THE SOFTWARE DEVELOPERS' MAGAZINE

EXE

OCTOBER 1998

£3.50

C++ RTTI
Right on time

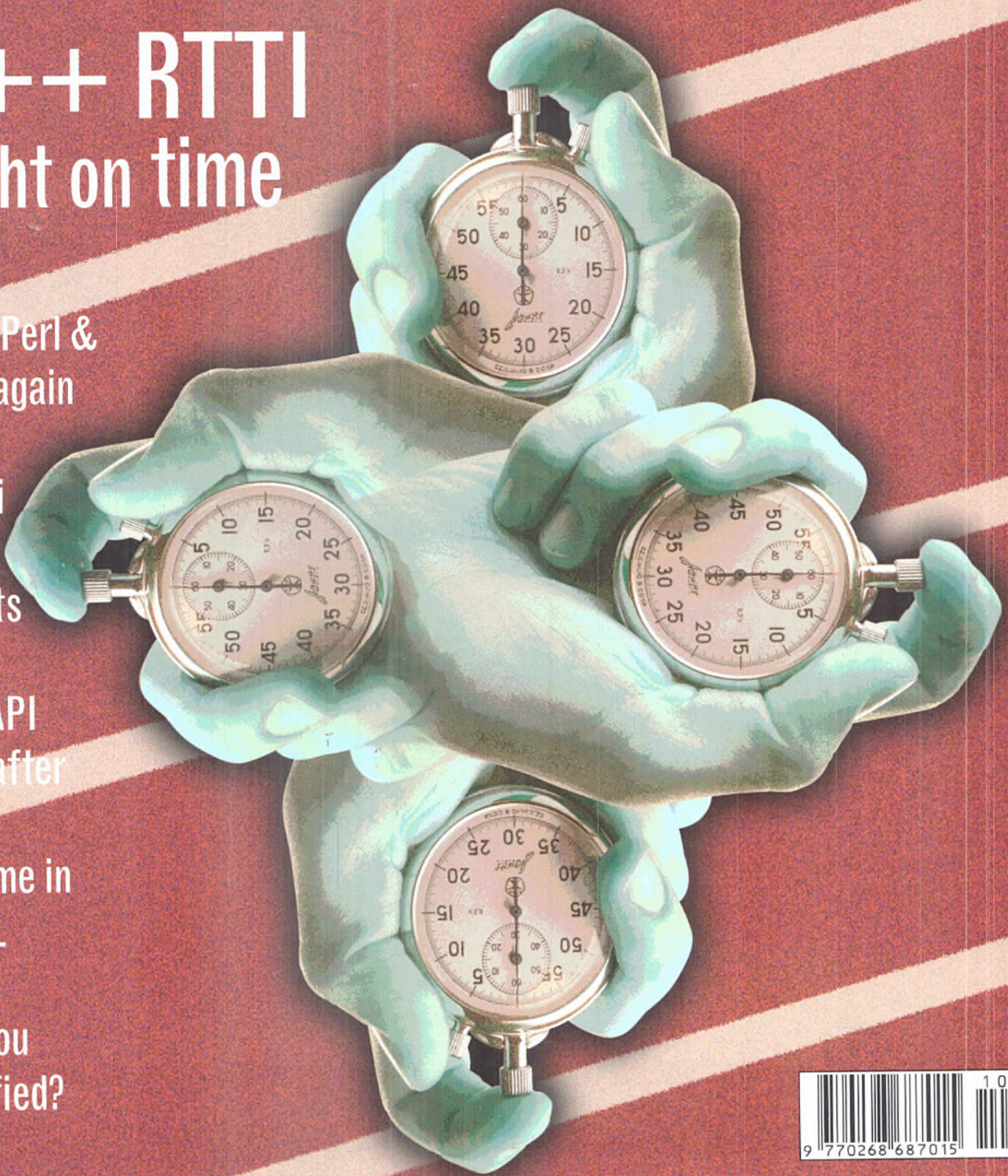
VB to Perl & back again

Delphi never forgets

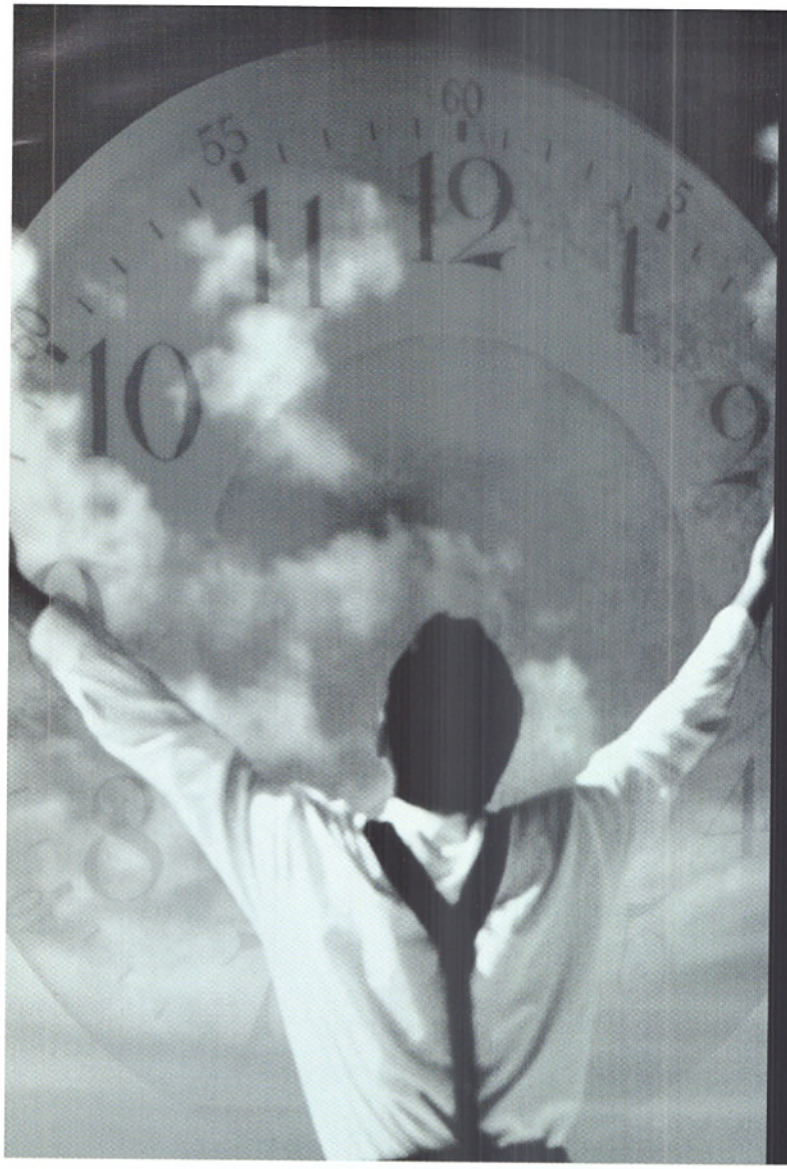
Java API ever after

Help me in HTML

Are you certified?

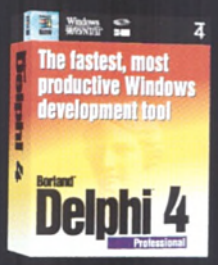


9 770268 687015 10



BORLAND DELPHI™ 4.

DELIVERING ON THE PROMISE OF PRODUCTIVITY.



Any Data, Any Time, Anywhere - Delphi 4

Today, as business needs dictate shorter development cycles, increasing demands are placed on developers, IT professionals and the tools they use. Delphi 4 has a new developer UI designed to make development quick and easy whilst dramatically increasing productivity.

Delphi 4 *Client/Server Suite* now includes full MTS support, high performance object relational database support for Oracle8 and Inprise's CORBA VisiBroker™ ORB integration.

Whether you're a corporate developer, consultant or just starting out as a programmer, there is a version of Delphi 4 that is perfect for your kind of Windows development.
Find out today how to increase your application productivity.

INPRISE
Integrating the Enterprise

Copyright © 1998 INPRISE Corporation. All rights reserved. All INPRISE product names are trademarks or registered trademarks of INPRISE Corporation.

Enquiry No. Oc1

COMPLETE AND RETURN THE COUPON OR TELEPHONE 0800 454065 TO DISCOVER HOW DELPHI 4 DELIVERS ON THE PROMISE OF PRODUCTIVITY.

Please return this completed coupon to: Inprise (UK) Limited, FREEPOST RG1571, Twyford, Reading, Berkshire. RG10 8BR.

Name: .....

Address: .....

.....

.....

Postcode: .....

Telephone: .....

Facsimile: .....

Email: .....

EX9810D4

THE FRONT END

SoapFlakes 5
Old programmers.

News 7
ProtoView's ActiveX Component Suite 3.0, Cold Fusion 4.0, and the next version of Corba. JClass Enterprise Suite 3.5, XML Object Manager and XSL draft specification 1.0, and this month's books.

Mayhem 14
People still exist who don't know how to use cashpoint machines. Jules met one.

Letters 17
Unacceptable memory leaks. Help - what Help?

THE CODE

C++ RTTI – keeping up with runtime type information 20
RTTI was originally omitted from C++ and Kevlin Henney shows there is more to the runtime type information mechanism than many developers realise.

The Help in HTML 29
Focusing on the HTML Help format, Dave Jewell rounds up three of the leading help development tools: RoboHELP Office, Doc-To-Help, and HDK.

Avoiding the pitfalls of Perl 41
Long linear unstructured programs, duplicated functions, and global variables, only declared by use...Peter Collinson has learnt the ways the Perl compiler and runtime system can help you avoid the beginner's pitfalls.

Ménage à trois 49
The practical experience of linking two languages can prove to be more demanding than expected. Gavin Smyth and Richard Caton have fun with Visual Basic and Perl (and C++ too)...

C & C++ 59
Francis Glassborow reports on the new C++ International Standard, and demonstrates a simple idiom to fix a problem of unnecessary rebuilds.

Delphi 63
Mark Smith shows how the Delphi TClientDataSet component can be used to build powerful but lightweight single-user database systems.

Java 67
To serialise or not to serialise? Tom Guinther covers the control available to a Java programmer with the Serialization API.

Visual Basic 71
Writing a VB application is easy, but writing a good VB application is another matter. Jon Perkins discusses some issues concerning professional Visual Basic development.

THE BACK END

Ctrl-Break 81
Ctrl-Break feels a mushy brain and Verity Stob (aged 10) has cause for poetic celebrations.

SERVICES

Directory 74
Recruitment 75

Two languages and an interface 49

Avoid the pitfalls of Perl 41

How to master technology 14

C++ RTTI – casting around 20

Editor: David Mery **Features Editor:** Neil Hewitt **Technical Sub-Editor:** Alun Williams **Contributing Editor:** Will Watts **Production Manager:** Kate Adams **Advertisement Manager:** Mark Parker **Display Sales Executive:** Jonathan Everitt **Classified Sales Executive:** Sarah Horsley **Office Administrator:** Catherine Calvert **Group Art Director:** Colin McHenry **Publisher:** James Bennett **Publishing Director:** Roger Beckett

EXE: The Software Developers' Magazine is independent and not affiliated to any vendor of hardware, software or services. It is published by: **Centaur Communications Ltd, St Giles House, 50 Poland Street, London W1V 4AX. EXE Advertising/Editorial/Production Telephone:** 0171 970 4000 **Fax:** 0171 970 4895 **Advertising email** markp@dotexe.demon.co.uk **Subscriptions** Tel: 0171 292 3706 Fax: 0171 970 4099 email: execirc@centaur.co.uk. EXE is available by subscription at £35 per annum (12 issues) in the UK: see subs card between pages 10 & 11. The magazine is published around the 1st of the month. To subscribe or if you have a subscription query, please call 0171 292 3706 or write to Dianne Henry, EXE, (address above). We can invoice your company if an official company order is provided. Back issues are available at £3.50 each. *'A Subscription implies that this journal will be sent to the subscriber until one of the three expires' (AG Macdonell.)* **Editorial.** Address all editorial enquiries and comments to The Editor, EXE, (address above) or email to editorial@dotexe.demon.co.uk. We welcome letters, opinions, suggestions and articles from readers. These may be edited. Information contained in EXE is believed to be correct. If errors are found, we will endeavour to publish a clarification in the next issue.

Copyright Material published in EXE is copyright © Centaur Communications Ltd. Articles (or parts of articles) may not be copied, distributed or republished without written permission from the publishers. All trademarks are acknowledged as the property of their respective owners.

Repro & Typesetting: Atelier Dataset Ltd **Printer:** St Ives (Roche) Ltd. **Front Cover Picture:** Tijuana Kate **ISSN:**0268-6872

EXE ONLINE http://www.exe.co.uk

GREY MATTER

Prigg Meadow, Ashburton
Devon TQ13 7DF

Prices do not include VAT or other local taxes but do include delivery in mainland UK. Please check prices at time of order as ads are prepared some weeks before publication. This page lists some products – call us for a complete price list. ORDER BY PHONE WITH YOUR CREDIT CARD

(01364) 654100
FAX: (01364) 654200
www.GreyMatter.co.uk
maildesk@GreyMatter.co.uk

Generic OCXs & DLLs

Bar Code	
Bar Code Pro	£136
d-Barcode-32 Developers Kit	£139
Charts & Graphs	
3D Business Graphics 3.0	£206
Chart FX Enterprise 3.0	£254
First Impression 5.0	£133
Graphics Server 5.1	£210
Olectra Chart	£255
ProEssentials 2.0	£220
Comms	
Greenleaf CommLib 5.2 (DLL)	£235
Sax Comm Objects Pro	£296
Data Grids & Spreadsheets	
DataTable OCX	£132
Formula One 5.0	£138
Spread 2.5	£182
Ultimate Grid 97 for ActiveX	£202
Database	
Classic Data Control for Btrieve Std	£175
CodeBase 6.3	£295
VBtrv Toolbox Controls 4.1	£209
Graphics	
Fastgraph for Windows	£226
InterAct 2.0	£843
GUI	
AceToolbar	£75
ActiveListBar	£84
SuiteFace	£255
WinX Component Library	£132
XRosyGUI	£233
Images	
Docs & Images 3.0	£206
ImageGear98 Std ActiveX 6.0	£483
ImageKnife/OCX 3.0	£348
ImageMan ActiveX Suite 5.0	£343
ImagN OCX32	£269
LEADTOOLS Imaging 10.0	£336
TWAINWizard	£99
VectorFX	£244
Victor Image Proc for Win32	£390
Internet	
Distinct Visual Internet Toolkit-32	£345
dsSocket OCX 1.7	£70
SocketTools	£186
Ultimate TCP/IP Pro	£406
Multi-Function	
ActiveX Component Suite	£209
OLETools	£139
Stamina	£150
Reports	
Crystal Reports Pro 6.0	£221
Crystal Reports Standard 6.0	£93
Report FX Win32	£209
Spell Checkers	
Sentry Spell-Checker Engine	£226
VisualSpeller 2.1	£103
Sundry Components	
ActiveX Voice Tools	£245
App-Link RADX Workstation	£139
Driver::Agent Win95/98	£175
Input Pro	£93
InterCom System	£131
Modem GuardX	£414
Schedule/OCX	£152
Solutions::PIM Pro	£235
Solutions::Schedule	£200
UCalc Fast Math Processor	£145
Text Editors	
ALLText HT/Pro OCX	£279
HighEdit Pro	£281
SourceView ActiveX	£226

LOW PRICES FOR MICROSOFT & BORLAND PRODUCTS

Visual Basic 6.0 Professional	£386
Visual Basic 6.0 Enterprise	£916
Visual C++ 6.0 Professional	£386
Visual C++ 6.0 Enterprise	£916
Visual Studio 6.0 Professional	£763
Visual Studio 6.0 Enterprise	£1120
C++Builder 3 Standard	£78
C++Builder 3 Professional	£369
Delphi 4 Standard	£78
Delphi 4 Professional	£415

WITH FULL TECHNICAL SUPPORT

PROGRAMMER'S TOOLS

CASE Tools	
EasyCASE Pro	£911
EasyER/EasyOBJECT 2.0	£1160
Visible Analyst Corporate	£1833
Visio 5.0 Professional	£265
Defect Management	
BugCollector Pro 2.0	£95
MKS Track Integrity 2.1 w/sub	£384
PVCS Tracker	£441
Track Record (per user)	£182
Visual Intercept	£609
Help Tools	
AnswerWorks 2.0	£405
Doc-to-Help 3.0	£295
Doc-to-Help Pro 3.0	£531
DotHLP Pro	£89
Help Magician Pro 4.5	£207
RoboHELP Classic 6.0	£304
RoboHELP Office 6.0	£413
Installers	
InstallSHIELD Express 2.0	£159
InstallShield 5.1 Professional	£495
PC-Install (Win32 & Win16)	£150
Wise Installation System	£191
Wise Installation System Enterprise	£447
Macro Languages	
Cypress Enable (32-bit)	£742
Sax Basic Engine Pro	£275
Version Control	
MKS Source Integrity (w/sub)	£470
MKS Source Integrity Pro (w/sub)	£773
PVCS Version Manager 6.0	£441
SMS 5.3	£445
StarTeam Workstation Pro 3.0	£317
TLIB 5.5 (Win32&16, DOS & OS/2)	£157
Visual SourceSafe 6.0	£386

FORTRAN

Absoft Pro Fortran	£473
Absoft Pro FortranMP	£608
DIGITAL Visual Fortran Standard	£423
Essential Lahey Fortran 90 3.0	£181
FortranPlus System	£250
Lahey Fortran 90 4.5	£762
Salford FTN77 Dev Bundle	£795
Watcom Fortran 77 11.0	£295

PROGRAMMING tools

ActiveX	**Ada**
Basic	**C/C++**
Comms	**Components**
Custom Controls	**Database**
Debuggers	**Delphi**
Editors	**Fortran**
Graphics	**GUI**
Internet	**Lisp**
Modula-2	**Multi-Tasking**
Pascal	**Prolog**
Smalltalk	**SQL**
Version Control	**Visual Basic**
Windows	**Xbase**

We stock many items for which there is no space in these advertisements

DELPHI

Delphi 4 Standard	£78
Delphi 4 Professional	£415
Delphi 4 Client/Server	£1570
Abbrevia	£150
ABC for Delphi 4.0	£117
Apollo Standard 4.0	£121
Async Pro 2.5	£193
BoundsChecker 5.0 for Delphi	£299
Charting Tools for Win - Delphi	£174
CodeSite	£58
DB Power 2.0	£65
DBProgress	£10
DBSortGrid	£26
DNotesVCL	£110
Docs & Images 3.0	£206
Essentials	£52
Helping Hand 3.0	£104
ImageLib Corporate Suite Win32	£299
InfoPower 4.0	£149
List & Labels for Delphi 5.0	£227
MK QueryBuilder	£309
Multilizer for VCL Standard 4.0	£195
Orpheus 2.16 (32 & 16-bit)	£167
Raize Components	£150
Speed Daemon	£128
SysTools	£150
TeeChart Pro VCL	£74
Transform: Component Expert	£110
VisualPROS 2.0	£125

PASCAL COMPILERS

Prospero Ext. Pascal for DOS	£155
Stony Brook Pascal+ 7.0	£445
Turbo Pascal 7.0	£91

WINDOWS CE

ODBC Driver for Windows CE	£42
Ultimate pocketGrid for WinCE	£487
Ultimate TCP/IP Enterprise	£711
Windows CE Toolkit for Visual Basic	£166
Windows CE Toolkit for Visual C++	£166
WinCE Embedded Toolkit for VC++	£412

C & C++ FOR WINDOWS

Charts & Graphs	
3D++ Class Library	£290
GraphiC/NT 7.0	£360
Real-Time Graphics Tools	£315
Ultimate Chart Pro	£568
Comms	
COMM-DRV/LIB 16.1	£132
Fax C++ SDK for Win16/95	£905
Compression	
Compression Plus 5.0	£174
Crusher! Win32	£225
Greenleaf ArchiveLib 3.0	£210
PKWare Data Comp Lib Win32	£223
Database	
DISAM96 for Win95	£715
ProtoGen+ Client/Server	£1360
Report Writer Visual Coder	£75
GUI	
Ultimate 16-Bit CoolTools	£215
Ultimate Toolbox	£372
Zinc 4.2 for Win32	£658
Images - Bitmap	
Ad Oculos Win32	£333
Image SDK Plus for NT	£595
System Level	
Dr DeeBee ODBC Driver Kit Bronze	£2161
Driver::Works 2.0 (Win98 & WinNT)	£574
SmartHeap for Windows Win32	£615
WinDK 2.6	£484
WinDriver PCI WinNT	£564
WinRT for C/C++ 3.0	£280
Tools	
BoundsChecker C++Builder	£299
BoundsChecker Visual C++ 5.0	£399
C-Cover 4.0	£495
CC-Rider 6.0 (Win32)	£293
Exemplar Setup Toolkit Pro	£130

EIFFEL

Graphical Eiffel Student (Win95)	£85
Graphical Eiffel Pro (Win16)	£465
TowerEiffel for Win32 Individual	£495
EiffelCase for Win32	£310

News & Views

Absoft Pro FortranMP 6.0

Multi-Processing Fortran Is Now Available On Your Desktop!

Absoft Pro FortranMP 6.0 brings supercomputer multi-processor and optimisation technology to the desktop. It is the first Fortran toolset for Windows NT to offer auto parallelising SMP tools as plug-ins to the Absoft IDE - greatly simplifying their use. spf analyses your existing Fortran 77/90 source code and automatically inserts SMP directives for dual processors. The result is a version of the original source file that will execute simultaneously on two processors using a special thread-safe runtime library. The single processor variant is still available - Pro Fortran 6.0 is now even easier to use and supports many Microsoft extensions for those porting PowerStation programs.

Mortar 2.0

A Comprehensive, Flexible Web Site Development Tool

Mortar 2.0 is a comprehensive, flexible set of tools for developing static web sites. You create HTML pages using a set of extended tags that supports features such as file inclusion, looping, if-then statements and your own custom tags. These are then converted to regular HTML pages. There is a site manager with tree-like display, syntax highlighting text editor (for HTML, CSS & Java) image map editor, cascading style sheet editor, multi-file search & replace, site grabber and site mapper. You can also customise Mortar by writing your own plug-ins using Java.

DevPartner Studio 6.0

If You Use Visual Studio, You Need DevPartner Studio

DevPartner Studio 6.0 speeds up the development of applications and components built with Visual Studio by automatically detecting, diagnosing and helping to resolve software errors and performance problems. Version 6.0 adds a number of new features to increase developer productivity including full IDE integration; Year 2000 error detection; expanded COM debugging support; Java thread analysis; comprehensive event debugging and performance analysis for MTS-based applications.

Fujitsu COBOL

Integrate COBOL Code With Visual Studio

Fujitsu COBOL is the fastest, most reliable Windows-based COBOL development environment and lets you access, reuse and retarget COBOL programs for client/server and Internet platforms while fully exploiting all the functions of Windows 95/NT and BackOffice. It supports all the latest COBOL standards including Object-Oriented COBOL, can be used with Visual Basic or create stand-alone GUI applications, and supports OLE, COM, DDE, ODBC and MS Transaction Server.

PowerGEN

Are Your Basic Programs Slow and Fat or Fast and Lean?

PowerGEN is a RAD tool for the PowerBASIC DLL Compiler. Now you can create complete visual applications in record time that don't need megabytes of runtime DLLs - everything is linked into a single EXE, often as small as 100 KB total. How easy is it? First, you have to design your dialogs with a visual dialog editor. Then PowerGEN takes over and generates PowerBasic source for the event handler, with an empty function for each control. All that you have to do is fill these in with the necessary code. The event handler code is very efficient, and form loading is virtually instantaneous. It uses binary resources, in the native mode used by Windows, not a slow, interpreted forms engine. Why don't you say goodbye to slow, fat bloatware with PowerGEN and the PowerBasic DLL Compiler!

BASIC LANGUAGE

PowerBASIC Console Compiler	£125
PowerBASIC DLL Compiler 5.0	£135
VisualAge for Basic	£79
XBasic (Win32)	£147

Enquiry No. Oc2

Old programmers

What happens to old programmers? A few events last month prompted me to take the time to think about this rather metaphysical question. One of them was reading Ellen Ullman's *Close to the machine: technophilia and its discontent* (0-87286-332-8). This is the only novel about the life of a developer that I can think of. Partly autobiographical, it goes a long way to explain to people outside our industry this mysterious activity called software development.

Before you turn to the next page thinking that you're young and this doesn't concern you, let me define what I mean by 'old' in my original question. By old programmers I mean developers who have lost their initial enthusiasm. In a way, lost the edge. At the start of your career or hobby (or both for the lucky ones), you look forward to a project involving a language you haven't practised yet, a new technique, the latest tools... That's the time when your CV reads like a list of all possible languages and operating systems:

'Languages: C, Pascal, Ada, LISP, Forth, Smalltalk, Basic, assemblers 6809, 68000 and 80x86, AWK, C++, notions of PL/1.

Operating systems: Multics, Unix, OS/2, MS-DOS, CP/M, Flex 9, notions of VMS.'

(This is not an invented list, I've taken it straight from one of my first CVs – the OS list shows its date. It even listed, in addition, some GUIs and telecommunications experience!)

That's where clichés enter the picture. It is the time when we fit the more positive meanings of terms such as geeks or hackers. It's amazing how many negative connotations are also associated with these terms. Yes we're 'close to the machine', but we are fully involved in a pure creative intellectual act: writing software. And no other creative activity gets so much criticism. As when people move to a different country and start to think and dream in a newly mastered language, so we dream in C++, Lisp, or Delphi. This explains the occasional difficulty in human relationships!

Then at some point, which could be just a few months or a few years or even decades later, you become wary of all the novelty. You only want to get involved in projects based on tried and tested methods. You start querying whether new technologies have proved themselves and whether they represent an advance. That's the time when you get alienated by the commercial pressures that interfere with the pure enjoyment of coding.

I'm talking about the switch from when writing software gives you a buzz, a sort of high, to when it just becomes a job.

Some developers become journalists. I'm not the only one. In journalism you can still have the buzz given by the creative act of writing. Of course, you are close to 'news' all the time, and in the technical press you preview new technologies regularly. But you don't have the time to immerse yourself in any particular technology; you've got to move on to the next issue. In a way, it is very frustrating. You've got to lose some enthusiasm or otherwise you would never finish any article or magazine issue. Most of the languages mentioned above are now just happy memories.

I'm talking about the switch from when writing software gives you a buzz, a sort of high, to when it just becomes a job.

Some become software managers with the emphasis on the latter term. It can be a slow transition. At the beginning, maybe you're still quite involved in the projects, writing some code. And then one day you realise that most of your time is spent in meetings.

Some, of course, become (old) software programmers. This is not pejorative. We need developers to maintain applications.

Our survey, last month, indicated that the majority of our readers rate software reliability as *the* important quality and most shy away from beta software. Are most EXE readers old developers? And as Jules writes in *Mayhem*: '[technology] has to be good, but not great, [...] designers must resist the temptation to keep messing with it – at least until all its users think of it as mundane.'

And I'm sure a few developers quit the industry altogether for the dream of a self-sufficient life out in the countryside, maybe somewhere in the Scottish Mountains...

Why do many of us we move on from this once ideal world of pure software development, where we hacked code and used the latest language manual for bedtime reading, to a more removed situation? For the majority of us, it is definitely not because we didn't enjoy it fully. One of the most common reasons is probably that we enjoyed it too much and got frustrated by the external pressures creeping in. It is gradual. We spend more time maintaining boring applications, more time in meetings. Companies force us to release imperfect code because of financial pressures. Commercial imperatives make otherwise great software fail to reach its potential.

Suddenly we realise we do very little of what we really like, ie just write code.

And then of course, there's the new generation, enthusiastic, fully familiar with the latest developments, ready to take our current or previous job. Software development is still in its infancy as an industry, so it keeps moving the goalposts fast, and keeping up is exhausting.

Am I nostalgic for this perfect time? Definitely. Could I do it all over again today? I'm not so sure. Am I happy to have moved on? Difficult to answer. It has left its mark on me. Being close to people, as opposed to machines, can be fantastic too, but finding friends with an understanding of geeks (for lack of a better term) is not easy.

David Mery

Now Supports Visual C++™ 6.0!

TIME SAVING TOOLS FOR VISUAL C++

OBJECTIVE™ TOOLKIT

Industry's most complete set of MFC extensions which allows you to create familiar user interfaces such as Microsoft Office™ and Developer Studio™.

- **Docking windows** - Add Visual C++ style docking windows including "cool look" grippers.
- **Visual C++ integration** - Now features wizards and on-line help incorporated with Visual C++ IDE.
- **Build wizard** - Dynamically configure the features built into your DLL.
- **Advanced toolbar/menubar** - Office 97 style toolbars and menus that are dockable and customizable.
- **Workspace manager** - Persist the state of all windows in your application and allow the user to restore them.
- **Extended controls** - Tree control, editable list boxes, color wells, calendar, date/time/currency controls, and much more.
- **Zooming/panning** - CView derivatives that support zooming and panning.
- **PRO edition available** - Includes advanced layout management, model-view-controller, docking views, forms and scripting engine.

a member of Objective Studio™

Call now for your free Demo CD

Stingray products are available from:
Rogue Wave Software UK Limited
Tel: 0118 9880224 Fax: 0118 9880360
sales@roguewave.co.uk

STINGRAY™ Software

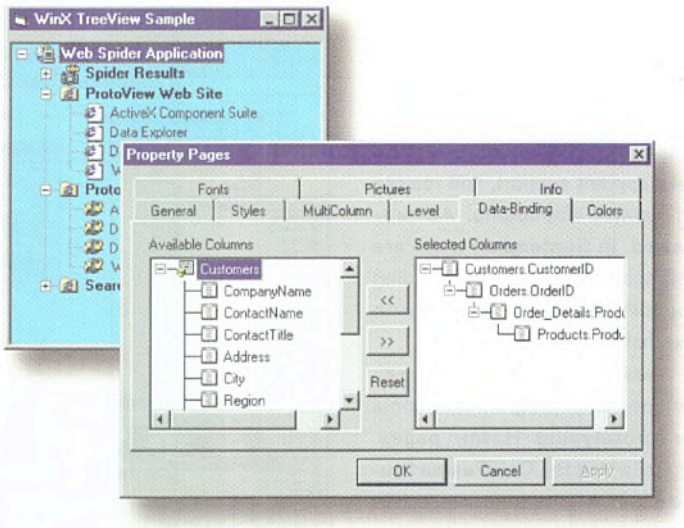
A Division of Rogue Wave Software

Enquiry No. Oc3

www.stingray.com

All products and brand names are trademarks and/or registered trademarks of their respective holders.

ProtoView Component Suite upgraded



Version 3.0 of the ActiveX Component Suite from ProtoView supports OLE DB and Active Data Objects (ADO), and the Microsoft Visual Studio 6.0 development system. Included in the Suite are four individual products, which are also available separately: Data Explorer v3.0, DataTable v5.0, WinX Component Library v3.0, and TreeViewX v3.0 (now available separated from the Component library).

Data Explorer enables the display and editing of application data in a UI similar to Windows Explorer. Version 3.0 simplifies the population of the control, with the ability to visually bind and display OLE DB hierarchical recordsets with ADO.

The grid component, DataTable v5.0, has also incorporated OLE DB/ADO binding to allow developers full integration with Visual Studio development. For added flexibility, variant data types can now be set for cells in the DataTable, allowing each cell in any column or row to have its own unique properties. A new cell type, added for this version, supports the inclusion of a WinX Component Library editing component inside a cell. There is an option for the use of multiple column headers as well as grouping across column headers. Version 5.0 includes OLE drag and drop. Developers can create applications that allow end-users to select records in a DataTable and easily pull them into Microsoft Excel and Word.

TreeViewX v3.0 allows developers to create, bind, and display ADO hierarchical recordsets using point-and-click property pages. It supports sorting, searching, multiple selection, tool tips, and multiple columns.

Finally, in addition to still including TreeViewX, the WinX Component Library v3.0 includes 16 additional data input and validation controls with full support for OLE DB and ADO.

All ActiveX Component Suite products support Apartment Model Threading and digitally signed CAB files for integration with IE 4.0.

The ActiveX Component Suite v3.0 costs £240 from ProtoView. Individually, TreeViewX v3.0 costs £85.

w www.protoview.co.uk/activexsuite

Java development with Oracle

JDeveloper Suite 1.1 includes the newly released Oracle Application Server 4.0. The suite is intended to provide developers with an integrated set of products to build, debug, and deploy component-based database applications for the Internet. It includes Oracle JDeveloper 1.1, Oracle Application Server 4.0, and the Oracle8 Database Server.

Oracle JDeveloper, a visual Java development environment, has integrated editing, debugging, and deployment tools to simplify the building of database applications.

With JDeveloper 1.1 and Application Server 4.0, wizards help developers to write server-side Java code that dynamically generates HTML for any client capable of running a standard Internet browser. The principle is to combine the power of Java on the server with the accessibility of HTML clients. For any static HTML scripting, JDeveloper includes integrated HTML editing capabilities. Using JDeveloper 1.1 also enables the developer to take advantage of the enhanced security, directory, and messaging services in the Application Server 4.0.

For component development and deployment, JDeveloper supports standards such as JDBC, JavaBeans, Enterprise JavaBeans, JFC, RMI, and Corba. Using wizards, developers can convert any data-aware Java class to a data-aware JavaBean or server-side Corba component. Over 100 pre-built JavaBeans are included.

w www.oracle.com

Visual Test 6.0

VisualTest is Rational's tool for the automated creation of functional tests. Features in Version 6.0 include integration with Microsoft Visual Studio 6.0, support for testing web-based applications, and enhanced VB support.

VisualTest 6.0 has 150 functions specifically for web testing. These cover HTML 4, Dynamic HTML, browser-specific HTML extensions, Active Server Pages, and ActiveX controls. Its ActiveX-based testing capabilities have been extended to include ActiveX controls running within a browser.

VisualTest supports VB version 4.0, 5.0, and 6.0, including the ability to access object properties, test new VB controls, and test objects contained within container OCX controls.

w www.rational.com

Cayenne Software is to incorporate the Microsoft **Repository** within its team-oriented modelling products. The Repository will underpin the multi-user features within ObjectTeam (component-based systems modelling), BusinessTeam (process and data **modelling**), and DataTeam (database design).
www.cayennesoft.com

WebTester Enterprise Edition emulates user interactions and tests server response at the peak load of simultaneous hits. It comprises of WebTester (regression testing), **WebMonitor** (site monitoring), and **WebLoader** (scalability testing).
www.cyrano.com

Help by simulation, such as teaching end users with on-screen **demonstrations**, is the goal of the creators of RoboHelp Office and **DemoShield**. For now this cooperation extends to Blue Sky and InstallShield including discount **coupons** for their respective products.
www.bluesky.com/shop/world.htm

From the world of **RISC** processors, the ARM Debugger for Unix (ADU) is a GUI-based debugger for **ARM** software development hosted on Solaris. The **debugger** is available as an add-on to ARM's existing Software Development Toolkit.
www.arm.com

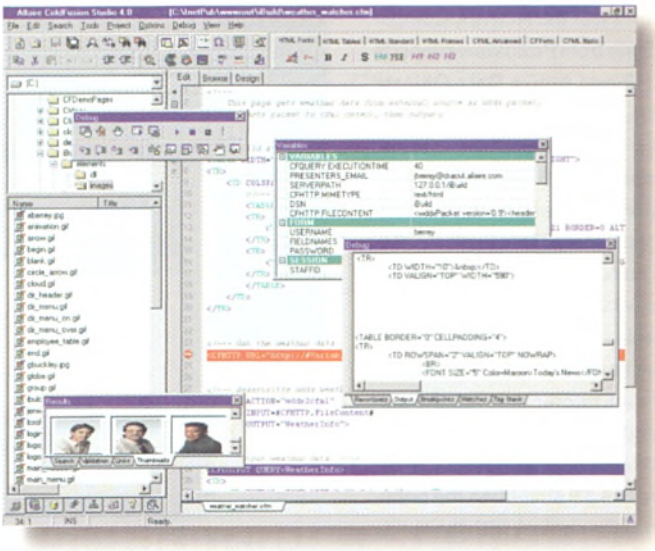
BEA Systems and Select SoftwareTools have agreed to integrate the Select **Component** Factory with BEA's cross-platform **middleware** product, BEA Tuxedo and the Object Transaction manager, **BEA M3**. Select Enterprise for BEA will be released shortly.

The RAD clustering of cold fusion

Allaire has unveiled the latest version of its web application server. ColdFusion 4.0 includes productivity features such as visual programming tools, enhanced team development support, and remote interactive debugging. As previewed, in September, there are new scalability features including support for server clusters with load balancing and fail-over.

Version 4.0's RAD features include visual programming tools for prototyping HTML pages. There is also the ColdFusion Studio support for remote interactive debugging with visual debugging tools. In terms of team development, this release provides server-side source control, and secure remote development for distributed teams.

To expand on existing database integration there are native database drivers for Oracle and Sybase as well as support for OLE DB. There is additional support for XML and Corba.



An embedded version of BrightTiger ClusterCATS provides Cold Fusion with dynamic load balancing across multiple servers to give scalable performance. There is automatic server fail-over.

Enhanced security takes the form of integration with network operating system security services, including LDAP directories and Window NT Domains. Version 4.0 supports server 'sandbox security', a feature that allows companies to securely host multiple applications on a single server.

The Professional edition costs £949 and the Enterprise edition costs £2565. Cold Fusion Studio costs £289.

w www.unipalm.co.uk

Compuware has acquired three Centerline testing tools to be added to *QA*Center, its enterprise-wide **testing** suite. AcquaNavio tests Corba components, while Acqua SQM (Software Quality Management) and **Acqua** ADMS (Application Delivery Management System) provide distributed test process management.
www.compuware.com

Rational Software's ClearCase, the software configuration management (SCM) system, will be available to IBM's **VisualAge for Java** 2.0 users. Access to **ClearCase** will be via IBM's Source Code Control integration.
www.rational.com

Sterling Software has announced an agreement to acquire Cayenne Software. **Sterling** provide enterprise application development systems and **Cayenne** is a supplier of modelling and design environments. The companies anticipate completing the **acquisition** by November.
www.sterling.com

Omnis 7^3 Version 7.0, the **fourth-generation** client/server application creator, joins its sister product, **Omnis Studio**, in an 'All-in-one' package of development kits. It includes Omnis 7 development platforms for **Windows** 3.1, 95, and NT.
www.omnis-software.com

Inprise and **Sun** are teaming up to provide Inprise's development products for **Solaris**. The announcement was made at ICON 98. With **Inprise** targeting industries that employ large-scale, transaction-oriented applications, support for the Solaris environment is seen as essential.
www.inprise.com

We support Visual Studio 6.0

Following on from last month's release of Microsoft's Visual Studio 6.0, a number of companies have announced their support for this version. These include Rational and its development tools, Cayenne and its modelling tools, Phar Laps' TNT Embedded ToolSuite, Object Design and its Object Store database management systems, and Select Software's Component factory development toolset.

Rational's entire line of development tools, from Rational Rose to Visual PureCoverage, will support the Studio 6.0 development system. Cayenne's ObjectTeam will generate code for VC++, VJ++, and VB from ObjectTeam models. Support for reverse engineering, from code into models, is included.

A Phar Lap VC++ 6.0 Support Package will be available to customers as a patch file to TNT Embedded ToolSuite Version 9.1. The integration of the RealTime ETS Kernel with the Developer Studio IDE enables the use of VC++ in conjunction with a hard real-time operating system.

ObjectStore and ObjectStore PSE Pro support the latest Microsoft visual tools. They can be accessed through OLE DB and generate database components specifically for Visual Studio.

Finally, Select Component Manager provides a Microsoft Repository-based solution for the publishing, managing, and reusing of Windows DNA-based components. Select Enterprise provides integrated component modelling support for DNA-based components together with round-trip synchronisation with VJ++, VC++, and VB.

w www.rational.com w www.cayennesoft.com w www.pharlap.com
w www.objectdesign.com w www.selectst.com

Corba 3.0

The Object Management Group (OMG) has announced Corba 3.0. The new version of Corba provides Java to IDL Mapping specifications, includes a Corba Component Model to provide support for distributed components, and addresses the need for a Corba-compliant system that can operate in an embedded environment (Real-time Corba 1.0). DCE/Corba Interworking specifications are intended to provide a roadmap for integrating legacy DCE applications into Corba environments.

The new Java language to IDL Mapping specifications will allow developers to build distributed applications completely in Java and then generate Corba IDL from the Java class files. This will allow other binary applications to access Java applications using Remote Method Invocation (RMI) over Internet Inter-ORB Protocol (IIOP).

w www.omg.org

Q. What's the definition of Internet Time?

1. Development schedules that drive you crazy.
2. Developing software around the clock, around the world.
3. The power and freedom to develop software across the Internet using PVCS Web-enabled tools.

A. All of the above!

Internet Time

Develop Software. Any Time. Any Place.

Meeting tight development schedules means managing projects quickly and possibly from distributed locations. So, what better tool to use than the Internet? With Internet-enabled PVCS Software Configuration Management (SCM) tools, development teams can work at full speed and co-ordinate projects whether members are based down the corridor or around the world.

Free Briefing

20th October - London
22nd October - Reading
29th October - Birmingham

Call UK Marketing on 01727 813302
or visit our web-site: www.intersolv.co.uk

Enquiry No. Oc4

INTERSOLV® | PVCS

Attention Developers

DATABASE PROGRAMMERS RETREAT

Programmers Teaching Programmers

In picturesque Painswick, Gloucestershire

Delphi

D101 - Programming Fundamentals
D201 - Advanced Programming
D301 - Client Server Programming
D401 - Programming 32 bit Delphi

Visual Basic

VB101 - Programming Fundamentals
VB201 - Advanced Programming
VB301 - VB 4 Upgrade

Visual FoxPro

VFP101 - Programming Fundamentals
VFP201 - Advanced Programming
VFP301 - Client Server Programming

Access

AC101 - Fundamentals of Access
AC102 - Application Development

CA-Visual Objects & Clipper

VO101 - Programming Fundamentals
VO201 - Advanced Programming
CL101 - Programming Fundamentals
CL201 - Advanced Programming

About *DPR*

DPR, run by Rick Spence, is a training, consulting, and development company with offices in St. Augustine, FL, and Painswick, UK. We specialize in teaching programmers how to develop database applications, and in developing applications for other companies. Our motto is "Programmers Teaching Programmers". We're programmers ourselves, and we only teach programming.

Classes

All classes are taught hands-on, on state of the art, Pentium PCs. Each student has his / her own PC, which is linked to an NT server running SQL Server, Oracle, and Watcom databases. Class sizes are small, ensuring individual attention. The beautiful surroundings provide a stress-free environment - ideal for learning.

On-Site

We can teach the same classes on-site, and we can customize them for small groups. Although we know you'll enjoy a visit to Painswick, *if you have 3 or more programmers it can make economic sense for us to come to you.* We can also augment our on-site visits with an element of consultancy - we're flexible, just ask.

Instructors

Our instructors are practicing developers with years of both development and teaching experience. Based on practical experience, they supplement course material with real world experience and examples. Rick Spence is well known for his top selling database books, his dynamic and entertaining speaking style, and as a contributing editor to Databased Advisor magazine.

DPR

In Europe: Call +44 (1452) 814 303 or fax +44 (1452) 813 918
In USA: Call 1-800-279-9717 or fax (904) 824 4622
Email: 71760.632@Compuserve.com

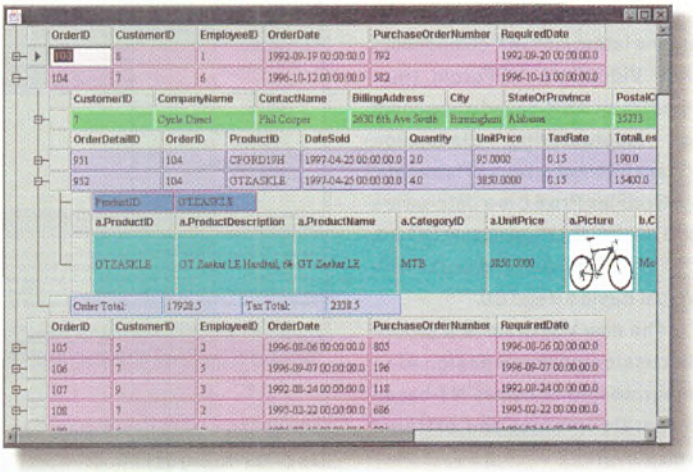
Borland Connections Partner

Enquiry No. Oc5

VISUAL FOX PRO / VISUAL OBJECTS / DELPHI / CLIPPER / VISUAL BASIC / ACCESS

Databases made easy with JavaBeans Suite

JClass Enterprise Suite 3.5, from KL Group, is the latest version of the family of JClass JavaBeans. Developers can use the Enterprise Suite to build GUI applications that connect to databases without cross-platform database connectivity issues. Database data can be shared between different JClass GUI components, and these can apparently be connected to multiple levels of a master-detail relationship. This release includes two new JavaBeans, HiGrid and DataSource, which let Java developers build the database applications without actually writing code.



The JClass Enterprise Suite comprises the following JClasses: HiGrid (pictured) is a RAD outline-grid for developing multi-level data-bound database GUIs; DataSource is a multiple-platform data source that facilitates data binding to components; LiveTable is a Java grid/table for creating tables and forms; Chart is a Java component for embedding graphs and charts into applications and applets; Field is a Java validation Bean for forms and applications; and finally, BWT is a collection of Java UI components to enhance AWT.

The 100% pure Java GUI JavaBeans work within any JavaBean-compliant IDE. JarHelper, a utility for creating deployment archives that contain only the class files necessary for the program, is included. There is one year of technical support provided.

JClass Enterprise Suite 3.5 is available now for evaluation, purchase, or upgrade from the PtS website. Bytecode and source code versions are available with prices starting from £1679.

w www.pts.com/static/jcent.html

Inprise Application Server

Inprise has unveiled more details about its Inprise Application Server. This follows the release of the VisiBroker Integrated Transaction Service (ITS) – the Corba-based middleware that supports Sun's new Java Transaction Service architecture – which is to be a core element of the Server. Scheduled for delivery later this year, the Application Server is an integrated suite of enterprise middleware and development tools that Inprise claim will simplify the development and deployment of applications across complex architectures.

The key components or features will include: visual development tool integration for rapid development; centralised management of distributed applications; a standards-based infrastructure; reliable transactions in a distributed environment; and enterprise-level security.

The integration of visual development tools with the application server is seen as essential to save time and effort for developers. For centralised management, Inprise's AppCenter will be fully integrated with the Server to avoid the need for third party monitoring tools and to simplify deployment and management of mission-critical distributed applications. The VisiBroker ITS (see *News* September 1998) should allow organisations to safely integrate legacy environments and conduct business over the Internet. The standards-based infrastructure is represented by the Server's Corba foundation, the use of Java, and a commitment to support Enterprise JavaBeans. Finally, for security, the Application Server will provide secure communication between components of a distributed application, protect against accidental or malicious corruption, encrypt data, and authenticate clients and servers. VisiBroker SSL (Secure Sockets Layer) will secure the execution of transactions.

w www.inprise.com

XML Object manager

XML Object Manager, from Object Design, is a database development tool that enables the creation of interactive XML-based (extensible markup language) web applications.

The XML Object Manager uses Object Design's ObjectStore, the object database management system, as an XML application database. The idea is that virtually any web professional can use XML Object manager to add features such as data entry, queries, and personalisation to ObjectStore-driven websites by using simple document type definitions (DTDs) for defining the database, and HTML and XML extensions for accessing and updating the data.

Object Design emphasise that XML Object Manager supports XML all the way back to the server: that the relevance of XML is not only to the client side. The intention is that XML is not just about document data but also application data.

w www.objectdesign.com

Oracle8 Wizards for **Visual Studio** (beta) enhance Oracle8 with wizards to speed application development for Windows NT. These wizards generate customisable, reusable code frameworks for web, **Visual Basic**, and C++ **Oracle8**-enabled applications.
www.oracle.com

ILOG **Sheduler** 4.3 enables realtime scheduling and resource allocation. Features include improved **sequencing** algorithms and multithreading mechanisms. ILOG claim the scheduler is five times faster than its predecessor. **ILOG** provides components for resource optimisation.
www.ilog.com

DynaBase 3.0 is a content management system for developing, managing, and dynamically publishing **websites** Version 3.0 provides **XML** support together with workflow features. It plugs in to the Microsoft Internet Information Server and Netscape Enterprise Server.
www.inso.com

Cambridge Control has released a suite which includes new releases of **The MathWork's** simulation and code generation products – Simulink 3, Stateflow 2, and Real-Time Workshop 3, which generates C and **Ada** code from Simulink models.
www.camcontrol.co.uk

From **Graticule** comes **webMapServer**, a toolkit for creating custom **Internet** or client/server mapping applications. The DLL can be used to display vector and raster maps, to distribute map data and to link maps to route finding applications. For Windows NT.
www.graticule.com

A component for discussion

Oracle Migration Workbench is a tool for the instant **migration** from any version of Microsoft SQL Server to the Oracle8 database. Currently in beta, Oracle claims it makes it easier to migrate from a **Microsoft** to an Oracle database than to migrate previous versions of SQL Server to SQL Server 7.0.
www.oracle.com

Internet connectivity for embedded applications is provided by **Embedded** System Product's RTXCnet suite. Web access, through HTTP, is available via the RTXCweb component. Other protocols supported include TCP, IP, UDP, SNMP, PPP, SLIP, and FTP. The RTXCalerter, using **SMTP**, allows system alarms to be transmitted via email.
www.rtxc.com

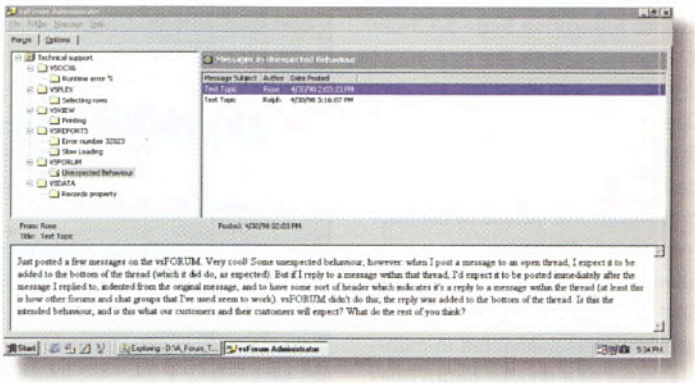
SCO is considering reverse engineering Microsoft's Remote Display Protocol. RDP is used by the NT Terminal Server to deliver Windows apps to **thin clients**. SCO cite the precedent of Samba: **open source** developers reverse engineering Microsoft's SMB. The beneficiary will be SCO's Tarantella, the server software that delivers apps to Java-capable browsers.
www.sco.com

Forté is licensing Sun's Java development tools, to be integrated into the Forté Application Environment. It will enable developers to build and deploy **enterprise**-scale applications written entirely in **Java**.
www.forté.com

VSForum and VSFlexGrid Pro 6.0 are the latest ActiveX components from VideoSoft. VSForum (pictured) is an ASP-based component for incorporating discussion forums into websites and intranets. VSGridFlex Pro 6.0 is a data-aware grid control that supports ADO 2.0, OLE DB, and DAO, and works with Visual Basic 5.0 and 6.0.

The new VSForum is a group-discussion package designed to integrate into Windows NT-based corporate intranet and extranet web servers.

Features of VSForum include a customisable interface to blend into existing intranet and web page designs. There is an administration utility, which performs archiving functions by date, number of messages, and forum sections, and the forum administrator can create and delete topics, sections, and messages. Finally, users can access and create new forum messages using any HTML browser.



VSFlexGrid Pro 6.0 is an upgrade to VSFlex 3.0. It allows developers to create customisable database apps. It includes features such as read and write access to data, in-cell editing and formatting, data input masking, and support for up to 2 billion database rows.

Features new to version 6.0 include support for ADO 2.0, OLE DB, and DAO. There is data input masking for automatic input feedback and data validation, and outlook-style sorting that allows the user to sort and pivot by column headings. Automatic auditing tracks data changes since the grid was loaded into memory.

ComponentSource retails VideoSoft VSForum at £270 and VSFlexGrid Pro 6.0 at £169.
w www.componentsource.com

The Web is all ancient Greek to me

W3C has published the first public working draft of the Extensible Style Language (XSL) 1.0 specification. XSL joins Cascading Style Sheets (CSS) as part of the W3C Style Sheets Activity. Three areas of focus with XSL are the generation of virtual XML documents, the specification of word processor-quality print styling, and full internationalisation of language support.

W3C will be developing both the XSL and CSS style sheet languages in parallel (CSS is used to style HTML and XML documents on the Web). W3C intends XSL and CSS to share the same underlying concepts and to use the same technology as much as possible.

In addition to styling XML documents, XSL allows XML data to be abstracted and displayed to the reader in many different ways, generating different XML documents in response to user queries. (XML is the W3C format for information exchange on the Web.)

In terms of printing on the Web, XSL aims to allow the specification of print styling of Web documents at least as well as a typical word processor. Future support for high-end print typography is planned.

With the internationalism of the Web, XSL allows documents to be written in any language, including historical languages. It also allows the specification of any writing direction. The uses for this range from modern Japanese vertical text to ancient Greek.

w www.w3.org/Style/XSL

Polish or Hungarian

Last month, 300 C++ aficionados attended the C&C++ European Developers' Forum. The enthusiasm of the participants was exceptional. The hall was even full for the first presentation (on language idioms) on a rainy Saturday at 9.30am!

The many seminar tracks brought in experts from both sides of the Atlantic. The conference ended with a 'balloon debate' where a panel of speakers each sought to defend a language from being thrown overboard. The final fight was between Forth, defended by conference organiser Francis Glassborow, and C++ defended by Dan Saks, well-known US C++ author. Somewhat expectedly, C++ won, which answered a participant's question: Polish or Hungarian?

Books received this month

Publisher	Title	Author	ISBN	RRP
AP Professional	FileMaker Pro and the World Wide Web	Jesse Feiler	0126380554	£29.95
John Wiley & Sons	Ready to Run Delphi 3.0 Algorithms	Rod Stephens	0471254002	£32.50
Cambridge University Press	The Patterns Handbook: Techniques, Strategies and Applications	Linda Rising	0521648181	£27.95

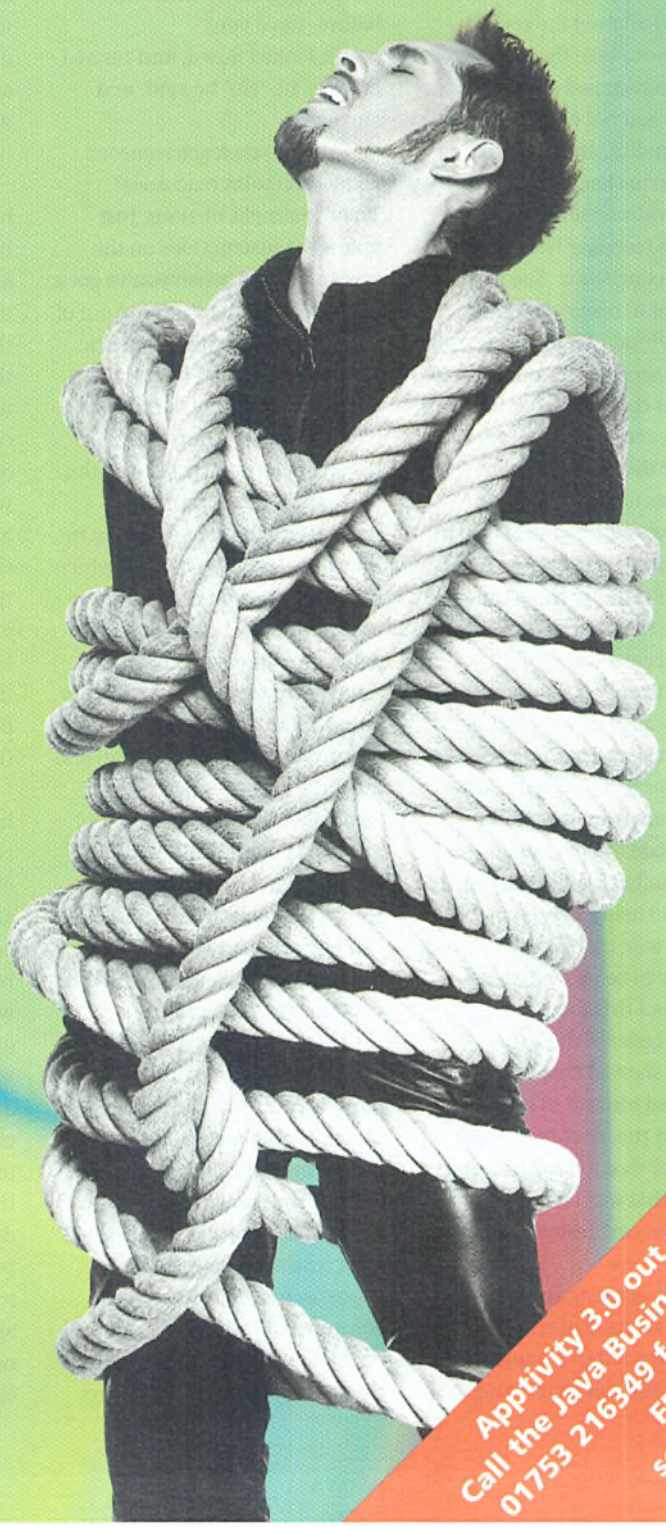
Extending your **business applications to the web** shouldn't be this tough

PROGRESS SOFTWARE
Developing Business

Apptivity™

Introducing Apptivity 3.0 – the fastest way to develop and deploy scaleable web-based applications.

- **NEW** multi-tier CORBA/IIOP application server
- **NEW** Java/CORBA/EJB-based infrastructure
- **NEW** SSL/firewall support
- **NEW** SmartAdaptors support SQL access to major databases, SAP/R3, XML, legacy and packaged applications (SDK available)
- **NEW** auto-sensing SmartClient supports HTML, DHTML, XML and Java clients from a single code base



Progress Software 210 Bath Road SLOUGH
SL1 3XE ·Tel: 01753 216300 · Fax: 01753 216301
Download a trial version from:
http://apptivity.progress.com/

Apptivity: Extending your business to the web

JAVA Compatible

Apptivity 3.0 out now. Call the Java Business Unit on 01753 216349 for details of FREE seminars.

Enquiry No. Oc6

The missing link

Some people still can't use cashpoint machines. Jules met one.

Trying to separate the money and the plastic from the waste paper that cashpoint machines inevitably disgorge, and thankful that the machine had suppressed its sense of humour by not saying 'Game over, player 1', I stepped away from the control panel and allowed the couple behind me to take their chances. Something seemed strange about them; he had not one card but a whole handful, and was holding them at arms length, demonstrating their existence, the way a teenager holds out her first backstage pass. She was holding onto his arm, almost hiding behind him to prevent the machine seeing her approach. He selected a card and fed it into the machine, consulted a piece of paper for the PIN, and then scowled as the machine said something unpleasant. He fed in another card; this time he had to key in his number three times before he received his bad news. The third card was more successful; only one attempt at the PIN was necessary, but then they both stared at the screen waiting for some activity. 'What does it want from me...?' he asked nobody in particular.

Normally, I wouldn't dream of offering to help a complete stranger take cash out of the wall – too easy to be misconstrued, you see, but this intrigued me, not least because the man's question showed that he considered himself to be the servant of the machine, which (no matter that the banks would prefer it that way) is rather putting the cart before the horse.

'Excuse me...' I ventured. 'I can't help noticing the machine is eating all your plastic.'

He was visibly alarmed. 'It's eating them? Oh dear! Does that mean they've gone for good?'

I hope he interpreted my smile as reassurance, rather than amusement. 'No, you can have them back tomorrow – just come back to the bank when it's open. Er – you've not used one of these machines before, have you?'

He looked down, and turned his toes in. 'No' he said, and shrugged.

How do you teach someone about cashpoint machines? They're simple, obvious; just follow the instructions on the screen. Except, when you've got a load of cards, and some are out of date, and some of the magnetic stripes have suffered bit rot and some cards are fine but the PINs have expired because they haven't been used in six months, and even if there's nothing wrong with the card you have to know which PIN goes with which card, because you only get three goes at the PIN before the card gets eaten unless you press the *return card* button after two goes (what damnfool designed *that* security measure? I ask you!) and all of the numbers have to be remembered, and different machines provide different facilities, and... Well, all those things that most of us have learned gradually over the last twenty-five years, I found myself explaining in five minutes.

That's the point, though. Nothing in a cashpoint is very hard, and the machines are carefully designed to be easily usable by customers. But, overall, the measures provided by them are pretty sophisticated – not just withdrawals, but deposits, movement between accounts, bill payments, and so on. Most people have learned how cashpoints think, and are able to figure out for themselves how best to use them. People have even developed a language to describe the machines, independent from the banks – when I said the cards had been eaten, that's an example of conventional usage. No engineer would have invented such a description, because that would suggest a normal transaction would involve spitting out a card half-chewed or untasted.

The person who I met didn't have these linguistic tools. He hadn't even clicked that the activities on the screen were a menu or that they referenced the buttons around the edge of the screen. Where most people understand the affordances of a cashpoint, and are able to operate it to get what they want, he didn't understand it, and without the ability to control the machine felt that the machine was trying to control him. He was stuck, looking at a menu, thinking that any of those things would be nice to do, if only he could figure out how.

I think, looking at technology in general, that this is a recurrent pattern. Technology evolves; it moves in little steps, and while each step is comprehensible in itself, the net result is a body of knowledge which is almost impossible to acquire in one step, and sometimes impossible to acquire at all. Even ten years ago, it was expected that the best programmers knew every bit of the insides of their machines in detail; now I don't think it's possible for any one individual to know all there is to know about even basic machines. As new protocols and standards are erected on top of old ones, the connection between function and activity is growing more tenuous, and it's possible to understand how a function works only by staying in touch with the intermediate stages. Someone who misses a stage, or who approaches a body of functionality after it has been constructed, will have a major comprehension problem. It is practically impossible, for example, for anyone to make small adjustments to the basics of the MFC structures – to make an MDI-looking single document application – without knowing enormous quantities of badly-documented class internals.

Consider again the cashpoint. Most people use these machines for little more than checking balances and withdrawing cash. How many people would know how to pay an electricity bill through the machine, or even why using the machine is better than the alternatives? The designers of those machines understand it, though, and if they continue to add feature on top of function, they will create a system which, though sporting the flexibility to handle any need, will be impenetrable to the customers who want to use it in an emergency to pay a forgotten electricity bill. After all, emergencies – times when the old ways have not worked – are exactly the times when people are willing to try something new.

Technology, whether it's a cashpoint machine, a digital watch, or an entire development platform, must be accessible to its users. That means it has to be good, but not great. It also means the designers must resist the temptation to keep messing with it – at least until all its users think of it as mundane. ■

In spite of accosting bank customers at cashpoint machines, Jules has not been arrested. He can be contacted on 01707 662698, or at mayhem@jules.cix.co.uk.

atm
VISA

Objects r Here.

Everyone agrees: the future belongs to objects.

But today's application developers have limited choices when it comes to harnessing the power of object technology without sacrificing performance, flexibility, or the freedom to use what you like.

Jasmine™ gives you the power you need with the freedom you want.

It's the first complete and pure object solution that has it all:

- The industry's easiest integrated development environment lets you drag and drop, and use all your favourite tools: native Java support, ActiveX controls, built-in VB integration, and C++.
- Jasmine is a powerful, true object database. It supports abstract classes, encapsulation, classification, inheritance (both single and multiple), unique object identity, methods (including instance-level, class-level, and collection-level), polymorphism, and aggregation.
- An industrial-strength architecture featuring SMP support, backup and restore, security, and transaction management.
- Built-in multimedia and Internet support: not only can you build and package the next generation of multimedia business applications; you can run them everywhere: Internet, intranet, extranet, client/server—all without recompiling.

Jasmine is real. A proven, complete object-oriented database and development environment. Unlike hybrid or partial object solutions, Jasmine actually works.

So you can shorten your time to market and gain a distinct competitive advantage.

Try it out—pick up the phone right now. Because Jasmine is ready today.

Are you?

For Details Of Hands On Seminars And How To Obtain A FREE Developer Edition CD, Call 01753 679679 or visit www.cai.com/offices/uk

INFORMATION IN HARMONY™

COMPUTER ASSOCIATES®
Software superior by design.

Introducing Jasmine™
Objects @ Work™

©1998 Computer Associates International, Inc., Islandia, NY 11788-7000.
All product names referenced herein are trademarks of their respective companies.

Enquiry No. Oc7

Unacceptable memory leaks

We welcome short letters on any subject relevant to software development. Please write to: The Editor, *EXE Magazine*, St. Giles House, 50 Poland Street, London W1V 4AX, or email editorial@dotexe.demon.co.uk

Dear Sir,
I feel I must take Robert Ennals to task over one of his closing comments in his *Getting on with your garbage collector* article (July 1998). He said 'If the system can work out when objects are no longer needed and save the programmer the bother of managing object lifetimes, then that is good'. I consider this to be a highly dangerous approach to application development, whatever the language.

I agree that garbage collection has its place in cleaning up unintentional memory leaks and ensuring system stability. But to rely on it for all object destruction is irresponsible. Mr. Ennals goes to great length in the article to explain how garbage collection is not an exact science and how difficult it is to implement perfectly, then suggests that we should rely upon such an imperfect mechanism to memory manage our systems and tidy up the mess after us. The concerns regarding this approach are further reinforced by his statement that 'one needs to understand how it works and give it a little help sometimes'.

Any developer should be fully aware of the usage of all objects within his or her system and explicitly provide for the destruction of each object, once it is no longer required. Casually discarding objects along the way and relying on the system to tidy up afterwards is almost as reckless as using VB's facility for not declaring variables before use. To start down such a route is to encourage lazy and careless coding techniques, which will inevitably lead to lower coding standards and a lower quality of produced software.

Even if the garbage collection mechanism were able to identify all the correct objects for destruction, there is no guarantee that this will occur within an acceptable timeframe; thus there is still scope for the memory leakage to reach disruptive or terminal proportions. In addition to which, there will always be an overhead of unclaimed garbage between collection cycles which, likewise, could present further problems.

Mr. Ennals is suggesting that one should apply the garbage collection principle to applications and enhance the mechanism specifically for each object. Does this not then defeat the very purpose for which he suggests using the inbuilt garbage collection of the language or system, namely to '...save the programmer the bother...' since the programmer would indeed be managing the object lifetimes, albeit via an alternative approach? It may well be that such a tailored mechanism may be appropriate to one or two specific applications but the developer is still responsible for coding that mechanism and ensuring that it is 100% reliable for all objects within the system – so no gain there.

Further to this is the issue of maintenance. Given the complexity of the task, the maintenance of the code by another developer at a later date would rely far too heavily on that developer's understanding of the mechanism used and would be likely to result in further degradation of the code or even a mixture of garbage collection and user coded object destruction.

I, for one, would not be happy if the local plumber were just to hand tighten all the joints in the new water system and then flush the system with a goo that 'usually stops most leaks, as long as the pipes and joints were set up right' – such a plumber would not be getting work from me.

Water leaks or memory leaks, neither is acceptable and is the responsibility of the person providing the system to ensure that they don't occur in the first place. To rely on a 'leak cleanup' mechanism which cannot ensure to provide 100% accuracy is a hazardous approach and one which could leave you with much worse than a damp spot on the ceiling.

Mike Northall,
Software Consultant,
MTBSoft@usa.net

I stand by everything I said in my article. What the Java garbage collector claims to do, it does completely correctly. It disposes of objects that are no longer referenced. This is an exact science and can be done completely reliably.

Things only get problematic if one is holding references to things that one doesn't need. While a little thought is required in order to ensure that one doesn't reference things that one doesn't need, this is still vastly easier than having to do all memory management manually. Not least because manual memory management introduces the problem of deleting objects that one is still using, something that cannot happen with Java.

I have to disagree with the assertion that anything that makes programming easier causes one to be 'lazy', and produce lower quality code. Indeed I would argue to the contrary. Garbage collection cleanly removes a common source of bugs and complexity and allows one to focus on the real problems.

With regard to the time taken to collect garbage, this can be an issue in extreme real-time situations where one needs to be able to prove time guarantees of one's code, but in most cases it really isn't a problem. Memory usage is not likely to grow out of control because if it does, the garbage collector simply adapts to check objects more often. The time complexity of the garbage collection is bounded by the space complexity of the program being collected for, so time spent is not going to get out of hand.
Robert Ennals

Help. What help?

Dear Sir,
May I endorse and broaden Will Watts criticisms of the Help files in the new Delphi 4 (EXE, August 1998)? Other Inprise (Borland) products are no better. Visual dBASE lacks examples for many new features, has no guidance on how to switch to the new OODML and omits reference to some methods altogether. To the extent that I understand a session at the recent Inprise Developer's Conference in Denver covered 'Undocumented Features'! Are details of these being placed on the Inprise website? Apparently not, they are for the ears and eyes of those present at Denver only (though no doubt they will soon leak out one way or another). How odd.

As I try the latest upgrades of other new software I find it more and more difficult to locate simple factual information. Lots of hyperlinks navigating from one bland generalisation to another but often little more.

Finding a list in the latest Excel of all the functions, with syntax and examples, proved quite a challenge in itself. A dancing paper clip is not much use when you are looking for details of `HLOOKUP()`, whatever the MS marketing people may think.

At one time we received good comprehensive books with our upgrades. Excellent for reference and with the bonus that while looking up the current problem one often stumbled on some other hitherto unknown and potentially useful function. Sadly we now get less and less printed material. Yet before they have finally vanished we are already moving towards incomplete online Help. Just how are we expected to learn all the new OOP and other wonders? By intuition?

Of course there may be a more mundane explanation. Various unguarded comments and other clues suggest that new upgrades are now being released so quickly after completion that not only is there inadequate time for proper testing but even less time for writing all the Help and printing such books as are supplied. Even that might be acceptable if the omissions were quickly rectified instead of being treated as a closely guarded secret, as with VdB.

Bob Rimmington,
BobRimmington@compuserve.com

We take all customer feedback seriously, and would like to respond to a few of your concerns.

With regard to Visual dBASE documentation, we made a business decision to focus our resources on updating the legacy information (mainly stripping out or updating outdated examples) while at the same time preparing a solid core documentation set for seasoned dBASE developers. As a result, we didn't get to cover some introductory and general conceptual material. However, one long-time customer called the rewritten Language Reference 'superb. An incredible compendium of technical information presented in readable form and great detail.' We have also had praise from users on the Delphi 4 documentation. We focused on strengthening the technical content of the material. Since we've shipped the product, we've already updated major sections of the Help and made the updates available for free download. And we'll continue to improve the documentation in response to customer needs and make those improvements readily available.

We did make a decision – as have many other companies in this industry – to offer printed versions (books) of the online documentation separately. That way, books can be printed after the product is released. The fact is, when we have to freeze a technical document for print far in advance of product release, customers can get outdated documentation. Most users have come to understand this equation.

Orders for post-release print documentation have been negligible, probably because most users know that all of the printed documentation is duplicated in the online Help system. They know the system provides quick access, comprehensive indexing, full-text search capabilities, the ability to print or copy any topic or series of topics, and the ability to easily download updates and improvements to the system.

Director,
Technical Publications,
Inprise Corporation

BOOCH UML IDEF3 ER Diagrams Jacobson Use Case JAVA PowerBuilder IDL Delphi SYBASE SQL Server IDEFO SMALLTALK Oracle Visual Basic ACCESS Ingress C++ PARADOX Ward & Mellor (real-time) Coad/Yourdon DB2 Rdb (VAX) Object-Oriented Gane & Sarson IDEFIX INTERBASE

Business Processes • Objects • Data

Answer All your modelling needs with one product!

NOW with
• *UML*
• *Web publishing*
• *JAVA*
• *MS-Repository support*

SYSTEM ARCHITECT WILL SATISFY ALL YOUR MODELLING NEEDS:
• Advanced data modelling
• Structured Analysis & Design
• Object-Oriented Analysis & Design
• And Business Process Reengineering

WITH SYSTEM ARCHITECT STORE ALL YOUR INFORMATION IN ONE PLACE: store it in SA's Shared multi-user Repository!

WHEN YOU USE SYSTEM ARCHITECT YOU GET SECOND-TO-NONE:
• Performance (at a lower price!)
• Network support
• Flexibility to customise

Popkin Software & Systems

The System Architect suite of enterprise modelling tools
System Architect • SA/Object Architect • SA/Data Architect • SA/BPR

Get the best for your team! call +44 (0)1926 450858 Now!
or visit us at http://www.popkin.com

Australia +61-6234-6499 * Benelux +31-30-666-5530 * Brazil +55-11-546-0246 * Chile +56-2-633-4733 * Colombia +57-1410-1303 * France +33-3-8944-4476
Germany +49-6131-866622 * Israel +972-99-598999 * Italy +39-49-8283411 * Korea +212-989-9809 * Malaysia +60-3-757-1806 * Spain +34-3-415-7800 * Sweden +46-8-626-8100
Switzerland +41-61-6922-666 * Turkey +90-212-257-48-70 * United Kingdom, Ireland, Denmark, Hungary, Poland, South Africa - Popkin Software & Systems LTD +44-1926-450858

© 1997 Popkin Software & Systems. The System Architect logo is a trademark of Popkin Software & Systems. All other brand and product names are trademarks or registered trademarks of their respective holders. Popkin Software & Systems, 11 Park Place, New York, NY 10007, Phone: +1-212-517-3434, Fax: +1-212-571-3436

Enquiry No. Oc8

Feeling Vulnerable?

Guarding against hostile viruses has become exceedingly complex. Today there are so many doors to your network that it's more important than ever to lock out viruses from every possible entry point.

***Total Virus Defense** from Network Associates is a complete anti-virus solution for the enterprise comprising a number of suites that guard desktops, servers and Internet gateways.*

TOTAL VIRUS DEFENSE

◆ Desktop Protection

VirusScan Security Suite offers comprehensive desktop security against viruses, web attacks and system crashes.

◆ Server & Groupware Protection

Netshield Security Suite offers comprehensive protection against viruses at the File and Group Ware server level.

◆ Internet Gateway Protection

Internet Security Suite offers comprehensive protection against viruses at athe internet gateway.

from £499

network ASSOCIATES
Who's watching your network

www.nai.com

Please call for full licensing options and prices.

PISYS
Creative Technical Solutions

DistKit
the Software Protection Utility

- Time/usage limit your software
- Provided as DLL's, DELPHI 1, 2 and 3 components, and C++Builder 1 and 3 components allowing compilation directly in your application
- Unlock selected features - ideal for sales over the web
- Password/copy protect your software with the most flexible ROYALTY FREE utility on the market

Version 2.1 Price @ £100 + VAT

DistKit
the Software Protection Utility

All product names are trademarks or registered trademarks of their respective owners

---

NEW FROM WISE SOLUTIONS

Wise Solutions offers the easiest, most powerful tools for creating installations for your Delphi Projects. Especially those projects where you need to install the BDE. Choose from three different Installation Suites depending on the level of functionality you need.

InstallMaker™ is the easiest tool to use for fast development of simple installation routines. Just follow the simple 6-step process and you'll create a professional setup in minutes. InstallMaker also includes SmarPatch® for creating "thin" installation patches that contain only the differences between multiple versions of an application.

InstallBuilder™ is the must-have tool for developers who need advanced functionality to develop their installation routines. InstallBuilder includes SmartPatch, fully customizable script editing, integrated, real-time debugging, built-in Windows API calling, custom dialog and graphics creation, and much more!

InstallMaster™ is the ultimate in installation utilities. Designed for the power user, InstallMaster includes SmartPatch, SetupCapture™, for "repackaging" your existing installations into Wise installations, WebDeploy™ for creating dynamic Internet/intranet-based installations, plus all the funtionality of InstallBuilder.

Call today for further info, pricing and upgrades

Wise solutions

Formula One 6.0

ActiveX, Excel-compatible spreadsheet component

Formula One 6.0 is an ActiveX, Microsoft Excel compatible spreadsheet component for building Windows applications in development environments such as Visual Basic, Visual C++, PowerBuilder, and Delphi.

Fast and powerful, Formula One gives you all the most popular features of standalone desktop spreadsheet applications. Unlike these applications, however, Formula One was built with the programmer in mind and includes a complete set of properties, methods, and events.

With Formula One, you receive all the benefits of using a standalone spreadsheet application at a fraction of the footprint and without royalties.

New and Improved Features

- Excel 97 Support
- Increased Rows
- Minimal Re-calc
- Merged Cells
- Cell Capacity
- Date Range
- Improved Cell Editing
- Fractions
- Enhanced Printing
- Mouse Handling
- Tested for Visual Studio 6
- Improved API Searching

£199
Upgrade £89
Per Developer Seat
Royalty-free Runtime

Download an eval from www.visualcomp.com

VISUAL COMPONENTS

QBS SOFTWARE

QBS Software Limited
0181 956 8000

www.qbss.com

Low Prices Next Day Delivery
90 Days Tech Support

Microsoft Certified Solution Provider

Borland Connections Partner

Lotus. Business Partner

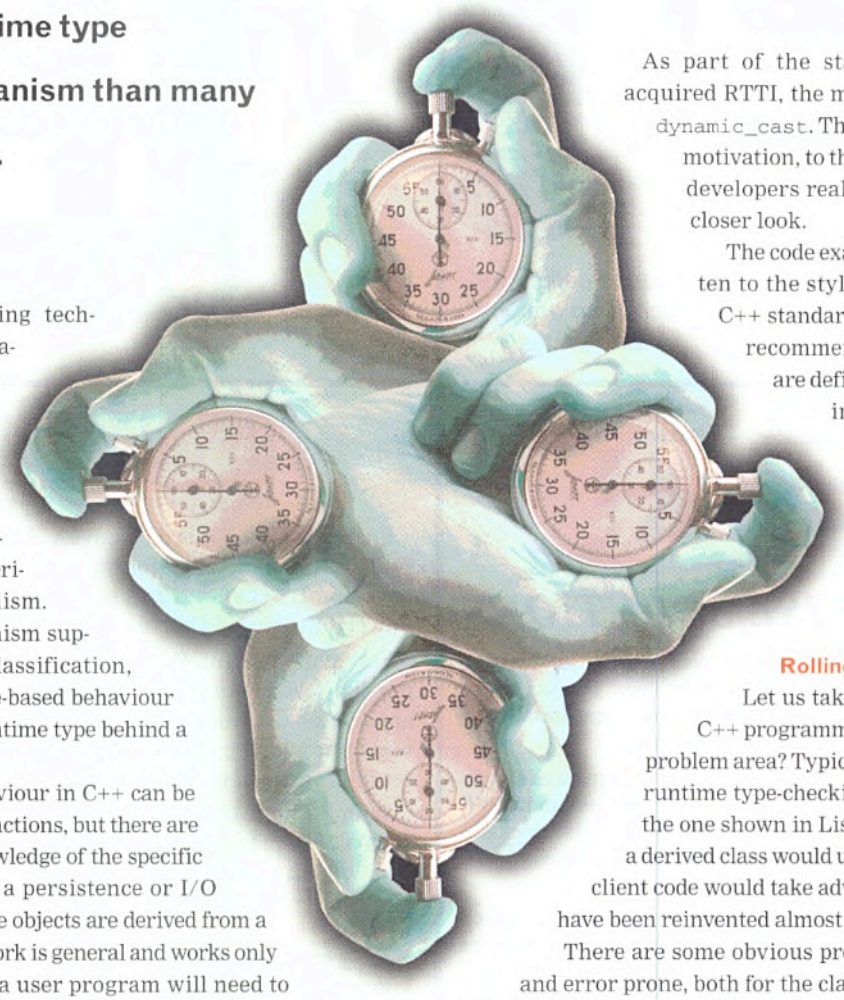
FREE
Catalogue
100's of products
Call for yours today

Enquiry No. Oc9

* prices, subject to change and exclusive of shipping plus VAT

Keeping up with runtime type information

RTTI was originally omitted from C++ and Kevlin Henney shows there is more to the runtime type information mechanism than many developers realise.



Good software engineering techniques, and object-orientation is no exception, are based on principles of abstraction. At heart, abstraction is about hiding and simplification. For OO, the abstraction principles are encapsulation, inheritance, and polymorphism. Inheritance and polymorphism support simplification by classification, expressing variation of type-based behaviour but hiding the detail of a runtime type behind a more general interface.

Most type selection behaviour in C++ can be expressed using `virtual` functions, but there are some cases where more knowledge of the specific type is required. Consider a persistence or I/O framework where all storable objects are derived from a `storable` class. The framework is general and works only in terms of `storable`, but a user program will need to recover a more specific type to be able to use it. This concept is one of type recovery, when an object of a type is passed into a framework and then back again via a more specific type.

Being able to downcast from a general to a specific class is often considered the hallmark of a bad design, but turns out to be a requirement of many OO systems. However, it is a capability that is needed in so few places that the presence of downcasting can still highlight poor design. The capability for typesafe downcast must be supported by some kind of runtime type information (RTTI) and it is this capability that was originally omitted from C++.

Bjarne Stroustrup held back from introducing it into C++ because he had seen how it had been (ab)used for 'type switching' in Simula 67. In an interesting and rare parallel, Bertrand Meyer did not originally include it in Eiffel for the same reasons. However, RTTI and a typesafe downcasting mechanism can be likened to a parachute: not something you need often, but the difference between having one versus not having one, in the few cases it is needed, can be significant!

As part of the standardisation process, C++ acquired RTTI, the most visible aspect of which is `dynamic_cast`. There is perhaps more detail, and motivation, to the RTTI mechanism than many developers realise, so this article will take a closer look.

The code examples presented here are written to the style and content of the new ISO C++ standard. For brevity, rather than as a recommended style, member functions are defined in the body of the class definition rather than out of line. All the standard library features are in `namespace std`, but again for brevity a `using namespace std;` directive is assumed in each code example.

Rolling your own

Let us take the historical route: how did C++ programmers traditionally approach this problem area? Typically, it was by creating a simple runtime type-checking framework, something like the one shown in Listing 1.1. Listing 1.2 shows how a derived class would use it, and Listing 1.3 shows how client code would take advantage of it. Such frameworks have been reinvented almost as often as string classes.

There are some obvious problems with this. It is tedious and error prone, both for the class user and the class provider. Listing 2.1 enumerates the common problems. Some things can be done to alleviate the tediousness and mundane errors. For instance, macros or templates can be used to simplify the responsibilities of the class provider and eliminate cut and paste coding; the job of the class user remains pretty much as before.

To understand why such a scheme requires a language rather than a library solution we must look beyond issues of convenience to more fundamental problems. A roll your own scheme does not work at all well for template classes, as Listing 2.2 illustrates. It is possible to get round some of the template problems and resolve some efficiency issues by using the address of the `static` type information, but the class name will still be the same. The other real show-stoppers are associated with multiple inheritance and `virtual` base classes: assuming you have the type information, what happens with the downcast? A cast through `virtual` base classes results in a compilation error and, for other MI cases, a plain cast may end up as a simple address cast without offset readjustment (chaos follows...).

The typeid operator

It is clear that a language solution is more appropriate than a library one. Part of C++'s RTTI mechanism is the `typeid` operator, which is syntactically reminiscent of the `sizeof` operator. It may take either a type name or a value as its operand, and it returns a `const` reference to a `std::type_info` object – a standard library type – that describes the given type or the type of the given value. If `typeid` had a prototype, it would look much like the following pseudo-C++:

```
const type_info &typeid(value of any type);
const type_info &typeid(type name);
```

To check whether an object is of a specific type, you could write:

```
if(typeid(*ptr) == typeid(example)) ...
```

Note that to use the `typeid` operator the programmer must include the standard `<typeinfo>` header file.

The type_info class

The `type_info` class itself is very simple (see Listing 3). In addition to the `name` member, which returns the type name, you may find a `raw_name` member function on some platforms. This is a non-standard extension that can be used to query the name-mangled version of the type name.

Only the system can create `type_info` objects. Once a reference to a `type_info` has been returned from `typeid`, that reference will be valid for the rest of the program. This is one of the few cases in C++ programming where it is reasonable for a programmer to take the address associated with a reference and hold onto it for later use:

```
const type_info *info = &typeid(*ptr);
```

A good compiler/linker system will ensure that `type_info` for a given type is not duplicated in the system, ie in all translation units of a program, an expression `&typeid(type)` would yield the same address for the same `type`. However, although expected of a good quality implementation, it is not a requirement and not something that can always be achieved, eg when dealing with dynamically linked libraries.

Polymorphic versus non-polymorphic types

How is the type information associated with an object? It would certainly be an unacceptable overhead if each object carried the `type_info` or a pointer to it.

For polymorphic types – ie a type with an inherited or declared `virtual` function – the solution is to use the *vtable*, which already represents a form of RTTI with respect to `virtual` function lookup. Figure 1 shows one possible implementation.

For non-polymorphic types, such a structure would be an unacceptable imposition. It would interfere with the layout compatibility of plain `structs` with other languages, such as C and Pascal. The C++ principle of not paying for what is not used would also be violated.

The solution is that for expressions whose types are non-polymorphic, including built-in types, the `type_info` is determined at compile time. Thus it is quite independent from the object and its memory layout. In this case, `typeid`'s operand is not evaluated as there is no need – this is like `sizeof`. A function `non_poly` that returns a pointer to a non-polymorphic base class will not get called in the following statement:

```
cout << typeid(*non_poly()).name() << endl;
```

However, as the essence of RTTI suggests, an expression resulting in a reference to a polymorphic type will get evaluated, and the `type_info` associated with the most derived class – ie the actual object's type – will be returned. In the following statement a function `poly`, which returns a pointer to a polymorphic class, will be called:

```
cout << typeid(*poly()).name() << endl;
```

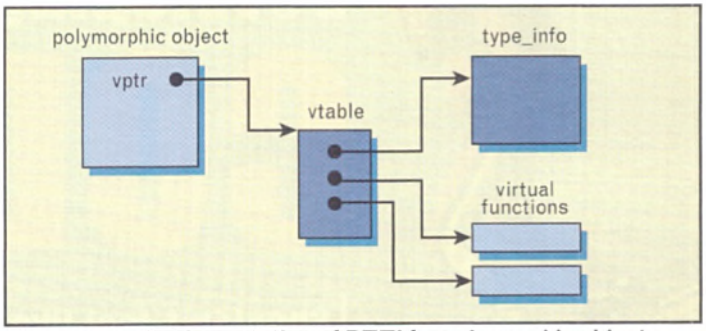


Figure 1 – An implementation of RTTI for polymorphic objects.

If the pointer being dereferenced is null, a `bad_typeid` exception is thrown (see Listing 3).

A common error is to attempt to take the `typeid` of a pointer to a polymorphic object. This results in a `type_info` that describes the pointer rather than what is being pointed to. On reflection, this is perhaps not that surprising; it is the reference to the object that must be used.

The dynamic_cast operator

However, everything is not yet solved. Casting through multiple inheritance and `virtual` base classes is still a problem; having the cast separate from the check is still error prone – only exact type matches can be supported using `typeid`, ie there is no *is-kind-of* check.

This is where the `dynamic_cast` operator fits in. It combines the type check with the cast, and uses the syntax of the new keyword casts (see *Keyword casts*). It is only legal for pointers and references to polymorphic types; it will fail to compile for non-polymorphic and incomplete types. For a pointer, a successful cast will result in a pointer correctly cast and adjusted to the applicable part of the object – including multiple inheritance and `virtual` base class cases – whereas an

```
class runtime_checkable
{
public:
   virtual const string &type() const = 0;
   virtual bool is_kind_of(const string &) const
      { return false; }
   virtual ~runtime() {}
};
```

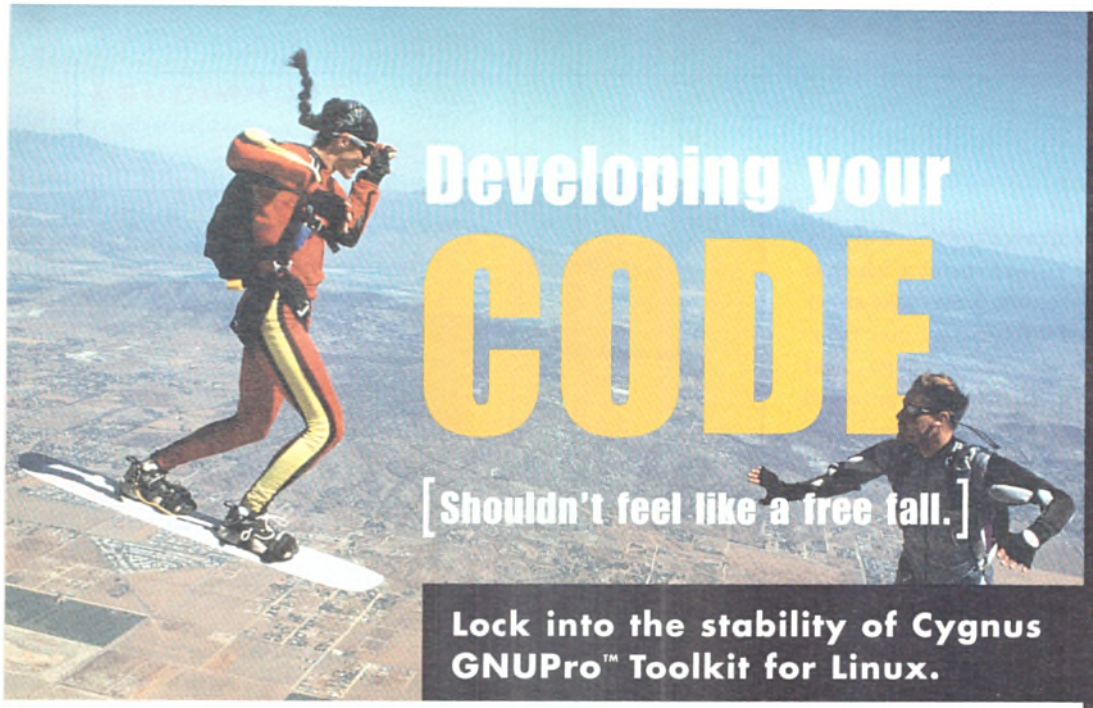
Listing 1.1 – A library solution to RTTI.

```
class example : public runtime_checkable
{
public:
   virtual const string &type() const
      { return type_name; }
   virtual bool is_kind_of(const string
                  &other_type) const
      { return type_name == other_type; }
   static const string type_name;
   ...
};
const string example::type_name = "example";
```

Listing 1.2 – Derived class view of library RTTI.

```
runtime_checkable *ptr = ...;
cout << "runtime type is " << ptr->type() << endl;
if(ptr->is_kind_of(example::type_name))
{
   example *cast_ptr = (example *) ptr;
   ... // use cast_ptr
}
```

Listing 1.3 – Usage example of library RTTI.



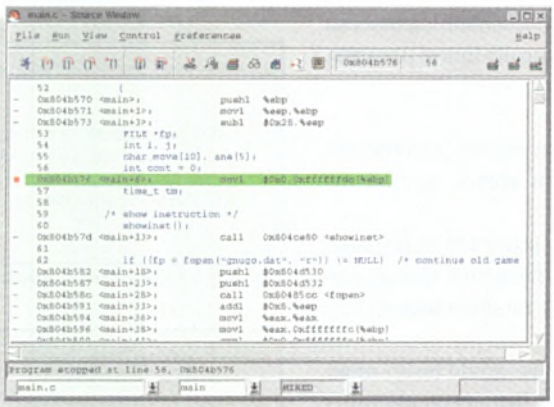
Lock into the stability of Cygnus GNUPro™ Toolkit for Linux.

Key Features

- ANSI-C conformant compiler
- ANSI compliant C++ compiler
- GNUPro visual debugger
- Macro-assembler
- Linker/loader
- Make/build utility
- C and C++ libraries
- Binary utilities
- Printed and online documentation
- Installation CD
- For Red Hat® Linux 5.1 and 4.2

You've been there before. Trying to compile complex code with less than satisfactory tools. You need a professional compiler and debugger that you can trust. Tools that have been tested, proven reliable, and specifically designed for your Linux development environment. You need Cygnus GNUPro Toolkit for Linux.

Take advantage of the GNUPro Toolkit's:



- **Robust and tested tools.** The ANSI-conforming C and C++ compilers, macro-assembler, visual debugger, utilities, and C/C++ libraries have been rigorously tested and enhanced to support development on Linux.
- **Intuitive visual debugger.** The GNUPro visual debugger helps you to quickly visualize, locate, and debug code at the source and assembly level.
- **Easy installation and complete documentation.** With GNUPro Toolkit, you receive an easy-to-install CD, online and printed guides, and a quick reference card to help you become immediately productive. And, to give you a running start, you receive 30 days of installation support.
- **Open source.** Because GNUPro is based on open source technology, you're never locked into a dead-end proprietary software product.

GET IT $149

Certified OFFICIAL CYGNUS GNUPro TOOLKIT

Cygnus has more GNU experts than any other organization in the world. Make sure that your GNU tools are Certified Official from Cygnus.

Need extra assistance?
Upgrade to Cygnus Mission Critical Support. A variety of programs and options are available.

Visit our Web site at
www.cygnus.com/gnupro

euroinfo@cygnus.com

CYGNUS®

redhat. partner

Copyright © 1997-1998 Cygnus Solutions. Cygnus GNUPro Toolkit is a trademark of Cygnus Solutions. All other trademarks are the property of their respective owners.

Enquiry No. Oc13

```
namespace zoo
{
   class animal : public runtime_checkable
   {
   public:
      virtual const string &type() const
         { return type_name; }
      // forgot to override is_kind_of
      static const string type_name;
         // must be "zoo::animal", not "animal"
      ...
   };

   class mammal : public animal
   {
   public:
      virtual const string &type() // forgot const
         { return name; }
      virtual bool is_kind_of(const string
                        &other_type) const
         { return name == other_type; }
            // forgot to chain to animal::is_kind_of
      static const string name; // should be type_name
      ...
   };

   class primate : public mammal
   {
      public:
         virtual const string &type() const
            { return type_name; }
         virtual bool is_kind_of(const string
                        &other_type) const
            { return type_name == other_type ||
                  animal::is_kind_of(other_type); }
               // chained to wrong class
         static const string type_name;
         ...
   };
}
```

Listing 2.1 – Some common problems with DIY RTTI.

```
template<typename value_type>
class container : public runtime_checkable
{
public:
   ...
   static const string type_name;
   ...
};

template<typename value_type>
const string container<value_type>::type_name
                        = "container";
   // different template instantiations will
   // have same string value for type_name
```

Listing 2.2 – Template problems with DIY RTTI.

```
namespace std
{
   class type_info
   {
   public:
      virtual ~type_info();
      bool operator==(const type_info &) const;
      bool operator!=(const type_info &) const;
      bool before(const type_info &) const;
      const char *name() const;
   private:
      // prevent copying
      type_info(const type_info &);
      type_info &operator=(const type_info &);
      ... // implementation not specified
   };

   // RTTI exception types derived from std::exception
   class bad_typeid : public exception { ... };
   class bad_cast : public exception { ... };
}
```

Listing 3 – Contents of the standard <typeinfo> header.

unsuccessful cast will result in a testable null pointer:

```
base *b = ...;
derived *d = dynamic_cast<derived
*>(b);
if(d)
   ... // successful cast
else
   ... // unsuccessful cast
```

As `dynamic_cast` checks that the cast is possible, rather than checking for an exact type match, it is our substitute for an *is-kind-of* operation. Listing 4.1 shows how it can be used to define a type predicate function object, and Listing 4.2 shows it in action as a type filter. If you still hanker for a more explicit *is-kind-of* operator, see the end of the *Keyword casts* box out for how to define your own operators.

Declarations in conditions

It is inevitable that almost all `dynamic_cast` operations will be associated with a null check. This inspired a change to the language. A pointer declaration may be combined with a declaration where a non-null initialisation represents `true`, and a null initialisation represents `false`. The variable has scope over the whole of the control statement, but not outside it. This simplifies the use of `dynamic_cast`, and reinforces the C++ principle of declaration as close to the point of first use as possible.

```
base *b = ...;
if(derived *d = dynamic_cast<derived *>(b))
   ... // successful cast, d in scope
else
   ... // unsuccessful cast, d in scope
... // d not in scope
```

Although originally intended to accommodate `dynamic_cast`, declarations in conditions were generalised so that variables of any type may be declared and initialised in the condition of an `if`, `while`, `for`, or `switch` statement. The constraint on this is that the type must be convertible to the expected type: `bool` for `if`, `while`, and `for`; and an integer or `enum` type for `switch`. This addition to the language also triggered a long overdue change to the scope of a variable declared in the initialiser of a `for` loop.

The bad_cast exception

The `dynamic_cast` operator may be used with references to objects of polymorphic type. The question naturally arises as to what happens in the event of failure: there is no such thing as a null reference. A `bad_cast` exception (see Listing 3) is thrown in such cases:

```
base &b = ...;
try
{
   derived &d = dynamic_cast<derived &>(b);
   ... // successful cast
}
catch(bad_cast &)
{
   ... // unsuccessful cast
}
```

Stylistically, one would use a pointer cast for type queries, and a checked reference cast for assertions, ie the premise is that the cast to the target type will succeed and any other outcome is a failure.

A `bad_cast` exception will also be thrown in the event of ambiguous classes – where a class has been repeatedly, but not virtually, inherited through multiple inheritance. The potential loophole of

Keyword casts

The adoption of the RTTI proposal in 1993, as part of the ISO/ANSI standardisation process, saw the introduction of four new casts, including `dynamic_cast`. The traditional cast form, inherited from C, is not attractive at the best of times. That they stand out is a good thing: explicit conversions are often an indication that the programmer is cheating the type system, and making such assumptions clear in the code is important. Given that, the problem with the old style casts is that they are not clear enough in their intent or easy enough to locate across a large program – how many matching parentheses do you think there are in the average C++ program?

The four keyword casts address these issues. Each one is a specialist, good at only one type of conversion. Based as they are on keywords and explicit template function qualification syntax, they are very easy to locate in your source.

`static_cast`
This cast covers all of the safe casts: widening numeric casts; pointer and reference casts from derived to base classes; construction of objects from single argument constructors; use of user-defined conversion operators; and pointer casts to `void *`. It also covers many of the 'plausible' casts, ie ones that might feasibly be safe if the programmer is to be trusted, but are otherwise not guaranteed: narrowing numeric casts and casts from integers to enumerations; pointer and reference casts from base to derived classes (excluding virtual base classes); and pointer casts from `void *`. Note that the types must be complete, otherwise you will receive a compilation error.

`dynamic_cast`
This cast handles typesafe casting between polymorphic classes of an object via pointers or references. It can handle casting through virtual base classes, downcasting, and crosscasting. It can also handle upcasting, but this is redundant and can be handled at compile time.

`const_cast`
This cast handles changes in cv qualification, ie `const` and `volatile` qualification, for pointers and references. The most common use of this form is to remove `const`-ness, hence its name, and in particular from poorly written code that is not `const` correct. None of the other casts permit changes in qualification, and will flag any attempts as compile time errors.

`reinterpret_cast`
This cast plays the role of the low-level cast beloved of systems programmers: unportable and dubious casts such as converting between pointers and integers, pointers to data, and pointers to functions, etc. Here be dragons, with attitude.

These keyword casts cover almost all of the capabilities, and more, of the older cast forms. Perhaps the one exception to this is casting to non-public base classes. However, this is no great loss. If you are genuinely hell bent on breaking encapsulation, you might as well do it in style: `#define private public` ...

The use of explicit template function qualification syntax means that you can, if you wish, define your own 'casting operators' to perform some kind of conversion and have the same appearance as the keyword casts. For instance, a numeric conversion implemented in terms of `numeric_limits`, and checked for loss of range, might be used as follows:

```
double d = ...;
int i = numeric_cast<int>(d);
```

If you wish to retain the versatility of the old cast forms, but the visibility of the modern cast form, you can achieve this as follows:

```
template<typename result_type, typename arg_type>
result_type explicit_cast(const arg_type &arg)
{
  return result_type(arg);
}
```

casting through to a private base class has been stoppered with a `bad_cast` exception.

Extending available type information

Standard C++ lacks the richness and detail of Smalltalk and Java's reflective capabilities. There are, however, two mechanisms by which type information may be enhanced: the first is open to the system vendor, and the second to any developer.

The `type_info` class is itself a polymorphic base class. A compiler vendor may choose to derive more specific classes from it that categorise and describe types in greater detail, eg a derived class holding extra information on classes, another holding details of function pointer types, etc. How would the user gain access to such extra information, given that `typeid` is required to return a `const` reference to `type_info`? By using RTTI of course! The `dynamic_cast` can be used to probe the specific type for selection and downcasting purposes.

A different technique is to use the `type_info` as a lookup index. This is significantly more portable, extensible, and accessible to the ordinary programmer, but requires additional support types and objects. A programmer may wish to associate a handler object or function, or a key value, with a specific type. This amounts to extending the capabilities of a type non-intrusively outside that type, eg for the purposes of I/O or persistence. It is here that the `type_info::before` member function comes into its own. It defines an ordering between `type_info` objects, but not one that is in anyway necessarily related to class hierarchy, alphabetical ordering, or position in memory. Listing 5 shows a generic map type for looking a value up based on `type_info`.

Navigation

Multiple inheritance ranks up there in the great computing holy wars alongside bracket alignment, editor of choice, real operating systems, and so on. Some regard it as an essential and fundamental

```
template<class base, class derived>
struct kind_of : unary_function<const base *, bool>
{
  bool operator()(const base *operand) const
  {
    return dynamic_cast<const derived *>(operand);
  }
};
```

Listing 4.1 – Type conformance predicate.

```
set<animal *> zoo;
... // populate zoo
cout << count_if(zoo.begin(), zoo.end(),
          kind_of<animal, mammal>()) << endl;
```

Listing 4.2 – Counting the mammals at the zoo with ISO C++.

e-business

Get a **free evaluation CD** and information package, and find out more about Business Intelligence at www.software.ibm.com/bi

How much is it worth to get up and running quickly?

You've got information scattered everywhere – different platforms in other branches, international offices – and your managers and staff need access to it. So when it comes to developing Business Intelligence, where delivering pertinent, timely information helps your users make better decisions, getting up and running fast is invaluable. You can do this quickly and easily with Visual Warehouse from IBM. It extracts, transfers and refreshes data from multiple sources like Sybase, Oracle and Informix automatically. Plus, you can use your existing applications to slice your data any way your users need it. It's available for Windows NT,** HP-UX, Sun Solaris and, of course, IBM platforms. And with its pre-integrated software, including IBM DB2 Universal Database, you'll be ready in no time. You can bank on it. How can you get up and running quickly? Visit us today at www.software.ibm.com/bi or phone Ian Barnes on 01705 498151 quoting reference EXE-VW1.

IBM

Solutions for a small planet

IBM and Solutions for a small planet are registered trademarks and the e-business logo is a trademark of International Business Machines Corporation. **Windows NT is a registered trademark of Microsoft Corporation. Other company, product, and service names may be trademarks or service marks of others. The IBM home page is located at www.ibm.com

Enquiry No. Oc14

OO feature, while others demonise it as a `goto`. It is important to remember that a program is not concerned whether or not you use MI badly. It is the programmer that cares; language features do not have a conscience.

One of the most common good uses of MI has been the style of mix-in programming, where additional 'property' classes are mixed in with a principal class hierarchy to add capabilities, such as persistence or notification. Mix-ins are abstract classes and, in the simplest form, they are pure abstract, ie they have no implementation at all. This use of pure abstract classes has been around for some time, but has more recently come into vogue as 'interface style programming' (see Listing 6.1).

A `dynamic_cast` is normally presented as a safe downcast mechanism, but this is a very narrow view of its capabilities: it may also be used for safe crosscasting to sibling classes. In this context, the role of `dynamic_cast` is to query interfaces (a question for COM programmers: does this sound familiar?) as illustrated in Listing 6.2.

A special case for `dynamic_cast` is casting to a `void *`. This returns a pointer to the beginning of the object, and will not fail. This can be used to support particular memory management schemes or to establish the actual identity of an object. In a multiple inheritance lattice this latter concept can be valuable when establishing whether or not two pointers to different types actually point to different parts of the same object (see Listing 6.3).

In reserve

Although RTTI can be – and has been – easily abused, effective and sparing use can lead to more loosely coupled systems; with poor use, the opposite is very definitely the case. In addition to the high powered uses of RTTI that have been mentioned, having access to basic type metadata such as the type name can assist in more mundane tasks ie debugging and exception reporting.

In spite of the continued use of home grown RTTI systems, native C++ RTTI presents a more robust and comprehensive mechanism for type discovery and navigation within a class hierarchy. ■

Further reading

The Design and Evolution of C++, Bjarne Stroustrup, Addison-Wesley, 1994 (ISBN 0-201-54330-3)
This excellent book describes the motivation and design decisions that have affected the development of C++ over the years, including the genesis and introduction of RTTI, keyword casts, and declarations in conditions.

Inside the C++ Object Model, Stanley B. Lippman, Addison-Wesley, 1996 (ISBN 0-201-83454-5)
This book is written from the compiler writer's perspective of C++, and shines a torch under the hood of C++. It describes the common vtable mechanism and how RTTI may be implemented.

The Annotated C++ Reference Manual, Margaret A. Ellis and Bjarne. Stroustrup, Addison-Wesley (ISBN 0-201-51459-1)
Although this book is getting a bit long in the tooth, superseded as it is by the new ISO C++ standard, it still thoroughly describes the details and implementation issues associated with the virtual function mechanism, multiple inheritance, virtual base classes, and casting.

```
template<typename value_type>
class type_map
{
public:
   value_type &operator[](const type_info &type_id)
   {
      return contents[&type_id];
   }

   const value_type &operator[](const type_info
                        &type_id) const
   {
      map_type::const_iterator found =
                     contents.find(&type_id);
      return found != contents.end()
           ? found->second
           : throw logic_error("bad type lookup");
   }
   ...
private:
   struct compare :
      binary_function<const type_info *,
                  const type_info *, bool>
   {
      bool operator()(const type_info *lhs,
                  const type_info *rhs) const
         {
            return lhs->before(*rhs);
         }
   };

   typedef map<const type_info *, value_type,
                        compare> map_type;
   map_type contents;
};
```

Listing 5 – A generic map type for looking a value up based on type_info.

```
// interface classes
class displayable { ... };
class notifiable { ... };
class storable { ... };

// entity classes
class document { ... };
class wp_document :
   public document,
   public virtual displayable, public virtual storable
{ ... };
```

Listing 6.1 – Polymorphic interface and entity classes.

```
document *d = new wp_document;
...
if(storable *s = dynamic_cast<storable *>(d))
   ... // use storable operations for d
if(notifiable *n = dynamic_cast<notifiable *>(d))
   ... // will not be executed for d
```

Listing 6.2 – Using dynamic_cast to query interface support.

```
notifiable *n = ...;
storable *s = ...;
if(dynamic_cast<void *>(n) ==
               dynamic_cast<void *>(s))
   ... // n and s refer to the same object
else
   ... // n and s refer to different objects
```

Listing 6.3 – Comparing object identity with dynamic_cast<void *>.

Kevlin Henney works for QA Training as a senior technologist, specialising in programming languages and architectures. He is also a member of the BSI C++ panel. He can be contacted by email at khenney@qatraining.com.

Developer Tools? - Look No Further.

NEW MICROSOFT Developer Tools

NEW MICROSOFT TOOLS

The latest versions of Microsoft's developer tools are available. Please check our web-site for new improved features etc. Meanwhile, here's the pricing.

MS Visual Basic 6.0 Pro/Upgrade	£359/185
MS Visual Basic 6.0 Enterprise/Upg	£859/499
MS Visual C++ 6.0 Pro/Upgrade	£359/180
MS Visual C++ 6.0 Enterprise/Upg.	£825/489
MS Visual FoxPro 6.0 Pro	£359
MS Visual FoxPro 6.0 Pro Upgrade	£189
MS Visual InterDev 6.0	£359
MS Visual InterDev 6.0 Upgrade	£189
MS Visual J++ 6.0 Std/Pro	£69/359
MS Visual J++ 6.0 Pro Upgrade	£149
MS Visual SourceSafe 6.0	£359
MS Visual SourceSafe 6.0 Upgrade	£185
MS Visual Studio 6.0 Pro/Ent	£699/1039
MS Visual Studio 6.0 Pro/Ent Upg	£359/699

Special Training Offer - £100 off Microsoft Development Tools Training Training must be taken before 31 October 1998. Call QBS for your training vouchers.

All Microsoft Developer tools come with free 90 days' QBS technical support.

New from devSoft Inc.

IP*Works! is a complete TCP/IP development package covering all popular protocols. **£185**

Internet Commerce Kit (ICK) is geared towards supporting Internet Commerce applications, and it has only a subset of these protocols relevant to Internet Commerce applications. **£165**

DELPHI

Abbrevia 1.0	£125
ABC for Delphi Pro with source	£179
ACE Reporter Professional	£165
Advantage Client Engine for Delphi	£195
Apiary Dev. Suite	£365
Apiary OCX Expert	£189
Apiary NetBIOS Custom Control	£79
Apollo 4 Standard/Pro	£129/260
Apollo 4 Source Code Kit	£75
Argos Clipper to Delphi Utility	£149
Async Pro 2.0 for Delphi	£165
BoundsChecker for Delphi	£299
Component Create	£135
Conversion Assistant DB	£119
DB Power Pro	£65
Delphi 4 Standard NEW	**£79**
Delphi 4 Professional NEW	**£425**
Delphi 4 Client/Server NEW	**£1649**
Delphi 4 Pro/CS Upgrade NEW	**£225/1149**
Direct Access	£189
DNotes / (+source)	£110/ (+175)
DynaZIP 16 bit/32 bit	£175/189
Eagle CDK 16 bit/32bit	£189/209
Essentials Vol 1 VCL directory	£47
Flashfiler	£119
ImageLib Combo 16 & 32 bit (incl. ImageLib@TheEdge)	£109
ImageLib Corporate Suite	£399
Infinity Reporting/MAPI	£89/89
InfoPower version 4 Std/Pro NEW	£150/199
InfoPower version 4 upgrades NEW	from £75
List & Label for Delphi	£290
MK Query Builder with source	£299
Multilizer Std (+src)	£195/390
Multilizer Pro (+src)	£525/1050
Orpheus	£119
Quick Reports 2 with source	£79
ReportBuilder Standard/ Pro	£175/350
ReportBuilder Component	£99
TOLEAutomationClient	£39
TeeChart Pro	£69
Titan for Btrieve/+ source	£265/395
Titan for Access 7/+ source	£265/395
TopGrid/(+source)	£169/(235)
Transform Component Expert	£95
Tsizer/ (+source) NEW	£75/(115)

WINDOWS TOOLS AND UTILITIES

Addsoft *(Upgrades available)*	
Gantt OCX	£185
Resource Manager VBX	£189
Schedule VBX/OCX	£189/185
Apex *(Upgrades available)*	
TrueDBGrid Pro VB/upgrade	£195/165
True DBInput	£115
True DBList Pro	£115
Crescent *(upgrades available)*	
PDQComm VBX/OCX	£99/125
PowerPak Enterprise or Pro OCX	£465
QuickPak VB/J	£149
Desaware *(Upgrades available)*	
ActiveX Gallimaufry	£60
SpyWorks 5 Pro (incl upgrade subs)	£185
StorageTools OCX	£99
Version Stamper VBX/OCX	£99
Farpoint	
ButtonMaker OCX	£70
Input Pro	£95
List Pro	£165
Spread VBX/OCX	£195
Tab Pro VBX/OCX	£90
Greentree	
DataTree/DataMask/DataList	£79/79/79
DataView	£79
ActiveX Suite	£325
Active Toolbox Standard	£85
Active Toolbox Professional	£125
Luxent *(upgrades available)*	
Luxent 3D Business Graphics	£235
Luxent Docs & Images	£235
Luxent Docs & Images Annotations	£365
Luxent MAP Images	£365
Luxent Power Pack	£565
Luxent WebGraphics Server	£635
NuMega (CompuWare)	
CodeReview Pro	£310
DevPartner Studio/VB/VC	£685/425/515
FailSafe Professional	£310
Soft Ice	from £310
TrueTime VB or VC++	£310
Pegasus (ImageFX)	
CapturePRO NEW	£135
FractalFX VBX	£265
FXTools Gold	£265
ImageN DLL or VBX or ActiveX	£265
RivetText NEW	£69
SuiteFace NEW	£265
VectorFX 32 bit OCX	£245
Protoview	
Data Explorer 32 bit	£135
DataTable OCX	£135
DataTable DLL	£135
Interact Diag. OCX/DLL	£275/£275
Interact Diagram combo	£345
WinX Library	£135
Sheridan	
ActiveListBar	£90
ActiveToolbar&Menu	£110
ActiveThreed	£90
ActiveTreeView	£129
ActiveSuite	£345
Calendar Widgets	£90
ClassAssist	£157
Component Suite (Cal+Data+Des)	£229
Data Widgets	£90
Designer Widgets	£90
Sp_Assist	£375
VBAssist	£119
VideoSoft *(Upgrades available)*	
VS Data ActiveX	£125
VS Direct	£120
VSFlex OCX	£160
VS Reports ActiveX	£95
VSVBX/VSOCX	£50/95
VSView OCX	£160
Visual Components	
First Impression ActiveX	£125
Formula One ActiveX	£129
Visual Components Studio	£229
Visual Speller OCX	£95
Visual Suite Deal OCX	£225
Utilities - Help Systems	
Doc-To-Help 16 or 32 bit v.3	£289/295
Doc-To-Help 3.0 Pro	£525
ForeHelp 2 16/32/Suite	£259/269/440
Help2HTML	£145
Helping Hand	£99
Help Magician Pro	£199
RoboHelp Classic/upgrade	£325/199
RoboHelp Office	£475
SOS Help! Info Author	£185
Utilities - Other	
Crystal Reports Pro v6.0	£249
Crystal Reports Pro v6.0 Upgrade	£149
Crystal Comm 32 (+source)	£135/(275)
DemoShield 32 bit	£330
DemoQuick 16/32 bit	£575
Dynamic Update	£199
English Wizard SDK	£250
ExtraFax for Lotus Notes Std/Lite	£669/399
InstallShield 5.1 Pro	£495
InstallShield Express Pro	£165
PC-Install DOS&WIN combo	£225
PC-Install Win + Internet Ext.	£265
R&R ReportWriter xBase 32 bit v 8	£239
Shrinker 3.0	£99
soft SENTRY	£475
Wise Version 6.0 Standard	£199
Wise Version 6.0 Enterprise	£465
Misc	
3D Graphics Tools 16/32	£119/129
Active Bar	£90
ActiveDelivery Std/Pro	£175/289
ActiveReports	£265
Address Rapid Addressing SDK	£149
Aegis v 3.6 1-5 user	£350/user
Basic Constituents	£119
Chart FX 16/32/bundle	£175/175/245
DBest Barcodes for DOS/Win	£199/345
DistKit Software Protection	£100
ED for Windows v 3.8	£145
ErgoPack for VB, VC++ and Delphi	£225
Erwin Desktop for VB	£395
Graphics Server SDK	£225
LeadTools Pro 8.0 32 bit OCX	£249
Map Tools	£745
MKS Source Integrity (incl PCS)	£450
MultiEdit /Evolve	£135/109
Olectra Chart ActiveX	£239
Olectra Resizer ActiveX	£130
PVCS Tracker	£425
Report FX 16/32/bundle	£199/199/275
Sybase SQL Anywhere	£190
Sybase SQL Anywhere 4 User	£395
TeeChart ProActiveX NEW	£99
TX Text Control OCX	£279
VB Commander NEW	£105
VBCompress Pro	£130
VB Language Manager Pro	£195

C/C++

Borland C++ 5	£225
Borland C++ 5 Dev Suite	£315
Borland C++Builder 3 Std	£79
Borland C++Builder 3 Pro/Upg	£379/225
Borland C++Builder 3 CS/Upg	£1565/1049
BoundsChecker Pro C++	£429
CC Rider 16/32/bundle	£220/300/400
C-Vision from Gimpel	£179
Codebase 6.3	£245
Dart Power TCP Internet Toolkit 16/32	£399
Great Circle Debugger Pro	£535
Greenleaf Comm++	£199
High Edit ProActive / Pro	£275/345
IP*Works! NEW	£185
Leadtools 9 WinPro DLL 16/32	£495/595
MKS Toolkit	£299
MS Visual C++ 6.0 Pro/Enterprise	£359/825
MS Visual C++ 6.0 Pro/Ent Upg.	£180/489
Object Master	£195
PC Lint from Gimpel	£179
TrueDBGrid Pro for Visual C++	£265
VBTrv for C++	£245

WEB INTERNET JAVA

3D Webmaster	£795
Borland Datagateway Pro	**£235**
Borland Datagateway Client/Server	**£949**
Codebase 6 with Java Docs	£245
Cold Fusion Pro/Workshop	£729/365
Cold Fusion Forums	£279
Crescent FTP Internet Data Control	£79
Crescent Internet ToolPak v4	£199
Delphi2Java/Database Ed NEW	£65/265
Distinct Vis Internet Toolkit 16	£245
Distinct Vis Internet Toolkit 32	£295
InstallShield 5 Java Edition	£325
InstallFromTheWeb	£260
Instant Basic for Java Std NEW	£69
Instant Basic for Java Pro NEW	£530
Internet Commerce Kit (ICK) NEW	£165
PackagedForTheWeb	£193
Jamba Professional	£189
JBuilder 2 Pro	£425
JBuilder 2 Client/Server	£1585
Java Workshop	£85
JClass BWT/(+ source)	£49/(175)
JClass Chart/(+ source)	£310/(785)
JClass Field/ (+ source)	£150/(375)
JClass LiveTable/(+ source)	£310/(785)
JDesignerPro 5 user/50	£130/465
JProbe Java Profiler	£375
DataTableJ	£135
MS Visual J++ Pro	£69
Multilizer /Java Standard	£195
Multilizer /Java Professional	£525
NetIntellect	£150
SuperCede Std/Pro	£75/450
Sybase PowerJ Enterprise USP	£550
Sybase PowerJ Enterprise	£1645
Visual Café 2.5 PDE	£199
Visual Café 2.5 DDE	£635
WinJ Component Library	£135
TreeViewJ	£35
VB 2 Java	£59

Web Design & Authoring

Adobe PageMill	£79
ColdFusion Home Site	£65
ColdFusion Studio	£215
Macromedia DreamWeaver	£275
Macromedia Flash	£239
MS FrontPage 98	£99
NetObjects Fusion	£195
NetObjects Team Fusion	from £695
Symantec Visual Page	£69

EXTENDED

Advantage DB NLM Srv 2 usr DK	£215
Advantage DB NLM Srv 5 usr	£645
Advantage ODBC Client kit	£195
Advantage API Client kit	£105

CLIPPER

Argos - Clipper to Delphi migration	£149
Blinker Linker	£225
Clip-4-Win	£195
dGE Graphics	£245
FUNCky 2.5	£199
NetLib Network Library	£269
Scripton PostScript Library	£129
SilverClip SPCS Comms	£249
Summer '93 Code Optimiser	£159
Telepathy Adv Serial Comms	£195
Xbase++	£269
XBTools++	£269
Xbase on the Web (per server)	£199

NET TOOLS

Total Virus Defense	from £499
WinInstall	from £495
Zero Administration Client 10 user	£495

POWERBUILDER

PowerBuilder 6 Desktop/Pro	£185/1090
PowerBuilder 6 Enterprise	£2895
PowerTCP Add-on for PowerBuilder	£99

SPECIAL OFFER

£50 Discount on RoboHelp Office when you buy InstallShield 5.1 Professional

£495 ~~£475~~ **£425**

QBS Software Limited

Tel: +44 (0)181 956 8000
Fax: +44 (0)181 956 8010
www.qbss.com

Business Alliance Programme

Microsoft Certified Solution Provider

Lotus. Business Partner

Borland Connections Partner

For the full auto-response QBS Price List send email to prices@qbss.com.

All prices, correct at time of going to press, are subject to change and do not include shipping and VAT. All trademarks recognised.

Enquiry No. Oc15

E X P A N D

YOUR

TEAM'S

PRODUCTIVITY

WITHOUT

EXPANDING

YOUR TEAM.

Call and request FREE 14 Day License!

DEVPARTNER STUDIO HELPS DEVELOPERS DELIVER WINDOWS APPLICATIONS FASTER.

Compuware® NuMega™

Finding good developers to crank out more software is tough (not to mention expensive). But with NuMega DevPartner Studio™, you can turn up productivity of your existing team. Its suite of SmartDebugging™ tools for Microsoft Visual Studio® accelerates development of multi-language components and applications. Using NuMega DevPartner Studio, individual developers can deliver reliable applications and components almost as fast as whole teams can. That's because it automatically detects, diagnoses, and facilitates the repair of errors and performance problems anywhere in your application. You get automatic error detection and system debugging, plus performance and deployment analysis, all integrated into one value-priced package. So save time and money. Cancel that developer recruitment ad and order NuMega DevPartner Studio Today.

Microsoft Enterprise Development Partner

+31 20 3118808 www.numega.com

SmartDebugging™ for faster development VISUAL C++® VISUAL BASIC® JAVA™

Copyright © 1998 Compuware Corporation. All rights reserved. All trademarks and registered trademarks are the property of their respective owners.

Enquiry No. Oc16

30-DAY MONEY BACK GUARANTEE

Help me in HTML

Andrew Foster

Focusing on the HTML Help format, Dave Jewell rounds up three of the leading help development tools: RoboHELP Office, Doc-To-Help, and HDK.

Constant change, as the saying goes, is here to stay. Some years ago, the innovative Threadz Organizer (now Lotus Organizer) received rave reviews for the way in which its user interface mimicked a real-life filofax, even down to the 'burst into flames' wastebasket into which you could dump unwanted items. Nowadays, the top-end contact managers and PIMs are moving away from the filofax paradigm, which is seen as being increasingly dated and passé. Microsoft is hoping that Windows developers and users will likewise see the faithful old WinHelp engine as a thing of the past and embrace the sexy-looking new HTML Help system.

Part of the reason for the emergence of HTML Help is frankly political and – some would say – a cunning but cynically manipulative move on the part of Microsoft. An extract from Microsoft's documentation for the HTML Help system states that: 'It [HTML Help] uses the underlying components of Microsoft Internet Explorer to display help content.' (Taken from HTML Help Workshop online help.) For the last year or so, Microsoft has been feverishly working to promote the view that Internet Explorer is a core component of the operating system and therefore cannot (allegedly) be removed from Windows, irrespective of what the US Department of Justice might say.

Thus, we have a situation where the new Windows help file system supposedly uses basic components of IE. Likewise, we find that there are important additions to the common controls that require the latest version of IE to be installed. The new HTML Help engine requires the same COM-based HTML viewing component that's used by the browser, then there's Active Desktop that uses... well, you get the picture.

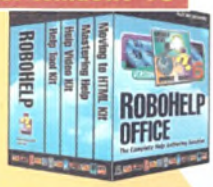
Develop to...

Delphi

Build better applications for Windows and the Web. Add performance, functionality & versatility.

Pervasive.SQL v7.0 – Newly released, Pervasive.SQL v7.0 now combines both Btrieve and Scalable SQL in one exciting product. Delivers the transaction speed of Btrieve, together with the sophisticated relational query capability of Scalable SQL. Linked by a single common microkernel in one package. Available for the Windows NT or Netware platforms with client support for all flavours of Windows and Netware, OS/2 and DOS. From **£615**

New! Ready for Windows '98



RoboHELP Office – Now you can write once and output all leading industry-standard Help formats. RoboHELP Office guides you through the entire process of creating professional online Help and information systems for Windows 3.1, 95, and NT, Windows CE, WebHelp, web sites, as well as the new Windows 98/NT 5 format called Microsoft HTML Help, and printed documentation. **£418** ...call for upgrades.

New version

Visible SYSTEMS CORPORATION

EasyER/EasyObject, New Version 2.0 – Visible Systems have released version 2.0 of their object-oriented database design tool. New and improved features include the database views design feature for building views from columns from several tables, compare and alter features for comparing database structures and generating alter statements for synchronising the two structures. Reverse engineering of SQL DDL and new reporting features add to the ease of use. Integration of EasyObject with EasyER aids the transition of relational ER diagrams to the new UML (Unified Modelling Language) object oriented class diagrams. only **£995**

LEADTOOLS Imaging – LEADTOOLS offers imaging technology in 15 general categories: scanning, colour conversion, display/special effects, annotations, image processing, compression, image format import/export filters, Internet imaging, database imaging, printing, multimedia, Imaging Common Dialogs, OCR, FlashPix format and screen capture. The result of eight years of development, the toolkit literally puts millions of lines of code at the fingertips of application developers. LEADTOOLS Imaging – (16 and 32 bit ActiveX) – LEADTOOLS popular ActiveX imaging toolkit allows developers a choice between a 16 bit or 32 bit development environment and includes C documentation. Choose the right package to suit your needs! – Toolkit also available in Multi-Media, Medical Imaging and more...! Only **£299**

New version

Codewright Professional Programmer's Editor premia

Codewright 5.1 – The programmer's favouite editor for large and complex source code projects. The speed and flexibility of Codewright 5.1 is enhanced by the addition of 3 scripting language options. Working with code is easier with side-by-side differencing , change merging, tags etc. CodeWright synchronises file with your Microsoft or Borland IDE. Call for upgrades. Still only **£159**

Be the first to get your copy of the New Microsoft Visual Studio 6.0 and Unleash the Power of Windows and the Web! Maximise your productivity, develop faster than ever before. Write less code: Reuse components from any language, automatically generate application logic from visual modules and take advantage of programming wizards. Inc; Visual Basic, Visual C++, Visual J++, Visual Interdev 6.0 and Visual FoxPro. Prof upg **£363**, Ent upg **£724**.

**Save £50 when you buy NuMega's DevPartner Studio with your upgrade!*

System Science News!

- **Sybase SQL AnyWhere Studio** – new version of Adaptive Server Anywhere, with extra features for synchronising workgroup and mobile databases. Studio also includes modelling and report tools. Call for upgrades.
- **IoMega Jaz Drives now available from System Science** – tailor made for the Software development field you can store up to 8GB's of work on one drive. Call for more details.
- **New catalogue** – call for the latest System Science release!

Data Junction 6.5 – Find unprecedented Data Conversion Power with the newly released Data Junction Version 6.5. Critical new features include more native SQL formats, new mass insert spokes, expanded data transformation power, metadata repository, a new delete mode for SQL and a new sort function. Enhance your team management with large file support and improved SDK's, and choose the upgrade that fits you data conversion needs by choosing from the Personal; **£245**, Professional; **£530** or Enterprise; **£1050** editions.

DATA JUNCTION CORPORATION

Enquiry No. Oc17

0171 833 1022

● PLEASE CALL IF THE ITEM YOU ARE LOOKING FOR IS NOT LISTED ● CALL FOR OUR COMPREHENSIVE CATALOGUE ● PRICES ARE EXCLUSIVE OF VAT ● SHIPPING TO MAINLAND UK £10.00. SAMEDAY LONDON DELIVERY AT COST ● PRICES ARE SUBJECT TO CHANGE - PLEASE CALL TO CHECK ● VISA, ACCESS, & MASTERCARD ACCEPTED WITH PHONE ORDERS

SYSTEM SCIENCE

1 Bradley's Close, White Lion St. London N1 9PN Fax: 0171 837 6411

www.systemscience.co.uk

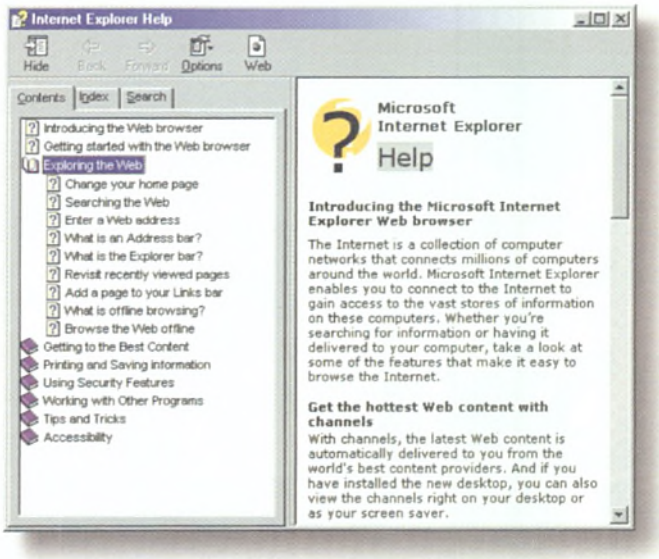


Figure 1 – HTML-based help first appeared as part of Microsoft's Internet Explorer. HTML Help makes it very easy to incorporate animated graphics into your online documentation, such as the animated question mark in this illustration.

In this roundup, I take a look at three of the leading help file authoring tools: RoboHELP Office, Doc-To-Help, and HDK. All of these products now offer the ability to create files in HTML Help format, and this article will major on this aspect of each system.

RoboHELP Office 6.0

The version of RoboHELP 6.0 reviewed here is the full 'Office' product, which includes both RoboHELP Classic and the newer HTML Help version of RoboHELP. The official name of the HTML variant is 'RoboHELP HTML Edition'. It was formally known as RoboHTML and I'll continue to use the older name for the sake of brevity. You may remember that Blue Sky Software established an early reputation through the use of its innovative RoboHELP system that runs inside Word, converting the word processor into a help authoring system. There are obvious pros and cons with such an approach, the most obvious one being that you won't get far without a copy of Word! Although still actively marketed, this `.HLP` file development tool has been renamed RoboHELP Classic to reflect the increasing focus on the HTML Help file format.

The new development environment is quite different from its predecessor. Instead of a Word add-in, RoboHTML appears as a standalone WYSIWYG application complete with an Explorer-style navigation window on the left, a content pane on the right, and a couple of draggable, dockable toolbars. As with the latest version of InstallShield, Blue Sky is essentially attempting to emulate the look and feel of Developer Studio on the assumption that many developers are familiar with it. Thus, there's a compilation pane along the bottom of the window and even a set of tabs below the navigation window for selecting different views of the world (see Figure 2).

The content pane also sports a set of tabs for examining an individual topic in various ways. Much of the time you'll be using the WYSIWYG tab, which provides a good representation of the finished topic. There's a TrueCode tab, which shows you the topic as syntax-highlighted HTML source code (similar to the `View|Source` option in Internet Explorer), and a Link View for examining the links between different topics, identifying URL links, broken links, and so forth.

As you'd expect, you can easily import existing HTML and Word documents (including Word 97) into RoboHTML with much of the formatting being preserved. Even tables seem to make it through the sausage machine without significant injury and you can create new tables within the design environment. Once you've got your body of text into the help development system, it's very easy to bash it into the shape that you want. RoboHTML has a particularly rich set of text formatting options that – in some cases – rival even those of Word itself. Fancy creating a bulleted-list with a custom bitmap to represent the 'bullets'? Well, you can do it easily with this package.

Instead of a Word add-in, RoboHTML appears as a standalone WYSIWYG application.

You can create and maintain style sheets that appear in the navigation panel as part of the project hierarchy. It's relatively straightforward to 'link' an existing style sheet to a topic, although personally I think it would be better if you could just drag a style sheet over and drop it onto a topic. In addition to linked style sheets, you can embed style definitions into individual HTML files (topics) on a one-off basis, and of course you can also select text and massage it 'inline' in the usual way using the various text formatting buttons on the toolbar. Thus, you've got a three-level hierarchy of linked style sheets, embedded style information, and inline styling, with the style information at the bottom level taking precedence over the higher level information.

GIF and JPEG can be easily incorporated into your project (but see later comments on the graphic file locator) though the WYSIWYG won't give you a real-time display of animated GIF files doing their thing. You can set up images as backgrounds to a topic and – if you must! – you can even tile a topic background with a small animated GIF.

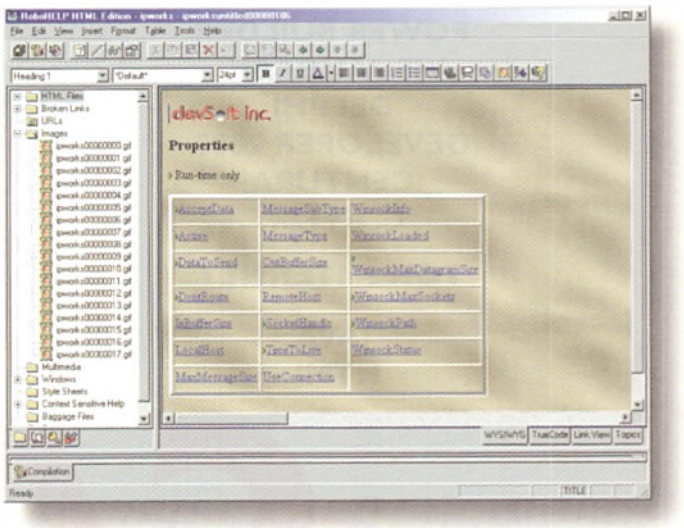
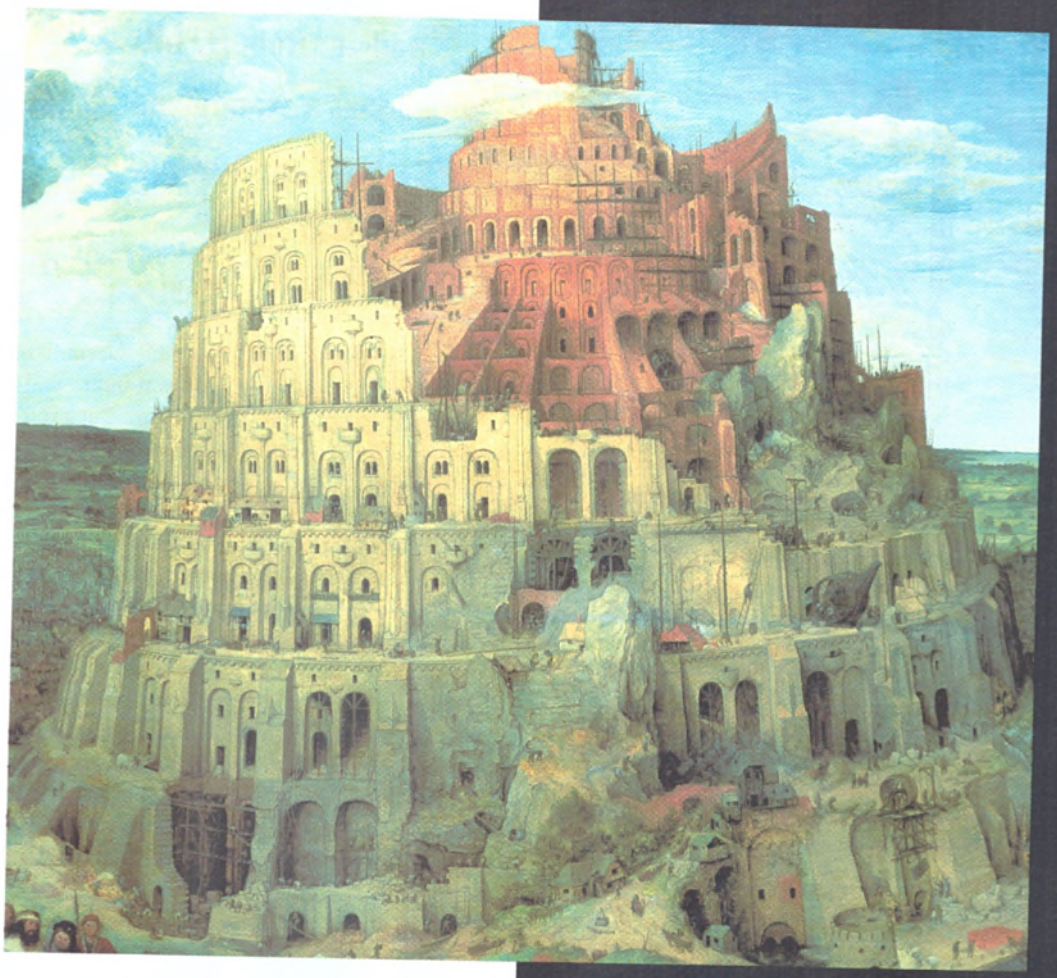


Figure 2 – RoboHELP HTML Edition makes it easy to cover all the basics. This is a help file that I've taken from a shareware application, converted to a HTML Help project, and then 'enhanced' in various ways. It could be recompiled as a `.CHM` file or published as part of a website.

NEW IN UK



TRANSLATE

FOR WINDOWS

POWER BUILDER
VISUAL BASIC
DELPHI
DEVELOPER 2000
CENTURA
C, C++, ...

FOR INTERNET

JAVA
HTML

ANY GRAPHICAL APPLICATION

IN TO

CHINESE
GREEK
RUSSIAN
GERMAN
BASQUE
FRENCH
JAPANESE
SPANISH
...

WITH

CATS

CATS UK

Call: (0171) 556 70 39 - Fax: 44 (0171) 556 70 01 **OR** www.catssoftware.com

Enquiry No. Oc18

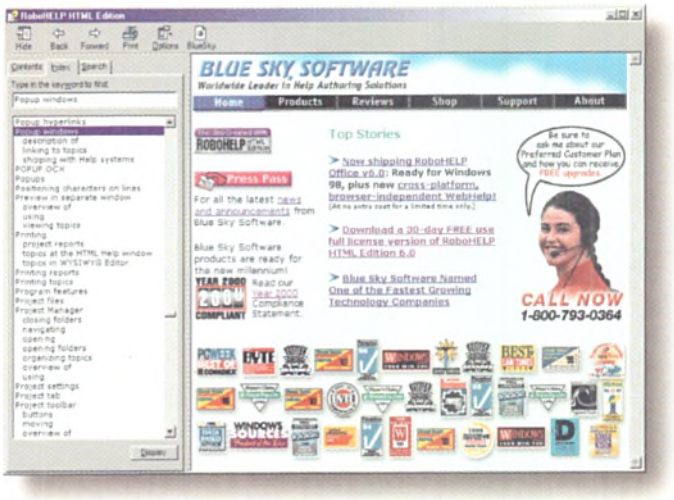


Figure 3 – Because the HTML Help ActiveX control is using the same underlying HTML display engine as Internet Explorer itself, you can browse the Web from the HTML Help viewer. Here's part of the Blue Sky site, which was created using RoboHELP itself.

Enter hyperlink stage left

A particularly cute aspect of RoboHTML is the inclusion of support for a number of 'special effects', each of which is provided courtesy of the Dynamic HTML support in Internet Explorer 4.0. Using the `Format|Special Effects` menu you can, for example, select a chunk of text, a hyperlink, or even an image and then choose which effect you want to apply to the selected item. You can have the object fly in from any of the four points of the compass, make it 'glow' when the mouse cursor moves over it (good for creating hyperlinks with immediate visual feedback), apply transitions, fade-ins, drop shadows, and so forth. It's all rather addictive and therein lies the danger: take care not to overuse these special effects or else the novelty will rapidly wear off and your end users will end up cursing while they wait for the wanted hyperlink to enter from stage left!

RoboHELP Office 6.0 ships with around 4" of printed documentation, which is approximately 3.95" more than most people seem to provide these days. The documentation comprises a large volume on the 'Classic' edition, another on the HTML edition, a third volume that discusses all the extra tools and utilities that ship with RoboHELP Office, and a fourth booklet about the 'What's This? Help Composer'.

Tools, inspectors and utilities

What's that lot then? As with previous other 'Office' products from Blue Sky, the package includes a large number of tools, inspectors, and conversion utilities. If you've invested a lot of time in creating a nice `.HLP` file for your product, you obviously don't want to start from square one when going over to HTML Help. With RoboHTML, you don't have to. There's a nice utility that will convert an existing `.HLP` file into a set of 'source' files, separating out all the individual topic files, GIFs, and so forth. There's another utility for taking a `.HLP` file, creating a set of RoboHTML sources, and recompiling into `.CHM` format – and it works too! Some tweaking may occasionally be required, but the vast bulk of the work is done for you.

The 'What's This? Help Composer' is another utility worthy of note. As you'll realise, under Windows 95/98, it's possible to right-click on dialog components in many applications and have a little 'What's This?' menu pop up. When clicked, this displays a popup window with information on the clicked control. The Composer utility can automatically parse a compiled `.EXE` file, Visual Basic project, `.DLL`, or

Because we're talking HTML here, there's no reason why you can't use RoboHTML to build a website!

`.OCX` file searching for dialog resources. It builds help system entries for each encountered control, adding them to an existing help project or optionally creating a new project as required. Naturally, you've got to supply the help text (!) but again, it's a great time saver.

A simple 'My first HTML help file' as created by RoboHTML comes out at a mere 11 KB and – unsurprisingly – compilation speed is almost instantaneous on a 300 MHz Pentium II. In order to give the system something serious to get its teeth into, I tried out one of the `.HLP` conversion utilities mentioned earlier, using it to convert a pre-existing 427 KB help file into source code. This process took about one minute to complete and would probably have been speedier if my machine hadn't been downloading an 8 MB update to Delphi 4 at the time – 'nuff said! Once converted, a recompile took 17 seconds (that's 515 topics, nearly 6000 links, and 18 graphics) and I ended up with a 321 KB `.CHM` file. Impressive, or 'wot? By default, RoboHTML is configured to create compressed `.CHM` files. The compilation report indicated that – without compression – the file would have been over 1.2 MB in size.

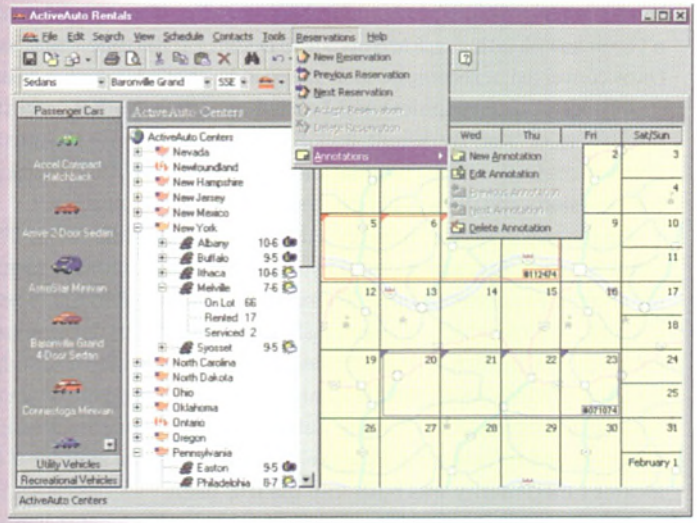
On the negative side, there are a few rough edges in the RoboHTML camp. Suppose, for example, that you want to locate a suitable graphic for your newly created topic? There's a built-in graphic file locator, `LOCATE32.EXE`, which is seamlessly executed by the development environment in such circumstances. At least, it should be seamless but, under Windows 98, the file locator twice crashed on me while the main IDE continued to sit there patiently waiting for the locator to talk to it, and refusing to talk to me! It would surely be simpler if the locator functionality was built into the IDE itself.

In any event, I wasn't too impressed with the file locator because – though fast – it had a tendency to dismiss relatively small GIFs as

Figure 4 – RoboHELP Office includes an initially bewildering array of tools and utilities. Fortunately, under Office 6.0, they're all neatly accessible through this RoboHELP Office program.

Talk about a Suite Solution...

Presenting Sheridan's ActiveSuite Components



Used individually or wrapped in a bundle, our ActiveX™ controls help you develop your customers' favourite program flavour: The "look and feel" of Office '97.

Satisfy your need to simulate the appearance of Microsoft® Office '97, with Sheridan's ActiveSuite series of ActiveX components. Not only will they help you build your applications with a look that everyone knows and prefers, they also provide you with clever, time-saving short-cuts that dramatically boost productivity. Individually, our ActiveX components are powerful tools that dynamically speed development. Together, they form an integrated bundle that delivers a flexible, affordable solution. It's the fastest, easiest, most logical way to give your applications an integrated look of Office '97.

Each ActiveSuite product in the series is a 32-Bit ActiveX component and supports Microsoft Visual Basic®, Visual C++® and Internet Explorer™. Individually packaged, ActiveSuite products deliver the familiar, rich UI elements of Office '97.

Now, that's a suite solution.

ActiveListBar™ Perfect for web and client/server developers, it lets you create web pages and traditional applications that emulate the sliding group metaphor used in Office '97's Outlook™ Bar for grouping icons into logical subsets.

List Price:
£99.00 *

ActiveThreed™ Gives applications the "look and feel" of the Internet, with Active control features such as a multi-pane splitter, like that in Microsoft Windows Explorer™, transparent backgrounds, and button styles with active borders.

List Price:
£99.00 *

ActiveTreeView™ The ideal drop-in replacement and a perfect super set of the TreeView control in Visual Basic®. Lets you navigate large corporate databases more efficiently. It also features three data modes for enhanced database connectivity.

List Price:
£139.00 *

ActiveToolBars™ Allows you to produce MenuBars and ToolBars just like those in Office '97. With its unique WYSIWYG designer, ToolBars and MenuBars appear in design-time just as they will at run-time, shaving hours off development.

List Price:
£115.00 *

*** VAT and delivery to be added to all quoted prices.**

©1998 Sheridan Software Systems, Inc. All rights reserved. ActiveToolBars, ActiveTreeView, ActiveSuite, ActiveListBar, ActiveThreed, Shersoft, and the Sheridan logo are trademarks of Sheridan Software Systems, Inc. Microsoft, Visual Basic and Visual C++ are registered trademarks of Microsoft Corporation. Windows Explorer, Internet Explorer, Outlook and ActiveX are trademarks of Microsoft Corporation. Information and prices subject to change without notice.

Order ActiveSuite, or any of its four components NOW by calling 01344 873434. Take advantage of ActiveSuite's WYSIWYG design capabilities and rich UI enhancements today.

List Price:
£350.00 *

CONTEMPORARY software

Enquiry No. Oc19

Contemporary Software Ltd,
The Mews, Kings Ride Court, Kings Ride, Ascot, Berkshire SL5 7JR
Fax: 01344 872228 E-mail: sales@contemporary.co.uk
Tel: 01344 873434 www.contemporary.co.uk

Figure 5 – Doc-To-Help offers support for a number of different types of Help project, including four different variations on the HTML theme.

'Not a valid graphics file' when there was actually nothing wrong with them. I'd also like to see a multi-level undo facility in the WYSIWYG view. Currently, this is limited to only one level of undo. The TrueCode editor provides a 1000-step undo facility, but implementing multi-level undo in a text-only editor is relatively trivial.

That said, these are relatively minor gripes. Overall, I was very impressed with RoboHTML and not just for its ability to create Help files. Because we're talking HTML here, there's no reason why you can't use RoboHTML to build a website! As it happens, I've been doing just that, and quite frankly I've found it easier and more intuitive to use than many of the top-end HTML authoring packages around. I'm not alone here – Blue Sky has used RoboHTML to design its website, and very nice it is too. Speaking of which, you can download a 30-day trial version of RoboHTML from *http://www.blue-sky.com* or *http://www.robohtml.com*.

This is a complex product (a full install of the Office version will set you back by nearly 80 MB of disk space) and there's not the room to cover everything here. Let me just finish by mentioning WebHelp, another interesting goodie that you'll find lurking in the RoboHELP Office box. Using WebHelp, you can apparently create implementations of HTML Help projects that run on other platforms such as the Mac or Sun Solaris. This is achieved through a set of Java classes that replace the usual ActiveX controls, thus eliminating the need for Internet Explorer.

Doc-To-Help 3.0

Even before you've finished installing WexTech's Doc-To-Help, you realise that it's a completely different animal to RoboHTML. Only part way through the setup, I was told that the installation program couldn't find Microsoft's HTML Help Workshop and I was advised to install it before loading Doc-To-Help. Once this was done, and Doc-To-Help was loading, I was then told in no uncertain terms that I needed to close down Word (it was running at the time) before the installation could continue. Later, I was asked various other questions relating to Word. As you may have guessed by now, Doc-To-Help 3.0 is much less of a stand-alone help development environment than RoboHTML. Like RoboHELP 'Classic', Doc-To-Help runs as a Word add-on.

As the product name suggests, the primary emphasis of Doc-To-Help has always been the conversion of printed documentation into online help. The product philosophy has been that you create your printed documentation with an eye on conversion to `.HLP` file format.

The primary emphasis of Doc-To-Help has always been the conversion of printed documentation into online help.

Thus, for example, what might appear as an explanatory margin note in the printed documentation will translate into a popup hint window when converted. Similarly, a cross-reference becomes a hypertext link, and so on. Even when you start a new help project from scratch, the initial Word documents created will 'look' like printed documentation.

Having loaded Doc-To-Help and started Word, you'll find that everything looks completely normal until you choose `File|New`. At that point, you'll see that a number of new templates have been installed into the system. Choose one of those as the basis for a new document, and the Doc-To-Help toolbar will appear, giving access to the help development system. This toolbar has buttons for setting project options, adding chapters, margin notes, glossary terms, cross-references, hypertext links, and so forth.

With RoboHELP and RoboHTML, there is a clear distinction between the 'Classic' product and the more recent HTML system. This distinction doesn't exist in Doc-To-Help. Instead, you use a project options dialog to create build targets for specific platforms, and the help development system will then invoke the correct compiler according to the platform that you've selected.

Doc-To-Help 3.0 supports the following platforms: Windows 3.0 (as the documentation states, this is rarely used these days, but you'll typically create a Windows 3.0 Help file if you need to ensure that it runs on practically everything); Windows 3.1 (this is the preferred choice if you're creating, say, 16-bit shareware applications, and you want the help system to be accessible under Windows 3.1, Windows 95/98, and NT); and Windows 95/NT (this is the most recent, and probably the last, variant on the `.HLP` theme – compatible with NT 3.51, Windows 95, and later).

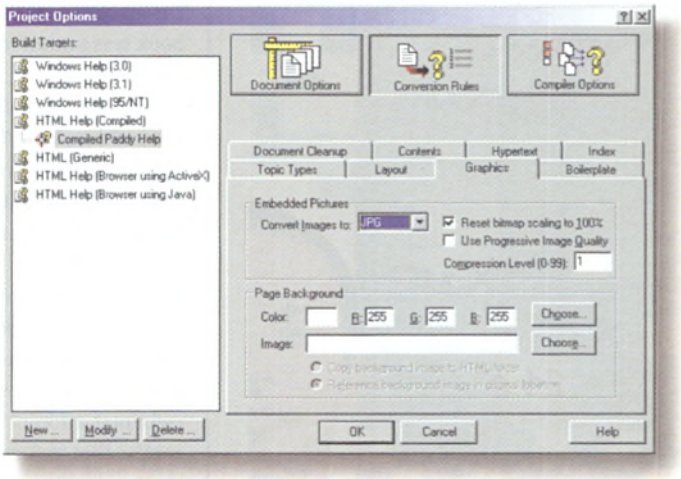
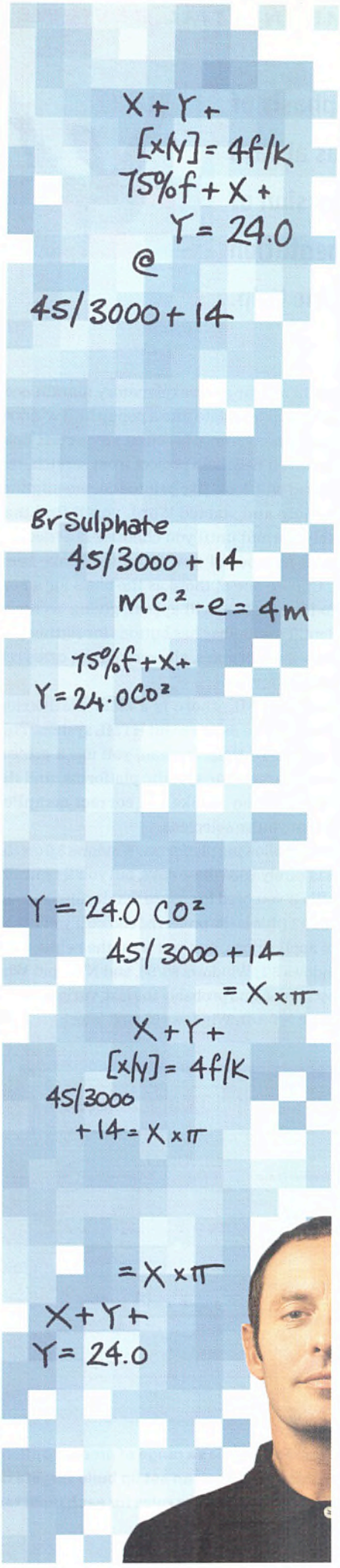


Figure 6 – As with HDK, Doc-To-Help has a range of product options that are available from within Word. You can set up build targets on the left and then set up different conversion rules for each build target on an individual basis.



The shortcomings of HTML Help (primarily, problems with browser independence) were decried in no uncertain terms.

In addition to the preceding, four different HTML 'platforms' are supported: Generic HTML (usable with any browser, but limited in functionality); HTML Help, with ActiveX (for use with browsers that support ActiveX, thus allowing hosting of Microsoft's HTML Help ActiveX control); HTML Help, using Java (analogous to the RoboHTML WebHelp facility, this uses a Java applet to replace the ActiveX control); and Compiled HTML (this corresponds to the compiled .CHM file we all know and love).

Within each platform, you can set up multiple build targets. These allow you to specify that the document conversions are performed in different ways, that certain documentation is included into one help file but not into another, and so on.

On the printed documentation front, WexTech is less generous than Blue Sky. There's a chunky user manual that takes you through the basics of working with Doc-To-Help and includes a limited amount of material on HTML Help. Additionally, the package includes a snappily-named Microsoft Press book, 'The Official Microsoft HTML Help Authoring Kit'. As the name implies, this book is all about how to make best use of the free Microsoft HTML Help Workshop, which I've referred to earlier. The tie-up comes by virtue of the fact that the book was authored by Steve Wexler, the president of WexTech.

Version 3.0 of Doc-To-Help includes a copy of version 1.7 of the same product. This is for folks who are still using Word for Windows 2.0 and creating help files for the 16-bit marketplace. There's also a copy of AnswerWorks in the box. AnswerWorks allows you to enter free format, natural language queries into an edit box and have the help system figure out what the user is trying to say. For instance, if you enter, 'How do I reformat a topic?' the system will correctly realise that 'reformat' is just a variant of 'format' and will search for all entries that relate to topic formatting. Sometimes it's more successful than others. If you type 'I'm going to kill Bill Gates', I'd argue that it should either confess that it doesn't know what you mean, or else phone the nearest police station. Instead, it latches onto the only word with any real meaning – kill – and brings up all topics that relate to deleting information.

You can download a 30-day evaluation copy of Doc-To-Help from the WexTech website at *http://www.wextech.com/*.

HDK 3.3

Virtual Media's HDK 3.3 has always enjoyed a reputation as a very full featured help authoring system that, traditionally, could often stretch the parts of the Windows help engine that other products couldn't reach. The company pioneered a number of add-ins for Windows help files, such as hierarchical topic viewers, the ability to zoom into a graphic, and so forth. As with Doc-To-Help, Virtual Media's offering is closely tied to Microsoft's Word.

First impressions, it has to be said, were not good. Once I'd installed HDK and restarted Windows 98, I found that HDK 3.3 was continually causing GPFs even when I was doing nothing more complex than browsing through its own help system. Fortunately, a reinstall fixed that one. I then found that I was getting a reliable GPF in a small DLL called WHLP16T.DLL. Once again, this caused a certain amount of head scratching, but I eventually discovered a small entry in the HDK documentation which stated that the problems was caused by an interaction with Microsoft's IntelliPoint 2.0 mouse support. Again, disabling Microsoft's mouse support fixed the problem.

Unlike Doc-To-Help, HDK provides you with a reasonable amount of tutorial information and sample help projects to get you going. There's a rich online help system that acts as a showcase of HDK's capabilities. However, as with Doc-To-Help, there's very little emphasis on support for HTML Help. In fact, I found several places in the Virtual Media documentation where the shortcomings of HTML Help (primarily, problems with browser independence) were decried in no uncertain terms. Well, I suppose if you've got a major investment in the existing .HLP file format...

Background to HTML Help

Why move to a HTML-based help system? What's wrong with what we've already got? When I first heard that Microsoft was planning to move over to a HTML system, no details were initially released by Redmond, and I was horrified at the prospect. The existing HLP system is compact, efficient, and (thanks to a couple of informative articles in *Dr. Dobb's Journal* a few years back) the overall file format of `.HLP` files is reasonably well known. Moreover, you can put an entire help system into a single, easily transportable file. The idea of a new HTML-based system conjured up thoughts of each help system being spread over a mishmash of separate HTML documents, GIFs, and so on. Nice to browse help files using a standard web browser, but maintenance would be a nightmare for end users and developers alike.

Well, I needn't have worried. A HTML help file is neatly wrapped up inside a file with the extension `.CHM`. If you're running Windows 98, you'll find that the *\windows\help* directory contains a whole slew of `.CHM` files and a parallel set of `.HLP` files. Perhaps Microsoft felt that it would be injudicious to enforce the new standard without having some sort of fall-back position. In any event, users of Microsoft's web browser will already be familiar with the HTML Help user interface since the technology was first pioneered in Internet Explorer.

In order to deploy an application with HTML-based help, you need to ensure that the key ActiveX control for HTML Help, `HHCTRL.OCX`, is installed on the end user's system. This is a redistributable file. Additionally, you may need to ship Internet Explorer 4.x (also redistributable – natch) along with your application in order to guarantee that all the needed runtime support is present. Certain extra functionality in the various help development systems reviewed here may also require other runtime files to be installed on the target system. For example, RoboHTML provides a popup window feature which, if used, means that you will also need to ship another ActiveX control, `POPUP.OCX`. This file, in turn, relies upon the ever-popular `MFC42.DLL`...

If you want to try your hand at HTML Help development and you don't fancy shelling out for one of the development systems reviewed here, you can always download the freebie HTML Help Workshop from Microsoft's website. It's rather crude compared to the likes of RoboHTML but as ever, you get what you pay for.

IntraWeb is an add-on to the basic HDK package that gives it the capability to create output in the form of HTML. Like its competitors, IntraWeb supports not just compiled HTML, but also ActiveX-enabled HTML Help and HTML Help that works via a set of Java classes. Here again, HDK takes an ultra-conservative approach to the vagaries of individual browsers by giving you a list of forty nine different HTML browsers (most of which I'd never heard of!) and asking you which one you want to tailor your HTML for. Each browser has an associated template that defines its idiosyncrasies, and these templates can be modified if you wish. Obviously this sort of stuff is applicable to those cases where you wish to use HDK for creating websites, but one's tempted to ask how one will know in advance which browser the punters will be using. It's clear that Virtual Media has strong feelings about HTML and its suitability as a general purpose markup language.

A nice feature of the HDK is the way in which it will create a 'shipping modules' report for you. This report describes all the different modules that you need to deploy in order to get the help system working on a target machine. In addition to `HHCTRL.OCX` you'll typically need `HH.EXE` (the small application that enables users to launch a `.CHM` file by double-clicking from the Windows Explorer), `ITSS.DLL`, and `ITIRC.DLL`. In fact, the HDK can even create a distribution disk for you, complete with a setup program, which takes care of all this stuff.

Note that if you've got a copy of the freebie HTML Help Workshop from Microsoft, there's an even simpler way of doing this. If you look in the `redist` directory where HTML Help Workshop is located, you'll find a file called `HHUPD.EXE`. This freely distributable file contains all four components mentioned above. You just include `HHUPD.EXE` (about 400 KB) as part of your install setup and arrange for it to be executed on the target system. It will self-extract the runtime components needed for viewing `.CHM` files, copy them to the Windows system directory, and perform any necessary registration. If you include '/Q' as a command-line parameter to `HHUPD.EXE`, it will run in 'quiet' mode, making it suitable for burying inside your own install script. But let me stress just once again that Internet Explorer *must* also be

This strange solidity of
French soil under my feet.
Flinty cubes of gravel lodged
in the toes of my sandals.

A recurring disbelief
that this garden path
leads somewhere
else as concrete as here.

Another veranda.
Another house.
A wall for the suckers
of ivy to cling to.

In front of me the light:
this lovely unknowability
of air and the
changing alphabets.

Of cigarette smoke –
ring on ring; only sound

the motion

of birds' wings.

Some people will no doubt argue that I'm just playing into Microsoft's hands.

installed on the target system. For the terminally curious, here is what each component does (this information is taken from the latest MSDN disk).

Component Name	Description
HHCTRL.OCX	HTML Help ActiveX control
ITSS.DLL	Dynamic link library that handles compiled HTML
ITIRCL.DLL	Full-text search dynamic link library
HH.EXE	HTML Help viewer application

You can find more details on HDK 3.3 and the IntraWeb add-on from the Virtual Media website at *http://www.virtualmedia.com.au/*.

The future

Although I didn't plan this as a comparative review, it's clear that there are major differences between RoboHELP on the one hand and Doc-To-Help / HDK on the other. You'll notice that I've also devoted more space to a discussion of RoboHELP than I have to the other two products. My primary interest here has been in creating compiled HTML Help files (.CHM) for the Windows platform and it's no surprise that RoboHELP HTML Edition is much more tightly focused on this goal than its competitors.

Blue Sky was (if my memory stretches back that far!) the first company to take seriously the idea of creating Windows help files using its development system as an add-on to Word, this idea being subsequently adopted by WexTech and others. But Blue Sky obviously hasn't let the grass grow under its feet and has invested in an all-new HTML Help authoring system that isn't dependent on Word. So much the better. The whole raison d'être behind the use of Word was its ability to create and edit .RTF files, the Rich Text Format being the raw 'source code' of the Microsoft .HLP file compiler. However, times move on and Word no longer needs to be in the picture.

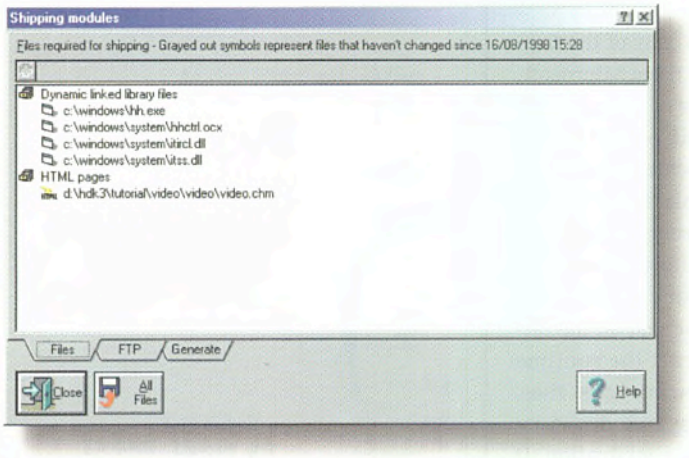


Figure 7 – A nice feature of HDK 3.3 is the ability to generate a list of files that are required to deploy a help system on the end-user's PC. It can generate a set of install disks for you and there's even a built-in facility for uploading a set of distribution files to a remote site via FTP.

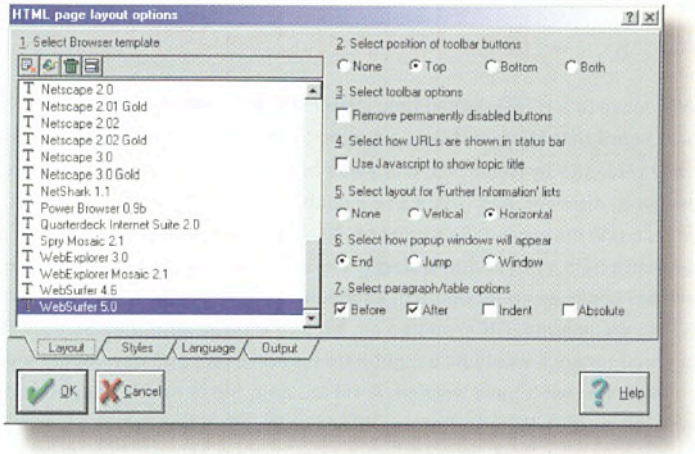


Figure 8 – The IntraWeb add-on supports the generation of HTML output for a vast number of different browsers. It's clear from the documentation that Virtual Media isn't totally sold on the idea of browser-independent HTML.

For Doc-To-Help, with its strong focus on a single-source solution for both online help and printed documentation, Word is still at the centre of things. But I'm speaking primarily from the viewpoint of a developer who is interested in moving over to the new HTML Help file format and who is perfectly happy to emulate Microsoft by reducing printed documentation to nothing more than a license agreement and a registration card. (Oops – did I say that?)

Some people will no doubt argue that I'm just playing into Microsoft's hands. After all HTML Help equals Internet Explorer, doesn't it? And Internet Explorer equals another area in which Microsoft dominates the desktop. This is true, but at this stage I think it's largely unavoidable. The new Visual J++ 6.0 development system offers the possibility of OCX controls that are ridiculously easy to write and use – certainly no more difficult to create than your average Delphi VCL control. OCX controls created with Visual J++ 6.0 are very small, and therefore easily deployable over the Web. The only caveat is that, in order to run these controls, you must have the Microsoft Java VM installed on the target system.

I could also talk about the new enhancements to the Microsoft common controls that come with Internet Explorer, or version 2.0 of the Rich Edit control, which gives you the ability to display clickable URL links directly in your word processing applications, and then there's... but you get the idea. The point I'm making is that – for better or worse – we seem to have a situation where it's impossible to resist the number of carrots that are being dangled under our noses. I suspect that the future of HTML Help is assured, so we may as well bow to the inevitable. ■

Dave Jewell is a freelance consultant, programmer, and technical author specialising in low-level systems programming, development systems, and compiler design. He is the author of 'Instant Delphi' published by Wrox Press. You can contact Dave as Dave@HexManiac.com.

RoboHELP Office 6.0 costs from £418 while Doc-To-Help 3.0 Professional costs from £497. Both are available from software resellers HDK 3.3 costs £299 and is available from SoftKlone on (01628) 819200, fax (01628) 810230, email sales@softklone.co.uk, or visit its website at http://www.softklone.co.uk/. All prices exclude VAT. Many thanks to System Science and SoftKlone for supplying review copies.

are you LOGICAL or lateral?

Developers tend to be portrayed simply as creatures of logic. Pure left-brainers. A little unfair when you consider that the best solutions are produced by a combination of logic and lateral thinking. **Microsoft® Visual Studio™ 6.0** works the way you work seamlessly integrating the logical with the creative.

It comprises advanced new versions of all your favourite tools, while its high levels of integration will enable you to rapidly build enterprise solutions and maximise your productivity.

In short, **Visual Studio 6.0** has everything you need to design and implement custom solutions for Windows® and the web.

The rest is up to you. After all, we simply make the tools, you create the future.

For further information please visit **www.microsoft.com/uk/msdn/** or to order your copy contact your usual Microsoft reseller including:

QBS Software Ltd	0181 956 8000,
System Science	0171 833 1022,
Grey Matter	01364 654100.

Enquiry No. Oc20

- Includes latest 6.0 versions of Visual Basic®, Visual C++®, Visual J++™*, Visual InterDev™ and Visual FoxPro®.

©1998 Microsoft Corporation. All rights reserved. Microsoft, the Microsoft logo, Where do you want to go today? Visual Studio, Windows, Visual Basic, Visual C++, Visual J++, Visual InterDev and Visual FoxPro are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

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

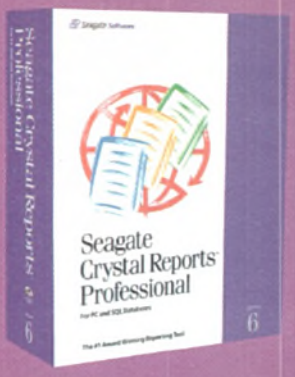
Microsoft®

Where do you want to go today?®

www.microsoft.com/uk/

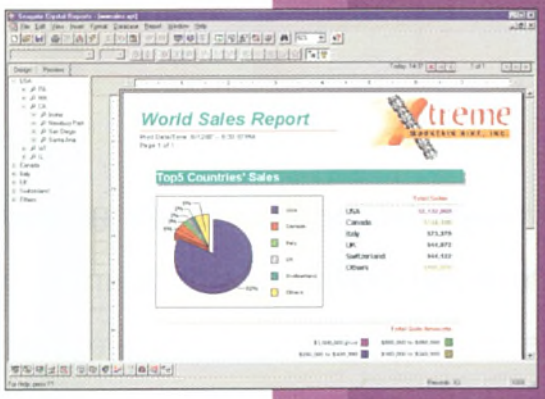
NEW Seagate Crystal Reports Professional 6.0

Reporting Designed for the Web and Beyond!



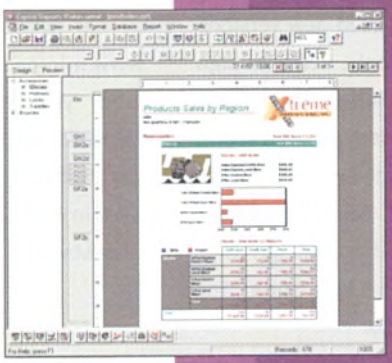
Seagate Crystal Reports™

Whether it's web reporting that leverages your existing skills, powerful and flexible reporting integrated tightly within your Windows application, or presentation-quality reports from any database, Seagate Crystal Reports 6.0 is the only tool you need.



It's easy to web-enable your existing reports created with any version of Seagate Crystal Reports – just host them on your ISAPI/NSAPI compliant web server, install and configure the Crystal Web Report Server (included in the box), and you're done! A thin-wire architecture ensures superior response times since users can pull reports to their browser a page at a time as desired. And cross-platform deployment is headache-free: lightweight ActiveX and Java viewers allow viewing reports in their native format, while HTML viewers extend reports to any browser.

For flexible, powerful reporting within web-deployed applications, the Crystal Report Engine can be integrated directly into Active Server Pages (ASPs). With a VisualDev Design-time ActiveX Control, it's as easy as pointing and clicking!



For Windows application developers, Seagate Crystal Reports 6.0 contains exciting new developer features like enhancements to the Runtime Preview Window including drill down; Automation Server support for object-oriented access to the entire Crystal Report Engine; event support; enhanced support for Apex True DBGrid, and the ability to report off application data and memory blocks.

In addition, new native database drivers for Arbor Essbase, ACT! 3.0, Informix, Oracle8 and the entire IBM DB2 family have been added to make Seagate Crystal Reports the only tool you need to transform data from over 30 different databases into presentation-quality, information-rich reports.

With over 3 million licences shipped[1], Seagate Crystal Reports is a key component of Seagate Software's Business Intelligence solutions that scale from the desktop to the enterprise.

[1] (IDC, 1997)

Upgrade to Seagate Crystal Reports 6.0 from any of the following:

- Previous versions of Seagate Crystal Reports
- R & R
- Business Objects
- dBASE for Windows
- Visual dBASE
- Impromptu
- Reportsmith
- Microsoft Access 1.0–2.5, 7.0
- Microsoft Visual Basic 4, 5
- Microsoft C++
- Microsoft BackOffice Resource Kit
- Microsoft Exchange Technical Resource CD-ROM
- Microsoft Internet Information Server 3.0
- Microsoft NT Resource Kit 4.0
- Microsoft Office Resource Kit
- Microsoft Systems Management Server
- Microsoft Visual Test

CALL CONTEMPORARY SOFTWARE FOR LATEST UPGRADE PRICES

Enquiry No. Oc21

DBMS 1996 READERS' CHOICE Winner

Visual Basic Programmer's Journal '97 Award Readers' Choice

PCWEEK ITX CORPORATE EXCELLENCE APRIL 1996

WINDOWS MAGAZINE W 1997 RECOMMENDED

Microsoft Enterprise Development Partner

Seagate Software

CONTEMPORARY software

+44 (0)1344 873434

sales@contemporary.co.uk

All trademarks are the property of their respective owners

Visit us on the web at www.contemporary.co.uk

Chris Draper

PERL Avoiding pitfalls

Long linear unstructured programs, duplicated functions, and global variables, only declared by use... Peter Collinson has learnt the ways the Perl compiler and runtime system can help you avoid the beginner's pitfalls.

It's a little over a year since I started to look seriously at Perl as a viable option for generating web pages. This time last year I was a Perl novice and used my initial experiences to write a couple of introductory articles to get over the basics of Perl programming. Tempus Fugit, another year gone. Get those millennium bugs ready, here I come. What have I learnt in this last year?

Well, I've written a lot of Perl, pretty awful Perl to start with, but getting better as time progressed. I've passed over that hump where you have to spend time searching the books to find out how to do something. I am now at the stage of looking at the books to identify how routines are called or to find just what *is* that magic letter that does something special. The early stage of book examination is painful, and I think I've created an enormous number of tiny experimental programs in attempts to understand how things fit together. My system has little files called `xx.pl` all over it. I suppose it's about time to re-read the books more deeply again to augment my knowledge, finding out how to do things optimally.

When you start programming in Perl, there's a great temptation to use it to create long linear programs with no great structure. Your initial programs will perhaps be a screenful or two, so all variables will be global, which is the default. Variables will be declared by use, which again is the default. You'll use routines and functions when you are 'saving code': you want to do something more than once, and don't want to type that code in again. Quick hacks 'R Us. I guess that you realise that this approach doesn't scale.

Enforcing rules

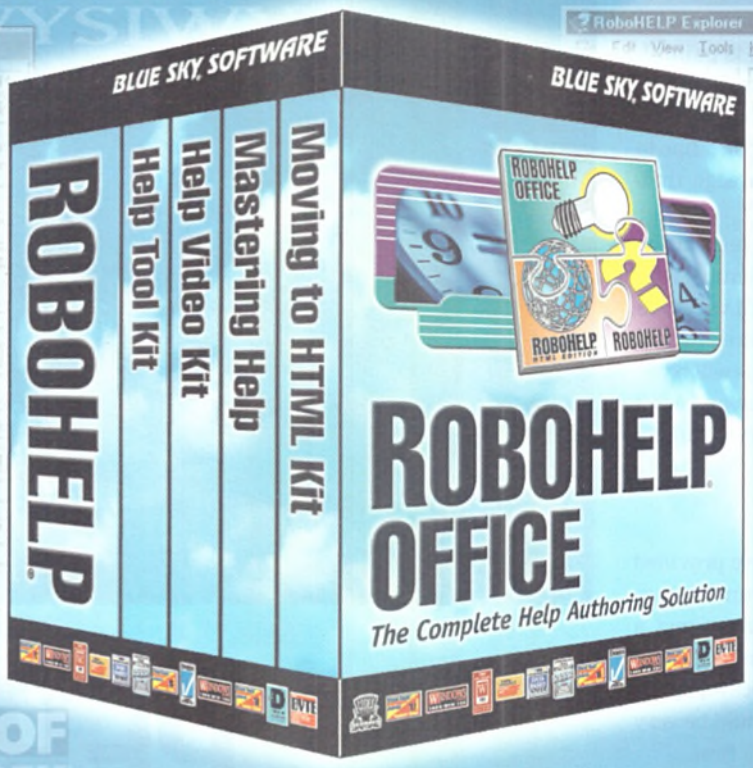
Well, the creators of Perl are aware of the pitfalls and have provided a couple of ways that you can get the Perl compiler and runtime system to help you generate 'correct' programs. The first is a pragma, a directive that enforces a more strict set of rules on the syntax of your program. The second is an option that adds runtime checking, picking up common faults that are often simple typos that would be very difficult to find in any other way. Let's look at the pragma first.

If you add the words: `use strict;` into your Perl program, then you convert the Perl programming environment from its default happy-go-lucky-anything-goes state to being more tightly controlled. All my Perl code now contains this statement, meaning that the system is checking my code for me. Setting `strict` enables three sets of tests.

First, it insists that all variables are defined before use, rather than permitting the default situation where variables can just appear in your code. This check is an enormous win on anything but the smallest program. My largest source of errors in any program is the dreaded typo. If you allow variables just to pop up and be used, then there is no check that you are actually employing the variable names that you intended to use. It's simply too easy to insert transposed characters in variable names, omit underscores, and pluralise variable names in one spot in the code when they are singular elsewhere. Worse, you probably won't spot these more subtle typos and will spend time puzzling over something that ought to work, but just doesn't.

Second, the `use strict` pragma checks that your code doesn't contain what Perl calls a 'bareword'. Lexical tokens in Perl are always preceded by some qualifier character: scalar variables are `$var`, lists `@list`, or the words are quoted in some way. The only time that you can legitimately place a `name` on the line is when it's a file handle or a pre-declared routine or function call. Without the `strict` directive, Perl will make the best of it, using context to ascribe the 'correct' meaning to the word. Well, this is another source of bugs, since Perl's view of the 'meaning' may differ from what you think is going on. You may have simply forgotten to place

The INDUSTRY STANDARD in Help Authoring



With WriteOnce Technology™, the following Help formats are at your fingertips:

- ✔ Windows 95 Help
- ✔ Windows 98/NT 5 Help
- ✔ Windows NT 4.0, 3.51 Help
- ✔ Windows 3.1 Help
- ✔ Printed Documentation
- ✔ Cross-Platform WebHelp*
- ✔ Windows CE Help
- ✔ Netscape NetHelp 1.0, 2.0
- ✔ Web Sites (HTML)

Nothing Is Easier!

No learning curve here. Immediately begin creating professional Help systems in an easy-to-use WYSIWYG environment.

No Late Nights!

RoboHELP Office is a huge time-saver – it automates tasks in minutes that could take hours for other programs.

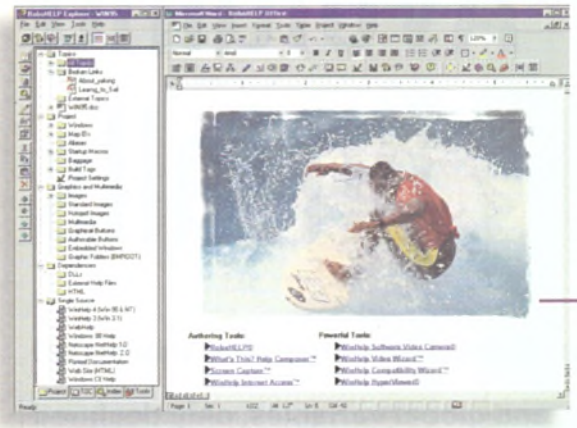
Maximum Productivity!

The RoboHELP Explorer keeps track of every single piece of your Help project in one convenient place. And it all works in conjunction with RoboHELP's WYSIWYG environment.

"RoboHELP saved me seven weeks of work – a savings of nearly $30,000 in labor costs alone."

— Ed Stennie, Software Engineer
Eastman Kodak Corp.

WYSIWYG Help Authoring



The RoboHELP Explorer gives you easy navigation, tracking and editing power. At right, RoboHELP's

Create all Help formats, plus Information Systems such as:

- Online documents
- Intranet sites
- Employee manuals
- Policies and procedures
- Catalogs and price lists

Get 10% OFF RoboHELP Office

OXFORD COMPUTER CONSULTANTS

tel: 01865 793 077 fax:01865 793 124
email: sales@oxfordcc.co.uk web: www.oxfordcc.co.uk

BLUE SKY SOFTWARE
Worldwide Leader In Help Authoring Solutions
www.blue-sky.com

*at no extra cost, for a limited time only.

Enquiry No. Oc22

RoboHELP and RoboHELP Office have WON MORE AWARDS than any other Help Authoring Tool!

a $ in front of a variable by mistake, and suddenly the program's action has diverged greatly from your intention.

These first two checks are made at compile time. The final check is made at runtime. In Perl, you can create a reference to an object, a pointer in C terms. The third check will cause the program to create a runtime error if your statement de-references a variable that actually doesn't contain a reference. In C terms, this picks up situations where you indirect through a pointer that doesn't point anywhere rational. I've not seen this error, yet, largely because I have not written too many programs that contain zillions of references, yet.

These three tests are a great help, and I find that they pick up a great many errors in my code that are errors in typing. Of course, to stop the compiler complaining, you have to add code to declare variables, and quote some text that didn't need quoting before. But I find that doing this is no great problem: the benefits outweigh the grief.

Incidentally, when thinking about naming I believe that you should always avoid using the Perl feature that supports different namespaces for scalars, arrays, associative arrays, and routines. This makes the following code into a legitimate program, creating a different object of each type.

```
$var = 5;
@var = (5, 6, 7);
%var = ();
$var{'fred'} = 'jim';
&var($var, $var[2], %var{'fred'});
```

I believe that doing this 'for real' is deeply confusing to a passing program reader. Remember that in around two weeks or maybe less, you, the program author, will have forgotten how the code actually works and will have become that passing program reader. Except that you won't have the luxury of just reading and will need to really understand what is going on. You wrote the code, and someone is expecting you to change it. Therefore, it is always a good rule to ensure that all variables are distinct and well named.

Interpreter switch

The second great help to the budding Perl programmer is the -w option, which is supplied to the interpreter. The switch turns on a great many checks, such as 'variable names that are mentioned only once, and scalar variables that are used before being set' (I am quoting from the manual page). These two checks pick up a wide variety of simple typing errors and mistakes. It also 'warns about redefined subroutines' – more sensible checks to find typing errors – 'and references to undefined file handles or file handles opened read-only that you are attempting to write on'. A file handle is the Perl object used when you open a file: picking up their misuse is a win. There are many other checks: '[it] warns you if you use values as a number [sic] that doesn't look like numbers, using an array as though it were a scalar, if your subroutines recurse more than 100 deep, and innumerable other things'.

I believe the -w option is a 'must-use' feature of Perl, and not enough is made in the books of its benefits and help in creating less buggy programs.

I tend to make my Perl programs into executable files using Unix's magic line: `#!/usr/bin/perl -w` which is added to the start of a script to give Unix the name of the program to be used as an interpreter for the script. You then turn on the execute bits on the script file and have a new command that can be executed. When the script is invoked as command, the kernel notices the magic #! sequence and starts /usr/bin/perl giving it the option -w and passing the remainder of the script file into the now running process.

I believe the -w option is a 'must-use' feature of Perl, and not enough is made in the books of its benefits.

Most Unix systems allow one parameter to be given to the interpreter, so the -w can always be supplied. Some Unix systems only permit one parameter, and some restrict the total length of the initial line.

Variable declaration

As I said at the start, my early programs tended to use global variables written in a single linear program. If you don't use the `strict` pragma, you can get away without declaring variables, so that all variables are global. I think that my first queasy feelings about this default situation happened when I realised that I didn't like having global variables in routines: I wanted to use real local variables.

I think that a common Perl error is to look quickly in the books for 'local variables', see the `local` declaration and start using that to create what are apparently local variables. I certainly did this, and have seen the same error in other people's code. Well, it works, but it ain't right. Actually the `local` statement is intended to make a local copy of a global variable, masking the original global contents for the duration of the enclosing block.

To create really local variables, you should use the `my` statement:

```
my $starts_undef;
my $localvar = 55;
my ($a, $b, $c) = (1, "fred", 4);
```

This creates a set of variables that are local to the current lexical block, which is a bracketed section, a subroutine, or a file. The variables spring into life just after the `my` statement is executed.

Declaration is usually combined with initialisation, but doesn't have to be, as the top line above shows. The second line declares `localvar` and sets it to 55. The third line is perhaps more arcane to non-Perl programmers. It performs a list assignment, copying a list of constants on the right-hand side into a list of variables on the left. It's shorthand, but a huge convenience since routines can return lists and you can pull apart the return values with minimum pain. For example:

```
my ($sec, $min, $hour) = localtime(time);
```

calls the `time` function to get the current system time value, and passes that into the `localtime` routine, which returns a list whose values are placed into named variables. Incidentally, I am discarding some values from the assignment: `localtime` will also return the day of the month, the month number, and the year. I don't want to give the impression that the list assignment must be combined with the declaration, you *can* say:

```
my ($sec, $min, $hour);
...some other statements and
($sec, $min, $hour) = localtime(time);
```

List assignment is also routinely used to obtain parameters to routines and functions. You'll call a routine with:

```
doit(1, $var, "fred");
```

and declare it with:

```
sub doit {
```

To access the parameters, you'll say:

```
my ($one, $v, $s) = @_;
```

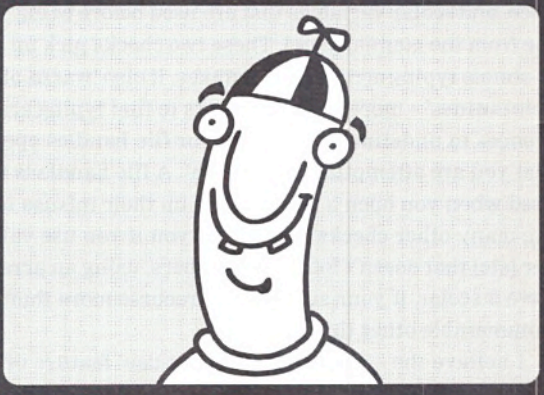
ACHIEVE FAME GLORY AND A SILLY HAT.

Ever come up with code that you're really proud of? Ever wanted to stick your head above the partition and show off your latest breakthrough? Yeah? Well now you've got somewhere to show the world just what you're made of. Send your most awe inspiring work to www.lotus-dev.net/sillyhat2 and enter our cool code competition. Each month the dev.net editor and the previous month's winner will judge the best entry and post it on the Web to show everyone just how clever you are. Best of all, on top of the plaudits from your industry peers, every winner will be awarded a dev.net propeller hat. So you can really hold your head up high.

dev.net

www.lotus-dev.net/sillyhat2

Enquiry No. Oc23



Lotus.

An IBM Company

© 1998 Lotus Development Corporation. Lotus and dev.net are registered trademarks of Lotus Development Corporation. IBM is a registered trademark of International Business Machines Corporation. Illustration: Gary Small/Meiklejohn.

The statement is assigning a list that is essentially on the top of the runtime stack to a set of scalar variables (the underscore is a magic variable name used to access the top of the stack). Another common idiom is to use the `shift` statement to remove the top stack element and place it into a variable:

```
my $arg = shift;
```

The lack of formal parameters niggled me for some time, and this entire mechanism seems arbitrary. However, I suppose I've grown used to it and it has the benefit of being very flexible. It's initially deeply confusing, and is prone to errors:

```
my $one, $v, $s = @_;
```

Missing the round brackets is a seemingly innocuous mistake, but potentially disastrous. It defines `$one` and `$v` and then assigns the first parameter of the routine to `$s`, which is probably not what was meant. The `-w` switch finds and reports on this error. It's legal, but normally incorrect.

Incidentally, I found that in the version of Perl that I run (5.004), it's possible to say:

```
foreach my $i (@list) {
```

stepping the variable `$i` through the entries in the array `@list`. This makes sense, allowing local loop variables. However, beware that the construct is not supported in previous versions of Perl.

References

You'll see from this quick look at function and routine declaration that all parameters are passed by value. This seems fine for simple scalar values. However, it's perhaps less fine when you want to pass an array or associative array into a routine, change it, and return the new result. Well, you *can* do something like:

```
sub process {
my %hash = %_;
do some processing
return (%hash);
}
```

and call it by:

```
%assoc = process(%assoc);
```

I suspect that it's my early Pavlovian conditioning making me worry about such things, but I am somewhat queasy about all the data copying that is happening when the above code is executed. Well, the routine could treat the `assoc` array as global and not have it passed in as a parameter. This works, but I don't like doing it. I don't like accessing global state in routines, it can lead to disasters and tends to tie processing routines into a particular script. I like my routines to be self-contained, which is basic good engineering practice.

I'd like to pass a pointer into the routine and have that routine change the global associative array. Well it's possible to derive a reference to an object by placing a backslash in front of it. This means we can pass a reference to the associative array by:

```
process(\%assoc);
```

As we've seen, we need to know what we are getting in the routine to create appropriate statements to unpack the arguments. A reference like this is actually a scalar object, so we can write:

```
sub process {
my $hash = shift;
```

pulling one value from the argument stack and placing it in the `$hash` scalar. There are now various syntaxes that can be used to access the array. The most pleasing uses the C pointer style:

```
$hash->{'key'} = 'value';
```

but notice that you can still treat the array as a whole:

```
%copy = %$hash;
```

Perl has an initially confusing range of modules and packages with fine distinctions between what the terms mean.

Perl doubles up on the initial character to indicate indirection. In this case, the `%$` indirects through `$hash`, treating the result as an associative array.

There's one other form of reference that I have needed: a reference to a file handle. File handles in Perl are very strange objects that stand apart somewhat from the rest of the language. You get a file handle by opening a file, it's a 'bareword':

```
FIN = open $file;
```

We'd like a file handle to behave like a scalar really, so we can pass it by value into routines, but it isn't. We can however, pass a reference to it (don't miss the star):

```
myprint(\*FIN, $args);
```

and we can use it in a routine as a scalar:

```
sub myprint {
my $fh = shift;
my @args = @_;
print $fh @args;
}
```

It took me ages to find out how to do this and it's all total magic.

Packages

The time soon comes when you get a little fed up with copying your routines from one program to the next, and start thinking about making your own library. Of course, well-organised people may want to create their routines in a separate library first. I generally favour a little iteration here, trying to get the interfaces right by trying the routines in several applications.

Perl has an initially confusing range of modules and packages with fine distinctions between what the terms mean and how you use them. On the whole, I've stuck to a small subset of what is possible and things seem to work.

The first step is to take the routines that you want to make into a library, and place them into a file, say `Mylib.pm`. You need to make this file into a *package* by placing the line:

```
package Mylib;
```

at the start. You also need to place: `1;` at the end, because Perl runs the library (at compile time) and checks whether it 'succeeds'. It will bleat if the library doesn't return a value of 'true'.

Back in your main program add: `use Mylib;` at the top of the file. The use of the same name for the filename and package name is intentional; Perl uses the package name to find the library file at compile time (it also appends `.pm`). It will look in the current directory (where the main script lives) and in various other places on your system (exactly where is system dependent) before giving up.

We now have two components to your program: the original command file, which is called the `main` package, and the new package `Mylib`. Actually, by default, the namespaces of the two programs are distinct: global names in `Mylib` such as routines and other variables must be accessed using an absolute path. If we have a routine called `error` in `Mylib`, then we can call it from the main program by:

```
Mylib::error($args);
```

Older versions of Perl used the single quote character instead of the double-colon, so you will sometimes see:

```
Mylib'error($args);
```

Of course, code in `Mylib` can access routines in the `main` section using similar syntax.

The use of double colons and the mention of explicit packages in the code are very ugly and rather defeat any portability. It's usual to cause a package to export the names that it wants other routines to use. To do this, place a call to a standard package called `Exporter` at the start of the library file:

```
use Exporter;
@ISA = qw(Exporter);
@EXPORT = qw(error run);
```

When the library is loaded, these lines are run and will export some names from the library package into the global namespace. You control which names are exported by placing them into the `EXPORT` list. Don't overlook the `qw` here; it forces each word inside the round brackets to be a quoted string. The `EXPORT` statement sets the global namespace to include the nominated routine names from that package. There are other options to include routines that may or may not be wanted by the calling code, but I am ignoring them here.

You will find that you can call `error` and `run` with no preceding explicit package name. The mechanism allows the creator of any package to control the namespace that will be exported outside the package, and it ostensibly allows a package to keep its routines private. However, the explicit full path to a routine can always be used.

The package loading system can also be used to generate Perl code that behaves like objects, so if you have been educated in that frame of mind, Perl can pretend to do the right things for you.

Further reading

In terms of further reading about Perl, a good place to start is *Learning Perl* by Randal L. Schwartz and Tom Christiansen, O'Reilly & Associates (ISBN 1-56592-284-0). The main book you need is *Programming Perl (2nd Edition)* by Larry Wall, Tom Christiansen, and Randal L. Schwartz, O'Reilly (ISBN 1-56592-149-6). Just in case you didn't know, Larry Wall is the originator of Perl. This book is dense, and is really a manual with examples. Mine is very well thumbed. There's also *Advanced Perl Programming* by Srinam Srinivasan, O'Reilly (ISBN 1-56592-220-4). This has quite a lot on how Perl works, as well as explaining the ins-and-outs of some of Perl's weird and wonderful features.

As I write, Tom Christiansen and Nathan Torkington are preparing a new book that aims to supply lots of Perl examples and ways to do things. It's called the *Perl Cookbook* and is to be published by O'Reilly (ISBN 1-56592-243-3). The book is due out in mid-August in the USA, and so should be out here in September. I have seen various drafts of this book, and it looks really good.

You can get Perl source (and libraries) from the Web: look for the Comprehensive Perl Archive Network (CPAN), and the main URL for this is *http://www.perl.com* (see *Perl of a resource kit?* EXE, May 1998). ■

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

Software Localisation is easy...

...well it is now.

Introducing Regent Translation Manager

Translation Manager smoothes the path from resource to translator and back, automating where practical, assisting where not.
Among the benefits are...

- **The translation process is 'packaged'.** All relevant data is recorded, accessed & manipulated within one closely bound suite of software.
- **Original source data (.RC) files do not have to be altered** and can contain data other than text strings.
- **Selection of text for translation** and translated text to be included is made easy.
- **Translated data files are automatically generated** under the control of the developer.
- **Translation into new languages and translation of new versions is made extremely quick & easy** using previously defined translation projects.
- **Translators are supplied with detailed information** that enables them to provide an accurate, meaningful and usable translation.
- **The translator needs nothing other than the translation project data.** In particular he/she does not have to use (and learn to use) the software being translated.
- **The system is entirely electronic.** No paper need be generated.
- **Custom import export can be provided** for companies not using resource files.
- **Supports C++, VB, Delphi** and anything else using standard windows resource files.

Why not try it? Download the demo at www.regent-design.co.uk

Regent Design: 01543 419009

Enquiry No. Oc24

RoboHELP training?

⇩

Call PTC on 0345 419470 for open & in-company courses presented by the UK's only Blue Sky Software certified RoboHELP trainer

PETERBOROUGH TECHNICAL COMMUNICATION

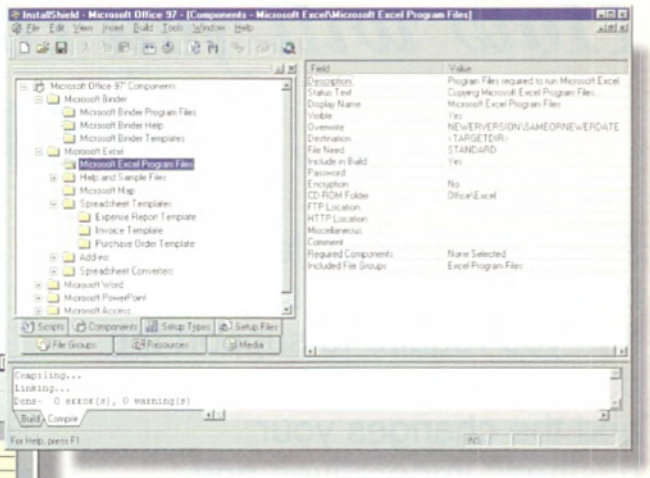
BLUE SKY® SOFTWARE
ROBOHELP® CERTIFIED TRAINER

Enquiry No. Oc25

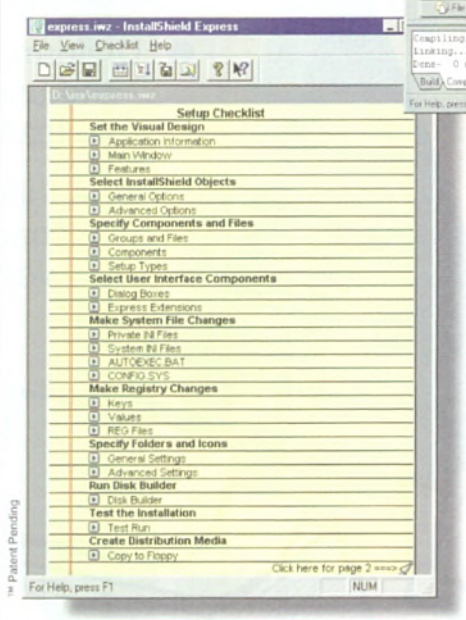
The Complete Solution for Software Distribution

PC MAGAZINE EDITORS' CHOICE
March 10, 1998
InstallShield Professional

PC MAGAZINE EDITORS' CHOICE
March 10, 1998
InstallShield Express



InstallShield 5.1 Professional



InstallShield Express 2

DemoShield 5.3

InstallShield® Software Corporation

InstallShield® 5.1 Professional

The complete professional installation development system.

Integrated installation development environment • Over 300 built-in, installation-smart functions • Single setup creates true cross-platform installations for both 16-bit and 32-bit Windows® systems • Command-line build for batch processing • Single installation project can produce multiple localized installations • New Visual Basic 5.0 Project Wizard • Templates for installing ODBC, DAO, RDO, ADO, DirectX, MFC, NT Services, OLE DB, and more

InstallShield® Express 2

A visual, point-and-click installation development system.

Point-and-click support for installing common components, such as DAO/Jet, ODBC, and BDE • Visual Basic 5.0 Express Wizard • Automatic handling of common Windows 95/NT logo compliance issues • Express Extensions allow calls to external DLL functions and launch EXEs from within the installation • Language support for English, French, German, Italian, Spanish, Dutch, Finnish, and Swedish

DemoShield® 5.3

A quick and easy way to give your software the competitive edge.

Easily import and synchronize text, graphics, sound, and animation • Provide links to demos, Web pages, or other applications from within your demo • Create a customized setup for distribution via CD, floppy disk, or the Internet • Use DemoX™ ActiveX control and DemoNow™ plug-in to play demos on the Internet • Localize a single demo file for distribution in more than 20 languages • Includes built-in macro recording and screen capture tools to simulate live action in your demo

Enquiry No. Oc26

© Copyright 1998 InstallShield Software Corporation. All rights reserved. InstallShield is a registered trademark and service mark and DemoShield is a registered trademark of InstallShield Corporation. DemoX and DemoNow are trademarks of InstallShield Software Technologies,Inc. The Yellow Pad Checklist is a trademark of InstallShield Corporation (Patent Pending). "It All Starts Here" is a service mark and a registered trademark of InstallShield Corporation. Windows is a registered trademark of Microsoft Corporation. All other trademarks are property of their respective owners. Part No. 161-42010 0498

It All Starts Here®

QBS SOFTWARE

Authorised InstallShield Reseller

QBS Software Ltd.
11 Barley Mow Passage
Chiswick, London W4 4PH UK

Tel: +44 (0) 181 956 8000
Fax: +44 (0) 181 956 8010

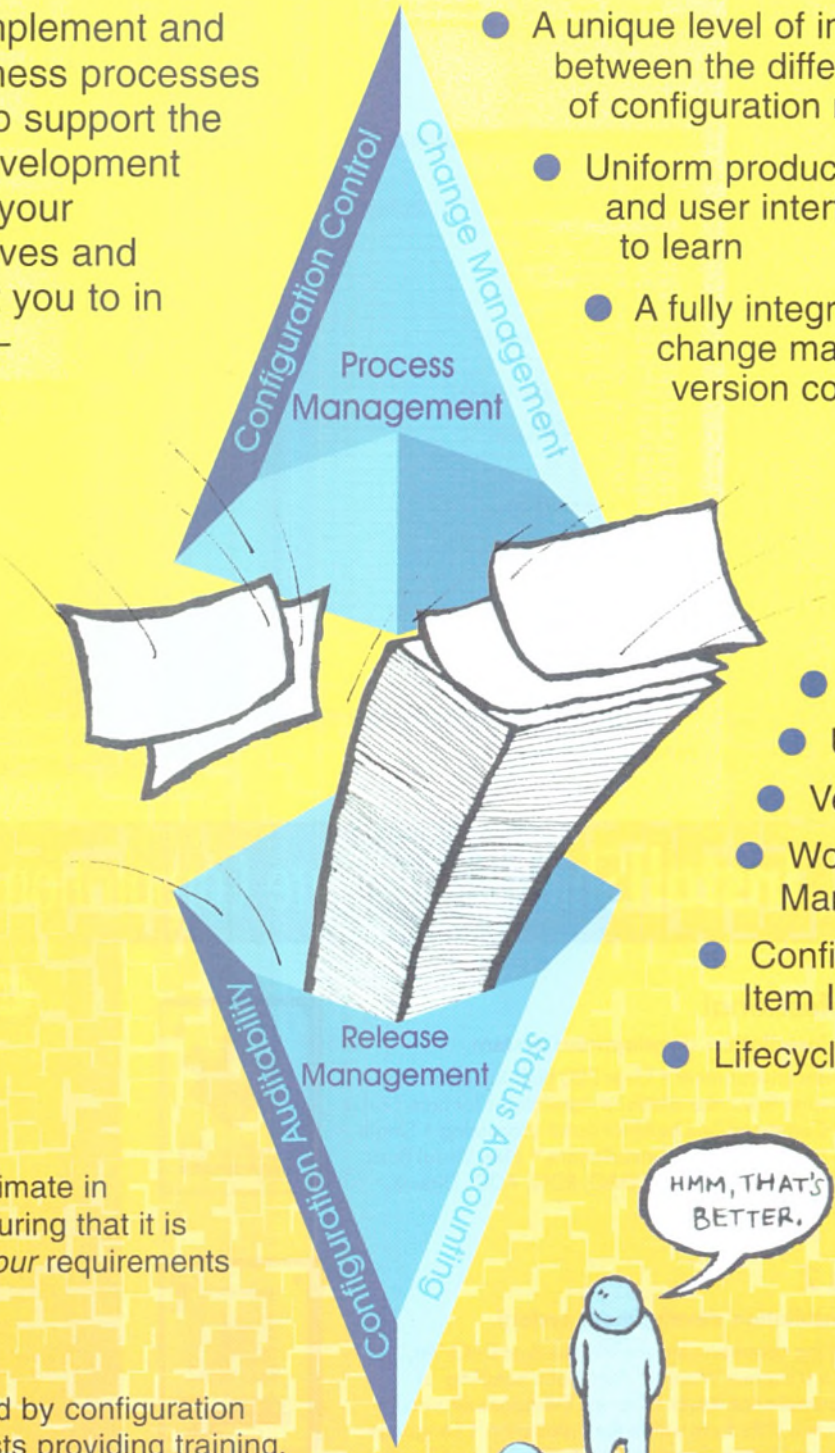
Email: info@qbss.co.uk
Web: www.qbss.com

InstallShield®
Software Corporation
www.installshield.com

How will you cope?
. . . AllChange that's how!

At last you can implement and manage the business processes that you require to support the control of your development and the changes your business imperatives and pressures subject you to in one CM solution – ***AllChange***.

- A unique level of integration between the different aspects of configuration management
- Uniform product technology and user interface for users to learn
- A fully integrated view of change management and version control information



Integrated

- MS Word
- MS Excel
- MS Project
- Email
- Seamless FTP
- VC++, VB

- Baselines
- User Roles
- Version Control
- Workspace Management
- Configuration Item Identification
- Lifecycle Management

Configurable

AllChange is the ultimate in configurable tools ensuring that it is *your* processes and *your* requirements that are implemented

Supported

AllChange is backed by configuration management specialists providing training, consultancy and technical support services second to none.

INTASOFT

Configuration Management tools for professionals

AllChange is a registered trade mark of Intasoft Limited. All trademarks acknowledged.

Intasoft Ltd.
153 Sweetbrier Lane
Exeter EX1 3DG
England
Tel: 01392 217670
Fax: 01392 437877
Email: sales@intasoft.co.uk
Web: http://www.intasoft.co.uk/intasoft/

Enquiry No. Oc27

Ménage à trois

The practical experience of linking two languages can prove to be more demanding than expected. Gavin Smyth and Richard Caton have fun with Visual Basic and Perl (and C++ too)...

As part of our work in Scientific Generics, we often have to massage the output of various software tools to a form suitable for feeding into other tools. Nothing unusual about that. But recently, we saw a need to merge a couple of programs, one written in Perl and the other in Visual Basic, and this proved to be more of a challenge than we expected.

What we wanted to do was interactively extract some 2D-polygon information from a file produced by a circuit design package and manipulate it on-screen. We already had suitable extraction code written in Perl, and bitmap and vector graphics code in Visual Basic (to be more exact, Visual Basic with some support DLLs).

We quickly rejected the approaches of porting one system to the other's language. The Perl code would have been too tortuous to translate to VB as it consisted mainly of pattern matching and string manipulation. Although Perl itself contains no graphical output mechanism, it is relatively easy to build and install Perl/Tk (even for 32-bit Windows), a version of Perl that includes the Tk widget set of Tcl/Tk fame. However, this is yet another graphics library to learn whereas we were already familiar with VB, and accessing the support DLLs from Perl would probably be as much work as connecting Perl and VB. In terms of our immediate application, the major interface function to deal with was a 'hit test'. Taking (x,y) coordinate pairs as input and returning a couple of strings and an unbounded list of coordinate pairs, which represent the outline of a polygon.

Having decided to try to link the two languages, there were essentially two options open to us: use a custom intermediate C/C++ layer, or use the Microsoft Script Control with PerlScript.

C++ to Perl

With an intermediate layer, there are obviously two interfaces to worry about. We will tackle the simpler first: C++ to Perl (Visual C++ to be precise: VC++ support was important, as will be explained later). The standard Perl documentation describes the interface in detail and there is a good overview chapter in *Advanced Perl Programming* (see *Books*). In summary, we need to instantiate a Perl interpreter, load the code (we can then invoke functions defined in the script), before finally disposing of the interpreter. Parameters and results are passed on a Perl stack, which is manipulated via a few macros provided in header files present in the standard Perl distribution.

Building the Perl interpreter into C++ was quite easy, but there were a few troublesome areas. Perl's connectivity is with C and not C++ so we had to insert some mucky preprocessor hackery to stop it getting

```
#ifdef DEBUG
# define OLD_DEBUG
# undef DEBUG
#endif
#include <math.h>
extern "C"
{
# include "EXTERN.h"
# include "perl.h"
}
#undef DEBUG
#undef Copy
#ifdef OLD_DEBUG
# define DEBUG
# undef OLD_DEBUG
#endif
```

Listing 1 – Perl header include.

```
extern "C"
{
   void boot_IO _((CV* cv));
}

static void xs_init(void)
{
   char *file = __FILE__;
   newXS("IO::bootstrap", boot_IO, file);
}
```

Listing 2 – Perl module initialisation.

```
void CPerlSheet::LoadPerl()
{
   m_Perl = perl_alloc();
   perl_construct( m_Perl );
   static char* argv[] = {"PerlScan", "scan.pl", NULL };
   perl_parse( m_Perl, xs_init, sizeof( argv ) /
         sizeof( argv[ 0 ] ) - 1, argv, NULL );
}

void CPerlSheet::UnloadPerl()
{
   perl_destruct(m_Perl);
   perl_free(m_Perl);
   m_Perl = NULL;
}
```

Listing 3 – Perl initialisation and destruction functions.

Now displays results 10-20 times faster!

SEARCH AND DESTROY JAVA PERFORMANCE BOTTLENECKS

"A real solution for a real problem."
Zona Research

JPROBE Profiler

Find performance hot spots in your Java applications and applets quickly and easily.

JAVA COMPATIBLE

JProbe lets you graphically monitor memory usage and object creation while your program is running. And JProbe's powerful Call Graph display lets you drill down to find the root cause of performance problems.

Only JProbe shows you precisely how much time and memory is used by each line of source code.

USE JPROBE TO FIND:

- Memory leaks
- Excessive method calling
- Inefficient algorithms
- Excessive object creation
- I/O blockage
- Excessive thread creation
- Inefficient memory usage

- ✓ Designed for Java
- ✓ Profile Time & Memory
- ✓ Measures 9 Performance Metrics
- ✓ A million times more accurate than 'java -prof'
- ✓ Free Evaluation

JavaBeans

Save with JClass Suites
JClass products are now available in Standard and Enterprise Suites including Gold Support and Subscription at attractive prices.

JAVA BEANS

JClass Beans, Now with Databinding

"The leading vendor of Java components is KL Group."
Price Waterhouse

JCLASS WORKS WITH:

- ✓ Java WorkShop
- ✓ JBuilder
- ✓ PowerJ
- ✓ SuperCede
- ✓ VisualAge for Java
- ✓ Visual Café
- ✓ Visual J++

and many more...

"JClass components have already saved us at least a man-year of development time."
Chisholm Technologies

New!

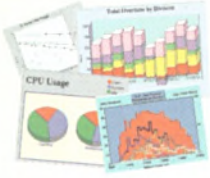
JClass HiGrid

An innovative RAD outline-grid, combined with our hierarchical JClass DataSource, lets you manage, display and update master-detail relation data with one easy-to-use component.

JClass BWT

21 "must-have" Beans, including advanced tabs, outliner/tree and multi-column list

JavaWorld Editors' Choice Finalist



JClass Chart

Feature-rich charting from the experts!

JClass Field

Complete data input and validation, including calendar

JClass LiveTable

The most flexible and powerful grid/table control available

EVALUATE/ORDER ONLINE www.klg.com
OR CALL +31-20-6799503 TO ORDER

KL GROUP
Software Development Productivity

KL Group Europe B.V.
Tel: +31 (0)20 679 95 03 Fax: +31 (0)20 470 03 26 www.klg.com

Enquiry No. Oc28

JClass, JClass BWT, JClass Chart, JClass Field, JClass LiveTable, JClass HiGrid, JProbe and JProbe Profiler are trademarks of KL Group Inc. All other products are trademarks or registered trademarks of their respective companies. EU001

confused, shown in Listing 1. First, the Perl headers use `DEBUG` differently to the normal Microsoft meaning, so we protected the definition around the Perl include. Second, Perl includes `math.h`, but the inclusion of `perl.h` has to occur within an `extern "C"`, causing complaints when the template definitions in `math.h` are parsed, so we explicitly included it first, outside the C linkage. Finally, Perl defines a `Copy` macro that interferes with a function declared later, but fortunately we did not need that anyway so the workaround was simply to undefine it.

Perl code can employ routines from a number of external modules, some of which may be separately compiled libraries. The Perl interpreter built into our program can quite happily access Perl modules, but needs a bit more help with C modules. Such modules are quite common. For example, socket handling uses one, and file access uses another. An initialisation function needs to be defined to bootstrap every compiled module being used, such as that in Listing 2, which illustrates the initialisation function for the Perl IO module. In addition, we must link the library files for these modules into the build process. While all this is easy to do, it does mean that the application has to be rebuilt if we change our Perl script to use a different set of compiled modules.

Listing 3 shows the Perl initialisation and de-initialisation code. The third and fourth arguments to `perl_parse` are an `argc / argv` combination: `argv[0]` behaves as an executable name and is unimportant here, and `argv[1]` is the name of the script to load and run. Further arguments and options can be specified by populating more of the `argv` array.

Our Perl script, along with the other Perl modules, loads the circuit design file and parses it into internal structures, as well as providing the hit test function we are really interested in. As mentioned earlier, communication with Perl is via a stack. We pass two integer arguments and expect the pair of strings and list of coordinate pairs in return. It is much easier to flatten the whole result data structure and return all the elements on the stack than it is either to return a structure or to populate a passed-in structure pointer. This is not because of any problem with the Perl script, but because it is easier to process the flattened list in C++. Listing 4 shows a fragment of code that just prints out the results and Listing 5 contains some much-simplified Perl test code.

The following stack manipulation macros from the Perl distribution are used: `dSP` to declare and initialise a local stack pointer; `ENTER` to create a stack frame; `SAVETMPS` to prepare to place temporary variables on the stack; `PUSHMARK` to mark the start of the stack so that Perl knows how many arguments to process; `XPUSHs` to push a scalar variable; `PUTBACK` to update the global stack pointer with respect to the local one; `SPAGAIN` to reread the global stack pointer back into the local one; `POPi` to pop off an integer; `POPs` to pop off a scalar variable; `FREETMPS` to release temporary variables (in this case, the returned values); and finally `LEAVE` to release the stack frame. These are explained in detail in the Perl online documentation. Notice that the return list is seen by C++ in reverse order to Perl.

VB to C++

What about VB to C++? The simplest mechanism from the C++ point of view is to expose a few functions in a DLL. Unfortunately, moving arrays this way is rather unpleasant, so we would have to extract the returned coordinates one at a time, implying that the list must be stored 'below' VB. Since we might have more than one hit test outstanding at any one time, we can not use a single global array. We have to allocate them on the heap, and take care to deallocate them when we are finished with them – this is easier to control in C++ than in Perl.

Having dabbled with the Active Template Library (ATL), we wondered if that could help; making the return structure a proper COM object means VB will 'know' how and when to deallocate it without extra assistance. (The ATL is why we used Visual C++ and therefore why we had to go to so much trouble to sort out the Perl include files.) Because we define the structures in a type library, we can treat them almost as any other control in VB. The bad news is that creating a suitable ATL control is not a trivial piece of work! We could have created an MFC control instead. That would have been marginally easier, but brings a huge amount of unwanted baggage with it, both in terms of runtime DLLs and in terms of source code to support operations in which we were not interested.

Visual C++'s ATL wizard (standard with VC 5.0, but available for download from the Microsoft site for VC 4.2) quickly creates a project into which you can insert controls and other COM objects. A little bit

```
dSP;
ENTER;
SAVETMPS;
PUSHMARK( sp );
// Push x and y
XPUSHs( sv_2mortal( newSViv( x ) ) );
XPUSHs( sv_2mortal( newSViv( y ) ) );
PUTBACK;

int stackSize = perl_call_pv( "Lookup", G_ARRAY );
SPAGAIN;

for( int i = 0; i < ( stackSize - 2 ) / 2; ++i )
{
   int y = POPi;
   int x = POPi;
   cout << "(" << x << ", " << y << ")\n";
}
char* s2 = SvPVX( POPs );
char* s1 = SvPVX( POPs );
cout << s1 << endl << s2 << endl;

PUTBACK;
FREETMPS;
LEAVE;
```

Listing 4 – Invoking a Perl function from C++.

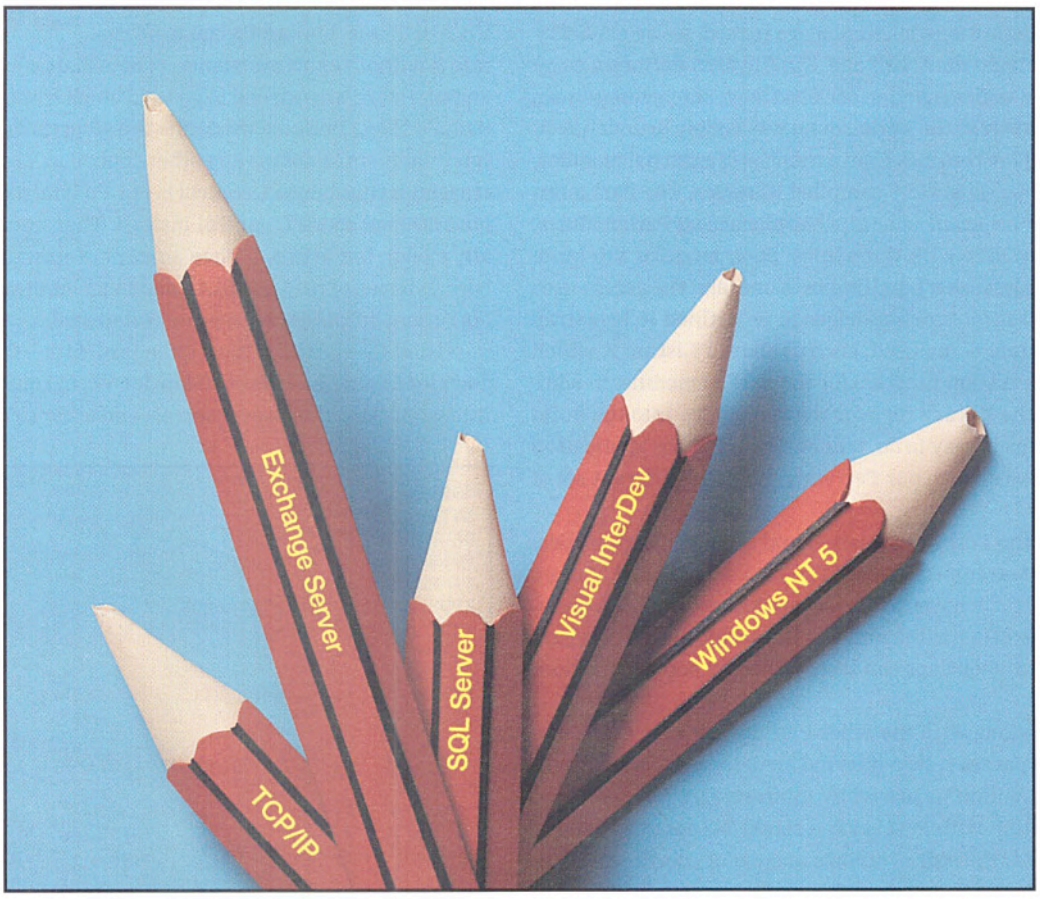
```
sub Lookup
{
   my( $x, $y ) = @_;
   my @ReturnArray = ( "String 1", "String 2", $x, $y,
                                   $x*2, $y*2, $x*3, $y*3 );
   @ReturnArray;
}
```

Listing 5 – Perl function called from C++.

```
[
object,
   uuid(B75E7D8D-1B05-11D2-A475-00A0245146B9),
   dual,
   hidden,
   nonextensible,
   helpstring("IPerlSheet Interface"),
   pointer_default(unique)
]
interface IPerlSheet : IDispatch
{
   [id(1), helpstring("Hit test")] HRESULT HitTest
               ([in] short x, [in] short y,
               [out,retval] IComponent ** component);
};
```

Listing 6 – IPerlSheet IDL.

It's pointless...



...having Microsoft technology without the right IT skills

Having Microsoft technology without the right skills and knowledge to exploit it, is frankly, pointless. Why not sharpen them up with training from an unbiased position. QA Training are a Microsoft Solution Provider Partner, Authorised Technical Education Centre (ATEC) and nobody knows Microsoft like we do.

With thousands of successful delegates every year, hundreds of courses, some covering pre-release Microsoft products, and a wide range of dates and venues, nobody gives you so much choice, value and flexibility. In fact, when it comes to Microsoft training, the people in the know come to QA Training.

To find out more call the Customer Service Team on 01285 655888

or send your business card to **QA Training Ltd, Cecily Hill Castle, Cirencester, Gloucestershire, GL7 2EF**
or email **responsecentre@qatraining.com**, or visit our web site at **www.qatraining.com**

Microsoft Certified Solution Provider Partner

QA Training

Enquiry No. Oc29

```
STDMETHODIMP CPerlSheet::HitTest(short x,
          short y, IComponent ** component)
{
   if( component == NULL )
      return E_POINTER;

   if( !m_Perl )
      LoadPerl();
   if( !m_Perl )
      return E_FAIL;

   CComObject< CComponent >* comp;
   HRESULT hr =
      CComObject< CComponent >:: CreateInstance( &comp );
   if( !SUCCEEDED( hr ) )
      return E_FAIL;

   // Stack manipulation as shown earlier

   comp->m_NumVertices = ( stackSize - 2 ) / 2;
   comp->m_Vertices = new Vertex[ comp->m_NumVertices ];
   if( !comp->m_Vertices )
   {
      comp->Release();
      return E_OUTOFMEMORY;
   }

   for( int i = 0; i < comp->m_NumVertices; ++i )
   {
      comp->m_Vertices[ i ].y = POPi;
      comp->m_Vertices[ i ].x = POPi;
   }
   comp->m_Description = SvPVX( POPs );
   comp->m_RefName = SvPVX( POPs );

   PUTBACK;
   FREETMPS;
   LEAVE;

   comp->QueryInterface( IID_IComponent,
                         (void**)component );

   return S_OK;
}
```

Listing 7 – Hit test implementation.

of experimentation suggested that a full control is the easiest type of object to manipulate in VB, but that VB can also access simpler COM objects. For example, controls show up in the VB components dialog box, can be placed on forms, and can have their properties set in the property box. The objects termed 'simple COM objects' in ATL do not have these abilities, but can still be used in VB.

We created a couple of objects: a PerlSheet full control that is responsible for handling the Perl interpreter, and a component simple object that contains the hit test return values. The most interesting function of the `IPerlSheet` interface is `HitTest`, which returns an `IComponent` interface. Note the 'I's in the previous sentence: we are dealing with COM interfaces, which will be implemented in ATL classes – VB knows about interfaces, but cares little about the objects behind the scenes.

The IDL source generated by the ATL wizard can be improved further. Each class has a default interface and this should be marked `hidden` to tidy up the presentation of the class to object browsing tools. (The OLE/COM browser tool that comes with Visual C++ is very useful for checking that you have defined the types you think you have.) Some COM containers can be more efficient if the classes they are using are marked `nonextensible`. And finally, since we wanted to restrict the component object to be created only as the result of our hit test routine, we marked that interface `noncreatable`.

The IDL definition for the PerlSheet interface is shown in Listing 6, and note the result value for the hit test function: a pointer to a pointer to the component object interface. Although the function itself

is declared to have an `HRESULT` return value, the function's `[out, retval]` parameter appears as the result within VB while the `HRESULT` is used to trigger VB error processing. We have made all of the integer parameters `short` (16-bit) so that they map directly on to VB's `Integer` type. (It would probably have been more efficient to handle 32-bit integers, but within VB using the `Integer` type comes much more naturally than using `Long`.) The hit test implementation, shown in Listing 7, includes the call to Perl discussed earlier and instantiates a component object in which the results are placed. Following the rules of COM, the object is not simply created via C++'s `new` operator. Instead, it uses COM creation, provided by the `CComObject` template. The actual result of the function is the `IComponent` interface of the component object, so that VB can deal with it (apparently, it is not enough to cast the component object to an `IComponent`). We could have returned an `IDispatch` interface instead, but an `IComponent` permits VB to use early binding instead of late.

The only other interesting function in the `CPerlSheet` class is `FinalRelease`, in which the Perl interpreter is unloaded. There is a `FinalConstruct` function, where I initially thought of invoking the Perl load routine. However, that function is called regardless of the user mode under which the control is operating (runtime or design-time) and we did not want to instantiate the interpreter at design-time. We tried using the `GetAmbientUserMode` function to indicate which mode was applicable, but that seems to fail when executed from `FinalConstruct`. Maybe the ambient object is not available that early in the component's lifetime, since `GetAmbientUserMode` behaved exactly as expected within the other methods. We did not have time to investigate, and simply tied the creation of the Perl interpreter to the hit test function as we knew that would be invoked only at run time.

The component class stores the two return strings as well as a vector of return coordinates, and merely contains access functions for these. I chose to implement them as properties with only the get accessors defined so that they would be read-only. A fragment of VB code to use the control is shown in Listing 8, where `ctlSheet` is a `CPerlSheet` control placed on the VB form. Since `Comp` is an object, it has to be assigned using `Set` instead of (the default) `Let`. Omitting the `Set` results in a very unhelpful VB error message – 'Run-time error 91: Object variable or With block variable not set'.

```
Dim Comp as Component
Set Comp = ctlSheet.HitTest (x, y)
Debug.Print Comp.RefName, Comp.Description,
                          Comp.NumVertices
Debug.Print "First coord: ", Comp.X(1), Comp.Y(1)
```

Listing 8 – VB code using the PerlSheet and Component objects.

```
ctlScript.Language = "PerlScript"
ctlScript.AddObject "textBox", txtOutput
ctlScript.AddCode "sub output
                   { textBox->{text} = 'hello'; }"
ctlScript.Run "output"
```

Listing 9 – Visual Basic invoking PerlScript.

```
ctlScript.AddCode "@global = ( 0, 1, 2, 3 );"
ctlScript.AddCode "sub accessGlobal { my( $index = @_ );
$global[ $index ]; }"
Result = ctlScript.Run ("accessGlobal", 2)
```

Listing 10 – Using a PerlScript global variable.

This mechanism suffers from one major flaw: if the Perl to VB interface changes, we have to change code in three languages. There is an alternative: expose the entire Perl API to VB, so that the C++ layer never needs to change. Although an interesting prospect, this sounded like far too much work for us at the moment, but the following describes something close to it...

Basic to PerlScript

Microsoft's Script Control lets COM-aware applications invoke scripts. These can be written in a number of languages, for example, the Microsoft supported VBScript and JScript, or PerlScript, such as that available from ActiveState. The interface to the scripting engine is not particularly efficient, however, effectively letting us execute a single statement or call one function at a time. Although the call can accept an arbitrary list of scalar parameters, it can return only a single value. More interesting is the ability to expose objects to the scripting engine, and hence to the script itself. Listing 9 shows a VB code fragment that executes a Perl script, where `ctlScript` is the Script Control and `txtOutput` is a text box, showing how Perl can access controls on a VB form.

Within the Perl code, the text box can be manipulated under the name of `textBox`, which is the first argument to `AddObject`. Properties are written and read as members of a hash table (`object->{propertyName}`), and in theory, methods can be invoked in a similar way (`object->method()`). However, experimentation indicated that method invocation did not work from PerlScript. This was unfortunate, because we had thought of using an invisible list box to store the coordinate values from the hit test function, using the list box's `AddItem` method within Perl.

Since the `Run` function can return only a single value, we were forced to create a Perl global variable for the results of the hit test

Books

Advanced Perl Programming
S. Srinivasan, O'Reilly, 1997 (ISBN 1-56592-220-4)
As the title suggests, this book covers the bits of Perl you might want to explore after you have learned how to write a few modestly sized scripts. It includes discussions on complex data structures, packages (leading on to object orientation), persistence and databases, networking with sockets and remote procedure calls, Perl/Tk, and invoking C from Perl and vice versa. It is a book well worth reading, though the errata sheet available on the O'Reilly website is rather long (*http://www.oreilly.com*).

Professional Visual C++ 5 ActiveX COM Control Programming
S. Li & P. Economopoulos, Wrox Press, 1997 (ISBN 1-861000-37-5)
This book gives a very good introduction to ActiveX objects, following a theoretical discussion of COM with the development of a control from scratch, before showing how much easier it is with ATL or MFC. The book is very pro-Microsoft, including a few sections that read like marketing blurb, but it does fill a lot of the gaps in the Microsoft ATL documentation.

Softlok

Our customers know who the users of their software are.

Do you?

On average, one out of every two software packages in use today is an illegal copy.

If your PC-based application is **not** protected by a hardware key then your software is likely to be pirated. The only way to securely market and sell your software is by incorporating a hardware key into your system. Softlok has been protecting software since 1987. We combine high quality technical support with very competitive pricing. This simple strategy has meant more and more developers are choosing Softlok products to protect their future.

For an information pack to see how cost-effective PC software protection can be, please contact:

Sales: 0800 7312860

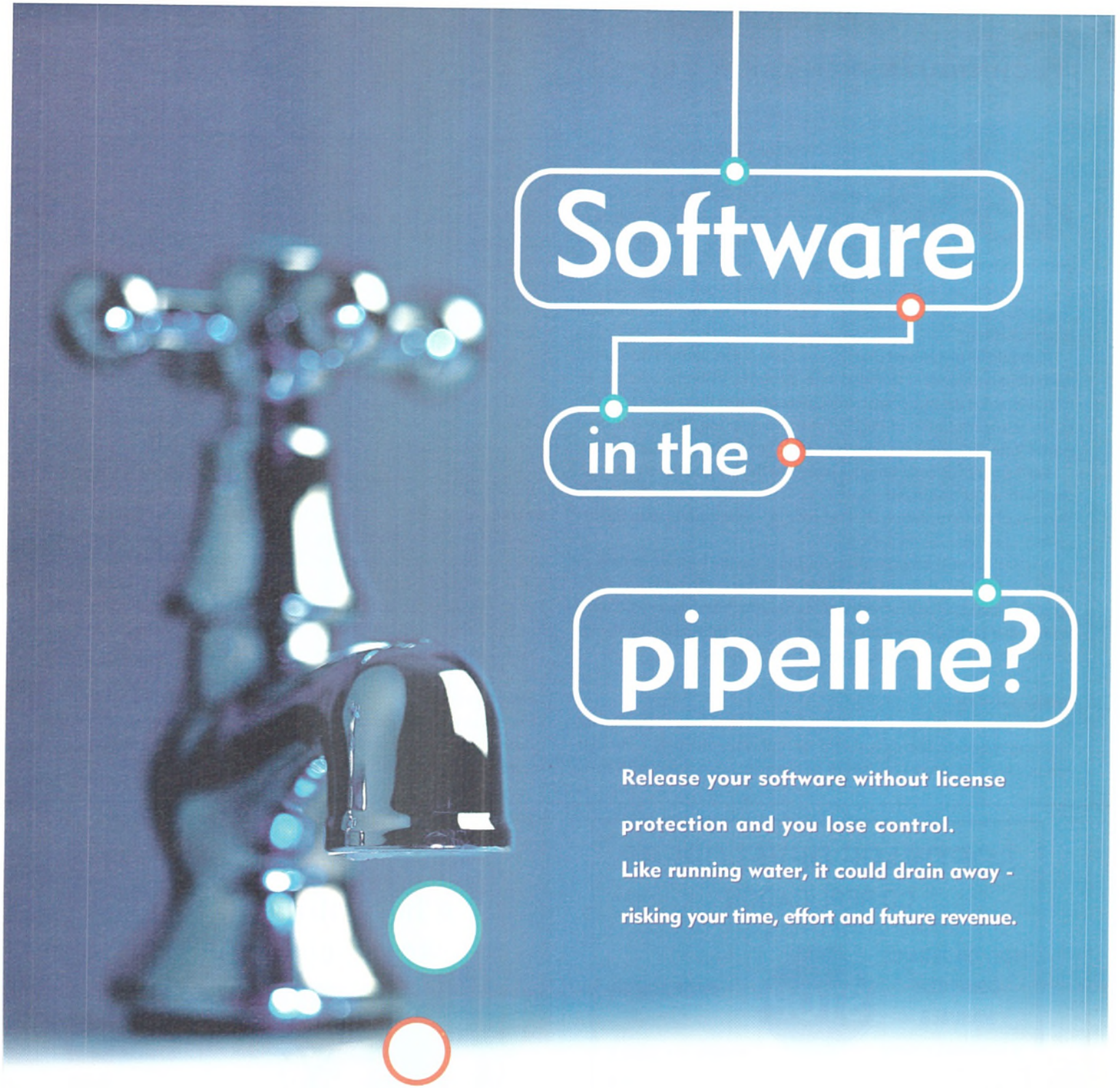
http://www.softlok.com

Softlok

Softlok International Limited
Softlok House
14 Bark Street East
Bolton
BL1 2BQ
United Kingdom

Tel: +44 (0)1204 436000
Fax: +44 (0)1204 436025
e-mail: sales@softlok.com

Enquiry No. Oc30



Software in the pipeline?

Release your software without license protection and you lose control. Like running water, it could drain away - risking your time, effort and future revenue.

Control the flow

The easy-to-use Sentinel range of License Management products from Rainbow will safeguard your software. But they also provide so much more - including flexible distribution, licensing and payment options. What's more, secure, cost-effective electronic software distribution and license activation is now available via the Internet, 24 hours a day, with Sentinel Express.

Try the Sentinel License Management products for yourself. See how they safeguard and enhance your software! Your ready-to-use Sentinel Evaluation Kit contains software and full documentation and is available FREE. You'll also receive the Rainbow Technologies Guide to Software License Management.

Contact us today for your FREE Evaluation Kit and Guide. Call

0800 579200

or register via the Rainbow website http://europe.rainbow.com/uk/

Sentinel – for watertight licensing!

RAINBOW TECHNOLOGIES

Rainbow Technologies, Sentinel House, 4 The Forum, Hanworth Lane, Chertsey, Surrey KT16 9JX

Enquiry No. Oc31

and access the fields within it via trivial Perl functions. A simplified version of the code is in Listing 10. In theory, once again, we should be able to use the Script Control's `Eval` method to evaluate an arbitrary expression in the script language. For example, replacing the call to `Run` and the `accessGlobal` with: `Result = ctlScript.Eval("$global[2]")`. However, this did not seem to work either.

It should be mentioned that the `Eval` and object method invocation operations both work as expected with JScript or VBScript so either we misunderstood the rather sparse documentation or there are a few bugs in the implementation of PerlScript we were using. Please note that ActiveState does point out that its current PerlScript package is a beta.

For brevity, the code samples have had the entire Perl script specified within the argument to `AddCode`. It is trivial to place the bulk of the code elsewhere: define the Perl code as a module and then merely specify '`use Module`' to `AddCode`.

With either of the mechanisms for handling the transfer of data we were tied to global data structures again, either a VB control or a Perl structure, making the processing of multiple hit tests awkward. Even if we had had no problems with methods or `Eval`, this makes PerlScript less attractive than the more complex C++ buffer layer.

Keeping it clean

We like the simplicity of the Script Control interface to PerlScript. One major benefit of this is that if the interface changes, code written in only two languages has to be changed, compared with three when the custom C++ layer is included. However, the custom COM object layer scores much higher for the cleanness of the interface to VB – no creating dummy VB controls (when method invocation works) or using Perl globals to fudge the return of large structures. For the short term, our project will use an intermediate C++ layer, but PerlScript remains a viable option where parameter and result passing requirements are simpler. ■

Resources

ActiveState site – *http://www.activestate.com*
Microsoft scripting site – *http://www.eu.microsoft.com/scripting*
ATL – information can be found from Microsoft via *http://www.eu.microsoft.com/visualc* or *http://www.eu.microsoft.com/com* and there is a good online article describing how to define IDL for efficient COM object access at *http://www.eu.microsoft.com/msdn/news/feature/031798/VBscript-COM.htm*. There are also independent ATL sites, the ones I found most useful being *http://www.worldofatl.com* and *http://www.widgetware.com/faqatl.htm*, although neither has been updated for quite a while.

Gavin Smyth and Richard Caton are consultants with Scientific Generics in Cambridge, specialising in real-time software engineering and high-speed integrated circuit design. They can be respectively contacted as gsmyth@scigen.co.uk and rcaton@scigen.co.uk.

SOFTWARE DEVELOPERS
CD REPLICATION
short run with on disk printing up to full colour
PRINT ON DEMAND
COMPUTER MANUALS
STOP
PACKAGING
- New manuals or reprints
- All sizes. Short or long run
- Offset print or photocopy
- Wire-o or perfect binding
- Printed copyright envelopes
- Disk labels
- Data conversion
- Artwork/origination service

ONE STOP SHOP

- Printed boxes & sleeves
- Ring binders/slip cases
- Postal cartons and labels
- CD/disk cases
- Disk pockets
- Disk duplication
- Shrink wrapping
- Assembly service

High quality digital printing direct from disk in black and white or colour. Every copy an original. Ideal for top quality screens .

VISA RIDGEWAY PRESS MasterCard
Tel: 0118 984 5331 Fax: 0118 984 5186
E-Mail: info@ridgewaypress.co.uk

Enquiry No. Oc32

Why should YOU join The Institution of Analysts and Programmers?

"For me the Institution demonstrates that I am a professional not a cowboy."
Freelance analyst/programmer

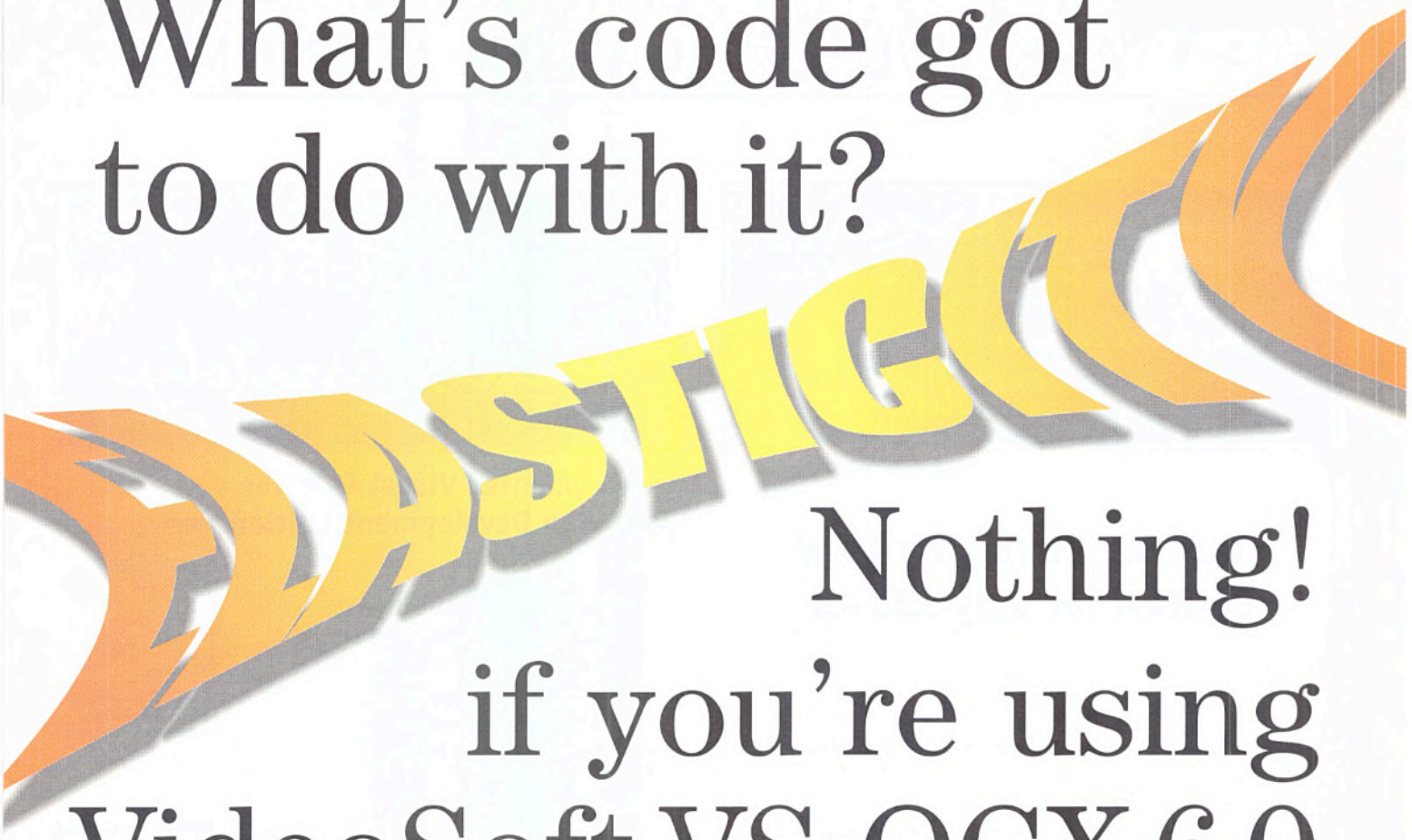
Some benefits of Membership:-
- Free legal advice service
- PI and medical insurance at special rates
- Support with business and technical problems
- Advice on training, careers and jobs

Call us now for an information pack on 0181 567 2118 or see our new website on www.iap.org.uk

The Institution of Analysts and Programmers
Charles House, 36 Culmington Road, London W13 9NH

Enquiry No. Oc33

What's code got to do with it?



Nothing!

if you're using VideoSoft VS-OCX 6.0

VS-OCX 6.0 is the easiest, fastest way to add elasticity to your forms. Just add the new **ElasticLight** control to your existing applications and set a couple of properties. Your forms immediately and automatically become resolution independent. EGA, VGA, SVGA or whatever your users have, it doesn't matter! When the form is resized the ElasticLight control automatically resizes all of the controls on the form.

With its new grid metaphor, VS-OCX makes easy the design of complex forms. At design time the improved ElasticLight control displays a grid layout, and it is on this that controls are aligned. When the form is resized, all the embedded controls - and their fonts - will be resized proportionately. Splitter bars can also be implemented between controls to allow custom resizing at runtime.

VS-OCX has a small footprint and can be distributed without additional DLLs.

VS-OCX has been the top selling Visual Basic add-on since 1995 and in addition to ElasticLight includes two other controls, a flexible index tab and powerful parsing engine.

IndexTab - This makes it unnecessary to switch between forms! Several screens worth of data can be presented in the space of one by using notebook-style tabs. IndexTab is 3 times faster than the equivalent control in Visual Basic and also provides a much wider range of tab styles, including hidden ones.

Awk - This control is a high-speed string parsing engine. It now allows recursive evaluation of functions. This means that Awk's Val property can be used to calculate the value of a variable, which in turn, can contain expressions. This is ideal for spreadsheet-type calculations and for utilising indexed variables.

What's new in VS-OCX 6.0

- Resizes all controls including lines, shapes and labels
- New grid metaphor for easier resizing
- Smaller footprint ElasticLight control (40k)
- Multi-splitter bars on the same ElasticLight control
- Enhanced font resizing capability
- Easy deployment - no external DLL dependencies
- Enhanced IndexTab control
- Enhanced recursive Awk control

CONTEMPORARY software

Contemporary Software Ltd, The Mews, Kings Ride Court, Kings Ride, Ascot, Berkshire SL5 7JR
Telephone: 01344 873434 Fax: 01344 872228 Email: sales@contemporary.co.uk

videosoft VS

www.contemporary.co.uk/videosoft

Enquiry No. Oc34

OFFERS EXTENDED TO 31/10/98 BY DEMAND

BEFORE YOU LEARN JAVA, HERE ARE TWO LESSONS IN ECONOMICS

Lesson 1

Cost of attending Bruce Eckel's 'Hands on Java Seminar' $1500

Plus travel expenses .....$???

Total .....$lots

Or

Buy the 'Hands-On Java' CD-ROM for only £39+vat

Course Features:

- CD contains the entire 'Hands-On Java' seminar.
- 14 hours of audio lectures, synchronised with 500 slides of information.
- Lectures begin with Java syntax and progress to advance topics such as network programming, AWT, Beans and RMI
- Full JDK 1.1 coverage.
- Over 15,000 lines of code in 320 Java examples.
- The CD contains two versions of Eckel's excellent 'Thinking in Java' book.
  - A printable version.
  - A screen formatted version for easy viewing. Includes 230 chapter, section and sub-heading hyper-links and 3600 index links.
- The CD contains approx. 600MB of content.
- Contains everything (with the exception of personalised attention) from Bruce Eckel's five-day full emersion training seminar

How to use:

Select the lesson you require, listen to the lively audio presentation whilst you observe well-constructed slides on screen. At any time you can interrupt the lesson to be taken directly to the relevant chapter in the 'Thinking in Java' book. Complete the supplied exercises to reinforce the lessons.

About Bruce Eckel:

Bruce is a 12 year veteran presenter, winner of Software Development Mag's 1996 *Jolt Authors Award* for best programming book of the year.
www.eckelobjects.com

Only **£39**

Free UK Delivery. Offer expires 31/10/98

To Order Call 0181 317 7777

Lesson 2

Don't Buy These Separately:

New Symantec Visual Café for Java Web Development Edition

RRP ~~£79~~

Features Include:

- Visual Café for Java IDE
- Visual Page WYSIWYG HTML authoring tool
- Full JDK 1.1 support
- Netscape Communicator
- Over 100+ Java Beans.

including

Symantec Visual Page

RRP ~~£69~~

- WYSIWYG
- Easy, Java ready environment
- One step publishing
- Drag and drop templates

and

Learn Java in 21 Days Book

RRP ~~£36.85~~

- Completely revised for JDK 1.1
- 700+ Pages
- Learn the basics of OO programming
- Learn about Java beans
- Includes detailed class hierarchy diagrams
- Easy to understand hands on examples

Get Symantec's Java Intro Bundle, all three for only £49

Also Now Available

Symantec Visual Café for Java:
Professional Development Edition V2.5 .....£199
Database Development Edition V2.5 .....£529

Call for competitive upgrades / educational pricing
For details see www.siliconriver.co.uk

To order Symantec's Java Intro Bundle for £49 call

(before 31/10/98) **0181 317 7777** sales@siliconriver.co.uk

Silicon River

Silicon River Ltd, 106-108 Powis Street, London, SE18 6LU. TEL: (0181) 317 7777, FAX: (0181) 316 7778, email: sales@siliconriver.co.uk www.siliconriver.co.uk
All trademarks are recognised. Prices exclude delivery and VAT.

Enquiry No. Oc35

World standard C++

Francis Glassborow reports on the new C++ International Standard, and demonstrates a simple idiom to fix a problem of unnecessary rebuilds.

The world now has a C++ standard. There were twenty 'yes' votes on converting the Final Draft International Standard (FDIS) to an IS. The three other National Bodies entitled to vote did not do so, and C++ finally made it to IS without any objections. It does not mean that we believe that the document is perfect. Just like software, there will be bugs that need correcting. However, those responsible for your C++ development tools can no longer use changes to C++ as an excuse for delivering compilers that do not compile correct C++ source code. If you write your code correctly, you have a right to expect the compiler to compile it.

Here is a piece of code that many current C++ compilers fail on:

```
#include <iostream>
using std::cout;
using std::endl;
template<typename T> class X {
   T t;
public:
   void report (){cout << t.report();}
   void report1(){cout << t.report1();}
   };

class A {
public:
   char * report(){return "report";}
   char * report1(){return "report 1";}
   };
class B {
public:
   char * report(){return "report";}
   };
int main(){
   X<A> a;
   a.report();
   cout << endl;
   a.report1();
   cout << endl;
   X<B> b;
   b.report();
   return 0;
}
```

Forget the `using` declarations and the new-style library header files; what disturbs me is the number of compilers that reject the declaration `X<B> b;` on the grounds that they are not able to compile `X<B>::report1()`. It has always been a requirement of template instantiation that member functions of a template instantiation need only compile if they are used. Without this guarantee, you cannot get proper benefit from template technology. Try the above code on your C++ compiler of choice. If it will not compile, start complaining. Until programmers demand correct tools, the lazier implementers will sell you inferior products.

C9X

Those responsible for C are preparing to ship a second committee draft (CD) for C9X. They are trying to ship the next C standard before the next millennium. Unfortunately, they have adopted an attitude of rejecting all public comments on their first CD that required substantive change rather than refinement. I believe that this is a serious error: the purpose of a CD is to tell the world what the committees propose and ask for criticism. Until now, they have been effectively working behind closed doors. How are experts to react when they see something that they know is wrong? For example, the UK experts on numerical programming are certain that what is in the current CD is not only wrong (does not achieve what it sets out to do) but would be a serious hindrance to anyone attempting to achieve those objectives in the future. That numerical work is a minority area of interest is irrelevant. Once WG14/J11 decide to tackle it they must get it right.

Problems with rebuilding

A few days ago I received this email (edited for space):

I'm not a fan of C++ anyway but there is one feature that is particularly annoying. Class definitions go in a header file. This header file has to be included in any component that uses the public members.

When the private members of the class are changed (this is the whole point of object-oriented code) both the header file and the CPP file for that class are usually affected. This means that every component that includes the header gets rebuilt.

In the old days when C programmers were in charge of devising their own object-oriented approach, it was possible to put public stuff in one header and private stuff in another. Then only the source file included the private stuff and components were only rebuilt when actually necessary.

I hate sitting around waiting for a compiler to do things that I know shouldn't be done. There's always a better C solution to a C++ problem – especially if one is not a human...

This email contains quite a few of the common misconceptions about C++. It is possible to program badly in any language and some languages lend themselves to bad programming more than others. Personally, I think Pascal is a highly dangerous language because its constraints compel expert users to find ways to circumvent its protectionism. C can be used safely but only if you are willing to invest in a large number of tools to enforce sensible guidelines. In the hands of most programmers C is highly dangerous. Thoughtless use of C++ results in many problems. Perhaps one of the greatest problems is those who write C++ simplistically without fully understanding the way the language can be used to support their needs.

Let me clear up one point in the above: there is much more to object-oriented programming than ADTs (abstract data types). While it is possible to hand-code polymorphic types in C, it is both easier and safer in C++. Another advantage of OO is that it partitions responsibility. I do not need access to your source code to tweak it to meet my needs. I can use derivation for that and, as long as both of us abide by the unwritten contract, my derived class works even when you make

changes to your class. If you do not understand things like this, then you have a very rudimentary grasp of C++. Unfortunately, a large amount of C++ code has been written by programmers with little if any understanding. This provides a maintenance nightmare that can only be tackled by either starting over or by using a highly skilled programmer (who will probably start over).

If the worst problem with your legacy code is that changes to private data and other implementation details are causing unacceptable rebuild times (too short for a coffee break or too long for a lunch hour) there is a very simple idiom to fix it. The fundamental feature is that you can use pointers and references even when there is only a declaration of the type name visible. Furthermore, you can use a function as long as its prototype (fully specified declaration) is visible. These two features ensure that you can avoid the cost of repeated rebuilds during development. This is not completely cost free: you'll introduce one more level of indirection into the uses of your code (note that Java doesn't give you a choice, you get this extra level of indirection whether you want it or not). The basic principle is to write a public class to provide the immutable interface.

Suppose that I already have a class, perhaps badly implemented, that I want to work on. I know that I am going to have to change some of the declarations that make up its private interface. Suppose this class is called `MyTask`. I first rename the class `MyTaskPrivate`. Next I write a new header file and paste in the original definition for `MyTask`. I then delete all of the private (and protected) interface and replace it with a single private data member:

```
MyTaskPrivate * data;
```

The last thing I do to this file is add in the declaration:

```
class MyTaskPrivate;
```

I have now disconnected the public use of `MyTask` from all implementation details. All the files using `MyTask` will have to be rebuilt once. Having done this, I have to provide a new implementation file for `MyTask` that in the first instance simply forwards the member function calls to the equivalent ones for `MyTaskPrivate`. Only this implementation file will be recompiled each time you make changes to `MyTaskPrivate`. Things get rather more complicated if you are trying to deal with problems in a badly written hierarchy of classes, but these too can be solved by correct use of C++ idioms.

The really paranoid who want to avoid rebuilds at all costs can even add public functionality to their classes without forcing a rebuild. Just add a new header file defining a class derived from your public base. For example:

```
#include "MyTask.h"
class NewMyTask: public MyTask{
public: void newfn();
};
```

You will need to add the constructors and destructors, but these will be pretty trivial as they do nothing other than support required exception specifications and forward parameters to the base class equivalents. Only files that use `newfn()` need know about this header file. You can even safely cast `MyTask` objects to `NewMyTask` ones, though I would discourage such casts as they rely on there never being any extra data.

C++ provides much better solutions for bad C++ code than C will ever manage. Place the blame where it belongs. Despite appearances, C++ is not C and should not be confused with it.

Last month's problem

In my July column I managed to pack two errors into a single statement.

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

The problem line is the `if` statement, and both problems are independent of the concept of compound literals that I was writing about.

All C programmers should spot the first problem immediately while many C++ programmers will miss it; user defined types in C must always be prefixed `struct`, `union`, or `enum` unless `typedef` has been used to inject a type name into the normal namespace (as opposed to the tag space). This is one of the subtle ways in which C++ rules for identifiers differ from those for C. It is easy to correct that by just prefixing `ColouredText` with `struct`.

The second error is one that cannot be directly fixed in C. Very few operators can be applied to user-defined types in C. The identity operator is not one of them. Even though every programmer reading the line in question knows exactly what is meant, no C compiler can ever compile it. In C++ we can handle the problem by defining operator `==()` for `ColouredText`. In C we have to resort to an explicit function. The name of that function has to be unique within the relevant scope.

Worse, in fully portable C89 code, a global identifier must be unique in the first six characters without regard to case. Very few C implementations are anywhere near so restrictive, but I can remember being bitten by a compiler that restricted extern linkage identifiers to eight characters. One of the benefits C has reaped from sharing C++ development environments is that modern C compilers generally support the long identifiers required by C++. C9X will require support for longer identifiers, but without overloading you will still need distinct names for all your C functions.

This month's problem

In the definition of the `vector` template in the Standard Template Library you will find the following declaration:

```
explicit vector(size_type n, const T& val = T(),
                             const A& a = A() );
```

This constructor allows such definitions as:

```
vector<MyType> vec(20);
```

to create a vector of twenty default instances of `MyType` using the default dynamic memory allocation strategy for `MyType`. In an earlier column I mentioned that STL containers use copy constructors, but what problems are introduced by defaulting the second parameter as above (`const T& val = T()`)? Specifically, what is the problem with the following code?

```
struct A {
   int i;
   float f;
};
int main () {
   vector<A> vec(20);     // rest of code follows
}
```

■

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

DB2 Universal Database scales without a hiccup from single processors to clusters to parallel processors – across platforms as diverse as Sun Solaris and Windows NT.**

Is your data warehouse missing something?

More and more companies are choosing IBM's DB2 Universal Database as the performance engine for today's demanding data warehouse applications. Basically, it enhances response for users while simplifying cross-platform implementation for IT staff. Like running diverse workloads (transaction processing and data warehousing) on the same processor without slowing down your business. New benchmarks in a real-world environment will show you what we mean. Over 30 case histories in nine industries will show you we deliver. And free trial code enables the ultimate real-world test; your own. So visit www.software.ibm.com/udb98 and see what you've been missing.

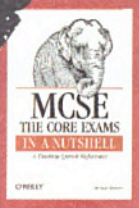
IBM

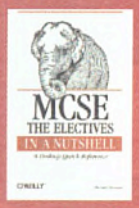
Solutions for a small planet

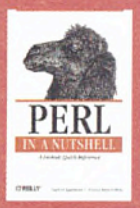
**Windows NT is a trademark of Microsoft Corporation. ©1998 IBM Corporation.

Enquiry No. Oc36

In a Nutshell
from O'Reilly







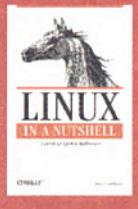
You've been searching for answers . . .

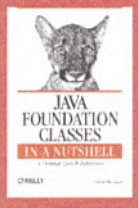
and staring into the computer screen far too long. The computer is acting up again. Or is it just your weary brain? Your deadline is fast approaching, and you feel under seige. Any solution seems distant and unreachable. In another time the decision would be easy—call in the Royal Guard. You only wish you could.

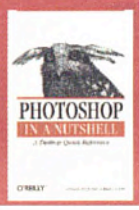
What you *can* do is turn to the *In a Nutshell* series from O'Reilly for the support and power you need. Concise, authoritative, and no-nonsense, our 27 different titles, on a wide variety of subjects, will give you the essential information you need without needless frills. With affordable prices, unparalleled quality and proven effectiveness, our *In a Nutshell* books are appearing on bestseller lists around the world.

When the going gets tough, turn to the leader in technical publishing—O'Reilly. To help you meet your goals and keep the peace, we'll give you exactly what you need . . .

In a Nutshell.







O'REILLY™
a different kind of animal

O'Reilly titles are available at your favourite bookseller.

Enquiry No. Oc37

Client dataset

Mark Smith shows how the Delphi TClientDataSet component can be used to build powerful but lightweight single-user database systems.

The `TClientDataSet` component, one of the most powerful pieces of technology in Delphi Client/Server, is a key part of three-tier client-server database development. It helps capture remote data, lets the user apply changes off-line, and later re-applies those changes to the remote system. It is less well known that you can use it to build powerful yet lightweight single-user database systems.

This is partly Inprise's fault – the documentation on using `TClientDataSet` in this flat-file manner is very brief. The help files do offer a topic group devoted to it, but much of this relates to three-tier development. I do not have space to cover all of the features that make `TClientDataSet` useful in lightweight database applications, but hopefully I can add a little more depth to the information in the manuals. Note that this component is included only in the Client/Server versions of Delphi 3 and 4, as it is part of the MIDAS technology. Given Inprise's new willingness to unbundle some of the parts of Delphi Client/Server, it might be worth asking for the component to be split into two classes to allow the functionality shown here to be sold separately.

Applications that use the `TClientDataSet` require the file `DBClient.DLL`, which provides the database functionality. But no `.BDE` files are needed. This means that you just might be able to fit an application, help file, and data onto a single floppy disk if you minimise your use of third party VCL components. There is of course a penalty to pay for this compact size: since it holds all records in memory, it can be used only for single-user applications.

At the time of writing, there are a number of things that do not work as advertised, though the core functionality seems fine. I will try to list the problems and suggest work-arounds, though it is worth seeing if Inprise has issued a fix or documented the bug on its new official bugs listing before deciding not to use a feature.

Using TClientDataSet

`TClientDataSet` inherits from `TDataSet` so it gets most of the standard properties and behaviour that you expect in a Delphi dataset. Since it is not bound to a table, you need to specify the fields that make up your data, and you can either use the old fields editor or the new FieldDefs property editor to do this. After a number of false starts I found the FieldDefs editor to be the more reliable choice. Once you have specified your fields, choose `Create Dataset` from the pop-up menu to build the fields. Once you have done this, you can link a DataSource and data-aware fields as if you were using a table or query component.

`TClientDataSet` supports the usual range of indexing and filtering options, and adds a few more. For `TTable`, you can specify that an index is composed of a number of fields, which are all descending or case-insensitive, or both. For `TClientDataSet`, the `DescFields` property is supposed to let you specify that individual fields are sorted in descending order within an ascending index. In the initial release of Delphi 4, setting this seems to have the same effect as specifying that the entire index is descending. There is a similar setting, `CaseInsFields`, for specifying case-insensitive fields in a case-sensitive index. This is also broken. Hopefully, there will be a patch from Inprise that fixes this before too long.

Loading and saving

The most basic requirement for a database application is to be able to load and save data to some form of storage. `TClientDataSet` has `LoadFromFile` and `SaveToFile` methods that accomplish this aim, storing or retrieving the entire table. Additionally, `TClientDataSet` has a `FileName` property that can be used to load and save the data automatically. If you set the `FileName` property to be a valid filename, then activate the dataset, it will attempt to load the data from the file you specified. Likewise, the data is automatically written to the file when you deactivate the dataset or the application is closed.

Aggregates and grouping

The first Delphi 4 specific feature of `TClientDataSet` that I want to look at is its ability to calculate aggregate fields. For example, the sum of a column. Aggregates allow you to build summarisation directly into the dataset, rather than having to iterate through the data producing the summary information yourself.

Aggregates are a new direction for Delphi datasets – instead of being part of a row, they are really part of the dataset, adding summarisation to it. They are connected to a `TAggregateField`, which allows you to bind the aggregate to a data-aware control, though you cannot display a `TAggregateField` in a grid or other row-oriented data-aware controls. Trying to display a running total by assigning the aggregate value to a calculated field does not work, though this is probably by design rather than a bug. A small annoyance is that aggregate fields lack the `Currency` and `Precision` properties of `TFloatField`, so you may need to do some extra formatting to display the aggregate value as you might wish. Hooking the Observer components from the July column into the `OnUpdate` event for the aggregate might be a useful way of doing this.

The fields editor for `TClientDataSet` has been extended to help you define aggregates. When you add a new field using the fields editor you get an extra option: `Field Type - Aggregate`. Picking this sets the field type to `Aggregate`, which stores floating point numbers, and adds the aggregate field to the new section at the bottom of the fields editor. You need to provide an expression for the calculation to be applied, using a mixture of field names, arithmetic operators, and the `Sum`, `Avg`, `Count`, `Min`, and `Max` operators. Usefully, the `Count` operator gives the number of non-blank entries rather than the number of records, thus allowing you to calculate meaningful averages easily. One surprising omission in the initial release of Delphi 4 is that you cannot use a calculated field as part of an aggregate expression. Trying to do so gives the less-than-useful error message 'Bits index out of range'. However, you can use an `InternalCalc` field instead, though you pay the small penalty of having the calculated field become a permanent part of your data.

Another unusual feature of TClientDataSet is its ability to embed read-only tables within the application file.

Undo-redo

By default, `TClientDataSet` records the user's changes in a change log, rather than modifying the original record. You can exploit this to add an undo feature to your application by calling the `UndoLastChange` method. Every time you call this, the last changes are reversed one row at a time until all changes have been undone. Surprisingly, you can undo changes made last time you had the data open, as the change log is also written to file when you save the data. This might be undesirable in your application as it makes it difficult for the user to undo just the changes they made since they opened the file. Calling `MergeChangeLog`, prior to saving the data, merges the changes with the original data, emptying the change log and resulting in a smaller data file. You can also achieve less fine-grained control over changes by using the `SavePoint` property. This is an integer that you can store and then re-assign later to return the dataset to the state it was in when you originally read it, a bit like a bookmark. This is flagged as not working on the Delphi 'Fixes and known issues' section of the Inprise website, yet seems to work correctly in the example program. If you decide to use this feature before this anomaly is resolved, please exercise caution.

Embedding lookup data

Another unusual feature of `TClientDataSet` is its ability to embed read-only tables within the application file. A `TClientDataSet` can 'borrow' the data from a regular `TTable` or `TQuery` at design time using the `Assign Local Data` menu option. You can then remove the `TTable` and the data remains in the `TClientDataSet` object. Interestingly, the data occupies less space in the executable than was occupied by the equivalent Paradox tables. The DBDEMOS Biolife table takes 1204 KB for its graphic images, yet when you embed it in an application it adds only 1070 KB to the executable's size. If you open the executable in a hex editor, you can see the data is not compressed so the savings must be due to better packing rather than compression. If you need to encrypt or compress this data, you could create a descendent of `TClientDataSet` that has its own implementations of `LoadFromStream` and `SaveToStream` that use the ZLib compression library provided in the */Extras* directory on the Delphi 4 CD.

```
with CustCDS.FieldDefs do
  begin
    // Add: FieldName, Type, Length, Mandatory
    Add('FIRST_NAME',ftString,20,True);
    Add('LAST_NAME',ftString,20,False);
    Add('Orders',ftDataSet,0,False);
    with Find('Orders').ChildDefs do
    begin
      Add('OrderRef',ftString,15,True);
      Add('OrderDate',ftDate,6,True);
    end;
  end;
```

Listing 1 – Building nested tables in code.

Creating master-detail datasets

The implementation of `TClientDataSet` in Delphi 3 had one major shortcoming: handling of linked tables. If you had linked master-detail tables, you needed to handle them as two separate files. In Delphi 4 you can store tables within tables: the new `TDataSetField` class stores the definition and data from a nested table. This allows you to combine a number of separate tables within a single client dataset in a master-detail format. You can have many nested tables, each of which may contain their own nested tables.

For example, imagine producing a parts catalogue and ordering application for distribution to potential customers. You could use a `TClientDataSet` to hold information at three levels. The customer table definition would have the usual name and address fields, with another field holding the nested Orders table. This Orders table definition would include the normal `OrderReference` and `OrderDate` fields, with an `OrderLines` field to hold the nested order lines table.

To create a nested table, you select the `DataSet` type when defining a new field. When viewing the field in the Object Inspector, you need to use the `FieldDefs` collection to edit the definition of the nested table, using the `ChildDefs` property to build the list of fields that make up the nested table. I have found that the most effective way is actually to build the table hierarchy in code, as the large number of different editor windows can be confusing. See Listing 1 for an example.

As might be expected, it is easy to incorporate nested tables into screen design. For every nested table, add another `TClientDataSet` component to the form or Data Module, and set its `DataSetField` property to the field that holds the nested data. These additional `TClientDataSet` components act as a channel for the nested tables to take part in the usual data-aware screen layouts.

Demonstration programs

EXE ONLINE The samples file for this month contains three small samples that illustrate different aspects of `TClientDataSet`. As usual, they can be downloaded from the EXE website, EXE OnLine. For those who do not have Delphi 4 Client/Server, I will provide the executables and `DBClient.DLL` in a separate download.

`UndoRedo.dpr`	Shows both `UndoLastChange` and `SavePoint`.
`Ranges.dpr`	Design and work with data structures at run time.
`Nested.dpr`	The classic invoice header and invoice detail lines application. Also contains embedded lookup tables.

Updates

In the July issue I showed a Delphi implementation of the Observer pattern. Delphi 4 simplifies adding interfaces to components, so if you are using Delphi 4 please pick up my new version on EXE Online.

Many thanks to Josh Dahlby of Inprise for the technical help given while I was writing this article.

Mark Smith is a contractor specialising in Delphi. You can contact him at msmitha@cix.co.uk or say hello at a Borland Users Group meeting. Call 01980 630032 for details.

Some tools just stay in their box...

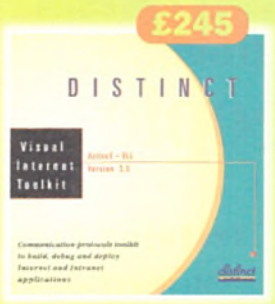
...and then there's the cool stuff you need every day.

for help

Doc-To-Help's intelligent single source approach enables you to automatically create and maintain professional printed documentation and online help for Windows 3.x, Windows 95 and Windows NT. Doc-To-Help offers no-compromise control over format and content of print and online help. Automatic generation of conceptual, procedural and What's This? Help topics as well as hierarchical .CNT files.

for comms

If you are developing for the Internet or your internal intranet on Windows, Windows 95 or NT, Distinct's toolkits are your window to rapid quality application development. Distinct Visual Internet covers over twenty-five TCP/IP-based protocols and comes with over one hundred source code samples for Visual Basic, Visual C++, Delphi, Powerbuilder and Access, as well as extensive documentation.

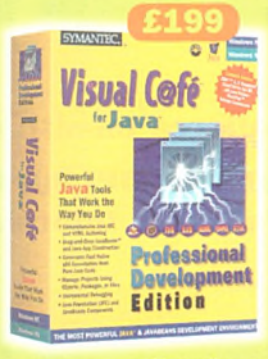


Enquiry No. Oc44

for MFC

Objective Toolkit provides over 60 extensions for MFC, including customisable toolbars, docking windows, and more. If you need grids and charts to present your data then Objective Grid and Objective Chart are for you. Objective Diagram allows you to provide graphical layout in your diagram, and Objective Plug-in converts your application into a web-based program instantly.

for Java



Visual Café Pro is the ultimate solution for professional Java developers, offering over 100 pre-built JavaBeans, pure Java code to native x86 compilation, incremental debugging, the ability to work with objects, packages or files, JDK 1.02-to-JDK 1.1 conversion. Extensive project management support including subprojects. Web Development and Database Development Editions available.

HIGHLANDER
PROFESSIONAL SOFTWARE DISTRIBUTION
SOFTWARE LTD

Get tooled up!

AMERICAN EXPRESS · MasterCard · VISA

Tel 0181 316 5001
Fax 0181 316 6001
Email sales@highlander.co.uk
Web www.highlander.co.uk

Prices subject to change. All trademarks are recognised and are the property of their respective owners.

Authorised resellers for: InstallShield Corp., NuMega Technologies, Accusoft Corp., Seagate Software IMG, Sequiter Software Inc., MKS Corp., Siemens Nixdorf IS Ltd, Genitor Corp., Sybase Inc., and more.

Visit our Website for open course schedules

World-wide education, training and support services for Java™ and VisualAge for Java.

special educational blends from...

The Object People

Education:
Getting Started with Java

- OO Programming with VisualAge for Java
- Building Applets and Applications Using VisualAge for Java
- Object-Oriented Programming with Java
- Building Applets and Applications using Java
- Java for Smalltalk Programmers
- Java for C++ Programmers

Training Programs

Masters Program
Immersion Program

Support Services

Project Mentoring
Consulting Services
Development Services

These courses are offered on-site or as open courses

Ask us about TOPLink for Java
Call for more information

THE OBJECT PEOPLE

North America: (613) 225-8812
United Kingdom: +44 (1703) 775566
Germany: +49 (228) 2420730
Web info: http://www.objectpeople.com

Java is a trademark of Sun Microsystems Inc. • VisualAge is a trademark of IBM

Enquiry No. Oc38

Persistence

To serialise or not to serialise? Tom Guinther covers the control available to a Java programmer with the Serialization API.

The release of JDK 1.1 included many new and important core packages, maybe none so important as the Java Reflection API. I wrote about the Reflection API in one of my first columns and followed it with a discussion of Introspection, which makes heavy use of the Reflection API. One of the primary uses for Introspection is with JavaBeans, which rely on the ability of Introspection and Reflection to identify design patterns and properties. JavaBeans also rely on another important technology, Java Object Serialization. As fate would decree, the Serialization API makes extensive use of the Java Reflection API...

Java Object Serialization

Serialisation may not be a term that you are familiar with so I will provide a loose definition based on my perception. Serialisation is the process of converting a dynamic object into a static form that is independent of process, machine, medium, and time. An object that has been serialised can be moved to a different process, a different machine, a different type of machine, an alternate type of storage device, and can be recreated at some future time for further use. The most common metaphor that comes to mind is a text document. When the document is being edited, the editor (the container) stores one or more pieces of the file in main computer memory, organised in a fashion that makes editing the document a fast and efficient process. When the document is saved to disk ('persisted') the document is stored in a format that may be radically different from its memory form. A good example is pointers into system memory, which need to be translated into file offsets (having a pointer in a disk file doesn't do you much good). Alternatively, the persistent form could include extra data, such as storing a copy of any non-standard fonts with the document in case it is moved to a different system where those fonts might not be available. Regardless, the document must be serialised so that it can be stored for future reference ('persistence') or moved via an unspecified medium to a new location. The process of restoring an object from its serialised form is called *deserialisation*.

The words 'persisted' and 'persistence' are used frequently when talking about serialisation and even though these are not equivalent terms they are often used interchangeably. This may seem confusing, but if you think about persistence as conveying a feeling of 'static storage' (such as a disk file) and serialisation as the 'translation process' then things should become clearer.

A second piece of terminology used when talking about serialisation is the word *stream*. As you are no doubt aware, a stream is a fundamental abstraction of input and output. Because all input and output operations are relatively similar we use the stream abstraction to isolate us from the specifics of a particular device. This device independence allows us to create code that can uniformly read and write the stream abstraction, leaving the underlying stream implementation to perform the device-specific I/O.

Given that serialisation and persistence are about reading and writing data you shouldn't be surprised to find out that the Serialization API (a small collection of classes and interfaces) was added to the `java.io` package.

Before we move on to the specifics of the Serialization API, it should be emphasised that successful serialisation of an object requires that the object can be re-created by the deserialisation process. If you can't recreate a facsimile of the object then there is not much point in persisting it.

The Serialization API

The following sample class definition shows how to support serialisation:

```
class Foo implements java.io.Serialization {
   protected int m_foo ;
   public Foo(int theFoo) { m_foo = theFoo ; }
}
```

That's all there is to it. Class `Foo` is ready for persistence!

I know that was difficult, so let's list the questions that you should be asking yourself right now.

First, 'How can it be so easy?' The answer to that question is that it is not easy at all. The implementation of the Serialization API is doing a lot of hard work under the covers so that you don't have to.

Your second question should be, 'Is class `Foo` actually doing anything special?' Well, not really. It is implementing the `Serialization` interface, but since the interface doesn't define any methods `Foo` doesn't have to do much!

At this point I will try to provide an explanation of the basics so that you don't have to keep asking all these questions.

As I mentioned earlier, Serialization is built upon the Java Reflection API. This gives Serialization the power to enumerate all methods, members, super classes, and super interfaces of any class. When you try to serialise an object the Serialization API uses reflection to determine whether the object in question implements the `Serialization` interface. In this way, the interface simply acts as a tag to indicate that the object supports serialisation. That is why `interface Serialization` doesn't need to declare any methods. Its purpose is quite simply to confirm to the system that the object does indeed support being serialised.

It would not be unreasonable to expect that an object that supports serialisation would have to provide a routine that actually reads and/or writes the object data. Actually it is very reasonable, and under many circumstances an object that supports serialisation will provide methods that interact with the default serialisation process. Still, in many cases (such as the `Foo` class above) no special work is required and the default serialisation process is sufficient.

I can see you have one more question so let's get it out of the way: 'What is the default serialisation process?' There isn't really a 'default' but the implementation of the Serialization API is so powerful it can save any type of Java object. Essentially, unless you have special considerations, you never have to implement any serialisation specific code. Even if your object contains other (aggregate) objects those objects will be recursively serialised. Don't even worry about super classes, they're handled automatically. The whole point is to make it so simple that you don't even have to think about it. That allows you to concentrate on the cool stuff like animating icons or scrolling text.

The primary interfaces of the Serialization API are `ObjectInput` and `ObjectOutput`. The primary classes are `ObjectInputStream`, `ObjectOutputStream`, and `NotSerializableException` (thrown if

the class doesn't support Serialization). The `ObjectInput` and `ObjectOutput` interfaces extend `java.io.DataInput` and `java.io.DataOutput` respectively. Their primary purpose is to define methods for reading and writing primitive types (`byte`, `char`, `int`, etc).

The class `ObjectOutputStream` inherits from `java.io.OutputStream` and implements `ObjectInput`. It is used for serialisation of objects. You may note that `OutputStream` is the same stream abstraction I discussed earlier, and is also the same class that is used for file and socket I/O. The class `ObjectInputStream` inherits from `java.io.InputStream` and implements `ObjectInput`, and it is used for deserialisation.

The following code fragment shows how to use class `ObjectOutputStream` to persist an object of class `Foo`.

```
FileOutputStream fout =
  new FileOutputStream("afile.ser") ;
ObjectOutputStream foostrm =
  new ObjectOutputStream(fout) ;
/* create and write the object to the stream */
class Foo aFoo(23) ;
foostrm.writeObject(aFoo) ;
```

If you wanted to deserialise the object, use the following code:

```
/* read a Foo object from the stream */
class Foo newFoo = (Foo) foostrm.readObject() ;
```

Adding your own stuff

Even though most objects can use the default serialisation functionality provided by the Serialization API, we as programmers often feel the need to add our own signature or 'special' handling code. After all we get paid to program, so we feel like we should program (and some of us actually enjoy it!). In that case you're going to like the Serialization API because it is easily and fully extensible. From the most basic 'special handling' to object validation. (And for those who like minimal interference and the maximum of expression, you can gain complete control over the serialised format of your object by using the `Externalizable` interface.)

Let's start with the basic customisation by extending Foo to have the two most fundamental serialisation methods, `writeObject` and `readObject`.

```
class Foo implements java.io.Serialization {
  protected int m_foo ;
  public Foo(int theFoo) { m_foo = theFoo ; }
  private void
  writeObject(ObjectOutputStream strm)
       throws IOException {
    // do the default thing
    strm.defaultWriteObject() ;
  }
  private void
  readObject(ObjectInputStream strm)
       throws IOException,
              ClassNotFoundException {
    // do the default thing
    strm.defaultReadObject() ;
  }
}
```

The Serialization API uses the Reflection API to search for the `writeObject` and `readObject` methods and, if they are present, calls them to perform the serialisation. In the previous sample the methods simply call the 'default' serialisation. These default methods recursively serialise the primitive members, super classes, and aggregate objects, and you will usually need to call them. During the before and after stage you can add a little custom functionality to the serialisation process.

And one more thing (or two...)

While it is important to be able to serialise important data, it is also important to avoid serialising sensitive information (your password, for example) or information that it doesn't make sense to serialise (such as a file handle or a process ID.)

If you don't want your class to support serialisation, then don't implement `interface Serialization`. If you want to be really, really sure (in case a super class supports serialisation) then implement `writeObject` and `readObject` as follows:

```
  private void
  writeObject(ObjectOutputStream strm)
       throws IOException {
    throw new NotSerializableException() ;
  }
  private void
  readObject(ObjectInputStream strm)
       throws IOException,
       ClassNotFoundException {
    throw new NotSerializableException() ;
  }
```

To avoid having a specific member of the class persisted, use the `transient` keyword. This ensures that the member is not saved in the object's persistent form. When the object is deserialised the values of the transient members of the class are not read from the persistent form so they are initialised to the default values for their type (`int=0`, `reference=null`, etc). You need to explicitly initialise these values if they should be other than the default. Not doing so will cause hard to find bugs. The following example defines a `transient` member and initialises it in `readObject()`.

```
class Foo implements java.io.Serialization {
  protected transient int m_fileHandle ;
  protected int m_foo ;
  public Foo(int theFoo) { m_foo = theFoo ; }
  private void
  writeObject(ObjectOutputStream strm)
       throws IOException {
    strm.defaultWriteObject() ; // do the default thing
  }
  private void
  readObject(ObjectInputStream strm)
       throws IOException, ClassNotFoundException {
    strm.defaultReadObject();   // do the default thing
    // initialise the file handle to invalid...
    m_fileHandle = -1 ;
  }
}
```

An important piece of the puzzle

The Serialization API is a very important piece of the core Java technologies puzzle and it is well worth exploring in depth. You can find the Java Object Serialization specification in the JDK 1.1 documentation and on the *java.sun.com* website. ■

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

Two Weeks that changed the World

From telecommunications networks to supermarket locations, Smallworld's software shows companies where customers and assets are located and how they are connected.

When there's a major upgrade, companies in over 30 countries want copies.

Fortunately, Smallworld know exactly the fastest path their software should take. They just hand over the masters and let LSL Ltd do the rest.

That amounted to duplicating 500 CD-ROMs, 300 UNIX tapes in two formats and 200 sets of four floppies. LSL also printed 1000 documents in various combinations of six manuals and two sets of bound Release Notes.

Finally, LSL had to ensure that the customer got the right mix of media and manuals. And they had all of two weeks to do it.

As Jill Ming, Technology Transfer Manager at Smallworld, observed, "It's vital to our business that our products are produced to a very high quality and delivered on time. That's why we trust LSL to handle all our manufacturing and distribution."

Thanks to the efficiency of LSL's fulfilment, the world improved dramatically for Smallworld.

Faster path revealed for software

If you're a software publisher, then all that should come between you and your customers are LSL's fulfilment services.

Our expertise has made us the most successful software fulfilment operation in the UK. By creating the fastest, most efficient and reliable path to your customers, we safeguard your reputation.

While you concentrate on your core activity, we'll take your software down the Software Production Path.

We'll design the packaging, duplicate the media, print all the documentation, assemble the packs, process your orders, deal with your customers and deliver to them anywhere in the world.

We'll also warehouse your product, manage the upgrade process and provide a range of marketing support services from mailing campaigns to on-line Helpdesks.

To get you off to a good start, we've produced a White Paper on preparing documents for digital printing. For your free copy, our brochure or to discuss a project in person, please call, fax or email us now.

Now you've discovered a faster path, there's no point waiting.

ARE YOU USING THE RIGHT SOFTWARE PATH?

DOCUMENTATION PRODUCTION

"The books we publish tend to be large and complex and LSL's normal production service has always proved to be excellent. Even on occasions when, for example, we've required a set on worldwide transactions within a week, they have delivered this substantial order on time - and at no extra cost".

Dow Jones Markets

WAREHOUSING

"We have a big range of specialist software products - and no space to store the individual components ready for despatch. But it's not just warehousing we need from LSL. Without their strict inventory management as well, we could easily be without product. Instead, we get fast and efficient turnaround for our customer orders".

AMTECH computer systems

UPGRADE RELEASE MANAGEMENT

"LSL have only five working days from when we hand over the master, to accurately carry out duplication, packaging and despatch. That they do it every time, despite sometimes having to face our last minute changes and software data problems, speaks volumes for their organisation".

Unigraphics Solutions (An EDS company)

LSL

THE FASTEST PATH YOUR SOFTWARE CAN TAKE

PACKAGING DESIGN
PACKAGING PRINTING
DOCUMENTATION PRODUCTION
SOFTWARE DUPLICATION
PRODUCTION ASSEMBLY
WAREHOUSING
UPGRADE RELEASE MANAGEMENT
MARKETING SUPPORT
ORDER PROCESSING
DISTRIBUTION

TEL 1234 214222
FAX 1234 210013
EMAIL lsl_fulfilment@compuserve.com
4 Caxton Park, Caxton Road, Bedford MK41 0TY

Enquiry No. Oc39

TRACK & TRACKWeb™

New version 4.0

from Soffront Software, Inc.

Beat the Competition!

Track all of your development and technical support.

- Bug reports
- Code changes
- Test cycles
- Support calls
- New features
- Releases
- Documentation
- System configurations

There's nothing like TRACK & TRACKWeb. Save time, money and dramatically increase customer satisfaction.

Easy to submit, modify and query. Your entire team can start using TRACK without any training. Not possible? Just download the evaluation copy from www.soffront.com, install it on the LAN and let everyone try it!

SQL database support. The fast dBaseIV engine supports 100+ users and popular SQL databases such as Microsoft SQL, Oracle , Sybase.

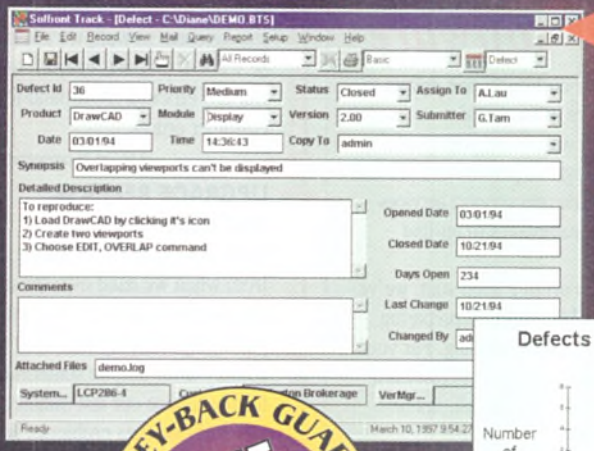
Global project management becomes reality. Get real-time interaction to geographically dispersed developers, QA and support personnel.

Links to customer database. TRACK integrates defect tracking and Help Desk.

Multiple security levels. Set up your desired level of security for commands, projects, tables, fields, data, and more!

Track code changes. TRACK integrates with popular version control systems.

Automatic notification using numerous mail systems. TRACK keeps everyone up-to-date when new bugs are entered or pending bugs are modified. You'll know when a bug was entered, who's working on it, and when it's likely to be fixed.



Customizing TRACK is a joy. Using a visual form editor, customize the database, tables, forms, fields, notifications, formulas, etc.

TRACK's reporting capabilities are *fast*, powerful and intuitive.

Here's what the users and press say about TRACK and TRACKWeb.

What Users Say:

"The ability to get users up and running with TRACK in a very short period of time is invaluable. Most people are able to use TRACK without ever reading the documentation."
— Greg Bryant, Principal Software Engineer, NEC Technologies, Inc.

"Using TRACK we're able to look at exactly what happened on a project and come up with accurate time estimates for future releases."
— Kirsten Thompson, Quality Assurance Analyist, Pepsi International

"After using TRACK for several months, we have found that it has streamlined our problem reporting and tracking efforts on a corporate basis."
— Rory Roybal, Director of Engineering, Phoenix Technologies, Ltd.

The Press Agrees:

"TRACK automates interactions with related tools."
— Peter Coffee, PC Week, March 4, 1996

"TRACK wins hands down in the flexibility, power and ease-of-use areas."
— Data Management Review, January 1996

30-DAY MONEY-BACK GUARANTEE

FREE EVAL!

SOFFRONT® TRACK

for Windows, NT, 95 and popular Web browsers.

www.soffront.com

SOFFRONT Software, Inc. Internet: info@soffront.com • http://www.soffront.com
Ph 800-763-3766 / 408-263-2703 P.O. Box 361936, Milpitas, CA 95036 • Fax 408-263-7452

Enquiry No. Oc40

Getting professional

Writing a VB application is easy, but writing a good VB application is another matter. Jon Perkins discusses some issues concerning professional Visual Basic development.

If you're familiar with using Windows, then you can learn the fundamentals of writing Visual Basic applications quite quickly by working through the Programmers Guide, right? Well, yes I suppose. But this doesn't mean that you'd be doing anything that you'd necessarily be proud of with another eighteen months of experience under your belt. Writing a Visual Basic application is easy, but writing a good Visual Basic application is another matter. In this month's column I want to outline a few thoughts about writing *professional* applications with Visual Basic. This is a very difficult task to do in only two pages of magazine space, so I'll state from the outset that I'm just scratching the surface.

What the user sees

In my time I've seen some user interface designs that are almost beyond belief, using a combination of wholly inappropriate controls and hard-coded colour schemes so psychedelic that they bring on an instant migraine. In order to develop for Windows, you need to understand Windows from a user perspective. Microsoft injects a lot of effort into building consistency throughout its applications to help a user that is familiar with one application get up to speed with another as soon as possible. Unfortunately, when some applications emerge from the development department the consistency can virtually disappear and the poor users have a steeper learning curve than would otherwise be necessary. Microsoft Press publishes a book called *The Windows Interface Guidelines for Software Design* (ISBN 1-55615-679-0) that is intended to be, and indeed is, a bible for anybody writing a Windows application. It details how to lay out screens, what sort of behaviour should be expected under different conditions, menu designs, providing on-screen feedback, and so on. I've been programming for Windows since 1990 and yet I still find that I refer to this book, say, a couple of times a month to help me clarify the nuances of how a Windows feature should look or behave. Regardless of what language you program in, every Windows developer should have access to this book.

Figure 1 – Not how Microsoft designs its forms!

One pet hate of mine is to see a top-level application form consist of a grey form that only contains large grey buttons, with no shortcuts. If you really don't feel that you can encapsulate your application into a menu-based environment, and I'll admit that it's not always appropriate, then at least try and turn it into an icon-based form loader. A comparable design scenario would be if Microsoft had designed the Control Panel to be a grey form with just grey buttons, as shown in Figure 1. It doesn't look good, and yet I've seen lots of developers adopt this approach.

One important component that is often omitted from an in-house product is an associated help file. Printed documentation does tend to get produced more often, but it is often an afterthought. On a solo project (ie one developer) the individual can probably write the help file at the same time as the application code. If a project is of a size to warrant a team of developers, then that team should include a professional technical author who can devote as much time as necessary to writing both online and printed documentation. There is more to providing user assistance than a help file though. ToolTips are incredibly easy to add to most standard controls, and they should leave the user in no doubt as to what a specific form component is there for. This facility is augmented by the 'What's This?' feature, whereby a popup help window can be associated with a specific control if a ToolTip explanation isn't going to be long enough. Furthermore, write short and concise instructions on the form that outlines its basic purpose, whenever possible.

Error messages should be meaningful, straightforward, and have a single-purpose. It's unhelpful for a user to see a message like 'Validation failed' on a form with 10 input fields, and it's even worse to get an uncaptured ODBC driver error passed directly to a MessageBox. Where appropriate, the error message dialog should include a Help button that links to the application help file. And, if a MessageBox is to be displayed with an error message, think carefully about what sort of severity to give the icon. I've noticed a tendency to use the Critical icon for error messages of a 'Telephone number is of the wrong format' type of severity. A Critical icon should mean something *really* bad has happened, like the hard disk is full.

What the user doesn't see

Still on the subject of errors, every sub, function, and event should have some sort of error handler. The default behaviour in a Visual Basic application is to report a runtime error in a MessageBox and then terminate. There is no way that Microsoft Excel would survive in the marketplace if it displayed a 'Divide By Zero' dialog when this problem arose and then unconditionally unloaded itself. Each piece of code should be designed so that every error that could predictably occur is catered for in the error handler. Because not all errors can be predicted, there should be a centralised error handler that will take all other errors, display a polite message, and store the error details to some form of storage.

Management issues

MSDN is a great source of information, and will probably answer two in every three queries that a Visual Basic (or Visual Studio) developer will have. Additionally, the Enterprise Edition ensures that you are

Studying for the Microsoft Certified Solution Developer exams goes a long way towards understanding the broader areas of the Windows platform.

sent the service packs as they become available. If your company gets MSDN how accessible is it? Are the developers informed when a new edition is available? If a developer gets a *real* problem, what facilities have you provided for him to make use of?

One way in which a development department can make life easier for the general development community is to create a dedicated development support function. The role of this team is to act as a central location to which a developer can go for technical notes, white papers, installation disks, and company standards. These would be the people who would be the named individuals to make use of a Microsoft – or equivalent – technical support contract. By acting as a single liaison point in such cases they are then in a position to add the problem resolution, together with any additional relevant information, to the local knowledge base.

It would also be the responsibility of a support person to actively push information out to the developers, ideally through an intranet. A typical bulletin would include notification that a new service pack was available, had been tested, and was available for download locally. This function could also take a more proactive role in the development process by developing and maintaining common code and standard form templates.

Microsoft Certified Solution Developer

What of becoming a Microsoft Certified Solution Developer? As somebody who has taken and passed these exams I feel that I am in a position where I can vouch for their value. Studying for them goes a long way towards understanding the broader areas of the Windows platform, and makes you aware of both the key areas of technology and of the less widely known SDKs that Microsoft issue. Working through the original syllabus for the core Windows Open System Architecture (WOSA) exams provided a good grounding in all of the key Windows technologies at the time (mainly OLE and ODBC). To pass these exams it was necessary to read and learn a lot of white papers and SDK chapters, and it would be true to say that I gained a broader picture of the Windows platform than I previously had. Then Microsoft announced the retirement of the WOSA-based exams and introduced the syllabus for the Windows Architecture exams, which additionally required a fairly comprehensive knowledge of general Internet development issues, digital certificates, replication, Unicode, shell extensions, and so on. Up to this point candidates were examined on general core Windows technology issues and they also needed to pass two of several optional exams that tested knowledge of specific products, for example Visual Basic and SQL Server.

In June of this year Microsoft announced at the Fusion 98 conference that the Solution Developer certification was being revamped again in order to bring the syllabus content in line with developing technologies and future product releases. The most noticeable change is the structuring of the core exams, in that there are now three core exams and one optional. However, the core exams have been split into two streams: one for Visual Basic 6 developers and one for Visual C++ 6, with an additional Visual J++ stream apparently due to appear later on. These new exams are due to start appearing around now, although the latest details can be found on the Microsoft MCP site at *http://www.eu.microsoft.com/mcp*. For existing MCSDs, who passed with the WOSA exams, your certification will expire on 1 March 1999, while those with the Windows Architecture exams have until 1 July 2000 to upgrade.

For the Visual Basic developer, the new core exam titles are: Analysing requirements and defining solution architectures (common to all streams), Designing and implementing desktop applications with VB6, and Designing and implementing distributed applications with VB6.

I firmly believe that an IT training manager looking to upgrade the general level of technical knowledge among a Windows-oriented development department should focus staff training towards this certification, because it provides a clear and quantifiable goal for developers to aim for.

ActiveToolBars

As I mentioned in last month's column, the menu editor in Visual Basic 6 remains unchanged from previous versions. This means that it is not possible to produce the menus that incorporate associated bitmaps such as you get in Microsoft Office 97 and the Visual Studio suite. Microsoft is apparently unwilling to classify the libraries that enhance menu items as redistributable components, so for this reason there is no point in altering the menu editor as it's perfectly workable as it is.

Fortunately, there are a small number of third party offerings to rectify this. I obtained an evaluation copy of one such product that I had heard good things about, namely ActiveToolBars by Sheridan Software Systems, and found it to be a well designed tool. As with other Sheridan products that I've had, there is no printed documentation, but the online help is excellent. The product provides the ability to create Office97 and IE4 style menus and toolbars. The menus support animation and different display styles, while the multiple sliding toolbars are dockable/free-floating or fixed as required. As with mainstream Microsoft products, the toolbars can be customised at runtime if you wish. The product comes with a reasonable stock of the most common images and sounds, and there is an image editor to create your own graphic resources.

To be honest, I didn't find the product particularly intuitive when I first started to use it, but the tutorial is very well designed and, now that I am familiar with it, the design does make sense. Once you're proficient in its use, then you should find that it takes no longer to assemble a toolbar than it would using the standard Visual Basic mechanism. One feature that I do like is a small autocoding facility that will generate an appropriate `Select Case` statement onto the clipboard once a menu/toolbar has been generated – a simple but timesaving feature. The product, along with the rest of Sheridan's range, is available from most UK software resellers (the price is around £115). ■

Jon Perkins is a freelance Visual Basic developer and a Microsoft Certified Solution Developer. He is a contributing author of Advanced Microsoft Visual Basic by The Mandelbrot Set, published by Microsoft Press. Contact him at www.jonperkins.com.

London Manchester

JAVA Training

Object Oriented Programming with Java 4 Days

Summer Special Only £890

Register NOW
tel: 0171 307 2300
info@valtech.com

JAVA Authorized Java Center

Sun

Valtech
www.valtech.com

Price does not include VAT

Enquiry No. Oc41

EXE DIRECTORY

Please call Sarah Horsley on 0171 970 4838 for details

ACTIVEX / JAVA COMPONENTS

ProtoView UK Ltd
26 Offington Drive, Worthing
West Sussex BN14 9PN
Tel:01903 538058 Fax:01903 538068
more.info@protoview.co.uk
www.protoview.co.uk
ProtoView UK offers a large selection of quality feature rich ActiveX and JavaBean components.

APPLICATION INTEGRATION

Frontec AMT UK
Unit 2, Wallbrook Business Centre
Green La, Hounslow, Middx TW4 6NW
Tel: 0181 814 4700 Fax: 0181 570 6760
info@frontec-uk.com
www.frontec.com
Cross platform intelligent messaging solutions for application integration and e-commerce. Full capabilities for the World Wide Web, EDI, SAP R|3, RDBMS, IBM MQ Series, VANs.

DEVELOPMENT TOOLS

Bits Per Second Ltd
14 Regent Hill, Brighton BN1 3ED
Tel: 01273 727119 Fax: 01273 731925
rflowers@bitspersecond.co.uk
www.bitspersecond.co.uk
Graphing|GIS tools. Centura support of training. Client|Server design & consultancy. Network storage consultancy. Multi-platform device driver development.

Borland International Ltd
8 Pavilions, Ruscombe Business Pk
Twyford, Berks RG10 9NN
Tel: 0118 932 0022 Fax: 0118 932 0017
Customer Services: 0800 454065
www.borland.co.uk
Borland International is the leading provider of development solutions from desktop to enterprise level. Borland's award-winning tools are supported by a network of VARs, partners and resellers in the UK.

ComponentSource
27-37 Vachel Road
Reading, Berks RG1 1NY
Tel: +44 (0)118 958 1111
Fax: +44 (0)118 958 9999
sales@componentsource.com
info@componentsource.com
www.componentsource.com
Over 1200 components can be unlocked instantly 24 hours a day, via the Internet, the Website, a private dial-up network or the telephone.

CYRANO (UK) Limited
Devon House, Park Street
Slough, Berkshire SL1 1PX
Tel: 01753 516500 Fax: 01753 516441
khall@cyrano.com
www.cyrano.com
Leading developer of automated software quality tools for financial, telecommunications, government, utilities and other markets. More than 1800 customers worldwide.

Intasoft Ltd
Tresco House, 153 Sweetbrier Lane
Exeter EX1 3DG
Tel: 01392 217670 Fax: 01392 437877
sales@intasoft.co.uk
Intasoft is the supplier of the popular configuration management tool AllChange. Our product is backed by high quality support, training and consultancy services.

Popkin Software & Systems
St Albans House, Portland St
Leamington, Warks, CV32 5EZ
Tel: 01926 450858 Fax: 01926 311833
sales@popkin.com
www.popkin.com
Popkin Software & Systems is the manufacturer and vendor of System Architect, the market leading suite of Analysis & Design Modelling tools.

Programming Research Ltd
Glenbrook House, 1/11 Molesey Rd
Hersham, Surrey KT12 4RH
Tel: 01932 888080 Fax: 01932 888081
Contact Mr John Heathcote

QBS Software Ltd
11 Barley Mow Passage
Chiswick London W4 4PH
Tel: 0181 956 8000 Fax: 0181 956 8010
orders@qbss.co.uk
www.qbss.com
Vast range of development products: Next Day delivery; 90 days free support; account customers welcome.

SELECT Software Tools plc
Westmoreland House, 80-86 Bath Rd
Cheltenham Glos GL53 7JT
Tel: 01242 229700 Fax: 01242 229701
heidik@selectst.com
www.selectst.com
SELECT Software Tools provides a business-driven solution to companies adopting component-based development. Through its market-leading products and services, SELECT enables the modeling, management and assembly of enterprise-class applications from components.

Stingray Software, Inc
9001 Aerial Center, Suite 110
Morrisville, NC 27560 USA
Tel:001 919 461 0672/001 800 924 4223
Fax: 001 919 461 9811
sales@stingray.com
www.stinray.com
Stingray create best of breed object orientated developer tools for Windows Programmers. Products can be sold direct and through Resellers and Distributors.

Superbase Developers Plc
14 Regent St, Cambridge CB2 1DB
Tel: 0118 944 8962 Fax: 0118 954 0760
Contact: Cathy Rowley
106253.3627@compuserve.com
www.superbase.com
Superbase 3.2 provides a powerful development environment for data based applications with modern features and graphical 2-way development tools including source code generation.

System Science
1-6 Bradley's Close, White Lion St
London N1 9PN
Tel: 0171 833 1022 Fax: 0171 837 6411
www.SystemScience.co.uk
Sales@SystemScience.co.uk
The UK Specialist for all Software Development tools, representatives of Pervasive (Btrieve), InstallShield, RoboHelp and many more US vendors.

Take Five Software Ltd
The Surrey Technology Centre
40 Occam Rd, Surrey Research Park
Guildford, Surrey, UK
Tel: ++44 1483 295050
Fax: ++44 1483 573704
Email: info@takefive.co.uk
http://www.takefive.com
SNiFF+ The integrated cross-platform programming environment for C|C++, Java, IDL, Fortran and other languages.

FORTRAN AND C++

Salford Software Ltd
Adelphi House, Adelphi Street,
Salford M3 6EN
Tel: 0161 834 2454
Fax: 0161 834 2148
Sales@salford-software.com
www.salford.co.uk
Fortran and C++ compilers with unique CHECKMATE switchable run-time diagnostics. Low cost student editions available.

HELP SYSTEMS

Peterborough Technical Communication
8 Whitewater, Peterborough PE2 6FB
Tel: 01733 237037
Lo-call 0345 419470
Fax: 01733 239933
petecom@bcs.org.uk
www.gold.net/petecom/
Creation of manuals and on-screen help systems. Please call or e-mail for our free information pack.

LIBRARIES

Wintertree Software Inc.
69 Beddington Ave. Nepean,
Ontario, Canada K2J 3N4
Tel: 001 613 825 6271
Fax: 001 613 825 5521
sales@wintertree-software.com
www.wintertree-software.com
Spelling checker and thesaurus components for C|C++, MFC, Visual Basic, or Delphi applications.

MFC LIBRARIES

Hypercube, Inc.
Los Angeles, CA, USA
Tel: +1 310 559 2354
Fax: +1310 559 2357
harlan@hcube.com
www.hcube.com
MFC Extension Libraries. HyperView++: VBA-like embeddable forms environment. HyperDraw++: VISIO-like diagramming | drawing. Free demos on www.hcube.com. Buy direct and save.

MIDDLEWARE

OpenLink Software
Amy Johnson House
15 Cherry Orchard Rd
Croydon, Surrey CR9 6BB
Tel: 0181 681 7701 Fax: 0181 681 7702
Contact: www.openlink.co.uk
OpenLink Software is an industry-leading developer and deployer of secure, high performance database connectivity technology, independent operating system, network protocol and underlying database engine.

PROGRAMMING TOOLS

ZAC CATALOGS
www.InstantSoftware.com
Huge selection of visual and internet development tools! Complete technical information, downloadable demos, on-line ordering and instant on-line delivery. 30 day money-back guarantee.

PUBLISHING

Addison Wesley Longman (Addison-Wesley)
Edinburgh Gate, Harlow
Essex CM20 2JE
Contact: Customer Info Centre
Tel: 01279 623928 Fax: 01279 414130
enq.orders@awl.co.uk
www.awl-he.com/ computing
A wide range of books on software development, object-oriented technology and programming from authors such as Watts Humphrey, Erich Gamma, Fred Brooks, Donald Knuth and Bjarne Stroustrup.

AP Professional
24/28 Oval Road, London NW1 7DX
Contact: Rachel Bridgman
Tel: 0171 482 2893 Fax: 0171 267 0362
app@apuk.co.uk
www.europe.apnet.com/ approfessional
Book publisher on internet development,programming, PDAs, software agents and more. Specialists in Macintosh books.

Digital Press
Butterworth-Heinemann,
Linacre House, Jordan Hill
Oxford OX2 8DP
Contact: Sophie Foster, Product Manager
Tel: 01865 314456 Fax: 01865 314572
www.bh.com
sophie.foster@repp.co.uk
Leading Publisher of books for professional programmers and software engineers. Digital Press publishes high-quality, leading edge books on topics such as Microsoft Exchange, Windows NT Server, Intranet Development, Microsoft SQL Server, Open VMS, X-Window Systems, UNIX, Linux, Lotus Notes, Web Servers.

Prentice Hall Europe
Campus 400, Marylands Avenue
Hemel Hempstead, Herts, HP2 7EZ
Contact: Customer Services
Tel: 01442 881891 Fax: 01442 882288
ibd_orders@prenhall.co.uk
We are the publisher of books and CD-based training materials in all areas of computing - and distribute leading imprints such as QUE and SAMS.

O'Reilly
Sheridan House, North Way
Andover, Hants
Tel: 01264 342832 Fax: 01264 342761
Contact: Customer Servs Dept
e-mail: itpuk@itps.co.uk
Leading publisher of books for Perl, C++, UNIX, Open Systems, Windows NT and the Internet.

SECURITY PRODUCTS

Aladdin Knowledge Systems UK Ltd
1 William Street, Windsor
Berks SL4 1BB
Tel: 01753 622266 Fax: 01753 622262
sales@aldn.co.uk www.aks.com
Aladdin is a leading supplier of advanced software security (HASP) and smart card development tools (ASE) for software developers.

BL Computer Security Ltd
101 Hendon Lane
Finchley, London N3 3SH
Tel: 0181 343 0734 Fax: 0181 346 2672
bl@blcs.co.uk www.blcs.co.uk
We specialise in design and manufacture of computer security products. Anchol, Lure Booster, Deadlock(Dongles) and C.L.A.M.P Alarms

Data Encryption Systems Ltd
Silver Street House,
Silver Street, Taunton,
Somerset TA1 3DL
Contact Roy Davidson(Sales)
Tel: 01823 352357 Fax: 01823 352358
www.des.co.uk
deskey@silver.cityscape.co.uk
DES manufactures software security products developed as a solution to software piracy and theft

Glyn Williams & Associates
Ladywood House, Ladywood,
Near Droitwich Spa,
Worcestershire WR9 0AJ
Tel: 01905 757700 Fax: 01905 757800
gwa@gwassoc.demon.co.uk
Software|Hardware copy protection systems - The professional choice for security and features. Worldwide support.

Rainbow Technologies Ltd
4 The Forum, Hanworth Lane
Chertsey, Surrey KT16 9JX
Tel: 01932 579200 Fax: 01932 570743
sales@uk.rainbow.com
Only Rainbow delivers leading edge technology and ISO certified quality for software protection and license management.

Softlok International
Softlok House, 14 Bark Street East
Bolton BL1 2BQ
Tel: 01204 436000 Fax: 01204 436025
sales@softlok.com
www.softlok.com
Protect your future, protect your software. Established in 1987, Softlok specialises in software piracy protection.

Superbase Developers Plc
14 Regent St, Cambridge CB2 1DB
Tel: 0118 944 8962 Fax: 0118 954 0760
Contact: Cathy Rowley
106253.3627@compuserve.com
www.superbase.com
Superbase 3.2 offers powerful data encryption and an RSA encryption library with user-definable key lengths and built-in email support for secure communications and data management.

TRAINING

Brooks Associates
Bismore, Gloucestershire GL6 7DG
Tel: +44 (0)1452 770060
Fax: +44 (0)1452 770078
Email: bbrooks@cix.co.uk
Contact: Bob Brooks
World class training for Delphi professionals.

Database Programmers Retreat Limited
The Old Fleece, Bisley Street,
Painswick, Stroud, GL6 6QQ
Contact Christine Shakespeare
Tel: 01452 814 303 Fax: 01452 813 918
100710.303@compuserve.com
www.dp-retreat.com
DPR is a Training, Consulting and Development Company offering scheduled, customised, 1-2-1, on-site education. All our courses are based on practical, hands-on exercises and we aim to te ach programmers to develop database applications in Delphi, Visual Basic, Access, Clipper and VO.

Learning Tree International Ltd
Mole Business Park
Leatherhead, Surrey KT22 7AD
Contact Jan Mott
Tel: 01372 364600 Fax: 01372 364611
uksales@learningtree.com
www.learningtree.com
Training for IT Professionals, Totally integrated training solutions from the worlds finest independent training company.

QA Training Ltd
Cecily Hill Castle, Cirencester
Gloucestershire GL7 2EF
Contact Customer Service Team
Tel: 01285 655888 Fax: 01285 644828
www.qatraining.com
Leaders in IT technical training and consultancy.

The Object People Limited
Epsilon House, Chilworth Science Pk
Southampton, SO16 7NS
Tel: 01703 769996 Fax: 01703 766066
ukinfo@objectpeople.com
www.objectpeople.com/uk/
The Object People have a world-wide reputation in assisting clients adopt and make successful progress with object technology.

Valtech Ltd
Corinthian House, St Giles Circus,
279 Tottenham Court Rd
London W1P 9AA
Tel: +44 (0) 171 307 2300
Fax: +44 (0) 171 307 2301
Web : http://www.valtech.com
training@valtech.com
Valtech is an international training and consulting group offering a wide range of courses, to transfer the expertise to develop new multi-tier systems. Valtech has trained 5000 people throughout Europe in 1997, and is recognized as the European leader in Object Technology Transfer.

WEB APP DEV

Unipalm
1 St Marys Court, High Street
Newmarket, Suffolk CB8 8HQ
Tel: 01638 569669 Fax: 01638 569601
Email: exe@unipalm.co.uk
Specialist Intranet|Internet software distributors. Cold Fusion Application Server, Cold Fusion Studio for rapid deployment of database driven Web applications. Netscape - award-winning client, servers and development tools for Web, messaging and crossware applications.

CAREERS & CONTRACTS

EXE brings you the cream of vacancies in the development and programming business.
For more information contact Sarah Horsley 0171 970 4838 Fax: 0171 970 4895 Email: sarahh@dotexe.demon.co.uk

AUTUMN JOB OPPORTUNITIES

Visual Basic A/Ps — **Surrey** — **to £35K + Bens**

This rapidly expanding software house requires a number of Visual Basic A/Ps to develop Real-Time trading systems, for some of the major city financial institutions. Skills required include VB 4/5, trading systems & Active X. *JR283*

Visual C++ — **Oxfordshire** — **£Negotiable**

We are seeking a number of candidates with solid Visual C++ and MS DOS experience, for a variety of positions, including Software Development and Testing. Excellent interpersonal skills are essential. *BF284*

VB Consultants — **S.East/Midlands** — **to £40K + Car**

Dynamic Consultancy requires Visual Basic 4/5 Developers for Client-site based development work. A minimum of eighteen months VB experience is essential and strong communication skills are a must. *JR285*

C++/Delphi A/Ps — **Surrey** — **to £30K**

Join a financial services company as a Developer using both C++ and Delphi. You will need at least one of these, though training in other PC products will be provided. *SPJ286*

Java Developers — **London** — **to £30K**

A leading Consultancy is looking for two experienced Java Developers to join a new UK team. From a London base you will be tasked with client-focused web activities using your 18 months plus Java and ideally any RDBMS. *SPJ287*

CAREERCARE

Careercare (Southern Computing) Ltd
Wembley Point, 1 Harrow Road, Wembley, HA9 6DE
Tel: 0181 902 3676 Fax: 0181 902 3677
E:Mail: Enquiries@Careercareldn.com

QUILL SYSTEMS

DO YOU HAVE:

- at least 2 years Delphi programming experience
- knowledge of client/server development using Delphi (and preferably Interbase)
- C++ Builder 3 experience
- excellent OO skills
- excellent UI design skills
- familiarity with Design Patterns
- some knowledge of UML
- some knowledge of COM

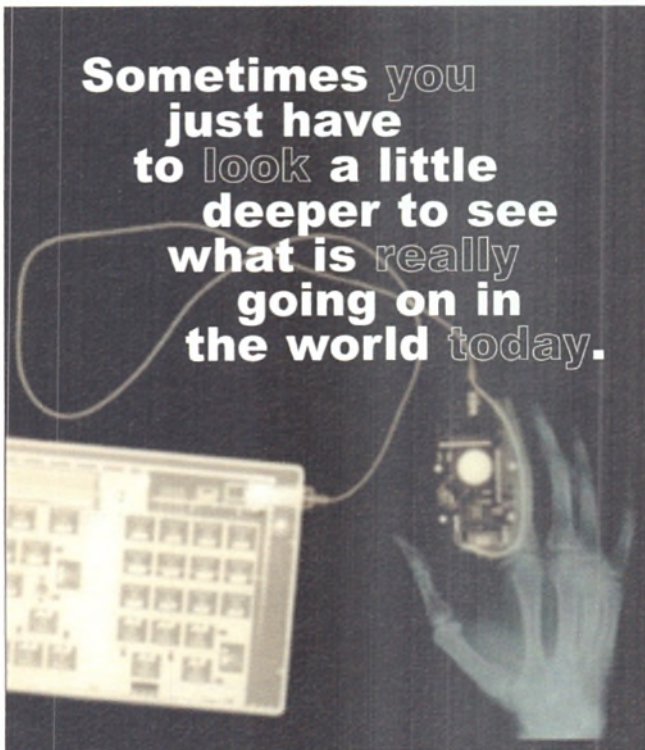
ARE YOU:

- well motivated
- able to demonstrate a high level of technical competence

IF SO:

then send your CV to
Mrs J Sherwin, Personnel Co-Ordinator,
Quill Computer Systems Ltd, Barclay House,
35 Whitworth Street West. MANCHESTER M1 5NG
by Monday 2nd November 1998
mark your envelope Private and Confidential
or E.Mail tony.landes@quill.co.uk

NO AGENCIES



Technical Manager
London/South-East — **£50,000 + Package**
This role requires the successful candidate to have between 5 and 10yrs experience of the Finance/Banking industry. In addition to project management skills the candidate will also need to have worked in either an NT4 or Novell environment and be capable of managing large teams of people. Salary and rewards are excellent.
Ref: 2228/1 Email: paul.macavoy@haymarket. com

Analyst Programmer
City — **£20-35,000**
Established for over 10 years, specialising in providing computer consultancy and bespoke development, this highly respected software house have a number of vacancies for Visual Basic Developers with a combination of the following skills: VB 4/5, RDBMS, SQL Server, ODBC, DAO, OLE, ActiveX, NT, 95, Java, COM, TCP/IP. Applicants will ideally be educated to degree level with strong analytical and communication skills, ability to learn new concepts and development tools and have the desire to work within a leading edge environment.
Ref: 89881/1 Email: chris.isaacs@haymarket.Com

Analyst Programmer
City — **to £45K plus bonus plus benefits**
Technical Consultants to join finance and banking team within this growing software house. You will be working on a variety of leading edge projects. You will need sound Unix along with either C or C++ experience. Sybase is advatageous, but training will be given for the right candidate. Casual dress code, flexitime and excellent career prospects.
Ref: 90947/1 Email: leigh.carrick.moore@haymarket.com

Analyst Programmer
London — **c £45000**
Our Client an International Systems Development company who's client base consists of Financial, Commercial, Industrial and Public Sectors is actively looking for a number of Analyst Programmers with emphasis on Visual Basic, C++, SQL Server, Oracle and Sybase. Suitable candidates are invited to forward applications for consideration, in addition to good technical skills you need to be reasonably mobile, motivated and quick to adapt to new situations.
Ref: 91046/3 Email: ian.dykes@haymarket.com

Analyst Programmer
City — **£40,000 + Benefits**
This major information company are looking to recruit some of the best in the market.
You will have the ability to design, develop,test and implement new product applications in C++ ,Unix or Oracle. You'll have a min of 3 years experience. You will be working on some exciting new project with some business focused people. In return you'll be offer a good salary and benefits package. For more information contact Nick Harris.
Ref: 93038/1
Email: nick.harris@haymarket.com

Software Development Test Engineer
High Wycombe — **up to £50,000**
Due to continuing expansion our client, with sites in Cambridge and Uxbridge requires several key personnel to strengthen their team. With immediate involvement in several large projects candidates should have experience in Visual C++ & Java Programming, NT, Unix and embedded software systems in terms of testing, implementation and analysis. As the client is international, a second language is also desired.
Re94573/1 Email: katherine.smith@haymarket.com

Haymarket Advertising | Haymarket Comms | Haymarket Consulting | Haymarket Contracts | Haymarket Development | Haymarket Executive | Haymarket Financial

Haymarket Development
114-116 Charing Cross Road
London WC2H 0JR
Tel 0171 836 7172
Fax 0171 836 7173
Email cv@haymarket.com
Web www.haymarket.com

www.haymarket.com

Haymarket Development is a Haymarket Consulting Group company. Copyright Haymarket Consulting 1998.

Computer CONNECT

0171 233 6688
68 WARWICK SQUARE
LONDON
SW1V 2AS
FAX: 0171 233 6602
e-mail: perm@computerconnect.co.uk

Visual Basic Analyst Progammer — c£30,000
Surrey/Hampshire

This market leading publishing organisation has a number of high profile projects underway which creates a dynamic and challenging environment. They are looking for Visual Basic Analyst Programmers (4 and/or 5) with a minimum of 18 months commercial client server development experience. Knowledge of and experience of Active-X, SQL and HTML/ASP would be of benefit. Duties will include analysis and technical design. Ref: EXE004

MS Office Developers — to£35,000
London

We have a number of interesting opportunities for MS Office Developers working for major City Banks and Professional Services organisations. A minimum one years' VBA programming (particularly Access and Excel) within a commercial environment is required. Duties will cover development, support and systems testing. Please call for further details of individual requirements. Ref: EXE005

ORACLE Database Design — c£35,000 + car + bens
Beds.

Working for a prestigious company with a global presence. In this role, you will be involved in designing and implementing a large-scale Oracle RDB for a financial services client. You will need to have significant experience of Oracle 7 and above with good skills in SQL, SQL Report Writer and system performance tuning in a Unix or NT environment. This is a customer facing role so good verbal communication skills are a must. Ref: EX006

SQL Windows Analyst Programmers c £37,500 + benefits
London

This respected Publishing Group is undergoing significant infrastructure growth and is consequently looking to expand their applications development team. Responsibilities will include design, programming, customisation, integration, interfacing and support of software applications. Successful candidates will be of degree calibre, and have 3 years experience in the development of client server applications utilising large scale relational databases (pref Oracle). Good SQL knowledge in a Client Server environment is essential, with PeopleSoft experience desirable (training provided). Great opportunity to join a company which values and empowers its' employees. Ref: EXE001

Cross Train to JAVA!! — To £30,000 + share equity
London

My client is a small but innovative Software organisation who specialises in server-side JAVA development. They are looking to recruit high calibre individuals with a strong desire to cross train to Java. As long as you have a minimum of 2 years software development experience in any 4GL or C, and ideally relational database knowledge, they will provide the Java training. The projects will be varied and interesting with plenty of technical challenges. Alternatively, if you already have experience of CORBA and/or DCOM, apply now! Ref: EXE002

Software Engineers C, C++, COBOL. Training in Visual C++ and MFC — to £45,000
Berkshire

Working for a highly successful company producing software development tools. These are high profile roles requiring excellent customer facing skills . In order to succeed, you must have a high level of competence in C, C++ or Cobol skills together with either OS/2 (or NT) or MVS/DB2 experience. The company offers Microsoft Foundation Classes (MFC) training and Visual C++. Ref: EXE003

CLIVEDEN

FRES

Established 1977

Cliveden Recruitment plc

Managing Director: Roger Howard C.Eng. M.I.E.E.

PERMANENT VACANCIES

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

DSP ENGINEER
Berkshire — Salary: £23,000 - £33,000
To design and develop DSP software for radio systems. Experience in DSP with C and assembler knowledge and mathematical ability. Also desirable is experience of DSP in a radio environment, hardware design experience and analogue processing techniques. Ref: BP2549

EMBEDDED SOFTWARE ENGINEER
Berkshire — Salary: up to £21,000
Design and develop embedded software. HND or degree level plus one years experience in structural analysis and design techniques using C. Knowledge of 68322 microprocessor systems, TCP/IP (Data communications and protocols) and forward error correction codes would be an advantage. Ref: BP2545

SOFTWARE SYSTEMS ANALYST
Berkshire — Salary: £23,000 - £28,300
Designing, implementing and testing embedded software for radio development. Degree level candidates with experience in realtime or embedded work. Experience in C or assembler embedded level and Unix experience would be an advantage. Ref: BP2557

SENIOR PRINCIPAL ENGINEER
Berkshire — Salary: up to £35,000
To be the Team Leader for control and DSP software, which involves developing realtime embedded software, creating and maintaining software documentation. Degree level candidates with at least 4 years experience of embedded software on microprocessors preferably in a realtime environment. Knowledge of software analysis methods is desired. Ref: BP2560

CONTRACT VACANCIES

Software Engineer
Realtime embedded C++ & OOD
3 mths+
Surrey
VC1-14281

Software Engineer
C/C++, C+C system
6 mths
Worcs
SC2339

Software Engineer
C, C++, DSP, TMS320, 8057
3 mths+
Middx
VC1-14266

Software Engineer
Ada, OOA, ODD, Defence
3 mths+
Sussex
SC2200

Software Engineer
C, C++, GUI, Windows
3 mths
Berks
VC1-14269

Software Engineer
C/C++, Yourdon, TCP/IP
3 mths+
Yorks
SC2191

Software Engineer
Solaris, Teamwork, Yourdon, Borland, C
3-6 mths
Middx
BC4029

Software Engineer
PSOS, GPS, Comms
3 mths+
Hants
SC2327

Software Engineer
Realtime embedded C & Assembler
6 mths
Berks
VC1-14284

Software Engineer
Embedded, Z80, satcomms
3-6 mths
Hants
SC2323

Software Engineer
C, Assembler, GSM Layers 1&3, MMI
6 mths
Berks
VC1-10016

Software Engineer
C/C++, Yourdon, comms
3 mths+
S. Wales
SC2299

Software Engineer
Realtime, C, C++, VxWorks, OOA, MOD
6 mths
Surrey
VC1-14290

Software Engineer
Realtime, Yourdon, safety critical
6 mths+
London
RS2211

92 The Broadway, BRACKNELL, Berks RG12 1AR Tel: 01 344 489 489 Fax: 01 344 489 505 Email: cliveden@cliveden.co.uk
161 Bitterne Road West, SOUTHAPMPTON SO18 1BN Tel: 01 203 229 094 Fax: 01 703 220 326 Email: soton@cliveden.co.uk
Internet Vacancy List: http//www.cliveden.co.uk Also at London, Birmingham, Crawley, Bristol, Glasgow, Manchester & Stevenage

RWJ

Robert William James & Associates

Professional Search/Contract Staffing

SOFTWARE ENGINEERS

C C++ Visual Basic UNIX NT

RWJ & Associates is a professional recruitment firm presently looking for experienced software engineers, with skills in C, C++, VB and at least 1-2 years genuine work experience.

Within the IT sector RWJ has formed close relationships with a wide range of Clients leading the way in a variety of technologies. These close affiliations mean we share our Clients' goals and challenges, which means we are able to better provide solutions to their needs.

We are therefore looking for high calibre IT individuals who have the desire to succeed in challenging environments. We are also very interested in graduates of a relevant discipline who have good work experience.

Specific skill sets may include:

C, C++, Visual Basic, Access, Object Oriented Design, Oracle, UNIX, Windows 95/98, NT, ODBC, SAPR13, AS400, Software Lifecycle, Systems Design, Artificial Intelligence, Client/Server.

Excellent salaries packages

£18k to £45k

2nd Floor, Haymarket House, Wote Street, Basingstoke, Hampshire RG21 7NL
Tel: 01256 818833 Fax: 01256 816144 email: ianc@rwjuk.demon.co.uk

Please call Ian Coles for further information on current opportunities

Ready For A New Challenge?

Software Engineers **to £35K**

Manchester & Winchester

Are you a C++/C/VB software professional with in-depth skills in one or more of the following..?

- Microsoft Windows Operating Systems and MFC
- Internet Applications
- Data Communications/ Messaging/ Email
- Unix Systems Programming and X-Windows
- Palmtop Computing

Teleca is a growing software house building windows, internet and device-oriented applications, often working to very demanding deadlines. We need enthusiastic, hard-working software developers who want to succeed in a varied, technically demanding environment. In return we offer a friendly working environment, real opportunities to develop your personal and technical skills and sensible salaries.

If you have a good honours degree, a sociable disposition and a commitment to high professional standards, send your CV to:

TELECA

634 Wilmslow Road, Didsbury, Manchester M20 3QX
Tel: 0161 448 2885 Fax: 0161 448 2886
E-mail: jobs@teleca.com http://www.teleca.com
Regional Offices in Winchester and Los Angeles

Introducing InCity

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

InCity

154 Bishopsgate

London

EC2M 4LN

Tel: 0171 247 9005

Fax: 0171 247 9006

InCity Products

The financial services sector places exacting demands on the systems that facilitate it. This means high performance, large capacity, wide area, 24*7 resilience, fault tolerance, real time, high security and accordingly system architecture is critical to any candidate product. Our objective is to develop software packages that meet these requirements, initially selling to the financial services sector by offering better functionality than our competitors. Once an established user community for our products is in place, which will take five years, we will have a sound technology footing to enable us to compete in the global technology market.

InCity Requirement

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

Your Skills

You will need to be very experienced in;

ANSI C++
MFC
STL
COM
UNIX
CORBA

Your Arts

You will need to be very experienced in;

storage
cacheing
sorting
searching
compressing
encrypting

So, if you're lively, have a positive mental attitude, resourceful, motivated and thrive on a variety of chaos then send your CV to Julie Montgomery at .....INCITY.

E-Mail:- juliem@incity.co.uk Tel:- 0171 247 9005 Fax:- 0171 247 9006

ASH Associates

ASH Associates specialise in the recruitment of real-time Software Engineers, Windows™ Developers and Programmers for the High/New Technology markets.

Application areas include:- Telecoms/Datacoms, Control, Graphics, Imaging, GIS/Mapping, Space & Aeronautics, Defence, Banking & Finance, Artificial Intelligence, Internet & Intranet, Office Applications Development in fact we have clients working on just about anything you can think of. The only areas we don't have much interest in, is the Commercial Mainframe/IT markets, COBOL etc.

Development environments are concentrated on Windows™ 95/NT, UNIX & MAC; software languages are C/C++, Visual C++, Visual Basic, JAVA, Embedded/ 80x86 - 68K; of real interest is OOD, MFC, TCP/IP, X-Windows, OSF/Motif, DSP etc.

We always keep a current selection of our positions on the INTERNET so call us for details on what we can do for you and see our web pages at http://www.ash-associates.com for whats NEW.

URGENT requirement for C++/Java developers for a client in Bucks Grads £20K+, experienced designers £30K-£40K

Call or Email
Ron Cook. Email: ron@ash-associates.com
James Hunt. Email: james@ash-associates.com

ASH Associates
COMPUTER RECRUITMENT CONSULTANTS
First Floor, 39 to 41 High Street
Ringwood, Hants, BH24 1AD
Email: recruit@ash-associates.com
TEL:(01425) 475480 FAX:(01425) 480807

Telephone
01425 475480
Fax
01425 480807

In and Around West Yorkshire

Programmers, Analyst Programmers,
Software Engineers,
Support (Novell, Unix), also
Computer Field Service Engineers.

FOR YOUR NEXT CAREER MOVE AROUND WEST YORKSHIRE

Telephone: Vincent Atherton on Leeds (0113) 250 4560 or write to:

AIREDALE RECRUITMENT

Realtex House, Micklefield Lane,
Rawdon, Leeds LS19 6AX

Airedale Recruitment

CATALYST CONSULTING

Our client, a global player in the securities market and one of the most respected names in the financial world are looking to recruit for the following roles:

Graduate Analyst Programmers
Analyst Programmers with good academic backgrounds and a sound training in structured development, required to participate in the following projects:

- International MIS system – VB, SQL
- Front Office trading system – VB, SQL
- Securities Processing System – C, Sybase, Unix
- Risk Management System – C & a relational database

Intranet Manager
To co-ordinate over 50 in house developed sites and provide an integrated architecture and framework and advise on development "best practice".

Internet Specialist
To specialise in web site creation - use dynamic HTML, XML, Javascript, active server pages, VB scripts etc.

Modelling
Opportunities are also available for developers with a strong mathematical / modelling background working on C, C++, SQL.

Analyst Programmers
Young, graduate calibre developers to work on complex trading applications. Candidates require 2 years Relational Database and C experience and the aptitude to cross train onto new leading edge technologies.

To apply for one of the above positions please fax your CV to 01923 249436, email - 106261,3134@compuserve.com or post it to Catalyst Consulting, 135 The Parade, Watford, WD1 1NA.
Any enquiries call 01923 240139.

Ninety four per cent of candidates using Connections, in response to a recent survey, have successfully been found a position which promised greater career prospects and, furthermore, higher salaries.

Nine out of ten candidates said they were more than satisfied with the market knowledge of the Connections consultants they worked with.

If you're looking for the fast lane past the slow traffic, telephone The Windows Connections on 01189 892444 or mail your CV to:

The Windows Connections
The Elms, 26 Broad Street,
Wokingham, Berkshire RG40 1AB
Fax: 01189 893322
Email: mail@winjobs.co.uk

The Windows CONNECTION

WINDOWS
VISUAL C++
3.1/NT/95
VISUAL BASIC
'C'/C++
DELPHI
JAVA
APPLE
MULTIMEDIA

If you have development or support skills in any of the above and you are looking for a permanent or contract position, then we can help you find the right opportunity.

Logistix

20 YEARS 1978–1998

FRES MEMBER COMPUTING DIVISION APPROVED

WINNER VISUAL SYSTEMS Journal READERS AWARDS 1998

Logistix Recruitment Limited, Lamb House, Church Street, Chiswick Mall, London W4 2PD Fax: 0181 742 3061 E-Mail: logistix@atlas.co.uk
Website: www.atlas.co.uk/logistix

Telephone: 0181 742 3060

Rebus Resourcing – South East

PERMANENT AND CONTRACT IT POSITIONS IN LONDON AND HOME COUNTIES

PERMANENT

Delphi Analyst Programmer
City £25k +bens S1
Leading financial institution seeks hands on A/P to work on exciting new development project.

C Programmers
Essex £35k + bens S2
Designing, developing and testing of software. A minimum of 2 years experience of C and Structured Programming

Analyst Programmer Team Leader
London £40k + bens S3
Top City Financial Institution seeks senior A/P with 3/4 years C/C++ and OOD to liaise with analysts, design, code and test. Knowledge of financial markets would be beneficial

C Programmer
Cambridge £30k + bens S4
C/C++ Real time embedded software implementation. Structured design. Must have 2 years experience.

Software Development Consultant
City/International £40k + bens S5
A unique opportunity to work witin a prestigious finance institution for a consultant with experience of C/C++, VB, RDB, SQL, OOD to work on bespoke development project. International travel will be required though London based

CONTRACT

VB Analyst Programmer 4 Months Essex M1
VB 4/5 with ACCESS experience needed for Millenium re-write, existing application is in DATAEASE & knowledge of this and SQL Server would be useful. Extensive inter-team working, so good communications skills essential.

Fortran A/P 3 Months + Ext. Essex M2
Strong FORTRAN and VMS + DCL skills required for A/P role within leading manufacturing company, to implement a system which controls a production line operated by mechanised robot cranes. Will involve Y2K changes and testing.

Delphi A/P 6 months Middlesex B1
Minimun 18 months experience of Delphi with Windows 3.1 and 95. Good design skills essential. C/C++ would be beneficial.

Oracle Developer 6 months Essex B2
Forms 3/4.5 skills essential to work within exciting development project for leading insurance organisation.

If you are interested in any of the above positions please telephone quoting the reference or alternatively forward your CV to:

Rebus Resourcing, Suffolk House,
102-108 Baxter Avenue, Southend-on-Sea, Essex SS2 6JP
Tel: 01702 386868 Fax: 01702 386958
Email: Rebus.Resourcing.SouthEast@Rebus.co.uk
Visit our Web site: HTTP://WWW.JOBSRUS.CO.UK

IT'S NOT WHO YOU KNOW

Seek out the training you need from a database of nearly 1,000 new courses, supplied by an ever-increasing number of companies.

From Basic Project Management to Advanced C++ programming, the Software Training Guide gives today's developr the right training, at the right time and in the right location.

Whether you're looking to brush up on old skills, or branch out into new technologies, the EXE Online Software Training Guide could be the answer for you.

For details of how to submit your company's entries into the Guide, please call Mark Parker on 0171 970 4836. Email markp@dotexe.demon.co.uk

THE SOFTWARE TRAINING GUIDE

EXE ONLINE
www.exe.co.uk

Teaching Maths in...

(Okay – this is an old one. We admit it. But the added extras at the end make it all worthwhile...)

1950 A logger sells a truckload of lumber for $100. His cost of production is 4/5 of the price. What is his profit?

1960 A logger sells a truckload of lumber for $100. His cost of production is 4/5 of the price, or $80. What is his profit?

1970 A logger exchanges a set 'L' of lumber for a set 'M' of money. The cardinality of set 'M' is 100. Each element is worth one dollar. Take 100 dots representing the elements of the set 'M'. The set 'C', the cost of production, contains 20 fewer points than set 'M'. Represent the set 'C' as a subset of set 'M' and answer the following question: What is the cardinality of the set 'P' for profits?

1980 A logger sells a truckload of lumber for $100. Her cost of production is $80 and her profit is $20. Your assignment: Underline the number 20.

1990 By cutting down beautiful forest trees, the logger makes $20. What do you think of this way of making a living? Topic for class participation after answering the question: How did the forest birds and squirrels feel as the logger cut down the trees? There are no wrong answers.

1996 By laying off 40% of its loggers, a company improves its stock price from $80 to $100. How much capital gain per share does the CEO make by exercising his stock options at $80? Assume capital gains are no longer taxed, because this encourages investment.

1997 A logging company outsources all of its loggers. The firm saves on benefits, and when demand for its product is down, the logging work force can easily be cut back. The average logger employed by the company earned $50,000, had three weeks vacation, a nice retirement plan, and medical insurance. The contracted logger charges $50 an hour. Was outsourcing a good move for the logger?

1998 A laid-off logger with four kids at home and a ridiculous alimony from his first failed marriage comes into the logging-company corporate offices and goes postal, mowing down 16 executives and a couple of secretaries, and gets lucky when he nails a politician on the premises collecting his kickback. Was outsourcing the loggers a good move for the company?

1999 A laid-off logger serving time in Fulsome for blowing away several people is being trained as a Cobol programmer in order to work on Y2K projects. What is the probability that the automatic cell doors will open on their own at midnight on January 1st?

Blast from the past

Remember this odd-looking gadget? It's the Maltron keyboard. Here's how *.EXE* described it in June 1989.

This strange-looking keyboard is the latest attempt to break the dominance of the QWERTY standard. As always with these products, the manufacturers claim that, once he has mastered the layout, the operator can achieve an improved rate of data entry. Frequently used keys, such as 'E', Space and Return, are positioned where they can be reached with the thumbs. The grouping of Alt, Ctrl, and Del together in a row presumably reflects the notorious unreliability of modern software.

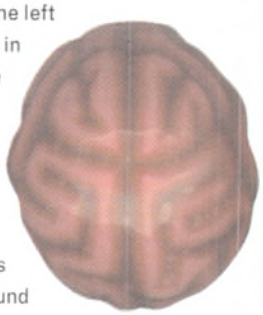
However, speed is not the main selling point. The keyboard is also claimed to reduce Repetitive Strain Injury. This condition, reputedly agonising in its severe forms, is becoming increasingly common in the DP industry. Several court actions are pending where keyboard operators are suing their employers because of RSI. According to Maltron, the manufacturer, the ergonomically designed keyboard reduces the strain on the hands, wrists, and forearms of users, and so the likelihood of RSI.

The unit is compatible with PC/XT's – and an AT version is under development. For the unadventurous, a button switches the keys to QWERTY mode. The price is £295 ex vat.

Only £295? We'll have two... The Maltron was not the only alternative keyboard to surface in the 80's. We dimly recall another alternative called the Dvorak, not forgetting the now-defunct Microwriter five-key keyboard. The first company to buy up the patent on this and incorporate it into one of today's Windows CE/Psion/Palm machines wins a Mystery Prize (the prize being they have to give us one. Each).

Freebie of the month

This has to be one of the most disgusting, vile, and frankly hilariously funny things we have received this year. Promoting the idea that Microsoft's Visual Studio 6.0 appeals to both the left *and* right sides of your brain, this monstrosity in plastic and some kind of viscous red fluid we believe is meant to represent blood – technically inaccurate since the brain is surrounded by a clear fluid, but what the heck – is not only visually (un)appealing, it also makes a horrendous slurping sound when you squeeze it. Described by various members of staff as 'blood-curdling', 'horrid', and 'urgh!', it's the sound that really makes this *objet d'arse* unique.



We're steadfastly hoping for a full-size version, so we can really gross out passengers on the 5:15 from Victoria. Unfortunately, a picture hardly does The Brain justice without the sound, but if you're really lucky, we might be persuaded to put it on the website... try *http://www.exe.co.uk/brain*.

And finally...

Yet more awards! The Boris Yeltsin 'What Crisis?' Award for the most Inconspicuous Visit to a Foreign Country goes to Microsoft chairman William H 'Bill' Gates III, who apparently did a European tour last week and managed to stay out of the media entirely. The Apple iMac 'No Beige' Award for Resurrecting Dead Ideas goes to IBM, which killed off OS/2 and then immediately brought it back as Workspace On-Demand. Finally, the IBM OS/2 Memorial Award for Trying Too Hard goes to the director of the Apple iMac commercial, who cleverly cut in a shot of a UK-style mains plug for the British version of the ad, but failed to notice that the phone plug immediately underneath it was a US-standard RJ11. Doh!

Old Possum's Book of Pragmatic Programmers

'Managing programmers is like trying to herd cats' – Ellen Ullman, *Close to the Machine.*

Author's note: This month I had originally determined to produce for you some poems parodying the style of T S Eliot's well-known and well-loved volume *Old Possum's Book of Practical Cats*. However, when I went back and reread the book, I discovered that in truth I don't much like Eliot's poems – they are sloppily written and affectedly sentimental, eccentric yet charmless. Whimsically naming a character 'Jennyanydots' may impress Lord Lloyd Webber, but it doesn't cut the ice with me. Problem: if you don't like the original, you can't do a decent parody.

Here instead, then, are parodies of four poems that I do admire. But the headline and the introduction, though now meaningless, seemed too good to change. So I didn't – *VS.*

Sonnet 233 Mhz

My laptop's size is nothing like a book;
Unlike my bag her weight drags down my arm;
If a mouse is like a digit, her pad's a foot;
A fast disk like a storm, her drive is calm.
The latest bat'tries charge in half an hour –
In half a week my laptop cannot do it.
The best of keyboards click and clack with power;
Her tiny keyboard squidges like Mum's suet.
To change some RAM should really be a cinch
Two dozen screws keep hers from prying eyes.
Through a mesh of blurry pixels, at a pinch,
I can discover where each fresh fault lies.
One question irks me ev'ry day anew,
How come this junk got five stars in review?

The Uncertainty of the Programmer

```
var
  i : TPoet;
begin
  Assert(i.fondness(bananas) >= VERY);

var
  i : TBananas;
begin
  Assert(i.fondness(poet) >= VERY);

type
  TPoet = class(TBananas)
  end;
var
  i : TPoet;
begin
  Assert(i.fondness >= VERY);

  i.i.fondness(poet);
  bananas >= VERY;

  if fondness(bananas = i) then
    if i then
      poet := VERY;

  Assert(i = poet.bananas);
  Assert(i.fondness(VERY));

  if bananas.fondness > VERY
    Assert(i in bananas);
  if i is TPoet then
    {nothing};
```

Ah. I see you too are having difficulties getting up to speed with CodeRush's keyboard templates.
(Sorry. That one was just for Delphi heads.)

Porting an old library late one evening

Whose C this is I think I know:
I made it many moons ago
When I was young and full of passion
And K&R was all the fashion.

Strange beauty here. I see the traces
In overhanging curly braces
Of long-forgotten big ideas
My hopes and thoughts of former years.

My little Compaq stirs her drive
As if to say, Hey! Look alive
For goodness sake pull out your finger
We do not have the time to linger.

I close the file with little zest.
I've many modules yet to test,
And code to write before I rest,
And code to write before I rest.

Night Mail

This is the email crossing the router,
A transient blip on its trouble shooter,

Email for Harry, email for Tom,
Mail for dot uk and mail for dot com.

The data fly past, ip* in each packet
The network is loaded but this lot won't crack it.

A glut from a recalcitrant mailing list
Which despite 'unsubscribe' will still not desist,

An adulterer's hint to her partner in crime,
Some idiot's Word file, bloated with MIME,

A letter to Feedback about Radio Four,
A rambling flame from some Christian bore,

A batch of blue jokes laced with tetragram**,
A job application, and spam spam spam.

But there's rings on its fingers and bells on its toes,
Email spreads joy wherever it goes –

For surely the hardiest cynic can't fail
To thrill at the popup: 'You have new mail'.

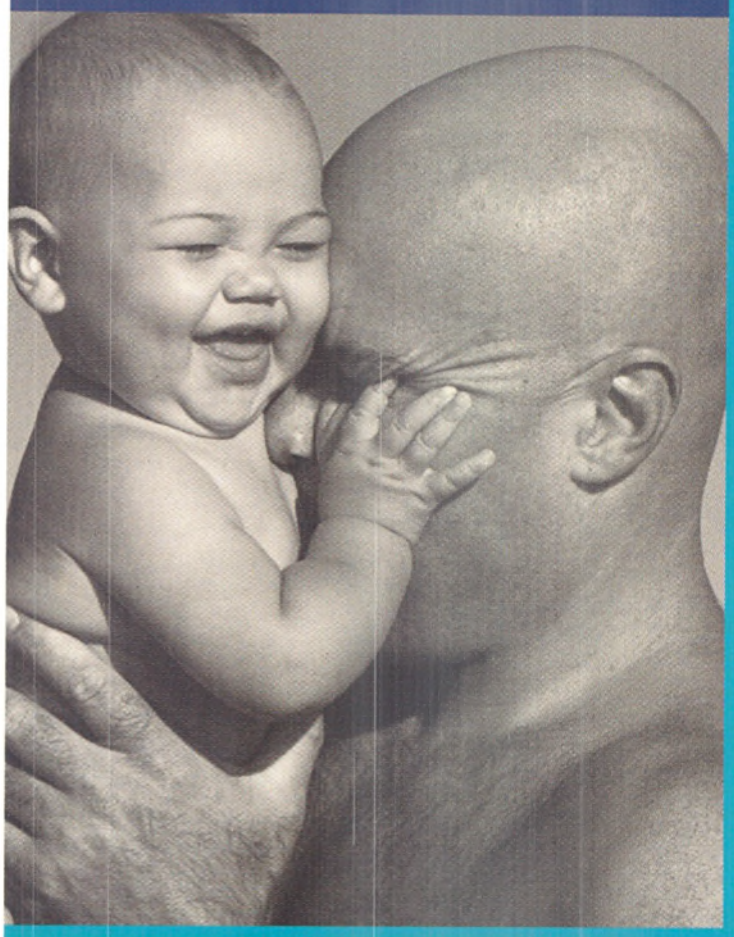
** Pronounced 'eye-pee', obviously.*
*** A four letter word. The stress falls on first and last syllables. At least, it does in this poem.*

Rampant self-indulgence

Happy Birthday to me,
Happy Birthday to me,
I've been writing this column on and off for ten years now,
Happy Birthday to me.

Verity Stob wishes to apologise to William 'The Other Big Bill' Shakespeare (Sonnet 130 – 'My mistress' eyes are nothing like the sun'), Wendy Cope ('The Uncertainty of the Poet'), Robert Frost ('Stopping By Woods On A Snowy Evening'), and W H Auden (his original also called 'Night Mail'). But not to T S Eliot, nor to the writer of 'Happy Birthday'.

HASP® Protects Your Software



Your software is your baby – and you want to look after it. You created it, you developed it, you saw it right through to the moment it was ready for market. Now protect it. 50% of business software is stolen; $11 billion of developers' income is lost to piracy.* Is your software a statistic?

All over the world, more developers are protecting against piracy. They're protecting more products, on more platforms, with more security – and selling more as a result. And more of these developers are protecting with HASP.

To see why 25,000 developers worldwide protect with Aladdin, call and order your HASP Developer's Kit now!

HASP – The Professional Software Protection System®

- Rated #1 in industry tests
- Unequalled security
- Unparalleled flexibility
- Genuine ease-of-use and transparency
- Supported under Windows 95, 98 and NT, Mac, OS/2, NEC, UNIX, and LANs
- ISO 9002 quality and reliability
- New – USBHasp!

Full Support with Windows '98 + USB

HASP Protects More

UK	**Aladdin Knowledge Systems UK Ltd.** +44 1753 622266, Fax: +44 1753 622262, Email: sales@aldn.co.uk
North America	**Aladdin Knowledge Systems Inc.** 800 223-4277, 212 564-5678, Fax: 212 564-3377, Email: hasp.sales@us.aks.com
Int'l Office	**Aladdin Knowledge Systems Ltd.** +972 3 636-2222, Fax: +972 3 537-5796, Email: hasp.sales@aks.com
Germany	**Aladdin Knowledge Systems Gmbh & Co. KG** +49 89 89 42 21-0, Fax: +49 89 89 42 21-40, Email: info@aladdin.de
Japan	**Aladdin Japan Co., Ltd.** +81 426 60-7191, Fax: +81 426 60-7194, Email: sales@aladdin.co.jp
France	**Aladdin France SA** +33 1 41-37-70-30, Fax: +33 1 41-37-70-39, Email: info@aladdin.fr
Benelux	**Aladdin Software Security Benelux B.V.** +31 24 648-8444, Fax: +31 24 645-1981, Email: sales@aladdin.nl
Russia	**Aladdin Software Security R.D. Ltd.** +7 095 923-0588, Fax: +7 095 928-6781, Email: aladdin@aladdin.msk.ru

01753 622266
www.aks.com

ALADDIN®
The Professional's Choice

■ **Australia** Conlab 03 98985685 ■ **China (Beijing)** Feitian 010 62567389 **(Hong Kong)** Hastings 02 5484629 **(Shenzhen)** Hastings 0755 2328741 ■ **Czech** Atlas 02 766085 ■ **Denmark** Berendsen 039 577316 ■ **Egypt** Zeineldein 02 3604632 ■ **Finland** ID-Systems 09 8703520 ■ **Greece** Unibrain 01 6756320 ■ **India** Solution 011 2148254 ■ **Italy** Partner Data 02 26147380 ■ **Korea** Dae-A 02 8484481 ■ **Mexico** SiSoft 091 80055283 ■ **Poland** Systherm 061 480273 ■ **Portugal** Futurmatica 01 4116269 ■ **Romania** Ro Interactive 064 140383 ■ **Singapore** ITR 065 5666788 ■ **South Africa** D Le Roux 011 8864704 ■ **Spain** PC Hardware 03 4493193 ■ **Sweden** Kordab 455 307 300 ■ **Switzerland** Opag 061 7169222 ■ **Taiwan** Teco 02 5559676 ■ **Turkey** Mikrobeta 0312 4670635 ■ **Yugoslavia** Asys 021 623920

© Aladdin Knowledge Systems Ltd. 1985-1998 HASP-ad (1/1998) 1.6-41036 HASP is a registered trademark of Aladdin Knowledge Systems Ltd. All other product names are trademarks of their respective owners.

* 1997 BSA/SPA Study

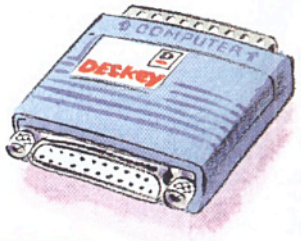
Come and visit us on stand C11, S/W Development '98 Show – 13-15th October at NEC and receive 10% discount for your first order.

Enquiry No. Oc42

One makes software theft illegal, the other makes it impossible.

If you would rather take the law into your own hands, the DESkey range of products have security designed into the hardware. ASICs and microprocessors running proprietary algorithms provide real protection. A comprehensive range of drivers and our software protection utility DESlock, work to bring the highest level of security with the minimum of effort.

Call today for product information, demonstration units and technical advice.



Don't just Dongle it – DESkey it

PC MAC PC Card UNIX etc

Designed for Microsoft Windows 95 · PC CARD · Member of FAST Promoting the legal use of software · ISO 9001 SGS · ACS ASIC · Mac OS · Ready for OS/2 WARP

DESkey

Data Encryption Systems Limited *Silver Street House, Silver Street, Taunton, Somerset TA1 3DL*
Telephone 01823 352357 Fax 01823 352358 BBS 01823 352259 E:mail sales@des.co.uk www.des.co.uk

Enquiry No. Oc43