475	Call	QA TR
Microsoft Exchange Server Performance and Troubleshooting	Regularly	2	695	Call	QA TR
Groupware Development with Microsoft Office Technologies	Regularly	5	1495	Call	QA TR
Domino Administration for Lotus Notes 4.6 and the Internet	Regularly	2	695	Call	QA TR
Internet Development with Lotus Notes Domino 4.6	Regularly	3	1045	Call	QA TR
VBA Programming with Microsoft Excel	Regularly	4	1275	Call	QA TR

GUI DEVELOPMENT

Application Development using Borland Delphi V3	Regularly	5		Call	QA TR
Advanced Programming with Visual Basic Enterprise Edition	Regularly	4	1295	Call	QA TR
Building Object-Oriented Applications with PowerBuilder V5	Regularly	3	1055	Call	QA TR
Fast Track to PowerBuilder V5	Regularly	4		Call	QA TR
Microsoft Visual Basic Primer	Regularly	1	295	Call	QA TR
Application Development using Visual Basic	Regularly	4	1275	Call	QA TR

INTERNET

Microsoft Internet Information Server	Monthly	4	1425	London	LTREE
Introduction to Internet/Intranet for Business	Monthly	4	1425	London	LTREE
Developing a Web Site	Monthly	4	1425	London	LTREE
Intranet Technologies: Comprehensive Introduction	Monthly	4	1425	London	LTREE
Internet and System Security	Monthly	4	1425	London	LTREE
Java for C++ Programmers	Monthly	4	1425	London	LTREE
Netscape Servers for Intranet Development	Monthly	4	1425	London	LTREE
Visual Cafe for Java Development	Monthly	4	1425	London	LTREE
Practical Internet	23/09	1	245	Reading	POPK
HTML Web Authoring	24/09	2	450	Reading	POPK
Programming with JavaScript	Regularly	2	625	Call	QA TR
Creating and Configuring a Web Server using Microsoft Tools	Regularly	3	995	Call	QA TR
Internetworking with Microsoft TCP/IP on Windows NT 4	Regularly	5	1375	Call	QA TR
Internet Fundamentals	Regularly	3	995	Call	QA TR
Intranet Design and Migration	Regularly	3	1045	Call	QA TR
Internet and Intranet Security	Regularly	3	1045	Call	QA TR
Building an Effective Web Site	Regularly	3	1045	Call	QA TR
Netscape SuiteSpot Server v3	Regularly	5	1495	Call	QA TR
Internetworking with TCP/IP	Regularly	4	1245	Call	QA TR
Programming with Visual Basic Script	Regularly	2	665	Call	QA TR

LANGUAGES

Programming in JAVA	02/09	3	720	Reading	POPK
Advanced C	Regularly	4	1275	Call	QA TR

Course	Date	Days	Cost	Place	Company	Course	Date	Days	Cost	Place	Company
Advanced C++ Development Techniques	Regularly	4	1275	Call	QA TR	ISDN Technology & Application	01/09	2	570	Reading	POPK
C++ for non-C Programmers	Regularly	5	1345	Call	QA TR	PC Networking	07/09	1	245	Reading	POPK
C++ for C Programmers	Regularly	4	1195	Call	QA TR	Supporting Modems	28/09	1	245	Reading	POPK
C++ Primer	Regularly	2	630	Call	QA TR	Troubleshooting Cisco Networks	Monthly	4	1425	London	LTREE
C Primer	Regularly	2	595	Call	QA TR	Introduction to Datacomm & Networks	Bi-weekly	4	1425	London	LTREE
C Programming	Regularly	4	1230	Call	QA TR	Local Area Networks	Monthly	4	1425	London	LTREE
Developing JavaBeans	Regularly	5	1495	Call	QA TR	Hand-on PC Networking	Monthly	4	1425	London	LTREE
Java for non-C Programmers	Regularly	5	1295	Call	QA TR	SNMP: From Workgroup to Enterprise Network	29/9	4	1425	London	LTREE
Java Primer	Regularly	2	630	Call	QA TR	Understanding ATM	Regularly	2	730	Call	QA TR
Java for C/C++ Programmers	Regularly	4	1245	Call	QA TR	Introduction to Data Communications	Regularly	2	730	Call	QA TR
Mastering Microsoft Visual Java J++	Regularly	5	1495	Call	QA TR	Enterprise-wide Communications and Networking	Regularly	4	1345	Call	QA TR
Database Development using Symantec Visual Café	Regularly	3	995	Call	QA TR	Local Area Network Implementation & Management	Regularly	4	1345	Call	QA TR
Programming with Java	26/10	4	890	London	VAL	Network Primer	Regularly	1	295	Call	QA TR
Programming with Java	23/11	4	890	London	VAL						
Programming with Java	21/12	4	890	London	VAL						
Developing JavaBeans	5/10	4	1295	London	VAL						
Developing JavaBeans	2/11	4	1295	London	VAL						
Developing JavaBeans	30/11	4	1295	London	VAL						
Developing Java Clients	5/10	4	1295	London	VAL						
Developing Java Clients	2/11	4	1295	London	VAL						
Developing Java Clients	30/11	4	1295	London	VAL						
Developing Java Servers	12/10	4	1295	London	VAL						
Developing Java Servers	9/11	4	1295	London	VAL						
Developing Java Servers	7/12	4	1295	London	VAL						
Enterprise JavaBeans	12/10	4	1295	London	VAL						
Enterprise JavaBeans	9/11	4	1295	London	VAL						
Enterprise JavaBeans	7/12	4	1295	London	VAL						

MANAGEMENT

Management Skills for IT Professionals	Monthly	4	1425	London	LTREE
Influence Skills	Monthly	4	1425	London	LTREE
Teambuilding Skills	Monthly	3	1125	London	LTREE
Business Process Re-engineering	Monthly	4	1425	London	LTREE

NETWARE

IntranetWare: NetWare 4 Administration	7/9	5	1675	London	LTREE
NetWare 3 Support and Administration	Regularly	4	1345	Call	QA TR
IntranetWare Support and Administration using Windows NT	Regularly	5	1475	Call	QA TR
IntranetWare: NetWare 4.x Administration	Regularly	5	1595	Call	QA TR
IntranetWare: NetWare 4.x Advanced Administration	Regularly	3	1095	Call	QA TR

NETWORKING

Hands-on LAN Troubleshooting	Monthly	4	1425	London	LTREE
Fast LAN Technologies	22/9	4	1425	Edinburgh	LTREE
Introduction to Internetworking	Monthly	4	1425	London	LTREE
Cisco Routers	Monthly	4	1425	London	LTREE
Hands-On Introduction to TCP/IP	Monthly	4	1425	London	LTREE
Introduction to Data Communications & Networking	14/09	3	735	Reading	POPK
TCP/IP Overview	14/09	1	245	Reading	POPK
Practical TCP/IP	17/09	2	490	Reading	POPK
Implementing TCP/IP	15/09	1	245	Reading	POPK
Basics of Data Communications	11/09	1	245	Reading	POPK
Understanding Frame Relay	30/09	1	265	Reading	POPK
Introduction to ISDN	29/09	1	265	Reading	POPK

OBJECT ORIENTED TECHNOLOGY

Object Technology Introduction	Monthly	4	1425	London	LTREE
Object-Oriented Analysis and Design	Monthly	5	1675	London	LTREE
Advanced IBM Smalltalk	12/10	5	1375	Southampton	OBJE
Building Distributed Applications using VisualAge for Smalltalk	19/10	3	895	Southampton	OBJE
Introduction to VisualAge	7/9	5	1375	Southampton	OBJE
Introduction to VisualAge	5/10	5	1375	London	OBJE
Building Applications using VisualAge for Smalltalk	14/9	5	1375	Southampton	OBJE
Building Applications using VisualAge for Smalltalk	12/10	5	1375	Southampton	OBJE
Team Programming using VisualAge for Smalltalk	28/9	2	650	Southampton	OBJE
Programming in IBM Smalltalk	5/10	5	1375	Southampton	OBJE
MVS Smalltalk: Transaction Managed Objects	26/10	5	1450	London	OBJE
Programming in VisualWorks	call	4	1025	Southampton	OBJE
Object Orientated Programming with VisualAge for Java	call	5	1250	Southampton	OBJE
Building Applets & Applications with VisualAge for Java	call	5	1250	Southampton	OBJE
OO Programming with VisualAge for Java at the weekend	call	4	Call	Southampton	OBJE
Using TOPLink Enabled Java Applications	call	3	Call	Southampton	OBJE
Object-Oriented Concepts Analysis & Design	call	3	800	Southampton	OBJE
A Technical Introduction to Java	19/10	1 day	395	London	VAL
A Technical Introduction to Java	16/11	1 day	395	London	VAL
A Technical Introduction to Java	14/12	1 day	395	London	VAL
Java Enterprise Architectures	20/10	3	1295	London	VAL
Java Enterprise Architectures	17/11	3	1295	London	VAL
Java Enterprise Architectures	15/12	3	1295	London	VAL
A Technical Introduction to CORBA	26/10	1 day	1295	London	VAL
A Technical Introduction to CORBA	23/11	1 day	1295	London	VAL
A Technical Introduction to CORBA	21/12	1 day	1295	London	VAL
CORBA Enterprise Architectures	27/10	3	1295	London	VAL
CORBA Enterprise Architectures	24/11	3	1295	London	VAL
CORBA Enterprise Architectures	22/12	3	1295	London	VAL
Analysis with UML 1.1	19/10	4	1295	London	VAL
Analysis with UML 1.1	16/11	4	1295	London	VAL
Analysis with UML 1.1	14/12	4	1295	London	VAL
Using Rose	26/10	2	795	London	VAL
Using Rose	16/12	2	795	London	VAL
Introduction to VisualAge for Smalltalk	7/9	5	1375	Southampton	OBJE
Introduction to VisualAge for Smalltalk	5/10	5	1375	London	OBJE
Introduction to VisualAge for Smalltalk	9/11	5	1375	Southampton	OBJE
Introduction to VisualAge for Smalltalk	7/12	5	1375	Southampton	OBJE
Building Applications using VisualAge for Smalltalk	14/9	5	1375	Southampton	OBJE
Building Applications using VisualAge for Smalltalk	12/10	5	1375	Southampton	OBJE

Course	Date	Days	Cost	Place	Company
Building Applications using VisualAge for Smalltalk	23/11	5	1375	Southampton	OBJE
Team Programming using VisualAge for Smalltalk	28/9	2	650	Southampton	OBJE
Team Programming using VisualAge for Smalltalk	9/11	2	650	Southampton	OBJE
Programming in IBM Smalltalk	5/10	5	1375	Southampton	OBJE
Programming in IBM Smalltalk	16/11	5	1375	Southampton	OBJE
Advanced IBM Smalltalk	12/10	5	1375	Southampton	OBJE
Advanced IBM Smalltalk	14/12	5	1375	Southampton	OBJE
Building Distributed Applications using VisualAge for Smalltalk	19/10	3	895	Southampton	OBJE
Building Distributed Applications using VisualAge for Smalltalk	2/12	3	895	Southampton	OBJE
MVS Smalltalk: Transaction Managed Objects	26/10	5	1450	London	OBJE
VisualAge for Smalltalk Programmers	2/11	5	1375	London	OBJE
Programming in VisualWorks	21/9	4	1025	Southampton	OBJE
Programming in VisualWorks	30/11	4	1025	Southampton	OBJE
OO Programming with VisualAge for Java	7/9	5	1250	Southampton	OBJE
OO Programming with VisualAge for Java	5/10	5	1250	Southampton	OBJE
OO Programming with VisualAge for Java	2/11	5	1250	Southampton	OBJE
OO Programming with VisualAge for Java	30/11	5	1250	Southampton	OBJE
Building Applets & Applications with VisualAge for Java	14/9	5	1250	Southampton	OBJE
Building Applets & Applications with VisualAge for Java	19/10	5	1250	Southampton	OBJE
Building Applets & Applications with VisualAge for Java	16/11	5	1250	Southampton	OBJE
OO Programming with VisualAge for Java at the weekend	Call	4	Call	Southampton	OBJE
Building TOPLink Enabled Java Applications	Call 01703 769996	3	Call	Southampton	OBJE
Building and using Java Beans	1/10	2	650	Southampton	OBJE
Building and using Java Beans	23/11	2	650	Southampton	OBJE
Building Distributed Applications with VisualAge for Java	29/10	2	650	Southampton	OBJE
Building Distributed Applications with VisualAge for Java	10/12	2	650	Southampton	OBJE
Team Programming using VisualAge for Java	26/10	2	650	Southampton	OBJE
Team Programming using VisualAge for Java	7/12	2	650	Southampton	OBJE
Object-Oriented Concepts Analysis & Design	Call	3	Call	Southampton	OBJE
Object-Oriented Analysis and Design using the Booch Method	Regularly	4	1245	Call	QA TR
Object-Oriented Analysis and Design using Rumbaugh's OMT	Regularly	5	1475	Call	QA TR
Developing CORBA Applications	Regularly	3	Call	Call	QA TR
Object-Oriented Design for C++ Development	Regularly	5	1475	Call	QA TR
Overview of Distributed Objects	Regularly	1	295	Call	QA TR
Object-Oriented Primer	Regularly	1	295	Call	QA TR
Object-Oriented Software Development	Regularly	3	995	Call	QA TR
Object-Oriented Analysis and Design using the Unified Modelling Language	Regularly	5	1475	Call	QA TR

PC SUPPORT

PC Configuration and Troubleshooting	Bi-weekly	4	1425	London	LTREE
PC Configuration and Troubleshooting	15/9	4	1425	Edinburgh	LTREE
Advanced PC Configuration Troubleshooting & Data Recovery	Monthly	4	1425	London	LTREE
Advanced PC Support	Regularly	4	1245	Call	QA TR
PC Fundamentals	Regularly	3	845	Call	QA TR
PC Support	Regularly	4	1175	Call	QA TR

PROGRAMMING

Visual Basic 5 for Business Solutions	Bi-weekly	4	1425	London	LTREE
Developing Windows CE Applications with Visual C++	Monthly	4	1425	London	LTREE

Course	Date	Days	Cost	Place	Company
Visual InterDev for Enterprise Applications	8/9	4	1425	London	LTREE
Win32 Systems and Network Programming	22/9	4	1425	London	LTREE
Programming ActiveX with MCF	Monthly	4	1425	London	LTREE
Java Programming: Hands-On	Monthly	4	1425	London	LTREE
Visual J++	Monthly	4	1425	London	LTREE
Introduction to Programming: Hands-on Workshop	Monthly	4	1425	London	LTREE
C Programming	Monthly	4	1425	London	LTREE
Introduction to C++ for Non-C Programmers	Monthly	4	1425	London	LTREE
Kornshell Programming	Monthly	4	1425	London	LTREE
Developing Windows NT Server Applications	Regularly	5	1595	Call	QA TR
Mastering Web Site Development using Visual InterDev	Regularly	5	1445	Call	QA TR
Win32 Programming Essentials	Regularly	5	1495	Call	QA TR
Developing ActiveX Controls and Components	Regularly	5	1495	Call	QA TR
Windows Programming in C	Regularly	5	1495	Call	QA TR
Windows Programming with Visual C++ and the MFC Library	Regularly	5	1475	Call	QA TR
Building Applications with Microsoft Transaction Server	Regularly	5	1595	Call	QA TR
Fasttrack Windows NT 5 for Developers	Regularly	2	650	Call	QA TR
Windows OLE Programming with the MFC Library	Regularly	5	Call	Call	QA TR
Developing OLE/ActiveX Controls with the MFC Library	Regularly	5	1495	Call	QA TR
Windows OLE System Programming	Regularly	5	1595	Call	QA TR
VisiBroker for Java	12/10	4	1295	London	VAL
VisiBroker for Java	9/11	4	1295	London	VAL
VisiBroker for Java	7/12	4	1295	London	VAL
Advanced VisiBroker for Java	16/11	3	995	London	VAL
Orbix C++	19/10/98	4	1295	London	VAL
Orbix C++	23/11/98	4	1295	London	VAL
Orbix C++	21/12/98	4	1295	London	VAL

PROJECT MANAGEMENT

Project Management: Skills for Success	Monthly	4	1425	London	LTREE
Software Project Planning and Management	25/8	4	1425	London	LTREE
Managing Enterprise Software Development Projects	Regularly	3	995	Call	QA TR
DSDM Practitioner	Regularly	3	945	Call	QA TR
Project Management Skills	Regularly	4	1245	Call	QA TR

SOFTWARE

Identifying and Confirming User Requirements	Monthly	4	1425	London	LTREE
Implementing the Year 2000 Conversion	Monthly	4	1425	London	LTREE

SYSTEMS ANALYSIS

Software Systems Analysis and Design	Monthly	4	1425	London	LTREE
Hands-on Microsoft Exchange 5	Monthly	4	1425	London	LTREE

SYSTEMS MANAGEMENT

Windows Architecture	5/4	4	1425	London	LTREE
Building Office 97 Intranet Applications	Monthly	21/4	1425	London	LTREE

TESTING

Practical Software Testing Methods	Monthly	4	1425	London	LTREE
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UNIX

UNIX Introduction	Monthly	4	1425	London	LTREE
UNIX Tools and Utilities	Monthly	4	1425	London	LTREE
UNIX Server Administration	8/9	4	1425	London	LTREE
Perl Programming	Monthly	4	1425	London	LTREE
Unix Fundamentals	28/09	3	690	Reading	POPK
Unix System Administration	02/09	3	690	Reading	POPK
Unix Networking	10/09	3	460	Reading	POPK
UNIX Fundamentals	Regularly	4	1195	Call	QA TR
UNIX Programming	Regularly	5	1375	Call	QA TR
UNIX Systems Administration	Regularly	4	1195	Call	QA TR
Mastering UNIX Shell Scripts	Regularly	4	1195	Call	QA TR
Solaris Systems Administration	Regularly	4		Call	QA TR

WINDOWS

Windows 95 Support and Networking	Monthly	5	1675	London	LTREE
Hands-On TCP/IP Internetworking on Windows NT	Monthly	4	1425	London	LTREE
Windows NT 5	Monthly	5	1675	London	LTREE

WINDOWS NT

Administering Microsoft Windows NT 4.x	Regularly	3	1035	Call	QA TR
Supporting Windows NT Server 4.x - Enterprise Technologies	Regularly	5	1475	Call	QA TR
Supporting Windows NT 4.x - Core Technologies	Regularly	5	1475	Call	QA TR
Supporting Microsoft Systems Management Server	Regularly	5	1475	Call	QA TR
Supporting Microsoft SNA Server V4	Regularly	5	1475	Call	QA TR
Windows NT 4.x Essentials	Regularly	4	1395	Call	QA TR
Windows NT 5 Essentials	Regularly	5	1595	Call	QA TR
Supporting Windows NT 4.x Servers	Regularly	4	1395	Call	QA TR
Implementing Windows NT 5 Active Directory	Regularly	3	1045	Call	QA TR
Windows NT 4 Workstation and Server: Hands-on	Bi-weekly	5	1675	London	LTREE
Windows NT 4 Workstation and Server: Hands-on	21/9	5	1675	Edinburgh	LTREE
Windows NT Optimisation and Troubleshooting	Monthly	5	1675	London	LTREE
Microsoft Transaction Server	Monthly	4	1425	London	LTREE
Porting Applications from UNIX to Windows NT	18/8	4	1425	London	LTREE
Windows NT Support Fundamentals	07/09	3	690	Reading	POPK
Supporting Windows NT Server	14/09	5	1150	Reading	POPK

WINDOWS SUPPORT

Implementing Windows NT Security: Hands-on	Monthly	4	1425	London	LTREE
Microsoft Systems Management Server	Monthly	4	1425	London	LTREE
Supporting Windows '95	17/09	2	460	Reading	POPK



Key OBJE The Object People Limited

Epsilon House, Chilworth Science Park, Southampton, SO16 7NS
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 Email: ukinfo@objectpeople.com
 Web: <http://www.objectpeople.com/uk/>

The Object People have a world-wide reputation in assisting clients adopt and make successful progress with object technology. Services include: general Java and Smalltalk Training/Consultancy/Migration. We also specialise in VisualAge and VisualWorks. In addition, we provide courses to cover Object-Oriented Analysis and Design techniques, as well as Object Technology Management Overviews.

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Learning Tree International provides training for IT professionals. Established in 1974, the company presents an impartial view, focusing on practical application of knowledge.

Key QA TR Popkin Software & Systems

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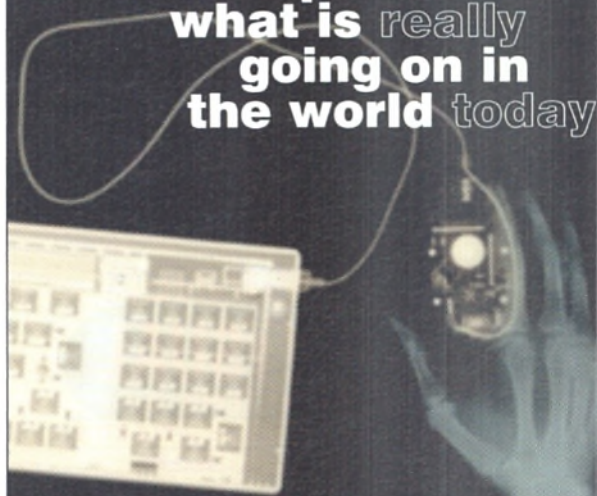
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London

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Your should be a highly skilled PC developer with 3 years plus experience of development in a Windows 3.X, Windows 95 and/or Windows NT environment. Candidates should be skilled in 1 or more of the following key Microsoft technologies: Visual C++, Visual Basic, Windows NT, Win32, BackOffice, Exchange, COM, ActiveX, HTML and/or Java. You will be employed as a consultant on Microsoft Technologies, and your work will involve a mixture of software development, advanced product development and consultancy.

Ref: 89604/1 Email: chris.isaacs@haymarket.com

Development Engineer

City, Reading

£Negotiable

Development engineers are required for all stages of software production including technical pre-sales support, requirements analysis, architecture proposal, object oriented design, implementation, testing, maintenance and enhancement. Skills required: Expertise in one or more of C, C++, Java, object oriented techniques and distributed systems. Financial systems experience is advantageous. Good communication and client interfacing skills and relevant technical expertise. Computer Science or related degree, ideally to masters level, or equivalent experience.

Ref: 89877/1 Email: chris.isaacs@haymarket.com

Analyst Programmer

City

to £45K plus generous bonus

Technical Consultants to join finance and banking team within this growing software house. You will be working on a variety of leading edge projects. You will need sound Unix along with either C or C++ experience. Sybase is advantageous, but training will be given for the right candidate. Casual dress code, flexitime and excellent career prospects.

Ref: 90947/1 Email: leigh.carrick.moore@haymarket.com

Analyst Programmer

West London

to £20 K plus benefits

Suit straight graduate. New Media division of promotions company is seeking a person with good understanding of internet and knowledge of standard web format. Must have either Perl or JavaScript or Java. HTML is a plus. You will learn both NT and Unix, and will have the opportunity to progress quickly within this growing company.

Ref: 94057/3 Email: leigh.carrick.moore@haymarket.com

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Experienced C++/Java developers to work within premier online service provider. Open, collaborative environment, flexi hours and casual dress code. Ground level opportunity within company only 9 months old and growing rapidly. Must be enthusiastic about designing, coding and implementing on-line applications. Excellent package including bonus and share options.

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Tester

Berks

to £25K plus shares plus bonus

At least two years experience of testing, preferably web testing, or at least in a client server environment. Experience of setting up test environment, test plans, test scripts preferred. Open, collaborative environment, flexi hours and casual dress code. Ground level opportunity within company only 9 months old and growing rapidly.

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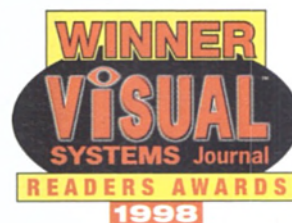
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Our client based in Berkshire, is recruiting a number of engineers to work on the latest radio/communications equipment. They offer the opportunity to work and train in a small team based environment with the support and security of a long established leader in their field. They are seeking engineers across all disciplines but as a priority require the following:

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Berkshire

Salary: £23,000 - £33,000

To design and develop DSP software for radio systems. Experience in DSP with C and assembler knowledge and mathematical ability. Also desirable is experience of DSP in a radio environment, hardware design experience and analogue processing techniques.

Ref: BP2549

EMBEDDED SOFTWARE ENGINEER

Berkshire

Salary: up to £21,000

Design and develop embedded software. HND or degree level plus one years experience in structural analysis and design techniques using C. Knowledge of 68322 microprocessor systems, TCP/IP (Data communications and protocols) and forward error correction codes would be an advantage.

Ref: BP2545

SOFTWARE SYSTEMS ANALYST

Berkshire

Salary: £23,000 - £28,300

Designing, implementing and testing embedded software for radio development. Degree level candidates with experience in realtime or embedded work. Experience in C or assembler embedded level and Unix experience would be an advantage.

Ref: BP2557

SENIOR PRINCIPAL ENGINEER

Berkshire

Salary: up to £35,000

To be the Team Leader for control and DSP software, which involves developing realtime embedded software, creating and maintaining software documentation. Degree level candidates with at least 4 years experience of embedded software on microprocessors preferably in a realtime environment. Knowledge of software analysis methods is desired.

Ref: BP2560

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BC4029

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3 mths+
Hants
SC2327

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Berks
VC1-14284

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3-6 mths
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SC2323

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C, Assembler, GSM Layers 1&3, MMI
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C/C++, Yourdon, comms
3 mths+
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Realtime, Yourdon, safety critical
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- ♦ Windows NT/95
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- ♦ Multimedia

Ref: PH3609

C++ Programmers

Hertfordshire

Our client is looking for bright graduate engineers with a minimum of 1 year's experience to join their small but well established team developing teletext and subtitling software for major broadcasters. You will have a good degree and be a proficient C++ programmer. Knowledge of Visual C++, SQL Server, NT Server, Transact SQL, Visual basic and TCP/IP is highly desirable. Set in a quiet village location this is a chance to work in a fast moving exiting industry without the hustle and bustle of Central London.

Ref: PH3610

Software Design Engineers

Hertfordshire

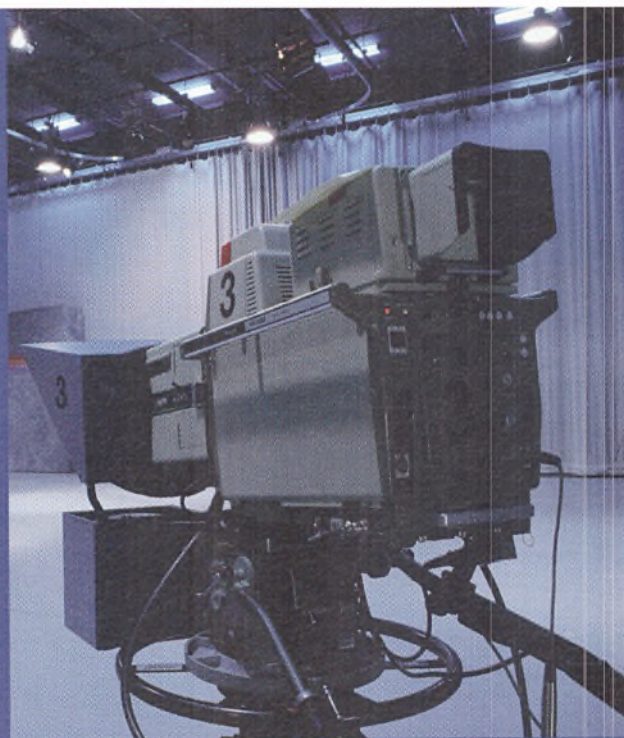
Young and dynamic this company has a string of technological firsts to its name developing innovative hardware and software products for the PC industry in 3D and media processing technology. They offer challenging and rewarding careers to people with enthusiasm, commitment and ability. They have a number of vacancies and are looking for graduate level candidates with experience in C/C++, Windows, 3D/Multimedia, Graphics, Device Drivers, DSP, Audio/Video, MPEG 1, MPEG 2, digital video and games. If you want to work on exciting projects using the latest tools and techniques then this is the place to do it!

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We are a software development company, based in the heart of London's financial district, developing software solutions and providing support services for our customers. Our core business areas are bespoke software development, distributed computing and investment analyses/market risk management. We are expanding the business, to provide software products in addition to our current range of services, to better facilitate our customers, and grow the company.

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As part of this software development programme, we are looking for experienced software engineers, who are committed to the long-term vision of InCity, of providing cutting edge consumer software. For us to develop the appropriate architecture, we need experience not just in writing GUIs, classes, IO etc., our generic architecture requires its own kernel, and accordingly we need experience and ambition for developing a performance-critical kernel to specification. As a company, our directorship is highly technically oriented, and we have no intention of releasing product unless we are happy that it is properly scoped and implemented. This means that you can be confident in the company backing you in decisions relating to software quality and release schedules. This is a green-field opportunity for developing ultimate software.

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CORBA

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AIT is based in Henley-on-Thames with offices in the USA and Australia.

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Testers up to £30K

Driving the project team through the testing lifecycle, you will be expected to review specifications, create test plans, execute test scripts and manage the bug tracking process. Experience of testing GUI systems in a client server environment is an advantage.

C Developers up to £25K

You will be experienced in developing on Windows NT based systems using MS Developer Studio in a client server environment. You will support and maintain functionality of existing systems and carry out new development to meet customer requirements.

Build Controller up to £35k

The best communication, interpersonal and troubleshooting skills are essential. Liaising with clients and developers you will be analysing their needs and applying rigid control to software development.

You will be experienced in assembling large software projects and have the vision and ability to seek and solve problems before they impact. Rapidly mastering new technologies you must be capable of integrating them into the project.

Experience of Visual C++ and DOS is required and knowledge of Unix and Installshield would be an advantage.

For information please call **Antonia Cox**

AIT Limited

The Malthouse
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Henley-on-Thames
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facsimile 01491 416601

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INVESTOR IN PEOPLE

A glossary of 90's terms

(OK, not strictly programming related but we thought this Internet meme was funny nonetheless...)

Alpha Geek: The most knowledgeable, technically proficient person in an office or work group. 'Ask Larry, he's the alpha geek around here.'

Assmosis: The process by which some people seem to absorb success and advancement by kissing up to the boss rather than working hard.

Blamestorming: Sitting around in a group discussing why a deadline was missed or a project failed, and who was responsible.

Body Nazis: Hard-core exercise and weight-lifting fanatics who look down on anyone who doesn't work out obsessively.

Seagull Manager: A manager who flies in, makes a lot of noise, shits all over everything, and then leaves.

Chainsaw Consultant: An outside expert brought in to reduce the employee headcount, leaving the top brass with clean hands.

Chips and Salsa: Chips = hardware, salsa = software. 'Well, first we gotta figure out if the problem's in your chips or your salsa.'

Cube Farm: An office filled with cubicles.

Flight Risk: Used to describe employees who are suspected of planning to leave a company or department soon.

Going Postal: Euphemism for being totally stressed out, for losing it. Makes reference to the unfortunate track record of postal employees who have snapped and gone on shooting rampages.

GOOD Job: A 'Get-Out-Of-Debt' job. A well-paying job people take in order to pay off their debts, one that they will quit as soon as they are solvent again.

Idea Hamsters: People who always seem to have their idea generators running.

Irritainment: Entertainment and media spectacles that are annoying, but you find yourself unable to stop watching them. The O.J. trials were a prime example.

Mouse Potato: The online, wired generation's answer to the couch potato.

Percussive Maintenance: The fine art of whacking the crap out of an electronic device to get it to work again.

Prairie Dogging: When someone yells or drops something loudly in a cube farm, and people's heads pop up over the walls to see what's going on.

SITCOMs: What yuppies turn into when they have children and one of them stops working to stay home with the kids. Stands for Single Income, Two Children, Oppressive Mortgage.

Squirt the Bird: To transmit a signal to a satellite.

Starter Marriage: A short-lived first marriage that ends in divorce with no kids, no property and no regrets.

Stress Puppy: A person who seems to thrive on being stressed out and whiny.

Swiped Out: An ATM or credit card that has been rendered useless because the magnetic strip is worn away from extensive use.

Tourists: People who take training classes just to get a vacation from their jobs. 'We had three serious students in the class; the rest were just tourists.'

Treeware: Hacker slang for documentation or other printed material.

Uninstalled: Euphemism for being fired. Heard on the voicemail of a Vice president at a downsizing computer firm: 'You have reached the number of an uninstalled vice president. Please dial our main number and ask the operator for assistance.' See also Decruitment.

Vulcan Nerve Pinch: The taxing hand position required to reach all the appropriate keys for certain commands. For instance, the warm re-boot for a Mac II computer involves simultaneously pressing the Control key, the Command key, the Return key, and the Power On key.

Xerox Subsidy: Euphemism for swiping free photocopies from one's workplace.

Yuppie Food Stamps: The ubiquitous £20 notes spewed out of ATMs everywhere. Often used when trying to split the bill after a meal: 'We all owe £8 each, but all anybody's got is yuppie food stamps.'

Blast from the past



EXE Magazine - June 1998

As this advert from the June 1988 issue of .EXE shows, even the rich and famous have been attracted to software development. What next? The Kirk Douglas Standard Template Library? MadonnaSoft VB 6.0 Grid Control? Or how about *More Design Patterns* by Stallone, Lundgren, and Schwarzenegger? Although perhaps in light of all this the name of the song should have been 'I'm RAD, I'm RAD (really really RAD)...'

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Freebie of the month



Is it a bird? Is it a plane? Is it Superman? No... actually, you were right the first time. It's a bird. But not just any bird. Oh no. We received a pair of these exquisitely plastic ducks from Rainbow Software recently. Apparently, they represent the concept that developers will take to Rainbow's hardware-based software protection solutions (read: dongles) 'like a duck to water'. As if it weren't enough that the ducks are resplendent in 'Beatles Submarine' yellow - with some rather dodgy eye makeup if you ask us - they also emit a plaintive squeak when squeezed (much better than the Intel Create & Share rubber camera we featured last month). Plus, they apparently have the ability to drive grown men insane: a member of the EXE team who shall remain nameless has been seen around the office talking to them with a beatific smile on his face. Isn't that right, Mr Duck? *Squeak squeak.*

And finally...



The great 'Small Islands exploit unusual domain names' saga goes on. Hot on the heels of its cousins in the Kingdom of Tonga (where, if you'll recall, they use to think Prince Charles was god or something), the tiny Pacific island of Tuvalu is the latest microstate to start selling Internet domain names to foreign businesses. Where a Tonga .to address is merely distinctive, Tuvalu's .tv domains are just perfect for the visual media... www.bbc.tv, anyone? Meanwhile, after a few moments research we found the site of 'Easy to Remember' (<http://www.i.am>), an organisation which provides free domain forwarding. Simply register your real email address or URL with them and they will give you an 'easy to remember' alias, like i.am/bob, or hello.to/EXE. Isn't philanthropy wonderful?

Arthur bruised his upper arm

Long term Apple Macintosh supporter

Douglas Adams has been receiving flame

mail from the Mac faithful, following the

Windows-only release of his new game

Starship Titanic.



Far back in the mists of time, when Debbie Harry sang punk rock not jazz and The Archers was on before 2 o'clock in the afternoon, all personal computers except Sir Clive Sinclair's were built in Californian garages by hippie geeks. And what computers they were: made with hexy keypads and cassette-recorder interfaces and bare wire-wrapped motherboards and 4K ROM BASICs illegally copied from you know who, they plugged into your parents' broken, black-and-white TV and afforded you endless hours

of fun typing in machine code Biorhythm programs from nearly-sequential listings printed in Practical Computing.

And so things went on until one day a geek named Steve became trapped inside a broken photocopier while trying to discover if the toner powder was edible. He was accidentally transported millions of parsecs through a wormhole in space to the distant planet of Xerox. The friendly and civilised Xeroxians looked after young Steve, and brought him up as though he were their own. And they trained him to be a master of the mysterious mosaic art of iconisation.

For, driven by an urge for elegant economy, a deep-felt laziness in the matter of making tiles, and a hatred of grouting, the Xeroxians had over millions of years perfected the technique of suggesting detail where there was none. Using only sixteen by sixteen tiles, and the dynamic wave theory of Impressionism, a Xeroxian IconMaster could make a picture of an envelope, or a Yale house key, or a pocket calculator, or Marilyn Monroe, or a Belgian person wearing a BBC Radio Solent tie smoking a cocktail cigarette while sitting in a racing car that had a small dent in its offside front wing. Other civilisations attempted to imitate this skill, but the best of their efforts always looked like small grey bogies, perhaps wearing a hat.

Young Steve soon took to the mysterious lore of iconisation, and determined to bring it back to Earth. So one Thursday, he repaid the Xeroxians' generosity by returning through the wormhole to his garage in Silicon Valley and building a wonderful new computer using the Xeroxian's ideas about icons.

At least, this is how it is explained in the official history of Apple Computer.

'Errm', said Arthur. 'Uhhmm, errrrm...'

She was a large girl with big, white American-style chompers reminiscent of Monica Lewinski's. In fact her teeth were so large

that her lips had to stretch a long way over them to conceal them, so it was quite an effort for her not to smile. However, she managed it for Arthur.

'Is there a problem, sir?'

'Herrrrrrrrrrrrrm', said Arthur, really embarrassed. 'Uhhmm...'

'Sir? Is there a problem with your Speediprint Artwork printed in Half The Time Just For You?'

Arthur pointed at a grey blob on the cover of an A4 brochure resting on the counter in front of him.

'Excuse me, but what is that supposed to be?'

The girl eyed it critically. 'I'd say it looked like a small grey bogie wearing a hat. Probably a Panama. But it's your brochure – you can tell me what it is supposed to be.'

'That,' said Arthur, finding courage in indignant rage, 'That is a fine piece of Corel clip-art representing Hercule Poirot sitting in a 1930s racing Bentley, which I spent ages doctoring to change his tie...'

The girl had held up her hand to halt him. 'I'm sorry – did sir say "Corel"? Does sir by any chance use a Windows-based computer?'

'Yes, of course. And don't tell me this is my fault, because it printed fine on our Laserjet...'

With a deft movement, the girl flicked a switch on the PBX. 'Attention. Attention. Security to reception. We have a whinging Windy in the building...'

A concealed steel shutter swept down with a clatter behind Arthur. Two huge security guards, armed with baseball bats, appeared behind the girl. The larger looked down at Arthur, and smiled slowly.

'You must be the Windows lover. So where do you want to go today?'

'Errm', said Arthur.

According to Encyclopaedia Galactica, a 'MacHead' is defined as a zealot who obstinately clings to technology which has rather passed its sell-by date. The venerable encyclopaedia goes on to note that most MacHeads work in the printing and publishing industries, are strikingly ignorant about technology in general and computers in particular, and offers some useful practical hints on how to spot and avoid them at parties.

According to Mac Monthly – Get the best out of your Mac every month, a MacHead is 'the kind of cool dude who knows how to take PhotoShop to the limits – and beyond'. This month's free CD-ROM contains a 30-day trial PhotoShop plug-in enabling YOU to add quicker, neater drop shadows. Coincidentally, this has also been the content in all previous months.

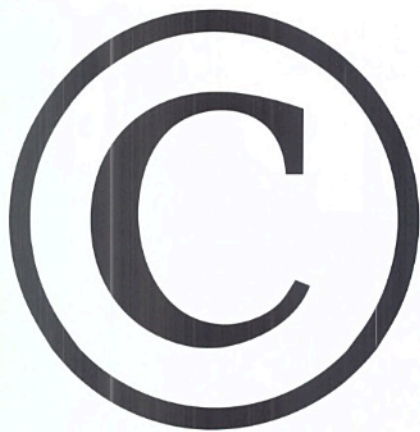
The Hitch-Hiker's Guide To The Galaxy, deluxe paper edition, is authored on a PC and sent to Speediprint Artwork, a Mac print shop on Zipdrive IV where they almost know how to read a PC diskette, and nearly decode MIME email. This edition of the Guide defines a MacHead thus: ♠♦♣♠♠♠♠♠ ♠♦ ♠♠ ♠♠♠♠ Monica Lewinski ♠♦ ♠♠♠♠♠♠♠♠♠ ♠♠♠ ♠♠♠♠♠ ♠♠♠♠♠ ♠♠♠♠♠ ♠♠♠♠♠♠♠♠♠

The paper edition of The Hitch-Hiker's Guide To The Galaxy has not been a great financial success.

'At least they let you keep the brochures – and we can still use them once we have wiped your blood off them. And you are all right really.'

Arthur was sitting on Ford's sofa, delicately dabbing a cut and bruised forearm. 'No thanks to you. I thought you told me MacHeads were harmless.'

'Mostly harmless', corrected Ford Prefect.



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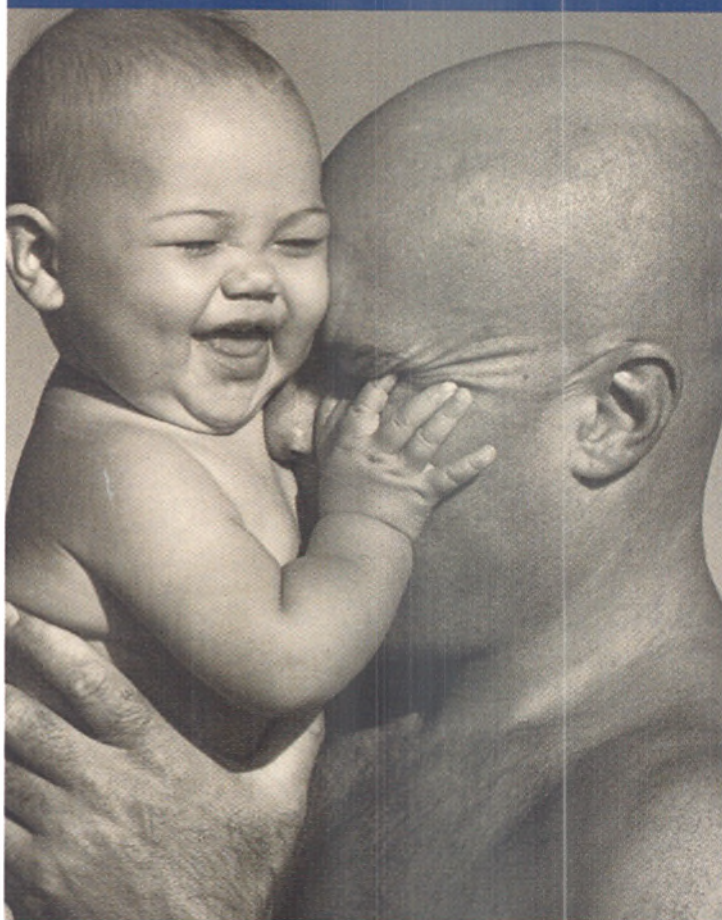
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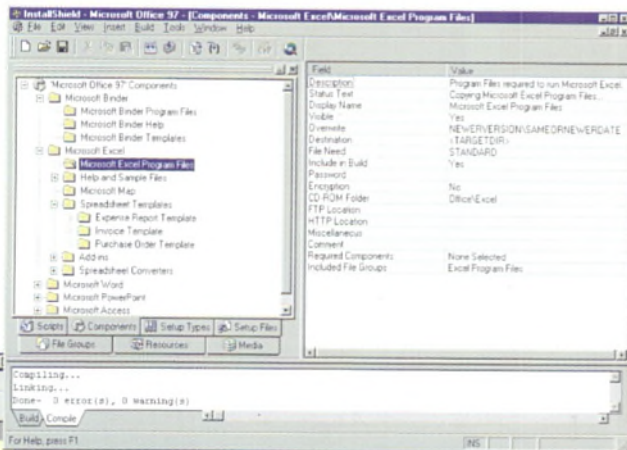


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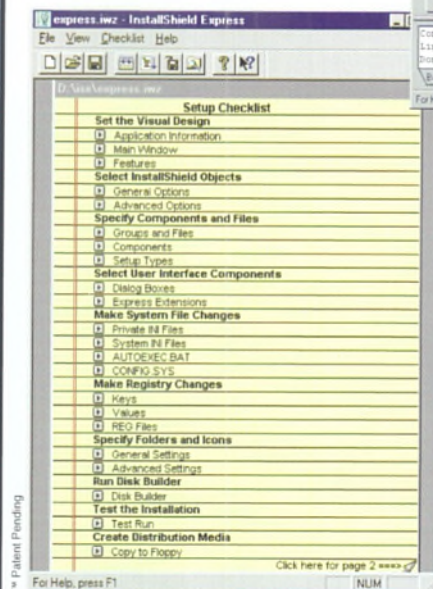
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Development Tools '98

Once upon a time, all the budding developer needed was a compiler – or, if he was dabbling in the murky waters of Basic, an interpreter – a few libraries, and a couple of good reference manuals. If he was really hard-core, he might want a separate assembler. All of which would generally fit on one floppy disk, 8" or 5¼". Single sided. Single density. You get the picture.

The world has moved on. Compilers now come with a host of support tools, many of which didn't even exist as concepts in the 80's. Modellers, profilers, code generators, form designers; the list continues to grow. There are more support tools than ever before – version control systems, help authoring suites, class libraries, component libraries, 4GLs, and more.

We wondered just what the well-equipped software professional of today keeps in his tool chest. To answer this question, and others, we carried out the first comprehensive survey of UK developers about the tools they use. Our questions covered three main areas:

Development environment – We asked about what operating systems today's developers use on their systems, which operating systems they develop software for, and what kind of platforms – PC, workstation, mainframe, mini, etc – they target.

Tools of the trade – Version control systems, debuggers, help authoring tools, 4GLs, DBMSs, methodologies. All have become key to the professional software developer. Or have they? We asked what tools people use, and what tools they plan to use in future.

Beliefs and opinions – What do developers think about the burning issues of our time? We asked about attitudes to Java, the Millenium Bug, COM versus Corba... We also asked about what criteria are important to software professionals when they choose which tools to buy.

Our survey was carried out by phone, using a sample of developers chosen at random from EXE Magazine's readership. Gilmour Research Services, who conducted the research for us, interviewed 311 respondents over two weeks in July and August 1998. All sizes of company and development team were surveyed, from one-man bands to 20-plus teams in companies with over 500 UK-based staff.

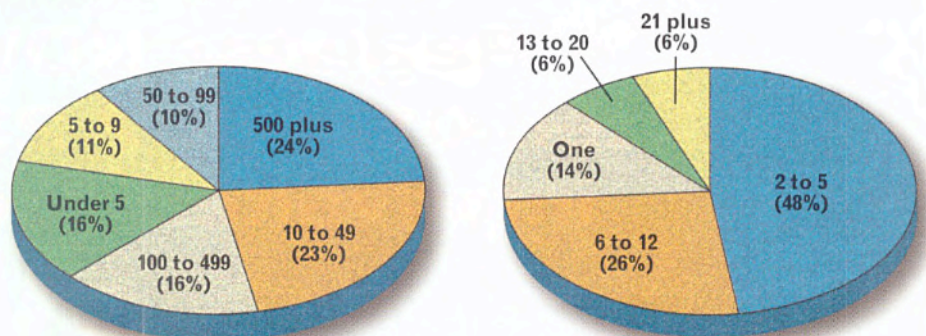
A clear majority of respondents worked in teams of between two and five developers, although over one in four worked in large teams of more than six.

Expect the unexpected

Software developers are building today the programs that will be used tomorrow. It seemed likely that our respondents would be on the bleeding edge of technology, using the latest beta software and the most comprehensive range of life-cycle tools. Far from it; the survey gave us a huge reality check.

The most overall important factor for developers is reliability and this influences all their choices. The need for an established operating system, proven languages, and only the tools which are critical to the project at hand. No fluff. This trend is apparent throughout the survey. Developers are a much more conservative bunch than you might have thought.

So read on, but prepare to be surprised...



How Many employees do you have in the UK?

What is the size of your software team?

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Environmental issues

Which operating systems and languages a developer uses has been the cause of many quasi-religious wars. Gordon Letwin, then chief-architect of OS/2 at Microsoft, even wrote a book with a chapter titled 'The OS/2 Religion'. Hence, in surveying developers there's a risk that the users of the most bizarre operating systems and languages will shout the loudest and skew the results in favour of their chosen environment. This is typical of web-based surveys. Of course it hasn't happened in our controlled survey; the flames sprinkling most discussions of these topics have been abandoned for straight answers.

Operating systems

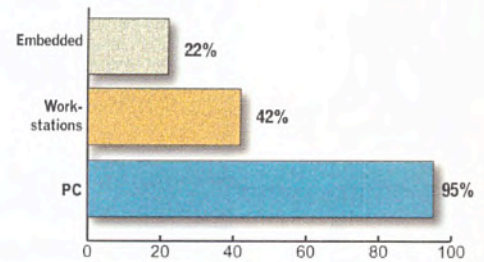
Windows NT was the most widely used operating system, with almost three out of four respondents running it. Windows 95 and Windows 98 (Windows 9x) ranked second, with Unix a poor third. Many respondents worked in several different software environments, but Microsoft dominated by a wide margin. Just under a third of developers surveyed worked on Unix.

It is no secret that Unix was in a much stronger position before the arrival of Windows NT. Microsoft has clearly succeeded in attracting traditional Unix developers to its platform. There's currently a renewed inter-

est in Linux, as witnessed by the recent announcements of database vendors endorsing variants of this OS. It will be interesting to see if this is enough for developers to go back in numbers to Unix. Another event which will have an impact on the choice of developers will be the eventual release of Windows NT 5.0.

Again, Windows NT was the favourite primary OS, used by 46% of the respondents. This was followed by Windows 9x, primary OS for 38%, with Unix reaching just 11%. Unsurprisingly in this environment, the majority of respondents (88%) developed applications for Win32. Twenty three percent developed specifically for Windows NT and 18% just for Windows 9x. Since Microsoft is heavily pushing its 'Designed for Windows NT and Windows 95' logo programme, the proportion of developers specifically targeting one Win32 OS is quite high.

On closer inspection however, it becomes obvious that there are some areas where operating system-specific code must be written. For example, to deal with the independent device-driver models of Windows NT and 9x, or when writing BackOffice server applications (which are NT server specific). And of course games developers can generally target only Windows 9x



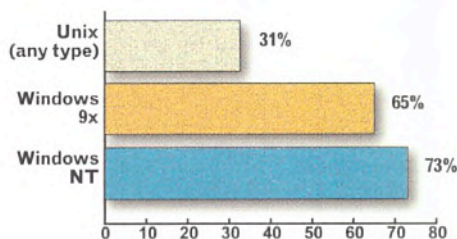
PC	95%
Workstations	42%
Embedded	22%
Mini	12%
PDA	6%
Mainframe	5%
Games consoles	2%
Other	1%

Which of the following platforms do you develop software for?

platforms because of the lack of DirectX support on NT. Plus there's built-in support for IrDA only in Windows 9x. The convergence awaited in Windows NT5 will definitely change the picture. To what extent will it affect next year's survey?

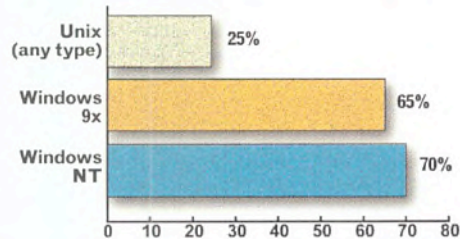
In line with most expectations, a quarter of respondents claimed to be developing Unix applications (all flavours of Unix combined). One set of results though did surprise us: 18% and 11% of respondents said they developed for 16-bit Windows and DOS respectively. These are still amazingly large figures. Will the legacy of Win16 and DOS stay with us forever? Thankfully, only 5% and 4% respectively said that these were their primary targets. MacOS gets even less consideration: 2% of respondents use it. Just one developer admitted having it as his primary OS, while 2% said they develop applications for it. Past confusion at Apple has obviously had devastating consequences. Although Steve Jobs is back in charge and Apple's new OS plans are much clearer, Apple evangelists will have a hard task in front of them to convince developers of the viability of any Apple platform.

Almost all respondents developed for PC platforms, but the desktop was not their sole concern; workstation development and embedded systems were major areas for a sizeable number. Funnily enough about the same number, 1 in 20, develop for PDAs and mainframes. Twice as many one-man bands developed for PDAs while three times as many teams of more than twenty



Windows NT	73%
Windows 9x	65%
Unix (any type)	31%
Windows 3.x	17%
DOS	12%
MacOS	2%
Others	15%

Which operating system do you use on your development systems?



Windows NT	70%
Windows 9x	65%
Unix (any type)	25%
Windows 3.x	18%
DOS	11%
MacOS	2%
Others	20%

Which operating system do you develop software for?



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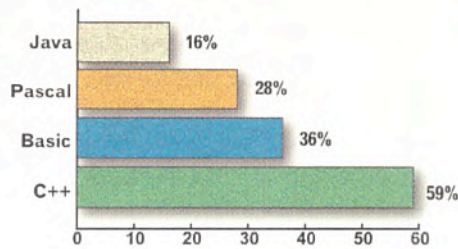
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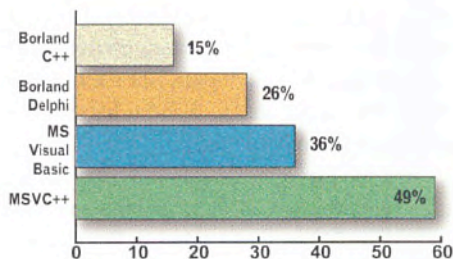
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C++	59%
Basic	36%
Pascal	28%
Java	16%
C	11%
Perl	5%
Assembly	5%

Which language do you currently use?

developed for mainframes. About one in ten of developers targets minis. While all members of the teams tend to be involved in all areas of development (standalone, intranet, internet, client/server, games...), twice as many heads of teams are involved in embedded development. This might reflect the requirement for greater experience in this particular field.



Microsoft VC++	49%
Microsoft Visual Basic	36%
Borland Delphi	26%
Borland C++	15%
C (any product)	11%
Symantec Visual Café	8%
Borland C++ Builder	8%
Perl	5%
Sun Java Workshop	5%
C++ (any other product)	5%
Assembly	5%

Which language do you currently use?

Languages

As for languages, Microsoft maintains a commanding position of dominance. Nearly half of the respondents use Visual C++ and more than a third develop with Visual Basic. The only other contender, which is used by more than a quarter of those surveyed, is Borland Delphi. Note that the top three slots are filled by different languages rather than by various implementations of C++, as might have been expected. Grouping together all the products by language reveals that C++ has an even stronger lead with Visual Basic and Delphi following in the same order.

Teams of 13 to 20 do not exactly follow the same trends. The use of VC++ is at its strongest (70%) but it is followed by Delphi (35%) and only then by Visual Basic (29%). Visual Basic regains its second position for teams of 21 and more, so it cannot be inferred that it is not considered professional enough.

Sixteen percent of the respondents said they were using Java. However, Java as the future of enterprise computing would still appear to be a long way off, as only 1% of respondents are currently targeting it as a platform. C has fallen behind Java, but inevitably a proportion of C++ users are actually still programming C style. Even if you intend to program in C, the likelihood is that, apart for specialist needs, you will purchase a C++ compiler.

Types of applications

Significant changes in the type of applications under development were forecast. Top gainers were internet and intranet development, which a significant number of respondents felt they would be involved with in 12 months' time. This probably reflects the recent demands for companies to have a web presence. Best to gain experience on an intranet and then scale it to the Internet.

Multi-tier applications were also thought to be on the increase, as well as distributed systems. While COM was predicted to show the largest increase in absolute terms compared with Corba, it is worth noting that Corba development was forecast to double (see *Beliefs and opinions* on page 13 for more information on COM and Corba).

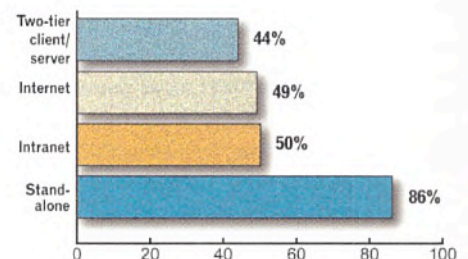
No category reveals any significant decrease over the next twelve months. So, where do the increases come from? One limited explanation concerns the growth of intranet/internet applications and multi-tier client/server apps: in most cases, the former can be viewed as an instance of the latter. As

a more general trend, either most development teams will grow, which is unlikely, or some developers will be asked to work on other projects in addition to what they're currently doing. Hard working days (or should that be nights) in store?

Again, as witnessed for the target platforms, nearly twice as many heads of teams are involved in embedded development. On the other hand, multi-tier client-server and mainframe connectivity are tasks where heads of teams are much less involved.

One for all

Microsoft is the clear winner here. In all product-related questions it features in the top two places. Unix comes third in operating systems while Delphi is the third language, although in each case for less than a third of respondents. Microsoft's dominance is overwhelming. It hasn't yet reached the monopoly position of Office, but developers from all sizes of teams are clearly dedicated to using Windows NT, 9x, Visual C++, and Visual Basic, and to developing for Windows NT and 9x.



Application developed	Developing now	Within 12 months
Standalone	86%	84%
Intranet	50%	61%
Internet	49%	66%
Two-tier client/server	44%	49%
System software	37%	36%
Multitier client/server	28%	37%
Distributed using COM	25%	39%
Embedded	23%	24%
Mainframe connectivity	15%	16%
Mini connectivity	15%	15%
Distributed using Corba	7%	15%
CTI	5%	7%
Games	3%	4%

Which type of application do you develop?

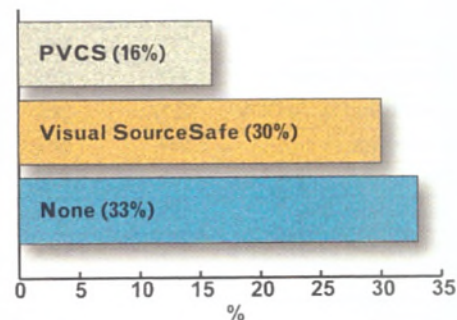
The right tools for the job

We asked a series of questions about the tools – version control, debugging, etc – methodologies, and databases that developers used or targeted. Overall, the results were a little surprising. A significant proportion of developers questioned used few if any tools or methodologies, and those that did tended to stick with the tools integral to, or bundled with, their development environments. The results were generally the same across all sizes of development team – indicating that no matter how many developers you put together, they generally think the same.

Version control

Alarming, 33% of respondents admitted to using no version control software at all. The largest number of these were those developing on their own (57%), or in teams of 5 or fewer people (37%). Among those who did, Visual SourceSafe was the most popular choice with 30% of those questioned using it. It was the first choice of development teams regardless of size. Next most popular was Intersolv's venerable PVCS at 17%.

Another surprising trend was the number of respondents using home-grown version control solutions – at 7% this came in higher than other 'big name' version control systems from MKS, StarBase Software, Rational, and Continuous. Six percent of developers who currently use no version control believed they would be using it in 12 months' time, but most could not specify which one they would be using.



Which version control systems do you currently use?

It seems the manufacturers of version control systems have an arduous task ahead of them to convince evidently sceptical developers of their benefits. Clearly, those who have plumped for Visual SourceSafe (which is very closely integrated into all the Visual Studio tools) prefer to use the bundled tools rather than buy large-scale products such as Continuous or ClearCase. This would seem to indicate that integration, rather than functionality, is the key factor that will persuade developers to make use of version control.

Debugging and testing

Version control software may be an option, but every developer needs debugging tools. Or does he? While the single largest group (37%) used only the debugging and testing tools built in to their development environment, the second largest (18%) claimed to use 'no recognised tools'. This suggests that either these respondents always write bug-free code or that they practice the ancient art of 'printf debugging'. Thirteen percent of respondents used NuMega's Bounds-Checker, while 5% said they were using Rational's Purify.

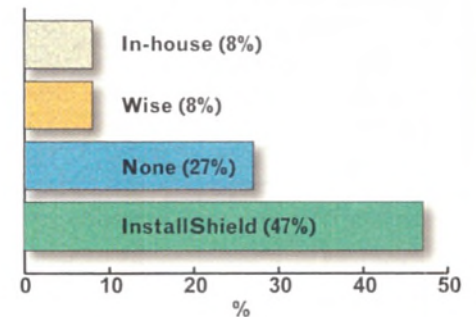
Perhaps the most worrying aspect was the almost total lack of use of automated testing tools – such as those from Mercury and Centerline – or indeed anything more than simple debuggers. This suggests that developers are either releasing their software without extensive testing or are relying on beta-testers to find all the problems. That developers are apparently unfamiliar with such testing tools doesn't bode well for those companies yet to solve their Year 2000 compliance problems.

Installation packages

There was only one clear winner here: InstallShield, which was used by 47% of respondents. Twenty-eight percent were using no install package at all, which was surprising as a majority of those questioned were developing for Win32 where some form of installer is almost always needed. This may be a reflection that those surveyed were

generally developing for in-house users, where unorthodox installation methods are less of an issue, rather than for sale.

One clear trend here was that one-man development teams were least likely to use an installer, with almost half using none, while larger teams were more convinced of their merits – 83% of developers in teams of thirteen or more using a package, predominantly InstallShield.



Which installation packages do you currently use?

For the future, only 5% of those questioned plan to start using an installer in the next 12 months. All of these thought they would be using InstallShield, confirming its firm grip on this market.

Help authoring systems

Developers excel at writing code, but writing documentation is not always top of the priority list. Thus it came as no surprise to discover that more than half of respondents (54%) did not use any help authoring tools at all. Of those who did, the honours were split more or less evenly between BlueSky's RoboHelp, Fore's Forehelp, WexTech's Doc-To-Help, and in-house solutions.

For the larger teams, RoboHelp was the more popular, with 25% of those questioned in teams of 13 or more using it. For the one-man band, the Forehelp product was the most popular with 14%.

There seems to be some confusion about what help strategies developers will adopt in future: 13% more respondents claimed they would be using a help authoring tool in 12

None	54%
Blue Sky RoboHelp	10%
Fore Software Forehelp	8%
WexTech Doc-to-Help	7%
In-house	7%

Which help authoring tools do you currently use?



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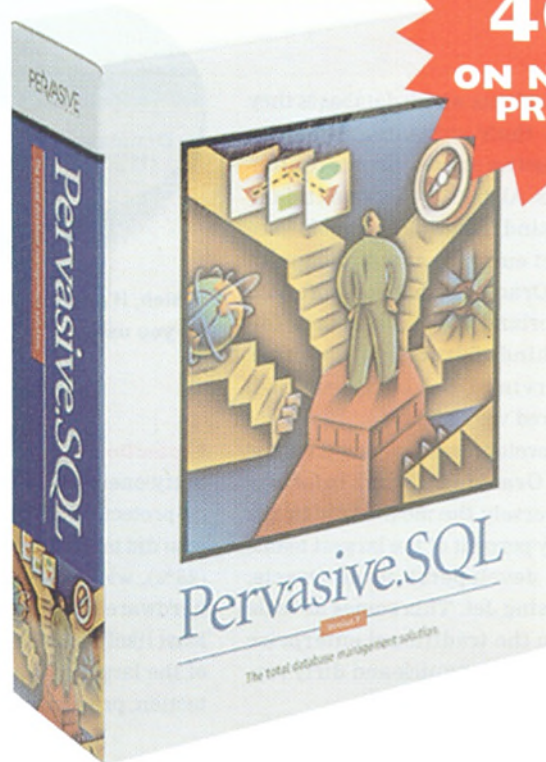
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months' time, but the majority of these did not know which one tool it would be. Whether this indicates that help tool vendors haven't got their message across effectively, or that developers would just prefer to put the decision off as long as possible, remains to be seen.

4GLs

Not so long ago, everyone seemed to think that 4GLs were the future of software development. Well, not according to our respondents. A whopping 70% overall used no 4GL. For those that did, the single most used tool was Visual Basic – hardly a 4GL in the conventional sense of the word – and this was used by a frankly insignificant 3%. It was followed by the narrowest of margins by Informix's 4GL. When it came to future trends, our respondents were equally unconvinced. Three percent each thought they would be using Oracle, an in-house solution, and Visual Basic in 12 months time, with practically no support for any other products.

Databases

We asked respondents which databases they targeted with their software, and got a rather more positive answer than to the previous questions. All but 18% targeted a database of some kind. Leading the pack were Microsoft's Jet engine – as supplied with Access – and Oracle, with Microsoft SQL Server and Borland's BDE/Interbase following on behind. Surprisingly, neither IBM's long-serving DB/2 or Sybase SQL Anywhere scored very highly.

One-man development teams were least likely to use Oracle (5%) and Informix (2%), but conversely the most likely to use Jet (38%). Sixty percent of the largest teams (21 or more developers) used Oracle, against 20% using Jet. This comes as little surprise given the traditional enterprise focus of Oracle and the quick-and-dirty reputation of Jet.

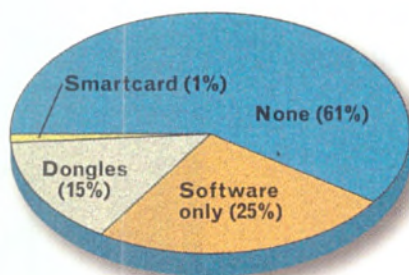
Product	Total	One	Team size			
			2-5	6-12	13-20	21+
JET	31%	38%	32%	28%	24%	20%
Oracle	23%	5%	20%	28%	29%	60%
MS SQL Server	22%	12%	21%	28%	24%	25%
Borland Interbase	12%	7%	16%	12%	6%	5%
Sybase SQL Server	7%	5%	7%	7%	12%	15%
Informix	4%	2%	2%	6%	18%	5%
FoxPro	4%	5%	4%	4%	-	5%

Which databases do you target?

Methodology	Total	One	Team size			
			2-5	6-12	13-20	21+
In-house	13%	12%	12%	15%	6%	20%
UML	12%	5%	11%	13%	18%	25%
OOA/D	11%	12%	13%	6%	12%	20%
RAD	9%	2%	8%	10%	18%	15%
Yourdon	6%	2%	5%	9%	6%	5%
SSADM	5%	2%	4%	10%	-	5%
OMT	5%	2%	5%	9%	6%	-
None	40%	50%	42%	35%	41%	10%

Which development methodologies do you use?

Interestingly, more of those questioned thought they would be using Microsoft SQL Server in 12 months time than Oracle, anticipating the launch of SQL Server 7.0 which is supposed to be much improved for enterprise use. Sybase SQL Server was also mentioned as a future option by 8% of respondents.



Which, if any, software protection method do you use.

Protection

Sixty-one percent of those questioned used no protection at all on their software. Those who did preferred software-based protection (25%), with a smaller number (15%) using hardware dongles. Smaller teams were the least likely to use protection, with up to 60% of the larger teams using some form of protection, predominantly software-based.

Methodologies

Development methodologies have been with us since the days of the IBM 360, but they have occasionally been seen as impractical for the average developer. Our results show that this is far from true. Fully sixty percent of respondents used some form of methodology. UML was popular with 12%, but more developers were using an in-house methodology of some kind (13%).

A definite progression was evident: the larger the team, the more likely it was to use a methodology. Ninety percent of the largest teams used one, with UML and OOA/D the most popular at 25% and 20% respectively. Conversely, only 50% of one-man teams used a methodology, and far fewer (5%) were using UML, preferring their own methods or OOA/D instead.

The high rate of adoption among large teams, where the use of methods-based development is predominant, must augur well for the future of UML as a modelling standard, although the individual developer must be targeted more directly.

Winds of change?

These results ought to send a message to the manufacturers of software tools that developers are far from convinced that they should spend good money on more software after shelling out heavily for their compilers and development environments. Clearly, our respondents are a conservative bunch, planning little or no change over the next 12 months where not absolutely necessary.

Where possible, they seem to prefer to do things by hand, within their usual development environment. They scorn version control and help authoring tools, show no interest in 4GLs, and don't much care about software protection. On the other hand, they are well-educated about recent developments like UML, and clued-up about databases. Their attitude is 'use the tools you need for the job – nothing more'.

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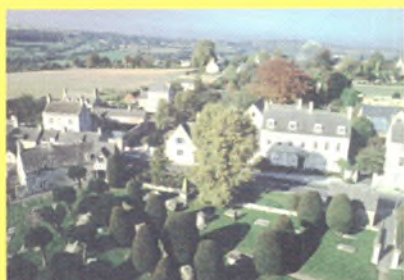
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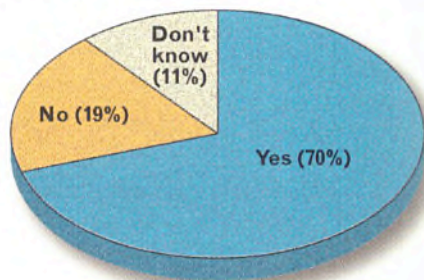
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Beliefs and opinions

Finally, we come to the beliefs and opinions section of the survey. For this, we covered a miscellaneous series of topics. These included: whether Java should always be 100% cross-platform; your beliefs on the practicality of code reuse; whether visual programming is making traditional programming skills obsolete; whether the consequences of the millennium bug have been exaggerated; and factors of influence when acquiring a piece of software.

Java

What of Java? A vast majority said Java should always be 100% cross-platform. For half of these, such cross-platform applicability is the entire point of Java, while 20% pragmatically felt this made their jobs easier. Only a small percentage of the cross-platform enthusiasts (6%) supported pure Java solely because it competed with Microsoft products. A similar sized group (5%) saw it as representing an industry standard.



Do you believe Java should always be 100% cross platform?

A strong sense of misgiving remains. For the minority (19%) who do not favour complete portability, the belief that it is not possible to be truly cross-platform is combined with the suspicion of hype surrounding the concept. Some 13% saw the benefits to be gained from platform-specific applications as more important than the idea of portability.

The larger the development team the less prevalent the belief in purity: it seems that developers working in larger scale, heterogeneous environments have a greater tendency towards compromise on this issue.

What's the reuse

How practical is code reuse? Three out of four believe code reuse is practical. Those in favour seem to take a pragmatic view. They believe it takes discipline and experience to identify productive areas for reuse, but that

it is cost-effective. It should be pointed out that code reuse covers a multitude of sins: there can be reuse at source-level, library-level, or component level, for example. 'It's what people have always done since the first Cobol libraries,' replied one respondent.

Very practical	30%
Fairly practical	46%
Neither practical nor impractical	12%
Fairly impractical	10%
Very impractical	1%

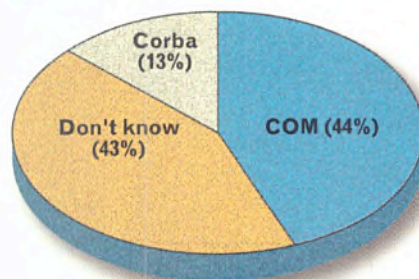
How practical do you believe code reuse is?

For those who do not believe in code reuse, two main principles underlie their objection. First, a large proportion considers that the efforts required outweigh the possible benefits: code reuse is seen as cumbersome and impractical, good in theory but different in reality. Second, others do not consider that the idea of reuse is scaleable.

COM versus Corba

Forty three percent reserved their judgement on whether COM or Corba would become the dominant standard for managing distributed objects. Of these, 90% felt unable to comment at all – the remainder felt there would be space for both or that a convergence would happen. However, for those who declared an opinion on this issue (with larger development teams predominating) COM was clearly seen as the more likely dominant standard. It appears that there is a lot of confusion in the marketplace regarding these standards.

Perception seems more important than substance for this question. The muscle of Microsoft marketing was the reason attributed by 75% of COM voters for its dominance. The fact that it is Microsoft's standard, rather than the intrinsic merit of COM itself, was the force



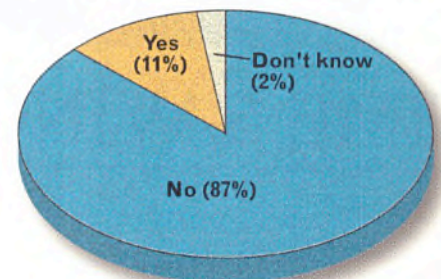
Do you believe that COM or Corba will become the dominant object standard?

behind the belief in COM – 36% of these explicitly identify COM as not being the best option.

Note that the most common reason for attributing dominance to Corba was also 'publicity', and the fact that 'everyone is talking about it'. Only 8% affirmed 'a more open standard' as a reason why Corba would become dominant.

An obsolete tradition?

We asked whether, in the age of visual programming, the traditional skills of programmers would become obsolete. A clear majority (87%) believes traditional skills – such as analysis and design, structured development, and systematic testing – will always be required. The obvious point was strongly made: even with visual tools an understanding of, or access to, the underlying code will still be required.



In your opinion, in the age of 'visual programming', will the traditional skills of programmers become obsolete?

However, an alternate view of the future was anticipated by the 11% who agree with the proposition that visual programming will displace manual code creation. People from this group see programming becoming a glorified form of integration, where applications are solely a question of configuration, and that 'everyone will become a programmer' to build personalised applications.

Y2K

Nearly half of software developers surveyed felt the consequences of the Millennium Bug had been exaggerated, but the extent of the exaggeration was seen to be varied. This led to a yes and no response. A generalised view could be: scaremongering may be taking place, but disruption will happen, and essential services could be affected.

The largest development teams, of 21+, had quite distinct views. Like respondents from smaller teams, they detected hype and misinformation, and believed the IT industry and consultants were seeking to make money out of a crisis. However, not a single respondent from this category believed that the problem was trivial. Disproportionately, they believed

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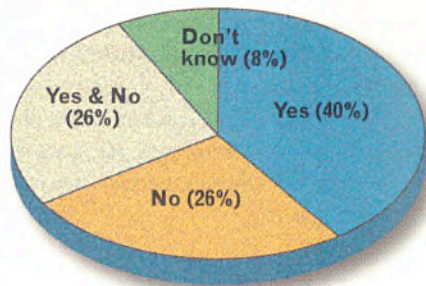
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A lot of misinformation and scaremongering	24%
Some problems but the consequences are exaggerated	19%
Not a problem for us	17%
A lot of confusion causing a domino effect	14%
IT industry/consultants making money out of it	13%
Essential services will have problems	9%

In your opinion, have the consequences of the Millenium Bug been exaggerated?

that there will be a lot of confusion and difficulty, with the interdependency of business systems creating a domino effect.

Want to buy some software?

Reliable. That's what software should be. More than ease of use, performance, or price, it seems that reliability is the key factor of influence when acquiring a piece of software. Similarly, the quality of code produced is a significant influence. Perhaps this can be related to the rise of visual programming tools. With any automatic code generation, developers have to trust the products they use: they are sometimes no longer in complete control of the code. Reliability begins to equate to the developer's own reputation – what could be more important? The cost of software is not really an issue.

Is it surprising how highly the desire for quality documentation is ranked? How does this square with the widespread perception that printed documentation for software is sparse, patchy, and generally an afterthought to the software itself. RTFM? Well, what was the quality of the documentation actually supplied? It seems that the desire for good documentation is there.

It was interesting to note that respondents do not themselves tend to use help-authoring tools. This suggests they are providing little in the way of help or documentation for the applications they create, but they expect good quality documentation for their own purchases.

Peer group recommendation was placed rather low. How can reliability be assessed, prior to purchase, without such word-of-mouth advice?

Least important to software buyers was the factor of whether or not a product was market leader in its field. Only 17% of software developers claimed to be influenced by this (despite the previous assertion that COM would dominate because of the marketing power of Microsoft).

I wait to see if there are problems	40%
I only upgrade when I require a new feature	30%
I always upgrade immediately	12%
I always stay one version behind	11%
I always use the latest beta version	7%

Which one of the following statements best describes your approach to upgrading?

Upgrading

Given the emphasis on reliability, when acquiring software, it was not surprising that 40% of respondents adopted a wait and see approach to upgrading software, to see if problems were revealed.

	V. important	Important	Neither unimportant nor important	Unimportant	V. Unimportant
Reliability	71%	25%	2%	–	1%
Quality of code produced	36%	35%	22%	4%	2%
Quality of documentation	30%	43%	21%	4%	1%
Features	27%	44%	20%	5%	–
Performance	27%	48%	19%	3%	–
Ease of use	27%	45%	22%	5%	–
Quality of support	25%	42%	24%	6%	2%
Price	13%	32%	35%	16%	4%
Source code availability	11%	17%	30%	28%	13%
Peer group recommendation	11%	36%	37%	10%	5%
Reputation of manufacturer	10%	25%	41%	15%	7%
Absence of protection	8%	12%	36%	25%	17%
Cross-platform support	8%	24%	27%	23%	17%
Tailored for specific OS	7%	19%	38%	26%	10%
Being the market leader	3%	14%	36%	27%	18%

The importance of factors when acquiring software.

In terms of the size of the development group, the largest teams (21+) have a greater preponderance towards staying one version behind, while one-man bands have a stronger tendency to track new features.

However, change – or is it churn? – is now built into the software market, and it seems a surprising 12% will seemingly upgrade irrespective of the new features available or the potential problems introduced. Not so much a captive market as a willing market.

I use a mixture of commercial, shareware, and freeware	65%
I only use commercial software	19%
I use a mixture of commercial and shareware	10%
I use a mixture of commercial and freeware	4%
I use only freeware	2%

What is your attitude towards freeware, shareware, and commercial software?

Free to mix

Finally, our question about the use of shareware and freeware reveals the mix of commercial and non-commercial offerings. Overall, 65% of respondents used all three possible sources of software, and just 19% only ever used software they had bought. The figures show that freeware and shareware are recognised as valid products within the software mix of commercial environments.

Pragmatism

The overwhelming characteristic of the varied replies we received was their pragmatic nature. The theory of reuse is all very well, but the attention paid to its practical application is crucial, the millennium bug has been exaggerated but there will be disruption, however attractive visual programming may seem to be the ability to drop down into the code will still be needed, and reliability is a key factor when acquiring software. Finally, a standard may achieve dominance but not necessarily for the right reasons...

On the subject of Microsoft's COM, one respondent claimed: 'People are like lemmings following each other, [Microsoft's] best asset is its marketing machine'. An irregular declension for developers suggests itself: I am independent, you are influenced by peer-group recommendations, and they follow the herd. Developers have a stronger faith in their own judgement than in the direction the marketplace may lead.

Our survey said...

Since Microsoft was long ago acknowledged to have won the war for the desktop, it came as no surprise that such a high proportion of respondents used Windows on their development system. That said, we were surprised at the degree to which Windows eclipsed Unix. It seems that fully two thirds of those who used Unix used it as a secondary operating system, usually to one version or another of Windows. On this evidence, the future of Unix may not be so bright as the vendors would have you believe. However, as it is still the most widely-used server operating system in the world, don't expect it to go away anytime soon.

Mac advocates must surely be disappointed that, after all these years, MacOS is still a minority system. This is despite Microsoft's continuing support for the platform, and it will be interesting to see how well or badly it does in the next year.

That Microsoft also dominates the compiler and development environment markets – on Windows, at any rate – is also little surprise. Over the years, the Microsoft tools have stolen a march on their competitors, consistently being the first to support new Windows trends (many of them introduced by Microsoft itself, of course). The success of the Visual Studio bundling philosophy shines through here, with a large number of those using Visual C++ also using Visual Basic. Clearly, developers like to get everything in the one box.

This is also the cause of bad news for the tools vendors. Developers have shown a clear propensity to use whatever tools are provided with the development environment over feature-stuffed alternatives, and where the environment provides no tool of its own, a majority are happy to go without altogether. They want to write and ship soft-

ware, not spend an age swapping between different tools trying to work out what stage of the life-cycle they are at. The loyalty of developers to their tools can be seen by the fact that very few respondents plan to change their development tools over the next twelve months.

Getting the message

The clear message is that to succeed, tools vendors must integrate their products seamlessly, and preferably invisibly, into the development environments used today, primarily Visual Studio. They also have a big job of education to do – developers are obviously unconvinced of the merits of version control, debuggers, help tools, and 4GLs. If they are to work on ever-larger and more complex projects, developers need to get with the programme, and it is the tools vendors who are best placed to help them do it.

Delphi obviously has a strong loyal core of users. It represents a serious alternative for developers looking beyond C++ or Visual Basic. Inprise (née Borland) will hope that Delphi continues to hold high the banner of Pascal in the language arena. The future for JBuilder does not look quite so rosy. Inprise

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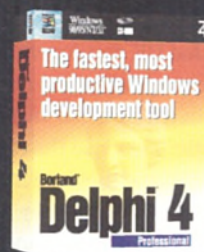
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will be aware of the cool reception awarded by the development community to its name change and apparent refocusing on the enterprise, and it will be very interesting to see how the Borland products fare.

Despite the hype, there's no sign that C++ will be beaten into second place as the development language of choice. If there is a successor waiting in the wings, it would have to be Visual Basic and not Java, as Sun and IBM would have us believe. Far too few developers are using Java, and especially writing any real software in it, for us to be convinced that it will really take off anytime soon. And this is in spite of the millions, possibly billions, that software tool vendors have invested in the language over the last three years. The one bright point for Sun is that a majority of developers believe in its concept of a 100% cross-platform language, even if they aren't enthusiastic enough to use it.

The survey shows that UK developers are above all pragmatic, conservative, and resistant to the hype and spin which tends to spew forth across the Atlantic. They use the tools they need to get the job done, they are loyal to the products that they use, and they are smart enough to see which way the wind is

blowing regardless of the surrounding technical issues. All of which suggests that the UK software industry is in a very healthy position indeed.

Moving on

As neat a snapshot as this survey is of developer attitudes in 1998, we know that developers live in an ever-changing world. Just where will the trends we have identified this year lead? Will developers find that, with the increasing enterprise focus of Microsoft and other major players, they will have to start using the version control tools and 4GLs they eschew today? Will NT continue to make inroads into the Unix market? Will Java ever take off?

These trends are what we hope to track and capture with the Development Tools survey in years to come. We intend to help developers hedge their bets against the future, and keep themselves at the forefront of the software industry – a comfortable distance from the bleeding edge, which is clearly where they like to be – and identify the coming changes *before* they arrive. Because in software, twelve months behind is just too far. ■

How to get the survey

Reprints

For reprints of the Development Tools '98 survey please contact Kate Adams on 0171 970 4832 or by email at katea@dotexe.demon.co.uk.

Full survey

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