

NOVEMBER 1999

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# EXE

## Delphi

Jacc '99  
Dreaming  
spires, C++  
and Java 2

Bookmarking  
Perl

Success  $\neq$  0  
Getting it  
right in C

From Jet to  
SQL Server

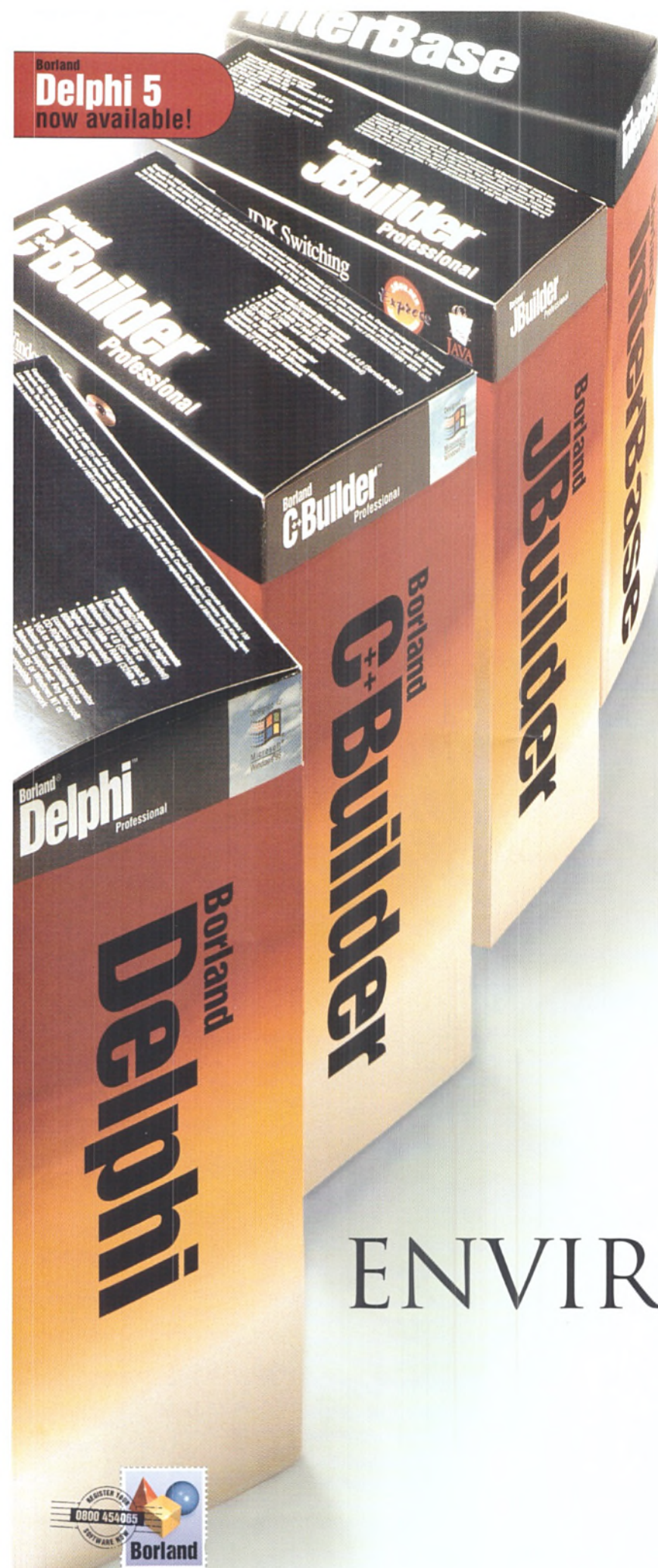
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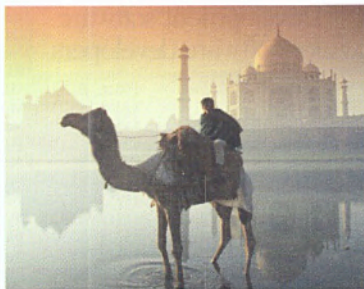
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# Can software scale?



**D**o you know the story of the King and the toaster? Briefly, it recounts a King asking two of his advisors about the shiny box with two slots and how they would go about designing one with an embedded computer on board. The 'engineer' offers a simple, straightforward answer based on a 4-bit microcontroller with no software involved, while the 'computer scientist' goes to great length to redefine the device as a multi-purpose 'breakfast food cooker', which needs a beefy Pentium-90 based system to support it. We'll soon see versions of this joke asking how one would connect the toaster to the Internet...

This month saw *Telecom 99*. Every four years the International Telecommunication Union organises a huge gathering of the industry. At *Telecom 95*, everyone was talking about mobile connectivity and IP-based solutions for traditional telco applications. This year, demonstrations of voice over IP and professional mobile connected devices were everywhere, and the talks were about introducing mobile and connected devices into the home. Expect this to happen by the next event in 2003.

This evolution raises two fundamental issues that are related. First, in a connected environment, where do you put the complexity? You've got the choice of putting it just at the periphery (in our previous example, it would be in the toaster), just in the network (in the electrical network), or split it between the two. The different choices have an obvious impact on the volume of communication

that has to take place. The second issue is that if every dumb or intelligent device gets an Internet address – a world where there'll be more Internet addresses than human beings (ie more than 6 billion) – then we've seriously got to study the behaviour of very large systems.

During a Q&A at *Telecom 99*, Larry Ellison was mocking the Microsoft strategy of always creating the need for ever more powerful computers for users. He's got a point. The time we spend configuring, re-configuring, tweaking, and rebooting our PCs is quite ridiculous. The complexity of Windows 2000 is rather mind-boggling when most users just

can't work. 'Micro payment is of mind-boggling complexity.' He explained that no database today could handle the amount of data and communication required by micro payment. He recommended a flat fee solution. I quite enjoy having most Internet content free so this really sounds good, however that's where I started to have problems with his overall strategy. If we add a vast number of dumb devices to the network, which all get their services from network-based central resources (and Ellison stands by his prediction that before the end of the year there will be more networked computers than traditional PCs), then we'll need

increase in network bandwidth available (roughly doubling every 6 to 9 months). In both cases, after the crossover point, we've got an issue of scale. Even though he stressed this view, he didn't offer any advice on how to get there from the here and now. He estimates that the gap between bandwidth and computer power will soon reach orders of magnitude in excess of a 1000. The only way to deliver such bandwidth will be to scale networks of computers! But just how you do that was left as an exercise...

An interesting side-point is his view that when we have more networked consumer devices than computers we'll have to change our model for software delivery, from the current shrinkwrap model to a service-oriented one. Another factor will contribute to this explosion of networked things: at some point along the line the number of consumer devices will itself be overtaken by the number of effectors and sensors.

If we start to rely on a general 'webtone' infrastructure without tackling how to scale it, then as soon as consumer devices, effectors, sensors, and all you can think of, begin to plug into this infrastructure it will fall apart. Finding ways to create software capable of handling such a large number of clients and such a volume of communication is a challenge that will show if Computer Science has reached maturity.

(By the way do you know how to decide if a field is a science or not? Simple. If its name includes Science, it is not!) ■

*David Mery*

*The full story of the King and the toaster is at [www.cs.bgu.ac.il/~omri/Humor/SoftEng.html](http://www.cs.bgu.ac.il/~omri/Humor/SoftEng.html).*

## No database today could handle the amount of data and communication required by micro payment.

need it for writing letters, sending email, browsing the Web, calculating some figures, and getting some data from a database. The few hiccups of websites like eBay amount to much less time offline than the cumulative time PCs need to be sorted out. Ellison characterised the Oracle strategy as: 'We've been 100% Internet pure for some time [...] the only way to get to an Oracle application is through an Internet browser; [there is] no software on the desktop PC'. So, we've got a clear case for putting the intelligence in the network and having dumb devices at the periphery. In fact Ellison jested that his company has reinvented the economy of scale principle.

Taken at face value, this strategy looks rather attractive. However, when asked what he thinks about micro payments, Ellison clearly stated that it just

some rather beefy software and hardware to handle it all. And if it can't work for micro payment, how can it work for the rest? Unsurprisingly, Ellison avoided questions related to this point.

Another company with a strong vested interest in a similar model is Sun with its motto 'The network is the computer'. Greg Papadopoulos, CTO Sun Microsystems, is one of Sun's visionaries who spends much of his time analysing what's going to happen and trying to find some answers. At *Telecom 99* he shared his thoughts on how the increasing number of 'things networked' will impact on us. He drew a parallel between (a) the increase of networked computers being overtaken by the increase of networked consumer devices and (b) the increase of computer power (roughly doubling every 12 months) being dwarfed by the





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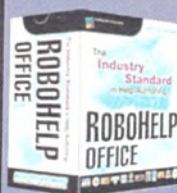
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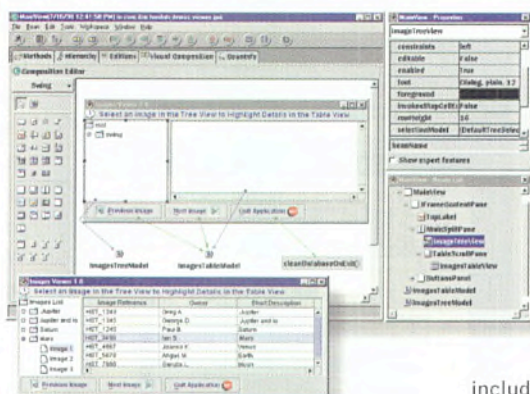


# IBM's Java wave has just got bigger

As previewed briefly back in August (A Java wave, News) releases of VisualAge for Java 3.0, WebSphere Studio 3.0, WebSphere Application Server 3.0 (Standard and Advanced Editions), and a WebSphere Performance Pack further integrate IBM's offerings for Web focused development: the development tools are designed to seamlessly link with the software used to deliver and manage full business systems, be they high-traffic retail sites, supply chain management, or Web self-service applications.

VisualAge for Java 3.0, is IBM's application development environment for building Java applications, applets, servlets, and JavaBeans components. In addition to support for Java 2, there is a new Stored Procedure Builder for

DB2 and support for SQLJ. There is an XML bridge between VisualAge for Java and Rational Rose and support for deploying to Sun



Solaris. The increased integration with WebSphere Application Server helps with the remote debugging of applications.

WebSphere Studio 3.0, a tools environment for building, debugging, deploying, and managing web apps,

includes a visual layout tool for web pages (using JavaServer Pages, HTML, DHTML, and JavaScript). As well as supporting team-based development, there are wizards for generating database-driven pages and the automatic updating of links as content is changed and deployed.

WebSphere Application Server, Standard Edition, is a Java-based web application server. V3.0 sees increased database connectivity, including XML/XSL technology. It allows multiple applications to run on the same machine using different JVMs and includes site-analysis functions to provide reports on website usage and performance. The Advanced Edition adds support for an EJB programming model.

www.ibm.com/e-business/

## Putting the style sheets into XML

Object Design describes eXcelon 2.0 as the industry's first XML-based application development environment for the building and deployment of e-business systems in areas such as knowledge management, customer-relationship management, and enterprise application integration.

Object Design identifies two requirements for such applications. First, the need to build the e-business 'infrastructure' by accessing existing info across an enterprise (from databases, the Web, desktops) and then managing this as XML. Second, there is the need to build and deploy applications on top of this infrastructure that deliver value-added services.

To this end, eXcelon 2.0 features the eXcelon Toolbox (a suite of XML development tools, including an eXtensible Stylesheet Language - XSL - editor), the eXcelon Data Server (the engine for storing, managing, and delivering XML business information, which can blend structured and unstructured data sources), and Xconnects (a connectivity system to access the data sources, convert data to XML, and load it into eXcelon Data Server).

Support for XSL is one of the major features of eXcelon 2.0. As well as XSL Stylus - the (WYSIWYG) XSL editing tool in the Toolbox, the Data Server has been enhanced to include an XSL engine that automatically processes XSL and XML to produce HTML for the Web or to translate different forms of XML.

Object Design and Stilo Technology have signed a partnership agreement for the interoperability of their products and services based on XML. Users of Stilo's WebWriter, the XML authoring tool, will be able to store and retrieve their work through eXcelon.

A 45-day trial version of eXcelon is available from the Web.

www.odi.com/excelon/

## Editing MSI

Wise for Windows Installer 2.0 is designed to help hide the full rigour of requirements for Microsoft's new Windows Installer technology. An increasing level of granularity is available to the user for the degree of customisation they wish to undertake. From the low-level Installation Expert, which can edit the installation database at a table level (including table relationships), through various Setup editors, to a higher-level Feature Editor. Finally, there are the Wizards, which can take you through the whole task. Wizards also exist for the creation of Microsoft SMS installations and to help with the conversion of old-style Windows installations.

An installation system developed with Wise for Windows Installer will produce an executable conformant with the Windows 2000 Application Specification Requirements.

Wise Solutions see ease of use and the direct creation and editing of MSI files as the key selling points. Version 2.0 costs \$795.

www.wisesolutions.com

Riverton Software has released the HOW Application Server Edition for EJBs. It includes graphical builder tools for designing different-tiered objects and OpenFrame, a component deployment framework. There is also an edition for MTS and the DNA platform.

www.riverton.com

A Digital Dashboard is an Office 2000-based system that brings customised knowledge management to the desktop. For the integration of external information via analytical and collaborative tools, a Starter Kit can be downloaded from the Web. The kit contains six samples. microsoft.com/DigitalNervous-System/

Cygwin is a Unix/Linux shell environment and portability layer, which enables the delivery of Open Source projects to Windows. Developers can use Cygwin to quickly migrate apps from Unix to Windows. Priced at \$99, it includes the GNUPro development tools (GNU gcc, g++, gdb, etc).

www.cygwin.com

Sheridan Data Widgets v3.12 is a set of six bound ActiveX controls. They support OLE DB and ADO data binding methods. The Data-Grid is a fully-editable Access-style grid and its features include multiple column styles printing, exporting to HTML, saving/restoring grid layouts, and masked editing. V3.12 costs \$219.

www.componentsource.com

For Windows, the Stilo WebWriter (an 'Internet wordprocessor') is an XML editor that ensures documents can be shared, stored, edited, and reused in a standard way. It provides a built-in DTD viewer and any document created will be XML-compliant. It's priced at \$499 from the Web.

www.stilo.com



# Write data once, recalculate anywhere

Version 7 of ProtoView's **ActiveX** Component Suite sees four new **components**: Outlook Bar, Resizer, and the drop-in replacement ListBox and ComboBox. New features include updateable OLE DB/ADO hierarchical recordsets, and an increase in functionality for the **DataTable**. It costs £430.

[www.protoview.co.uk](http://www.protoview.co.uk)

The **Jeode** platform is Insignia's implementation of Sun's **PersonalJava** and EmbeddedJava specifications that is specifically designed for embedded devices. Jeode has been integrated with the Metrowerks **CodeWarrior** IDE. This includes a plug-in of Jeode's EVM functionality.

[www.insignia.com](http://www.insignia.com)

A lint for **HTML**, CSE **HTML Validator** Business 4.0 automatically corrects misspelled or invalid tag names, tag attribute values, and character entities. It comes pre-configured with HTML 2.0/3.2/4.0, Netscape extension tags, IE tags, and Cold Fusion **CFML** tags. For Windows 9x and NT, it costs £65.

[www.greymatter.co.uk](http://www.greymatter.co.uk)

Widcomm's **Bluetooth** protocol software suite should aid the integration of Bluetooth technology into the next generation of wireless products. For Windows or embedded environments, the connectivity **APIs** come bundled with a test and simulation environment and a Bluetooth **diagnostic** toolkit.

[www.widcomm.com](http://www.widcomm.com)

**Correction**: Together/J V3 (News, September) features **UML** 1.3 support, not 1.2 as stated. The Whiteboard Edition of Together/C++ supports simultaneous round-trip engineering for **C++** and this can be downloaded from the Web.

[www.objectuk.co.uk](http://www.objectuk.co.uk)

Formula One (F1) is a Java spreadsheet development tool, of which Tidestone has just released version 7.0 (an ActiveX version is also available). It was written for Java 2 and can be used to create Beans, applets, or applications (it can also be used as a cross-platform standalone spreadsheet app). The development was done with JDK 1.2.2 and F1 supports the Java Foundation Classes, Swing, the Java 2D API, InfoBus, and it respects a model/view/controller (MVC) architecture. Most common uses are as a database reporting tool (interfacing with JDBC), a calculation engine, and for data distribution. For the latter, F1 saves the spreadsheet files in a proprietary UTS format, which is claimed to be

about 15% the size of an equivalent XLS file (the limitation is the lack of macro support). Developments can be deployed on any machine with a JVM. For Tidestone's many clients

from the financial sector, where security is a strong issue, server-based applets are very popular.

F1 is compatible with Excel 2000 – most Excel functions are sup-

ported (more than 320) with the exception of pivot tables. Full 2D charting is present but not 3D.

ported (more than 320) with the exception of pivot tables. Full 2D charting is present but not 3D.

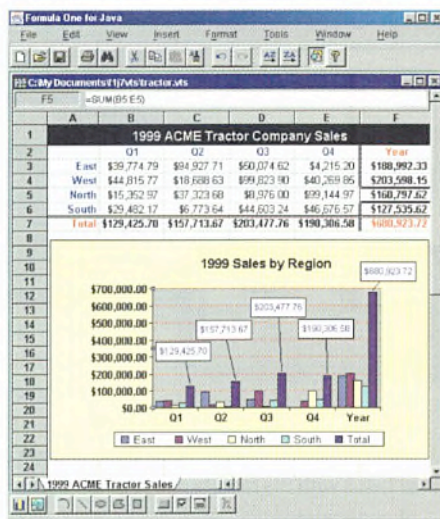
In terms of Java development,

Tidestone's developers found com-

patibility between JVMs to be very good (where one has to pay attention is in specifying the correct version of the JDK). What took most of the development time for this version was re-engineering the architecture to MVC and supporting 2D graphics. The overhead is about 1 MB for a full-blown Swing application. This can be reduced further to less than 500 KB for just the calculation engine. Gary Wood, European Business Manager, stresses that 'Java has a low overhead versus ActiveX' (the F1 ActiveX memory requirement is closer to 3 MB). A year ago Tidestone was selling F1 in proportions of about 80% for the ActiveX version and 20% for the Java one. Now this has been inverted to about 25% and 75% respectively.

Per user, a licence costs \$99, per server/per CPU they are \$6,500, and for a four-CPU server a licence goes up to \$24,000.

[www.tidestone.com](http://www.tidestone.com)



## InstallShield Professional 2000

InstallShield Professional 2000 has two elements: InstallShield Professional 6.0, the newest version of the established setup authoring system, and InstallShield for Windows Installer 1.02, an installation system to satisfy the official requirements for Windows 2000.

InstallShield Professional 6.0 features increased control over the installation process. As well as more robust error handling, with customisation of the handling available, developers can allow end-users to install or uninstall individual components within an application. And there is support for two dialog box 'styles' to cater for Windows 2000 as well as Windows 9x.

There are a number of features to help shorten development cycles. InstallShield Objects are designed to eliminate the need to write or change scripts to include third-party technologies in a setup – the current version of an object can be dragged and dropped into a project (updated objects will appear on the InstallShield website). Event-based scripting, using a standard framework for all setup projects, should concentrate development work on added customisations. And an Active Dependency Manager automatically identifies missing static and dynamic file dependencies for a project.

InstallShield for Windows Installer (ISWI) 1.02 streamlines the Microsoft Installer authoring process with Wizards and a Graphical Dialog Editor. Over 20 languages are supported in an International Edition. Setup packages created in ISWI will also run on Windows 9x and NT 4.

It has an RRP of \$995 per licence. Upgrades are available for \$495.

[www.installshield.com](http://www.installshield.com)

## If VB could talk

The speech enabling of VB applications – ie, the use of dictation, voice command, and voice control – is possible with VoiceTools 6.0 from Speech Solutions. A set of 10 ActiveX controls and libraries, it allows you to incorporate speech recognition and synthesis using drag and drop.

A Sonar Tool automatically voice enables all buttons, menu bar items, radio buttons, and check boxes in an application. The List Assist has standard list box properties but automatically includes its contents in the available list of command words. And a Dictation Window is a text box with voice navigation and dictation.

VoiceTools is SAPI-compliant so you can use any SAPI 4.0 speech engine including those from Dragon, IBM, Lernout & Hauspie, Lucent, and Microsoft. VoiceTools v6.0 costs £223 from Grey Matter.

[www.greymatter.co.uk](http://www.greymatter.co.uk)



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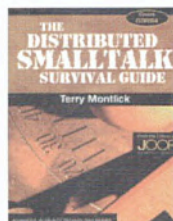
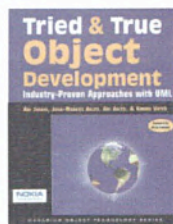
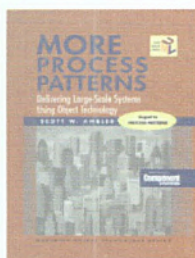
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Fixed or Other	164	192	27
Total Defects	192	27	
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Liwu Li, John Kellerman and Richard S. Wiener

This book shows developers how to succeed with versions 3.0 and 4.0 of VisualAge. It serves both as an introduction to the Smalltalk language and to the base classes of IBM Smalltalk.

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### Rethinking Smart Objects

Building Artificial Intelligence with Objects

Daniel W. Rasmus

This is the first book to explain the integration of object technology and knowledge software development: how to create intelligent software to control and automate the functional units of information created through object technology.

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Kent Beck

In this book Kent Beck weaves together a collection of his landmark articles from The Smalltalk Report, JOOP, and Object Magazine. It is filled with insider tips, advanced techniques, and proven strategies on getting the most out of the Smalltalk language.

£ 24.95 Paperback 0 521 64437 2 426pp 1999

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# A component for online communities

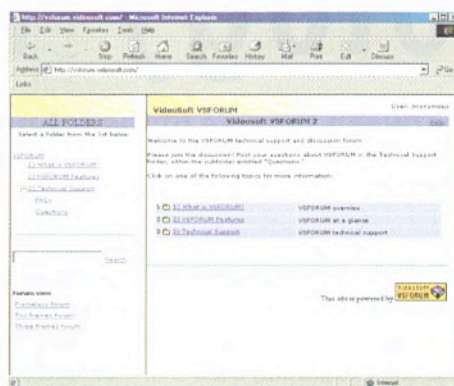
There are two new components from VideoSoft: VSForum 2.0, a group discussion component, and VSSpell 6.0, for adding spell checking and thesaurus functionality.

VSForum 2.0 includes a Remote Administrator Utility, extra security features, support for attachment of files to messages, full threading of messages, support for SQL Server data stores, and the ability to subscribe to email notification of new forum postings. The goal is to add value to websites, with the minimum use of HTML, by helping to create 'online communities'.

With version 2.0 users have the option of subscribing to individual message threads: new postings are automatically sent via email, removing

the need to constantly check the forum. Postings to discussions can be dynamically switched between a chronological view or a threading by topic. For the keyword search engine, a new boolean search function, using an AND operator, will help with exact content matches.

Another VideoSoft control is VSSpell 6.0. This lets Visual basic developers add spell checking and thesaurus functionality to Windows apps. As well as customisation features, version 6.0 has a four-fold increase of its dictionary size and



a 'check as you type' feature, like MS Word. As an alternative to the wiggly red line, a `TypingError` event can be trapped to provide users with custom warnings.

VSForum 2.0 costs £350 and VSSpell 6.0 costs £149.

www.contemporary.co.uk

Borland has announced it's developing a high-performance **Linux** application development environment that will support C, **C++**, and Delphi development. The project, code named *Kylix*, is set for release next year. It will be a component-based development environment for two-way visual development of GUIs, Internet, database, and server applications.

www.borland.com

Progress **SonicMQ** is a JMS-compliant Internet **messaging** server for Java developers. Designed to simplify the development of highly distributed enterprise and Internet-based applications, **Progress** claim **SonicMQ** as the first standalone Java messaging server. The Developer Edition will run on Windows NT and will be certified to run with Oracle8i, SQL Server v7.0, and Progress RDBMS 9.1. Available from early 2000, a beta version is on the Web.

www.sonicmq.com

Rogue Wave's **Nouveau ORB** will support the Windows **DNA** 2000 COM+ component model, which means developers can build applications from mixed Corba, **COM+**, Java, and RPC environments. The Simple Object Access Protocol (SOAP) in DNA 2000 provides for applications to communicate using XML-based messages over the Web.

www.roguewave.com

## Visual Studio Installer 1.0

For those Visual Studio users who like tools to be bundled with the box, help is at hand for dealing with the new Microsoft Windows Installer technology. It comes in the form of Visual Studio Installer 1.0, which simplifies the creation of application setup programs. Setups created with the tool provide capabilities such as centralised distribution for maintenance and updates, application self-repair, and installation rollback facilities.

Features include integration with the Visual Studio shell, support for mixed language projects, Installer project templates, and support for a range of distribution media. Two additional features for those running on Windows 2000 are 'application advertisements' and the ability to run installation programs on 'locked down' machines.

Application self-repair is when a malfunctioning application can check installation data to discover and replace any missing or corrupt files. Rollback capabilities involve the Windows installer maintaining an undo operation for every change it makes during any installation.

Visual Studio Installer 1.0 is available to licensed customers of any Visual Studio 6.0 Professional or Enterprise edition tool.

www.msdn.microsoft.com/vstudio/

## EJB-ready

Doing for data what Enterprise JavaBeans application servers do for logic – this is the claim for Javlin, an EJB data server from Object Design. It's aimed at reducing the data access times of e-business apps by providing a high-performance data server that can access data from multiple back-end sources, and manage it in an EJB-ready format for application servers.

By introducing distributed middle-tier data caching, EJB apps should be able to access business data at in-memory speeds. The goal is to help eliminate backend databases as a scalability bottleneck. Pricing begins at \$495. Javlin supports the NT and Solaris platforms.

www.odi.com

## Books received this month

Publisher	Title	Author	ISBN	RRP
Morgan Kaufmann	Data & databases: concepts in practice	Joe Celko	1-55860-432-4	£24.95
John Wiley & Sons	Data structures and algorithms with OO design patterns in Java	Bruno R. Preiss	0-471-34613-6	£22.95
Morgan Kaufmann	Developing time-oriented database apps in SQL	Richard T. Snodgrass	1-55860-436-7	£34.95
Morgan Kaufmann	Discovering QuickTime	George Towner	0-12-059640-7	£25.95
Morgan Kaufmann	Foundations of genetic algorithms v5	Ed. by W. Banzhaf & C. Reeves	1-55860-559-2	£54.95
Morgan Kaufmann	QuickTime for Java, a developer reference	T. Maremaa & W. Stewart	0-12-305440-0	£30.95
Hay House	Technofutures: how leading-edge technology will transform business in the 21st century	James Canton	1-56170-653-1	\$23.00



# Technology villages

Jules finds a connection between the rise of the Internet and the collapse of the car-centred transport network.

From the air, England looks very characteristic. It's dotted with small villages, all enmeshed in crossroads. Here and there, towns and cities have landed, and the roads surround and radiate from these like shock waves. It's not like Europe at all, where towns tend to be built along the lengths of roads, and crossroads are left bare for traffic.

There's a reason why our road network looks the way it does. The first roads that were built by the Romans were few, and strategic. The points where these roads crossed were vitally important, both in terms of long-distance distribution, and in terms of local, 'service' trade (clearly, a service on a road got trade from one route; a service on a crossroads got trade from two). For centuries, the British have built on crossroads, growing villages organically, improving the roads that fed them, and in turn growing the villages into towns. Roads were not planned or built; they started from tracks and grew in size and importance over many years.

Twice since the Romans this pattern has changed. The first time was the development of the rail network in the last century. As the Industrial Revolution took hold, and economies of scale necessitated huge factories, large towns dedicated to specific industries developed, and rail systems were needed to feed in raw materials, carry out the finished product, and move workers between work and the dormitories that surrounded the industrial heart. The rail system worked like the old Roman

roads, massively boosting the importance of the towns where they stopped, and starving towns and villages only a few miles away. Unlike the roads, though, railways were straight and relatively unbranched, and couldn't develop into a detailed network – the railway towns that were created 150 years ago are still largely the same ones we find today.

The second big change had to do with the development of the car. As more people bought cars, it was realised that conducting vehicular traffic into town centres (which is exactly what the original road system evolved to do) was no longer desirable – the towns choked up with cars whose occupants couldn't park to buy things even if they wanted to stop. In 1962 the first motorway was opened, and thus was born the age of high-speed bypasses and motorway services. For the first time in our history, enormous, ecologically devastating roads had to be planned and built, at enormous expense. These roads were directed into clean countryside, away from existing conurbations, habitation, or rights of way, and their arrival came as a shock everywhere they appeared.

Once drivers understood the bypass, the benefits were felt far and wide. Commuting over long distances from small villages and estates became possible (and desirable). Huge supermarkets could be built on cheap, out-of-town sites, and could offer vast choice at ever cheaper prices. The small, relatively self-contained

communities vanished almost at a stroke.

After forty years of virtually unfettered motoring, all this is about to change. Even if our roads weren't gridlocking, there's so much opposition to the motor car that it can't survive long in its present form.

The trouble with banning cars is that we can't, now, live without them. We no longer have self-contained communities – we need something like the supermarket system in order to keep the choice and value that we will be extremely reluctant to give up. We need to be able to drive to railway stations otherwise small villages will die completely, and the rail towns will be congested with people. The new motorways and bypasses, the major asset of the road infrastructure, are designed to conduct people away from towns, so will be completely useless when we're forced onto expensive and slow public transport.

If we're going to ban driving, we've got to replace it with something. The answer is to move people less, and to use freight systems that are not time-critical. If more people were to work from home, or in small technology villages, the communications that would enable this would also allow for all purchases to be made over the Internet, and then be delivered later – and when you spend all day at home, it doesn't matter much what time it arrives. Home shopping works: the catalogue companies like Littlewoods and Grattan

have been doing it for years, and the success of Amazon is legendary. Tesco has been providing a similar service for groceries, and I understand it's about to go national. Even Argos has shown that it's possible to run a shop without a sales floor. All we need now is to help employers make the same transition. (Did you know that a homeworker is four times as effective as an office-based colleague?)

There's one other thing we need, and that's a proper, integrated payments system. Most Internet transactions involve credit or debit cards. That's fine if you've got one, but it's devastating if you haven't, and if, for some reason, a bank suddenly doesn't like you, you can be left in the middle of nowhere, freezing and starving, and not even able to plead with the bank on the Internet.

Mr Blair is exhorting British Industry to embrace the Internet or die (and he's right), and he wants rid of our cars (and, in the long run, he's probably right about that too), but if this is going to happen, we need, as a matter of urgency, some system of Internet cash. Without it, the Internet will only be any use to the educated and credit-worthy, and the enormous social problems that we're staring in the face right now will not get solved at all. ■

*Jules lives three miles from a rail town, in a small village that has been a motorway services for 2000 years (and still is). You can call him on 01707 662698, or email him as jules@jules.cix.cok.uk.*







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## Loading Emacs

Dear Sir,

Peter Collinson's well-written review of Unix editors points out the perceptible pause as Emacs loads. There are several ways to reduce this delay, the most painless of which being to increase the threshold of how much memory Lisp can allocate before the garbage collector runs. The default value is about half a megabyte, which can cause the GC to run several times during startup. Doubling the threshold usually improves things. Locate the site initialisation file (in Debian it is `/etc/xemacs20/site-start.d/00debian.el`) and add at the start (`setq gc-cons-threshold 1000000`).

On most systems, the remaining delay is mostly caused by packages other than Emacs. Emacs can dump an image of itself with the Lisp libraries pre-loaded, and this is what happens normally so it doesn't have to load the standard Lisp. Extra packages, however, are not usually compiled in. You can dump an Emacs image yourself by typing this in bash:

```
xemacs -batch -eval
"(progn (setq command-
line-processed nil)
(dump-emacs \"~/xemacs\"
\"$(which xemacs)\")")
```

This creates a file called `xemacs` in your home directory, which you should run with the `-no-site-file` option (or alias it). Do not overwrite the original Emacs, since you may run into a bug that is only present when you've dumped your own image (eg mine can't do tty I/O).

Increasing the GC threshold is a much safer option, although the benefit is not as great.

This does not make Emacs as fast as `ed`, but I hope it's useful.

and other more specific aptitudes. After all, human beings are programmed to be receptive to language, and the majority of people become highly proficient in the use of

## The adult learner is greatly helped by gaining an understanding of the underlying grammar, linguistic roots, and of how the language ties in with the culture and history of its development.

More information:  
info: (lispref) Autoload  
Silas Brown  
[ssb22@cam.ac.uk](mailto:ssb22@cam.ac.uk)

## Programmers sold short

Dear Sir,

I read Alex Telford's article (*Self-selection of the species?* EXE, July 1999) with interest. I think that he sells himself and his fellow programmers short by hypothesising that his difficulty in understanding the finer nuances of computer languages is due to lack of intellectual ability. Rather I surmise that it is an educational problem.

I agree that those who invent new languages and make the major developments in the science will undoubtedly be very bright individuals with good conceptual and creative ability. However, ordinary programmers are also likely to possess good abstracting ability

their learned language irrespective of their intellectual ability.

There are of course many highly intelligent people for whom communication with and via computer remains a black box. In my own work as an applied psychologist, I am aware that I approach the PC very much in the manner of someone using a phrase book to guide them through a foreign country. This is in spite of having learned five languages with ease, been enthralled in formal logic as an undergraduate, and coped comfortably with mathematics and statistical concepts through my career. So wherein lies the difficulty? I offer the following as suggestions, which I hope may also be relevant to the difficulties of computer programmers struggling with new languages.

The first great aid to learning a language is youth. It is noticeable the ease and speed with which our younger colleagues absorb instruction, experiment, and communicate

with their computers. This is true of all forms of learning.

Secondly, immersion in a language allows very effective learning through trial and error, positive and negative reinforcement. It may be worth asking however, if the computer programmer has access to human feedback regularly when he is struggling to master his new language. Human modelling and correction are generally very enabling.

Thirdly, and perhaps most importantly for the student coming to a new language as an adult, is the availability of good teaching. The adult learner is greatly helped by gaining an understanding of the underlying grammar, linguistic roots, and of how the language ties in with the culture and history of its development. Also important to the adult learner is being able to relate the new knowledge to his existing concepts - 'how do I tie this in with what I already know and believe to be valid'. The experienced teacher in adult education will bear these concepts in mind. We already have, I am sure, very adequate teaching of computer skills for the young. What is still to be developed is the adaptation of this teaching for the older adult.

So, as you argue later in your article, advances in education in computer languages still have a long way to go. We surely do not all have to possess the deciphering skills of Bletchley Park boffins to be able to talk comfortably with our PCs.

Anne Gray  
Applied Psychologist  
email address supplied



# Delphi

**Still showing its Pascal heritage, Delphi has reached its fifth incarnation. Jules May takes its measure.**

**B**efore the days of Windows, compilers were relatively simple affairs. Standardised languages would be designed by academics, then compiler writers would create batch-mode compilers, perhaps adding a key-word here and there in order to better adapt the abstract language to a particular platform. Compiler companies abounded; names like, Zortech, Glockenspiel and Whitewater were everywhere. Competition was intense, and compilers were improving all the time. Crude IDEs and even cruder debuggers were the order of the day.

Today, not one of these names is left – they’ve all been swept away in the face of the torrential rush of Windows standards. When Windows first appeared, even Microsoft only supported it in C (its Pascal compiler didn’t work at all), and compiler companies struggled to adapt their languages to use Windows’ C-like model. As more and more layers were added to Windows, the task became harder and harder. The companies dropped away one by one, until there were hardly any left.

One company did survive – a little battered and bruised, perhaps, but it made it. That company is Inprise, née Borland. From the beginning, it took a different line to the others – writing small, fast, and efficient compilers. The IDEs were even more crude than the opposition, and it would change any language details it didn't like without noticing the agonised wails of the purists, but the end result was usable and fast, and its no-nonsense licensing policy meant that there were no legal or financial headaches down the line. Along with support packages like its Toolbox range, the products were so efficient and reliable that today, fifteen years on, some of these old console-mode compilers are still on sale and still, I believe, being supported.

What made its reputation was its Pascal series. Four versions of Turbo Pascal were followed, a little reluctantly, by Turbo Pascal for Windows, which spread those appalling ticked buttons all over our desktops. The following edition was renamed Delphi, to reflect the dif-



ferences between it and vanilla Pascal. Although Delphi still has a loyal following, it developed a reputation for being a little flaky, and there's a general perception that, since it's not Microsoft, it's not 'Industrial Strength'. Over the years, Borland felt the pinch and re-emerged as Inprise (which kept the Borland brand and company name), and just recently Inprise has sold a chunk of itself to Borland's arch rival, Microsoft, thus at least ensuring the long-term survival of the company. Delphi version 5 has just gone on sale, and it claims to fix a lot of what's wrong.

I have to admit I have a soft spot for Pascal-type languages. Because you can strike up a new procedure just to name an action or one of the parameters, programs tend to be self-documenting. I like being able to read a type declaration left-to-right, in something resembling English, and not risk getting into an argument about what it actually means. Namespace pollution, the bane of C and C++, is simply not an issue. And, I think the statically-linked stack frame is one of the most important inventions in computers. Delphi still shows its Pascal heritage. Is it, then, a serious development environment?



## Out of the box

Delphi 5 comes in three versions. The cheapest is Standard, with an RRP of £69, which provides the compiler, the IDE, and a basic class library. Professional at £499 includes a few extra classes to handle OLE and COM object creation, some database functions, and some extra controls. The Enterprise edition costs £1,699 and provides Corba object creation, some serious web publishing facilities, and some very high-powered database functions (which require further licences). InstallShield and a source control system are provided as standard. The Professional and Enterprise versions also provide a CD full of third-party tools (some free, some crippled, and some time-limited), a copy of JBuilder 2, C++Builder 3, and HoTMetaL Pro 5 which, even though they're not the current versions, are still a very nice touch.

I'm reviewing the Enterprise edition. Apart from the disks, the box contains a number of useful books. There's a guide to the language (which is reassuringly thin), a *Developers Guide* (which is about three inches of terse hints, chapterised into specific topics), and the InterBase operations guide (InterBase is the proprietary database that Borland supplies). There's also a huge poster with the entire object library printed on it in glorious Technicolor – it's too big to handle on a desk easily, and the words are too small to justify hanging it on the wall, so I'm not sure what you're supposed to do with it. The same information is presented, in a much more useful form, in the Browser window of the IDE.

Installation is straightforward – put the CD in the machine, and watch it go. After an initial menu window, the program hands over control to InstallShield (InstallShield is included on the disk, and you can install that too, if you want). As is common these days, a reboot is required, but the entire installation went smoothly.

Once the program starts, you are presented with a selection of windows spread all over the screen, in much the same manner as the old VB editor (see Figure 1). A blank form-based application is pre-loaded, already waiting for you to program it. If you want to write something else (such as a DLL, a console app, a control panel applet, a database service tool... the list is almost endless), there's a menu item to select one out of a dialog, and the same dialog gives access to a selection of useful wizards.

## Writing programs

Placing controls on the form is easy, and just like every tool you've ever used. There's a good selection of controls, and (unlike Microsoft tools) you can write your own and add them to the selection.

Now you add code to the program. The language guide tells you about the language and except for a few wrinkles (which are required to support some bad decisions made in the past about how the language should work) it's as simple and clean as you'd expect Pascal to be. The object-oriented extensions work well with the Borland unit mechanism (another 'innovation' from the past), there is a notion of property that C++ programmers can only dream of, and there's a really excellent exception mechanism (a far cry from the sullen and grudging support for exceptions in MSVC++, and a demonstration of the power of the static link) which, if you use it properly, should ensure the applications are super-reliable. This is a nice language. All it needs is iterators, and it will be heaven.

But, the language guide is actually no help when trying to put in some code. Nowhere in the books or the online help does it tell you that you have to switch the object inspector over to *events* and then double-click one of the events in the list. Nowhere in the books or online help does it show a complete, well-formed program, so I couldn't even figure out how to type in all the code by hand. (Without using the object inspector, I still can't.)

## Documentation

Previous versions of Delphi were criticised for the poor quality of their documentation. In a way, that's not fair. I found the documentation that did exist to be excellent and helpful. The *Developer's Guide* in particular covers an enormous range of subjects very concisely indeed, and though it's by no means bedtime reading, it is nevertheless easier to digest than (for example) Petzold, which spends more words, and loads of pointless code, on much less information. But, there's a yawning hole in the documentation. There's nothing to tell you how to operate the control surfaces, there's no rationale or explanation, there's no chance to tune into what the designers were thinking of. That's a great shame, because the software is quite unapproachable without it.

The answer, of course, is to turn to the many books that have been written outside Borland or Inprise. After so many years of Microsofting, the Inprise philosophy is quite surprising; the company seems to sell an incomplete product precisely because it wants outside people to fill the gaps. It would prefer other people to write the necessary documentation, and other people have, indeed, risen to the challenge.

Part of the online documentation is the old Microsoft Win32 help file. It's still in C, it's out of date, and it's incomplete. Frankly, you'd need an MSDN subscription to achieve anything remotely out of the ordinary. Even having access to help files didn't help when I tried to put an icon in the system tray – I couldn't figure out how to declare the external call or the record that it needed. In the end I turned to the website, where there is a piece of textbook code that called on a special unit called `shellapi`, which had all the prototypes and records pre-defined. In the books and online help, there's not even a list of all the prefab units or their contents, and when I searched for `shellapi` in the help file, nothing at all turned up. To be fair, the website was pretty good, and once I'd found out how to do it, it was dead easy, but I reckon that in addition to the MSDN subscription, you have to have an Internet connection as well. That upsets me a bit – until now my development machine has been quarantined. After lashing out £1,700 and still not having even a basic documentation set, I'd be furious.

## Programming, once again

Once I'd been able to operate the controls, and find the information I needed, programming was very easy. It feels very VB-like, in that the code and control set are very tightly bound, and there's no analogue of the (unnecessarily complex) document/view model that the MFC enforces. But, unlike VB, there's no sense of being hemmed in. The

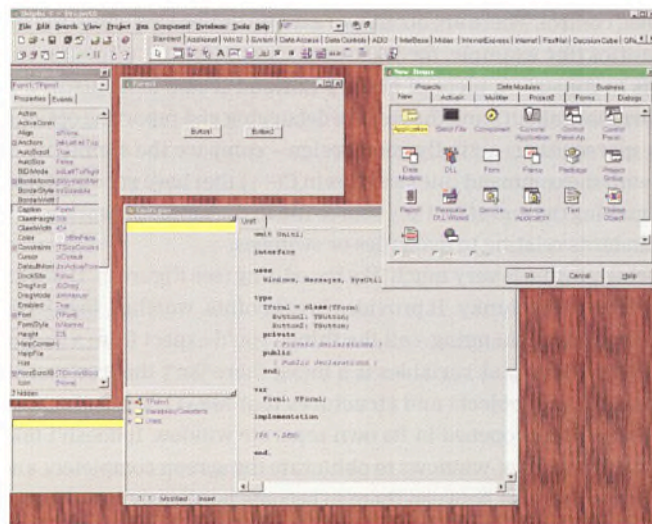


Figure 1 – Delphi at startup.



feeling is always that the system is responsive and extensible. It is possible to program entirely component-fashion, like VB, but if you want to write your own components, or you want to write a single large program with multiple threads running, you can – these things are just a button click away.

The main editor window looks like nearly every editor window you've ever used. It has a conventional automatic colour coding, traditional ToolTips that pop up to remind you of the format of procedure calls, and you can customise everything in sight. It would all be very impressive five years ago, but it's completely routine now. That's why the problems with the editor stand out so much. You can change the font, but you can select only from fixed-width fonts. (Why do they make that restriction?) There's a facility to insert empty blocks of code (such as `case` statements and class definitions), and it understands about indenting, but it doesn't show up on the menu, it doesn't autocomplete, and the control key that activates it (^j) is buried so deep in the help file as to be useless. There's also a stack of 'default' code templates, which are activated on special keys, but nowhere does it tell you what they are or tell you how to modify them. At one point, I selected a group of lines, pressed the tab key (to indent them all) and the editor deleted them. There's no procedure folding (which, for a recursive language like Pascal would be a real help), and the object explorer doesn't show contained procedures, which is a serious omission.

Overall, the editor feels like a ten-year-old editor that has had a facelift – it looks good, and it's just about usable, but it smells a bit and there's a funny knocking in the back. It's a shame, but in the long run doesn't matter – the Borland philosophy of letting other people do the work extends even to here, and various products are available that range from adding a few goodies to the editor to a wholesale ripping out and replacing of the entire IDE. (For a review of the CodeRush IDE enhancement see *The ultimate Delphi fashion accessory?*, EXE, June 1998.)

Code generation is very straightforward. You click on *build* (which, thankfully, is in the menu) and a little window appears to tell you when it's finished. Compiles are fast (fast was how Borland made its name, after all), and the error messages are useful and informative, and don't appear to multiply like rabbits when faced with minor typos. When error messages exist, a little window pops up underneath the editor, so you don't have to keep finding the output window each time you want the next error. Unlike C, the compiler switches are simple and few – there is an option to turn optimisation on or off, but no fine-grained control. There are about half a dozen options for adjusting the semantics (for example, for backward compatibility, 'allow assignments to consts' – a piece of history Borland seems to be justifiably embarrassed about), and the rest are debugging and reporting options. This sparseness is actually good design – compare the simplicity of this with the command line switches in C++ that have got out of control, making the makefile a key source file in the project, despite a lack of standards relating to makefiles or switches.

Debugging feels very much like the editing (see Figure 2). It works, but it feels a bit clunky. It provides breakpoints, watches, breaks on global variables changing – all the things you'd expect from a decent debugger. Looking at variables is a mess; there isn't the tree system for drilling into objects and structures that MSVC++ has. Instead, each structure is opened in its own separate window. It doesn't take long for the mass of windows to obliterate the screen completely, and for the connections between them to become hopelessly lost. There's an environment option to keep the watch windows on top, but that only makes matters worse. And the arrangement of windows is not

preserved from run to run. The routine `OutputDebugString` is possibly the most useful debugging function (it sends its output to an Event Log, which can be either a pane or a file), but again serious debugging is seen to be someone else's problem and (predictably) armies of someone else's have taken up the challenge of creating a decent debugger. (See *Freeware from the East*, EXE, February 1999.)

However, the weakness of the IDE and debugger is not really relevant. They're crude, but they will get you started, and they're easily replaceable. Far more important is the quality of the compiler and

libraries – the bits that have a direct impact on the programs that you write – and those are pretty good. Basic classes handle docking windows, toolbar management, and 'cool-bars', and different classes will work together to behave just the way you'd expect. For example, you can create a set of tool-buttons and then make them behave like radio buttons just by giving them identical group numbers. There are special provisions for handling internationalisation. And the dreadful, ticked OK buttons are nowhere to be seen.

Overall, Delphi is fast and effective. It has a comprehensive and comprehensible class library, and after only a small amount of familiarity will become second nature. When augmented by decent manuals (or guidebooks) and when the IDE is replaced with something a bit more intelligent, this is an excellent system to learn Windows programming, to prototype applications, and even to make reliable production code for small, self-contained applications.

### Real world programming

The world, though, has moved on since the days of self-contained programs, and a modern application is a much more sophisticated beast. Few applications are self-contained – they have to interact with shells, with the Internet, with heterogeneous and changing networks, and through COM or Corba with other applications. They may front-end for databases. They may even be web servers or the databases themselves. Delphi claims to offer excellent support for such advanced features. How does it measure up?

In the *Developer's Guide*, eight chapters are devoted to COM programming, and only one to Corba. In spite of that, Borland is giving a number of hints that it favours Corba. For one thing, the Corba chapter tells you how to make a Corba client, but nowhere in the COM chapters is any similar guidance given. Another hint is where the opening page giving overviews of COM programming advises you to get an MSDN subscription. And all over the website there are little logos proclaiming 'We support Corba'.

I decided to have a go at making some COM objects. I read the *Developer's Guide* on the subject, and it all made perfect sense. I fired up the wizards, and they worked simply and effectively. Then I got stuck. I had no idea how to program the control, or how to use it. There was nothing in the books. There was nothing in the help files that was not in the books. I checked out the website, and there was nothing – not a bean! I found some sample code for COM objects (some of which crashed the IDE on loading, and some of which didn't). One was a shell extension. I understood all of it, but I couldn't persuade any of the wizards to produce skeleton code anything like the sample. Closer inspection showed that the interface to the shell extension COM object was inside another of those undocumented units, in a Pascal interface. At one point, where a unit initialiser was assigned to another unit's initialiser, the utterly unhelpful comment 'Avoid compiler warning' was given. The code was not wizard code at all, but had been carefully hand-crafted by







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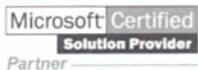
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an expert. In other words, Delphi will go there, but as you approach you'll have to get out and push. That's not excellent support.

It's not really surprising either. Managing the interfaces between COM objects is a totally different problem space to coding

event handlers, and it's not reasonable to expect a single language to make a seamless transition between the two. I would have expected either more active support from the IDE, or else some other, higher-level language to be used. But Borland clearly is not

## Delphi 5 – an old lag's view

The Bonzo Dog Band's last ever LP was called *Let's make up and be friendly*, and if Borland gave its compilers names instead of version numbers, this wouldn't be such a bad choice for version 5 of Delphi. For version 4 was a stinker, issued at the height of the 'Inprise' renaming fiasco when Borland appeared to lose interest in its core customers, and contained a choice set of bugs. Many Delphi users chose to take a pass on the upgrade to version 4 and hang in with version 3. Including me.

So version 5 is Borland's chance at reconciliation, and Borland knows it. The main upgrade selling point is better QA; and if it doesn't say so explicitly in the feature list that Borland keeps mailshotting to you, you'll find it in between the lines of all the pre-release statements on the website: 'We'll release Delphi 5 when it's ready'.

It's not possible reliably to assess quality when you're on your own with limited time. But from my playing around with D5 so far, and from hanging around a few online conferences, I'd say Borland has delivered in this respect. It 'feels' solid. So far so good.

### ADO Support

The second most important feature included in Delphi is ADO support. Mark Smith, in an online survey for this magazine (*Delphi*, EXE, March 1999), discovered that the most popular client/server database back end among Delphi-heads was Microsoft SQL Server. Users of Delphi 4 had the choice of talking to SQL Server 7 with ODBC – fast but rough at the edges – or via the SQL Links extension to the BDE that came with the Client Server edition of Delphi. But the latter, as well as being hugely expensive and slow, depended upon an API that had been declared obsolete by Microsoft. Microsoft wants you to use the ADO API.

ADO Express for Delphi costs an extra £150 or so as an add-on to Delphi Professional, but that is a long way short of the £1,200 price of an upgrade to the Enterprise edition, as the top end edition is now known. It is also a significant strategic move. ADO Express's release must surely mark the beginning of the end for the increasingly cruffy and clumsy BDE, for which three cheers. Existing data-aware controls work with ADO straight off; to make this happen Borland had to do a major rewrite of the *TDataSet* portion of the VCL *again*, but the famous Wolls of Infopower think they have made a better job of it this time, so that's okay. ADO Express comprises seven toolbar components: *TADOConnection* (approximately equivalent to *TDatabase*), *TADOCommand* and *TADODataSet* (each wrapping underlying ADO objects), *TADOTable*, *TADOQuery*, and *TADOStoredProc* (which are equivalent to the BDE standards), and *TRDSConnection* (wraps an RDS *DataSpace* object).

If you were paying attention (and I wasn't, until it was pointed out to me), you will have spotted some omissions there. Where's *TADOBatchMove*? *TADOUpdateSQL*? Okay, so in real life nobody uses the batch move stuff, but surely *TUpdateSQL* is just the thing for stuffing a heavily normalised, multi-tabled dataset into a grid with a few clever joins, then updating as needed with suitable stored procedures? I've studied the manual and I can't see how you do this with ADO. Apparently the queries are more 'update friendly', and don't become read-only at the first hint of a join, so there is less need – but it's one to watch out for.

I wondered about the speed of the ADO, so I set up the following test. I wrote a small program that inserted 10,000 records into a table, and produced various versions using ADO and other Delphi-based methods of

database access. I was obliged to use Delphi 3 for the SQL Links test, as I don't have a copy of Delphi 5 Enterprise. I tried the test against SQL Server, Access, and an excellent Russian shareware library called Diamond Access. The results, which I show below in Table 1, were unexpected. Sure enough the BDE/dbLib combination was dog slow, but ADO Express did not really shine, compared either with ODBC or the third party library Diamond. Some tuning needed by somebody there, but whether it is in the Borland code or the OLE DB drivers, or because I have missed some obscure ADO-favourable setting when writing the test, I couldn't say.

### Other bits

I have badgered Borland long and hard about the standard of Delphi help, which declined in quality continuously from version 1 to version 4, so it is nice to be able to report, finally, that it has at last stopped getting worse. I'd go further than that: it's actually got rather better, and now stands at about version 2 quality, if you see what I mean. The pages of functions with single line descriptions have been restored; there are liberal cross-references. They still haven't fixed the 'shy' help bug when the top help window suddenly loses focus and hides itself, a bug extant since the release of version 1. Delphi guru Brian Long tells me that this is Winhelp's fault not Borland's...

Other improvements are a bit ho hum, frankly. Datamodules now boast some slightly ugly-looking diagramming capabilities. It is possible to turn off Delphi Direct, without poking the registry with your finger. Thanks. A handy setting has been added so you can conceal properties of no interest in the Object Inspector. A new IDE-supported class called a 'frame' in effect allows you to place one form within another at design time. And so on. The things I am really looking forward to – overloaded functions, action lists – are Delphi 4 features.

The truth is that this is a comparatively unambitious release of Delphi. It should restore confidence among the converted, but it does nothing to gain market share from those currently using Microsoft tools. Future versions of Delphi for Windows, if there are to be any, need to show more clear Delphic water between this product and Visual Basic. Buying out Eagle Software's splendid CodeRush add-in might be a good start (rather than copying its functionality piecemeal). I know I am not the only one who considers Delphi 5 unusable for serious projects pending the release of CodeRush 5. But for now the company is pinning its hopes (and presumably a chunk of the Microsoft windfall) on the forthcoming port of Delphi to Linux. Everybody expects great things of this, and I wish Borland the best of British with it. But am I alone in wondering if Linux will still be the *OS du jour* by the time Delphi is released for it? And, if it is, that a community of developers which is famous for its love affair with free (both senses) curly bracket language compilers will be prepared to spend money on a commercial Pascal compiler? Scary times ahead.

Will Watts

Compiler	Library	Database	Time (secs)
Delphi 5	ADO Express	Access '97	200
Delphi 5	BDE/DAO	Access '97	105
Delphi 3	Diamond Access & DAO	Access '97	131
Delphi 5	ADO Express	MS SQL 7	40
Delphi 5	BDE/ODBC	MS SQL 7	31
Delphi 3	BDE/dbLib	MS SQL 7	56

Table 1 – Timings for inserts using a parameterised query



excited by developing the IDE, and it has become somewhat precious about its idiosyncratic dialect of Pascal and is avoiding a repetition of its previous mistakes by refusing to fiddle with the language. That refusal is a shame, because there are areas where fiddling would certainly be worthwhile.

Take threads, for example. The ugly and excessively complex thread mechanism that Windows provides was necessitated by assembling a system that would work, and could be used, from vanilla C. Delphi encapsulates this mechanism, in all its hideous glory, in a class called `TThread`. That's the chicken's solution; since Borland has control of the language, they could have adopted the same approach as several concurrent flavours of Pascal have done in the past, and introduced a single new keyword, `CoBegin`. It could have turned the complexities of the thread mechanism into a simple and elegant syntactical structure, and gained the benefit of some measure of platform independence to boot.

### Database programming

It is quite clear that Borland takes databases very seriously. Over half the *Developer's Guide* is given over to considerations of database programming, and the advice is clear and comprehensible. It is here that one can see the scale of development that the Delphi designers are aiming towards. The manual describes how to write small, flat databases, and then how to develop them, incrementally, into huge, multi-tier, multi-access, multi everything monsters. The web publishing facilities are based quite firmly in the large-scale database stuff. Borland clearly believes that Delphi will scale smoothly, and still be reliable at the extremes.

Included in the pack is a complete database engine, called Interbase. Using the supplied interfaces, a Delphi program can couple tightly with an Interbase database and (presumably) gain some efficiency advantages (though, with characteristic modesty, the manual doesn't actually tell you this). If you'd prefer a more conventional, third-party engine, you can have these too, interfacing to them either with BDE (the Borland Database Engine) or ADO (ActiveX Database Objects). A clever system of components and classes does all the hard work, and all you have to do is write the user interface and describe the coupling.

The Professional edition includes enough tools to be able to build a basic, self-contained database. If you want to create a client/server operation, you'll probably need the much more expensive Enterprise edition, and if you want to undertake anything larger, such as web publishing or data brokering, you'll definitely need the Enterprise edition. All the distribution code is based on another Borland product called Midas. Since Midas is licensed separately, you'll have to pay again to deploy your application, and since Midas is licensed per seat, you may end up paying quite heavily.

### The quality of code is not strained

Delphi has a reputation for crashing, so all the time I was working I was trying to break it. Normally I'm quite good at breaking software, and though I managed to confuse it on several occasions by ludicrous fumbling, at no point did it give up and crash. (It was only a couple of sample files, which were messing with the system, which killed it.) Furthermore, at no point ever did the system delete any unrecoverable files, hide away any specially-named resources, or exhibit any translation faults (and I'm a bit sensitive about that, because I just wasted a day discovering that `MSVC++` can't even get `#extern` right).

This is a great tool for learning about Windows, for learning about programming, and for throwing together simple applica-

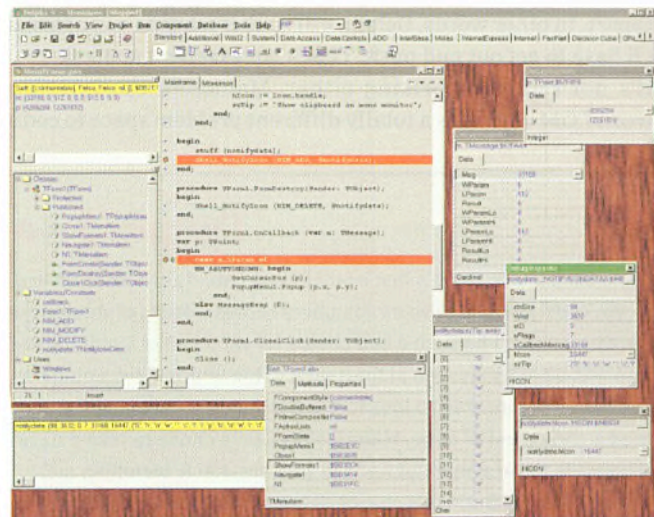


Figure 2 – A debug session.

tions. It's also very good for carefully building high-reliability applications, and it seems to work well even on large-scale, complex programming tasks – the scale of task that would benefit from source code management. It's true, the IDE looks ugly, and the debugger is even worse. But, that's because all the development effort went into making a reliable compiler, using good class libraries and exceptions that really work, instead of making the IDE look pretty at the expense of the compiler and output code. It's the quality of the code that leaves my shop that counts, and I'm satisfied that Delphi code is pretty good.


The biggest complaint I've got with Delphi is the documentation. What there is, is good. What's missing is really essential, and to fill the gaps you'd need an MSDN subscription, you'd need to know C++ anyway, and you'd probably need to take advantage of the support offered by the networks of experienced Delphi programmers. (For a review of some of the shareware and freeware that is available to supplement Delphi see *Spirit of Delphi*, EXE, January 1998. Also check out the yearly award of the same name that Borland launched afterwards). That's a real shame, because I reckon that a company like Inprise could easily afford to have some decent books written, even if they were sold as optional extras through bookshops, in the way Microsoft does it.

I'd also complain at the prices. £69 is pretty good for an entry-level system, and at that price I wouldn't mind adding bits on here and there. £499 is a bit expensive for the Professional system and (though the extra software is a nice touch) I think that the manuals should be better. However, £1,700 for the Enterprise edition is outrageous, and should represent a Rolls Royce system with everything included, instead of an old Escort in need of a new coat of paint.

Now that Inprise is commercially stable, and given the obvious quality of the compiler, I'd be happy committing a big development to Delphi. I wouldn't do it tomorrow, though – in the absence of documentation, long experience in the language is essential, and I'm going to make lots of little programs first (and expect all my colleagues to do the same). Inprise take note: more people would be doing the same with their free samples if only they weren't limited to 30-day evaluations.

*As well as creating Mayhem for EXE, Jules May is a programmer, writer, and hardware designer. You can contact him on 01707 662698, or at [mayhem@jules.cix.co.uk](mailto:mayhem@jules.cix.co.uk).*

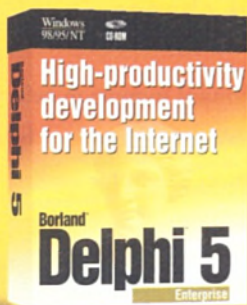




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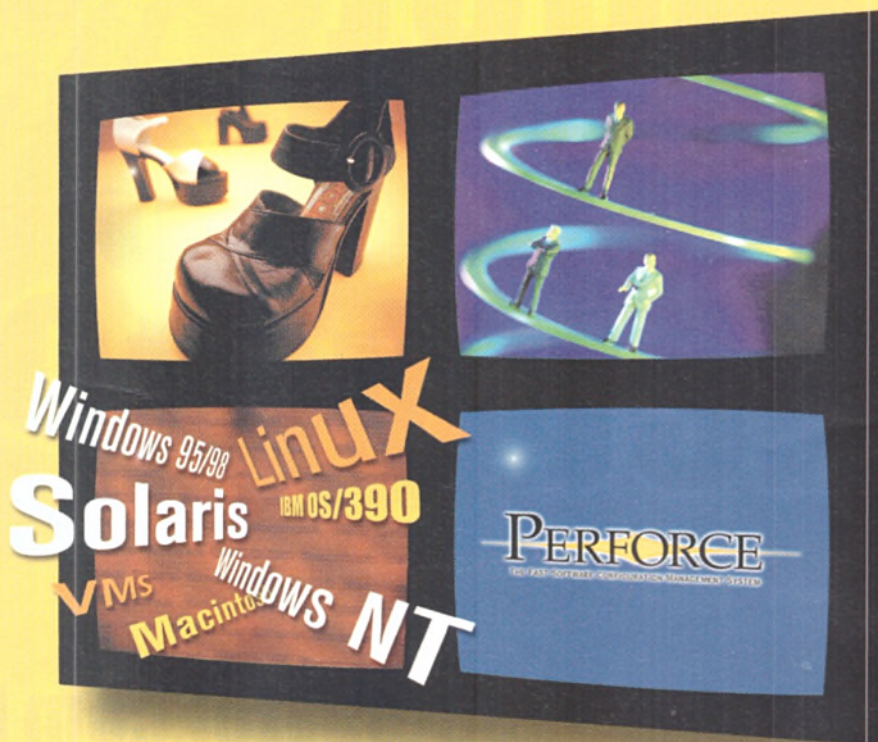
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# Four days in Oxford



**Well, three and a half days really. Neil Hewitt and Alun Williams wrap up JaCC 99 into a little neat package, and present it to you on a platter.**

**W**here were you, then? is the question I would ask all those who didn't bother to attend this year's ACCU/EXE conference, staged at the historic Oxford Union over four days from September 15 to 18. Because you missed a whole lot of stuff. Like Jim Coplien, Barbara Moo, and Andy Koenig. Not to mention Bertrand Meyer, Nigel Warren, and of course Francis Glassborow. Shame on you for skipping it. Over two hundred of your fellow developers wisely decided against missing it, however, and packed out the narrow hallways and staircases of the ancient buildings, queuing for lunch or inter-session coffee with a patience that only the dedicated C++ programmer can manage.

Having got up ridiculously early in order to catch a train at the ungodly hour of 7:15 AM, I had trudged my way around Paddington Station, lugging a big green bag full of geek kit – Handheld PC, Palm-top PC, MiniDisc recorder, chargers for same, spare batteries, oh and some clothes, too – like a Para on Goose Green (but considerably less fit). Pausing only to muse on the idiocy of a rail system where you can't buy a return ticket before 9:17 – I'm not joking – I had boarded my train, and promptly fallen asleep. On arrival at Oxford it was raining heavily. I didn't have an umbrella. Plus there didn't appear to be any taxis at all. Not an auspicious start. But better things were ahead.

## Day One – Platform Day

Luckily for me, Day One kicked off with a nice, gentle keynote from the nice, gentle Sean Baker of Iona Technologies, nicely (and indeed gently) entitled *Corba State of the Union*. I have to admit that Corba, and object technology in general, is almost always guaranteed to send me to sleep, but – setting a trend that would continue throughout the conference – Sean's talk was simply too interesting to sleep through. The theme of the keynote was that a cross-platform architecture for distributed objects is the only way to make sense of the heterogenous nightmare that exists inside most companies' IT divisions. Since COM has spectacularly failed to appear on any platform other than Windows, Corba is that architecture. Sean also drew some interesting parallels between the Enterprise Java Beans specification and the current Corba spec, suggesting that EJB is essentially a native Java implementation of the Corba model.

Clearly unsure as to whether to assume the audience knew the Corba spec intimately, and plunge into excruciating technical detail, or to explain some of the grounding concepts, Sean took the middle road and assumed that everyone knew what Corba actually was, but stopped to describe ORBs, IDL, and IIOP. He also broke down in detail the entire list of standard Corba services, checking off those that were deprecated and due for the chop and highlighting the latest additions.



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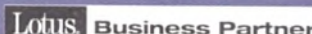
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Almost incredibly, Sean managed to last the entire hour-and-a-half without needlessly plugging Iona's technology, thus putting the lie to that rumour about the Blarney Stone.

After this uplifting start it was off to the bar for coffee, where I badgered Microsoft's Kieran Mockford mercilessly about the company's COOL project, which depending on who you talk to is either a whole new language and IDE to replace Visual J++, or an add-on kit for Visual C++ based on the Technology Preview for COM+ stuff that was shown at the Visual C++ Developers Conference earlier this year (see *Attributes in VC++*, EXE, March 1999). Kieran was admirably non-committal and told me nothing, which wasn't why I didn't go to his session later in the day. Honest. Actually, for a Microsoftie in a sea of C++ developers, many of whom I heard mutter dark things about the Beast of Redmond and ISO compliance, Kieran showed remarkable reserves of courage.

The aim for Platform Day was to provide something for everyone, and so attendees had the choice between tracks for Windows, Linux, PDAs, or yet more Corba. I wasn't ready to risk the Corba track for fear that Sean Baker's inability to put me to sleep had been a one-off, and besides I was interested to see what Iain Barclay's session on developing for the Palm was like; his article on just that subject has consistently ranked among the most viewed pages at EXE OnLine, despite being over eighteen months old (see *PalmPilot software development*, EXE, February 1998).

Iain's session, as it turned out, was quite sparsely attended – it was more of a round-table, in fact – but those who were there were unquestionably Palm enthusiasts and a very receptive audience. Iain began by outlining the Palm platform and its history, through US Robotics and 3COM, and touched on the new Visor, an iMac-like translucent implementation of the Palm from Handspring, which was good going as it had only been announced that day! He also had a range of Palm devices to demo, which impressed the geeks among us no end.

Next he covered the state of the tools market. While there's a shortage of decent commercial C++ compilers for Palm – Metrowerks' CodeWarrior is the only one – there is a wide variety of freeware and Open Source tools available including PalmForth (which we featured recently in May's EXE) and various interpreters and scripting languages, as well as a version of gcc.

The programming model for Palm turns out to be remarkably similar to the early event-driven graphical OSes like GEM and Windows 2.0 – essentially a question of waiting for and handling messages. Iain favours the 'old-fashioned' style of event-driven programming, meaning big C-style `switch...case` statements and message handling functions rather than C++ classes and templates. Iain finished about 30 minutes early with a quick list of do's and don'ts when programming on minimal memory systems like the Palm, and those present took advantage of the extra time to engage in an impromptu debate about the technical merits of CodeWarrior, gcc, and Windows CE, which for me sums up the spirit of the conference nicely; everyone was interested in what everyone else had to say, and everyone cared about software. Which is the way it should be.

I skipped the minimalist packed lunch in the bar to wander around Oxford for a while, taking in a few sights. It's quite a bustling little place, even with most of the students on vacation, so much so that many of the shops have trouble squeezing all their customers into their tiny premises, and queues were often visible outside the likes of McDonalds and KFC, where I must admit I ended up having lunch (oops... there goes my street cred). As a journalist, I go to a lot of conferences, most of them in London, and actually being able to breathe the air without coughing

was a major plus of JaCC. But, with all the queues, no sooner had I finished my Zinger burger than it was time to get back to the Union for the low-down on Borland's latest efforts on the Linux platform.

Here at EXE we know Inprise's Jeremy McGee very well. We had rustled him up, along with Borland product manager and author of *Borland C++Builder for dummies*, Jason Vokes, to talk about the company's previously secret project to port its C++ and Pascal compilers to Linux. At the time, little of what Jeremy had to say had actually been announced officially, giving JaCC delegates a few days head start on everyone else.

Had anyone been expecting Delphi for Linux there and then, they would have been disappointed. But Jeremy had a port of bcc, the Borland C++ command line compiler, up and running. As he explained, the intention is for bcc to be a drop-in replacement for gcc. Why, someone asked, would anyone want to replace the Open Source GNU compiler with a proprietary system from a company not known for its support of anything not Windows? Jeremy demonstrated one reason by compiling XGalaga, an X-Windows version of the old arcade game, under both gcc and bcc, there and then. As if by magic, bcc was twice as quick, even without Borland's much-fêted SmartLinker (which has yet to be ported to Linux). Then he dropped another bombshell by revealing that Inprise might Open Source the bcc compiler, although he wouldn't commit to a full GPL release. Just for extra effect he casually mentioned that the company would be doing the same with the command line Delphi compiler.

What of a proper Delphi for Linux, though? Linux developers are just going to have to wait for that, it seems. Borland plans to release a full graphical IDE for Delphi late next year, but as Jeremy admitted the challenges are formidable, not least because of the Gnome/KDE schism; a KDE version of Delphi wouldn't sit well with the Free Software crowd. To this end, Borland commissioned a survey of Linux developers and were surprised by the apparently contradictory results; while a majority of those surveyed use KDE, and would prefer the Delphi product to use it, a similar majority would rather Delphi use the GTK widget set, which is fully GPLed, over the not-quite-open-sourced qt set used by KDE. GUI problems aside, however, Jeremy did reveal that Inprise is committed to producing full versions of both the Delphi and C++Builder products for Linux, which seemed to go down well with the audience.

Much closer to reality, and the next product to be previewed, was JBuilder for Linux – well, actually Solaris – codenamed 'Primetime'. This has been in the pipeline for some time, and is apparently due to ship this year on the Sun platform. Written, like the latest Windows version, entirely in Java, the Solaris version should run on Linux, and indeed the Primetime beta build did run on Jeremy's Linux box, but rather more flakily than it should have. Inprise intends to tweak the Solaris release for Linux, giving it a Gnome/KDE look and feel, and releasing it shortly after the Solaris version. To someone whose Linux experience has been largely confined to the command line, I found it odd to see a working graphical IDE actually running on the platform, with all the statement-completion widgets we've become used to on Windows.

The Borland-ites ran into trouble when they attempted to demo VisiBroker for Linux to show one Linux box finding and using a Corba object on another box. It didn't work. Despite much fiddling by both Jeremy and Jason, and some helpful comments from qualified members of the audience, nothing could be done. Jason rather sheepishly revealed that his notebook was actually running Windows NT, and indeed when Jeremy tried to use VisiBroker to invoke an object on his own Linux box it did work as intended. It was probably a good thing that Sean Baker wasn't in *that* session.





If the message was supposed to be that Inprise takes Linux seriously, then it would seem to have been well and truly received. All present agreed that it had been a worthwhile session; in fact, half of them stayed behind afterward to pester Jeremy and Jason with more questions. And with that, Day One came to a close.

## Day Two

Day Two was a Thursday, normally a day I despise (you know, it's not quite the weekend, but it feels like it ought to be). I'd spent the night reliving my nightmares of University life in a 'study bedroom' at an annex of Peter College. Unlike the delegates, who were being housed at Brasenose College, I and the other organisers had en suite rooms in St George's Court, which would have been the sort of place I would have wished to live when I actually was a student. Having spent some time in the real world since, I'm not so sure. The en suite facilities, as it turned out, were some kind of space-age sink-toilet-and-shower module squeezed into an incredibly small space in the corner of the room. If anyone would like to sponsor my stay in a five-star hotel next year, I'd be very grateful, by the way.

Back at the Union, things were buzzing. Today would see the first of the star turns, Barbara Moo, and maverick Eiffel proponent Bertrand Meyer, speaking rather unfortunately at the same time. I say unfortunately, because I would have liked to attend both sessions, but as an organiser I can safely say that there was no way to ensure that everybody could attend all the sessions they wanted short of actually running the conference over two weeks. Hard decisions were afoot, and not just for me: sometime-EXE-contributor and prominent luminary Kevlin Henney admitted that he would have attended Bertrand Meyer's sessions if only he hadn't been speaking at the same time too.

The keynote was given by patterns expert and all-round C++ guru Jim Coplien, who suggested that the reason software never seems to work reliably is because of fundamental problems in the way we think about software design. Using the classic book about real-world design, John Thackara's *Design after Modernism* (ISBN 0-500-23483-3), as a template, he showed how the situation in software over the last forty years or so closely parallels the different movements in design during the 20th Century, and suggested that the problems really arose when we stopped thinking about software development as a craft and started thinking about it as an industrial process, rather as furniture stopped being handmade and began to be turned out by machine during the heyday of the Industrial Revolution. Why do we make jokes about bedside tables from MFI? Because they're not very good. So it is with software that you try to assemble from badly-designed pieces. Jim espoused the case for multi-paradigm design, berating those who believe that there is only One Solution – be it OO, UML, CASE, or whatever.

This was a refreshing change from the dreary, homogenous, over-ready keynotes I've got used to hearing at conferences. Coplien is a gifted speaker, playing the audience well – although I suspect he's used to getting more response from his US audiences than from half-awake Brits – and injecting a much-needed note of humour into the proceedings.

Next up, it was time for some education on the wonders of UML, courtesy of occasional EXE contributor Mark Collins-Cope. Let me say upfront that I'm not a great believer in the Programming Fad of the Month approach to development, and I had yet to be convinced of the real value of modelling over a more traditional code-led approach. Mark's talk was by way of an introduction to the subject; he first explained a little about the history of UML, the different notations from which it evolved, and the pivotal role of Rational in bringing

together Booch, Jacobsen, and Rumbaugh. Then he explained five of the most common notations, including use cases, state diagrams, and object diagrams. Those who believe in UML, it seems, are utterly convinced of the superiority of the method but to me it all smacks just a little too much of CASE. Perhaps I'm just too cynical.

Lunch followed, and once again I skipped the delights of the packed lunch – spotting a pattern here? – for the alternative delights of Burger King. Since I intended to spend the afternoon in Bertrand Meyer's sessions, I figured I'd need the protein.

For most programmers, Meyer needs no introduction. Famous both for his dislike of C++ and fierce advocacy of Eiffel – his own creation – there's no question that having him speak at a conference aimed mainly at C and C++ developers was going to be controversial. We prepared for a bloodbath, but in the end it wasn't necessary. The talk, entitled *The Unity of Software and the Revenge of the Programmers*, was an introduction to Meyer's technique of *design-by-contract*, which is fundamental to the Eiffel language – although, as Meyer was at pains to point out, it could be implemented in other languages as well – but he did stop along the way to point out some of the failings he perceives in C++ – such as the fact that it's even possible to have a public data member in a C++ class.

Design-by-contract affects both the analysis and coding phases of the programming process. Under Eiffel, these two phases come together, as the design notation is actually Eiffel syntax. The implementor is supplied with a *short form* of a class or object definition, which defines the methods and properties, and the *preconditions* and *postconditions* that must be satisfied for the code to work. Meyer likens this to the human process of making and signing a contract – the document specifies obligations and benefits for each party, with each obligation for one generally equating to a benefit for the other. Giving multiple examples, most of which seemed to have something to do with aircraft or chemical tanks, Meyer attempted to show that by imposing sufficient pre- and postconditions on an operation, it is possible to eliminate the problems of unexpected behaviour under unexpected input, which is the cause of most operational bugs.

Despite the heavy competition from both Kevlin Henney and Barbara Moo speaking at the same time, these sessions were well-attended, and from conversations I overheard later many additional people would have turned up had the competition been less persuasive. The curious logic of inviting a prominent C++-sceptic to a conference heavily populated with C++ devotees seems to have been proven. In fact, we're already thinking of inviting Niklaus Wirth next year. No, really.

## Day Three

One night and another claustrophobic shower later, I was up at the crack of dawn – not something I'm used to, you understand – to check out of my room and still get to the Union in time for the Friday morning keynote. For once, it wasn't raining, indeed the Sun was peeking over the horizon in a way that implied I might not need my non-existent umbrella that day. When I arrived at the Union, mercifully dry, I found several die-hards who'd got there even before me, including the indefatigable Francis Glassborow. We had a long, coffee-fuelled conversation about the relative merits of Oxford versus London – clean air against 24-hour public transport, for example. Francis explained that while West Oxford might not be a swarming metropolis, East Oxford is a far livelier place altogether. So now we know.

Another day, another keynote. Andy Koenig was the second member of the AT&T posse at JaCC – along with Barbara Moo – and the last to





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speak. A giant picture of his cat entertained the audience members as they filed in, which was probably a good indicator of the talk to come. *Programming Traps and Pitfalls*, which echoes the title of his well-known book *C Traps and Pitfalls* (ISBN 0201179288), made the radical suggestion that many of the mistakes made in software are a result of failed expectations. That is to say, a programmer expects a function or command to behave in a certain way, when in fact it may not do so. Andy illustrated this point with reference to the C language – most people don't even stop to think about it, but a function as elemental as `printf` is not actually part of the language, it's part of the support libraries and as such may not be present (or functionally identical) in all compilers. In part, this is an argument for standardisation – which you would expect coming from a leading light of the ISO C++ standards committee. But it's also an argument for not taking things for granted; implementation is at least as important as design, and a perfect design can easily go awry because of an implementation defect.

One session I had been intrigued about was Jez Sherlock's *What it takes to be a Games Programmer*, so I decided to go along. Jez, who has worked in the games industry for many years and now works for French software house Infogrames, was tackling subjects that used to be close to my heart in the 1980s when I was writing system software for the ZX Spectrum.

Unlike most of the other speakers at the conference, who came up through a traditional computer science background, Jez is a self-taught programmer, a child of the microcomputer revolution. Rather than actu-

ally describing the programming techniques involved in writing modern games in C++, the talk focused on the state of the games industry, the skills required to be in it, and the correct approach to take to get a job as a games programmer. Some of those in the session seemed – if you'll forgive the ageism – a little old to be looking to get into a new industry, but a few young guns were furiously taking notes and may yet go on to be the next Bitmap Brothers.

The choice of sessions for the afternoon was particularly enticing; David Harvey and Peter Marks were giving a two-part session *Cultures of Programming* for which the setup looked interesting. It was to be a group-based session, with exercises and the whole nine yards, quite a departure from the rest of the sessions. There was also the chance to experience more of the Andy Koenig Effect with two sessions on *Recent Ideas in Generic Programming*.

One session I really wanted to attend with my web developer hat on was Mike Banahan's presentation on *Building Dynamic Websites using Open Source Software*; Mike is former chairman of the European C Users Group and an EXE contributor of old. Meanwhile, I could have caught the end of the Java track with Nigel Warren – a veteran of the JaCC Spring Seminars – speaking on *Managing Connected and Complex Objects via Resource Pools*. Nigel's session at the Spring event, where everyone had one eye on Bjarne Stroustrup at the back to see what he was going to take issue with (actually, Bjarne was reading EXE at the same time in a classic demonstration of multitasking), was one of the highlights of the event.



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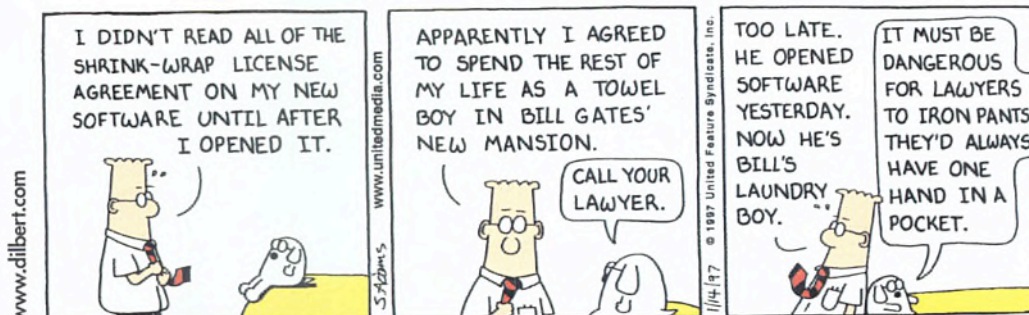
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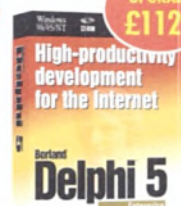


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Alas, just after lunchtime I was summoned back to London early, and so I had to miss out on these sessions – which, attendees report, were excellent – as well as a chance to hear Francis Glassborow on *Programming for Non-Experts*, in order to hop on the next train to Paddington. My experience of JaCC ended as it had begun, in the rain – sans umbrella

– at Oxford railway station, but with plenty to look back on. Certainly I learned a lot, and anecdotal evidence suggests that the other delegates did, too. Those who missed it should know better next time. I look forward to seeing them there.

Neil Hewitt

## A day for enthusiasts

The final day of JaCC, taking place on the Saturday, was dubbed the 'Enthusiast's Day'.

It was Kevlin Henney, Principal Technologist at QA Training, who gave the keynote *Design – Concepts and Practices*, and he proved as entertaining and informative as ever. Considering how design relates to all parts of the development process and involves different levels of detail, he emphasised how organisational structure determines the nature of software. He also raised the concept of layering ('think lasagne, rather than spaghetti') as an approach to the design of a project, whether that layering be by the development skills of those involved, the rate of change likely for the code, or any other determinable factor. The concept of the 'Goldilock curve' recurred – the measurement of 'how much' is 'just right'. Modularity? Cohesiveness? Yes, enough to be appropriate, but no more. Whatever the intrinsic value of a concept or technique, its overuse will decrease the effectiveness of a system (be it overuse of a particular software design pattern or yet another roundabout on the Swindon road system, a favourite town of Mr Henney, it seems).

Touching on the issues raised in his recent Soapflake for EXE (*For the sake of simplicity*, EXE July 1999), he dealt with the notions of inherent complexity and actual complexity. Any software system involves a degree of complexity inherent to the problem it is trying to solve. The goal of the design should be to minimise any increase in the actual complexity, in size and structure, of the delivered system. It is very easy to add complexity. It's not so easy to model the solution accurately and elegantly.

### Distributed gotchas

Next up was Lois Goldthwaite, with *The gotchas of distributed computing*, who gave an enthusiastic talk about the pitfalls that lie in wait for distributed systems. Working as a Technologist for ObjectSpace, she gave an overview of how distributed computing had evolved and the sort of problems it entailed that made it an area of difficulty. Pitfalls covered included: 'adding distribution later, after the application is working', 'distributed computing being just a matter of adding interfaces', 'choosing technologies prematurely or simply by default', and 'developing the Startup use case last'.

The overriding principle she stressed was the importance of defining software architecture. This can not be avoided or somehow worked around at a later date. (Her definition of the verb 'to architect' was: 'to cause an orderly unity to emerge from a chaotic multiplicity'.) The lack of an appropriate architecture being a major source of maintenance costs and a major cause of failure on software projects.

It was unfortunate that this interesting talk began to overrun, and Goldthwaite had to defer to the overriding priority of lunch.

### Repetitive failure

Of all talks to be affected by glitches, it was almost inevitable that *Paradigm shift or measurement-based feedback?* – the one on reliability given by Les Hatton – became a victim. With all the drama of Windows Explorer beamed full over head (we watched as PowerPoint files slowly, but heroically, made their way from A: to C:) he remarked, 'Only in the software industry would the copying of files from a floppy warrant a round of applause!'

Drawing on his experience with the University of Kent and Oakwood Computing, he recounted horrendous tales of software failure. These included the experience of the high-tech USS Yorktown, which was left dead in the water off the coast of Virginia in September 1997, because of software failure. The ship had to be rebooted (the blue sea of death, perhaps).

Particularly interesting was a story about Ariane 5. The piece of code that actually caused the disastrous failure of the rocket involved a problem with casting – a 64-bit floating point number was forced into a 16-bit integer. (The system had twin-channel redundancy, but the same software was running in each channel...) Apparently, the programmer had anticipated the possibility of an overflow but had decided to reject it. He had recorded his observation in the form of a comment in the code!

The key point Les Hatton made was about repetitive failure. Uniquely, among other branches of engineering, the software industry does not seriously use measurement-based feedback to increase reliability of future work. And those who do not learn from their mistakes are doomed to repeat them. The software industry is more concerned with the latest, newest paradigm. For whatever reasons – whether software development is an immature industry or one too controlled by commercial pressures – naïve optimism seems to triumph over the basic principles of control process feedback. We should expect failures and plan to counter them. For shame, he chided the industry in general, we can do better than this.

### The standard of goodness

The closing debate had the motion that 'Good software development is only possible in a standardised language'. Andy Koenig and Chris Hills proposed the motion and Kevlin Henney and Francis Glassborow opposed it.

Andy Koenig asserted that standardisation underpinned all communication in a community, be it spread across time or geography. When one developer looked at another's piece of code, how else could any understanding be shared? Kevlin Henney's main defence seemed to lie in (English) language-lawyer semantic exactitude: whatever the merits of the intent behind the proposal it still had to be rejected. How could we possibly define the quality of 'goodness', let alone 'standardisation'? And I seem to remember him quibbling (Don't get personal – Ed.) over the use of the singular indefinite article to introduce the concept of language – therefore, mixed language projects could not be a good thing.

Following questions of communication and definition, Chris Hills and Francis Glassborow promptly began a skirmish as to where, exactly, standard English was defined.

Points raised from the floor in the short debate included the observation that without standardisation we would be reduced to constantly dealing with boxes of hardware with banks of DIL switches. Another questioned how many people used MSVC++ 6. As this did not conform to the current C++ standard, no quality development could have taken place. It was Barbara Moo who hit the straight reply that the *next* release of VC++ should be the one that conforms to that standard...

You may guess that I voted for the proposal, but I found myself in a small minority. Triumphant over cogent argument and sound reasoning, the force of personality of Henney and Glassborow carried the day.

Alun Williams





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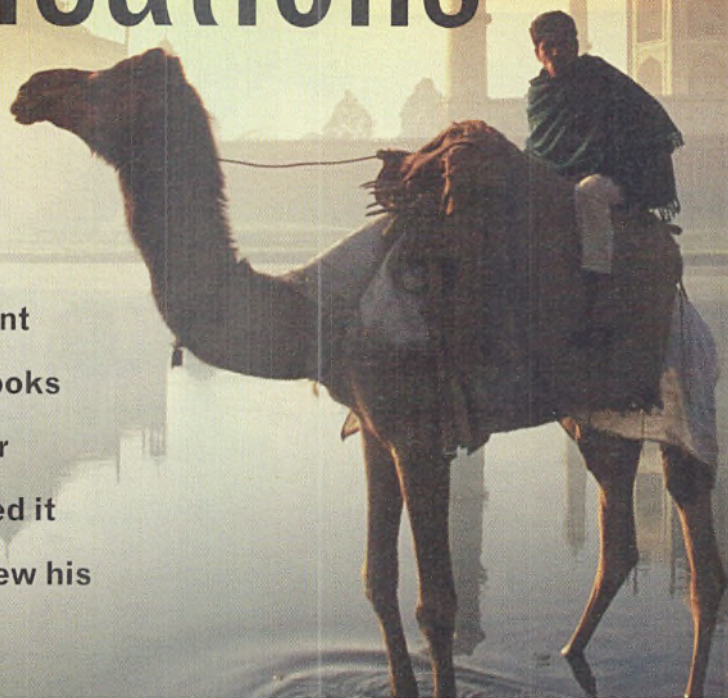
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# A plethora of Perl publications

Following a recent outpouring of books about Perl, Peter Collinson decided it was time to review his bookshelf.



O'Reilly and Associates is the major publishing house for books on Perl. It's more than fair to say that over the last few years O'Reilly has given considerable support to Perl. As a result, the language is supplied with much better documentation than it would otherwise have had. The documentation has contributed mightily to the success of Perl. Without the resources that O'Reilly has poured in at various crucial moments, it would not be in such widespread use today.

In the last six or so months, there's been a second outpouring of Perl books (and CDs) from O'Reilly and I thought that some examination of my Perl bookshelf would be interesting. I'll miss out the Perl Resource Kit, because I covered it in these pages last year (*Perl of a resource kit?* EXE, May 1998). The other books that I own are described below in acquisition order. The intention is to arm you with some knowledge of what the books contain should you be wandering into your local bookshop intent on increasing your Perl skills.

## Learning Perl

Let's start at the beginning. *Learning Perl* by Randal L. Schwartz and Tom Christiansen reached its second edition in 1997. I believe that this version is mostly the work of Christiansen, whose erudite skills can be seen in many of the books that follow. The release of Perl 5 was the main reason for the second edition.



As its title indicates, *Learning Perl* is a pass through the features of the language and intends to get you started. Unlike many of the other publications, most of this book (perhaps 80% of the pages) is devoted to a scan through the syntax and semantics, so it's quite slow in pace. I have a feeling that, probably for good reasons, the book shies away a little too much from some of the more complicated features that you will most likely end up using.

The remaining 20% of the book contains useful 'tasters' of some of the things that you can do with Perl, introducing databases, networks, and web programming. There's a couple of very useful 'how to do' style appendices that you can steal and use in your own programs.

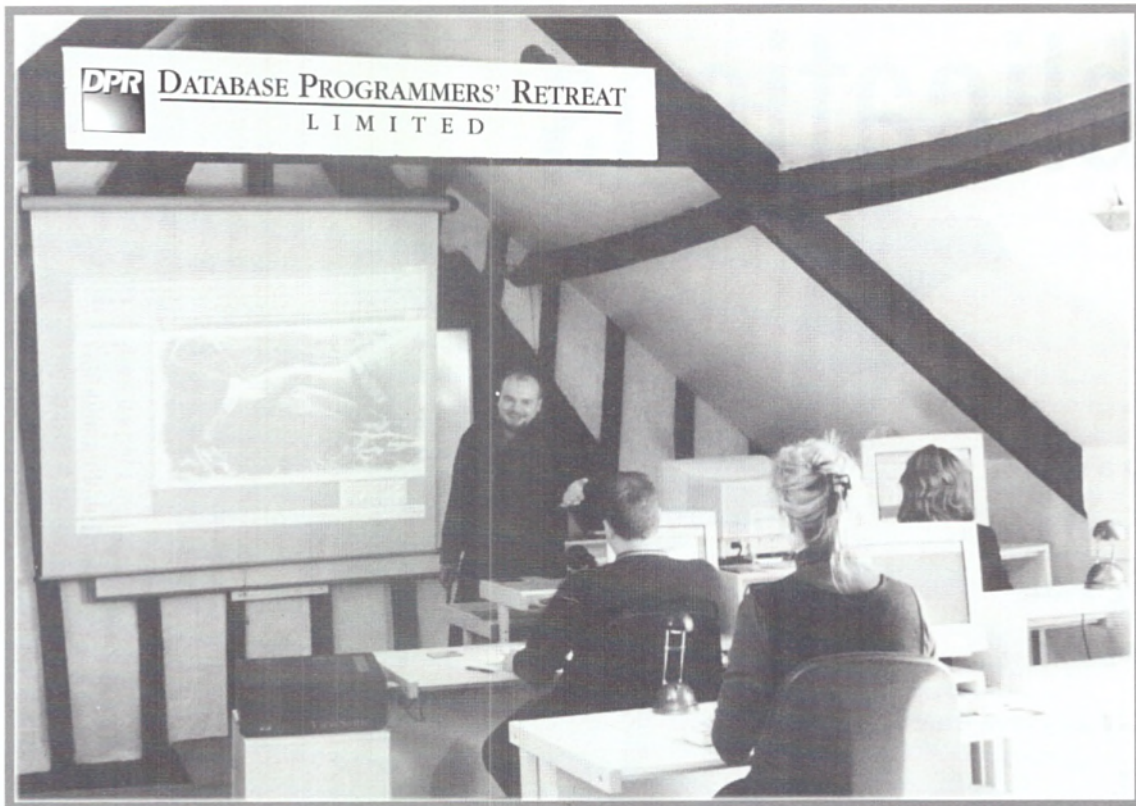
Actually, I found that the useful life of this book was limited. I speed read it and then got into the main Perl book (see next). However, I've used the text infrequently when looking for examples of how to do things. I tend to learn languages in a 'job directed' way, and frequently need to find some code that's similar to the work in hand so that I can expand my knowledge. Luckily for me, the authors understand this need and throw in a great many simple examples that you can trawl to find something similar to what you are doing. You can then write little `xx.pl` programs until you have the code that you want for the job.

I suspect that if you are coming at Perl from the Windows world, then you may find this book helpful in understanding the language used in other Perl books. I expect that you may have the same linguistic problems that I find when looking at Windows documentation. Mr Gates' company tends to document things using terms that are unique to its world. I sometimes find that something I have always referred to



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## Every language needs a basic reference book. Ritchie did it for C with the 'White book'. for C with the 'White book'.

as 'x' is called 'y'. I'll guess that people immersed in the One Microsoft Way will undoubtedly have reverse translation problems.

Buy this book if you are a novice programmer, or want to get a flavour of Perl, or you feel that you need a slower-paced introduction to the facilities. It supplies the salient points without being 'complete'.



### Programming Perl

Every language needs a basic reference book. Dennis Ritchie did it for C with the 'White book'. And Larry Wall, Tom Christiansen, and Randal L. Schwartz did it for Perl with the 'Camel book'. This book reached a second edition in 1996, again for Perl 5 reasons. As you might expect, the book contains everything you need to know about Perl (well, nearly). The book is often called the 'Camel book' for reasons that are evident when you see the cover.

asons that are evident when you see the cover.

The book weighs in at a little under 650 pages, which is about as big as a book can be and still be soft bound. The first two chapters are about 20% of the book and contain much of the introductory material on the language basics. This is followed by a chapter that contains an exhaustive alphabetic list of functions that the core release supports (another 15% of the book). The functions are documented with examples and cross-references. Some of chapters 4 and 5 are not really needed by novices; they contain some 'hard' topics like using pointers and indirection, complex data structures, and modules. I have not yet got to grips with all of this material.

Only the first part of chapter 6 is really relevant on first reading, it details the switches and options that you can use to start Perl from the command line. The chapter is followed by a sizeable chunk on the standard library routines and modules that are supplied with Perl, which comprises much of the remainder of the book. If you are a novice, don't miss 'Common Goofs for Novices' tucked away on page 528 in the *Other oddments* chapter. This whole chapter is worth reading.

I think it is hard to write a book that fulfils the needs of teaching a language and acting as a basic reference for that language. On balance, the book is better on the reference side, but does have some excellent teaching sections. One of my gripes is that I have spent a lot of time looking in the introductory section for flags to certain language statements and information about regular expressions. I know that what I need to know is there somewhere, but I cannot find it easily. It should be possible to document this reference information in a more easily accessible reference style, but as I said, the sheer size of the volume militates against that.

However, I do tend to find that the level of examples and explanation in most of the book is about right. You can usually find a relevant example or some hint on how to express the action you are trying to code. Of course, at the start you often need to rethink the way that you go about solving certain problems, to get into the Perl way of doing things, and this can take some time.

I am just beginning to find that some of the 'advanced' sections are hard to get to grips with, especially some of the information about creating data structures. I think that there is a need for more explana-

tion – creating advanced data structures in Perl is actually rather complex. The information in the book is somewhat dense, and perhaps there are not enough examples.

If you are planning to become a serious Perl programmer, you need to buy this book. Although I've griped about it above, it's necessary. My version is very well thumbed.



### Advanced Perl programming

As a C programmer, I've been used to having an underlying model of how things work to act as a way of moving forward and deducing the right thing to say at the right time. Neither of the books above manage to supply you with a really good model. Probably, the authors are too close to Perl to be able to deduce one. To a large extent, *Advanced Perl programming* by Sriram Srinivasan tries to fill this gap while

delving more deeply into the mysteries of Perl.

I've made extensive use of the first few chapters of this book to help me understand the arcane arts of handling indirection and pointers (that are really known as *references* in Perl-speak). The first chapter, *Data references and anonymous storage* supplies models for what is happening when you use some of Perl's indirection features. The next chapter, *Implementing complex data structures*, gives a set of fairly large examples of data structure implementation and use. These are both 'sit down and understand' chapters rather than 'get on the terminal and do'.

Chapter 3, *Typeglobs and symbol tables*, helps you to understand what is needed to pass references to file handles and the like. I've tended to skip chapter 4, *Subroutine references and closures*, heading for the next three or four chapters that augment the information on the two books above, often spending more space on a topic. For example, the chapters on *eval* and Perl modules are very readable and usefully add to the information you've derived from the other two books.

The remainder of the book covers quite a lot of esoterica that I've not used, to be honest. The chapter on the Perl/Tk GUI creation interface looks useful, but I've not used it in anger.

I am not sure that you need to buy this book, although I am pleased to have it. I have found that its strength is that it looks at the subjects from a different viewpoint from the way that the material is presented in the two books above.



### Perl 5 – pocket reference

On a trip to a conference in the USA, I picked up this tiny book (48 pocket sized pages) by Johan Vromans. Someone recommended the book to me at the conference when I made, in a meeting, the same statements about the Camel book that I made above. The book is a raw listing of the language features aimed at filling in the gap of 'I know it's there, but how is it expressed?'

I brought the book home, hoping that it would fill in the lookup gaps that I found in the Camel book. I've used it a little, the coffee stain along the edge is evidence of that. However, its big snag is that it doesn't have an index, presumably because it would double the number of pages. The lack of an index means that it's mostly quicker to delve into the Camel book to obtain the information that you need, and also be rewarded with some comforting examples describing how to do things.



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This book has been consigned to a bookshelf for some time, so I've not made much use of it. The idea of the book is sound, and you may find it useful to have lying around. It takes up very little desk space.



### The Perl cookbook

Tom Christiansen is responsible for this tome, this time with co-author Nathan Torkington. For several years, Christiansen's been the purveyor of much of the readily available 'real-world' Perl solutions that you could pull from the Web. This book sets out to gather a lot of that material together in the form of 'recipes'. You have a problem. What is the solution? Why is it done that way? And each problem has a

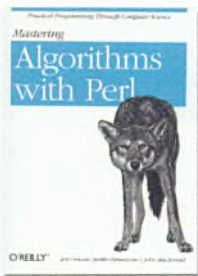
See Also section, so if the section is not exactly one-to-one with what you are trying to do, then you do have a reference path that can be used to delve further.

The result of the problem solving approach is a lot of readable examples in Perl that are used to document, explain, and discuss the language. Not all problems can be solved in a simple manner, and in these cases you are supplied with several solutions examining and illustrating why Perl does certain things in certain ways. The book also contains some lengthy programs that allow you to see how a complete solution can be created.

This is not a book that you'll read from cover to cover. Its strength is that you can dip in, get a couple of pages that describe possible solutions, derive an answer, and get on with the job in hand. However, you probably should spend some time scanning through the pages so that you have an idea of what the book contains. The question and answer format means that not only is there a good index, but the contents page is worth reading when you are seeking a solution to a problem.

The book is really helpful when you are starting with Perl, and want to solve often quite simple problems. Sometimes things that are easy to do in C become initially hard in Perl without knowledge of the requisite magic. For example, my earliest 'difficult problem' was trying to pass a file handle into a routine so I could access it from inside. Habit means that I dislike global data. The magic was there in the language, I just needed to find it.

Again, this is a book that I am pleased to have, and wish that I had acquired earlier in my Perl writing career because it would have eased my discovery of some language features. As it happens, I ended up (with others) doing some of the early reviews of the book. My comments were mostly to ask the authors to remove the footnotes from the book, but I seem to recall that this was being done by the copy editors from O'Reilly anyway. If you are just starting with Perl, then you can live without this book for a bit, but don't wait too long because it will save you some time.



### Mastering algorithms with Perl

*Mastering algorithms with perl* is a very recent publication – my copy is dated August 1999. The book is by Jon Orwant, Jarkko Heitaniemi, and John Macdonald. I've not had a great deal of time to do anything but skim through it. However, in these days where bookshops have endless shelves of books describing what you click on when, it's great to see something that's aimed at getting Computer

Science across in an accessible way. Computer Science does contain a slab of theory that programmers should all know. Incidentally, the book is practical; there isn't space for the mathematical proofs that

## Book details

*Learning Perl* is by Randal L. Schwartz and Tom Christiansen. Its second edition ISBN is 1-56592-284-0.

*Programming Perl* (2nd Edition) is by Larry Wall, Tom Christiansen, and Randal L. Schwartz and its ISBN is 1-56592-149-6.

*Advanced Perl programming* is by Sriram Srinivasan with an ISBN of 1-56592-220-4.

*Perl 5 – pocket reference* is by Johan Vromans, ISBN 1-56592-187-9.

*The Perl cookbook*, by Tom Christiansen and Nathan Torkington, has an ISBN of 1-56592-243-3.

*Mastering algorithms with Perl* is by Jon Orwant, Jarkko Heitaniemi, and John Macdonald. Its ISBN is 1-56592-398-7.

Finally, there is the Perl CD bookshelf, ISBN 1-56592-462-2. This package contains the book *Perl in a nutshell* (by Ellen Siever, Stephen Spainhour, and Nathan Patwardhan, ISBN 1-56592-286-7) and a CD containing several texts: *Perl in a nutshell*, *Learning Perl*, *Learning Perl on Win32 systems*, *Programming Perl*, *Advanced Perl programming*, and the *Perl cookbook*.

All the books are published by O'Reilly & Associates.

you'll find on a Computer Science course. The main emphasis of the book is on 'knowing this will make your life easier'.

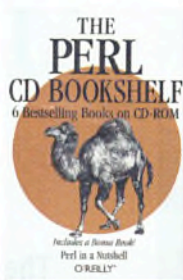
The book starts with a discussion of the basics and the main considerations behind the design of algorithms and then moves into a discussion of fundamental data structures, progressing through various types of lists and trees. Pretty soon, we are discussing sorting, which is all good fundamental stuff, and it is coupled with timed benchmarks to show how well the algorithms perform. There's a lot of code, so you can pick up the programs and try them yourself.

The next chunk of the book is maths really. It starts with sets, moves into matrices, and progresses to graph theory. I hastily pass through here; this kind of material is not my cup of tea until I want to use something.

Then there is a section on strings, looking at matching algorithms and text compression. I find this is useful, much of the string matching is used in regular expression routines, and an understanding of the algorithms should help you to construct sensible matching patterns that yield results in a manageable time.

A section on geometric methods follows, which is useful if you are dealing with raster images in any form. The book ends with quite a lot on number theory and what might be loosely called numerical analysis of one form or another. It also includes a section on encryption.

Much of this book seems very interesting if you want to improve the way that you go about doing what you do as a programmer. It is written very clearly, and there are loads of examples and things to try. I expect to see it on university-level CS reading lists.



### The Perl CD bookshelf

This publication appeared in my office just a few days ago, and was the event that triggered this article. The publication includes a real printed book (*Perl in a nutshell* by Ellen Siever, Stephen Spainhour, and Nathan Patwardhan) and a CD containing several of the books I've discussed above.

The CD has *Perl in a nutshell*, *Learning Perl*, *Learning Perl on Win32 systems*, *Programming Perl*, *Advanced Perl programming*, and the *Perl cookbook*.



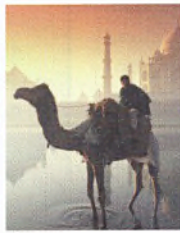
The books are in HTML, so all you need to read them is a browser. They do seem to have been prepared with some care, so any mentions of URLs in the text are now real working hyperlinks that you can jump to using your browser. The pages have a consistent feel, with previous page/next page style navigation.

Each HTML page maps onto a complete chapter or coherent section, so providing links from the Contents pages of the books works well. There are also internal and external links, so when another book on the CD is mentioned, you can jump there. The index that appears at the back of each book is also hyperlinked, so you can pick a book, look up something in the index and get to the relevant page in a few button clicks.

I am not too sure that I want to read books off a screen. I've been involved in computing for over 30 years and I still like to have a book in a physical form. However, the HTML navigation allows fast progression around the pages, and for reference use it works very well. This is augmented by a Java-based search engine on the CD from Astaware. I plugged the CD into my Windows NT machine, the search engine auto-started, and in an instant I was in business to use the CD. You can search a single book or all six books looking for a phrase or word, and it appears to work quickly to help you find some topic or other.

What's missing from the CD are the programs that go with each book. O'Reilly usually places these on its website to save you from having to type them in. I guess that it's possible to cut and paste Perl code from a browser that's looking at the CD contents should the need arise when you don't have Internet access to pull the support files.

I really had doubts about whether this publication would be of any use. Those doubts disappeared when I saw the product and realised that the search features could save oodles of time. I also plan to make judicious use of browser bookmarks so I can remember the common places in the books that I need to access frequently.



I will finish by saying a few words about *Perl in a Nutshell*, which I had not seen until I obtained the CD. The book is packaged in O'Reilly's stay-flat book binding, so it sits on the desk and allows you to keep it open at some point without having to engage in the precarious balancing of some heavy object on the pages.

The book is the reference document that I have been seeking; it contains the syntax and the semantics of all parts of Perl. However, it doesn't have any examples, so I guess that I'll be returning to *Programming Perl* (or the CD) to find code examples that I can steal and use.

The text seems to be provided with an adequate index and content pages, so finding something in the book should be easy. This is helped because each chapter is 'black tabbed' along the edge of the page so finding the correct section to browse through is relatively easy.

I suspect that this combination of CD and book will sell very well. The prospect of being able to emit complex CD searches in addition to a well-constructed handbook makes it worthwhile. ■

*Peter Collinson is a freelance consultant specialising in Unix. He can be reached electronically at [pc@hillside.co.uk](mailto:pc@hillside.co.uk), by phone on 01227 761824, or on the Web at <http://www.hillside.co.uk>.*

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# The ways of your errors

Watch out for C anti-idioms. Francis Glassborow looks at the vulnerable ways the Standard C Library deals with possible failures.



At the recent JaCC event my workshop on writing clean code was hijacked by a couple of experts into a discussion of the correct way to handle program failure. The resulting discussion was an example of what makes these events so enjoyable – participants learn something. Another example was Andy Koenig's keynote, *Programming Traps and Pitfalls*. Not only did it provide insights to the audience but Andy confessed afterwards that in addressing the title he had found some new insights. A quick reminder that the next JaCC is scheduled for March 24-25 next year – make sure you get to it.

## Handling program failure

I am focusing on C because this is where bad habits start. Even if you are mainly interested in C++, you have likely learnt from someone who has been influenced by the C idioms or worse, C anti-idioms.

In the early days of writing code, you were probably responsible for the whole program apart from using the Standard C Library. While you would have been puzzled if your program stopped in mid-flow because a library function decided you were in a mess, you would have had little hesitation in stopping the program in your own code. Generations of C programmers have been taught that a call to `exit` was a correct way to finish a program. This would be either because the task of the program had been logically completed or because something had gone wrong. Novice programmers become accustomed to baling out with `exit` wherever their program runs out of steam. As they are responsible for the whole program, it does not seem important. Their programs are small and the alternative of always supporting a return up the function call stack is tedious.

A look at the Standard C Library shows several ways of dealing with possible failures. It also reveals how vulnerable these can be.

## Use of a global state variable

The mathematics library uses `errno` to report the most recent error. This has several problems. First, programmers ignore it, so errors go undetected. Next, even if it is checked, all you see is the most recent error. This may have happened just after it was last reset (when did you write code to reset `errno`?). Finally, it simply does not work in a multi-threaded environment.

Not one of these problems is specific to `errno`. They are characteristic of using global variables to report program-state information. However attractive you may find the idea, leave it alone. It is very unfortunate that this idea seems to receive endorsement from the C Standard, though most C experts will describe it as a disaster, or words to that effect.

## Return success or failure

An example is `fflush`. This returns 0 if it succeeded and EOF if it fails. I wonder if you find those return values as bizarre as I do. But with time, we get used to 0 representing success.

Where a function is essentially a procedure – it does something – this mechanism is fine. You must train programmers to check the return value. Experience teaches us that that is not easy to achieve.

If we want to use this mechanism for functions that have to pass data back, we have to use 'out' parameters. An example of this is `fgets`, which uses an out parameter to capture the input string and returns a NULL pointer if there has been a failure. Just to add complexity, even if a NULL pointer is returned you have to check if the input is in an EOF condition.

## Return status information

This is similar to the previous idea except that there is a range of information and it is up to the programmer to know what is allowable in each case. The `scanf` routine is a good example from the Standard Library. How many programmers remember that complete input failure is reported by returning EOF? Otherwise, the return value is the number of items read. This can be zero if there is input but it is rejected because it does not fit the requirement for the first field specified by the format string.

Note that `if (scanf ("%d", &i))` does not check that a value was read into `i`, because both success (1 in this case) and total failure (EOF) will evaluate as true.

Checking status return values needs attention to detail.

## Provide a special value

Functions like `fgetc` normally return a value within a specified range (in this case, the range of an `unsigned char`) but have a special value (EOF) to represent failure. In the case of stream handling functions there is also a per stream error indicator that can be accessed via `ferror`. Again, we have zero representing that everything is working. Mentally, you have to translate this kind of function into 'stream failed?'

Apart from the perennial problem of getting programmers to check, we have the added problem of ensuring that we find a suitable error return value that will never be wanted as a normal value.

I sometimes wish that compiler writers would provide a special debug mode where there would be the equivalent of an assert failure if any of these error conditions happened at runtime. I know it is not that simple, but I think we could work out something useful if only for the cases where the return value is ignored by the programmer.

## A 'No, No'

What you must not do when encountering a problem is to call `exit`. It is not the responsibility of the function implementor to determine that the program must stop. The only justifiable case is to call `exit (EXIT_SUCCESS)`. Even here you must realise that by doing so you are preventing your code from being reused in a bigger program. Just because a task has succeeded does not mean that it will always be the end of a program. If you value reuse, you will never call `exit` in any function other than the top level of a task. It may be harder to write clean code that returns all the way to the top before ending, but it is the hallmark of professional code rather than something thrown together for a single use (I mean, write-compile-run-throw away).





I have no doubt that many C programmers will want to defend use of `exit` in their code, but others want to defend using `goto`. The two things are not that dissimilar; both make the life of the novice superficially easier at the price of getting in the way of learning to produce high quality work.

#### Contender for Book of the Year

*The C++ Standard Library: a tutorial and reference*, by Nicolai M. Josuttis (ISBN 0-201-37926-0), has finally arrived in this country. The original was written in German, but much has been added during the process of translation. This book should be on every C++ programmer's desk. It is written with authority and will provide all that ordinary C++ programmers need to know. My only criticism is that Dietmar Kühl deserves more than just an acknowledgement. He has added greatly to the quality of this book by helping with both the translation of large parts as well as contributing technical content in his areas of expertise (i/o streams and internationalisation).

In my January column, I will award my accolade for C/C++ programmer's book of the year. I think the final choice will be even harder than last year. However, this year I have decided to have a second 'award', that of EXE reader's choice of the year. Please send me (preferably by email: [francis@robinton.demon.co.uk](mailto:francis@robinton.demon.co.uk)) your three top C/C++ related books of 1999 (they can be on methodologies, analysis and design, etc). The books must have been first published between December 1998 and November 1999 (inclusive). To encourage your participation, I will put the names of all those submitting titles into a hat and draw one at random to receive a copy of Josuttis' book.

#### The September problem prize winner

There were many submissions for the September problem (for the full description of the problem and a solution, see p.44 of the October issue, or check EXE OnLine). I don't think anyone produced a perfect, definitive answer. However, there were quite a few excellent efforts. In the end, I awarded the prize to Roger Orr for his opening sentences:

*1) Errors – what errors? It compiles doesn't it – and to misquote Descartes I compile therefore I am correct. For perfection I'd put it into the header file (so the compiler can inline it of course) – and so I'd have to add:*

```
#include <iostream>
using namespace std;
```

Even Herbert Schildt sometimes misses opportunities to introduce you quietly to destructive coding habits.

#### Last month's problem

Look at the following piece of C++ source code and consider if there are any potential problems with it. Do not stop when you find the first problem.

```
#include <iostream>
struct A {
    A() { cout << "A constructed" << endl; }
    ~A() { cout << "A destroyed" << endl; }
};

struct B : public A {
    B(int i = 0):i_m(i) { cout << "B constructed" << endl; }
    ~B() { cout << "B destroyed" << endl; }
    int i_m;
};
```

```
int main(){
    B b1(1), b2(2);
    A& a1 = b1;
    A& a2 = b2;
    a1 = a2;
    cout << b1.i_m << endl;
    return 0;
}
```

I hope you noticed the first line: `#include <iostream>`. The significance being that this code is intended for compilation with a compiler that at least aims to be standard conforming. In that case, we will need to do something about `cout` and `endl`. Either we must correct them with `std::cout` and `std::endl` or we must consider a `using` declaration or even a `using` directive.

Many writers will tell you that you should not put `using namespace std;` in your code. I am not so sure that this is so bad for implementation files. But more about that another time.

The second point that should be considered is that the destructor in `A` has not been declared as `virtual`. Lines such as `A& a1 = b1;` strongly suggest that `B`s are `A`s. If this is the case, then `A` should have a virtual destructor. If `B`s are not a kind of `A` then referencing them as `A`s is highly suspect.

And lastly, we have the really dangerous error. C++ requires that all complete objects have a size of at least one. However, there is no such requirement for sub-objects. The `A` is a stateless class and so does not need any storage for data. In order to allow space saving, C++ allows such objects to have zero size if and only if they are part of a larger object (either by derivation or by layering). It does require that all sub-objects of the same type have distinct addresses.

With this in mind, have a look at: `a1 = a2;` The compiler-generated assignment for `A` should be a no-op, but there are several compilers that provide a default assignment like this:

```
if (this != &rhs) memcpy(this, &rhs, sizeof(Type));
return *this;
```

This is fine for complete types that have no data members with user-written copy assignment operators, and generally produces tight efficient code. However, in the case of a stateless class such as `A` above it results in complete disaster. The above assignment results in at least a byte from `b2` being copied to a byte of `b1`.

In other words the assignment not only slices (uses just the `A` part of the `B`s) but copies a non-existent slice and corrupts the `b1`.

#### This month's problem

It is coming up to the end of the Millennium, so I thought it was time to give you a very simple little problem. What is wrong with this simple header file?

```
#include <iostream.h>
using namespace std;

class Millennium {
public:
    Millenium(){cout << "Happy New Millennium." << endl;};
    ~Millenium(){cout << "This code is full of bugs." << endl;};
};
```

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# Delphi 5 and custom edits

Mark Smith shows how the new classes and interfaces of the Open Tools API provide rich matter for the writer of Delphi add-ins.



With the new release of Delphi comes a lot of new functionality, especially in the integrated development environment. These enhancements are reflected in changes to the programming interface that Delphi presents to the add-in writer – the Open Tools API (OTA). The biggest change has been to expose an interface to the editor window. This presents us with a new opportunity to customise the editor window to make it more productive, so this month I want to look at how you can use the new OTA classes and interfaces to produce IDE enhancements. The demo project that accompanies this article contains a number of enhancements and can be downloaded from the EXE website and from the EXE forum on Cix. The first enhancement shows some of the new editor API methods and extends the Cut and Delete key-presses to make them act upon the whole word that the cursor is in. Other IDE enhancements make it easier to see what the IDE is doing in response to the user's input.

In Delphi 5, the open tools API source code modules have been moved into their own *ToolsAPI* folder so they are no longer mixed in with the VCL modules, and Table 1 gives a brief overview of what each of the modules contains. The one of interest this month is *ToolsAPI.pas*, which contains most of the new interfaces, and especially the ones that allow your expert to interface with the editor.

*ToolsAPI.pas* defines a collection of interfaces – known as the OTA interfaces (they usually start with the OTA prefix) – which are descended from *IUnknown* and give you access to a lot of the Delphi IDE. Generally, these new *ToolsAPI* interfaces supersede much of the stuff in the other modules. The starting point is an interface called *BorlandIDEServices*, which declares no methods of its own but is part of an object that supports many of the other OTA interfaces, specifically those that have the word 'Services' as part of their name. The Service interfaces give you access to the source code editor, debugger, keyboard, project, module and package interfaces, to-do list, and message window among other things. There is far too much for one article, so I'll just concentrate on the editor window services – once you've seen it done for one service, it becomes a lot easier to do it for the others.

## Notifiers

The basic process for extending the Delphi IDE is as follows. You write a class (called a notifier) that supports certain other interfaces (in the *IUnknown* sense of the word) defined in the *ToolsAPI* module. In your add-in package, you need a special method called *Register* (an upper case 'R' is needed, for compatibility with C++Builder), which Delphi will call when the package containing your add-in is loaded. In your *Register* method, you get hold of the appropriate service from the Delphi IDE, and register your notifier with that service. When something noteworthy happens, Delphi calls the appropriate method on your notifier, and you respond appropriately. Notifiers descend from the class *TNotifierObject*, which is also defined in *ToolsAPI.pas*. The base class is fairly dull and merely defines some methods that Delphi may call once your notifier has been installed into the IDE. Typically, your notifier will support some specific interface that the IDE will call methods on. For example, our editor enhancements are in a class that supports the *IOTAKeyboardBinding* interface. The *IOTAKeyboardBinding* defines

methods for you to add your add-in to the IDE, and for the IDE to inform you of the key presses you wish to provide functionality for.

The main body of the code for our first editor add-in is shown in Listing 1. This add-in changes the *Ctrl-X* and *Ctrl-C* keys to make them select the text that the cursor is in, if there is no text selected. The Copy or Cut operations then proceed as normal. The class declaration shows the main methods we need to provide the *IOTAKeyboardBinding* interface. As you can see, all we need to do is instantiate our add-in, get the *IOTAKeyboardServices* from the Delphi IDE object, and add our keyboard binding to the keyboard services object. The IDE then calls our *BindKeyboard* method, passing in an *IOTAKeyboardBindingServices* object that we then add our key bindings to by calling *AddKeyBinding*. When the user presses our special keys (*Ctrl-X* and *Ctrl-C*), Delphi calls back into our *Proc* method, where we interpret the key press and act accordingly. It surprises me that the main interaction is by a callback when it could have been a straight method call, since we've already made the IDE aware of our notifier object.

The main work in this add-in is in building up a text selection. This is a little fiddly, as you need to move the editing position to be able to select the text in the editor window. If you do move the edit position, you need to take care not to move beyond the end of the text on a line – you can do it, and the IDE gives no clues that you are doing something wrong.

There are a few small problems with this expert as it stands. If you select text from a line that has its rightmost character off the right edge of the window, the entire view moves slightly to the right as a consequence of our getting the rightmost character position. You might want to make the add-in leave tokens such as brackets and semi-

Module	Contents
DsgnIntf	Definitions used when writing component and property editors.
EditIntf	Interfaces to the editor window, form design window, modules, and resource files.
ExptIntf	Declares the base class for an expert, <i>TExpert</i> .
FileIntf	Declares a class <i>TIVirtualFileSystem</i> that can be used to provide Delphi with a way of saving files to places other than the hard disk. I've never seen anyone use this, though there is an example in Ray's book.
IStreams	Declares classes for saving files to memory, disk files or other unspecified locations.
ToolIntf	Declares the <i>TIToolServices</i> class, which is the standard way Delphi communicates with your Expert.
ToolsAPI	Interfaces to the more recent changes to the IDE.
VCSIntf	Declares an interface for version control systems to interface with the Delphi IDE.
VirtIntf	Defines a class <i>TInterface</i> , which is used as the base class of many of the older Open Tools API pure-virtual base classes.

Table 1 – The *ToolsAPI* modules



```

type
  TCutCopyEnhancer = class(TNotifierObject,
                           IOTAKeyboardBinding)
  private
    procedure BuildSelection (Context: IOTAKeyContext);
  public
    procedure Proc (const Context: IOTAKeyContext;
                   KeyCode: TShortCut;
                   var BindingResult: TKeyBindingResult);
    function GetBindingType: TBindingType;
    function GetDisplayName: string;
    function GetName: string;
    procedure BindKeyboard(const BindingServices:
                          IOTAKeyBindingServices);
  end;

procedure Register;
var
  Binding : TCutCopyEnhancer;
begin
  Binding := TCutCopyEnhancer.Create;
  BorlandIDEServices.QueryInterface (IOTAKeyboardServices,
                                     IOTAKeyboardServices);
  IOTAKeyboardServices.AddKeyboardBinding(Binding);
end;

procedure TCutCopyEnhancer.BindKeyboard(
  const BindingServices: IOTAKeyBindingServices);
begin
  BindingServices.AddKeyBinding([ShortCut(Ord('C'), [ssCtrl])],
                               Proc, nil);
  BindingServices.AddKeyBinding([ShortCut(Ord('C'), [ssCtrl])],
                               Proc, nil);
end;

procedure TCutCopyEnhancer.Proc(
  const Context: IOTAKeyContext; KeyCode: TShortCut;
  var BindingResult: TKeyBindingResult);
begin
  BuildSelection (Context);
  if KeyCode = FControlC_ShortCut then
    Context.EditBuffer.EditBlock.Copy(false)
  else
    if KeyCode = FControlX_ShortCut then
      Context.EditBuffer.EditBlock.Cut(false);
end;

procedure TCutCopyEnhancer.BuildSelection(
  Context: IOTAKeyContext);
var
  EditBlock : IOTAEditBlock;
  EditBuffer : IOTAEditBuffer;
  EditPosition: IOTAEditPosition;
  OriginalColumn : integer;
  StartPos, EndPos : integer;
  ThisRow : integer;
  LastColumn : integer;
begin
  EditBuffer := Context.EditBuffer;
  EditBlock := EditBuffer.EditBlock;
  EditPosition := EditBuffer.EditPosition;
  OriginalColumn := EditPosition.Column;
  ThisRow := EditPosition.Row;

  // if there's no selection already, & cursor is in some text
  if (EditBlock.Size = 0) and (not EditPosition.IsWhiteSpace)
  then
  begin
    // Record the last column with information in it.
    EditPosition.MoveEOL;
    LastColumn := EditPosition.Column;
    EditPosition.Move (ThisRow, OriginalColumn);

    StartPos := OriginalColumn;
    // Find the beginning of the text to copy
    while not EditPosition.IsWhiteSpace do
    begin
      dec (StartPos);
      if StartPos = 0 then
        break;
      EditPosition.Move (ThisRow, StartPos);
    end;
    Inc (StartPos, 1);
    EditPosition.Move (ThisRow, StartPos);

    // Find the end of the text to copy.
    // Can overrun the last col, so check against
    // the last column value we already have
    EndPos := StartPos + 1;
    EditPosition.Move (ThisRow, EndPos);
    while EditPosition.Character <> ' ' do
    begin
      inc (EndPos);
      EditPosition.Move (ThisRow, EndPos);
      if EndPos >= LastColumn then
        break;
    end;

    // Select the text between StartPos and EndPos
    EditBlock.BeginBlock;
    EditPosition.Move (ThisRow, StartPos);
    EditBlock.Extend (ThisRow, EndPos);
  end;
end;

```

Listing 1 – The Editor enhancement expert.

## Further information

Source code for GExperts 0.97 <http://www.gexperts.com>  
 Hidden Paths of Delphi 3 Ray Lischner (ISBN 0965736601)  
 Public.delphi.opentoolsapi [forums.borland.com](http://forums.borland.com)

colons out of the selection, or make it behave exactly the same as double-clicking. The great thing is that you now get the choice.

Debugging editor enhancements is made easier if you can see what the editor window thinks you are doing. One of the demo experts shows how to exploit the `IOTAKeyboardDiagnostics` interface, which allows you to control a trace of what keys are being pressed in the editor window. Another useful interface is `IOTAMessageServices`, which allows you to send messages to the compiler messages window. See the demonstration project for examples of these interfaces in action. The module `EditorTrace.pas` contains a keyboard binding add-in that lets you turn keyboard tracing on and off by pressing `Ctrl-P`. Note that holding down the `Ctrl` key leads to a lot of messages being generated, so turning off the expert also clears the messages window by calling `IOTAMessageServices.ClearAllMessages`. It would have been better to just clear the trace messages, but the call to `ClearToolMessages` does not seem to work.

### Docking forms in the IDE

The Delphi team decided not to expose an interface to allow third parties to add docking forms to the Delphi IDE. However, looking in the GExperts module, `IdeDock.pas` exposes a back door that allows you to add docking forms. The IDE exposes a function `@IdeIntf@BorlandIDE` that seems to be a reliable indicator of the location of a `StringList` that contains references to the windows currently within the IDE. The demonstration program shows how to build IDE-docking forms based on the code in GExperts. Basically, the trick is to have a base form class that has the same properties and methods as the `TDockableForm` class used to build dockable forms in the Delphi IDE. Your descendent forms can then be created and registered with the IDE. The methods of the base form class used to impersonate the `TDockableForm` class are then hooked to the same code within the IDE that does the same job by reading the virtual method table of the class within the IDE.

### Where next

While understanding the contents of a source code module has not been made easier (you would still need a decent parser), working with a source file has become a lot more straightforward. Modifying a source code file in earlier versions of Delphi required you to build `EditReader` and `EditWriter` classes. The `IOTAEditPosition` interface for Delphi 5 has methods for inserting text into a file, `InsertText`, that makes the old approach redundant. You could use the new interfaces to build add-ins that replace the Delphi code completion templates with a more intelligent version. You might not reach CodeRush (the somewhat amazing Delphi editor enhancement suite from Eagle Software) levels of productivity enhancement, but there's enough to keep you amused when the thrill of writing yet another database application palls. ■

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Many thanks to Gerald Nunn, Erik Berry, Stefan Hoffmeister, Ray Lischner, and others for their work on exposing the workings of the Delphi IDE.

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# javadoc — a friend that's overlooked



It's flexible, it's free, and it can be fundamental to the development of Java code.

Lou Grinzo politely asks you to consider javadoc.

**D**ocumentation. The merest mention of the word is enough to send many programmers screaming from the room in a cold sweat. Given how much most of us detest writing documentation, and all the battle scars most of us have collected by following someone else's inaccurate documentation, this isn't much of a surprise. But we all know what a joy it can be to pick up a piece of programming, whether it's a component we're to use as-is or some source code that we must heavily modify to fill a new role, and find that it includes excellent documentation. In that more upbeat spirit, I want to talk about one of the more useful documentation tools at the disposal of Java programmers and one that's frequently overlooked: the lowly javadoc program. (Next month I'll address the other side of the coin, namely documentation intended for end-users, and Sun's JavaHelp facility.)

For those of you who aren't familiar with it, javadoc is a command line program that generates online help for your project in the form of a set of HTML files. It's the tool that Sun uses to generate the HTML-based help that comes with the JDK, in fact. There are numerous similar programs available for various languages, of course, but javadoc is pertinent for several reasons, aside from the fact that it works with Java. First of all, it's free, since it comes with Sun's JDK. Second, it does a surprisingly nice job with minimal (or even no) effort from the programmer to dress up the source code. Finally, it's about as flexible as such tools get, and provides more options than most of us will need on a project.

## Using it

Javadoc uses the Java compiler to load your source code into memory and parse it, and then produces the documentation based on the analysed structure of the source code and optional information you've added in the form of tagged fields in comments. Like most things in life, the amount of effort you put into working with javadoc and the amount of benefit you get from it are largely up to you, but the more you put in, the more you generally get back.

For example, you can process a set of 'bare' files that contain no comments and no tags, and still get a quite attractive (if sparse) overview of your source code. This can be a very useful tool for your own reference, particularly if you're working on a project intermittently. You can incrementally add information to the source code via comments and tags as the program solidifies and evolves. Particularly in a group environment, this continual development of the documentation in parallel with the programming can be an excellent way to employ javadoc, since anyone else on your team can get an up to date overview of your code with very little effort.

The one serious drawback to javadoc is that it's so loaded with features and options that you can wind up boggled by the detail and not use it at all or use only a small portion of it. Luckily, Sun has some

excellent documentation online for javadoc that's worth wading through. See <http://java.sun.com/products/jdk/javadoc/index.html> for the javadoc home page, <http://java.sun.com/products/jdk/1.2/docs/tooldocs/win32/javadoc.html> for a very extensive online manual, and <http://java.sun.com/products/jdk/javadoc/faq.html> for the FAQ.

To help you get started, I've included a basic project with this column in `bigSilly.zip`. It contains a series of Java source files and a DOS/Windows batch file (`runjdoc.bat`) that issues the javadoc command with what I think are the most useful and interesting command line arguments. Note that this zip file has directory names stored with the files, and that the `intStuff` and `doubleStuff` files must be in the `numericStuff` directory beneath the main directory for the project. I intentionally included a normal class, an interface (and a class that implements it), and two more classes that make up a package, all with private, protected, and public members to give you a reasonable test subject. I developed this using the JDK (and therefore javadoc 1.2.2).

## The details

Obviously, I can barely scratch the surface of a tool of this size and depth in a column. Rather than try to condense Sun's lengthy documentation, let me point out some of the more interesting and potentially bothersome details that I've run across in my usage of javadoc, and make some recommendations about how to get the most out of it.

It's worth noting up front that Sun admits that javadoc has some hefty resource requirements. Given how aggressively it employs code reuse by using the Java compiler to read the entire project into memory, this isn't a surprise. The answer to question B3 in the FAQ says that when creating the JDK 1.2 documentation javadoc requires 120 MB of memory and 8 minutes on an Ultra Enterprise computer. Your project likely won't be anywhere near that size, but still consider yourself warned.

Probably the best way to become familiar with javadoc's features and options, even if you've used it in the past, is to experiment with the `bigSilly` package I've provided, since you can mangle the source however you want with impunity. If you simply run the `runjdoc.bat` batch file, it will cause javadoc to rebuild the documentation using options that insert things like custom headers and footers and enable other features. If you check the second URL mentioned above, you'll find a list of the tags you can use in your source code and the numerous javadoc command line options. While some of Sun's choices here are a bit odd (like the requirement that you use a command line switch to enable the author and version tags), and others are fussy enough in their syntax to take a couple of tries to get working, they're all documented well enough that they're easily mastered.





**If you want more control over javadoc, including the ability to create fully customised documents,**

**you can write what Sun calls a doclet.**

As you experiment with `bigSilly` and see the changes you can (and can't) make in the output, you'll probably start conjuring up ways to exploit javadoc in your current projects. This is where you have to be careful, though, since it's very easy to fall into the trap of wanting to use every bell and whistle of javadoc. (Since programmers are almost universally gizmonauts, resisting such urges should be familiar territory.) For the rest of this column, I'll detail one approach to using javadoc that's worked well for me.

### Good practice

Before you touch your source code or javadoc it's important to decide how extensive your documentation will be when it's finished. Will it include private members? Will it include customised comments for all individual fields, just some, or none? Will you use the javadoc features that let you add entire HTML files as overview documents to the project, to provide a higher-level explanation of the project? The answers to these and other questions will depend on numerous technical and non-technical factors, but you should have a pretty good idea of the right answers for any given project even at the outset. Like programming, documenting your code always works better if you have a clear idea of your goals before you start.

No matter what your goals, keep your use of comments, tags, etc, as simple as possible at first. Even though I'm about as pro-documentation as programmers get, I know from experience how quickly source code can evolve and render your commentary obsolete, making documentation maintenance as much of a burden as code maintenance. Also, don't try to slide by with manual invocations of javadoc; create a batch, script, or `make` file that uses the command line options you want and includes all the desired files from your project. You'll thank yourself later for taking the time to do this up front.

As you're developing your source code you should make sure you always add new source files to your javadoc project as you create them. It's a good idea to re-run javadoc periodically, just to make sure you haven't forgotten to propagate a change to your configuration to the javadoc project. (Seeing the pretty documentation for your minutes-old code is a nice reinforcement, too.) It's also a good idea to check on how well javadoc is working. Sun has documented a number of bugs in prior versions, and there are still quirks in v1.2.2, like inserting 'Package' hyperlinks on pages that point to non-existent files. Another minor problem I ran into was javadoc using an errant leading comma in the 'Methods inherited from class [name]' section. These aren't serious issues for internal documentation, but for a commercial product it's probably a good idea to fix those problems with an HTML or text editor before shipping your files.

Once each class in your project gels, make an effort to insert block comments before the class and all fields and methods that will be documented, and use all the applicable tags. Even at this stage I rec-

ommend that you hold back a little and avoid the `@see` and `@link` cross-reference tags. Those are often more work to set up as well as being more prone to breakage. It's a good idea to use them where appropriate, but only once you're reasonably sure their contents won't change.

You can lighten your documentation workload during this phase of your project by using small commentary templates with the tags (and even some of the tag values) already filled in, stored as separate files. Depending on the editor you're using you can either assign these entire comments to key combinations or make some keys import the files.

Similarly, don't be shy about using your spellchecker. (Lou's Second Law of Computers: The typos will get you every time.) If your editor doesn't have a spellchecker, use a wordprocessor to check your source, or write the comments in one window via a wordprocessor and then copy and paste them into your source.

As your project matures, your documentation should mature with it. This process will result in more accurate and more useful commentary, since not only will the project have stopped mutating, but you'll understand your own code more fully and on more than one level. This insight will allow you to abstract meaning from the code better and avoid the dreaded syndrome of writing documentation that tells the reader what each component is without explaining how it's used or what it really does.

When updating the commentary in mature code make sure you pay particular attention to the accuracy of the `@since`, `@deprecated`, `@see`, `@link`, and `@serial` tags. It's very easy to start copying and pasting text in a flurry of documentation catch-up, only to accidentally propagate things like these tags to places they don't belong or forget to update the data associated with each tag.

If you find that you're not entirely happy with the aesthetics of javadoc's output, you can alter it somewhat. One of the files that javadoc generates automatically is called `stylesheet.css`, which is an HTML stylesheet, just as the name implies. You can easily modify the font and colour settings in this file with a text editor. But make sure you preserve your changes, because javadoc will overwrite your customised file with its own version without warning.

### Doclets

If you want even more control over javadoc, including the ability to create fully customised documents, you can write what Sun calls a doclet. A doclet is a Java program that works as a plug-in to javadoc and generates the output file. Javadoc as it comes from Sun uses a default doclet that generates HTML. By writing your own doclet you can exercise complete control over the format and nature of the output and create almost any type of document that you desire. See <http://java.sun.com/products/jdk/1.2/docs/tooldocs/javadoc/doclet/index.html> for the doclet API (generated with javadoc, of course) and <http://java.sun.com/products/jdk/1.2/docs/tooldocs/javadoc/overview.html> for an overview of doclets and how to create and support custom tags to javadoc.

If you have any interesting ideas for ways to use the doclet facility, please send me an email. We might be able to concoct an interesting ongoing project that builds on Sun's basic javadoc framework. ■

*Lou Grinzo has been working with and writing about desktop computers for more years than he'll publicly admit. He's currently focusing on cross-platform technologies, including Java, Linux, and XML. His website is <http://www.gizmoDrome.com> and you can email him at [lou@gizmoDrome.com](mailto:lou@gizmoDrome.com).*

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Check the schedule at the link below for the latest updates (two new sessions on Wednesday: *Solaris Technology* and *COM as a better C++*, *COM+/MTS as a better COM*; and a swap of sessions between Friday and Saturday).  
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**Orchestrating an embedded revolution?**

It's not often that we write about hardware in EXE. We are, after all, a *software* developer's magazine. But recently we got a preview of a new technology which threatens to blur the line between hardware and software permanently.

Embedded Solutions Ltd (ESL), a spin-off joint venture with Oxford University, was set up to develop and exploit Handel-C, a radical approach to co-design (see *Co-design: where hardware and software meet*, EXE, December 1995). The aim of Handel-C is to bring the flexibility and reconfigurability of software to hardware, using Field-Programmable Gate Array (FPGA) technology. FPGAs contain large numbers of gates - as found in microprocessors and RAM chips - whose logical arrangement can be reprogrammed on the fly. In effect, it's possible to write and rewrite different circuits onto the FPGA at will.

Handel-C itself is a subset of C that is tailored to doing the job of writing hardware. Programs in Handel-C translate *directly* into circuitry on the FPGA. A device using an FPGA doesn't need a microprocessor, or support chips. Functions like driving a display or taking input can be performed by hardware written onto the FPGA itself. ESL uses a demo board consisting of an FPGA and DRAM chip, with some connectors

**Notes**  
We're sure that you'll be hearing a lot more about FPGAs - and Handel-C - in future. Meanwhile, you can get your hands on a Handel-C toolkit for £3,500 per seat from ESL direct.  
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# Microsoft Data Engine

Jon Perkins lifts the bonnet on the new Microsoft Data Engine,  
a more scalable alternative to Jet.



Last month I wrote about using SQL-DMO to control SQL Server from Visual Basic. Staying within the general vicinity of SQL Server, I'm now going to discuss the Microsoft Data Engine (MSDE). Up to now, the majority of Visual Basic developers have used Jet for small database systems, and a full-blown relational database product such as SQL Server or Oracle for the larger departmental/enterprise systems. To date, all versions of Microsoft Access have been based around Jet. However, it sometimes happens that applications that were designed and implemented for relatively small user bases are seen to be much more useful than was originally predicted, and so the number of potential users suddenly increases beyond the practical ability of the database engine. When this happens it is necessary to scale the database implementation from Access up to, as far as Microsoft is concerned, SQL Server. To facilitate this process an upsizing wizard is provided to ease the transition, but it doesn't overcome the fact that there are some differences between Access and SQL Server that could require a fair bit of manual intervention to complete.

MSDE is designed for use in cases where you would previously have used Jet, but this time you won't have to face any conversion issues if you need to scale up the application. MSDE is, in fact, a significant subset of the actual SQL Server product. This means that any application can be scaled upwards from a small workgroup to an enterprise-wide scenario simply by moving the database over to the full-blown SQL Server product. No modifications are required. In fact, if you are happy to use the same machine, then you just need to install SQL Server; the setup program will detect the existing MSDE installation and incorporate the databases into its own environment. The first run of this setup program will, however, just perform the necessary conversion. You will find that you need to run the setup program a second time to install the various tools.

## Installation

MSDE requires about 55 MB of disk space, and it is recommended that the target machine has a minimum of 64 MB of RAM. It will run on Windows NT 4 if service pack 4 or higher has been installed, and of course it will run on Windows 2000. It will also run on Windows 95 and Windows 98, but some advanced features (such as read-ahead buffering and performance monitoring) will be disabled due to the lack of underlying support from the operating system.

If you are an MSDN subscriber, then (at the time of writing, at least) disk 7 of the Office Test Platform and Development Tools collection will give you the installation files. Alternately, it can be found on disk 1 of all versions of the Office 2000 product that include Access; run the `setupsql.exe` application from the `\sql\i386` directory. It can also be downloaded by registered Visual Studio users from the <http://msdn.microsoft.com> site. When you run these install programs (the MSDN subscriber disk version will auto-start) you will find that the SQL Server Developer Edition will actually be loaded instead. Microsoft recommends that developers use this environment to work against, presumably because of the

associated tools, and then detach the database when you have finished. This is achieved by running the `sp_detach_db` stored procedure from Query Analyser.

Once you come to put together the setup program for your application, you will need to include the MSDE runtime application along with your other files. Depending upon your target environment this is called either `msdex86.exe` or `msdealpha.exe`. This executable needs to be run from the command line, along with various parameters to provide such features as 'silent running'. If you use InstallShield to create your setup programs, then a suitable unattended response file is provided. However, if you use the Package and Deployment Wizard (PDW), then you will need to modify the provided Visual Studio `setup1` project files because in its native form PDW does not cater for issuing command line instructions such as this.

One interesting feature is that an existing SQL Server 7.0 installation can be scaled down to an MSDE version, which can be useful in such circumstances as creating a demo version of your system.

## The relationship with SQL Server

MSDE is SQL Server 7.0, but in a scaled down version. This is most visibly reinforced by the fact that the SQL Server service pack (which is available for version 7.0, by the way) can be applied to an MSDE installation too. There are, however, some deliberate differences in the implementation. MSDE can only support databases up to 2 GB, although it does work happily with multiple databases. SQL Server, on the other hand, will support databases of up to 1 TB. Another difference is the number of users that each implementation is targeted for. SQL Server will cater for hundreds of users, whereas MSDE (and specifically the Developer Edition of SQL Server) is tuned – some might say nobbled – for up to five users. The big difference here, of course, is the cost. Any licensed user of either Visual Studio or the relevant versions of Office 2000 can redistribute an MSDE-based application, whereas a licence for SQL Server 7.0 can cost hundreds of pounds depending upon the configuration selected. Note that the same OLE DB and ODBC drivers can be used for both technologies. Finally, it has been limited to make use of up to two processors, regardless of the number that are actually available.

Although there are some features found within SQL Server that are excluded from MSDE, multiple transaction processes across different servers for example, it is possible for an MSDE application to communicate with a separate SQL Server. In order to make this work, the MSDE machine will need to have a per-seat SQL Server CAL (Client Access Licence).

## Comparing Jet to MSDE

MSDE is a good choice for new applications that are being targeted at machines with a typical corporate user specification. As with its grown up version, all database operations are performed on the server side, giving a performance improvement over Jet. The only





**The ability to include more sophisticated features such as stored procedures and triggers into the full range of applications that I develop is something that I find most appealing.**

time that Jet really scores over MSDE is if you are using machines with somewhat older specifications (and therefore less resources). Jet is designed for a smaller memory footprint and so will score over MSDE in these circumstances. There is also a difference in Microsoft's recommendations for the numbers of users that can be supported by each technology. As I said, MSDE is tuned for up to five users. Jet, on the other hand, can technically support up to 255 users, although in practice this figure falls to about 20 or less, depending upon the complexity of the system, the network throughput, and the speed of the hardware in general.

Another difference is that of stored procedures. Jet databases use QueryDef objects, whereas both MSDE and SQL Server use compiled stored procedures. These stored procedures are based upon Transact-SQL statements and are capable of encapsulating more complex business logic than QueryDefs. Harking back to the issue of the ease of upgradability, QueryDefs must still be manually re-coded as stored procedures after the Access Upsizing Wizard has been run.

By the way, I don't want to give the impression that Jet has been retired. On the contrary, Jet is still the default database engine within Access 2000. The primary benefit of MSDE is that it offers a complete and direct scalability from a basic workgroup up to an enterprise-wide installation, whereas Jet doesn't.

#### Creating Databases and Tables

Databases can be created in one of three ways, depending upon what you feel the most comfortable with:

```
Dim oDatabase As SQLDMO.Database
Dim oDataFile As SQLDMO.DBFile
Dim oLogFile As SQLDMO.LogFile
Dim oServer As SQLDMO.SQLServer

' Set data file parameters
Set oDataFile = New SQLDMO.DBFile
oDataFile.PhysicalName = CurDir() & "\exe_test.mdf"
oDataFile.Name = "ExeTest"

' Set log file parameters
Set oLogFile = New SQLDMO.LogFile
oLogFile.PhysicalName = CurDir() & "\exe_test.ldf"
oLogFile.Name = "ExeTestLog"

' Get a server connection
Set oServer = New SQLDMO.SQLServer
oServer.Connect "MyServer" ' N.B. Integrated security

' Add it all together
Set oDatabase = New SQLDMO.Database
oDatabase.Name = "ExeTest"
oDatabase.FileGroups("Primary").DBFiles.Add oDataFile
oDatabase.TransactionLog.LogFiles.Add oLogFile
oServer.Databases.Add oDatabase
```

**Listing 1 – Creating a new database from Visual Basic.**

1. Using the SQL Server 7.0 Enterprise manager: Select the databases folder, click on the *Action* menu, and choose *New Database*. The database can be created by completing the resulting form. This approach gives you full control over the parameters of the new database, such as initial size, amount of growth, and location.
2. Using Access 2000. The default type of database is that of a Jet-style MDB. However, choosing a *Project* type from the *File, New* dialog will create the required MSDE database. This option displays an additional form that asks which SQL Server service will host the database. The upshot of this is that the task of creating the database is actually passed to SQL Server anyway. Creating a database in this way will give you no control over its initial properties, other than the underlying SQL Server name. By this, I mean that the database at the SQL Server level can be different to the name of the Access Project. The new database will initially be the same size as the *model* database, will grow by 10%, will be unrestricted in size, and will reside in the SQL Server installation's *Data* folder. These options can subsequently be altered from the Enterprise Manager.
3. From Visual Basic code. This task can be achieved by using the SQL-DMO library, which works equally well for SQL Server and MSDE. Listing 1 shows a database being created in this manner.

#### The appeal

What do I think of MSDE? Well, speaking as somebody who is generally more at home with SQL Server than Jet, I'm frankly delighted, but then I would be. The ability to include more sophisticated features such as stored procedures and triggers into the full range of applications that I develop is something that I find most appealing. I do know, however, that there are many developers out there who prefer the cosiness of a standalone MDB file and who will regard the installation onto a client machine of a cut-down version of SQL Server as something of an overkill for some applications, and they would probably be right. However, Jet is still there and will be for a while yet I would guess. I also know that developers who are itching to get their hands on SQL Server 7.0 but are still tied by their company to using version 6.5 will spot the opportunity to get some real experience with the product while not necessarily going against the corporate platform. One important difference, however, will be the increased need for training. Jet is really a component technology that you can largely pick up as you go along. SQL Server, on the other hand, is much more sophisticated and really does benefit from a formal training course.

The fact that MSDE is free to registered users of Visual Studio or Office 2000 isn't quite as generous as it sounds. Jet is better able to support more concurrent users than MSDE, so this particular ceiling has been lowered. One can sense the canny minds of the marketing arm of Microsoft at work here because the decision as to which product to use when scaling up an application will now always be SQL Server, whereas before a redevelopment might well have revolved around whatever tool the relational database teams used as their standard. However, I think that it offers more than it restricts and so I will undoubtedly be using it where relevant. At the end of the day, Microsoft has now delivered a consistent and compatible database environment for applications of all sizes. ■

*Jon Perkins is a freelance Visual Basic developer and a Microsoft Certified Solution Developer. He is a contributing author of *Advanced Microsoft Visual Basic 6.0* by The Mandelbrot Set, published by Microsoft Press. Contact him at [www.jonperkins.com](http://www.jonperkins.com).*



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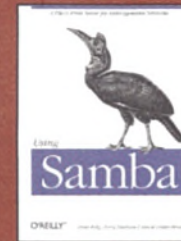
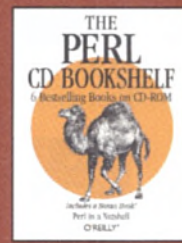
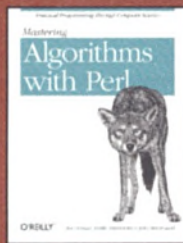
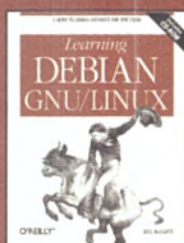
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### TALENTED SOFTWARE DEVELOPERS WILL LOVE G.I.S.

GIS is one of the most exciting areas of IT. It combines object oriented data management, graphics and spatial data analysis with an ever-increasing focus on Internet integration. The good news is that many of my clients will forego experience of G.I.S. in favour of solid software development skills in industry-standard products such as Visual Basic, Access and Java. The six jobs below represent just a small fraction of the total number of systems development vacancies currently being handled by Concurrent Appointments.

#### Access/VB Development

c. £30K plus bonus

West London

The brief calls for a graduate with at least 18 months experience of building applications in MS Access. You should be fluent in Visual Basic or Visual C++ and most importantly apply rigorous quality standards to your work. You will be joining a "fun" young development team whose experience will complement your specialist skills. The project is to build a market leader in analysis and modelling applications for the desktop G.I.S. industry. A fluency in one or more European languages is highly desirable.

#### Visual C++ Software Engineer

To £28K+car

N Home Counties

Does the opportunity to extend your experience in Windows-based applications development combined with travel within Europe appeal to you? You will be using your Visual C++ skills to customise clients GIS software and once established you will handle the more challenging components of the projects. You must be competent in MS Access and also ODBC. Fluency in French and/or German is welcome though not vital.

#### Applications Programmers

To £30

Central London

This is a fun place to work if you are a highly motivated young programmer with fluency in C and Visual Basic under MS-Windows. The client is a young, hugely successful MapInfo partner able to offer challenging new development work for an extremely wide range of commercial clients, many of whom are themselves new to GIS.

#### Software Engineers

To £28K

Home Counties

A degree qualification in Computer Science or similar is the ideal foundation for these newly released vacancies. Although the client is a G.I.S. vendor, the work is 100% new applications development, based on-site and in the office. Technology is leading edge and includes Web-based applications, Oracle7, Delphi and other OO tools. To qualify you must have a minimum 12 months experience in one or more of C, C++, VB or Pascal.

#### Applications Developer

To £30K

West Country

The client is a young, dynamic Oracle partner with a very healthy order book!! They are market leaders in G.I.S. applications software and can offer an experienced software developer the opportunity to work on one of the most challenging projects around. You must know Oracle and have fluency in C and/or C++ programming under Windows or Windows NT. Experience of one specific GIS is not essential although ArcView or MapInfo would be beneficial.

#### ArcView/Visual Basic Developers

£Truly negotiable

Numerous UK Locations

ArcView is really taking off and this has created several job opportunities. If you are proficient in a recognised OO language and you have experience of programming in Windows then they are willing to send you on an ArcView training course!! Applications vary from local government to insurance and retail and locations from London, Bristol, Nottingham and Edinburgh.



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Alternatively you can e-mail your CV to  
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### MORE OPPORTUNITIES IN GIS FOR SOFTWARE ENGINEERS!

No longer is GIS a stand-alone technology. Today GIS is at the heart of IT, enabling better decision making and yielding quality information few would have imagined possible ten years ago. The new generation of GIS specialist is a software professional. Not just an ad-hoc programmer but a highly skilled engineer who can weave the infrastructure that draws together all of the technology strands of databases, graphics and analysis that form the GIS solution. It is such individuals we seek to attract into the GIS industry.

#### Technical Programmer (Oracle & Windows)

To £30K plus car

Thames Valley

If you feel under-valued and under-utilised then you should consider this position. The client is a fast-growing software company who genuinely places their employees first. The working environment is fun and the dress code non-existent. To qualify you will need a minimum 18 months experience of:

- \* Programming in VB5 or 6, Java or Visual C++.
- \* Software development under Windows NT or 98.
- \* Use of MFC, COM and ActiveX.
- \* Development of Internet/Intranet applications.

#### Software Developers

To £35K

London or Client Site

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- \* On-going technical and professional training.
- \* Grooming for a career in consultancy.
- \* Training in several GIS packages.

To qualify you must have a minimum 12 month's post-graduate experience of developing computer applications using C++, Visual C++ or Visual Basic.

#### Head of Software Development

To £40K

South-East

The brief calls for a "customer-focused" technical resource manager who can prioritise and direct the efforts of a small, highly talented team of application developers. Your CV should reflect solid database applications experience, sound project management skills and a background in "core product" development applying client/server and OO technology. Be assured that your efforts will be valued both in financial terms and through an on-going investment programme of training in technical and management issues.

#### Visual Basic Application Developers

To £30K

North London

You will be joining a new Development Centre, recently established by this rapidly growing yet financially secure GIS technology provider.

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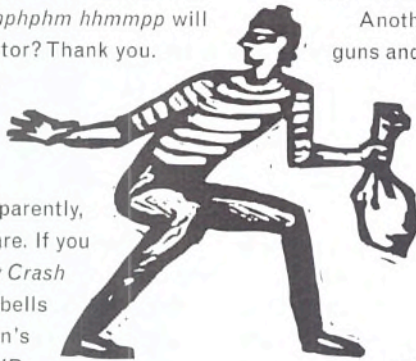


# The future's bright. The future's criminal.

Thanks to the good fellows at NeedTo Know ([www.ntk.net](http://www.ntk.net)) for putting us onto a hilarious feature in the Guardian on the future of crime. Barring the odd bit of rounding-up fraud, developers have never had much opportunity to enter a life of crime – well, there are those who say that Microsoft programmers are *mmph hmmmphphm hhmppp* will you please take your hand off my mouth Mr Editor? Thank you.

Anyway, suffice it to say the Grauniad foresees many criminal opportunities that will undoubtedly call for the services of talented coders like yourselves.

Top of the list is 'virtual reality drugs'. Yes, apparently, in the future, you'll be able to get high on software. If you took my tip in the September issue and read *Snow Crash* by Neal Stephenson, this will probably ring some bells with you. It's not quite as pure as Stephenson's vision, though, because this particular kind of VR dope will require you to hook yourself up to some kind of apparatus which stimulates the pleasure centres of the brain (some of us have been doing this for years with chocolate). Quite how the drug barons of tomorrow will overcome the problem of people copying their



'stuff' and posting it on *alt.drugs.virtual.wasted.wasted.wasted* is not covered. We suspect the fun will go out of it anyway when the Free Software Foundation get the idea of doing Open Source VR drugs – 'anyone want to do some Linaine?'

Another growth market is in IT-disabling devices such as EM guns and wide-spectrum radiation devices, which can be used to zap expensive business-critical servers. These can cheerfully be assembled from a range of bits and pieces you'll find lying around most geek homes. Would-be corporate raiders can simply stroll into the machine room of their target company and shout 'this is a stick-up! Put the data on the disk! No funny business, or I blow the RS6000 away!' and wait for the computer hostage negotiator to arrive.

If none of these criminal pursuits interests you, you might want to look into becoming a Grauniad feature writer; the only qualifications you'll need are ludicrous gullibility and an aptitude for writing thoughtful, provocative, technophobic, reactionary rubbish blaming the Internet for everything. Which shouldn't be too hard, now should it?

## More scary than...

Cinema fans have been queuing up to buy tickets for the 'scariest film ever', *The Blair Mainframe Project*. The film features newcomers Robert Young – CEO of RedHat, Jeff Bezos of Amazon.com and UK 'e-envoy' Alex Allan as three inexperienced programmers who travel deep into the machine room at IBM Hursley Park in search of the truth about the Blair Mainframe, a demonic IBM Series 70 rumoured to eat passing sysadmins. They are never heard of again, but nine months later their source code is found and compiled.

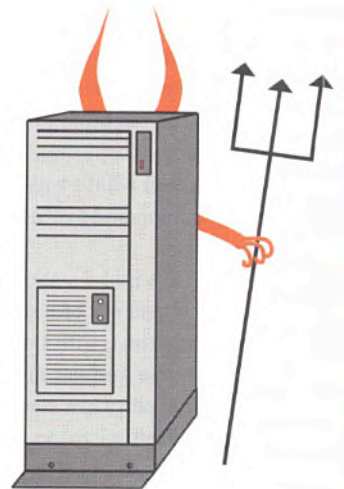
The film has been praised for its use of 'high reality' techniques. 'Everything you see on screen is real,' says director Mike Cowlshaw – one time inventor of the Rexx language, 'including the core dumps. We would leave them punchcards at predetermined locations and they would have to run these without knowing what they would do. We'd sneak up on them during lunch and simulate a premature end-of-file error, then film them trying to stop the fan-fold paper from falling out of the output bin.'

The three stars were said to be genuinely terrified when an unhandled exception was arranged right in the middle of the global payroll run and hordes of white-coated techies loomed out of the dark, weeping and wail-

ing. 'All the labcoats were extras we'd hired, but they didn't know that – they thought there was really going to be a code inspection,' says Cowlshaw.

The film, which is being released under the FSF GPL, has a grainy, amateurish feel – akin to genuine Video CD – and was shot entirely on Webcams dotted around Hursley Park. The film-makers are rumoured to have paid extensive royalties to Unisys for the use of the GIF compression algorithm. Controversy arose when Robert Young suggested that he would be making available a proprietary version of the film with his own extended footage.

Meanwhile, Microsoft continues to deny rumours that it is to make its own film entitled *Building 18* which tells the story of Netscape/AOL's attempts to back-engineer a crashed Windows 2000 installation at its secret Area M7 facility located within Mozilla Air Force Base in Nevada.



## Onward, ever onward Exedonia

Thanks for the massive response to our invitation to submit flag designs for the fledgling Distributed Republic of Exedonia. It took us several weeks to sift through all your entry. And no, that's not a typo. Still, heartfelt thanks to Barbara Casarin, who emailed us this delightful design, and wins by default – which is not to say she wouldn't have won anyway! She wins a set of EXE juggling balls. Meanwhile, our not-yet-announced competition for a National Anthem for Exedonia is already concluded; trawl-

ing through some old files we managed to find a copy of the *IBM Rally* – yes, it's true, IBM has a corporate theme song – which we decided was just the ticket.

Anyone committed enough to a) find their own copy of this little ditty and b) write some appropriate Exedonian lyrics for it is welcome to submit them to us for consideration. Just keep it clean, please.





# Acceptance test

The personnel are poised, the computers are in place, the test documentation is ready, and Ms Stob's company is just about to deliver on a large project. Maybe.

**Y**es, it is rather noisy and dusty and cramped here, we've been finding it a bit hard to concentrate. Sorry it's so uncomfortable. But I've known worse.'

What inspired me to say that, for God's sake? I've known worse, have I? When exactly have I known worse, I would like to ask? Have I ever commissioned an n-tier database system inside a running aircraft engine? Have I ever had to configure a TCP/IP network while dangled over the side of the late Jacques Cousteau's ship the *Calypso* in a shark cage? I demand that I produce the evidence that I have had to think in a worse environment than this factory.

This factory. With its ongoing whirlpool of mouse-clogging dust, its nowhere at all to sit while you are typing, its Local Radio Nowhere for Complete Morons blaring out its mysteriously piddling selection of five hateful tunes and two advertisements over the tannoy, which audio salad is continuously seasoned – aaaaargh, there it goes again! – by the screech of the aluminium saw conveniently sited three feet away from where I am allowed to set up the laptop, and the eardrum shattering spluttering of the portable air-driven tool, which as far as I can see achieves nothing except make noise, this factory, this factory... I'm sorry I've forgotten what I was going to say now.

That's been happening rather a lot since we got here. Me losing the thingy, thread.

'Of course, let's make a start on the test. The sooner we start, the sooner we can all get out of here.'

At least that's the truth. Come on, come on, let's get it over with, then I can go home and get my CV up to date. No way this house of cards we call our software stands up to the ten megaton Acceptance Test, correction ten megaton Acceptance Retest, 'cos it has already failed this exercise once... If we manage to survive this ordeal, then my name is Peter Mandelson Northern Ireland Secretary.

Yes I do know I am thought of as a pessimist, but you will find I am right about this one. You weren't here last week, during Attempt One. It was a massacre. Module after module went nipples skyward. The process monitor, which in happier times just says 'Minor Warningette' or 'Nothing doing', read like an obituary column. It had, count them, one, two, three, four entries, all the same. 'In not very loving memory of dbUpdate.exe which, being of unsound and corrupt body, did terminate suddenly and unnaturally'. It leaves behind a meaningless error log and also a project leader and a programmer looking excruciatingly foolish, being required to test the reporting of data that they know very well is not going to be there. No flowers; charitable donations should be made to the *Royal Society for Prevention of Thirst in the Disappointed*.

Have I discussed the matter with Mr dbUpdate? I fancy I may have mentioned it. Yes, he says he has fixed it. He has been up four nights in a row, steam-hammering exception-handlers into every nook and destructor he can find. According to him, the program will carry on running even if you switch off the PC and take it away. He has spot-

welded it into an upright position. Confidence-making? Not really. It makes me think of the way they used to defend trenches in WW1, by carefully propping up corpses along the parapet.

'By all means try that. What a good idea – we should really have put that in the test ourselves.'

Don't look at me like that – what else could I say for God's sake? What do you think you are doing Mister Customer, improvising fresh tests for your software as you go along? Are you not aware of how narrow is the path we tread? Do you not sense the precipices either side? Can you not smell the sulphur rising up from the abyss below? Is this really the time to stray from the true way and go picking flowers among the pretty dialogs of obscure configuration? Do you not – aaaaaargh, the saw! The saw!

Actually, he did this last week too, did I tell you? He suddenly fancied he'd like to print out a list of incorrect transactions – a simple dump of the monochrome display – only it came out black-on-crimson from that stupid colour printer. Yup, it was a corker, something to do with the way MFC handles printing, apparently. Anyway, I got the giggles – I was way past caring by that point – I said, I'm afraid the software is wounded and it is bleeding, and then he said perhaps it is the time of... hold on, what's this?

'No, that happens because we have been jumping the date forward. You see, normally it gets run automatically on a Saturday. Look, if I kick off this batch file, it will be all right again.'

Wow, what a brilliant recovery, Verity, though I say so myself. A wonderful save, reacting like lightning and just flicking it over the crossbar with the very ends of your fingertips, safely past the bunker at third man into the gully at Becher's Brook from the centre of the racket. You know, I think we might pull this off. Don't start getting excited in the back there, but I think we might get away with it.

It's a funny thing about moving the clock forward. Here we are past the vernal equinox of next year already, having paused briefly at the turn of the year and on the legendary leap day of 2000. And although in real time I have only been standing here six hours, it *does* seem like halfway through next year. How did you bring in the millennium Verity? Did you go out? Yes, I spent it in this factory listening to a competition between Radio Moron and an electric saw, while a nasty man poked my software with a stick. It was absolutely the thing, my dear.

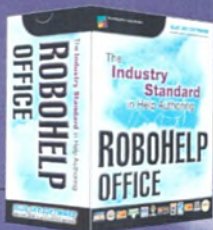
'Well of course you can redo that part of the test if you like, but it will take us some time to set it up.'

No you bloody won't matey. I'm sorry, but I'm going to have to stop you doing this. I forbid it. I am going to use my Venusian mind meld: you will obey me, you will obey me, you want to get out of this factory, you want to go home, I WANT TO GO HOME.

'If you could just sign there, that's lovely. Thanks. No, I'm sorry we had to bring you back. Still, it worked out okay in the end, didn't it?'

eeeeeeeeeeeeee Yusssss!





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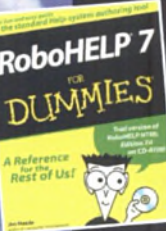
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