C++ GUI LIBRARY BLITZ • PERSISTING WITH POET • DIY WEB PAGES

November 1994

# EXE

The Software Developers' Magazine

£3.20

## Unix, an open book

### Kirk McKusick of BSD fame speaks out

Career Opportunities See Page 104


Making the move: Clipper to Visual Objects

InfoModeler review

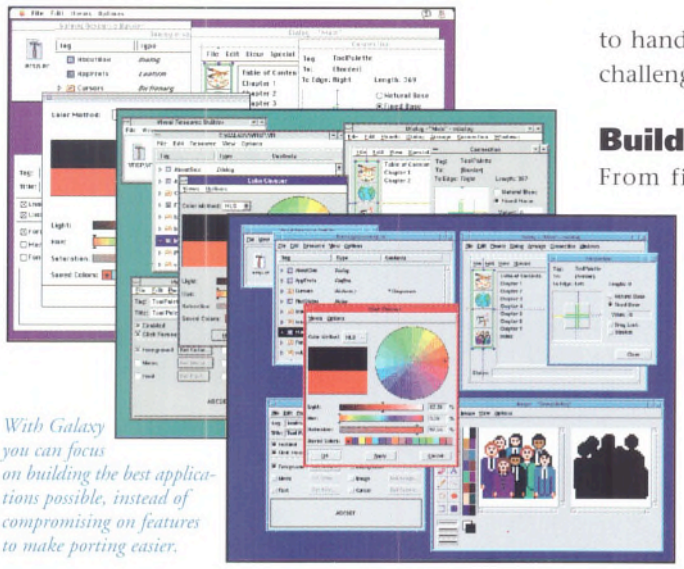
Big time operators in C++

9 770268 987008

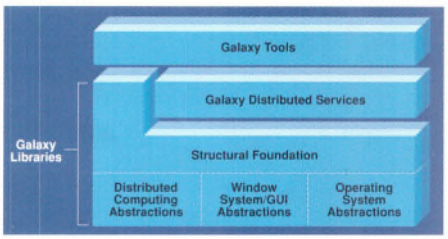
# BUILD IT ONCE. BUILD IT RIGHT. BUILD IT WITH GALAXY.

If you're building a new generation of mission-critical applications, you need a tool with the power and scalability to span departments, divisions— the entire enterprise. Only one tool can help you do it all, because only one tool has it all—the Galaxy Application Environment® from Visix.

When we say "build it once, build it right," we mean it. Galaxy dramatically reduces both the time and cost of developing distributed, portable applications and significantly increases the quality of your final product. Only Galaxy can handle your toughest development challenges and then some—it's that good.



*With Galaxy you can focus on building the best applications possible, instead of compromising on features to make porting easier.*




*Galaxy's object-oriented architecture offers unprecedented API depth and breadth to liberate C and C++ developers from the constraints of platform-specific toolkits.*

## Build it once

Cross-platform no longer means compromise. With Galaxy's object-oriented API and integrated tools, your development team can write an entire application once and move it to UNIX, Windows, Windows NT, Macintosh, OS/2 and OpenVMS without changing a single line of code. You can easily support all your target platforms without struggling with multiple toolkits or supporting separate development teams. Best of all, there's no "least common denominator" effect with Galaxy—your applications are completely portable and still able to exploit the advanced capabilities of each native environment. The end result? You'll have a better application that is completely portable in a fraction of the time it would take otherwise.

## Build it right

You'll build it right because we've built it right. Galaxy specifically targets the needs of high-end professional developers by providing a comprehensive set of object-oriented libraries, distributed services, and visual tools into a cohesive, multiplatform development environment. Galaxy not only provides a powerful GUI builder, but also includes a rich set of platform-independent abstractions—such as memory management, networking, file management, and distributed services—to handle the other 50% of your most challenging development projects.

## Build it with Galaxy

From financial services to manufacturing, Galaxy has exceeded the expectations of even the most demanding developers and won the praises of the computer industry press and analysts. Galaxy architecture has proven itself in hundreds of real world environments—J.P. Morgan, Xerox, IBM, Legent, and many others are using Galaxy today to build their mission-critical applications.

"The best cross-platform generator that we saw."

***—Ovum Evaluators, Ovum Ltd., August 1994***

Winner Outstanding Product

***—Unix Review, December 1993***

Winner Jolt Award

***—Software Development, May 1994***

## Attend a free seminar

Call us today at 071.872.5825 to request a complete Galaxy information kit and a current seminar schedule. Or, if you prefer, send us your request by fax to 071.753.2720.

GALAXY
Application Environment®
LIGHT YEARS AHEAD

**Visix Software (UK) Ltd. 1 Northumberland Avenue Trafalgar Square London WC2N 5BW**
**071.872.5825/phone 071.753.2720/facsimile**

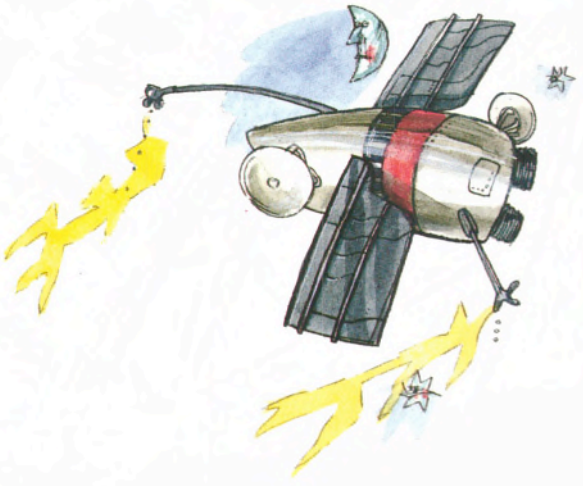
VISIX

CIRCLE NO. 765

EXE
The Software Developers' Magazine

# CONTENTS



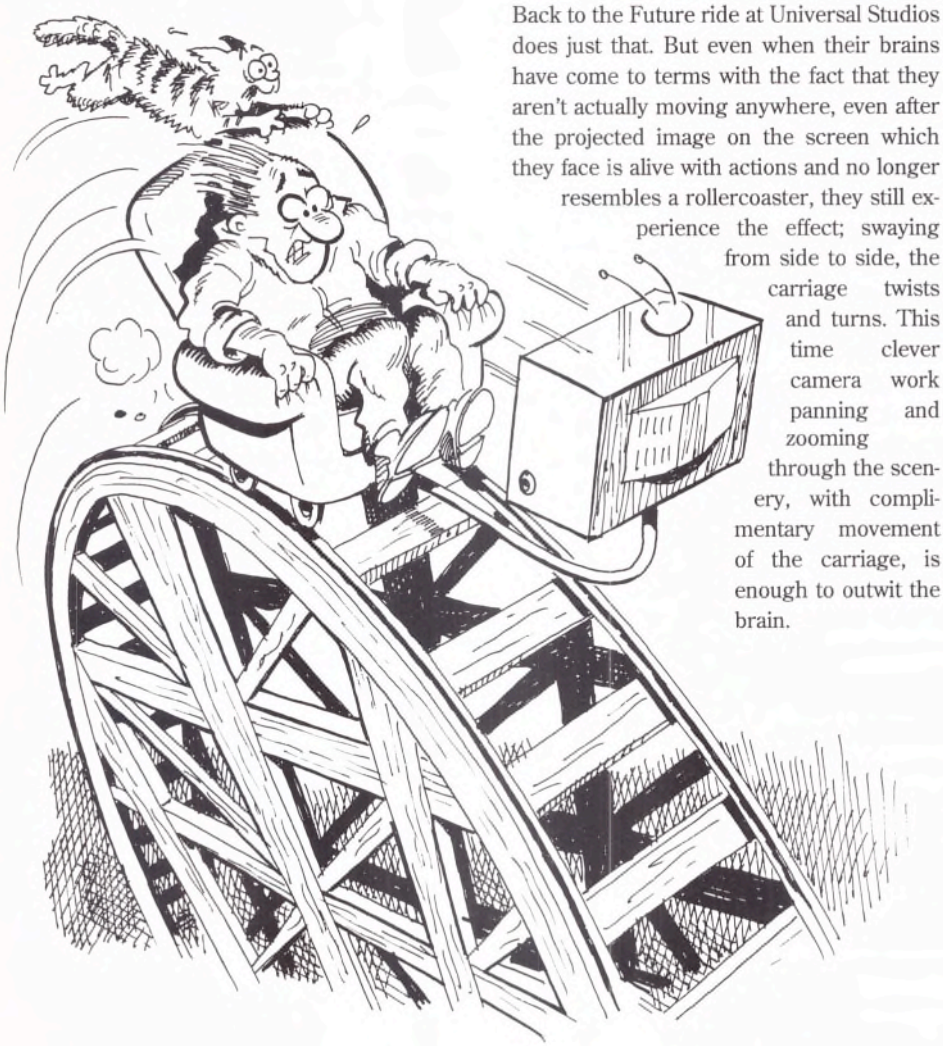


# Back to reality

Hold on tight folks. You're about to take a ride on the armchair rollercoaster...

A darkened room. Six people file in from a doorway on the left and take adjacent seats in the open carriage. The safety harness is lowered down across their laps and a cool breezes brushes past their face as they stare into the blackness. Without warning the carriage jolts forward. They lunge and squelch their fingers around the soft padding of the harness. Ahead two bar doors swing open and the carriages drops almost vertically into the darkness accompanied by screams of exhilaration from its occupants.

To a bystander the carriage hasn't moved an inch: it has no wheels; there is no rail. It is stationary; this is no rollercoaster. The sensation of movement is achieved solely through the action of pistons pumping the carriage violently left and right, up and down. The combined effect is difficult to distinguish from reality, which in this case is the reality of a 'death-defying white knuckle' ride. It is hard to believe the mind can be fooled, even temporarily, by such basic mechanical movements. Yet, for those who have not experienced it before, the Back to the Future ride at Universal Studios does just that. But even when their brains have come to terms with the fact that they aren't actually moving anywhere, even after the projected image on the screen which they face is alive with actions and no longer resembles a rollercoaster, they still experience the effect; swaying from side to side, the carriage twists and turns. This time clever camera work panning and zooming through the scenery, with complimentary movement of the carriage, is enough to outwit the brain.



Those in the know will say the ride isn't really virtual reality. While there may be no all-encompassing VR suit with accompanying helmet and data glover, the simplicity of the ride gives an extremely close approximation. By the turn of the century rollercoasters will be resigned to history as a short-lived monstrosity of the latter 20th century. By stimulating just two or three of the senses in coordination it is possible to trick the brain into believing it is elsewhere. If this is not an application of virtual reality then what is?

It has been predicted that the biggest growth sector for VR products will be in the entertainment industry. More precisely, in the home entertainment sector. But do developers of VR products honestly believe that the average household six years from now will own a home computer equivalent to one of today's $50,000 Silcon Graphics workstations? I think not. Let's face it: the *de facto* standard for proccessors in games consoles is the 16-bit 68K. And, for the time being, the mass market is quite happy to accept it. While 32-bit machines are in production today, they lack the power in terms of raw processing, graphics performance and memory reqired to generate an acceptable VR environment. There is a trade-off between cost and performance.

Unless it is ridiculuously cheap, VR won't enter the home through the front door as the magical box of tricks that sits beneath the TV. Instead, it will appear gradually, over time, with the addition of more and more hardware. People said CDs would never become generally accepted. They mocked digital stereo. Today compact disc is the accepted standard. Today it is less common to hear a TV broadcast in mono than in stereo.

In one form or another virtual reality is finding its way into the home: with surround sound via an AV amplifier we can produce effects so realistic that it makes us turn around when we hear something behind us. It won't be long before games writers take advantage of this technology. It's here today and it's relatively cheap. We already have video disc players capable of playing back full length feature films. We already have interactive CDs. Combine the two and you have Universal Studios in your living room. All that's missing is the fancy hydraulic chair. As to the cost... Well it will certainly be a hell of a lot less than a 'red hot' Risc workstation.

***Cliff Saran***

# 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**

*(0364) 654100*
FAX: (0364) 654200

## C & C++ FOR WINDOWS

| | |
|---|---|
| COMM-DRV | £145 |
| CrystalComm for Windows | £130 |
| Greenleaf Comm++ | £180 |
| Greenleaf CommLib Pro | £365 |
| MagnaComm/Windows | £280 |
| Btrieve for Windows | £365 |
| Btrv++ | £185 |
| CB/ISAM MU for Win | £150 |
| CodeBase 5.1 | £259 |
| CodeBase++ 5.1 | £259 |
| DataBoss for Windows | £410 |
| Integra VDB/C++, Client/Server | £509 |
| Integra VDB/C++, Desktop | £209 |
| List & Label Pro | £395 |
| Paradox Engine & DFX 3.0 | £125 |
| POET SDK 2.0 | £360 |
| Q+E Database Library | £295 |
| Raima Database Manager | £380 |
| Raima Object Manager | £305 |
| Spread/VBX++ | £175 |
| Watcom SQL for Windows | £260 |
| Essential Chart for Win | £320 |
| GraphiC/Win 7.0 | £370 |
| Graphics Server SDK | £205 |
| Real Time Graphics Tools | £480 |
| Windows Charting Tools | £245 |
| Accusoft Image Format Lib/Win | £430 |
| Ad Oculos (Image Analysis) 2.0 | £325 |
| Borland Visual Solutions Pack | £59 |
| Canvas.h++ | £340 |
| Control Palette 2.0 | £135 |
| Data Entry Workshop | £135 |
| DataTable | £249 |
| Diamond Toolkit | £310 |
| IC Image Control 1.1 | £325 |
| KPWin++ | £600 |
| LEADTOOLS Prof | £520 |
| M.4 | £685 |
| Magic Fields | £260 |
| MS Visual Control Pack | £69 |
| PCX Toolkit for Windows | £155 |
| ProtoGen+ | £220 |
| SafeWin 3.0 | £190 |
| TX Text-Control 3.0 | £1160 |
| Win/Sys Library | £105 |
| WindowsMaker Pro 5.5 | £750 |

## BASIC COMPILERS

| | |
|---|---|
| BBC BASIC-86 Plus | £75 |
| CA-Realizer 2.0 (Win) | £190 |
| GFA-BASIC for DOS | £80 |
| GFA-BASIC for Windows | £80 |
| GFA-BASIC for Win Compiler | £54 |
| PowerBASIC (DOS) | £110 |
| PowerBASIC Pro (Win&DOS) | £225 |
| TrueBASIC 3.0 | £88 |

## LOW PRICES FOR MICROSOFT & BORLAND PRODUCTS

| | |
|---|---|
| **Microsoft Access 2.0** | **£289** |
| **Microsoft Delta** | **£230** |
| **Microsoft Fortran 5.1** | **£138** |
| **Microsoft Fortran Power Station** | **£230** |
| **MS FoxPro 2.6 Pro DOS** | **£360** |
| **MS FoxPro 2.6 Std DOS** | **£87** |
| **MS FoxPro 2.6 Pro Win** | **£360** |
| **MS FoxPro 2.6 Std Win** | **£87** |
| **MS Macro Assembler 6.11** | **£110** |
| **MS Multimedia Viewer Pub Kit** | **£230** |
| **MS Visual Basic for DOS Std** | **£96** |
| **MS Visual Basic for DOS Prof** | **£230** |
| **MS Visual Basic for Win Std** | **£96** |
| **MS Visual Basic for Win Prof** | **£230** |
| **Microsoft Visual C++ Std** | **£65** |
| **Microsoft Visual C++ 2.0** | **£299** |
| **Microsoft Windows 3.1** | **£78** |
| **Borland C++ 4.0** | **£285** |
| **Borland Pascal with Objects 7.0** | **£250** |
| **dBase 5.0 for DOS** | **£405** |
| **dBase 5.0 for Windows** | **£280** |
| **dBase Compiler 2.0** | **£245** |
| **Paradox Engine & DFX 3.0** | **£125** |
| **Turbo C++ 3.0** | **£59** |
| **Turbo C++ Visual Ed. for Win** | **£84** |
| **Turbo Pascal 7.0** | **£84** |
| **Turbo Pascal for Windows 1.5** | **£99** |
| **Paradox for DOS 4.5** | **£405** |
| **Paradox for Win 5.0** | **£285** |

**WITH FULL TECHNICAL SUPPORT**

## PROGRAMMING tools

| | |
|---|---|
| **Ada** | **Assemblers** |
| **Basic** | **C/C++** |
| **Comms** | **Cross Dev** |
| **Custom Controls** | **Database** |
| **Debuggers** | **Dos Extenders** |
| **Editors** | **Fortran** |
| **Graphics** | **GUI** |
| **Linkers/Locaters** | **Lisp** |
| **Modula-2** | **Multi-tasking** |
| **Pascal** | **Prolog** |
| **Smalltalk** | **SQL** |
| **Version Control** | **Visual Programming** |
| **Windows** | **Xbase** |

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

## C & C++ COMPILERS

| | |
|---|---|
| Aztec Embedded C86 | £290 |
| Microsoft Visual C++ Std | £65 |
| Microsoft Visual C++ Intel Ed | £299 |
| Symantec C++ 6.1 Std | £85 |
| TopSpeed C Prof | £169 |
| TopSpeed C/C++ Prof | £215 |
| Turbo C++ 3.0 | £59 |
| Turbo C++ Visual Ed. for Win | £84 |
| Borland C++ 4.0 | £285 |
| Borland C++ for OS/2 1.5 | £149 |
| High C/C++ 386 3.2 | £555 |
| High C/C++ for OS/2 | £445 |
| High C/C++ for Win NT | £445 |
| Salford C/C++ Developer | £395 |
| Salford C/C++ Prof Plus | £295 |
| Symantec C++ 6.1 Prof | £310 |
| Watcom C/C++ 10.0 (CD) | £164 |

## News & Views

**Microsoft Visual C++ 2.0 for Intel**
Get ready for Windows 95! Visual C++ 2.0 includes MFC 3.0 (32-bit OLE & ODBC, multithreading, tooltips, floating & docking toolbars and tabbed dialogs), new IDE (integrated resource editors, customisable user interface & new project window), C++ templates & exceptions (hurray!), faster compiler with new optimisations and new incremental linker. Visual C++ 2.0 can host & target Windows NT or Windows 95 and can also target Win32s. It also includes Visual C++ 1.51 for 16-bit development (with MFC 2.5) and the OLE Control Developer's Kit (for developing both 16 & 32-bit OCX's). All of this with online docs on CD-ROM for just £299. Printed documents will be published by Microsoft Press - call for details. Upgrade from ANY Microsoft C compiler (including QuickC!) for only £155 (no proof required - it scans your hard disk).

Purchasers of Visual C++ 2.0 can also get a copy of Windows NT 3.5 Workstation for only £79. If you want to start developing for Win32, convert your Win16 apps, write OpenGL apps, or simply want a more stable development platform, call us right now to place your order.

**Codewright Fusion**
If you use Visual C++ or Borland C++ and like the IDE but not the editor - your dreams have been answered. Codewright Fusion plugs into your IDE replacing the existing editor and gives you all the power of a standalone editor. Only £129 - call us now for full details.

**Visual Developer's Suite**
This has to be the bargain of the year for Visual Basic and C++ programmers. All the VisualTools products are now available as a bundle for an introductory price of £220. It includes Formula One (spreadsheet/grid control), First Impression (2 & 3-D charting with photorealistic rendered output), Visual Writer (word processing engine), ImageStream (bitmap & vector imaging library) and Visual Speller (spelling checker). All include a DLL & VBX and are royalty free except ImageStream (which includes a VBX and 100 runtimes). Call us now to order your copy.

## C & C++ FOR DOS

### Comms

| | |
|---|---|
| Async Prof for C/C++ 2.0 | £170 |
| C Asynch Manager | £175 |
| C Comms Toolkit | £215 |
| COMM-DRV | £145 |
| Essential Comm 5.0 | £265 |
| Greenleaf CommLib 5.0 | £235 |
| MagnaComm/DOS | £215 |
| SilverComm "C" Asynch 4.0 | £195 |

### Database

| | |
|---|---|
| Btree Filer for C Network | £170 |
| Btrieve | £365 |
| C-Index+ Pro | £349 |
| c-tree Plus 6.4A | £565 |
| CodeBase 5.1 | £259 |
| CodeBase++ 5.1 | £259 |
| D-ISAM | £325 |
| d-tree | £490 |
| DataBoss 3.5 (Special Offer) | £79 |
| Greenleaf Database Library | £180 |
| Paradox Engine & DFX 3.0 | £125 |
| POET SDK 2.0 | £360 |
| r-tree | £305 |
| Raima Database Manager | £360 |
| Raima Object Manager | £360 |
| SoftFocus Btree/ISAM | £75 |
| Topaz for C 4.0 | £255 |
| Watcom SQL Developer's | £260 |

### Graphics

| | |
|---|---|
| 3D-Ware Std | £99 |
| 3D-Ware Prof | £249 |
| Accusoft Image Format Lib | £430 |
| dGE 5.0 | £205 |
| Essential Graphics Toolkit | £320 |
| Fastgraph 3.0 (Ted Gruber) | £160 |
| GFX Graphics Lib 32-bit | £270 |
| GraphiC 7.0 | £345 |
| GX Effects 3.0 | £125 |
| GX Graphics 3.0 | £155 |
| HALO Professional 2.0 | £245 |
| MetaWINDOW-DOS 4.4 | £170 |
| MetaWINDOW-DOS/286 4.4 | £240 |
| MetaWINDOW-DOS/386 4.4 | £309 |
| PCX Toolkit 6.0 | £155 |
| PCXLab-DOS/286/386 | £135 |
| Real-Time Graphics & UIT | £225 |

### GUI

| | |
|---|---|
| 4Sight | £300 |
| graphics-MENU | £185 |
| Menuet/CPP 2.0 | £310 |
| MEWEL/GUI Std 4.0 | £390 |
| object-Menu w/Source 2.7 | £510 |
| T-Windows | £240 |
| Zinc 3.6 for DOS | £505 |

### Math & Scientific

| | |
|---|---|
| C/Math Toolchest & Grafix | £45 |
| Huge Virtual Array & NAT | £215 |
| Linpack.h++ w/Source | £429 |
| Math.h++ w/Source | £257 |
| MIRACL | £39 |
| Science, Eng & Graphics Tools | £140 |

### Memory Managers

| | |
|---|---|
| Heap Expander 3.0 | £130 |
| MegaHeap | £115 |
| MoreHeap 3.0 | £135 |
| PowerSTOR | £99 |
| VMData for DOS | £665 |

### Printer

| | |
|---|---|
| Baby Driver Kernel 3.0 | £250 |
| BGI Printer Driver Toolkit | £105 |
| GX Printer 1.5 | £240 |
| SLATE | £260 |

### Screen

| | |
|---|---|
| C-Scape 4.0 | £360 |
| C/Windows Toolchest | £45 |
| Greenleaf Datawindows 3.0 | £225 |
| MEWEL/TEXT Std 4.0 | £390 |
| Object Professional for C++ | £190 |
| Panel Plus II | £260 |
| TCXL UI Dev Sys for DOS/Win | £140 |
| Vermont Views Plus 4.05 | £595 |

### General & Systems Libraries

| | |
|---|---|
| C Tools Plus/6.0 | £135 |
| CAD/CAM Dev Kit/2D Personal | £375 |
| Crusher! with Source 2.0 | £195 |
| Greenleaf ArchiveLib | £210 |
| Hold Everything | £160 |
| Interwork | £205 |
| MTASK | £215 |
| Multi-C w/Source | £39 |
| Resident-C | £160 |
| SpontaneousAssembly for C++ | £95 |
| TCOMP/Multi-Platform | £105 |
| TTSR Ram Res Dev Sys 2.0 | £105 |
| TG-CAD Prof 5.0 | £795 |
| Tools.h++ w/Source 6.04 | £259 |
| TSRs and More | £130 |

### Tools

| | |
|---|---|
| C-DOC 5.0 | £185 |
| C-Vision for C 3.1 | £95 |
| Clear+ for C | £135 |
| CodeCheck (Professional) | £495 |
| MKS LEX & YACC | £240 |
| PC-Lint for C | £89 |
| PC-Lint for C/C++ | £139 |
| PCYACC Personal | £250 |
| SourcePrint+ 5.0 | £190 |

## VISUAL BASIC FOR WINDOWS

| | |
|---|---|
| Visual Basic 3.0 for Win Std | £96 |
| Visual Basic 3.0 for Win Prof | £230 |
| Comms Lib/Win | £115 |
| Network Library/Win | £80 |
| PDQ Comm for Windows | £99 |
| Agility/VB | £180 |
| Btrieve for Windows | £365 |
| CodeBasic 5.1 | £140 |
| Controls for Btrieve | £185 |
| Integra VDB/VB, Client/Server | £509 |
| Integra VDB/VB, Desktop | £209 |
| List & Labels for VB | £279 |
| Q+E Multilink/VB 2.0 | £270 |
| Q+E ODBC Pack 1.2 for Win | £340 |
| Raima Data Manager | £450 |
| VB/ISAM MU | £150 |
| VBtrv for Windows | £185 |
| Visual/db Network 3.0 | £235 |
| 3-D Widgets | £89 |
| ChartBuilder for VB | £75 |
| Control Palette 2.0 | £135 |
| Custom Control Factory | £49 |
| Data Widgets | £99 |
| Designer Widgets | £99 |
| Formula One | £220 |
| HighEdit for VB | £165 |
| MS Visual Control Pack | £69 |
| QuickPak Pro for Win 3.0 | £145 |
| Spread/VBX | £175 |
| SpyWorks-VB | £120 |
| Tab/VBX | £49 |
| TX Text Control for VB + IC | £199 |
| VB/Magic Controls | £120 |
| VBAssist 3.0 | £135 |
| VBTools 4.0 | £115 |
| WinWidgets/VBX | £160 |
| Accusoft Image Lib/VBX | £430 |
| 3D Graphic Tools | £130 |
| Code.Print Pro for VB | £85 |
| Compression Plus for VBWin | £200 |
| DynaZIP VBX | £179 |
| FXTools/VB Std 1.5 | £149 |
| FXTools/VB Prof | £260 |
| Grid/VBX | £75 |
| GUI Assist | £350 |
| ImageKnife/VBX 1.3 | £175 |
| ImageMan/VB 3.0c | £239 |
| ImageStream/VBX | £220 |
| MediaKnife/VBX | £244 |
| Microhelp Muscle/Win | £125 |
| PCX Toolkit for Windows | £155 |
| QuickPak Scientific for Win | £105 |
| Spellcheck | £49 |
| TMS Tools | £99 |
| TrueGrid Pro 2.1 | £105 |
| VB Compress Pro 3.0 | £99 |
| Visual Instrument Panel Controls | £150 |

## VISUAL BASIC FOR DOS

| | |
|---|---|
| MS Visual Basic for DOS Std | £96 |
| MS Visual Basic for DOS Prof | £230 |
| Comms Lib/DOS | £115 |
| Network Library/DOS | £80 |
| PDQ Comm | £65 |
| Btrieve 5.1 | £365 |
| CodeBasic 5.1 | £140 |
| db/Lib Prof 3.0 | £195 |
| E-Tree Plus | £165 |
| VB/ISAM MU | £150 |
| Vbtrv for DOS | £120 |
| Elltech's GUI Toolkit | £125 |
| Fastgraph | £160 |
| Graphics QuickScreen | £105 |
| Graphics Workshop | £105 |
| GraphPak Pro | £99 |
| GX Graphics 3.0 | £155 |
| Compression Plus | £130 |
| Compression Workshop | £110 |
| Microhelp Muscle/DOS | £155 |
| PDQ | £110 |
| Printer Plus | £185 |
| ProBas 5.6 | £169 |
| QuickPak Prof 4.1 | £145 |
| QuickPak Scientific 3.0 | £105 |
| QuickScreen 4.0 | £105 |
| TSRific | £89 |

### Embedded systems development

On November 7th, Microtec Research will run a free one day conference on embedded systems development. The day will begin with a Microtec Research update followed by 'how-to' seminars and application seminars from silicon and instrument vendors. A prize ceremony will end the evening. There will also be an exhibition which will showcase embedded systems products such as emulators, chips and RTOSs. To attend contact Microtec Research on 01256 57551.

### Lotus gets on the Edge

Lotus Development acquired Edge Research Inc in September. Edge Research produces development tools for Lotus Notes and offers a link between VB and Notes. Its development tools includes HiTest API, an object-based C API for Notes; htGLUE-VB, a tool which makes HiTest API accessible from VB or VBA and htVISUAL, a set of VBX 3.0. Edge Research was founded in 1993 and will continue to operate from its office in Portsmouth, New Hampshire. Lotus is on 01784 455445.

### Intersolv tracks DCS

Software Edge, developer of the bug tracking tool Defect Control System was acquired by Intersolv (see a review of DCS in EXE September). DCS will join PVCS in the family of software configuration management solutions. PVCS is also a product that had been acquired by Intersolv.

### Rdb sold to Oracle

DEC has sold its Rdb database, CDD repositary and the DBA Workcenter suite of database administration tools to Oracle for $108 million cash. Oracle announced it will create a New England Development Centre and add the Colorado Springs Rdb Support Centre to its worldwide customer support and service network. It will be working to create closer links between Rdb and Oracle 7 database servers. The planned port of Rdb to OSF/1 and Windows NT for Alpha AXP will be followed through. Oracle has said that Rdb third party vendors and Rdb resellers will be given the opportunity to join Oracle's Business Alliance Programme.

### Virtual shopping

Virtual reality is not restricted to high tech companies, the military or the entertainment industry. At the 1994 Retail Automation conference Simon Pitt, of Hoskyns explained that the technology is now available at a low cost today on PC-based systems. For instance it is now possible to link VR to existing store-planning software to provide 3D store layouts in virtual reality.

# New CEO for Novell

**Robert J Frankenberg, new president, CEO and chairman of Novell has announced his vision for computing and Novell. 'Networks connect people to other people and the information they need, enabling them to act on it anytime, anyplace.' Nice definition, but its effects are not positive for all Novell products. For instance AppWare Foundation (see EXE August) is set to become 'de-emphasised' ie sold. The same thing looks likely to happen to Novell DOS (ex DR-DOS).**

*Robert J Frankenberg, new President, CEO and Chairman of Novell*

**The company will have four groups, personal productivity, group productivity, consumer edutainment and application development tools. It will be focusing on areas such as pervasive computing: advanced network clients, mobile connection, embedded networking and SuperNOS. The latter should be a microkernel system with NetWare and UnixWare personalities.**

**The development will happen in three stages: first the kernel, then the architecture of Unix and NetWare and last the delivery. Since the first two phases are internal to Novell, SuperNOS will not be available before 1997! David Godwin, UK country director summarised with the ambiguous 'Novell is still focused on networking but networking is changing'. Novell is on 01344 724000.**

# People, places and objects

Taligent was present at Object Expo to show a demonstration of the pre-beta code of TalÆ, Taligent Application Environment. For the demo, TalÆ was run on AIX, OS/2 2.1, Mac System 7 and NT 3.1 systems. An HP-UX system was also present. During the demo a document was shared between several systems. The form appeared exactly the same on each screen simultaneously. All modifications made on one machine appeared also on the other screen.

Taligent is working on the three building blocks which comprises its strategy. First is TalÆ. This is currently a set of about 100 frameworks. Then there is TalDE, a portable Development Environment built as a TalÆ application. And last TalOS, the *Object Services*. Stratton Sclavos, Sales and Marketing VP, considers that the system software of tomorrow will be 'an application system which is different from an operating system, different from tools; it's an emerging trend.' He believes that there is a reason to change the current view of OS's: 'we [the software industry] are stagnating. Software economics to create new applications are daunting...What are you going to do when you become collaborative?' If Taligent succeeds in imposing its vision, there will come a time when the machine or the operating system you have won't matter anymore - as long as it can run Taligent's framework.'

TalÆ has already been delivered in its pre-beta incarnation to 100 US developers and to Taligent's partners, namely Apple, IBM and HP. The beta programme should also include some European developers, five to ten according to Jack Grimes, Technology Evaluation Manager. TalÆ is composed of frameworks belonging to three main categories. From high level to low level: application (user interface, compound document architecture...), domain (2D and 3D graphics, international text...) and support (printing, timing, data management...). Most current operating systems advocate a document centric computing model; TalÆ goes further with a task centric model. Interactions are based around the trademarked metaphor of 'People, Places and Things' to represent collaborative work.

TalÆ should be available in its final form at some time in 1995 directly from IBM, HP and Apple. Taligent will probably sell a shrink wrapped version for NT. TalDE should also be available in 1995, but it has not yet been in beta. TalDE will include an incremental C++ compiler. TalOS, which is based on the Mach 3.0 micro-kernel should appear in 1996 at the earliest. Taligent is on 0101 408 2552525

## Best development tools for DOS & Windows

**DISTRIBUTION KIT NOW AVAILABLE**

# Attention all dBASE users


*"Windows dBASE proves a triumph."*
PC User, 7-20 September 1994

*"dBASE for DOS is a slick development tool."*
PC Magazine, September 1994

**Call us today for details of a seminar in your area**

## See the next generation of dBASE

New dBASE® 5.0 for DOS and new dBASE 5.0 for Windows have been built to bring you the highest database performance and developers tools ever offered. Whatever level of user, whichever environment, new dBASE 5.0 powers through your work, totally compatible with your existing information. See it to believe it! Take a closer look at dBASE by attending one of our free seminars.

## Upsizing PC applications to Client/Server

The need to harness the vast amount of information on PCs into a manageable, secure and reliable corporate resource has meant that more and more companies are starting to "upsize" their PC and PC network applications into Client/Server solutions. Upsizing with Borland products enables seamless interoperability *without* extensive application rewriting or new hardware investments.

**Borland**
The Upsizing Company



CIRCLE NO. 767

## BELIEVE IT WITH THE FREE dBASE DEMONSTRATION DISK

**For a free demonstration disk of dBASE for Windows and details of a free dBASE seminar call**

**0800 212727**

**or return the coupon.**

**Have you used any version of dBASE before? Yes ☐ No ☐**

Name _____

Position _____

Company _____

Address _____

_____

_____

_____

Postcode _____ Tel: _____

Numbers of PCs in your company _____

☐ I am responsible for purchasing software. My interest is ☐ business ☐ personal

**Please return to: Borland International (UK) Limited, FREEPOST, PO Box 9, Stroud, Gloucestershire GL6 8BR.** **AS/9444/DG**

### Calling OMT users

A new user group has been established to cater for the needs of UK software developers who have adopted Rumbaugh's Object Modelling Technique (OMT) methodology. The UK OMT User group will hold a one day conference twice a year. There will be a quarterly newsletter and an electronic bulletin board. Members will also receive OMT Casebook which contains regularly updated articles and papers. Authors include the creators of the methodology. QA Training is managing the new user group. Membership costs £39. Application details are available from QA Training on 0285 655888.

### Double dose of DBMS

According to a recent report by Ovum the use of databases in both European and US organisations will more than double in size from $4 billion today to $8.7 billion by the turn of the century. The report predicts the greatest growth area will be in the market for Unix relational databases This sector will increase four-fold to $4.3 billion. Ovum believes growth will be as a direct result of the on-going transition away from mainframe hierarchical databases. In addition to the Unix marketplace a new sector for LAN-server DBMSs was identified. As increasing numbers of users choose to run their DBMS server on a LAN, Ovum estimates the sector to be worth $630 million: compare this to the PC DBMS market which is twice the size. *Future of the database market* is priced at £995. Ovum is on 071 2552670.

### Triple speed 486

Intel has a new addition to the 486 family, the IntelDX4 Overdrive processor which is an upgrade to existing Intel486 SX and DX based systems. Both 75 MHz and 100 MHz versions will be available. Intel estimates that an Intel486 SX processor running at 33 MHz with an iCOMP index of 136 when upgraded to a 100 Mhz Intel486 DX4 will have an iCOMP index rating of 435. The 100 MHz DX4 is priced at £449. The 75 MHz version will cost £379.

### A case for middleware

Technogsis is holding a series of regular seminars for developers worrried about the problems of connecting to Client/Server systems through middleware. The seminars will include sessions on how SequelLink, Technogsis' own middleware product overcomes the limitations of ODBC. Of more interest to the development community is that they will explain what Technogsis perceives to be the shortcomings of ODBC. For more information call Sue King at Technogsis on 061 4741963.

## Europe NeXT

NeXT is launching Object Experts and Object Learning Solutions programmes in Europe. The latter is an on-site support program designed to help in the development of custom object oriented application using NextStep. The latter is a training program for corporate developers. These services are being offered by the Professional Services organisation inside NeXT. Other services will mirror the ones already present in the USA. For instance, there will be a Premium Developer and Premium System support provide access to NextStep engineers. NeXT also opened a tour of European technical seminars with a developers day at Object Expo.

If these support programmes look like they are intended mainly for corporate developers, that's because they are supposed to. Ronald Weissman, director for corporate marketing, describes NeXT market as business targets, mainly in the financial and healthcare corporate markets but also including the telecommunication operators one.

Following its partnership, last year, with Sun, HP and DEC, NeXT is focusing on two main products: NextStep and OpenStep. The first one is the operating system that was originally designed for the black box but now runs on Intel and 68K platforms. The second is an OS independent object framework. OpenStep provides an API enabling multiplatform development. In fact, one binary object can contain code for several processors enabling one OpenStep compliant shrink-wrapped application to run on several architecture. OpenStep can be installed on top of MachOS, Unix, Solaris and OSF/1. Native NextStep for PowerPC is not an existing product but according to Paul Vais, executive director for worldwide marketing, 'the code already exists, so it could be done.' Before the black machine was abandoned, NeXT had worked on PowerPC versions.

Paul Vais considers that several factors differentiate NeXT from its main future competitor Taligent: 'NextStep and OpenStep are easy and accessible to developers. It's really a good environment having a rich object set but still manageable. That will become the most differentiating factor.' Most of the development for NextStep is done in Objective-C. Next has favoured parametrisation instead of subclassing. Paul Vais insisted on the importance of mastering the development tools as well as the environment: 'We think that Taligent shipping the pre-beta of TalDE with third-party tool is a major flaw in their strategy.' NeXT can be reached on 0181 5650005.

## To reuse or not to reuse

**For the launch of ResourceCenter, CenterLine issued a backgrounder on software reuse. 'Reuse' has been the primary angle in terms of marketing taken by the majority of companies selling object oriented products. In a recent survey from Valley Forge Information Service, 35% of OOP users found software reusability the foremost benefit of OOP. But the idea of reuse is not new. The concept of mass produced reusable components is attributed to Douglas McIlroy at a NATO Conference in 1968. In the beginning of the 80s, Brad Cox of Objective-C fame, coined the term 'Software-IC'.**

**Benefits of software reuse appear to be multiple. There is increased productivity as development effort concentrates on the application domain software. As a side effect, software developers should experience improved reliability in their software. From a project management perspective, the more components that are reused, the easier it is to predict reliably development time.**

**That's the theory. However in object reuse there are also shortcomings. The major one is how to find the needed component. A year or so ago, Adele Goldberg, who participated in the development of Smalltalk, was saying that 90% of classes were never reused because people couldn't find the object.**

**According to CenterLine, the success of software reuse depends on several factors: 'These include the availability of class libraries, management commitment, the degree to which software developers design components for reuse and the ease with which developers can locate and retrieve the reusable assets they need.'**

**In the same backgrounder, figures from a 1994 Forge Information Service survey of developers and managers interested in OOD were quoted: 'more than two thirds (68%) of the respondents use commercial class libraries ... and nearly three quarters (74%) have developed their own class libraries [but as much as] 68% do not use tools for reuse.' Since so many in the survey were not using tools specifically designed to manage code reuse, the question arises as to whether such tools are really necessary. Or perhaps reuse tools today don't meet their expectations. CenterLine is on 0101 617 4983000.**

# DEVELOPERS TRAINING

**Richfords offer hands-on, practical courses for professional programmers. Expert course leaders, small class sizes, public scheduled courses in central London and on-site training... all backed by the authorisation of the leading software authors.**

Microsoft | Solution Provider
Authorised Training Centre

- **EXCEL 5.0 VBA PROGRAMMING**
  This course will enable you to create sophisticated solutions to your business problems by showing Excel VBA's capabiities and how to use OLE, as well as teaching good programming style. Three days £710 + VAT.

- **ACCESS 2.0 APPLICATION DEVELOPMENT**
  For experienced commercial programmers. Learn how wizards and builders are employed to create objects; how to modify objects without using wizards and how to roll out a polished and robust application. Three days £710 + VAT.

- **VISUAL BASIC PROGRAMMING**
  A practical course for new users wishing to develop and support systems written using the Professional Editions. Five days £1100 + VAT.

- **ADVANCED VISUAL BASIC**
  This course sets out to answer mnay of the questions asked by developers who are pushing VB further. Three days £710 + VAT.

- **C++ FOUNDATION**
  A bridging course for programmers with no previous C experience. Five days £1100 + VAT.

- **VISUAL C++ PROGRAMMING**
  For C programmers who wish to make effective use of C language extensions and start OO programming. Five days £1100 + VAT.

- **VISUAL C++ FOR WINDOWS**
  For C++ programmers. A thorough, practical introduction to WINDOWS programming using Visual C++. Five days £1100 + VAT.

- **OLE 2.0 PROGRAMMING WORKSHOP**
  Learn how to design and build C++ code to make full use of OLE 2.0 and OLE enabled code. Three days £710 + VAT.

- **WINDOWS PROGRAMMING**
  A comprehensive, practical course addressing major operating systems facilities. C experience essential. Five days £1100 + VAT.

- **ADVANCED WINDOWS**
  For experienced WINDOWS professionals. Teaches the more sophisticated features and application of the Foundation classes C++ experience essential. Five days £1100 + VAT.

- **C++ FOUNDATION**
  A bridging course for programmers with no previous C experience. Five days £1100 + VAT.

BORLAND *Approved Training Centre*

- **BORLAND C++ PROGRAMMING**
  For experienced C programmers. A thorough and practical introduction to the Borland C++ programming language. Five days £1100 + VAT.

- **BORLAND C++ FOR WINDOWS**
  Includes Object Windows Library, how to write Windows applications using Borland C++. An intensive practical course for experienced C++ developers. Five days £1100 + VAT.

## Call 071 922 8819 for full course outlines

# RICHFORDS

SOUTH BANK TECHNOPARK 90 LONDON ROAD LONDON SE1 6LN FAX 071 922 8839

## Look for Taligent

Object Productivity presented version 2.2 of LOOK! C++ at Object Expo. This tool is a dynamic OO debugger which creates animated diagrams showing the dynamic flow of OO applications. Doug Brent, Taligent's VP of engineering comments 'visualisation of system flow at runtime is a critical part of object-oriented development.' LOOK! costs £495 for Windows 3.1 and £1,995 for SunOS and Solaris (per seat). Ports to HP and NT are planned. Taligent also signed a partnership agreement with Object Productivity (on 01962 877907).

## Quick Oracle

QuickObjects for Oracle is an extension to SQLWindows that allows developers to add stored procedures interactively to an Oracle relational database. QuickObjects is the basis of Gupta's component architecture whereby applications are created without writing code by dragging objects. Gupta claims that QuickObjects for Oracle is the only SQLWindows tool that is capable of invoking Oracle stored procedures without coding. It is expected that QuickObjects will be integrated into the SQLWindows product in early 1995. For details phone Gupta on 0800 834399.

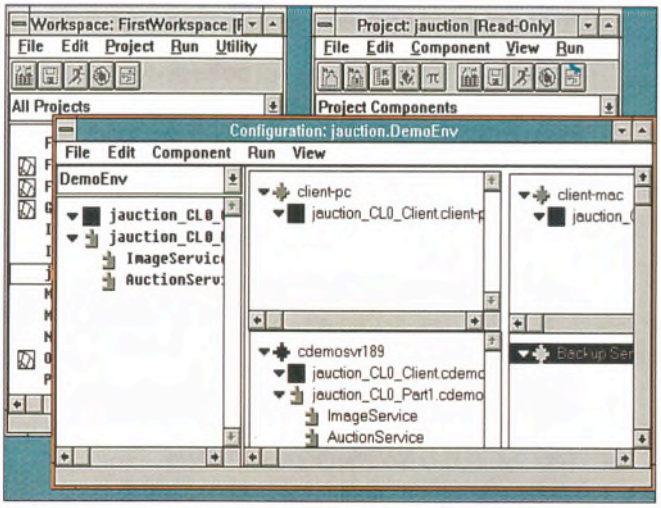
## Go VO

If you have already seen Rick Spence's article on porting Clipper 5.x to Visual Objects (VO) in this issue then you'll realise it's pretty hard and the results are not exactly 'pretty'. Artful Applications in conjunction with Rhino Publishing has developed an alternative. Visual Magic takes Clipper 5.0 user interfaces them and converts them to objects for the VO repository. Dictionary and .DBF definitions are stored as dbServer objects. It will be available in the first quarter of 1995. Rhino Publishing is on 0302 364861.

## Training on a PC

In addition to traditional training, books and video you can now learn C or Unix with a Windows training application. The Complete Unix and C 'courseware' covers Unix SVR4. According to Electrovision, its publisher, 'the Complete Unix and C course provides an entire curriculum of reusable Unix catering for all levels of experience and addresses the needs of users, programmers and system administrators.' Prices start at £999. Electrovision is on 01703 452221.

# Forté ready to partition




*To change the partitioning, just drag a partition from one machine and drop it on another.*

Advanced Forté Application Development Environment is now available after more than a year of beta testing (see the article in EXE March). This enterprise Client/Server development suite distributes applications in a different way to other tools. The *logical* application is decoupled from the operating system. It is written in a high level language that can be executed with a runtime on multiple platforms. C++ code can also be generated for maximum performance. Legacy code can be encapsulated. The logical application is made up of modules that can then be executed on any machine in the enterprise. This is known as partitioning. The technology allows easy movement of any part of the application to any machine. So the decision as to which hardware the software will run on can be made at a much later stage than design. Also, if one machine fails, the code can be automatically uploaded to another one which will take over. By refining the partitioning, less bandwidth will be used on the network.

It works as follows: first, the logical application is stored in a repository. Independently, description of target platforms can also be stored in the repository. Then Forté automatically generates a default partitioning scheme by mapping the application modules into target environments and moving the code to these targets. This automatic partitioning can be overridden. To change it, a graphical interface allows you to drag a module from one machine and drop it on another. Of course, different operating systems have different possibilities. To overcome this, Forté provides on all supported OSs a minimum level of functionality such as multi-threading, concurrency and shareable services. There is still a distinction between servers and desktops. The latter do not locally support all database functions. DDE and OLE are implemented in the desktop runtime as are CORBA and RPC on the server. Forté also enables communication between modules based on a 'business event' model which, according to the company, have a very low overhead.

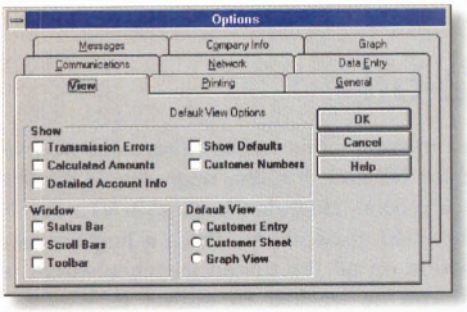
The first release supports Mac System 7, Windows and Motif GUIs. On the server front there is AViiON, Open VMS on VAX and Alpha, OSF/1 on Alpha, HP PC-RISC, IBM RS/6000, Sequent Symmetry and Sun SPARC. RDBMS support includes Oracle 7, Digital Rdb and Sybase. For networks there is TCP/IP and DECnet. NT and OS/2 should be supported in the next release. Forté is aimed at large enterprises with prices starting at £75,000 for five developers, ten users license. Forté is on 0181 5289870

# Multiple databases and platforms

**The Borland Database Engine 2.0 for Windows provides a mechanism for developers to access Paradox, dBASE, text files and remote databases through a common API. Native drivers are included for Oracle, Microsoft/Sybase SQL Server, Informix and the Borland Interbase server via Borland SQL links 2.0 for Windows. In addition, it features what Borland calls ODBC socket which, funnily enough, can be used to 'plug in' ODBC drivers. One of the benefits of the Borland Database Engine, according to Borland, is its ability to access multiple databases on multiple platforms simultaneously. Other features include linked cursors, bi-directional scrollable cursors, in-memory tables and support for BLObs. The Borland Database Engine 2.0 for Windows is distributed on CD-ROM. The price of £249 includes unlimited runtime distribution. Developers using Paradox Engine 1.x can upgrade for £99. Borland is on 01734321150.**

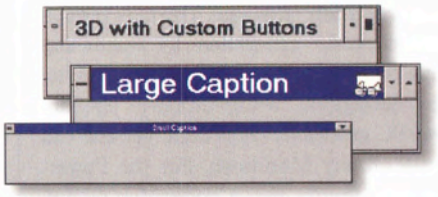
## DESIGNER WIDGETS

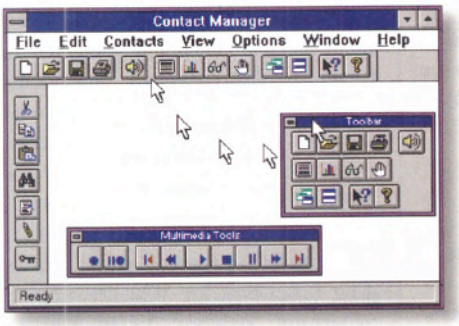
# THE STATE *AND* THE ART OF WINDOWS PROGRAMMING.




*With the Index Tab control you can effectively present several screen's worth of data in the space of one screen extending a metaphor that is familiar to all users - the index card! With labeled tabs neatly presented in multiple rows, the user can see at a glance what options are available and easily navigate between them by pointing and clicking on the desired tab. And since the tabs are active at design time, the developer can easily place controls in the cards by selecting the desired tab and drawing the controls right on the card. All of the tab cards shown above are actually a single Index Tab control.*

*The Dockable Toolbar control lets you create floating toolbars of buttons that the user can "dock" (attach) to the top, sides or bottom of an MDI (Multiple Document Interface) form. When toolbars are not docked, the user can resize and reshape the "floating" palette as needed.*

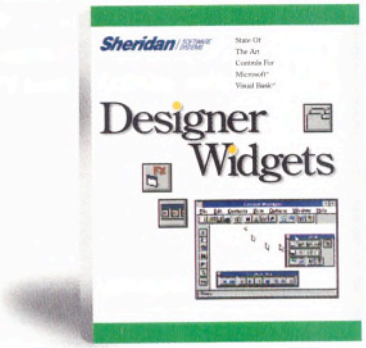



*The FormFX control allows you to customize the look of your forms by manipulating captions and borders. You can include multi-line text, pictures, alter the height, adjust the fonts and alignment, or add a 3-D look. It also offers significant form control with such features as locking the form at runtime to maintain size, position and lock the form so that it never goes behind another window.*

Designer Widgets™ from Sheridan Software is a set of custom controls that lets you create applications with the look, feel, and power of today's most popular commercial applications. And now you can do it with the ease you've come to expect from using Microsoft® Visual Basic® and Sheridan Custom Controls.

Designer Widgets lets you create floating toolbars with the *Dockable Toolbar* control, maximize the use of screen real estate with the *Index Tab* control, and design high impact forms with the *FormFX* control.




Manufacturer's suggested list price: £99 plus VAT

CIRCLE NO. 769

ORDER HOTLINE (01727) 811999

CONTEMPORARY Software

Abbey View, Everard Close, St Albans, Herts AL1 2PS
Tel: (01727) 811999 • Fax: (01727) 848991

CONTEMPORARY SOFTWARE A DIVISION OF INTERSOLV PLC

### Things for VB

Bits Per Second has launched ToolThings, a set of 10 tools for Visual Basic's developers. It includes forms, message boxes and common dialogs designers which generate VB code. There are other tools which work on the presentation of the code, like Block-out Thing which comments out chunks of codes such as testing code, or Compress Thing which removes unnecessary statements and characters. All the tools are accessible from a floating toolbar. ToolThings is available at £129 from Bits Per Second (01273 727119)

### From 68k to PPC

MicroAPL has released version 1.2 of PortAsm for Macintosh, a tool which converts 680x0 assembly language to PowerPC source assembly language. The new version improves code generation by optimising Macintosh toolbox calls. It supports symbolic debugging using Apple's ppcAsm PowerPC assembler. A generic version can be run on any Macintosh. For the PowerMac user, there's also a PowerMac recompiled version. Prices vary depending on the amount of code to be translated. It ranges from £500 for 2,500 lines up to £20,000 for more than 250,000. MicroAPL is on 0171 9228866.

### Shareware on CD-ROM

EMS Professional Shareware publishes a range of CD-ROMs containing public domain and shareware tools for developers. Two new releases have just been announced. Clipper Utility Library is a set of two CD-ROMs containing 2,924 tools for CA-Clipper developers. It's also available on diskettes, but fills 70 of these! The library is updated every two months. The other release is a Pascal Utility Library. Each set of CD-ROMs cost $59.50 respectively. EMS is on 0101 301 9243594.

### Out tabbed...

FarPoint Technologies has developed what it claims to be the first data aware tab dialog control for Visual Basic. At design time Tab/Pro offers over 150 properties, 19 events and nine functions. Many of the properties can be set individually for each tab. In addition to the tab dialog control Tab/Pro can also display multiple notebook pages side-by-side with spiral or ring binding. Tab/Pro is priced at £75 and is available from Contemporary Software (0727 811999).

## Tracking memory

New Track V3.0 from Cavendish Software is a tool for trapping memory leaks in C and C++. It operates as an add-on library and DLL that links into application code to allow runtime checking of memory deallocation, unfreed memory allocation and the ability to determine overruns and underruns of memory usage. The library is compatible with Visual C++ 1.5, Borland C++ 4.0 for Windows 3.1 and Visual C++ 1.1 for Windows NT. New Track works by making a list of all allocations made by a program through calls to `new` or `malloc()`. With this list it can determine whether a memory deallocation using `delete` or `free()` is valid.

Another feature of New Track is its ability to check whether memory outside an allocated block has been erroneously refererenced. To do this it allocates extra memory on either side of the block requested by `new` or `malloc()`. It fills this extra region with a known value then checks for corruption on every call to `delete` or `free()`.

A common problem encountered by developers is reusing memory *after* it has been freed. New Track fills deallocated memory with the value 0xFF. Furthermore, when memory is first allocated it is filled with the value 0x24, the hash (#) character in order to force programmers to initialise data explicitly. A shareware version of New Track v3 can be downloaded from CIX. The Microsoft Visual C++ version is in the file NEWT30MS.ZIP in the Microsoft conference, under the `Files` topic. The Borland C++ versions are in the Borland conference under the `2bc` topic. NEWT30B3.ZIP contains the Borland C++ v3.1 version. NEWT30B4.ZIP contains the Borland C++ v4 version. Cavendish Software is on 01225 763 598.

## Nu-Mega goes 32-bit

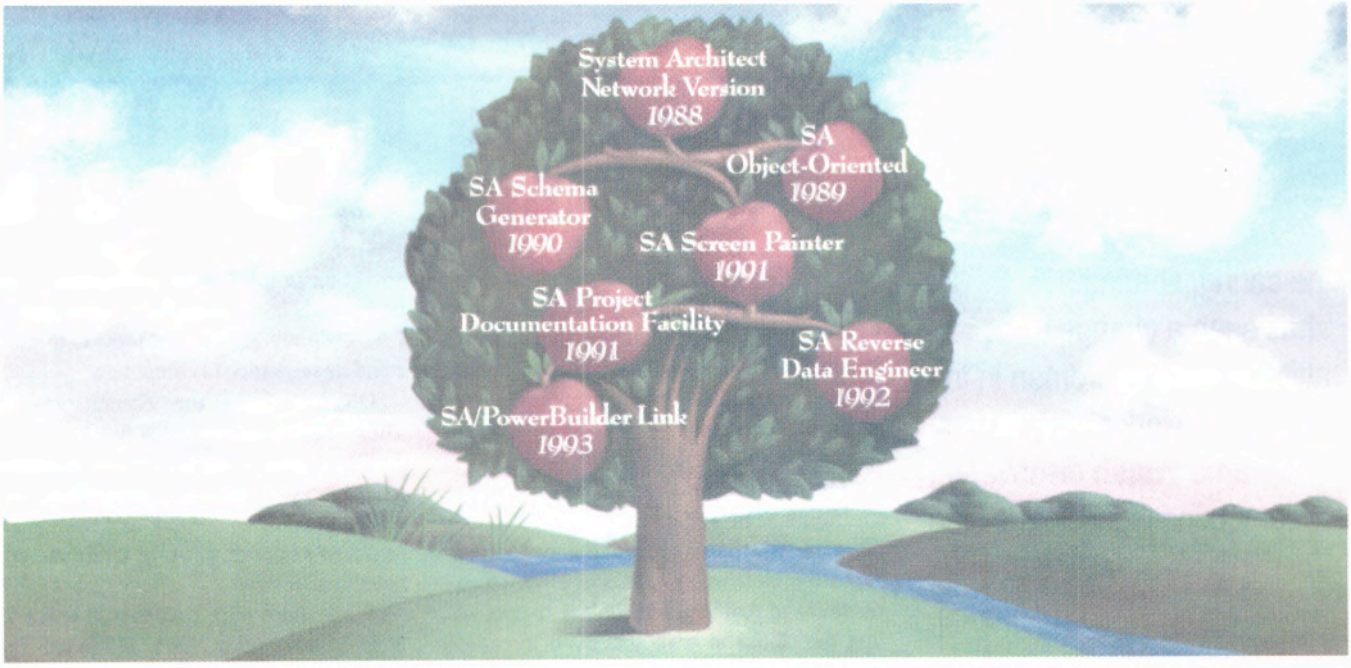
**Nu-Mega has several new products and upgrades this month. There are new versions of Bounds-Checker and Soft-ICE for NT and Win32s, upgrades of the Windows 3.1 versions and a Windows '95 beta. Bounds-Checker32/NT, the NT version, can trace API calls of multi-threaded applications. Once a bug has been trapped, the trace file provides information on all the thread switches within the program. All APIs are supported and can be tracked by subset ie Win32NT, Win32c or Win32s. Also, parameters and return codes for majors NT DLLs are checked for type validity. All the events traced can be viewed in a tree structure with the accompanying TView software. Bounds-Checker32/NT also traps many types of invalid memory access or memory leakage such as blocks allocated but not freed.**

**Bound-Checker32/s 1.0 works with Soft-ICE/W 1.5 to provide similar debugging functions for Win32s application. Soft-ICE debugs both 16-bit and Win32s programs, drivers, VxDs and DOS programs (see News in EXE September). Win32s is an important API to Nu-Mega according to Frank Grossman, its president: 'Many developers are standardising on the Win32s to make versions of their products for the vast installed base of Windows 3.1 users.' On the debugging tools market, he adds 'As is the case with most new OSs, the availability of high quality debugging tools has lagged behind the release of the Win32s platform.'**

**Version 2.2 of Bounds-Checker for Windows automates debugging of Visual Basic custom controls. Memory and resource leakage, as well as heap and data corruption in VBXs are automatically detected whether called from C, C++ or Visual Basic. Nu-Mega also announced a beta programme for the Windows '95 versions of Bounds-Checker 1.0 and Soft-ICE/W 2.0. All Bound-Checker packages cost $249. Soft-ICE costs $386. Nu-Mega is on 0101 603 8892386.**

## Guidelines on OS/2

JBA has produced an OS/2 version of PC Guidelines, its Windows application development tool. The screen painter supports IBM CUA '91 objects such as containers, notebooks, sliders and value sets. In addition, PC Guidelines offers a range of other screen objects including status bars, tool bars, business graphics, animated push buttons, picture fields and formatted data entry fields. While there is a built-in object-oriented language called JOT, developers can still call the native API and reuse C modules such as resources and dialog boxes. Under OS/2, SOM (System Object Model) objects can be utilised. The code generator produces commented C++. PC Guidelines costs £395. JBA is on 01789 400212.




An application development tool company you can stay with

# System Architect - the world's best selling CASE tool just got better!

**In 1989 we sold the original version of *System Architect*. To meet the needs of its family of 40,000 users, there is now an entire crop of application development tools and enough product plans to lead you into the next century.**

## Options

**SA** supports the major structured and object oriented methodologies. It runs under Windows or OS/2 and it has an extensive selection of optional modules. For example, developers involved in the complex world of client/server application development can use ***SA Schema Generator*** to make life easier and more productive. You'll be able to create data designs for the major 4GL and SQL RDBMS, including SQL Server, Oracle, Informix, SYBASE and many others. With many SQL databases, you can enforce database integrity checks using SA's Trigger Editor.

With ***SA Reverse Data Engineer*** you can generate data dictionary entries and ER diagrams from existing SQL tables and know that you can re-engineer a wide array of RDBMS'. ODBC support opens up an even wider range of options.

Support bi-directional exchange of data models between **SA** and PowerBuilder with ***SA PowerBuilder Link***

Design Windows graphics screens and menus directly from the dictionary using ***SA's*** drag and drop facilities with ***SA Screen Painter***

Produce comprehensive documentation with desktop publishing quality for each stage of your project with ***SA Project Documentation Facility***

***SA Workgroup Support*** enables project team members to share the SA repository using our network version or the check in/ check out facilities.

Generate C++ code with ***SA OO Module***, including Rumbaugh's OMT.

## Customising

**SA** comes with as many as 50 objects available for user-definition, plus the ability to customise the environment. You can choose the DBMS, 4GL and methodology you want to use.

Don't just take our word for it...

**"*System Architect* from Popkin Software is evolving at a phenomenal rate. This product is without a doubt the best value for developers on limited budgets, or for that matter perhaps on any budget... Comparing *System Architect* to other CASE tools, it appeared to be the easiest to customise and learn."**

*- Application Development Trends Magazine June 1994*

MICROSOFT WINDOWS

POWERSOFT CODE PARTNER

SYSTEM ARCHITECT™

*Available exclusively in the UK from:*

RT&M Ltd

118-120 Warwick Street Leamington Spa Warwickshire England CV32 4QY

Tel: (01926) 450858 • Fax: (01926) 311833

software DEVELOPMENT 94

See us on Stand No. 212

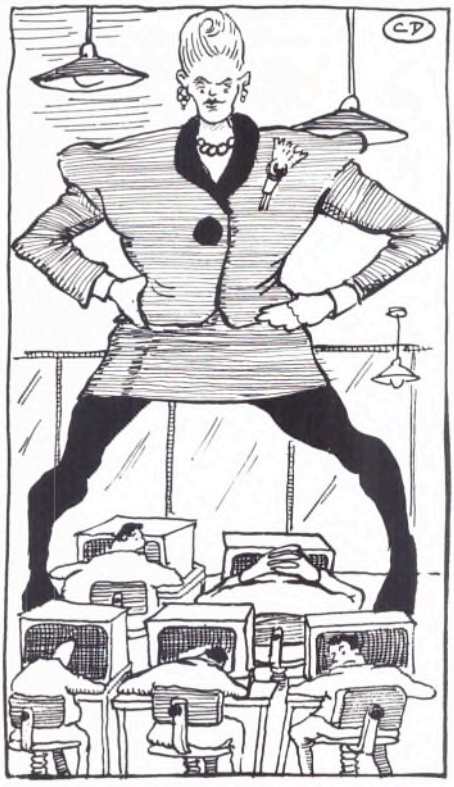
CIRCLE NO. 770

# SOAPBOX

The caring, sharing 90s has seen a change in attitude towards women in the work place. But as **Melanie Welsh** discovered, computing is stuck in a time capsule as a bastion of male dominance.

Spare a moment's thought, if you would, for an endangered species. Their numbers are already small, statistics predict they are likely to shrink even further. Their cause is a beleaguered and unfashionable one. Princess Diana is unlikely to sign up as patron of this charity. Yet I personally feel that the situation has reached a point where some kind of organisation is going to be required if we are to prevent extinction. I think I may call it the NSPFCP: the National Society for the Protection of Female Computer Programmers.

Some of you have just sighed at the last sentence, others may even have turned over the page. Not another feminist rant, please. It's not. But I'd like you to think about how many women you know who work in computing. And how many of those work in top level management. It's unlikely that many of you will be able to claim knowledge of any females within the latter group. It's the much maligned glass ceiling again but unfortunately it does exist.



Software development is about shaping the future. The programs you write determine the way that the rest of the world lives. From the Hollywood realms of DNA reproduction and Artificial Intelligence to controlling the clocks in train stations or creating mass market games.

Computing has now entered every facet of our lives. All the things that so many people take for granted in their everyday existence would never have been possible without the power of computing. We really are at the last frontier, we're going where no man has gone before. But at the moment we're not taking any women.

This of course, is much more than simply a problem within the computing industry. The 'glass ceiling' exists in all areas of business. Across the globe, still, the perception of women is generally deemed to be that they are 'illogical'. Engineering sciences just aren't supposed to be their strong point. Women are supposed to be the emotional, intuitive half of the human race.

This, as most of you know, is ridiculous. Of course there are women who don't wish to study engineering, and of course there are some who struggle with logic puzzles. Not all men have a talent for computing. Yet in the back of our minds, be it only in the tiniest part of our subconscious, even women can be found to subscribe to these Neanderthal prejudices.

The logic of sexism doesn't even stand up to closer examination. So women are intuitive? How many times do we read of programming as being the 'black art', 'an intuitive science' which requires a 'a broad perspective and a jab of lateral thinking'?

The media, admittedly must take no small part of the blame for these prejudices against women in computing. It's doubtful that there are many reading this who subscribe to PC Expert: the Ziff-Davies publication for French speaking software developers. Last year it ran a series of adverts by a hardware company in which a scantily clad, and very attractive, young woman lies on a bed, holding an emerald green condom towards the camera. As an advert for prophylactics, underwear or even bedspreads it had many admirable qualities. I was slightly at a loss however, to understand its relevance to computers.

Oh but that's the French you say. They're sex *mad*: we're not like that. Or are we? How many times are women depicted as sex objects in magazine advertising, to increase sales of something as banal as a PC or a new range of software to a male dominated readership?

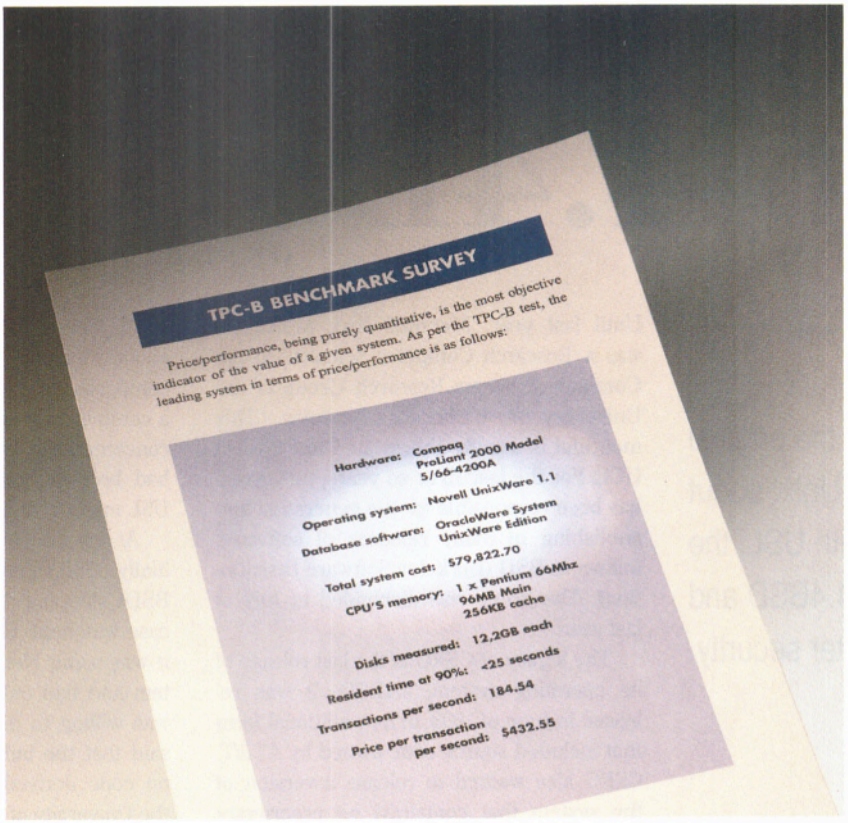
While there were a number of women notable in computing when Microsoft Press published *Programmers at Work* the only woman featured in the book was the journalist who wrote it. The Computer Bowl, held in April of this year, was, according to John Schwartz at least, 'a tribal gathering' for 'the computer industry's pioneers'. And yes, you've guessed it, there was one woman competing.

I could go on like this for a very long time. But there isn't any point. There isn't any point because examining the present situation is no longer useful. We've got to start doing something about it and fast. Computing really is the industry of the future. If we set the pattern now, we're allowing a prejudice that has distorted our lives since time immemorial, to become firmly entrenched in an age that is only just beginning.

This is a global issue to which there is no quick and easy solution. There are 'points' for and against on either side. Sexism occurs in subtler ways, in the minds of both men *and* women. Both are to 'blame'. Women have to learn to accept responsibility for their intelligence: it's no longer acceptable to take the easy route out and claim ignorance in the face of new technology. Of course you're ignorant if you haven't started learning. Not all women are going to find themselves gifted in the area of computing, but we must ensure that they take the opportunity to find out.

As for the men - the residents of the information age. They must finally accept the responsibility that they have given themselves. You're in charge of this industry; you've got to make sure it works. And how are you going to do that if you push aside the potential manpower resources of half the population?

It's time for women to start taking an active role in computing *without* the emerald green condoms.




# The best performance for the best price.

# Shouldn't UnixWare be on your list?

In the latest TPC-B Benchmark tests, UnixWare achieved unprecedented results in price-performance. It easily beat those solutions offering MS Windows NT, Solaris and SCO UNIX. In fact, it actually set a new record, making it the most cost-effective and high performance 32 - bit application server in the world.

If it were just fast, that would be one thing. But UnixWare also clearly demonstrated new highs in reliability and recoverability from system failure.

All this is hardly surprising, since UnixWare is built on the latest version of UNIX System V Release 4.2, and was developed by the same professionals who created the original UNIX operating system. Furthermore, these same engineers also ensured that UnixWare is extremely versatile, supporting over 2,500 business critical applications.

We could go on listing the achievements and capabilities of UnixWare. In the end, though, there really is only one other list that the price-performance winner should be on. Your shortlist. Call 0800 666 767 for a free copy of the TCP-B Benchmark Report today!

Please send me details of UnixWare seminars ❑

Please send me details of my nearest Authorised UnixWare Reseller ❑

I would like to become an Authorised UnixWare Reseller or Accredited Developer ❑

Name _____

Address _____

_____

Postcode _____

Telephone _____

Novell UK, Novell House, London Road, Bracknell, Berkshire, RG12 2UY.

yes UnixWare

NOVELL The Past, Present and Future of Network Computing

*UnixWare test results from March 28, 1994 for a single Pentium™ processor Compaq ProLiant™ 2000 Model 5/66-4200A running OracleWare™ System - UnixWare Edition. Results $433 tpsB based on 184.54 tpsB. Other results detailed in TCP-B Benchmark Report.



CIRCLE NO. 771

# Fairwell USL, hello 4.4BSD

**Peter Collinson**

speaks to Kirk McKusick, one of the original developers of BSD Unix: about the legal battle with USL, the improvements in 4.4BSD and tighter security.

Until last year, Marshall Kirk McKusick was a 'Research Computer Scientist' at the Computer Systems Research Group of the University of California, Berkeley. This mouthful is usually abbreviated to CSRG at UCL. For the last 15 or so years, this group has been responsible for the generation and publishing of many releases of software, known as BSD (Berkeley Software Distribution). The group was disbanded in July of last year.

The legacy of CSRG is the last release of its operating system: 4.4BSD. It was released in June of 1993, in its traditional form that included source code owned by AT&T. CSRG also wanted to release a version of the system that contained no proprietary code, called 4.4BSD-Lite. There had been a previous unencumbered release known as the Berkeley Net/2. The release of 4.4BSD-Lite had been held up by a legal case. It's with that case I started my talk with Kirk on his recent visit to the UK.

***Perhaps we can start with talking about the court case that prevented the release of 4.4BSD-Lite.***

USL (the owner of the rights to Unix at that time) was concerned that its proprietary technology might be compromised by the release of Berkeley Net/2. It didn't care much about it being used by academics. But when companies such as BSDI began selling it as a commercially supported product, USL was concerned that other larger companies that had been paying large sums of money to USL might also decide to start using BSD.

At any rate, it filed suit against BSDI. Initially, USL requested an injunction to stop BSDI shipping the product while the court case was held. BSDI replied by saying that it was using Net/2 as the basis for its system and had only added seven files. BSDI was willing to discuss these new files, but said that the bulk of its system was based on code derived from a distribution from the University of California.

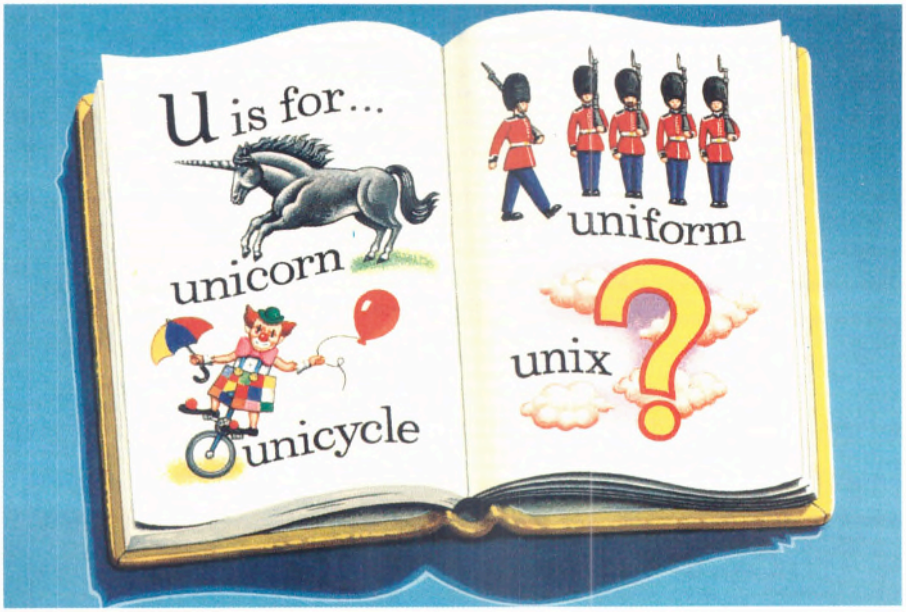
The judge looked at the filing and said that the case didn't have enough merit to hold a full court case unless USL showed more evidence that there was a problem. It was forced to refile the case, incorporating the University of California as a defendant.

There were some preliminary discussions with the University of California as to whether it would be possible to make some modifications to Net/2 and re-issue it. USL was not interested in helping the University to build an unencumbered tape; it just wanted Net/2 removed from the marketplace.

The case began to proceed. The preliminary injunction was denied because the court did not feel that there was enough evidence to show that the final outcome would be in USL's favour. USL made a request for reconsideration that was also denied.

Then the University filed a motion to have the case dismissed under the 11th amendment of the United States constitution. This amendment says that the federal courts cannot be used to sue a state. Since the University is part of the state of California, it cannot be sued in federal court. The judge agreed with this argument and virtually the entire suit against the University was dismissed.

Having lost three decisions in the courts, USL was beginning to reconsider its strat-



egy. About this time it was sold to Novell. Once Novell took over, the legal case was presumably reviewed and Novell perhaps decided that it was not all that interested in pursuing the case any further. At least, this was the philosophy given by Ray Noorda, the then CEO of Novell.

It entered into negotiations with the University and BSDI for an out of court settlement. Most of the details of this settlement cannot be discussed. However, the University was cleared to ship 4.4BSD-Lite, an update to Net/2. Three of the files that appeared on Net/2 were deleted. A further 80 or so files were marked with a USL copyright, with the provision that those files would be freely redistributable.

All this paperwork took some time. We had a broad agreement in late November of 1993 but it took weeks to pass all the paperwork about. I had planned to spend February to mid-April of 1994 in Australia and wanted to get 4.4BSD-Lite out before I left. Unfortunately, the ink on the final settlement dried one week after I left for Australia. Even though I was pressed to put the release together while I was in Australia, it was not something that I really had time to do.

I got back from Australia in April and spent another month or so with Keith Bostic getting the 4.4BSD-Lite release together. We got the system out in June 1994.

As part of the settlement, USL was required to notify vendors of Net/2 based systems of the need to stop shipping that product. This notice produced much interest in 4.4BSD-Lite, even though the differences between Net/2 and the new release were not that great.

People wanted to get 4.4BSD-Lite and base things on it because of its free and clear legal status. The main players, BSDI, NetBSD and FreeBSD have all committed to have products out that are based on the 4.4BSD-Lite code.

***USL also agreed to acknowledge work from Berkeley that was being distributed in System V, Release 4.***

Yes. Part of the settlement was that USL would put Berkeley copyright notices back into many files in the System V, Release 4 product. It would also notify it's sub-licensees to do the same. For that purpose, Keith Bostic and I got hold of a copy of the USL source and spent some time looking for files that should have a copyright notice. There were many.

***Well, what's new in 4.4BSD-Lite?***

There were many changes between 4.3BSD and Net/2. Let's concentrate on the differences between Net/2 and 4.4BSD-Lite. Much work was done on the file system to generalise the internal *vnode* interface to allow the expansion of the set of operations that you can support without having to recompile the whole system. This framework allows binary vendors to supply plug-in modules supporting new file system types that include new vnode operators.

Another new feature is the ability to do file system stacking. Stacking has been an academic idea for some years. However, it has not been released in a commercial system. The notion is that you can take different file system layers and stack them on top of each other. For example, you can take a local disk file system and put a compression or encryption layer on top of it. Or you could export the file system to NFS with an encoding layer that allows mapping of user ids.

**Part of the settlement was that USL would put Berkeley copyright notices back into many files in the System V, Release 4 product. It would also notify its sub-licensees to do the same**

Stacking is the way that a CD-ROM is exported to NFS. An ISO-9660 layer is stacked underneath an NFS export layer.

***I seem to remember in Holland, you were talking about support for bigger files.***

POSIX allows file offsets and sizes in the `lseek` and `stat` system calls respectively to change from 32 bits to 64 bits, so we have done that. The file system has always supported 64-bit sizes. It was just a matter of changing the kernel interface exported to the user processes.

***There are also some additional bits in the file mode word for the file. You are using that for some new things.***

What we did was to add a new 32-bit flag word, the low 16-bits can be set by the owner of the file or the super-user, the high 16-bits can only be set by the super-user. We defined some of these bits. For example, we added a bit that says 'don't dump this file'. So, core files and `.o` files have this bit set so you don't fill your dump archives with useless files.

There is an option to dump to control when the bit is honoured. By default, the bit is honoured on incremental, but not full dumps.

Another thing that we have added is a security feature. A problem with our source machine is that it's the target of almost every hacker in the universe. Every so often, we'd have people break in. Sometimes they would manage to get to be root. A favourite thing for them to do was replace the login program so that they could capture people's passwords. Sometimes they would change the NFS exports file allowing the user file system to be exported with read/write permissions. They would mount the file system on their own machine and have a field day.

To combat these attacks, we added an 'immutable' bit in the flags word. This bit can be set by root, but cannot be cleared. You install the login binary and set the immutable bit. When the bit is set, it stops the file being changed. You can't rewrite the file or change its modes; you cannot even link to it.

The idea is that even if someone breaks into the system as root, they cannot change the login program or any other immutable files.

The immutable bit cannot be cleared when the kernel is in 'secure' mode, defined as when the system is running multi-user. To change the file, you need to take the system down to single-user. The system is then in 'insecure' mode. The idea is that sensitive files are protected by the need to have physical access to the console of the machine.

A hacker could try to open the raw disk device and get around the file system protection by dealing with the raw blocks of data on the disk. To prevent this attack, all the raw disks devices for mounted file systems become read-only when in secure mode.

To prevent the hacker from modifying kernel memory using the `/dev/kmem` interface, this interface is also set to be read-only in secure mode.

Unmounted file systems are not read-only, otherwise you wouldn't be able to do things like build a new file system on a partition. This ability makes it possible for a hacker to unmount a disk, modify it, and re-mount it again. However, you can run the system in 'very secure' mode, where even unmounted disks cannot be modified.

Incidentally, we have also added a new bit to the file flags that only permits appending to a file. This flag is typically set on system logs so that a hacker cannot modify the log files and hide their tracks.

# Introducing the essential

**Introducing an exclusive offer from Select Software Tools - the company who specialises in bringing essential and affordable development tools direct to your desktop. This unique Object Developers' Pack includes the brand new release of the market leading OO CASE tool, Select OMT, three 'must read' books and a discount voucher worth £100.**

## Build your knowledge and expertise

For only £495, this limited offer brings together everything you need to build your knowledge and experience in the latest object oriented development techniques. Select OMT is used by thousands of developers world-wide to create successful object oriented applications. Whether you're a developer or manager in charge of a project team, the powerful combination of Select OMT with three definitive publications by Rumbaugh, Jacobson and Frost will give your project the head start it needs.

And when your organisation is ready to start building large-scale client/server systems, there's a smooth upgrade path to the Professional edition of Select OMT - and a £100 discount voucher to help you on your way.

Not only that, but to give you additional security, we're offering a thirty day money back guarantee if the pack doesn't match up to your expectations.


## Open up the world of OO


"Because we understand the way developers work, we know how to combine functionality with ease of use, and how to integrate with other tools on the desktop. That's been the key to the success of Select OMT."

***Stuart Frost,*** *Chief Executive, Select Software Tools*

Select OMT offers a complete set of integrated techniques for modelling classes, relationships, states and events. These models combine to form a rigorous view of the system, which is automatically checked for completeness and consistency. The intuitive interface and on-line help system enable easy navigation through the development process.

Project information is stored in a configurable data dictionary. We've used OLE automation technology to make projects, diagrams and dictionary objects easily accessible to other OLE complementary tools such as Visual Basic. This makes Select OMT the perfect tool for building flexible and stable applications.

With an established customer base of over 5,000 developers world-wide using our object oriented application development tools, you can be confident that Select Software Tools has the strength and experience to make your project succeed.

LIMITED EDITION Object Developers' Pack


**FREE**

**Money off voucher**

If you upgrade to Select OMT Professional you will receive £100 off the release price. This limited edition voucher is only available with this special Object Developers' Pack.

**FREE**

**OO questions answered**

This unique book shows you how Object-Oriented concepts can be used throughout the entire software development process. Rumbaugh uses graphics, practical exercises and examples to make sure you fully understand OO.

Microsoft SOLUTION PROVIDER

**SPECIAL LIMITED OFFER £495 For Select OMT + FREE**

# Object Developers Pack

**FREE**

**Limited edition white paper**

Stuart Frost, leading OO technologist, focuses on three key issues: development processes, distributed architecture and modelling techniques. He brings them together in a report that will leave you with a clear understanding of OO issues.


**FREE**

**Award winning hardback**

*"Perhaps the most profound and deeply revealing volume on Object Technology to date... It is simply a must-own book."* Steve Bilow, Journal of Object-Oriented Programming on this award winning hardback by Ivar Jacobson.

## Better applications by design

- *Integrated* - OLE automation enables integration with a variety of widely used tools and applications including Visual Basic™, Word™ and Excel.™
- *Extendible* - a range of add-on features to Select OMT enable you to produce reports, quality documentation and programming code.
- *Upgradable* - to the Professional edition for large-scale client/server development.

**Offer ends 30th November 1994**

## Three easy ways to order

To place your order please complete the order form opposite and return with a cheque for the full amount, or a purchase order, or quoting your credit card number and billing address to Select Software Tools.

Call the Object Developers' Hotline to place your order quoting your credit card number on 01242 226553.

Complete the reply card opposite and fax back to us on 01242 251491.

## Ready when you are

"CIO's don't need to worry about whether or not object oriented technology is the right way to go. The industry has already decided that." ***Christopher Thames,*** *Director of Engineering, World Vision Software.*

Many organisations are looking to object technology to help them achieve their goals of faster business systems delivery, more scalable and more reusable software. It is a trend few software developers can afford to ignore. Jacobson, Frost and Rumbaugh will give you the insight to build successful large-scale distributed systems using object technology.

Select OMT Professional will carry the systems you build with Select OMT into the future. It is a powerful high level client/server development tool with hooks into GUI builders, code and schema generators. It combines support for the Rumbaugh and Jacobson techniques with a multi-tier client/server architecture. Model information that you build on OMT can be easily upgraded to professional editions.

The Object Developers' Pack will enable you to get a firm foothold in this rapidly expanding world. So if you want to build rigorous and flexible systems and fully understand the world of OO, take advantage of this very special offer.

**Special limited offer**

**YES**

I would like to buy ____ copies of the Select Object Developers Pack at £495.00 per copy.

*Name:* _____

*Position:* _____

*Company:* _____

*Address:* _____

_____

_____ *Postcode:* _____

*Telephone:* _____ *Fax:* _____

☐ *I enclose a cheque for £* _____ *payable to* **Select Software Tools**

☐ *I enclose a purchase order number* _____
*Please invoice me/my company*

*Please debit my Access/Visa card*

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |

*Expiry date* ☐☐ ☐☐

*Please supply billing address if different from above:*

_____

_____

☐ *I am interested in finding out more about Select OMT and the Object Developers Pack. Please ask one of your representatives to call me.*

SELECT Software Tools

Select Software Tools Limited, Idsall House, High Street, Prestbury, Cheltenham, Gloucestershire, GL52 3AY

CIRCLE NO. 772

**Object Developers Pack worth £160**

**HOTLINE 01242 226553**

***Has the flags word changed usage on the disk? Is the file system bigger?***

The flags word was always defined on the disk. It was just not accessible. In 4.4BSD, you change it with a `chflags` system call and view it with `stat`.

***Also, in true Berkeley style, there are some new aspects that are essentially other people's work feeding into the system. There is the 'Union' file system created by Jan-Simon Pendry, author of the AMD auto-mounter. What's this?***

We provided a new framework for making stackable file systems. Jan-Simon looked at it and wrote about eight different file systems including things like a `/proc` layer and a file descriptor layer, similar in functionality to those found in other versions of Unix.

But the most interesting layer that he built was the Union file system. The Union file system allows you to take one subtree from your file system and mount it on top of some other existing point. This file system is a little like the Loopback file system supported in Solaris.

However, there is a big difference. Normally when you do a mount, the part of the tree underneath the mount point disappears. You can only see the data that is on the top. The semantics of the union file system is that you see both the layers, so you see the top layer and the layer below it. It's transparent.

It gives you the opportunity to do many interesting things. An example is compiling or modifying data on a CD-ROM. You mount the CD-ROM file system, then you union mount a part of your file system that is on a magnetic disk on top of it. This stack gives you the appearance of being able to modify your CD-ROM. When you change directory into the resulting stack, the top layer will create directories as you wander around the file tree on the CD-ROM. Since there are no files in the top layer, an `ls` will show you only the files on the CD-ROM.

If you read a file, it is brought from the CD-ROM. If you try to modify it, it is first copied to the top layer of the file system stack where you can change it because it's sitting on magnetic media. If you have a file by the same name in both file systems, you are given the one 'on top'. You will always see the file that you have modified and not the one underneath. There are also mechanisms to deal with file deletion in the top layer that preserve 'normal' behaviour. Things are arranged so that if a file is deleted it is 'whited out' so that it appears to go away.

There are other uses of the union file system. For instance, you can generate a versioning system where each layer in the union mount tree is a different version of some set of files. You can then go back and look at different versions by unmounting the layers above it, or by loopback mounting the layer of interest to another part of the file system.

**Stacking has been an academic idea for some years. However, it has not been released in a commercial system**

***Can users do this? Have you relaxed the need for super user privilege when doing a mount?***

Yes, that's something else that becomes necessary. For flexibility, you don't want to have to run to your system administrator to mount things. The `mount` system call is no longer a strictly privileged one. You do need to have some tight rules about what permissions users require to request new mounts.

The rules that we have imposed are that you must have the appropriate privilage to access the thing that you are mounting from (either the special device or a directory in the file system). If you are doing a read-only mount, you need read access to device or the directory; if you are doing a read/write mount then you need to have read/write access to the source point. Also, you must own the target directory. You cannot just arbitrarily mount things at random points in the system.

When the mount is completed, we record who did it. The `unmount` system call will only allow the super-user or the person who did the mount to unmount that part of the tree.

***Jan-Simon did Portals, as well, I think.***

Yes. Portals are a way of mounting a process at some point in the file system. When a client process uses a pathname that traverses the mount point, the remainder of the path is sent to a portal server to interpret as it sees fit. This file system allows you to extend the use of pathnames. Perhaps the best example is making a machine dialout using a pathname to send the phone number, for instance calling the portal process by something like `/dev/dialer/`*phone-number*. The portal server is mounted on `/dev/dialer` and will be given the phone number to dial.

When called, the server can return a socket if it wishes to continue interacting with the process that accessed it. Reads and writes that are done by the client will go directly to the portal process.

Alternatively, if a portal process is controlling a bank of dial-out modems, it can open a modem, place the call and simply return a descriptor for that modem. The calling process then simply talks to the modem using normal read/write calls and the portal process can get out of the loop.

***How accessible is the programming interface? How easy is it to write portal-type processes?***

It's about as complicated as writing a networking application. It is not a trivial thing to do. There are certainly many people with the skill set to do it. In the usual BSD tradition where source code is handed out, someone figures out how to do it once and then their code is a template for a new application.

***Talking of networks, have there been any changes in that area? Presumably, the TCP/IP stack is well tested and tried these days. The code must be very solid.***

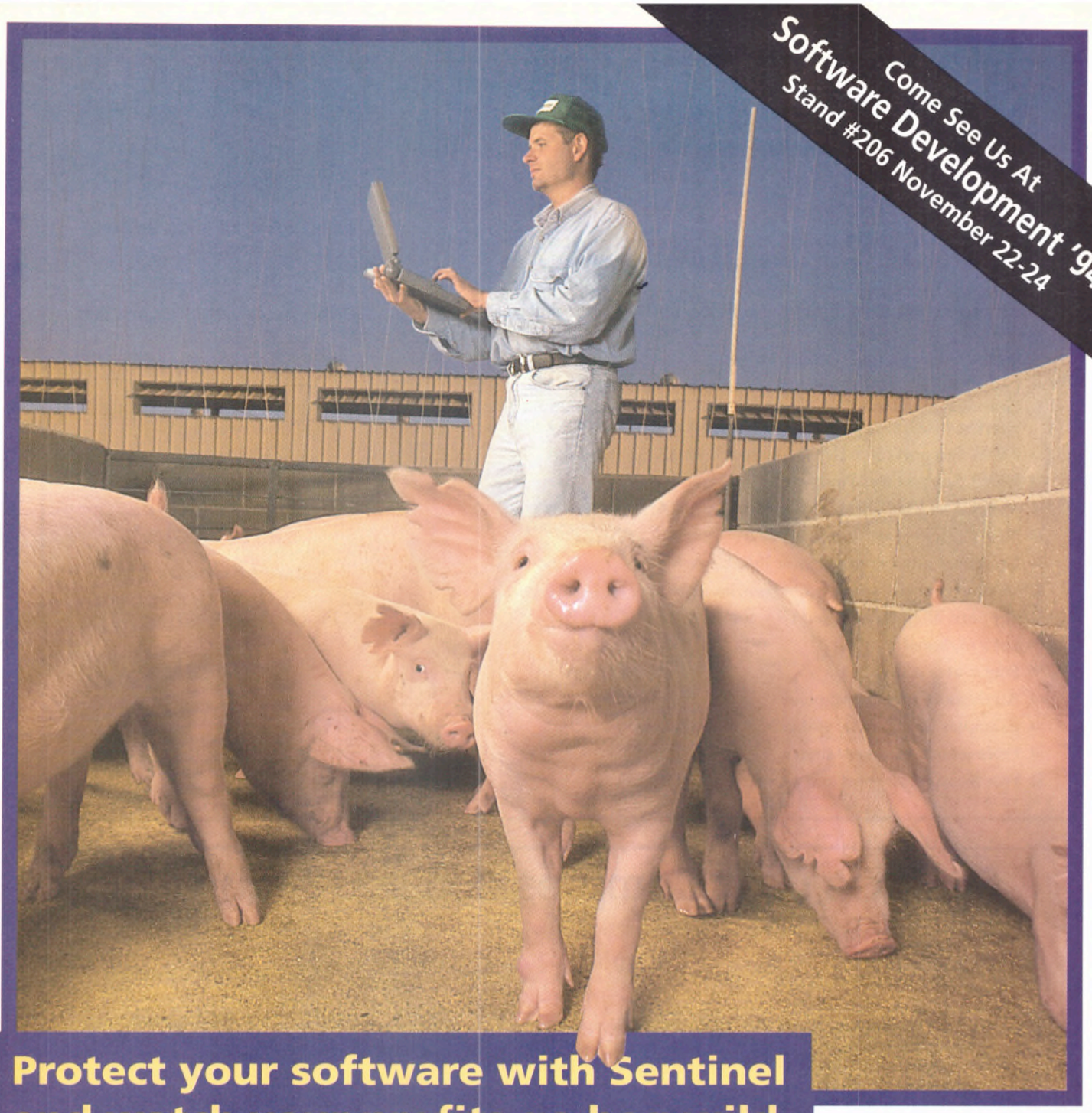
There have been some minor bug fixes. The main thing that is new is multicasting. Multicasting allows you to do a selective broadcast of IP packets. A system will register that it wants a particular broadcast. The source machine is not aware of who its recipients are, it simply does a multicast and anyone who has registered for that broadcast will receive it.

Multicast has been used to put together something called the *Mbone*. It allows users to have large chat sessions with both audio and video. If you are sitting on your machine and want to join in with the Mbone, then your machine has to work its way back through the network to find the nearest point at which the broadcast of interest is occurring. It then sets up a route of multicast back to your machine.

The Mbone has been used to broadcast keynote sessions at Usenix for the last couple of years, as well as many other events.

***If this becomes widespread, then it could be seen as another step for the Internet in broadcasting multimedia and that type of application. What happens about security?***

It simply isn't secure. The Mbone is designed to be available to all. It also chews up a fair amount of bandwidth. You can easily saturate an ISDN link just with a voice conversation. A voice tool used to access the Mbone, written by Steve McCanne and Van Jacobsen at Lawrence Berkeley Labs, has a dial on it that allows you to set how much bandwidth you are willing to consume. For voice, you can set it anywhere from 64 KB down to 9.6 KB. At 64 KB, I will easily be able to recognise your




# Protect your software with Sentinel and watch your profits go hog wild.

**Nothing can eat away profits like a herd of pigs.** That's why farmers in 47 countries manage their swine production with PigCHAMP® software. And that's why PigCHAMP protects their products with Sentinel®, from Rainbow Technologies.

As a developer, you know the importance of profit margins. If you sell software, you're probably losing revenue to piracy. Protect with Sentinel and get all the revenue you deserve.

"Illegal duplication can drive the cost of software sky high. Sentinel protection lets us sell our products inexpensively throughout the world, while serving our customers better," explains PigCHAMP's Steve Abrams.

Over 11,000 developers protect their software with Sentinel. For DOS, Windows, NT, OS/2, Macintosh, UNIX, or any platform – Sentinel is the worldwide standard in software protection.

Implementing Sentinel is quick and easy. And only Sentinel delivers the most advanced technology and highest quality every time, all backed by the industry's largest technical staff.

So fatten up your software sales. Protect with confidence, protect with Sentinel. Call for a Developer's Kit today.

**0932 570066**

SENTINEL
*Securing the future of software*

RAINBOW TECHNOLOGIES Rainbow U.K. Fax 0932 570743 • International offices • Rainbow Worldwide HQ: Irvine, CA. Phone 714-454-2100 • Fax 714-454-8557 • Rainbow France 33 1 47 38 21 21• Rainbow Germany 49 89 3217 98 0



CIRCLE NO. 773

# Announcing a Major New Upgrade of CommLib

## Greenleaf CommLib 5.0

**Over 350 public functions and macros, providing powerful tools for all aspects of asynchronous communications programming for Microsoft Windows 3.1 and MS-DOS.**

**Now we provide even more of the power and features you've asked for!**

*Some features of CommLib 5.0:*

- Level 2 device-independent C functions for these drivers: MS Windows, Greenleaf Standard, Fast, Smart, Digiboard, Smart Arnet, Smart Star Gate, Sparkle, BIOS, Extended BIOS, Polled, MODEM Assist, FOSSIL
- NEW! Support for WIN-32 API and 32 bit DOS extenders
- NEW! Support for Windows NT
- XMODEM, YMODEM, ZMODEM, Kermit, ASCII, many options
- NEW! Support for Compuserve B+
- Unlimited number of ports for ISA, EISA, MCA
- Modem controls, keyboard, screen, handshaking and much more!
- Supports all popular C and C++ compilers

*What's included:*

- Free source code
- All memory models supplied
- Examples that compile and run included for every function
- Professional documentation
- Free technical support and access to our BBS

Greenleaf CommLib 5.0

**Only £259 excluding delivery and VAT**

**No royalties**

**90-day money back guarantee**

☎ Telephone today for complete information, demonstration, or details of how to order.

**0566 86037**

**FAX 0566 86147**

**BBS 0566 86925**

*Citadel Software Ltd*
*Coombe, Trewen, Launceston, Cornwall PL15 8QF*

GREENLEAF Software©

# Painless Data Compression and Archiving

## Introducing Greenleaf ArchiveLib

**Experience the power to compress and store data from anywhere, to anywhere in your C/C++ applications.**

**Until now your development choices for data compression and archiving in C or C++ applications (and other languages too!) were severely limited. Professionals – don't be stymied any longer!**

**ArchiveLib includes a fast, efficient compression engine and architecture for addition of other compression methods. You control source and destination (file, memory, port, etc.) of all data. Complete control over format of archives.**

**Many extras for Windows programmers.**

*ArchiveLib Major Features:*

- 100% C++ class library plus C interface
- Supports Microsoft Windows 3.1, MS-DOS, and Watcom 32-bit extended DOS
- Portable data compression is fast and efficient
- Platform and language independence
- Coded for Win32 – smooth path to 32-bit Windows
- Extensible through plug-in compression classes
- Five compression levels – auto or manual selection
- Versatile archiving – files, memory objects
- File information automatically included in archive
- Release and debug library versions included
- Tagged objects flag allocation or pointer errors
- Extensive Windows support includes compression/archiving progress meters and message options
- Wildcard expander class is also useful for general purpose application
- 25 classes – over 100 functions in C and C++

*What's included*

- Free source code
- All memory models supplied
- Examples that compile and run included for every function
- Professional documentation
- Free technical support and access to our BBS

Greenleaf ArchiveLib

**Only £229 excluding delivery and VAT**

**No royalties**

**90-day money back guarantee**

☎ Telephone today for complete information, demonstration, or details of how to order.

**0566 86037**

**FAX 0566 86147**

**BBS 0566 86925**

*Citadel Software Ltd*
*Coombe, Trewen, Launceston, Cornwall PL15 8QF*

GREENLEAF Software©

voice. As you turn down the bandwidth that you are willing to consume, you can still understand the conversation but it becomes harder and harder to identify who it is you are talking to. When you turn it down to 9.6 KB, you suddenly find you have no difficulty in identifying who you are talking to: it's always Donald Duck.

***Do you think that multicasting like this is going to be big? At the moment, it's experimental...***

It's experimental because it chews up the bandwidth, particularly the video stuff. If you don't have at least 128 KB of bandwidth, the video rate is so slow that it's not very useful. Many folks are spending much time working on compression, not just things like JPEG, but also generating deltas between each frame and sending those. There is much work that is going on. As the available bandwidth goes up and the compression technology gets better, eventually we will reach the point where the two lines will cross and people will start using it. It is not yet ready.

***OK, well 4.4BSD-Lite is out and we have one company and a few free systems using it. Do you think that it will pose a threat to currently established systems suppliers like say Sun?***

I think that it will continue to have an effect in the same sense that 4.3BSD did. But not in the way the 4.2BSD did. In 4.2BSD, people took the entire system and just ran it.

In 4.3BSD, the vendors went through picking out the things that interested them. Much of 4.3BSD was carried over into the commercial releases but noone just ran the whole system. I think you are going to see this selection process with 4.4BSD.

***Do you think that people will pick up the file system stacking code and give us the Union file system?***

That's an interesting question. Sun has a similar system called the Translucent file system so it already has much of the functionality. The difference is that Sun didn't have the framework to do the stacking that we have implemented. Our union file system code is short because the stacking framework allows things to work. Sun's implementation had to go through several contortions to make things work properly.

Also, the Sun file system protocol stack was much more expensive. Sun found that it could only deal with about 10 to 20 layers. We add about six instructions to go through a layer, so we can create stacks of about 100 layers deep before it becomes vaguely perceptible that the stacking system is there. If you are going to use the Union system for versioning, we can do it, whereas the Sun file system protocol stack tends to die quickly.

***Since the release of 4.4BSD-Lite what have you been doing?***

Well, I've spent some considerable time in documenting the system and preparing a set of manuals that have been printed by O'Reilly in cooperation with Usenix. As part of the project of doing Net/2 we rewrote all the encumbered manual pages and updated them to be current. There was probably two years worth of work that went into the manuals that culminated in the Usenix/O'Reilly manuals being published. Surprisingly, the Supplementary Document volumes are selling better than the manual pages. Most of the new material is in the manual pages. I guess that people are thinking that they can just do the `man` command and they will have it online.

**Under the 11th amendment of the US constitution the federal courts cannot be used to sue a state. Since the University is part of the state of California, it cannot be sued in federal court**

After the manuals were completed, I finally started to write the 4.4BSD book. I had originally thought that it would just be a revision of the 4.3BSD book and we would finish it in a couple of months. When we sat down and figured out what needed to be done, we discovered that there was only about a third of the original book that is still relevant, predominantly the stuff on networking. About a third of the 4.4BSD book has to be written from scratch. A third is such heavy editing of the original material that it will be virtually unrecognisable and a third will be a revision of the existing material.

We still have four authors, Sam Leffler has dropped out because he has not worked on the system for the last five years. He is replaced by Keith Bostic. The other three authors remain the same: Mike Karels, John Quarterman and myself.

***When's that due out?***

We *hope* to have it out on the market by the middle of next year. However, there is so much work that realistically, it will probably be in the Fall of next year. We hope to do as well as we did with the 4.3BSD book, which has sold 50,000 copies so far.

## Further reading

*The 4.4BSD Manual Set* (ISBN 1-56592-075-9) is published by O'Reilly & Associates Inc. It comes in six volumes. The *User's Reference Manual* is Sections 1, 6 and 7 of the manual set plus the traditional permuted index.

*The User's Supplementary Documents* (ISBN 1-56592-076-7) contain text aimed at users of the system: with both tutorial literature and documentation of several subsystems,

*The Programmer's Reference Manual* (ISBN 1-56592-078-3) is Sections 2, 3, 4 and 5 of the manual.

*The Programmer's Supplementary Documents* (ISBN 1-56592-079-1) contain text which is of more use to programmers including some basic papers on the design of the system and the 4.4BSD architecture manual.

*The System Manager's Manual* (ISBN 1-56592-080-5) contains pages from Section 1 and also Section 8 of the manual. As well as several papers on various sub-systems targeted to system managers.

*CD-ROM Companion* (ISBN 1-56592-092-9) is a slim volume containing an index to the whole set of documents. The CD-ROM contains the 4.4 BSD-Lite code. There are both international and US domestic versions of this volume. Presumably the DES encryption is not on the International version. ■

*Peter Collinson is a freelance consultant specialising in UNIX. He can be reached electronically as pc@hillside.co.uk (although your mailer might be happier to put the address the other way round) or by phone on 01227 761824.*

# Taking Clipper to the visual frontier

Visual Objects is Computer Associates' object oriented application development system for Windows. It's based on the Clipper language, adds Visual Basic-like tools and C++ style syntax. **Rick Spence** discusses porting from Clipper.

In this article I'll look at how to port your existing Clipper code to VO, but lest you get the wrong idea, let me tell you up front that VO is much more than Clipper for Windows. While it may well be important to get *some* existing code running with VO and Windows, and VO provides a compatibility layer that will do just that, I can't recommend it. If that's all you do with VO, you'll have barely touched the surface. To write *real* VO applications, you'll use the supplied painters, editors, and application frameworks to generate object oriented code to which you'll add your business logic. That, however, deserves an article in itself.

## A quick overview

VO is not generally available yet. Since mid-August you could buy a pre release version, with a free upgrade to the real version, when released. And when will that be, I hear you ask? CA has announced a final release date before the end of this year. From what I hear it appears to be sticking to that date.

Put simply VO is Clipper 5 with features of Visual Basic and C++. CA claims VO is over 90% compatible with Clipper 5. The basic language is based on Clipper 5. So you have the familiar `LOCAL` and `STATIC` variables, a preprocessor, the same rich set of functions and commands and the same database system. The Visual Basic part comes from the rich set of visual tools supplied with VO. There's a Window editor, menu editor and icon/cursor designer, for example. VO also comes with a set of 'programmer tools' you won't see in Visual Basic. These include Application, Module and Entity (I'll tell you what entities are in a moment) browsers, a class browser and an MDI integrated development environment. Enhancements CA has made to the basic Clipper language make it more object oriented and like C++ in terms of functionality. VO lets you define variables with a type. You can also define what type a function returns and the types of its parameters. Naturally the compiler complains if you use a variable or function in a manner inconsistent with its type (if you try and add a logical to a character string, for example). VO supports all the same data types as C. Structures, pointers, C style strings and various numeric types are all available. Most important, you can create your own classes and you can use single inheritance and polymorphism (I'll cover VO's object model in a subsequent article).

## Repository and browser

Briefly, the IDE is an MDI application you use to launch the various editors and browsers available in VO. The VO IDE knows about all your program's components be they functions, menus, defined constants or database views. It stores these components in a database which CA calls the 'repository'. This stores each individual program component and recognises and stores the dependencies between them. The repository knows, for example, where each constant is used. The dependency list allows for incremental compilation. If you change just one function, the IDE has only to recompile that function and perhaps any other function which uses it.

CA calls each independent program component an entity. No guesses what the entity browser does. Figure 1 shows most of the entity types recognised by VO. Incremental compilation, then, works at the entity level, rather than the module level.

It is important to note that the repository does not define any ordering. There's no concept of a lexical ordering, wherein one entity is defined before another. As you can probably imagine this architecture does not fit well with a preprocessor which is essentially a file-based, line by line translation tool. Indeed, handle differences between VO's and Clipper 5's preprocessor is one of the more tedious jobs you'll have to do when porting code.

## What's supported and what's not

The good news is that you can make most of your code work in VO. The bad news is that you will have to make some changes. The terrible news is you probably won't like

| Function / Procedure |
|---|
| Defined constant |
| Structure |
| Class Definition |
| Method |
| Menu |
| Window |
| Windows Resource Declaration |
| Dataserver |
| FieldSpec |
| Report |

*Figure 1 - Entity types in VO*

# VISUAL BASIC® TOOLS

## THE DEVELOPERS SOFTWARE

Save time and money with the best range of powerful and easy-to-use Visual Basic® development tools from Contemporary Software. Featuring leading products from MicroHelp, Sheridan, Farpoint and Crystal Services.

### MICROHELP

- **VBTOOLS 4**
  The best VBX control pack anywhere: Now over 50 controls **£115**
- **HIGHEDIT PRO 2 & HIGH EDIT LITE**
  WYSIWYG word processing & text editing for Visual Basic applications **From £199**
- **MUSCLE 2**
  600+ ASM routines for power programmers **£165**
- **COMMS LIBRARY**
  Reliable, easy-to-use communications routines **£155**
- **NETWORK LIBRARY**
  Easy-to-use node and admin routines **£80**
- **LIST, LABELS & BARCODES**
  WYSIWYG reports, labels, barcodes & more **£175**
- **VBXREF 2**
  Project management for Visual Basic applications **£80**

### SHERIDAN

**VBASSIST 3**
Adds powerful design tools and new data access extensions for Rapid Application Development **£145**

**DATA WIDGETS**
Bound data controls for designing database application front ends **£99**

**DESIGNER WIDGETS**
Create apps that resemble current popular commercial packages **£99**

**3-D WIDGETS**
Give a 3-D State-of-the-Art look to your Windows applications **£89**

### FARPOINT

**SPREAD/VBX 2.1 & SPREAD/VBX ++2.0**
The best spreadsheet control for Visual Basic & C++ **£175**

**TAB/VBX**
Gives your applications an organised, professional feel **£49**

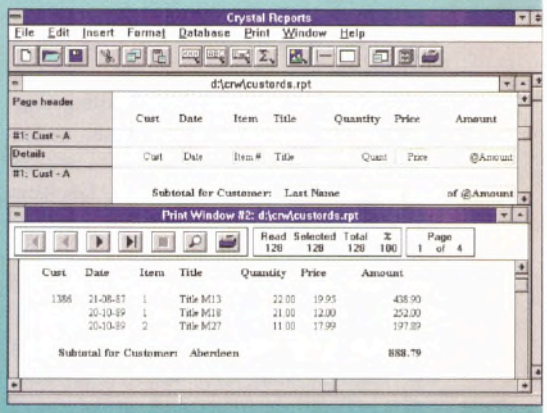
**GRID/VBX**
The ultimate grid control on the market for VB & C++ developers **£75**

**AWARE/VBX**
The specialist tool for building database front ends **£110**

### CRYSTAL

**CRYSTAL REPORTS 3**
The standard edition lets you create reports using data from the major PC databases easily and simply. **£149**

**CRYSTAL REPORTS PRO 3**
Pro 3 gives even more reporting functionality, a full copy of TrueGrid 2 + access to SQL databases. **£299**




## PRODUCT FEATURE

### FARPOINT SPREAD/VBX 2.1 & SPREAD/VBX++ 2.0

£175


The two versions of Spread/VBX have over 250 properties that make them the most powerful and comprehensive data aware controls for Visual Basic, Visual C++, Borland C++ and Symantec C++. They are designed to implement spreadsheets, grids, listboxes, toolbars and more.

**Look out for:**

- **Microsoft Access Engine support** for VB users
- **Spreadsheet Interface Designer** reduces the time it takes to generate and prototype code
- **Database connectivity to Q+E Database Library** is a read/write control that gives virtual data management for oversized files and automatic updating of other data controls
- **Single or multiple cell operation** for back and foreground colours, formulae, borders, etc
- **Data Events** include Advance, ButtonClick, DblClick, EditError, LeaveCell, ColWidthChange, DragDropBlock, UserFormulaEntered, and others
- **Database Events:** EnterRow, LeaveRow, QueryData & TopLeftChange
- **GUI operations** include text overflow, read only mode, sizing of rows and columns, scroll freezing, hide/show single or all rows/columns, grid line adjustment, auto-sizing to fit parent spreadsheet, etc, etc.



CIRCLE NO. 775

CONTEMPORARY Software

**FOR MORE INFORMATION AND TO ORDER**

**CALL NOW ON 0727 811999**

Abbey View
Everard Close
St Albans AL1 2PS
Tel: 0727 811999 Fax 0727 848991

Prices quoted exclude VAT and delivery and may be subject to change without further notice

```
FUNC Test

ifdef DEBUGGING
  // ...
else
  // ...
endif

RETU

but this is not:

ifdef DEBUGGING
  FUNC Test
    // ...
  RETU
else
  FUNC Test
    // ...
  RETU
endif
```

*Figure 2 - VO only allows conditional compilation within an entity*

the result. You'll see why towards the end of this article.

CA says VO will run 97% of existing Clipper code if you make some minor syntax changes. I don't know how it arrives at such figures (do you count commands, functions etc and form the percentage?), but based on my experience that figure seems pretty accurate. You can take your existing `GETs` and `READs`, `MemoEdit()s`, even `DBEdit()` and make them work under Windows. But of the others, `InKey()`, `WAIT`, `TBrowse`, `LIST`.... Well I don't know about you, but I think it could be pretty amusing using a `WAIT` in a Windows program. And just imagine the fun you could have with `ACCEPT`.

## Detached locals

So what's not supported? The most obvious omission is support of *Detached Locals*. These were pretty useful in Clipper 5, but thankfully not many people used them. The following code creates a detached local:

```
FUNC Test
LOCAL x := 12
RETU {|| x }
```

Clipper normally discards local variables when a routine returns, but in this case it can't discard the variable `x` because the calling code requires its value to be maintained:

```
b := Test()
? Eval( b )     // 12
```

To handle this Clipper makes a copy of the variable `x` (it actually creates an array containing all the function's local variables and parameters), then only releases it when the variable which refers to the code block is released (in this case the variable `b`). Hence the variable is detached.

This behaviour is not supported by VO. However, if you consider that you are actually performing dynamic allocation of a variable, you may be able to use VO's pointers and `MemAlloc()` (VO's version of C's `Malloc()`) to do a similar job.

## Preprocessor

The concept of VO's preprocessor is different. Certain Clipper 5 preprocessor directives are not supported. I already mentioned the architecture of the repository and how there was no lexical ordering of entities. I also hinted that this would cause problems with the preprocessor. Indeed it does.

The easiest way to think of Clipper 5's preprocessor is as a line by line search and replace facility. Without regard for program structure, it reads one line at a time, converts that line according to preprocessor directives and produces an output file for the compiler. When you work with VO you are not working with files so the nature of the preprocessor is different. There's no lexical ordering. Any preprocessor declarations you make are automatically application-wide. If you define a constant, for example, that constant is visible in all program modules which comprise the application. By default, defined constants are application-wide, though you can restrict their visibility to the current module by prefixing their declaration with `STATIC`.

In terms of existing code, you can't have certain lines of code which are converted according to your definitions and others which are not. There are several other changes to preprocessor directives worthy of mention.

First, you don't use the leading `#` - `define` on its own is fine. Also, you must use `:=`, as in:

```
define NAMES_ORDER := 2
```

Constants can only be defined at compile time. Further more VO does not support compiler macros so use a function instead. `#include` is not supported, but you don't need it. You can import your defines into the repository where they are globally visible anyway.

VO *does* support used-defined commands, though some of the match and replacement markers have been slightly changed. The only change with regard to commands which may cause you problems is that the command processor is not iterative. Clipper 5's preprocessor would repeatedly process commands until there was nothing left to translate. This allowed you to write commands that emitted other commands, which the preprocessor continued to process. VO's preprocessor does not do this, so you must manually replace commands in the right hand side of the command definition with that command's definition. Tedious but possible.

VO does not support `#translate` or `#xtranslate` but you can perform the translation, manually. Again tedious, but possible. Perhaps the most irritating change

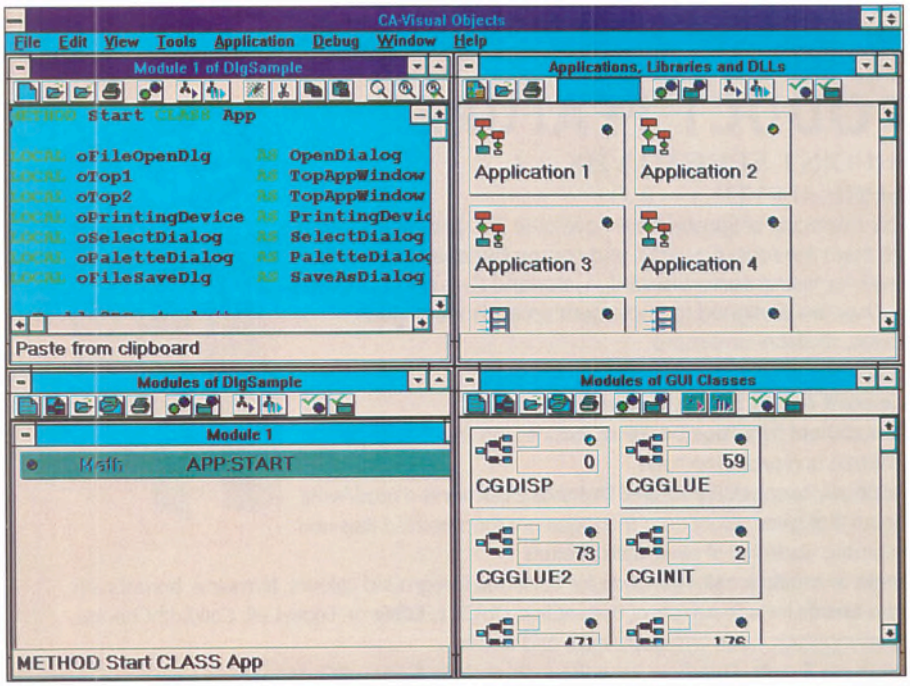
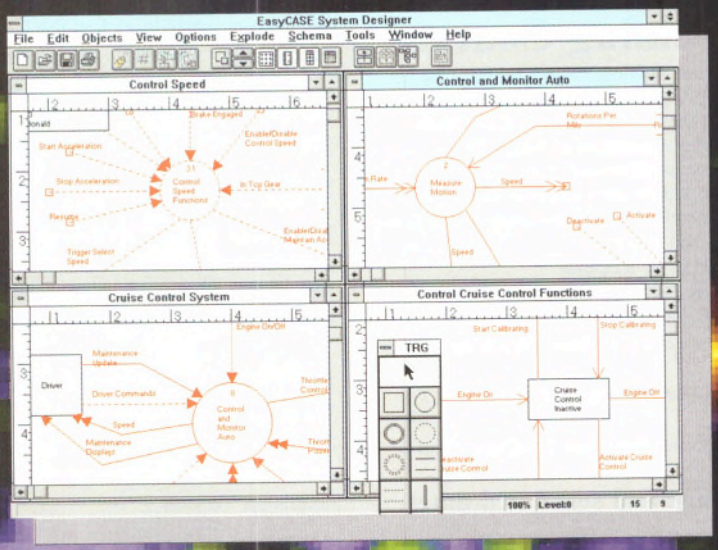



*Figure 3 - The Visual Objects IDE showing browser windows*

# EasyCASE®

## *The Designers Tool of choice, its Powerful, its Easy to Use and Affordable.*




**✱ Runs under MS Windows**
**✱ Supports Yourdon, SSADM etc**
**✱ dBASE compatible**
**✱ Multi-User support built-in**
**✱ Methodology and Product Training available**

Evergreen CASE Tools

*For further information...*

**Tel: 0272 860400**

GREAT WESTERN INSTRUMENTS LTD

Great Western Instruments Ltd

Redwood House Bristol Road Keynsham Bristol BS18 2BB England



Evergreen CASE Tools

CIRCLE NO. 776

# CA-Visual Objects is Shipping !

## Rhino Publishing Ltd is the preferred CA-Visual Objects & CA-Clipper Specialist

### *Buy CA-Visual Objects now and get it for nearly half price!*

The pre-release version of CA-Visual Objects™ is available now from Rhino Publishing at £425. The list price for the full release will be £745. The pre-release price includes documentation and an upgrade to the full version when it ships. Purchase the pre-release from us and get a copy of **Oodles** (our CA-Clipper® 5 OOPS extension ) and three months membership to our Visual Objects user group, **this bundle is only available from Rhino Publishing**. By purchasing now you get to start your projects sooner and start on your learning curve right away, you also save £320.

We have been using the pre-release for a few weeks, it looks like a truly great product and is certainly everything Computer Associates promised it would be. The language is a natural extension to the CA-Clipper language so you don't need to throw away years of xBase knowledge.

### *CA-Visual Objects is a full blown product:*

With its language roots firmly in the xBase world CA-Visual Objects is fully object oriented (does not require oodles) and boasts a full native code compiler allowing your applications to approach the speed of C/C++ but without the worry of complex memory management. It includes an Integrated Development Environment (IDE), Window Editor (Screen/Form editor), Menu Editor, Report Editor, Source Code Editor, Icon Editor and Class Browser and much more. CA-Visual Objects allows you to write Multi-Tasking, Multi-Document (MDI) and Multi-Windowed Applications using an iterative process. Compilation speed is fast with the ability to execute the application without a full link. It can produce stand alone EXE's, DLL's and library files. Just like CA-Clipper the final executable is royalty free. Because CA-Visual Objects has been built from the ground up as a Windows database language it fully understands Windows and the requirements of database applications. It can be programmed in the traditional sense with familiar xBase commands or in the newer object oriented way with classes and methods. It supports DBF files, Various SQL Engines and ODBC in the box as standard.

## CA-Visual Objects and CA-Clipper Training Courses

As the only current Computer Associates Training Partner for CA-Clipper and CA-Visual Objects in the UK we are pleased to announce five new courses. **Rhino Publishing** runs all of the **CA-Clipper** and **CA-Visual Objects** scheduled courses at **Computer Associates** training offices throughout the UK. Each delegate has a machine and printer (except for seminar style courses), in addition, the trainer has a machine with a barco projector. All courses are given in a friendly, and lively manner where delegates are encouraged to ask questions and interact.

- ***new!*** *Conversion to CA-Visual Objects for Windows*
- ***new!*** *CA-Visual Objects for Windows Part 1*
- ***new!*** *CA-Visual Objects for Windows Part 2*
- ***new!*** *Networking with CA-Clipper 5.x and CA-Visual Objects for Windows*
- ***new!*** *Object Oriented Programming for CA-Clipper & CA-Visual Objects.*

We are still running the regular CA-Clipper Part 1 and CA-Clipper Part 2 courses.

**Contact us for course outline and scheduled dates.**

## AS-400 Connectivity

### With FileT/PC - AS/400 Data Access Library

Maximise the performance and capacity of your AS/400 with FileT/PC

- Reduce data access times by 10 times and more
- Improve processor capacity by 250%
- One Customer reported that their data access time went from 10 minutes to just 19 Seconds FileT/PC gives interactive PC applications written in C/C++, Visual Basic, Clipper, & more, the Fastest access available to remote data on the AS/400.

**FileT/PC offers:**

- Easy program integration
- Performs all data conversions
- Automated record format translation
- DOS, Windows and OS/2 support
- FileT/PC requires no additional host code

## The UK Visual Objects User Group

We have recently launched the UK Visual Objects User Group. Members get a monthly newsletter, access to the User Groups BBS, technical support (via the BBS) and a discount on add-ons. Membership costs £95 per year. First three months free if you purchase Visual Objects from Rhino Publishing.

## VBX Support for CA-Visual Objects™

News from the US CA-Technicon: Two companies have announced products that allow CA-Visual Objects to use VBX libraries. This will enable the ease of porting from visual basic over to visual objects. Call us for further details.

## Advantage xBase Server Version 3

We have just been appointed a direct distributor for Extended Systems. You may purchase upgrades through us. Ask for our article on "Client Server" for more on xBase Advantage or call us for more details on Version 3.

**FileT/PC now supports:**

- Clipper RDD
- Clipper Protected Mode
- Visual Basic Custom Controls
- 32 Bit OS/2 Version

| DOS | OS/2 | Windows |
|---|---|---|
| CA-Clipper | C/C++ | Gupta SQL |
| Windows CA-Clipper RDD | IBM C Set ++ | C/C++ |
| C/C++ | DLL | DLL |
| Visual Basic | | PowerBuilder |
| Quick Basic | | Visual Basic |
| FoxPro | | FoxPro |
| Microfocus COBOL | | Access |
| Clarion | | Paradox |
| Paradox | | |

## We offer a complete service :-

- **Add on Products**
- **On-site training** • **One-to-One tuition**
- **Conversion courses from other languages (COBOL, Basic, C/C++ , etc)**
- **Consulting, Programming and Conversions**

### Free Mag - Database News

We are giving away a free mag called Database News. It is full of product announcements, tricks, tips and work arounds for database products. Our September Issue was the first mag to announce the Launch of Visual Objects. Articles included: How to TBrowse a two dimensional array, Reducing Memory Requirements with a Library Manager, explanation of Query Optimisers, Clipper Memory Management, Interactive Voice Programming using Clipper, Foxpro and a discussion of Client Server using the Advantage xBase Server.

For more information, Demo Disks or free advice call: **0302 364861**

***The most powerful xBase language now does Windows !!!***

**Rhino Publishing Ltd, 86 Spring Gardens, Doncaster, DN1 3DJ Phone: 0302 364 861 Fax: 0302 367 111**

CIRCLE NO. 777

```
nKey := InKey(0)

// TBrowse CASE statement
// ...
CASE siKey == K_LBUTTON
  // TBrowse mouse
  // handling addition
  oTbr:GoMousePos()
```

*Figure 4 - Recognising the mouse with TBROWSE*

is that VO only allows conditional compilation within an entity. This means the code in Figure 2 is valid. Since defines are entities, you cannot conditionally compile constants (nor include files of constants).

## Other changes

So far we've looked at the lack of support for detached locals and some awkwardness with the preprocessor. There are other changes you'll need to make as well, though nothing too serious.

Some functions have been renamed to prevent a conflict with new reserved works. `Witness Array()` has been renamed `Arraynew()`, `Date()` is now `Today()` and the `TBrowse` and `Get :end()` methods are both referred to as `:_end()`. So there's not much you can't handle armed with a word processor's search and replace facility.

The final change I'll discuss concerns file-wide declarations. You declare file-wide (external) statics using `STATIC GLOBAL` rather than `STATIC` on its own. VO does not support file-wide `FIELD` or `MEMVAR` statements and you can only initialize file-wide static arrays to a single dimensional array of constants. No earth shattering changes here.

```
define IDC_FnameId := 700
// Add a check box

// Create check boxes
  wCheckFname := CRTAddCheckBox(;
    IDC_FnameId,   ; // siNKey as short
    "First Name",  ; // sText as string
    1,   ;           // siTop as short
    60,  ;           // siLeft as short
    1,   ;           // siHeight as short
    15   ;           // siWidth as short
    )                // end of call
```

*Figure 5 - Adding windows controls*

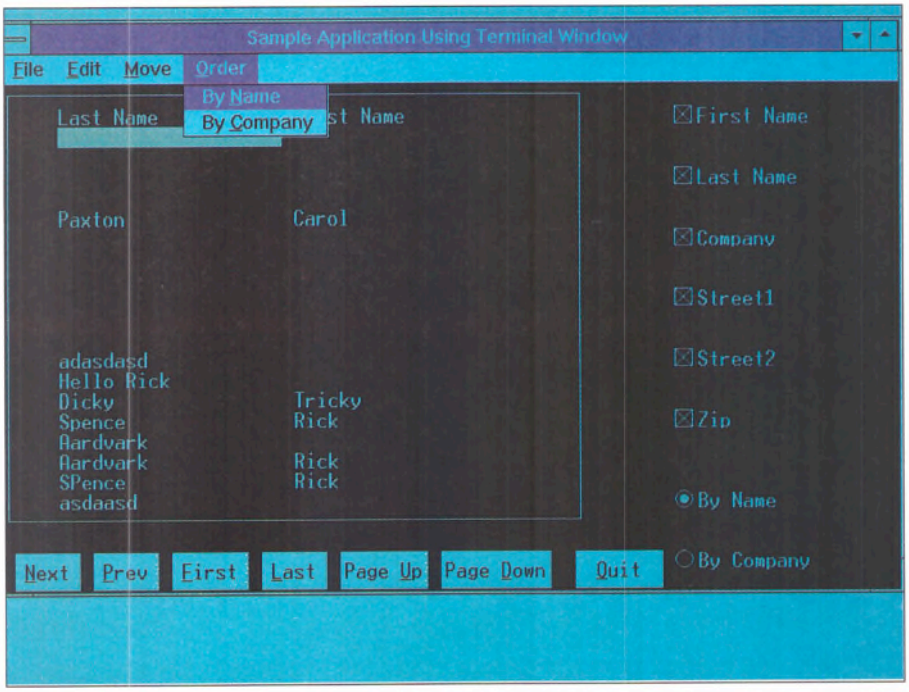



*Figure 7 - Enhanced terminal mode program*

## Running under Windows

A typical Clipper program ported to Windows looks much like a DOS box, but it is in fact a real VO Windows program. All output appears in what is called the terminal window, an 80 column by 25 row window using a fixed pitch font. Hardly the look and feel of Windows, but what did you expect? Actually, you do get some mouse support which you may not have expected. `MENU TO`, `Achoice()` and `DBEdit()` are all now mouse aware. A simple change to your TBrowse `CASE` statement makes it recognise the mouse as shown in Figure 4.

> **While it may well be important to get some existing code running existing code running with VO, I can't recommend it**

`InKey()` returns `K_LBUTTON` when you press the mouse inside a TBrowse window. The TBrowse object maintains the mouse position so the subsequent call to the `goMousePos()` method knows what to do.

## Improving appearance

It's pretty easy to add some Windows controls to this terminal Window. You can use check boxes, radio buttons, list boxes, and real Windows menus. VO comes with a set of functions, called the CRT functions, which you use to add these controls. For the controls, you indicate their position and assign them a unique identifier which `InKey()` will return when you select that control (see Figure 5).

For menus, you pass a two dimensional array of prompts and identifiers. When the user selects a particular prompt, `InKey()` returns that identifier. Figure 6 shows a section of a terminal mode program which uses and processes check boxes, radio buttons, push buttons and includes a real windows menu. Figure 7 shows how this looks on screen.

## Enhancing your code

The biggest enhancement you can make to your existing code is to declare variables with their type, and to declare the types of your functions' return results and parameters. You get two benefits from this. First, the compiler can generate real machine code and can assign machine addresses at compile time. And second the compiler will complain in each place your code uses variables or functions in a manner which is inconsistent with their declarations. Declaring your variables' types is easy. You use the following form of a `LOCAL` (or `STATIC`) declaration:

```
LOCAL <var> AS <type>
```

Here are some examples:

```
define IDC_CompanyId  := 702
define IDC_FnameId  := 700
// ...
define IDM_EditId   := 520
define IDM_FileExitId  := 510
define IDM_MoveFirstId  := 502
// ...
define IDP_First   := 803
define IDP_Last   := 804
// ...
define IDR_OrderCompanyId := 601
define IDR_OrderNameId  := 600

FUNC FindColumn( oTbr AS OBJECT, oTbc AS OBJECT) AS Int

LOCAL siPos := 1

  DO WHILE !( oTbr:getColumn(siPos) == oTbc )
    siPos++
  ENDDO

RETU siPos

FUNC Start

LOCAL siKey := 0  AS SHORTINT
LOCAL oTbr        AS TBrowse
LOCAL oTbcFname   AS TBColumn
LOCAL oTbcLname   AS TBColumn
LOCAL oTbcCompany AS TBColumn
LOCAL oTbcStreet1 AS TBColumn
LOCAL oTbcStreet2 AS TBColumn
LOCAL oTbcZip     AS TBColumn

LOCAL siTbc AS INT

LOCAL aFileMenu   AS ARRAY
LOCAL aEditMenu   AS ARRAY
LOCAL aMoveMenu   AS ARRAY
LOCAL aOrderMenu  AS ARRAY
LOCAL aMainMenu   AS ARRAY

LOCAL wMenuHandle AS WORD

LOCAL wButtonNext      AS WORD
LOCAL wButtonPrev      AS WORD
LOCAL wButtonFirst     AS WORD
LOCAL wButtonLast      AS WORD
LOCAL wButtonPageUp    AS WORD
LOCAL wButtonPageDown  AS WORD
LOCAL wButtonQuit      AS WORD

LOCAL wCheckFname      AS WORD
LOCAL wCheckLname      AS WORD
LOCAL wCheckCompany    AS WORD
LOCAL wCheckStreet1    AS WORD
LOCAL wCheckStreet2    AS WORD
LOCAL wCheckZip        AS WORD

LOCAL wRadioName       AS WORD
LOCAL wRadioCompany    AS WORD

  USE c:\Names
   INDEX ON Upper(Names -> Lname + Names -> Fname)  TO
Names1
   INDEX ON Upper(Names -> Company)                 TO
Names2
  SET INDEX TO Names1, Names2

//  SetMode(42, 80)
//  SetColor("b")

   CRTSetCaption("Sample Application Using Terminal Win-
dow")

  CLEAR SCREEN

  // Create TBrowse and set its bits and pieces
  oTbr := TBrowseDB(1, 1, MaxRow() - 4, 50)
  @ 0, 0 TO MaxRow() - 3, 51

  oTbcLname := TBColumnNew("Last Name",     {|| Names ->
Lname })
  oTbr:AddColumn( oTbcLname )

  oTbcFname := TBColumnNew("First Name",    {|| Names ->
Fname } )
  oTbr:AddColumn( oTbcFname )

   oTbcCompany  :=  TBColumnNew("Company",  {||  Names  ->
Company })
  oTbr:AddColumn( oTbcCompany )

  oTbcStreet1 := TBColumnNew("Street1",     {|| Names ->
Street1 })
  oTbr:AddColumn( oTbcStreet1 )

  oTbcStreet2 := TBColumnNew("Street2",     {|| Names ->
Street2 })
  oTbr:AddColumn( oTbcStreet2 )

  oTbcZip := TBColumnNew("Zip",             {|| Names ->
Zip })
  oTbr:AddColumn( oTbcZip )

  // Create menus
  aFileMenu := { ;
         { "&File" }, ;
               { IDM_FileExitId, "E&xit" } ;
           }

  aEditMenu := { ;
               { "&Edit" }, ;
               { IDM_EditId, "&Edit" } ;
             }

  aMoveMenu := { ;
               { "&Move" }, ;
               { IDM_MoveNextId,     "&Next"      }, ;
               { IDM_MovePrevId,     "&Prev"      }, ;
               { IDM_MoveFirstId,    "&First"     }, ;
               { IDM_MoveLastId,     "&Last"      }, ;
               { IDM_MovePageUpId,   "Page &Up"   }, ;
               { IDM_MovePageDownId, "Page &Down" }  ;
             }

  aOrderMenu := { ;
                { "&Order" }, ;
                 { IDM_OrderNameId,    "By &Name"    },
;
                  { IDM_OrderCompanyId, "By &Company" }
;
               }

  aMainMenu := { ;
       aFileMenu, ;
       aEditMenu, ;
       aMoveMenu, ;
```

*Figure 6 - Terminal mode program using Windows controls*

See us at Comdex Fall, Stand S-3554

# Dongles? Buttons? Plugs?

## Get Serious About Software Protection.

**When it comes to protecting your software**, you need real solutions - not gadgets. You need **HASP**® - *the Professional Software Protection System.*


### Quick & Easy to Implement

Getting started with HASP is a snap. Interfaces are available for most programming languages, and a variety of installation options are supplied to meet your needs and schedule.

### Technology That's Tough to Beat

ASIC technology, sophisticated software and random encryption algorithms are just a few reasons your products are safer when protected by HASP.

### Developed with Users in Mind

Transparency. Compatibility. Connectivity. HASP was developed to perform unnoticed. Whether installed on a PC, Mac or network, your end-users will never know it's there.

### Get Serious-Try it for Yourself

Find out why HASP is the fastest growing form of protection in the industry. Order your HASP Developer's Kit today.

**ALADDIN**

*The Professional's Choice*

| | |
|---|---|
| **North America** | **Aladdin Software Security Inc.**<br>Tel: (800) 223 4277, 212-564 5678<br>Fax: 212-564 3377<br>E-mail: sales@hasp.com |
| **Intl. Office** | **Aladdin Knowledge Systems Ltd.**<br>Tel: 972-3-537 5795, Fax: 972-3-537 5796<br>E-mail: aladdin@aladdin.co.il |
| **United Kingdom** | **Aladdin Knowledge Systems UK Ltd.**<br>Tel: 0753-622266, Fax: 0753-622262 |
| **France** | **Aladdin France SA**<br>Tel: 1 40 85 98 85, Fax: 1 41 21 90 56 |



member of SPA

yes It runs with NetWare Developer tested, only

Available and Ready for OS/2

Microsoft Windows Compatible

**Australia** Conlab 3 8985685 ■ **Benelux** Aladdin Benelux 080 782098 ■ **Czech** Atlas 2 766085 ■ **Chile** Micrologica 2 222 1388
■ **Denmark** Berendsen 39 577100 ■ **Egypt** Zeineldein 2 3604632 ■ **Finland** ID-Systems 0 870 3520 ■ **Germany** CSS 201 278804
■ **Greece** Unibrain 1 6856320 ■ **Italy** Partner Data 2 26147380 ■ **Japan** Athena, 3 58 213284 ■ **Korea** Dae-A 2 848 4481
■ **New Zealand** Training , 4 5666014 ■ **Poland** Systherm 61 480273 ■ **Portugal** Futurmatica 1 4116269 ■ **South Africa** D Le Roux, 11 886 4704
■ **Spain** PC Hardware, 3 4493193 ■ **Switzerland** Opag 61 7169222 ■ **Taiwan** Teco 2 555 9676 ■ **Turkey** Mikrobeta 312 467 7504

```
        aOrderMenu ;
                }

   wMenuHandle := CRTNewPullMenu( aMainMenu )

   // Create push buttons
   wButtonNext := CRTAddButton(;
     IDP_Next,;  // siNKey as short
     "&Next",;  // sText as string
     MaxRow() - 1,; // siTop as short
     1,;   // siLeft as short
     2,;   // siHeight as short
     6;   // siWidth as short
     )   //  end of call

// ...

   // Create check boxes
   wCheckFname := CRTAddCheckBox(;
      IDC_FnameId,;  // siNKey as short
      "First Name",; // sText as string
      1,;      // siTop as short
      60,;      // siLeft as short
      1,;      // siHeight as short
      15;      // siWidth as short
      )     //  end of call

   CRTSetButtonState( wCheckFname, 1 )

// Create radio buttons
   wRadioName := CRTAddARadio(;
      IDR_OrderNameId,; // siNKey as short
      "By Name",;  // sText as string
      19,;   // siTop as short
      60,;   // siLeft as short
      3,;   // siHeight as short
      15;   // siWidth as short
      ) // end of call
   CRTSetButtonState( wRadioName, 1 )

   // Enter key handling loop
   siKey := 0
   DO WHILE siKey != K_ESC .AND. siKey != IDM_FileExitId
;
       .AND. siKey != IDP_Quit
     oTbr:ForceStable()
     siKey := InKey(0)

     DO CASE
        CASE siKey == K_UP      .OR. siKey == IDM_MovePre-
vId ;
          .OR. siKey == IDP_Prev
   oTbr:Up()
        CASE siKey == K_DOWN    .OR. siKey == IDM_MoveNex-
tId ;
          .OR. siKey == IDP_Next
      oTbr:_Down()
        CASE siKey == K_PGUP    .OR. siKey == IDM_MovePage-
UpId ;
          .OR. siKey == IDP_PageUp
   oTbr:PageUp()
        CASE siKey == K_LBUTTON
          // TBrowse mouse handling addition ...
          oTbr:GoMousePos()

        CASE siKey == IDC_FnameId
          IF CRTGetButtonState(IDC_FnameId) == 0
            oTbr:AddColumn( oTbcFname )
            oTbr:Configure()
          ELSE
            siTbc := FindColumn ( oTbr, oTbcFname )
            oTbr:DelColumn( siTbc )
          ENDIF

        CASE siKey == IDC_LnameId
          IF CRTGetButtonState(IDC_LnameId) == 0
            oTbr:AddColumn( oTbcLname )
          ELSE
            siTbc := FindColumn( oTbr, oTbcLname )
            oTbr:DelColumn( siTbc )
          ENDIF

        CASE siKey == IDR_OrderNameId
          SET ORDER TO 1
          oTbr:RefreshAll()

        CASE siKey == IDR_OrderCompanyId
          SET ORDER TO 2
          oTbr:RefreshAll()
     ENDCASE
   ENDDO

   CRTDeleteMenu( wMenuHandle )

   CRTRemoveButton( wButtonNext     )

   CRTRemoveButton( wCheckFname )

   CRTRemoveButton( wRadioName )

RETU
```

*Figure 6 continued- Terminal mode program using Windows controls*

```
LOCAL c AS STRING
LOCAL l AS LOGIC
LOCAL aNames AS ARRAY
LOCAL o AS OBJECT
```

Declaring the type of functions' return values and parameters is pretty basic too:

```
FUNC test(d AS DATE, l AS LOGIC)
        AS ARRAY
```

If you don't have the source code to a function, you can define its prototype in much the same way. The compiler then knows how to generate code to call it. And since VO now supports all the data types as C, this means you can call the Windows API functions as if they were your own functions, just by specifying their prototypes.

## Summary

In this article I gave you an overview of what's involved in porting existing Clipper code to VO, and showed you how it will look. I also showed you how you add some Windows controls to provide some of the look, but none of the feel of Windows. In summary, I think you and your users will be disappointed at how your ported applications will look and feel. I think you'll want to use VO's tools to redesign them from the ground up.

*Rick Spence, an original member of the Clipper development team, runs "The Database Programmers' Retreat" and "Software Design Consultants", two UK based companies specialising in Database Programmer training and development. When he's not at the pub he's writing a book on Visual Objects.*

# A marriage of convenience?

C++ developers and database developers have different requirements of an OODBMS. **Mary Hope** reports on how the latest version of Poet tries to tackle both groups.

Object Oriented databases bring together the database community and OO programmers. Both have need of something possessed by the other and so, somewhat reluctantly, they have formed a liaison. This is not a partnership that could have been predicted. For many years database devotees and OO programmers had little to say to each other. Database users had the assurance that comes from millions of users and a system based on mathematical rules rather than the sand of fashion. Object oriented programmers knew they were at the bleeding edge and had the confidence that comes from being part of an esoteric, though rapidly growing, club. And so it might have continued if the OO programmers had not run up against the problem of persistence and the database developers hit the limits of modelling the world with two dimensional tables. And so an alliance was formed.

```
// food.hcd
//
// class definitions for the food program
//
// Only one class at the moment; ie
// ReadyMeals
// Later will derive refridgerated ReadyMeals.
//
// mhh 9/9/94
//
// need to use Poet string class for queries
# include <ptstring.hxx>

persistent class ReadyMeal
{
private:
  PtString name;
  float price;
  char veggy;  // acceptable = y
public:
  ReadyMeal(PtString aname, float aprice, char veg);
  virtual void Print();
};

// and a set to use for the output of queries
typedef lset<ReadyMeal*> ReadyMealSet;
```

*Figure 1 - Declaration of the ReadyMeal class*

## The meaning of OODBMS

What you expect from an object oriented database is affected by which community you come from. Database aficionados want to know such things as whether there is a SQL-like query language, how security and integrity are maintained, the speed and volume of transactions that can be handled and the facilities for recovery and concurrency. Those from an object oriented background tend not to have the same 'data processing' concerns of the traditional database users. While acknowledging that relational databases may have their place in high volume, low information (ie rather boring) transactions, they maintain that a totally different approach is needed to model many of the complex (ie more interesting) objects that systems have to deal with. There are now OO analysis and design techniques and OO languages to implement these. The only missing part of the jigsaw is how to deal with storing the information. Smalltalk has the simple but limited solution of dumping the whole of memory onto disk; C++ programmers have devised various wheezes to save and restore objects without loss of references and functionality. But the real answer to the storage problem looks like being an object oriented database. When assessing an OODBMS the OO programmers ask questions about how reliably the database follows the OO model. Does it offer the key OO features of classes with encapsulation, inheritance and polymorphism? The traditional database characteristics are less important.

## Pure or hybrid...

'Pure' OODBs are totally based on the object model. Some are whiter than white. For instance, if a database truly has encapsulation then, the purists argue, you should not be able to query the value of members of objects except through member functions giving access to the data. So, no member function, no access. The pure OODBs tend to look like extensions of C++ and/or Smalltalk.

# SYSTEM SCIENCE

See us on Stand 191 at SD'94, NEC, Nov 22-24

## SOFTWARE DEVELOPMENT TOOLS FOR WINDOWS, DOS, UNIX, & OS/2

### Windows Development

| | |
|---|---|
| Doc-To-Help - help authoring | £259 |
| Robo-HELP - help authoring | £365 |
| InstallSHIELD - installation utility | £325 |
| LeadTools Imaging library | £call |
| Smalltalk/V Windows | £295 |
| PC-Logo Windows | £60 |
| PI DLLs for WP & graphics import | £call |
| PI Document Editor - new pricing | £345 |
| Spread/VB++ - spreadsheet function | £169 |
| Professional Toolkit | £239 |
| Zinc Application Framework | £call |
| Graphics Server SDK | £245 |
| SmartHeap Win or DOS | £345 |
| TCP/IP Development tools | £call |
| CodeBase or CodeBase++ | £239 |

### VB Value

| | |
|---|---|
| PI for Vbx - new import filters | £call |
| Disctinct TCP/IP Visual Ed | £179 |
| Spyworks by Desaware | £115 |
| Spread/VBx | £165 |
| TrueGrid Pro | £115 |
| VB Assist | £139 |
| Designer/Data Widgets | £95 |
| VB Tools 4.0 | £110 |
| QuickPak Professional for Windows | £149 |
| QuickPak Scientific for Windows | £125 |
| PinPoint/VB - API debugger | £125 |
| Grid/VBx, Tab/VBx | £call |

### Mathematics & Science

| | |
|---|---|
| MathCad Plus | £365 |

- Mathematica - DOS, Win, Mac, Workstations, Education & Student pricing.
- Derive - school & university licensing.
- Origin new ver 3.5 with add-on modules.
- Lindo & What's Best Linear Programming
- SigmaPlot, SigmaStat, TableCurve

*...many more for maths & stats.*

### UNIX

- SCO Unix operating systems & development systems.
- SCO Open Desktop, TCP/IP and NFS.
- FoxPro for SCO UNIX (NEW)
- PC TCP, NFS and Xwindow servers

### For FORTRAN

| | |
|---|---|
| Lahey FORTRAN 90 - new | £625 |
| FORTRAN to C translators | £call |
| MS FORTRAN-77 5.1 - DOS | £145 |
| MS FORTRAN Powerstation - DOS | £235 |
| MS FORTRAN Powerstation - NT | £415 |
| IMSL Numerics for MS Fortran | £call |

### Cross Development

| | |
|---|---|
| Hi-Tech C Cross - many tragets | £call |
| Aztec C for 68K, 8086 & Z80 targets | £call |
| Introl C Cross - many targets | £call |
| 2500AD Cross Asm & Simulators | £call |

### Pharlap DOS Extenders

| | |
|---|---|
| TNTIDOS Extender - 32 bit | £335 |
| 286IDOS Extender - 16 bit | £335 |

### Microsoft

| | |
|---|---|
| Visual C++ 2.0 CD, & VC++ 1.5 16-bit | £299 |
| Visual C++ 2.0 CD upgrades MS C/C++ | £149 |
| Visual Basic Windows PE | £235 |
| Visual Basic DOS PE | £235 |
| Macro Assembler 6.11- NT or DOS | £110 |
| Access 2.0 (upgrades available) | £289 |
| Access Developers Kit | £295 |
| Multimedia Viewer | £239 |
| Project for Windows | £375 |
| Windows for Worgroups, Windows NT | £call |
| Office and Office Professional | £call |

*(See FORTRAN Section)*

### Editors and Tools

| | |
|---|---|
| CodeWright Editor Windows ver. 3.1 | £175 |
| CodeWright Fusion for MS VC++ | £109 |
| Multi-EDIT Pro - DOS | £129 |
| DemoQUICK - create Windows Demos | £395 |
| Dan Bricklin's Demo II - DOS Demos | £195 |
| PC Lint C/C++ - Lint code checking | £149 |
| Flowcharting & diagramming tools | £call |
| Track Record - bug tracking software | £110 |
| Archimedes BugBase | £375 |

### MKS

| | |
|---|---|
| MKS Toolkit of Unix tools | £210 |
| MKS RCS - Version Control | £275 |
| MKS Lex & Yacc for C, C++ & TP | £215 |
| Internet AnyWhere - off line news & Mail | £99 |

*For Windows/Dos, OS/2 & NT, call for multi-user licences on all MKS products.*

**3-5 CYNTHIA STREET, LONDON N1 9JF**
**FAX 0171 837 6411**

QUALITY IN CUSTOMER SERVICE AND SUPPORT

SYSTEM SCIENCE

# 0171 833 1022

### Watcom

| | |
|---|---|
| Watcom C/C++ 10.0 CD-ROM | £225 |

*Printed documentation is also available*

| | |
|---|---|
| Watcom Fortran-77[32] - DOS,OS/2, NT | £375 |
| Watcom SQL - DOS,Win,OS/2 | £259 |

*SQL Servers for DOS, Win, OS/2 & Netware*

### Borland

| | |
|---|---|
| Borland C++ 4.0 - CD or disk | £295 |

*Upgrades & Comp. Upgrades available*

| | |
|---|---|
| Power Pack for DOS | £69 |
| Borland C++ OS/2 1.5 | £249 |
| Turbo C++ Visual Edition - Win | £85 |
| Turbo C++ 3.0 & World C++ Video | £79 |
| Visual Solutions Pack of Vbxs | £59 |
| Turbo Assembler | £59 |
| Brief Programmers Editor | £125 |
| Borland Pascal & Turbo Pascal | £call |
| dBASE for Windows & upgrades | £call |

### Nu-Mega

| | |
|---|---|
| BOUNDS-CHECKER Win/32 | £195 |
| BOUNDS-CHECKER Win | £195 |
| BOUNDS-CHECKER Win/NT | £195 |
| BOUNDS-CHECKER Win/DOS | £195 |
| Soft-ICE/W with 32-bit functions | £295 |

*Call for savings on Nu-Mega bumdles*

### PVCS Specialists

- PVCS Version Manager is available for Win, Win NT, OS/2 and many Unix platforms in single user and work-group configurations for all development teams.

### OS/2

| | |
|---|---|
| OS/2 OS/2 for Windows | £49 |
| IBM C Set++ bundle on CD | £185 |

*Includes OS/2 Windows & Kase:Set*

| | |
|---|---|
| Visual Age | £1,295 |
| CA-Realizer | £99 |

### CLIENT/SERVER

| | |
|---|---|
| ObjectView Desktop special | £169 |
| Btrieve Development DOS or Windows | £395 |
| Btrieve Client Engines DOS or Windows | £645 |
| Scalable SQL for Netware | £call |
| PowerBuilder Desktop | £189 |
| PowerBuilder Desktop C/S Starter | £425 |

*With Erwin for PB, & Watcom 3 user SQL server*

### NEWS

- Microsoft Visual C++ 2.0 now shipping, with option of special offer Windows NT Workstation version 3.5.
- Btrieve Technologies demerge from Novell All Btrieve products & upgrades now available from System Science.
- EasyCASE Database Engineer module for SQL development and reverse engineering.
- BOUNDS-CHECKER Win/32s for Windows hosted 32 bit debugging.
- PowerBuilder Bundles with ER/WIN, Lotus Notes library and Funcky.
- New PVCS Tracker, Track Record and Bug-Base, for recording bugs and managing their resolution.

| | |
|---|---|
| ObjectView from KnowledgeWare for Client/Server Development special | £169 |

- PLEASE CALL IF THE ITEM YOU ARE LOOKING FOR IS NOT LISTED - CALL FOR OUR NEW COMPREHENSIVE CATALOGUE - PRICES ARE EXCLUSIVE OF VAT
- PRICES (EXCEPT UPGRADES & SPECIALS) INCLUDE DELIVERY TO MAILAND UK. SAMEDAY LONDON DELIVERY AT COST - PRICES ARE SUBJECT TO CHANGE - PLEASE CALL TO CHECK - VISA, ACCESS, & MASTERCARD ACCEPTED WITH PHONE ORDERS

In contrast hybrid OODBs result from grafting on object technology to current relational products. Thus moving towards objects is seen as an *evolutionary* rather than *revolutionary* step. For instance new versions of Oracle and Ingres will offer object oriented features. Poet is of the 'pure' variety. You can tell by glancing at the index: there are an awful lot of references to object this and that, but not a mention of normalisation or Codd.

## Are you a poet?

Poet is aimed clearly at Object Oriented C++ programmers who want a means of making objects persistent. Unlike some OODBMSs, it's not in the megabucks league. Poet really does give you a true OODBMS for under £100. (This is for the standalone PC version). At this sort of price it must also be targeted at those of us who have pretensions about keeping up to date regardless of immediate need. This market is not to be ignored as experience of an OODB is fast becoming *de rigueur* for OO enthusiasts!

## System modesty

The version reviewed here is Poet 2.1.2 Personal Edition. It runs under Borland C++ version 4.xx (used here) and Microsoft's Visual C++ version 1.5. At the time of writing a Symantec version was not available. It requires a fairly standard configuration of Windows 3.1 and 4 MB of RAM to run an application and 8 MB to do anything interesting. It has a modest requirement of about 7 MB of your hard disk. This is the bottom end. Poet 2.1 also runs on a range of other platforms including WFWG server, Novell, NT Advanced Server, Macintosh, OS/2 , Unix etc. From a users point of view there did not appear to be substantial differences between version 2.1 and the 2.1.2 upgrade.

**An OODB should offer a means of querying the data while preserving integrity and security**

## Maintaining persistence

The persistence problem arises because each object has a unique identity described by its address and behaviour determined by its class. An object may contain pointers (ie addresses) to other objects. The difficulty is to ensure that all this information is stored then correctly reconstructed when it is retrieved. It should not depend on the programmer retrieving the data having intimate knowledge of the innards of the class. Additionally, an OODB should offer a means of querying the data while preserving integrity and security.

Using an OODB does not affect the analysis and design end of an object oriented system, it merely means that when you get to implementation you introduce an OODB. The alternatives are to write your own classes to handle the persistence issues, to implement in a relational database (ugh!) or to use a class library offering persistent classes. An OODB can be looked on as a 'class library plus database security and integrity features'.

Poet offers all of these features through an extended syntax of C++. (Could this be C+++?) It is all totally object based (ie instantly recognisable to C++ programmers and a total mystery to SQL developers).

## Get loaded

Poet comes on four disks and a manual of under 500 pages. Installation is a five minute job. The mechanics of using Poet are simple. The essence of it is that you write a header file containing the declarations of the classes you want to use. Any classes that you want to store in the database are preceded by the key word `persistent`. You can mix these with transient, ie non persistent, classes. The header file is then precompiled using Poet. As a result the database is created along with a few files. That is all you do in Poet. At this stage you switch to your preferred C++ compiler (Borland C++ in this case) and write your program in the normal way. The only difference is that you have access to the extended syntax to set up, query and maintain the database. It really is that straightforward.

## A simple example

To demonstrate the way in which Poet operates I have written a little program listed in Figures 1 and 3. The database uses a class called `ReadyMeals`. (The next version would include some examples of inheritance and polymorphism.) The program will allow you to add `ReadyMeals` to the database, show all the meals, sort them in price order and find a `ReadyMeal` with a name specified by the user, ie a basic small database program.

The first stage is precompiling the header file shown in Figure 1. This is only slightly different from a million other header files. It includes the key word `persistent` in front of the class definition. As you would expect, this enables the database to handle objects of this class. It uses Poet's own string class as this is necessary when searching the database using the string as a criteria. The final line in the header file uses a `typedef` to give a name uncluttered by implementation details to the set that will be used to hold the result of queries. Figure 2 shows Poet precompiling the header file.

Next we write the actual program. The C++ program, FOOD.CPP, discussed here is shown in Figure 3. It `#includes` two files that were generated by the Poet precompiler, BASE.HXX, the header file for the database which is called 'base', and FOOD.HXX, a modified version of the original header file. To produce the executable, FOOD.CPP must be linked to a file, generated by the precompiler, which describes

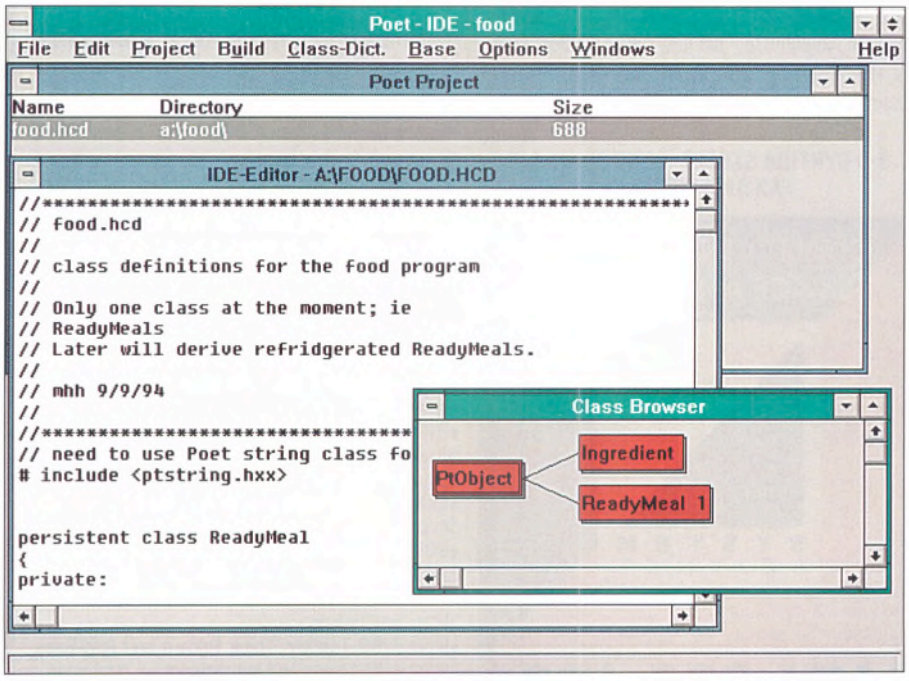



*Figure 2 - The Poet precompiler in action*

# NEW ZINC 4.0 SHRINKS THE WORLD

## WITH GLOBALLY ENABLED, OBJECT-ORIENTED, CROSS-PLATFORM DEVELOPMENT TOOLS.

## ZINC® APPLICATION FRAMEWORK™ 4.0. TODAY THE WORLD, TOMORROW THE UNIVERSE!

### OBJECTS & FEATURES

- ■ = NEW OR ENHANCED

C++ CLASS LIBRARY WITH:
STRING
- ■ FORMATTED STRING
- ■ DATE
- ■ TIME

NUMBER
- ■ BUTTON

RADIO BUTTON
CHECK BOX
VERTICAL LIST
HORIZONTAL LIST
- ■ COMBO BOX
- ■ NOTEBOOK
- ■ TABLE

PULL DOWN MENU
- ■ POP UP MENU

TOOL BAR
- ■ STATUS BAR
- ■ SPINNER
- ■ SLIDER
- ■ SCROLL BAR

ICON
PROMPT
GROUP BOX
- ■ DRAG & DROP
- ■ GEOMETRY MANAGEMENT
- ■ EVENT MAPPING
- ■ PALETTE MAPPING
- ■ OBJECT PERSISTENCE

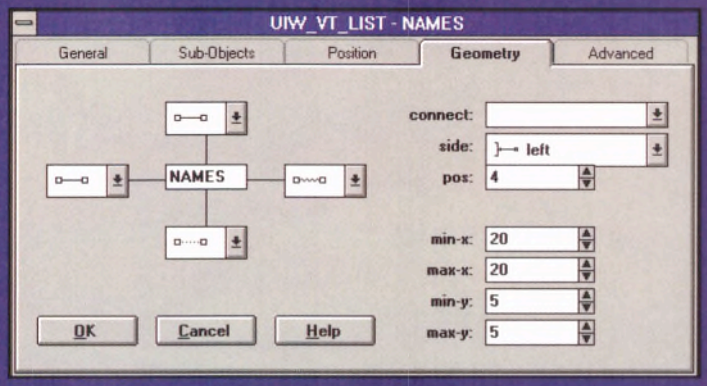
HELP SYSTEM
ERROR SYSTEM
- ■ PRINTER SUPPORT

LOGICAL & NATIVE
MESSAGE PROCESSING
AND MORE...

### GLOBAL SUPPORT

- ■ RUNTIME LOADABLE

SINGLE-BYTE (ISO)
DOUBLE-BYTE (UNICODE)
- ■ DELTA STORAGE
- ■ UNIVERSAL TIME
- ■ 13 LANGUAGES
- ■ 19 LOCALES




Zinc Designer™ 4.0 is an all new multiplatform visual development tool with Drag and Drop, Geometry Management, Persistent Object Storage and more....

### PLATFORMS

DOS TEXT
DOS GRAPHICS
MICROSOFT WINDOWS:
WIN16, WIN32s, WINNT
IBM OS/2
- ■ APPLE MACINTOSH

UNIX TEXT (CURSES)
OSF/MOTIF:
SOLARIS, SUNOS,
HPUX, AIX, OSF/1,
- ■ QNX, SCO, X-86.
- ■ DESQVIEW/X
- ■ NEXTSTEP

INTEL, MOTOROLA
- ■ X/WINDOWS

AND MORE...

### ZINC DESIGNER

- ■ BUS ARCHITECTURE:
- ■ 22 WINDOW OBJECT EDITORS
- ■ INTERNATIONALIZATION EDITOR
- ■ IMAGE EDITOR
- ■ MESSAGE EDITOR
- ■ CHARACTER SUPPORT

SINGLE-BYTE (ISO)
DOUBLE-BYTE (UNICODE)
PERSISTENT OBJECT STORAGE
- ■ DRAG & DROP
- ■ IMPORT/EXPORT NATIVE IMAGES & RESOURCES

AND MORE...

**HOLD THE WORLD IN YOUR HAND.**
**CALL +44 (0) 181 855 9918. WE'LL SEND YOU A FREE TECHNICAL INFORMATION KIT THAT WILL SHOW YOU JUST HOW AMAZING ZINC APPLICATION FRAMEWORK IS.**

IN THE U.S. CALL: 1.800.638.8665;
ASIA: +81 (052) 733 4301; OTHER: 801.785.8900

z i n c

ZINC SOFTWARE INCORPORATED, TELEPHONE: 801.785.8900 FAX: 801.785.8996 INTERNET: INFO@ZINC.COM EUROPE: ZINC SOFTWARE (UK) LIMITED TEL: +44 (0) 181 855 9918 FAX: +44 (0) 181 316 7778
ASIA: ZINC SOFTWARE (JAPAN) TEL: +81 (052) 733 4301, FAX: +81 (052) 733 4328 

CIRCLE NO. 782

# AllChange

For Configuration Management

PVCS

## What is *AllChange*?

Companies have been integrating version management into their development environments for a number of years. Version management, however, fulfills only a part of the wider Software Configuration Management solution.

AllChange manages all aspects of the change process, improving productivity, quality and reliability.

AllChange provides an active, supportive environment for product development, testing and maintenance, but without imposing throttling constraints and creating bottlenecks in your procedures. At its heart, AllChange has a database holding information about all the configuration items that you want managed.

AllChange contains a number of integrated managers which share information to produce a complete Configuration and Change Management environment.

Complete traceability and control is provided according to site / project requirements.

For further information call:

**071 625 5255**

## AllChange Features

- Configuration Management
- Configuration Items
- Life-Cycles
- User Roles
- Version Tracking
- Baselines
- Release Management
- Change Management
- Workspaces
- Pools
- Registers
- Monitors
- Configuration Build
- Reports / Queries
- Full Configurability
- User Interface

*Readmar Systems*
LIMITED

239 Kilburn Park Road, London NW6 5LG
Tel: (+44) 071 625 5255 Fax: (+44) 071 624 9404



CIRCLE NO. 783

```
// food.cpp
//
// class definitions and main program for first version of
// food program.  Will only store and retrieve one class.
//
// Must be linked to the two Poet Library classes
// and the base.cpp file
// Mhh 9/94

extern "C" {
# include <ctype.h>
# include <stdlib.h>
# include <string.h>  // for strcpy
}

# include <iostream.h>
# include <ptstring.hxx>  // for Poet strings

// include the poet header file
# include <poet.hxx>

// include the application specific header files
# include "base.hxx"
# include "food.hxx"

// function prototypes
void menu();
void AddReadyMeal(PtBase *pb);
void ShowAll(PtBase *pb);
void SortByPrice(PtBase *pb);
void FindReadyMeal(PtBase *pb);

// the definitions for the class ReadyMeal
// The constructor
ReadyMeal::ReadyMeal(PtString aname, float aprice, char veg)
{
 name = aname;
 price = aprice;
 veggy = veg;
}

// and the virtual Print() function
void ReadyMeal::Print()
{
  cout << endl;
  cout << "ReadyMeal name: " << (char*)name << endl;
  cout << "Price: " << price << endl;
  cout << "Suitable for vegetarians: " << veggy << endl;
}

// The main program
// This will open the database,
// present a menu to add, show or sort
// the database or close down.
main()
{
char choice = ' ';
int err;
PtString Server ("LOCAL");
PtBase *pb;
  pb = new PtBase();  // to point to the database

  // First open the database which is called 'base'.
  if (pb->Connect ( Server ) != 0)
    cout << "Cannot connect to server" << endl;
  if ( (err = pb->Open ("base")) != 0)
    cout << "Cannot open the database" << endl;
  cout << "Good God, it must have worked!" << endl;
  while (choice != 'Q')
  {
    menu();
    cin >> choice;
    choice = toupper(choice);
    switch(choice)
    {
      case 'A': AddReadyMeal(pb);
            break;
      case 'S': ShowAll(pb);
            break;
      case 'P': SortByPrice(pb);
            break;
      case 'F': FindReadyMeal(pb);
            break;
    } // end of switch
  } // end of while

  // and now to close the database
  err = pb->Close();
  if (err)
    cout << "Could not close the database" << endl;
  err = pb->DisConnect();
  if (err)
    cout << "Could not disconnect from the server" << endl;
  return 0;
}

void menu()
{
  cout << endl;
  cout << "A) To add a ReadyMeal" << endl;
  cout << "S) To show all ReadyMeals" << endl;
  cout << "P) Sort by Price" << endl;
  cout << "F) Find a ReadyMeal" << endl;
  cout << "Q) To quit" << endl;
}

void AddReadyMeal(PtBase *pb)
{
ReadyMeal *ptRM;
int err;
char aname[30];
float aprice;
char veg;

  cout << "Name of ReadyMeal: ";
  cin >> aname;
  PtString ptsname(aname);
  cout << "Price: ";
  cin >> aprice;
  cout << "Acceptable to vegetarians (y/n)?: ";
  cin >> veg;
  ptRM = new ReadyMeal(ptsname, aprice, veg);

  // now have to assign and store
  err = ptRM->Assign(pb);
  if (err)
    cout << "could not assign the ReadyMeal" << endl;
  err = ptRM->Store();
  if (err)
    cout << "Could not store the ReadyMeal" << endl;
  // and delete the pointer
  delete ptRM;
} // end of add ReadyMeal

void ShowAll(PtBase *pb)
{
// uses the AllSet type
ReadyMealAllSet *all = new ReadyMealAllSet(pb);

  // set the pointer to the start of the set and go
  if (all->Seek (0L, PtSTART) == 0)
    do
    {
      ReadyMeal *ptRM;
      // the the ingredient and print it
      if (all->Get (ptRM) == 0)
      {
        ptRM->Print();
        // the object is created internally and must be
           destroyed
```

*Figure 3 - An application using ReadyMeal*

```
        all->Unget(ptRM);
      }  // end of if
    } while (all->Seek (1L, PtCURRENT) == 0);
  else
    cout << "problem seeking " << endl;
}  // end of ShowAllReadyMeals

void SortByPrice(PtBase *pb)
{
  // First need a container for all ReadyMeals
  ReadyMealAllSet *all = new ReadyMealAllSet(pb);

  // and a set to hold the result of the sort
  ReadyMealSet *SortSet = new ReadyMealSet(pb);

  // and an instance of the class handling the query
  ReadyMealQuery MyQuery;

  // and specify the sort criteria
  MyQuery.SortByprice(PtASCENDING);

  // carry out the sort
  all->Query( &MyQuery, SortSet);

  // and display the result
  if (SortSet->Seek(0L, PtSTART) == 0)
  {
    do
    {
      ReadyMeal *ptRM;  // to hold the ReadyMeal

      // Get it
      if (SortSet->Get(ptRM) == 0)
      {
        ptRM->Print();
        // and then destroy it
        SortSet->Unget(ptRM);
      }
    } while (SortSet->Seek(1L, PtCURRENT ) == 0);
  }
  else
    cout << "A problem with the sort" << endl;

  // and delete the SortSet
  delete SortSet;
  delete all;
}  // end of SortByPrice

void FindReadyMeal(PtBase *pb)
{
// create and assign an AllSet
ReadyMealAllSet *all = new ReadyMealAllSet(pb);
// and a set to hold the results
ReadyMealSet *subset = new ReadyMealSet(pb);
ReadyMeal *ptRM;
ReadyMealQuery MyQuery;
int err;
char name[30];
  cout << "Name of ReadyMeal to find: ";
  cin >> name;
  PtString ptsname(name); // create a PtString of this name
  // Set up the query
  MyQuery.Setname(ptsname, PtEQ);
  // do the query and put the result in the subset
  all->Query(&MyQuery, subset);
  // now need to display all those in the subset
  // but first check if there is anything in the subset
  if ((subset->GetNum()) != 0)
  {
    for (err = subset->Seek (0L, PtSTART); err == 0;
      err = subset->Seek(1L, PtCURRENT))
    {
    subset->Get(ptRM);
    ptRM->Print();
    subset->Unget(ptRM);
    }
  }
  else
      cout << "No ReadyMeals with this name were found" <<
      endl;
   // and clean up
  delete all;
  delete subset;
}
```

*Figure 3 Continued - An application using ReadyMeal*

how objects are built from the database. Then it's ready to run.

## Common database operations

Since Poet is a Client/Server database to open the database we first select the server then perform the actual open operation. In the standalone version the Server is always known as `LOCAL`. Note that `pb` is a pointer to the Poet database handling class.

```
pb->Connect(Server);
pb->Open("base");
```

## To Add an Object

In the process of precompiling Poet derives the persistent classes from a base class `PtObject`. This gives the persistent classes all the methods needed to be saved and retrieved from databases. To add an object we first call the `Assign` function to say which database it is to be added to, then the `Store` function to add it. Note that `ptRM` is a pointer to the `ReadyMeal` class we have created.

```
ptRM->Assign(pb);
ptRM->Store();
```

All objects of a persistent class are held in

> **I am left wondering what you get when you pay well over ten times this amount**

an `AllSet`. They can be accessed by cycling through the **AllSet** using the inherited method `Get`. Having 'got' an object it can then be accessed, for instance to print it. Once the operation is completed the object should then be disposed using `Unget` to save on memory. Note that `all` is a pointer to the `AllSet` type for this class.

```
all->Get(ptRM);
all->Unget(ptRM);
```

Sorting an object involves an instance of a query class to be created and the criteria for the sort specified. The sort is carried out and the results stored in a set. As before the set can be cycled through and printed out. In this program the criterion is to sort the objects on the field `price` in ascending order.

```
MyQuery.SortByprice
(
  PtASCENDING
);
```

Or it could have been descending, eg

```
MyQuery.SortByprice(
  PtDESCENDING
);
```

As you would expect strings can be used as the criteria to give an alphabetic listing.

Queries to find objects is one of the common requirements of a database. There are two issues; how easy is it and how comprehensive are the query facilities.

# CAN YOUR APPLICATIONS SURVIVE A SUDDEN CHANGE IN BUSINESS CLIMATE?

Several million years ago, the dinosaurs were wiped out by a sudden climatic change. What they left behind, besides some impressive footprints, was a lesson for us all: adapt or die. This same parable applied to application development: if your applications are made extinct by changes in your business, you've got a problem. Fact is, because they can't effectively capture the essence of your business in the application, today's popular client/server tools—you know who they are—can't easily adapt. So when the business changes, you're back to square one. Not so with Object Studio™ from Easel Corporation. Object Studio is the first client/server development family that affords business

**Object Studio**

developers the power and flexibility of business objects—high-level, recognisable "super objects." The result: **Object Studio allows applications to stay in-synch with your business. So they never face extinction.**

Object Studio features our popular Smalltalk environment, ENFIN.™
Plus the world's first business object management tool, Synchronicity.™
To register for a FREE seminar or to receive an independent white paper on business objects, call Easel UK on (0344) 304611. Like the dinosaur, these offers will someday be extinct.

EASEL
United Kingdom

Easel USA: 617-221-2100. Germany: 04101-5401-0. Japan: 03-3355-7195. Also represented in Austria, Belgium, Denmark, Finland, France, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, Australia, Brazil, Venezuela.

CIRCLE NO. 784

As regards the first it is very easy to use. The aim here was to find all the `ReadyMeals` with a name specified by the user. To do this you create an instance of the `Query` class and define the query as follows.

```
MyQuery.Setname
(
  ptsname, PtEQ
);
```

where `ptsname` is an instance of a Poet string class holding the name you are seeking. Then you carry out the search and store the result in a subset ie

```
all->Query(&MyQuery, subset);
```

But, how comprehensive are the query facilities?

## Querying Poet

Mary Loomis in an article in the *Journal of Object Oriented Programming* (1) described the capabilities data base people expect to find in object databases. Can Poet meet all their expectations?

Her six categories of query are;

- **Quantification**
  ie return all instances matching a given criteria or for all matching this criteria perform a certain action. While SQL users can write such queries in one line using `EXISTS` or `NOT EXISTS`, in Poet you could do a query and then test if the subset was empty. In other words Poet can do it but it is a bit more verbose.

- **Operations on collections of objects and intermediate results**
  For instance SQL users are used to doing a `SELECT` query drawing data from several tables, using `SELECT`, `FROM` and `WHERE`. The table derived in this way could itself be used as part of a further query. A parallel operation in Poet would mean querying two classes and combining all or part of each class in the result. There does not seem to be a simple way of doing this. To query a class an instance of a Poet query class must be created and this is specific to the class. There is no such thing as a 'class independent' query. Therefore each class must be queried separately and the results stored in a subset. Any amalgamation of subsets would have to be quite explicit.

- **Boolean functions to combine criteria**
  Yes, Poet offers `and`, `or`, `exclusive or`, `not`, `nand`, `nor` and `nxor` to combine criteria in queries. Precedence can be determined by brackets.

- **Aggregate functions**
  such as sum, count, min, average etc. The only 'ready to use' aggregate function in Poet is `GetNum` which returns the number in a set. The others would have to be coded explicitly.

> **Each class must be queried separately and the results stored in a subset**

- **Sorting and Grouping functions**
  Yes, Poet can sort in ascending or descending order but it does not have any grouping functions.

- **Nesting queries**
  so that the results of one query can be used directly as the scope for another. Queries in Poet are carried out on all the objects in a class. Therefore using the output of one as the scope for another query is logically the same as combining the two queries in the first place!. 'Nesting' in the Poet context means being able to query a class within a class. This can be done quite easily.

Overall, a Poet user coming from a SQL type of background will find most, but not all, of the query capabilities they are used to. However the reality is that most users will come from a programming background and bring with them a less demanding set of expectations.

## Transactions and Concurrency

One of the fundamentals of RDBMs is that transactions have atomicity, ie a set of events make up a transaction and either all or none are committed. Poet implements this in a straightforward manner with methods to begin, commit and abort the transaction. If `pb` is the pointer to the database (as in the `ReadyMeals` example program) these are called thus:

```
pb->BeginTransaction();
pb->CommitTransaction();
pb->AbortTransaction();
```

It could not be much easier! One of the interesting research problems in OODBs is how to handle long transactions where this sort of all or none atomicity is too severe. Categorising transactions into short or long and then nesting the short ones in long transactions is one possible solution. Maybe this is one of the extras you get when you pay several thousand pounds for an OODB?

While concurrency is not an issue on a standalone version of a database, Poet is essentially a Client/Server OODB and thus has to be able to deal with simultaneous accesses. In RDBMS three strategies are used. Pessimistic concurrency control, assumes that clashes will occur and provides locks of various sorts to prevent them. Optimistic concurrency control assumes that simultaneous updates will happen rarely and waits until the commit phase to check on the isolation of the transaction. Versioning creates a new version of the object with each update.

The most frequently used strategy is locking and this is the approach adopted by Poet. There are seven different types of lock covering most of the obvious permutations of I can/you can't read, write or delete. The granularity of the lock varies from only the object to the object and all its referenced objects. In true polymorphic function the lock is implemented by adding a `PtLockSpec` object as a parameter to the `Get()` member function. (This is used to get an object from the database or a subset of it.)

## A good buy?

It may or may not be an 'industrial strength' database, as it is impossible to tell with a standalone version. But you do get a true object oriented database with most of the features that a hardened RDBMS enthusiast would expect. It is strictly for the C++ community and has no truck with easy access through a SQL type language. It is easy to use (assuming you are familiar with C++) and well documented. It seems to offer such good value that I am left wondering what you get when you pay well over ten times this amount for one of the bigger names such as ObjectStore, Objectivity and Versant.

## References

Loomis, Mary E S, "Querying Object Databases", Journal of Object.
Oriented Programming, June 1994, Vol 7, No 3.

*Mary Hope teaches software development at Thames Valley University which has just purchased the Objectivity ODBMS. She can be reached as hope_m@slough.thames-valley.ac.uk.*

*Poet is available from Silican River (081 316 7777).*

# A major development for developers...

**SOFTWARE DEVELOPERS FORUM – TOOLS, TECHNOLOGIES & TECHNIQUES** is an exciting new event designed specifically for the corporate and commercial developer.

**SOFTWARE DEVELOPERS FORUM** is a working event where developers, programmers and senior technical managers can effectively evaluate the products and services available.

It features a six-track **VENDOR SEMINAR PROGRAMME (focusing on Client Server building; Client Server installation and management; RAD/JAD; CAST; Objects; and Re-engineering and Legacy Systems);** A multi-stream, multi-speaker **CONFERENCE,** organised by VISUAL – The Vendor-Independent Software Users Association; as well as a **SHOWCASE EXHIBITION** featuring the well-known names in the industry.

**software developers forum**

**TOOLS TECHNOLOGIES TECHNIQUES**

**8-9 February 1995**
**Sandown Exhibition Centre**
**Esher, Surrey**

# Be part of it...

Exhibitor packages are available for all levels of participation – from the special *'Toolrack'* aimed at small, specialist software houses for just £815+VAT, right through to Total Marketing Packages for vendors looking to maximise the potential of this unique business opportunity.

**For details of exhibiting or visiting, call Nigel McGuire on telephone 081-541 5040 or fax 081-974 5188**

Event Sponsors

EXE
The Software Developers' Magazine

SOFTWARE FUTURES
*Exploring Software Development*

Conference organised by

VISUAL

Event organised by
Interactive Exhibitions Limited

CIRCLE NO. 785

# Five go cross-platform

If cross-platform source compatibility is on the list of design constraints for your next project, you should be looking at one of these C++ class libraries proposes **Laine Stump.**

When all displays were text-only, mice didn't exist and users didn't mind being led through a labyrinth of menus and prompts. Writing a program that was source compatible across several platforms meant sticking to the standard C library and watching out for byte order problems on Intel CPUs. With the introduction and proliferation of multiple windowing environments there has been an uncontrollable, cancerous growth of GUI APIs into unwieldy dragons sporting all manner of fire belching orifices and stinging pods. Consequently, it has become near impossible for a single human being to write one set of source code for a modern application that will compile without change on more than a single operating environment (sometimes even one is too many).

Recognising that many software houses would be willing to pay some amount of money (usually a few thousand dollars when all is said and done) to enlarge the market for their applications, several companies have begun to market 'Cross Platform GUI Development Libraries' which can be used to take the pain out of developing an application that compiles on many different systems. Some of these take the form of translation libraries, accepting calls meant for one API (eg MS Windows) and translating those calls into calls for another (eg X-Windows). The large majority, however, provide an encapsulating layer, a 'private API' of sorts, which hides the API of the target systems. The application is written to this private API. Porting the finished product from one platform to another then involves simply compiling it with one of these encapsulating layers written specifically for the target system. Since C++ is so good at encapsulating things, it's not at all surprising that the great majority of these libraries use C++ classes to perform their encapsulation.

In this article I'll be taking a look at five such packages: C++/Views 3.0 from Liant Software, StarView 2.2 from Star Division, XVT Development Solution for C++ 4.0 from XVT Software, zApp 2.11 from Inmark Development and Zinc Application Framework 4.0 from Zinc Software. At a casual glance, these packages look similar in many ways. But each has its own strengths and weaknesses that will make it more or less well suited for a particular project.

In this first instalment I will limit my discussions to the design of the class libraries and capabilities of included tools. Next month I will actually write some applications and see how each does at fulfilling the promise of 'multiple platforms, single source.' All libraries presented here support at least Windows, OS/2, Windows NT, Macintosh and one or more X-Windows platforms.

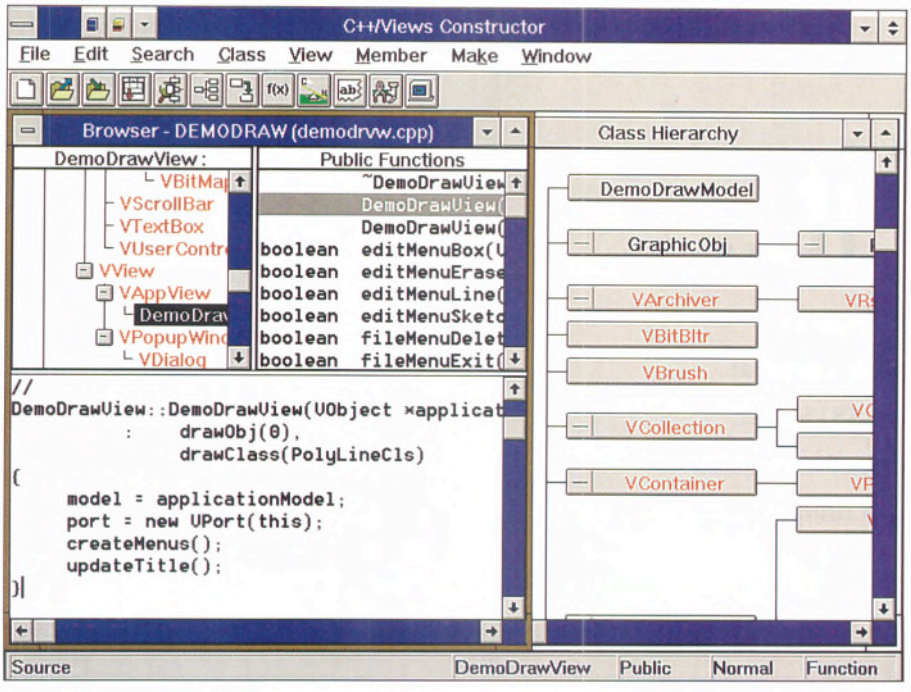



*Figure 1 - Constructor IDE for C++/Views*

## Liant C++/Views

Like the other four packages presented here, C++/Views has classes for windows, dialog controls and event management. The 'application' class is called `VNotifier`. Every C++/Views application starts from a global function called `cvmain()`. Here you create a `VNotifier` to gather and dispatch events and a main window. Then you call `VNotifier::start()`. When `start()` finishes, the program is done.

**Call about Special Limited Time £99.95 Offer**

# Don't even think about using a Relational Database System !


## Use the POET Object Database for C++

C++ and class libraries have made the GUI development much easier. After all, it is only logical that more and more developers think in objects. But object orientation shouldn't end at the user interface programming level.

**The Problem:** Without POET, a C++ programmer must use flat files or a RDBMS to store objects. He has to write code to overcome the mismatch between the application and the database model. This leads to design restrictions, performance penalties and more code to write and maintain.

**The Solution:** POET operates at the object level, it speeds up the development process and provides greater performance. Furthermore, the developer can simply take the object-oriented application design in C++ and map it 1 to 1 into the database. Without any compromise at all!

**Comparing Object Oriented and Relational Design Methodologies**

| Feature | POET ODBMS | Relational RDBMS |
|---|---|---|
| Storing Objects | As Objects | Break Objects into Tables |
| Database Model | User Application Model | Separate Database Model Required |
| C++ Integration | Total | Poor |
| Database Operations | At Object Level | Must Write Code |
| Productivity | Increased | Reduced |
| Complex Object Performance | Excellent | Poor |

**Full featured database:** POET provides complete support for Encapsulation, Inheritance, Polymorphism and Containers as well as queries, object locking, and transaction handling .

**True cross platform support:** Complete interoperability makes the development of network enabled applications a breeze. POET supports Windows 3.1, Windows NT, Win32s, Windows for Workgroups, Novell Netware (NLM), SUN, AIX, HP-UX, SGI, SCO, Macintosh, Power Macintosh, OS/2 and NeXTStep.

## Call 081 317 7777

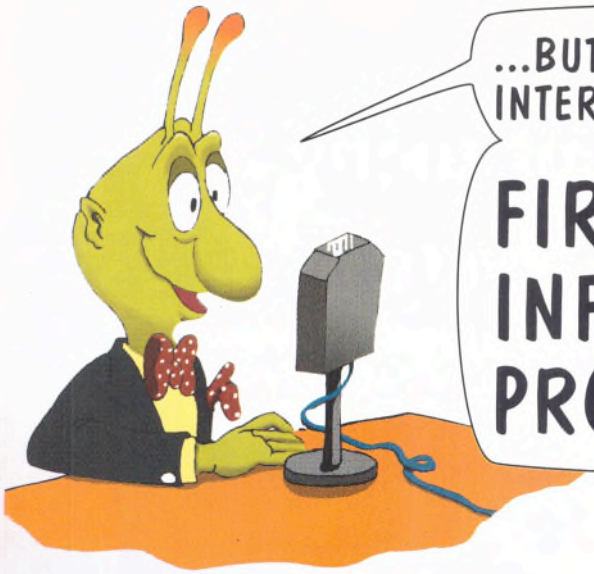
POET Software

*Silicon River*

Silicon River Ltd •106-108 Powis Street • LONDON SE18 6LU • Tel: 081 317 7777 • Fax: 081 316 7778

**Call about Special Limited Time £99.95 Offer**

CIRCLE NO. 786



...BUT BEFORE WE PASS YOU OVER TO NANCY FOR THE INTER-GALACTIC WEATHER FORECAST

# FIRST SOME IMPORTANT INFORMATION FOR ALL YOU PROGRAMMERS OUT THERE

When you buy from QBS, you know what to expect...
Premium Prices. Expert Guidance.
A friendly reception and prompt service.

Check out this selection of bestsellers from our range of over 250 products.

## Visual Basic

| | |
|---|---|
| 3D Graphics Toolkit | £115.00 |
| CodeBasic | £129.00 |
| CodePrint Pro | £85.00 |
| Compression Plus | £195.00 |
| Crystal Reports Pro | £229.00 |
| Data Widgets | £95.00 |
| Designer Widgets | £95.00 |
| Extra! Tools from Attachmate | £195.00 |
| Formula One | £225.00 |
| FxTools for VB | £145.00 |
| HighEdit/VB | £159.00 |
| ImageKnife/VB | £165.00 |
| Imagestream | £225.00 |
| Integra/VB for VB Desktop | £199.00 |
| LeadTools/VB | £299.00 |
| MediaKnife/VB | £230.00 |
| Muscle | £119.00 |
| NetPak Prof | £129.00 |
| PDQComms | £99.00 |
| QuickPak Professional | £145.00 |
| Spread/VBX | £175.00 |
| SpyWorks/VB | £120.00 |
| ToolThings | £129.00 |
| TrueGrid Professional | £129.95 |
| VBAssist | £140.00 |
| VBTools4 | £109.00 |
| Version Stamper | £120.00 |

## C++

| | |
|---|---|
| Borland C++ v4 | £275.00 |
| Borland Visual Solutions Pack | £59.00 |
| CodeBase | £249.00 |
| CodeBase++ | £249.00 |
| EZ-VBX | £115.00 |
| Greenleaf Comm++ | £195.00 |
| Greenleaf Commlib | £245.00 |
| Integra/VDB for C++ (Desktop) | £199.00 |
| Integra/VDB for C++ (Server) | £499.00 |
| Microsoft Visual C++ Prof v1.0 | £225.00 |
| Microsoft Visual C++ Prof v1.5 | £295.00 |
| NeoImage API (Std) | £160.00 |
| NeoImage API (Pro) | £210.00 |
| Watcom C++ v10 | £159.00 |

## Tools

| | |
|---|---|
| 9K Version Control (1 user) | £145.00 |
| Blinker the Linker v 3 | £225.00 |
| Doc-To-Help (1 user) | £225.00 |
| ED for Windows v 3 | £145.00 |
| GraphicServer for Windows | £239.00 |
| InstallShield for Windows | £350.00 |
| MultiEdit Pro + Evolve | £159.00 |
| PCX Toolkit for DOS or WIN | £189.00 |
| R&R Report Writer for SQL | £325.00 |
| R&R Report Writer for Windows | £195.00 |
| SOS Help! for Windows | £195.00 |
| Watcom SQL for Windows | £260.00 |

## PowerBuilder

| | |
|---|---|
| Extra! tools from Attachmate | £195.00 |
| Formula One | £225.00 |
| GraphicServer | £239.00 |
| ImageStream | £225.00 |
| Libary for Lotus Notes | £199.00 |
| PowerBuilder Desktop | £190.00 |
| PowerMaker | £135.00 |
| PowerViewer | £65.00 |
| VT Speller | £75.00 |

## Xitech

| | |
|---|---|
| dGE Graphics | £239.00 |
| MS FoxPro Standard v2.6 Promo | £79.00 |
| MS FoxPro Prof v2.6 Upgrade | £199.00 |
| Netlib for DOS or Windows | £225.00 |
| Refox decompiler from Xitech | £299.00 |
| SilverFox Comms DOS or WIN | £249.00 |
| The FEEL Editor | £85.00 |

## Clipper

Too many to mention!
We are the leading supplier of Clipper products in the UK.
Call us for details

## Call us today for further product info and price listing

# 081 994 4842

QBS Software Limited
10 Barley Mow Passage
London W4 4PH
PH: +44 81 994 4842
Fax: +44 81 994 3441
email: qbs@cix.compulink.co.uk

QBS SOFTWARE

*Prices, which are correct at time of going to press, are subject to change.

CIRCLE NO. 787

C++/Views is OOP from the ground up: all events are sent around in `VEvent` objects. `VWindows` are notified of them via virtual functions. Some would argue that this creates huge tables of Virtual Method Tables in memory. I would argue that these are infinitely easier to understand, debug and modify than a mangled mess of intertwined `switch` statements as you would find in a Windows API program written in C, for example. Besides, poor underprivileged RAM manufacturers need their weekends at the country club too. If you ever need to get at an event obscure enough not to have a virtual function, there are still ways of detecting it. Of course these ways are nonportable, but then probably the event you're looking at is nonportable anyway.

Aside from the standard classes, C++/Views also includes a `VArchiver` class for making persistent objects. DDE server, client classes and `VPrinter` are only for Windows and OS/2. There is also newly added help support, which works only on Windows and requires you to build the .HLP file yourself.

Two other useful classes are `VSash`, which implements a sizing bar like the one separating the file and directory views in Windows File Manager, and `VTableView`, a window which implements the display part of a scrolling spreadsheet.

C++/Views offers 'geometry management' for its controls. This feature allows the programmer to specify relationships between the controls in a window or dialog and have those relationships maintained as the window changes in size. You could, for example, have two list boxes with each always filling 50% of the window, no matter how large or small it became, or buttons which always remained 10 clicks up from the bottom border.

Although the class library is well designed in my opinion, the real highlight of C++/Views is the development environment called Constructor, illustrated in Figure 1, that is included with it. I had thought that Visual C++ was a good environment, but C++/Views Constructor is a wonderful piece of software intended to replace whatever IDE you are currently using.

After creating a new application in Constructor you are presented with a browser window, split into three sections. The top left shows a map of the entire project's class hierarchy, with library classes in red and application classes in black. The top right is a list of member functions and/or variables for the currently selected class. The bottom half displays either the .h file or the .cpp file for the current class. If a function is selected, it shows only that function.

To create a new class, click on the ancestor class and push the 'derive' button. Adding new members is just as easy. When you create new classes or members it asks what type it should be (public, virtual, callback, etc) and creates a file with all the right stuff in it. Templates of useful code can then be squirted into the functions by making a menu selection.

Constructor also contains a resource editor for creating dialog boxes, menus and bitmaps, which is similar to the dozens of other dialog editors available. One nice feature is the ease at which you can specify callback functions for specific events occurring in controls (eg which function to call when a button is pressed). This function can be either a function of the control, or a function of the control's parent dialog.

**Poor underprivileged RAM manufacturers need their weekends at the country club too**

Overall, C++/Views seems to be a well planned, truly object oriented GUI library. The browser is nice to work with and should make writing and modifying applications much easier. My only complaints are of the few classes not supported on all platforms and the couple of nits about the editor. Also, it is lacking a few important controls (numeric edits, etc).

*UK contact: Liant*
*(071 799 2434)*

### StarDivision StarView

StarDivision is well known in Germany for its wordprocessor. It designed StarView to help make the wordprocessor run on different platforms without creating maintenance headaches. Coming from a German speaking country and being originally designed to write a wordprocessor, this library has two very useful features: multiple language support and comprehensive print and font handling.

But first some basics. A StarView application is controlled by an object derived from the class Application. This object has a member function `Main()`, which opens the app's main window, then calls the `Execute` member function. As always, when `Execute()` is finished, the program is done.

Aside from the normal control classes, StarView also includes several different masked edits, including numeric, currency and date. Other value added controls include spinners, combo boxes of masked edits, tristate buttons (They can be on, off, or neuter. I haven't decided yet if this is an artefact of StarViews WP background, or the tri-gender German Language.) and several buttons with predefined behaviours. StarView's US representative told me: 'the only thing we don't have is graphics in listboxes. We're working on that.'

Unlike C++/Views, printing is supported on all platforms. There is a print previewer, along with a long section in the manual on how to use the Printer class. Font support includes shadowing, outlining, strikeout - surprisingly everything you'd need to write a word processor. StarView definitely seems the best equipped of all packages in the printed output category. Drag and drop hooks are also in all Window classes, in case you want to drag that text over to the printer.

As well as supporting multiple languages in the class library, StarView's resource editor, DesignEd, eases building multi-lingual applications. After creating all the resources with 'DEFAULT' language selected, switch to each other language in turn and change the text of the controls. The produced resource file can be used to build versions of your application for any language you have specified. Each language can also have date and currency formats specified in the resource file.

DesignEd has some flaws, though. It doesn't have its own bitmap editor, so you must use the one that came with your compiler. While all other resources are platform independent, bitmap files must be the native format of the target system (eg BMP for Windows, PICT for Mac). And, of course, DesignEd isn't intended to replace the IDE that came with your compiler. No fancy browser here. Still, it does what it was intended to do.

One thing I didn't like about StarView's resources was that the menus have an ID attached to them, requiring a `switch` statement in the application to act according to the ID retrieved from the Menu's `GetCurItemId()` function. This feels a bit clunky and old fashioned, but I suppose it works. Controls must also be linked to functionality at runtime, rather than in the resource editor. This can be seen as an advantage or a disadvantage (see below).

Like C++/Views, StarView supports the Windows Help engine on Windows targets. Unlike C++/View, however, it goes the extra step and provides a translator for OS/2 to put the RTF files you write into OS/2's IPF format and offers an entire help system for Unix and MacIntosh targets. The result is that you can use the same RTF source file for the help on all platforms.

The OLE classes are also quite good. As well as providing an encapsulation of OLE for Windows, they have implemented workalike facilities on all other platforms us-

ing each platform's native interprocess communication facilities (when they exist).
Finally, StarView's Link objects provide the ability to change the handling of certain events at runtime. A Link object is created and given the address of a function, is attached to the handler for the desired event. Multiple functions can be attached to a given handler at any time, making for a very configurable and fluid environment.

I didn't get the general feeling of cohesiveness in design from StarView that I did from C++/Views. However, it has several features lacking in other packages.
*UK contact: StarDivision*
*(0533 626 999)*

## XVT Power++

In a dramatic departure from all the other libraries, XVT Power++ programs start with a `main()` function which creates a `CApplication` derived object and calls its `Go()` member. Seriously though, XVT is different from the other libraries because it is a C++ shell around the XVT Portability Toolkit, which was written in C. From the manuals, it seems as though the XVT Portability Toolkit might provide even more functionality than any of the other class libraries here. Unfortunately, the Power++ class library does not totally encapsulate it: calls to C functions are sprinkled liberally throughout the examples.

All the normal controls are provided in Power++. Although most classes in Power++ have names starting with 'C', most controls start with 'N', for *Native*. This indicates that the native controls of the target environment will be used, resulting in an application that looks like a native application of that environment. (I should point out that this is the case for all five libraries reviewed here; the XVT developers just felt the need to point that out in their naming scheme). None of the extra controls present in StarView, Zinc, or zApp are present here - just the essentials.

Rather than attempting to whack together its own set of persistent containers, XVT chose to license Rogue Wave's fine Tools.h++ container classes. The entire (inheritence based) Tools.h++ library is included with every copy of Power++. Most of the Power++ classes are derived directly or indirectly from a Tools.h++ class. The Tools.h++ license is object only, so if you want the source (which implies that you want the template versions of the classes), you need to call XVT and arrange to purchase it.

The resource editor offers a bit less than StarView in some ways, a bit more in others. Although it can generate a one shot, preliminary 'application shell' aka Microsoft App Wizard, as in StarView, it can't edit bitmaps and has no obvious way of putting user defined controls into a resource file. The files are stored in a universal format that is later translated into platform specific resources, so you only have to create your dialogs once.

Power++ also has a method of making controls stretch, shrink and move as a window is resized. Objects of class `CGlue` define the 'stickiness' of the four corners of a control and automatically resize and reposition it when necessary.

Being an OOP snob, I didn't get very excited about XVT Power++. It seemed to be the MFC 1.0 of cross platform GUI development libraries. Of course, I may change my mind next month when I actually attempt to write some usable software that requires no change for any platform. The XVT Portability Toolkit has been around a while, and should be fairly robust and complete by now. Hopefully I will be able to find a solution that doesn't require degrading myself by writing straight C, though. (Pssst! Don't tell anybody that's exactly what I do at my 'day job'.)
*UK contact: Personal Workstations*
*(071 403 6698)*

## zApp Developer's Suite

The zApp Developer's Suite is a combination of three packages: the zApp Application Framework, zApp Interface Pack and zApp Factory. While available separately, it seems to make economic sense to purchase them together as the Developer's Suite, which is what most zApp customers are doing these days.

A zApp application starts from the user define `zApp::Main()` function (the class is already defined: only `Main()` must be written). The application's main window is created and `zApp::go()` is called. All displayable objects in zApp are derived from class `zWindow`.

zApp is the library that Will Watts raved about during his review of GUI development environments last year. zApp has advanced since then. In particular there are two new additions: the zAppInterface Pack (Zip) and Factory.

Along with its own particular brand of 3D controls (all cross-platform compatible, unlike the Microsoft or Borland controls), Zip has a spreadsheet-like `zTable` class, a `zToolBar` and a `zStatusLine`, amongst other classes. The Windows version of these controls can be hooked in to either the Microsoft or the Borland Resource Editors, as well as zApp's own Factory.

zApp Factory is a combination Dialog/Window/Menu editor and source code generator. Like XVT's resource editor it has no provision for editing bitmaps and additionally has what I think is a real clunky method of editing menus. On the other hand, it allows custom controls to be installed into its toolbar (in the Windows version), generates the source code for a working application framework and can link events in controls to user written source code. Factory falls somewhere in between XVT's one-shot source code generation and C++/Views' interactive source code browser. The source code is not dynamically updated as you change things: you have to tell it explicitly to do so. And rather than having a class browser linked to a built-in editor, it simply has a menu selection that let's you call up an external editor on the file of your choice. Finally, while C++/Views lets you add your own code anywhere outside of small, well defined reserved areas, zApp Factory does just the opposite. If you add code anywhere outside of certain allowable, well defined areas, it simply disappears next time you regenerate the application's source code.

This combined with the lack of a bitmap editor means that it is best to keep the VC++ IDE for a while. Personally, I can't live without a class browser. On the other hand, if you're already used to your compiler's IDE and don't want to give it up, this might be a viable choice.

Since I've mentioned these features in other libraries, I should mention that zApp also has a set of classes (`zSizer` and descendants) that handle redimensioning and moving controls when the parent window is resized. `zStringEdits` has picture capabilities (like dBASE) to handle formatted input. Persistent versions of most classes are available by recompiling the library with proper options set.

Internationalisation support, by the way, is quite weak, only allowing for the setting of currency symbol and numeric formats (although date and other settings are planned in the future). Furthermore, I could find no implementation of context sensitive help in zApp either.

zApp's origin in Windows shows through in many places. For example, because Windows has MDI (Multiple Document Interface), Inmark saw fit to implement MDI on those platforms that didn't directly support it. Many function names and constants are reminiscent of (or actually *are*) names from the Windows API. Additionally, zApp has DDE client and server classes, but these work only on the MS Windows platform. However, Inmark openly admits these holes and promises in writing that it is working on them. zApp seems to sit somewhere towards the top of the 'library features' list and above the middle on the 'resource editor/source code generator' list. We'll find out next month how it rates on the cross-platform list.
*UK contact: Software Plus*
*(0928) 579 900*

# Hardlock E-Y-E®- tying the hands of software pirates

### The effective way to protect your software

FAST Electronic has made life a lot harder for software pirates. Hardlock E-Y-E was designed using cryptographic principles. It took the experience and know-how of Germany's number one in software protection and the leading edge technology of a US semiconductor company to create the ultimate software protection tool.

### The technology programmers have at their fingertips

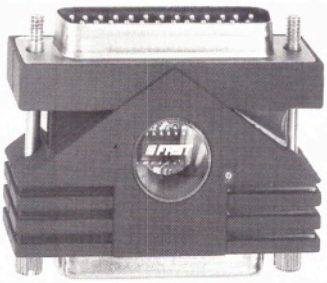
Hardlock E-Y-E is based on a custom chip and combines all the features that a programmer would expect from such a device: secure, algorithmic query routines and an optional non-volatile memory for custom configurations. With the Crypto-Programmer card from FAST you can program the algorithmic parameters and the memory within seconds. This unique card guarantees that no one else can burn Hardlock E-Y-Es with your codes. Linking Hardlock E-Y-E to your software is easy: you can either protect your .COM and .EXE files with the automatic encryption software HL-Crypt or integrate FAST's high level language routines into your source code.

### Readily acceptable to your customers

Hardlock E-Y-E allows unlimited backup copies of the master floppy. The customer gets the device together with the software and plugs it into the parallel port between the printer and the PC. Daisy-chainability, outstanding reliability and the compact high tech design guarantee that your customers will accept Hardlock E-Y-E.

### The benefits your management will appreciate

Hardlock E-Y-E can be programmed by the software house with the Crypto-Programmer card. This ensures optimum delivery schedules and stock flexibility. Revenues will go up as software piracy and multiple usage are prevented.



**Hardlock E-Y-E programmable, algorithmic response and memory option – all in one**

MAGNIFEYE

**Order your demo unit today. Contact Magnifeye, 235-239 Walmer Road, Walmer Studio # 6, W 11 4 EY, Telephone 071 221 8024, Fax 071 792 3449.**

**Magnifeye is a subsidiary of Fast Electronic GmbH.**

CIRCLE NO. 788

### Zinc Application Framework

I reviewed Zinc 2.0 quite some time ago. The soon-to-be-released Zinc 4.0 has many major additions over what I saw then. Although Zinc had an impressive repertoire of controls in version 2.0, the new version contains even more. In addition to tables, tool-bars and status lines as far as I know, Zinc is the only of the five libraries here to support the placement of any arbitrary controls inside a scrolling listbox. This makes long rows of check boxes much more palatable. In addition, Zinc now has a `UIW_NOTEBOOK` class which uses labelled graphical 'tabs' to move easily between pages in a dialog. If you have MS Windows, you'll know how this works - another easy to grasp space saver. Hopping on the bandwagon with everybody else, Zinc also now supports geometry management for controls.

In 2.0, my biggest complaint about Zinc (other than its odd convention of using all caps for class names (real C programmers only use all caps for constants!) was the large amount of `#ifdefed` code in the applications necessary to make them compile on different target platforms. Zinc has apparently done a lot of work on that in the last couple years, because I see much less of it now. In particular, the `UI_DISPLAY` object is created in some hidden away place in the library now, removing the need to put a string of `#ifdefs` in `main()` (one for each type of display).

The real area of work in Zinc 4.0 seems to be in 'globalising' Zinc applications. Not only is there a full set of classes and functions dealing with locale (currency, date format, etc), they also support multiple language resources and can optionally do it all with Unicode (the new 16-bit standard for characters which supposedly encompasses every character in every written language on Earth). This makes Zinc a good candidate for applications that must run in East Asian countries.

Although not a class browser or source code generator, Zinc Designer *is* a full resource editor. It leaves out nothing, editing bitmaps, icons and mouse cursors along with the normal dialogs and menus. While it only stores resources in its own, cross platform compatible .DAT format, it does allow you to import .RC files created by Windows resource editors. The source code to Zinc Designer is included with Zinc, a good example of its cross-platform capabilities at work.

Zinc has an integrated context sensitive help system which works identically across all platforms. Unfortunately, it is a bit primitive, lacking hypertext, hotspots and multiple fonts. StarView definitely takes the prize on this subject.

Zinc has matured a lot since I last saw it, and now looks like it could be used to develop some serious applications. If it could just use *normal* names for the classes!

*UK contact: Zinc*
*(0181) 855 9918*

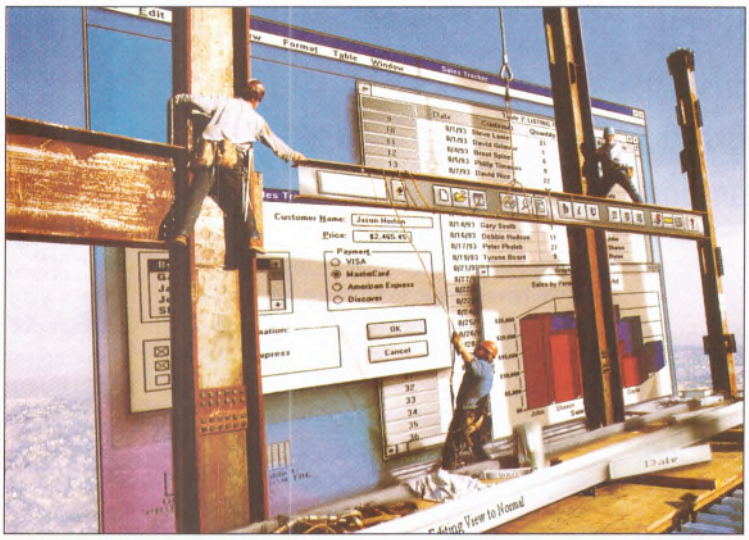
### And the winner is...

No No No! Don't start the drum roll yet! So far we've looked at five different class libraries. Each one has had some strong points and some weak points. I truthfully can't claim that I could choose one over the others if I was asked today (which is too bad, because that's exactly what my boss wants me to do!). But the evaluation isn't over yet. Next month we'll take a look at how well these libraries cope with moving to different platforms and what kind of support the vendors have. Also, we'll take a look at two alternate solutions to the cross-platform problem - Windows API translation libraries. ■

*Laine Stump is a software engineer at Morning Star Technologies in Columbus, Ohio. He can be reached via email as laine@morningstar.com.*

NEW!

# The Suite Way to Build Portable Applications



Is building applications your job? Then life just got easier thanks to the zApp® Developer's Suite for Windows. The zApp Developer's Suite is a set of highly integrated C++ development tools designed to help you transform the blueprints in your mind into commercial quality applications—quickly and easily. And best of all, applications built using the zApp Developer's Suite are portable to fourteen different platforms!

The zApp Developer's Suite consists of zApp, the award-winning portable C++ application framework; zApp Factory™, a fully visual application designer and code generator; and the zApp Interface Pack, a collection of high-level visual objects for the zApp environment. All of these tools are highly integrated to provide maximum ease of use and flexibility.

## Rapid Application Development.

Introducing an exciting new visual technology that lets you drag and drop a wide assortment of objects like toolbars, tables, and 3D dialogs; define their characteristics; and build interfaces of any complexity; all in one powerful but easy to use environment. With the click of a button, you can engage a powerful test mode which lets you interact with your application, seeing it exactly like your end user will see it: letting you fill in dialogs, pull down menus, etc. When you are pleased with the look and feel of your application, fully commented C++ source code is only a mouse click away, thanks to the zApp Developer's Suite's code generation capabilities.

## Object-oriented Power.

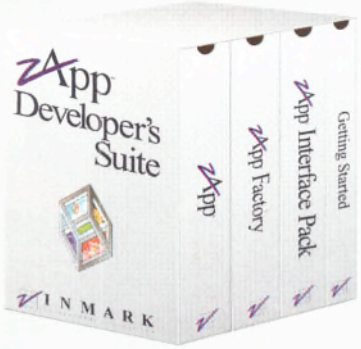
The best news is that this development environment sits on top of zApp, the industry leading C++ application framework, and the zApp Interface Pack, so you have all of their power at your disposal - toolbars, table objects, advanced graphics — in all, over 300 object classes of power just waiting to be tomorrow's best-selling application.

## Portability and More.

When you're done building your application, *then* you can decide what platforms you want to support! Applications built using the zApp Developer's Suite are single-source portable to fourteen different platforms. By simply recompiling, your application will run natively on Windows, Win32 (Windows NT, Chicago, and NT on the DEC Alpha), OS/2®, DOS Text, DOS Graphics and seven X/Motif platforms: IBM RS/6000 AIX, HP HPUX 9.x, SGI IRIX 5.2, SCO UNIX, Sun Solaris 2.x, Sun SunOS 4.1.x, Sun Solaris x86.

## Free Demo.

To see zApp for yourself either call, fax or email us - **today.**




Windows Tech StarTech 1994

.EXE Editor's Choice Award-1993

Software Development Productivity Award 1993



software plus

SOFTWARE plus Ltd
Manor Park Avenue, Manor Park
Runcorn, Cheshire WA7 1TL, England
Tel: +44 (0)1928 579900
Fax: +44 (0)1928 579901
Email: info@splus.co.uk

CIRCLE NO. 790

# Mayhem!

Traffic is in the news again. When is it not? **Jules** shares his thoughts with the policy makers at the Department of Transport.

JAKE ABRAMS

The Office of the Mandarins,
Department of Transport,
London.

Dear Sirs,

Just like everyone else in this country, you are concerned with traffic congestion. It's not surprising, I suppose. By your own figures there are 20 million private cars on our roads. I make that twice as many car seats as we have people to fill them, and that's before we account for lorries, buses, trains, or horses. That's a lot of seats. I'm sure, on your way to your pleasant weekends at the South Coast you must feel that every one of those cars is stationary, and in front of you, but I can assure you that everyone else in the country feels the same way. We do have a congestion problem. It is your job to fix it.

Your office has estimated that, in 10 years, the number of cars on the roads will have risen 50%. That would be some trick in a country whose population is falling. Whom, do you suppose, will be driving all these extra cars? 30 million cars there may be, but they won't all be on the road at once. Never mind the spurious figures. It makes a change for you to overestimate demand. I have no real problem with avoiding another M25 fiasco.

We all want to avoid congestion, so it is probably worthwhile looking at its causes. Perhaps surprisingly, cars don't cause congestion. Drivers do. Road capacities are limited not by the physical area of vehicles on them, but by the ability of the drivers to anticipate and react to situations. Several experiments have shown that drivers with advanced training, such as bus and truck drivers, contribute less to congestion than typically skilful car drivers, in spite of the much larger size of their vehicles. One simple and cheap measure to relieve congestion would be to require car drivers to pass more advanced tests, or retake tests to catch bad habits.

But, in research departments all over the world, augmenting the skills and intent of the driver with 'smart cars' has shown to be a dramatic contribution to the

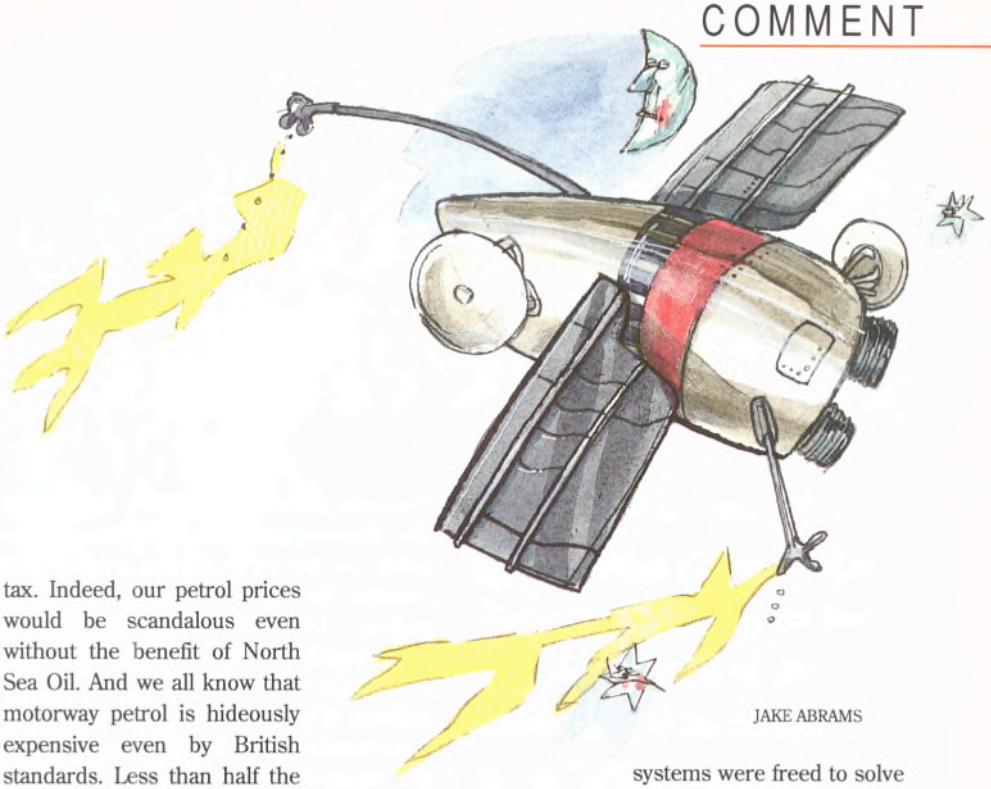
problem. Cars can form into long 'road trains', travelling at 100mph with six foot gaps, with the cars themselves preventing sudden diversions or collisions. Drivers can slot in and out of the trains any time they want. But we can't use that technology. A myriad of legal technicalities prevents anyone from ever taking to the road with such equipment, in spite of the fact that the technology is proved. But, of course, that's not your problem, is it? You're transport, not legal.

Dismissing the results from technical, legal and social experiments, both here and abroad, you have gone for the same old solution. You are going to toll the motorways. Wholesale road tolling in this country was driven out in the 16th century, by public opposition, and has never returned - until now. You have been told that motorway tolls will drive traffic off the motorways into the towns and villages which the motorways, at enormous cost to the environment, were built to relieve. You have been shown how, in France, nobody except foreign tourists use the piages, while the free motorways around Paris and Lyon are used as heavily as ours. And you don't believe it.

You are proposing to start by taxing specifically the most congested parts of the network; the North West M25, the M6 as it passes Birmingham and the M62 in Manchester - precisely those areas which need better road access.

How does one pay these tolls? You have decided you don't want cash, because people paying cash will make the problem even worse. (That is uncommonly far-sighted of you!) Instead, you want to develop, at enormous expense, a vast infrastructure of technology, partly installed in private cars. Ignoring the fact that we already have technologies like Tracker and Datatag which could easily be adapted, you are looking at madly expensive systems like satellite tracking. You are not proposing to use this to track stolen cars - even that would sweeten the pill a little - though the fact that you can find any vehicle anywhere in the system is not lost on civil rights groups. No, you will accept the legal problems caused by malfunctions or breakdowns of the equipment. You will accept the social problems caused by restricting access to the motorways and you will accept the immense costs, so you can raise more money from the motorist.

Your reasoning is that taxing is a means of rationing access. You ignore conveniently the fact that you are already rationing access. You raise £2 billion a year from road duty and perhaps 10 times that from petrol tax. Indeed, our petrol prices would be scandalous even without the benefit of North Sea Oil. And we all know that motorway petrol is hideously expensive even by British standards. Less than half the money you raise is ploughed back into transport infrastructure. A tiny proportion goes into roads. If that's not rationing, I don't know what is.



JAKE ABRAMS

But, it's obvious that this rationing is not working. Out roads are still congested, after all. Everybody in this country hates sitting in traffic jams and hates driving on overcrowded roads. They do it because, of the available alternatives, they hate this the least. It is all very well to ration access, but if there is no alternative, the driver simply has to stump up the tax.

**Road congestion is a technological problem, caused by the success and extreme sophistication of modern cars**

Road congestion is a technological problem, caused by the success and extreme sophistication of modern cars. Like all technological problems the solution will be found in technology. Dozens of methods have been found, and proved the world over. Some, such as tram systems and park-and-ride, are being implemented here. But, building expensive infrastructures to extort yet more money from the driver will not solve the problem.

It is an abuse of technology. If the immensely clever people who design the toll systems were freed to solve the real problems, armed with the kind of funds you're giving them now, we would probably have a complete, socially acceptable solution in five years. We need to make the road network more efficient, not less so. We do not need more restrictive infrastructure. We need enabling infrastructure. And technology is where we will find it.

But, gentlemen, I don't think you care one iota about congestion. I think you are happy to continue wrecking our countryside, polluting our air and maiming our children. I think this whole exercise is aimed at making us pay, again, for the roads we have already paid for, and are continuing to pay for, through the nose. I think the lack of investment in public and shared transport schemes is not because it is anti-competitive (your toll systems are just as anti-competitive), I think it is so that drivers have nowhere else to go. I think you are tolling the motorways, not because it's expedient, but simply because you can. Gentlemen, I think you are lying.

Now, I know you're going to complain that there's not much in this about computers, so I'd like to defend myself now. I don't often do this, but there's so much background to the roads issue that the background needs exploring. What is going on now is entirely because of modern comms and encryption technology. This article *is* about computers, it just doesn't say so.

*Jules is a computer professional who works from home. Don't come and see him unless you want to buy him a drink; if you want to contact him, phone him on 0707 644185, or email him as jules@cix.compulink.co.uk.*

# Macros for the Mac

System 7.5 has a replacement for bubble help called AppleGuide which can be controlled through AppleEvents. **Paul Smith** examines how this can be done.

These are interesting times for developers. The choice of platforms and tools that one might use seems to expand almost exponentially each month. The barriers to re-tooling and adopting these new technologies, increases in parallel. I've just been along to a technical presentation by Taligent on its *Vision and Technology*. While I was impressed by what we were told about the technology embodied in the Taligent frameworks and operating system (which I plan to discuss in detail in a future article) I am yet to be convinced of how developers will react to the cost of re-tooling for yet another system software platform.

This month, back in the real world, I'll start by taking a brief look at the Apple Guide technology that, as a key part of System 7.5, introduces the concept of *active assistance* (as opposed to passive *help*) to personal computers. One of the components that helps underpin active assistance on the Macintosh is the inter-application communications facility provided by Apple events. Apple events is the underlying technology behind the software automation services offered by the Open Scripting Architecture and AppleScript. In the remainder of this month's column, I'll tell you all you need to know to get started making your applications scriptable through Apple events.

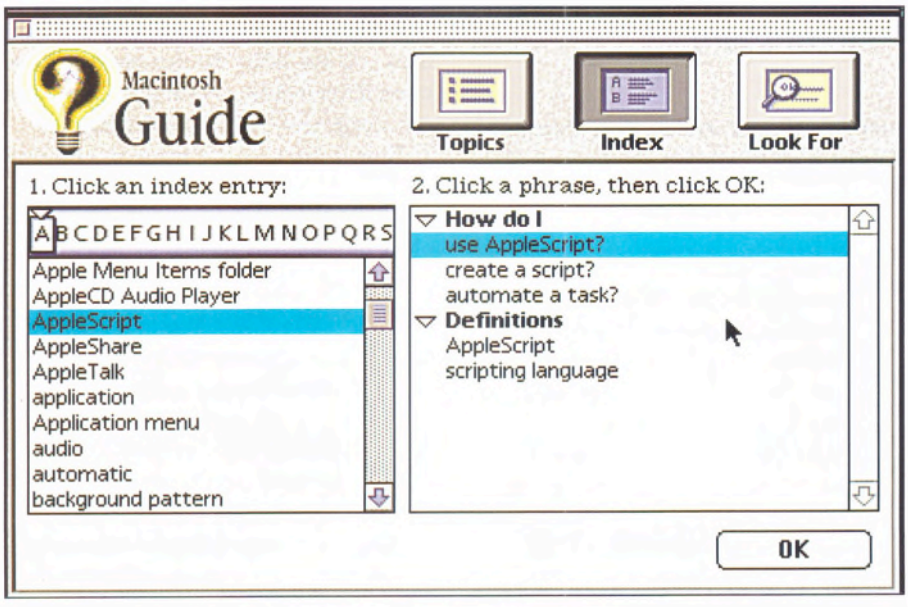



*Figure 1 - AppleGuide Access window*

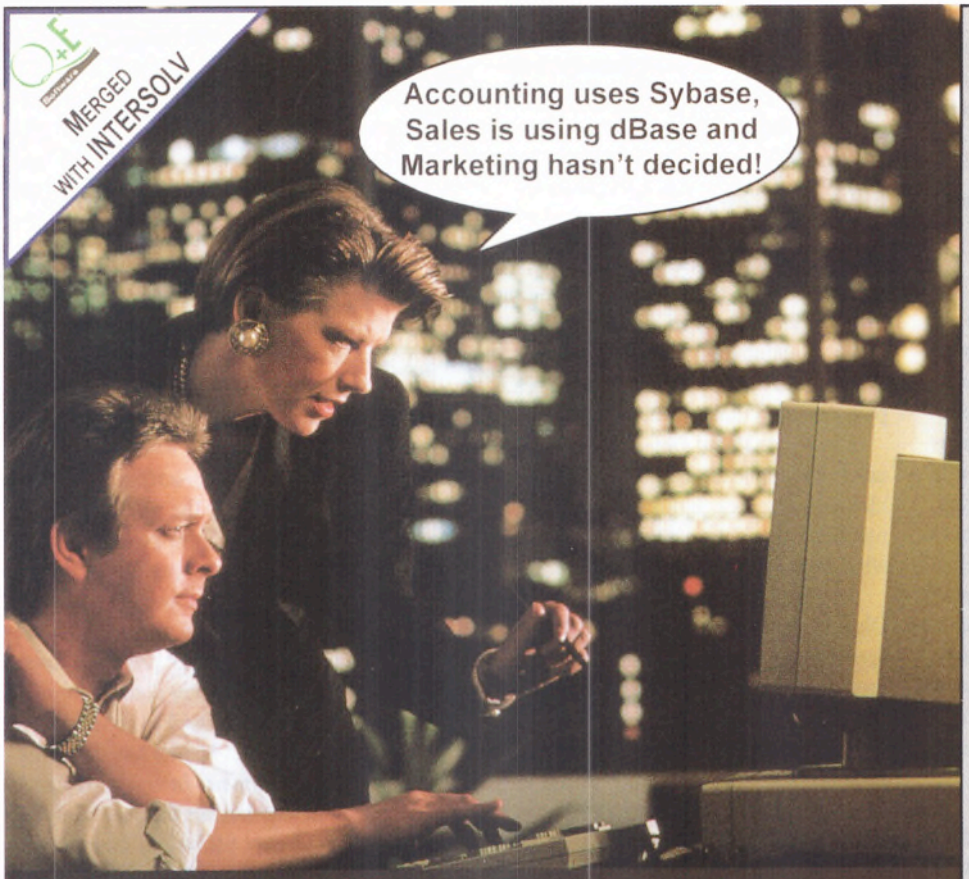
## AppleGuide

AppleGuide is a system-wide facility, available to all applications that run under System 7.5, that serves as an interactive task-oriented guide to using the computer. The guiding principle is that when the user wants help, it is to accomplish a task. The user doesn't want to navigate printed or on-screen documentation to identify the correct context for the problem in the documentation.

AppleGuide displays different kinds of window according to how it was invoked and according to the type of help database that it is displaying. If the program that invoked AppleGuide is well integrated with it, the help topic will be automatically presented according to the current context. If the integration is less complete, the user will be presented with an Access window through which they can use one of three ways to select the help topic. Figure 1 shows an example of an Access window. Figure 2 is of a Help Presentation window.

All programs running under System 7.5 automatically benefit from the basic AppleGuide facilities. These include the help command under the Help menu, the delivery of interactive multimedia help, display *coach marks* to highlight basic interface elements and draw them to the user's attention, and a moderate degree of context sensitivity. All you need to do is deliver an AppleGuide help database along with the next release of your program.

It's also possible to go a lot further. By responding to Apple events (described shortly) sent by AppleGuide, and scripted into your program's help database, you can respond to instructions sent by the help system. For instance, the help system can control your program to demonstrate how to perform a task. Your program can provide feedback to the help system so that coach marks can highlight more interface elements. There are two ways it can do this: using object specifiers in accordance with




# "Hardwiring our client/server applications to a single DBMS is crazy!"

**INTERSOLV's ODBC Connects To:**

- ALLBASE
- Btrieve
- Clipper
- DB2
- DB2/2
- DB2/6000
- dBASE
- Excel .XLS files
- FoxBase
- FoxPro
- Gupta SQLBase
- IMAGE/SQL
- INFORMIX
- INGRES
- Microsoft SQL Server
- NetWare SQL
- Oracle
- Paradox
- PROGRESS
- SQL/400
- SQL/DS
- Sybase
- Sybase SQL Server
- Teradata
- Text files
- XDB

**Operating Systems Supported:**

- Windows
- OS/2
- Windows NT
- Macintosh
- Solaris

## One Development View

INTERSOLV's cross-platform data accessware is for developers building database-independent applications using ODBC. Our unique, thinly layered approach leverages productivity and insulates your application without blocking access to key DBMS functionality. With INTERSOLV, you code and maintain a single set of highly efficient source code regardless of the number of different data sources.

## Many Deployment Options

Using INTERSOLV's drivers, you can link any ODBC-enabled software to your choice of over 30 different data stores. Even ODBC applications not built using INTERSOLV's developer kit are eligible. Most important, our ODBC drivers are fast and memory efficient—unlike other ODBC drivers that hamper performance. So, if you need to link Excel to dBase, Lotus 123 to SYBASE or Access to INFORMIX, check out INTERSOLV's ODBC drivers

**INTERSOLV DataDirect - the standard in client/server data access:**

INTERSOLV DataDirect Developers Toolkit allows you to build DBMS-independent, ODBC-compliant applications. **£500 per developer.**

INTERSOLV DataDirect ODBC Pack enables users to seamlessly access corporate data from any application that supports ODBC standards. **£350 for all drivers, £85 per driver.**

INTERSOLV DataDirect Multilink/VB increases the power and functionality of Visual Basic to boost development productivity and optimise system resources. **£300 per developer.**

# INTERSOLV with ODBC is the Answer!

The Standard for Client/Server Data Access

**Building or deploying an ODBC-enabled application?**

## Call today: 0727 812812, ext. 262

INTERSOLV



CIRCLE NO. 791

the Apple Event Object Model (see below), or using *coach handler* functions you include in your program. You can also make AppleGuide totally context sensitive by responding to context check calls and by responding to the user's `focus` in the help system.

## Apple events

An Apple event is a message that can be passed between different programs, which may be on the same machine or be connected using a network, or within one process on the same machine. An Apple event message is characterised by the event's class and ID (both are 32-bit quantities, each a 4-character alphanumeric mnemonic), and carries zero or more parameters. A result, conveyed by a *reply* Apple event, is optional. The Apple event manager is very efficient. Apple event calls within one process are resolved by a simple lookup and direct function call, so they are an effective means of communicating between the user interface elements of a program and the program's back-end engine.

The Apple event manager uses a data structure called an `AEDesc` as its standard data carrier. The `AEDesc` contains two fields: a data type and a 4-character value. A 4-Character value is a data handle which points to a *private* chunk of memory that holds the value of the `AEDesc`. `AEDescs` can refer to simple data, such as numeric quantities, boolean values or strings. Boolean values don't require any additional data to be stored in the data handle: the data type field tells all. `AEDescs` can also refer to more complex data structures such as arrays and keyword-specified records, which include *nested* `AEDescs` that are packed and unpacked using the Apple event manager API. Apple events are an essential mechanism that help underpin both AppleScript and AppleGuide.

Building on top of Apple events is possibly a more important mechanism: the Apple Event Object Model, which describes in a program-independent data structure the user-domain objects the program deals with. Through system automation and the object model which makes the look and feel of application programs consistent with one-another, programs appear more usable, improving their acceptance by end users. Using similar visual cues to prompt the user, and following conventions so that equivalent operations are initiated the same way, means that the user can work naturally with the Macintosh, without surprises. Having learned how to do something a certain way, the user doesn't have to learn again when he uses a different program to perform a comparable operation. Apple's *Human Interface Guidelines* help developers make their applications programs consistent with one-another. In turn, this improves the experience of the users of the software.

There is a comparable set of guidelines that sets out how you should structure your programs so they can be controlled from other programs. The Apple Event Object Model provides the framework, defining an object oriented way of describing the information maintained by applications programs and the operations that can be performed on that information.

The Apple Event Object Model separates *what* an applications program does (manipulate graphics, index and retrieve information, calculate inventory levels, or whatever) from *how* it does it.

The data objects described through the Object Model are those that make up your applications program at run time, from the user's point of view. These data objects have properties, such as an object's name, or size, or color, or position within a picture graphic. For instance, there is the application object itself, which has properties such as its name (the Finder name of the program file) and version number. Data objects may also have elements that are objects *contained* within other objects. For instance, in document-centric programs, the documents currently open are elements of the applications program. Within a graphic editor program a graphics document contains elements that are graphic objects. These may in turn contain other graphic object elements. Within an inventory program, there may be a more complex containment hierarchy, in which individual stock lines can be elements of more than one bill of materials at the same time. The containment hierarchy of objects within applications is comparable to the containment of files within folders in the Macintosh operating system.

The object model defines a concise collection of standard operations that may be performed on objects. These operations (equivalent to verbs in human languages) are instigated through Apple Events, so they can be dispatched from within your program, or externally from other applications or user-written scripts. The standardisation implied by the object model is in no way intended to limit your programs to performing only those operations. However, it has the advantage of ensuring that when your program performs an operation it has in common with another program, such as opening a file or copying some information, the language that is used is consistent. The Apple Event Object Model has the same effect as the *Human Interface Guidelines*, which help standardise the look and feel of programs. When equivalent operations are performed they do so the same way, whatever software is being used. If an application needs to go beyond what is pre-defined, it can do so. You can also define an extension to the standards if one is needed.

The *standard* data object classes follow an inheritance hierarchy, in the spirit of good object oriented programming. At the top of the tree is the `cObject` class that defines basic properties common to all other

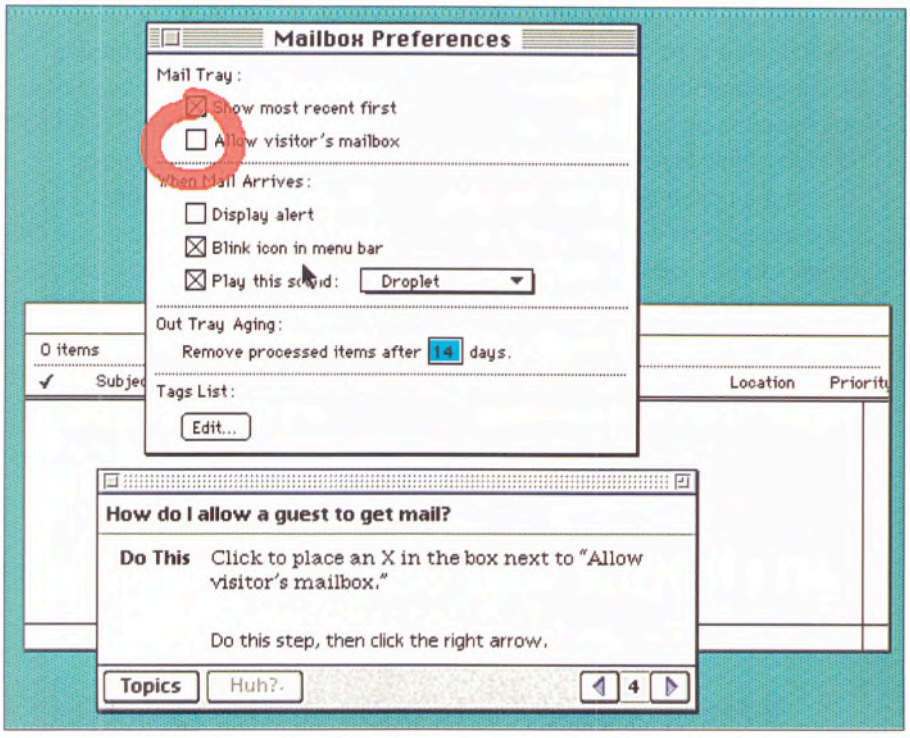
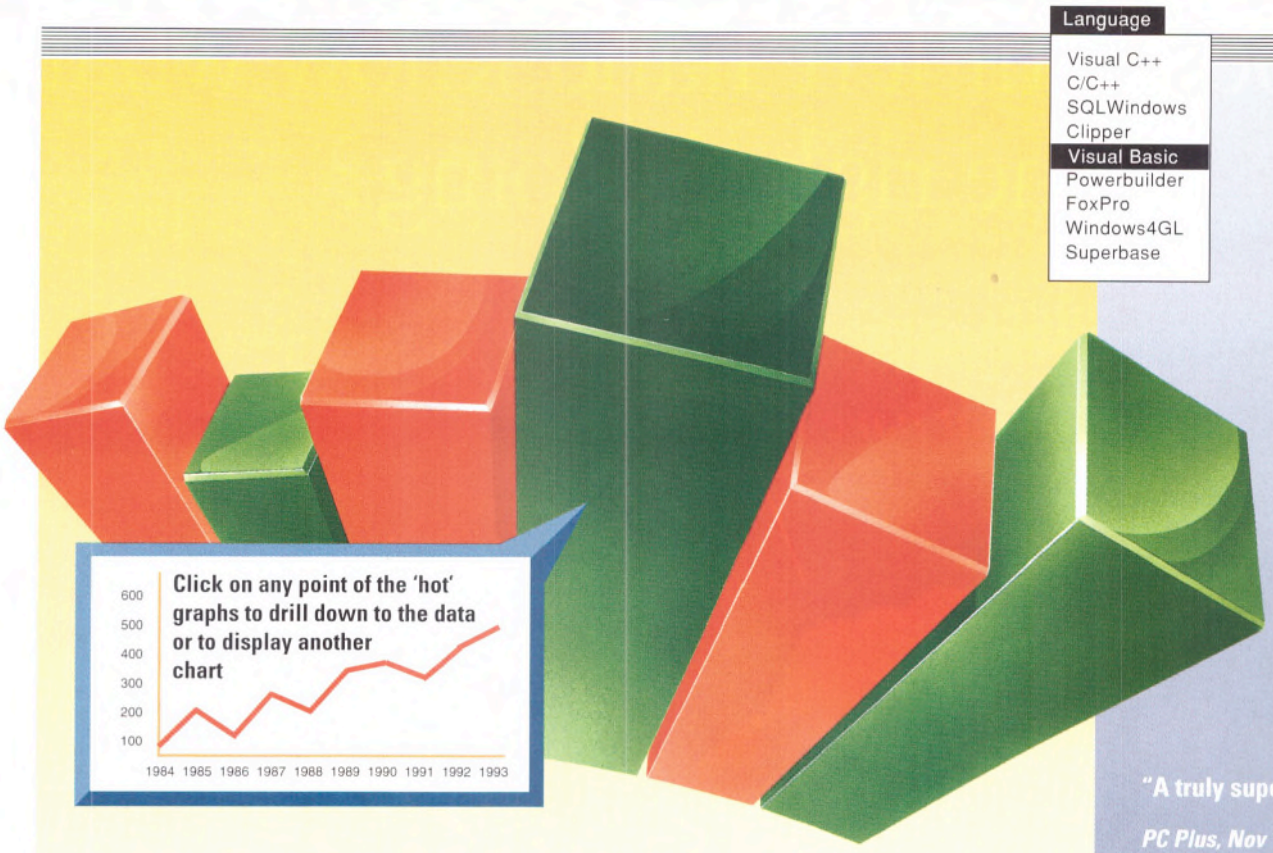



*Figure 2 - A presentation window*




# Programmable graphs

## DOS and Windows

Whatever language you have chosen for DOS or Windows development, you can use one of our libraries to integrate graphs and charts into your application.

## Best graphics tool

dGE has been voted Best Graphics Tool for six years in a row, and in 1992 Graphics server was voted Best Add-on DLL. Microsoft licensed our technology for the graphs in Visual Basic Pro (we've added 'hot' graphs to our VBX since then).


## Re-usable components

The future of applications development lies in 'components' which programmers can use time and again. Graphs and charts are part of so many of today's applications that it makes sense to use the same graphing component, especially one which 'gets full marks for coming with so many interfaces' *(Windows Tech Journal, April '93).*

## Windows NT and OLE 2

If your long-term plans include Windows NT, you can be confident that Graphics Server will still deliver the charts you want. In the latest release we have added a 32-bit version for Windows NT. And we have developed an OLE 2.0 automation server - the beginning of the end for function calls!

## Leaders in our field

We founded Bits Per Second, here in Brighton, eleven years ago, when getting graphs into a dBASE app was the leading edge of PC development.

We've stayed out in front and now count Microsoft and Gupta among those who license our software.

Thousands of developers in business, engineering and science now use our programmable graphs (and distribute the run-times royalty-free). If you'd like to join them, do give us a call.

Graeme Kitt John Marsh

**"A truly superb tool"**

***PC Plus, Nov '93***

**"You won't find an easier way to add charting to your Windows applications"**

***PC Magazine, Sept '93***

BITS PER SECOND

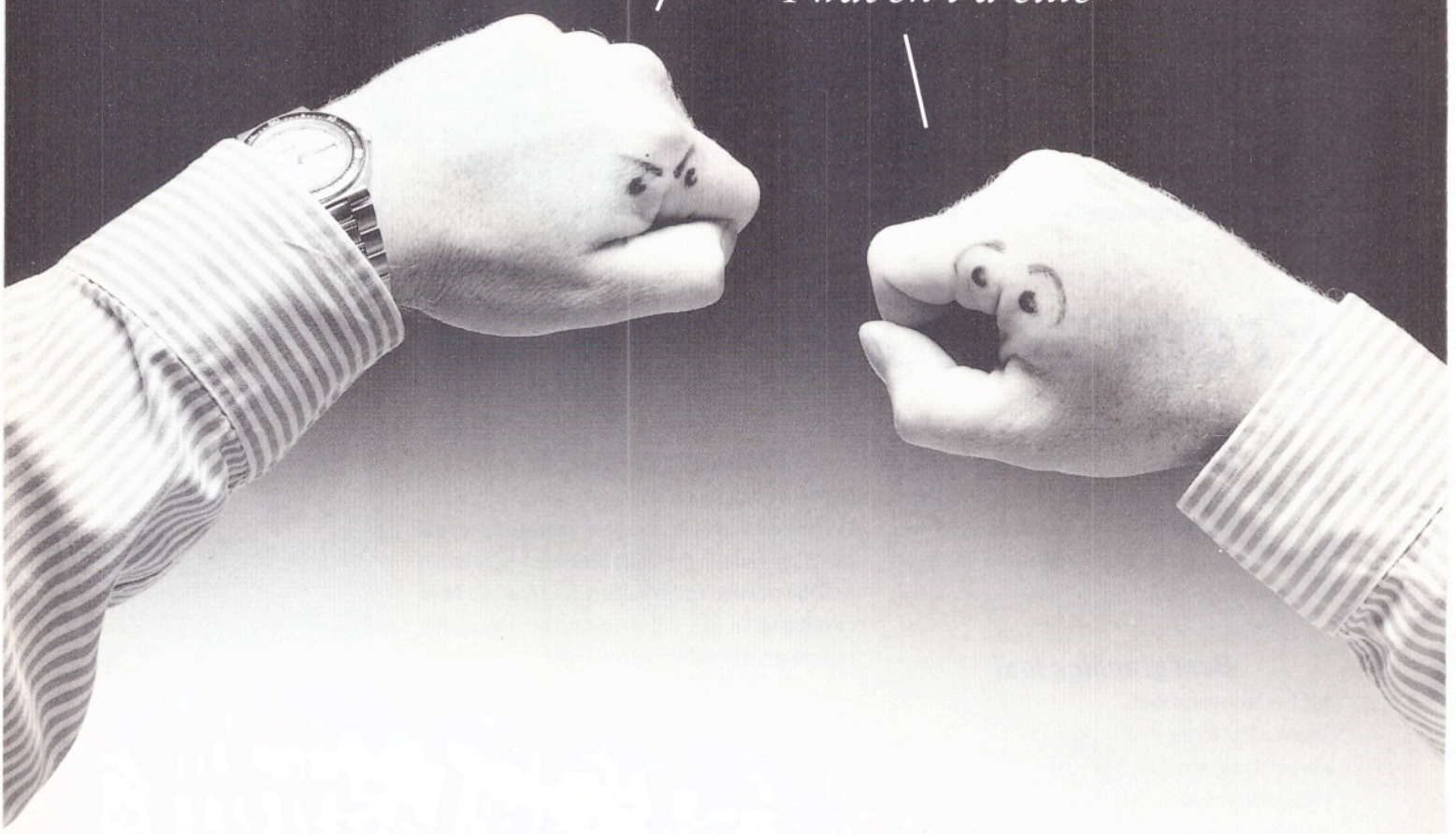
14 Regent Hill
Brighton
England
BN1 3ED

*Telephone*
0273 727119

*Fax*
0273 731925

CIRCLE NO. 792

# Does your left hand know what the right is doing?




Get your hands on Intasoft's Configuration Management tools and it will!

**SMS** is our full-featured version control package: perfect for preventing users overwriting each others' changes and for automating the build process – as well as telling you *Who?*, *What?*, *When?* and *Why?*

Full configuration and change management can make anyone all fingers and thumbs. Not with **AllChange**, Intasoft's brilliant package which provides facilities for product design, baselines, life-cycles, user roles, change requests, configuration build and release management.

Our products will help you with standards (e.g. ISO9001, BS5750) and are backed by our outstanding support.

With all of this available for MS-DOS, Windows and UNIX at prices from as little as £490, we think you'll agree Intasoft are handy people to know!

INTASOFT, Tresco House, 153 Sweetbrier Lane, Exeter, EX1 3DG.
Tel 0392 217670 Fax 0392 437877

**NEW** *SMS Version 4 for Windows Now available*

**NEW** *AllChange – Change control & configuration management system*

INTASOFT

*Quality tools for professional software developers*

CIRCLE NO. 793

objects and a set of Apple Event verbs that represent operations common to all objects. Such operations include moving the objects, getting and setting the data of object properties, creating, counting and deleting object elements and getting information about the object classes, their elements and the operations that may be performed on them. Descending the tree, object classes extend and redefine the properties, elements and Apple Event verbs defined by their ancestors.

Almost all the Object Model verbs represented by Apple Events operate upon an object or collection of objects that are specified in the `direct` parameter of the Apple Event. This parameter, called an *object specifier*, describes how the target applications program should find the object or objects that are to be operated on, expressed in terms of the runtime containment hierarchy of objects in the program. For instance, you might describe a graphic object within a document with an object specifier such as:

'the third green blob of document *Wibbly Bits* of application *Pandora's Box*.'

Those of you familiar with AppleScript will recognise the syntax used in the above example. Each *of* separates a level of the containment description. The underlying data structures are independent of the language. They are expressed as nested Apple Event records that describe how the desired object or objects can be resolved by the target application.

As an example, a program might define a containment hierarchy for its object classes as illustrated in Figure 3.

There would, in the above example, be two ways to resolve a reference to a particular component object: by containment in the components file, or by containment in a bill of materials in the bills of materials file. This is comparable to the way a program might permit two or more *views* of an object. Adobe Illustrator, for instance, lets the artist view a graphic object in preview mode, in wire-frame mode, or through dialog boxes that define text or paint characteristics. This does not require duplication of data.

The high level view of an application program's contents and capabilities provided by its Apple Event Object Model description is akin to the kind of high level object oriented model of an application's data and the operations performed on it, that could be derived in a classical systems analysis exercise. This high level model does not have to be literally implemented at lower levels of the program code. It can also be achieved by wrapping an Object Model layer around an already developed program.

The Apple Event Object Model makes it possible, through Apple Events, to control an application remotely without having to worry about the details of the user interface. All the controlling script or application needs to know is the classes of data objects the application stores and manipulates and the operations that can be performed on the data objects.

This allows the services of an applications program to be called upon by other software without the other software having to know specific details about how the program is operated. This is central to making scripting workable. Without a common descriptive grammar for application-domain objects and the verbs that operate on them, users would be faced with an impossibly complicated mixture of different scripting interfaces to applications software. It would be like asking your company receptionist to deal with callers in 10 different languages at once. A handful of linguistically inclined individuals (and anyone with a Babel fish in their ear) might be able to cope, but the vast majority of humans would be sorely pressed to deal with it. With the Apple Event Object Model it is possible to deal with common operations all the same way, whatever target application is being scripted. Variations are only really necessary for particular applications.

## Making programs scriptable

There are a number of things that must be done to support the Apple Event Object Model in your programs. First, define a high level object oriented data model for the program, basing the model around the standard suites of the Apple Event Object Model. Then build in a wrapper layer that resolves object specifications into a form that is applicable to the program's internal format if you are building your program from scratch. The high level data model can be very tightly integrated into the internal formats. Next, define an `aete` resource that specifies to scripting software the object classes defined by, and the Apple Events understood by your program. Finally, implement Apple Event handlers for the Apple Events supported by the program, that at the very least should include the required and core suites of the Object Model.

Having done all the above, your program is scriptable. In other words, users of OSA scripting systems (such as AppleScript) can write scripts that remotely control your program, automating activities. The program is also now well placed for evolving into an OpenDoc part: Apple Event Object Model support is one of the keys to building OpenDoc components. The next step beyond this is to make the application recordable, by factoring out user-interface driven operations from the internal functions of the program and translating the operations into Apple Events. This factoring process must take into account the separation between *what* the program does and *how* it does it, making sure that all the Apple Events sent are those defined in the high level data model that you defined for the program.

## Script architecture

By now you have probably installed and used Apple's applications scripting software, AppleScript. It is an integral part of Apple's System 7.5 operating system and was also included with System 7 Pro (superceded by 7.5), HyperCard 2.2 and the AppleScript Scripters' Kit. Underlying AppleScript is a system software extension, called the Open Scripting Architecture (OSA), that allows developers to incorporate scripting capabilities into their programs.

The best known client of the OSA is Ap-

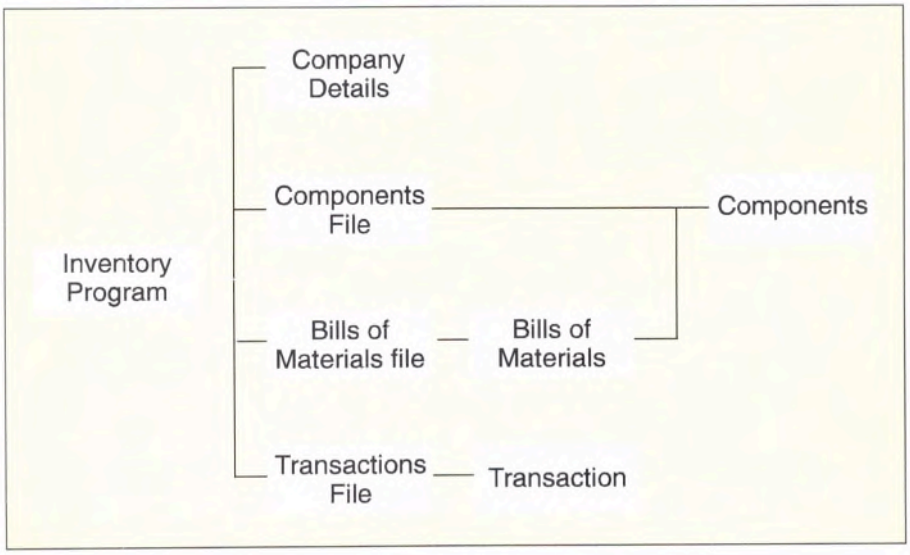



*Figure 3 - Object containment hierarchy example*

ple's Script Editor program, supplied with AppleScript. The Script Editor allows the user to create, edit and compile scripts, run them, record new scripts by *watching* recordable Macintosh programs and save standalone script applications that can be run from the Finder when double clicked or when files are dropped on them. My company's product *ScriptWizard* is a plug-compatible replacement for Apple's Script Editor and has additional features including step-by-step debugging of scripts.

There are a number of benefits OSA offers to your program. These include choosing which scripting component and dialect is to be used; compiling and decompiling scripts and loading and saving compiled scripts and *script values*. In addition, it is possible to execute compiled scripts and display the results of execution. Another benefit is it allows you to pass Apple Events to compiled scripts so they can handle them and record Apple Events sent by programs in the course of their operation.

The OSA also permits developers to write new *scripting components* that add new script languages and scripting capabilities to programs that make use of the OSA APIs. The choices of scripting language, dialect and the scripting capabilities it makes available are independent of the OSA. Commercially available OSA scripting components include Frontier 3.0 and Quickeys Script; third party components include one for TCL (Tool Control Language).

From the point of view of a program using the OSA APIs, the OSA makes no distinction between compiled scripts and the values that may result from executing them: all are *script values* and can be used interchangeably. To the OSA, compiled scripts are data values. These can be stored in variables and manipulated just like numbers, text, lists, or records. When a program passes a script value to the OSA, or when the OSA passes a script value to a program, it is referred to through a value called an OSAID. OSAIDs are 32-bit long integers and the OSA privately maps these onto the data they refer to.

The OSA API provides mechanisms your program can use to convert OSAID script values into AEDescs, and *vice versa*. When communicating with other programs, OSA scripting components like AppleScript send Apple Events. The OSA understands Apple Events as well. Compiled scripts map directly onto the Apple Events, described in a target program's `aete` resource, that are implied by the script source code. For instance, if a script contains text like 'make new menu with name *Extras*', then AppleScript is able to use the information in the target program's `aete` resource to construct a `create element` Apple Event with the correct parameters.

## How far with OSA

Varying degrees of OSA support are open to your programs. You can use the OSA's services to execute scripts previously created with the Apple Script Editor. Your database program can store compiled scripts and other script values. You can compile directly and execute scripts. And you can decompile existing scripts. For editing you can use embedded scripts to automate your program's handling of Apple Events. You can also allow users to customise and extend your program's capabilities by attaching scripts to objects in the application's domain. As they say, it is entirely up to you how far you take it. ■

*Paul G Smith is a software developer and IT consultant, now in his 16th year in the industry. He can be reached by telephone on (0727) 844232, or (preferably) by electronic mail at Rpaul@ctalk.exnet.comS. Questions and feedback for possible publication in EXE should be sent to Raskexe@ctalk.exnet.comS.*

# R&R Report Writer®

the best database reporting tool since the

## R&R Report Writer Version 6 is simply our best Report Writer ever.

***Remarkably, we have taken our award-winning software and made it even better.***

From simple queries to complex client/server application reporting, R&R delivers the power and performance you need to produce publication quality reports from all your PC and SQL data - ***FAST!***

### Power

R&R is so easy to use that even a complete novice can create ad hoc reports in a matter of minutes, but has the power in reserve to cope with the most demanding database reporting task.

Quick+Easy Database Connections™ give you instant access to over 25 database formats including ODBC, and ASAP Query Generator™ turns your information requests into efficient database queries to give you the results you want - without programming.

R&R makes it simple to select, analyse, summarize and present the information you need, when you need it - instantly.

### Professional Reports

Quickly turn your raw data into professional quality reports, forms, financial statements, directories, form letters and mailing labels. Use R&R's Report Templates and Wizards to create impressive looking reports with the minimum of effort.

For maximum impact use R&R's powerful design tools to format text and add borders, patterns, colours and graphics to your data. Print reports, view them on-line, or send them to others via e-mail. Export reports to database, spreadsheet or text files, and create crosstabs and charts in Excel via OLE Automation links.

### Performance

R&R delivers the performance developers demand with the ease of use end users expect. R&R's new Open Scripting™ allows developers to create custom Report Wizards in Visual Basic, C++ or other tools to make designing reports even easier for non-technical users.

Link production reports seamlessly into other applications using EXE, DLL or VBX interfaces and distribute reports freely to other users with the royalty-free Runtime.

***Connections to:***

| | |
|---|---|
| Access | SQL Server |
| Btrieve | Netware SQL |
| Clipper | ODBC |
| DB2 | Oracle |
| DB2/2 | Paradox |
| Dbase | Progress |
| Excel | SQL/400 |
| Foxpro | SQL/DS |
| ALLBASE/SQL | SQLBase |
| IMAGE SQL | Sybase |
| DDCS/2 | Teradata |
| Informix | Text Files |
| Ingres | XDB |
| MDI Gateway | And more... |

***See why more than 200,000 users of all skill levels have chosen R&R. Call now to order your copy, or for your FREE demo disk. Tel 0500 400881***


R&R Version 6 for Windows works with all databases.
R&R Version 6 for DOS works with dBASE, Foxpro and Clipper.
All R&R reports are portable between editions AND SCALABLE BETWEEN DATABASES.
Reports created with any earlier release of R&R are 100% compatible with Version 6.
All editions include a royalty-free Runtime for unlimited distribution.

**R&R Software Limited, Viking House, Denmark Street, Maidenhead, Berkshire, SL6 7XJ**
**Tel: 0628 788181. Fax: 0628 788182**
A subsidiary of Concentric Data Systems Inc.
110 Turnpike Road, Westborough, MA 01581 USA Tel 508 366 1122 Fax 508 366 2954


Visual Basic Programmer's Journal 1994 Award Readers' Choice

★1993★ DATA BASED ADVISOR Readers Choice Award 1989-1993

DBMS 1993 READERS' CHOICE 1989-1993

CIRCLE NO. 795

# Static electricity

While pondering the question of whether MS' 'strict' compiler switch alters the meaning of a program, **Francis Glassborow** turned to the ISO C Standard and discovered a host of problems relating to storage classes.

A few weeks ago a member of the Association of C & C++ Users asked me if there was any possibility that Microsoft's 'strict' compiler switch could change the meaning of a program. For those of you who are unfamiliar with this topic, it is a mechanism to turn weak types created with `typedef` declarations into strong types that can be used for overloading and type-safety in C++.

Knowing something of the problems I considered my answer carefully before saying 'I don't know, however the following seems to be a candidate.'

```
typedef int * ptint;
const ptint cpi;
ptint const pci;
```

Are `cpi` and `cpi` of the same type? Are they of the same type after switching on Microsoft's 'strict' compiler switch? Think very carefully about your answers, because many experts that I have spoken to are certain they *know* the answers. The problem is that they 'know' different ones. I am not convinced that the answers are the same for C and C++. C++ allows some uses of `typedef` that C does not. For example the following is, I believe, conforming C++ but not conforming C.

```
typedef const int cint;
const cint ci;
```

In order to try to reach a correct solution to the initial question I turned to my copy of the ISO C Standard (BS ISO/IEC 9899 : 1990). The rest of this article is about what I then discovered. Looking things up in a standard is a little like looking words up in a dictionary. Your eye alights on the adjacent text.

## Storage-class Specifiers

The box on the adjacent page lists the whole of 6.5.1 from the ISO C Standard. I have included it here because it is short and reveals some interesting problems. (I should make clear that I hold the ISO C Standard in high regard and appreciate the many thousands of hours of unpaid work contributed by members of ANSI X3J14 in its production).

One problem with the ISO C Standard document is that its index is of very poor quality. For example the only reference to `auto` in the index is to 6.5.1 though there is a constraint in 6.7 that forbids its use in external definitions.

I have been unable to find any other reference to `auto` anywhere in the ISO C Standard. Does this mean that `auto` must do nothing? Or can do anything? (Don't waste time writing to tell me what you think it should do unless you can quote the Standard to support you.)

Moving on to `register` we find just how poor the index is because there are several places where facets of `register` are mentioned. For example 6.5.4.3 specifies that `register` is the only storage-class specifier that can be applied to a parameter. Note that this also, indirectly, provides information about the other specifiers. Elsewhere the constraints on applying the `&` (address of) operator forbid its use on a variable declared as `register`. However the Standard does not seem to make clear whether the following is legal:

```
register int array[10];
fn(array);
```

A recent defect report has made clear that storage-class specifiers applied to arrays are meant to apply to the elements of such (now is `typedef` included in this clarification, or did the Standards Committee forget about it being in 6.5.1?). So perhaps the above is conforming but the supposed equivalent call is not?

```
fn(&(array[0]))
```

Note that these are non-questions in C++ because currently that language has devalued `register` variables by allowing their addresses to be taken. This leaves nothing but a constraint that `register` cannot be applied to a global. Which is a pity because there might be a real use for it in such a context: the one place where the compiler will not have an overview of all relevant code. C++ also seems to make assumptions about the meaning of `auto`.

The actual uses of `extern` and `static` are interesting because they are motivated largely by the occasional need to distinguish declarations from definitions and function calls. As originally specified, a variable declaration was always a definition (ie generated allocation of storage) unless explicitly declared not to be. Those writing single file programs might not realise the need to separate the two concepts. At file scope `extern` limits specifications of variable names to pure declarations. The definitions (memory allocation) must be provided elsewhere.

The issue is even worse with regard to functions because in the traditional C mode a call became a declaration as well if no declaration had yet been seen by the compiler. In simple terms `extern` limited a use of a function name to being a declaration and not either a simultaneous use (call) or definition.

To my mind `static` is even worse. It recycles a term from general computing to have explicit multiple meanings distinguished by context (and C++ makes this an order of magnitude worse by overloading extra meanings on the word).

In the context of a block scope static means exactly what it says: use static memory. This is memory whose lifetime is that of the program. Initialise it once at the time of first use. Note that the last requirement forces some form of housekeeping overhead to track its point of first use.

In file scope the use of `static` to limit name visibility (and pollution of global name spaces) was unwise to say the least as it has lead to numerous confused descriptions in books introducing C. Typically: *Global variables by default have static storage classes.*

By the way, the original ISO C Standard completely forgot dynamic memory when describing the lifetime of objects and explicitly stated that the storage duration of all objects was either of *static storage duration or of automatic storage duration.*

## Back to typedef

Having highlighted some of the many problems thrown up by a casual exploration of the short extract from the ISO C Standard quoted above, let me return to the original question. There are two distinct views. One

# Put an end to software piracy!

Meet the growing family of security keys from Software Security.

Each one a specialist at enforcing your license agreement in virtually any user environment you can think of. Whether it's DOS, UNIX, Macintosh or OS/2... whether it's a single user installation or a LAN.

Simply connect the appropriate key to a single user computer, or a non-dedicated file server in a network, and you control all access to your protected application.

Users, however, won't even know it's there. The keys are transparent and won't impact software functionality or the ability to make back up copies. Normal node and LAN operations are unaffected.

Simple. Unassuming. Ever vigilant. Easy to incorporate into your application package. And quite possibly the most profitable hardware investment a software developer can make.

**To find out more, call:**

**(0784) 430060**

## THE ULTIMATE PROTECTION FOR SOFTWARE PUBLISHERS




**Software Security International Ltd**

**21a The Precinct, High Street, Egham, Surrey, United Kingdom, TW20 9HN**

*National telephone: Egham (0784) 430060 fax: (0784) 430050 International telephone: +44 784 430060 fax: +44 784 430050*

group believes that `typedefs` provide macro-like behaviour with the substitution made much later in the compilation process. In this group I find many experienced C compiler implementors including the recently retired convenor of the UK C panel. They believe that in the context of the `typedef` above:

```
const int * pci;
```

is equivalent to

```
const ptint pci
```

and

```
int * const cpi;
```

is equivalent to

```
ptint const cpi;
```

On the other hand there are a substantial group of notable experts such as Andrew Koenig (author of *C Traps and Pitfalls* - an excellent book - and a major participant in the standardisation of C++), who believe that the `typedef` creates a genuine weak type to which the `const` keyword is then applied so that

```
const ptint pci;
```

is equivalent to

```
ptint const pci;
```

and

```
int * const pci;
```

Does it matter? You bet it does, because until this issue is resolved so that all agree, using `typedef` in your program is a defect. Whichever interpretation is correct, legacy code will be broken. In the meantime compilers should issue warnings at the very least for any `typedefs` that are any kind of pointer.

## An afterthought

One thing that causes me no little concern is the complexity of the C++ working paper, the document that will eventually mature into a C++ Standard. It is hard enough finding the correct information from the ISO C Standard which is just over two hundred pages long (of which 80 are concerned with the library). Currently the C++ working paper exceeds 600 pages. Even though 400 of those concern the C++ specific standard library that still leaves 200 pages that have to be read in the context of the ISO C Standard. Even if the eventual document is substantially correct, understanding it will be a far from trivial task. Quoting it will become a skill akin to quoting from religious texts.



## Section 6.5.1 of the ISO C Standard

### Syntax

*storage-class-specifier:*
`typedef`
`extern`
`static`
`auto`
`register`

### Constraints

At most one storage-class specifier may be given in the declaration specifiers in a declaration.

### Semantics

The `typedef` specifier is called a 'storage-class specifier' for syntactic convenience only; it is discussed in 6.5.6. The meaning of the various linkages and storage durations were discussed in 6.1.2.2 and 6.1.2.4

A declaration of an identifier for an object with storage-class specifier `register` suggests that access to the object be as fast as possible. The extent to which such suggestions are effective is implementation-defined.

The declaration of an identifier for a function that has block scope shall have no explicit storage-class specifier other than `extern`.

## No More Guesswork

InfoModeler takes the guesswork out of database design. You are able to focus on facts about the business. You are able to express facts about business information as simple sentences, in plain English. From this "factbase" you are able to generate the database model, then check that model against real-world examples - again expressed in English. It's the best way yet to design a database, check that it's relationally correct, then generate tables in the format of your choice.

## Communicating What Matters

Because InfoModeler uses plain English and simple diagrams to express the database model, it's easy to explain the design to users and managers who don't have a technical background. Now there is a way to check your design with your users. A way for them to understand their information system. So there is no longer a need to learn obscure code or complex relational theory to participate in the design process. InfoModeler helps you focus on solutions, not theory.

## *InfoModeler* Is Easy To Use And Easy To Maintain

InfoModeler works in Windows. So it's visual tools are familiar and easy to use. It's easy to switch from diagramming tools which help you understand your database model, to the Fact Compiler which sets out the business information clearly, to the Table Browser which lets you see the relational structure of the database. And InfoModeler automatically documents your database design, reducing support and maintenance overheads.

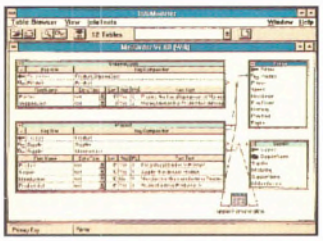
## Building Client Server Systems

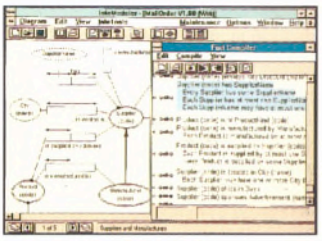
InfoModeler's new technologies have been developed to underpin company wide, client-server systems with sound database design methodology. Object-Role Modelling gives you a new, structured method for developing client-server solutions. As well as generating code for the leading database servers, InfoModeler can support any SQL database. So whatever the combination of back-end or desktop tools InfoModeler helps you maintain and develop your client-server framework.

# Break The Chains

## "Finally, After 20 Years, There Is A Database Design Tool With Real, Practical Usefulness"

Richard Finkelstein, Performance Computing



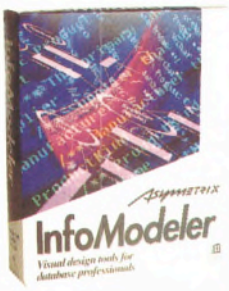


## *InfoModeler* Saves Your Time

Because InfoModeler automates routine, but essential, tasks such as normalisation and table generation, it saves development time. Automation also means fewer errors and higher quality. You have more time to create the front-end features today's users demand.

## Knowing It's Correct

In important projects you can't afford to *think* your design is correct. You need to *know*. With InfoModeler you can be sure that the foundations of your system are solid. You have the means to be sure of your users' requirements. You have the confidence to create innovative, reliable software.




## A Revolution In Relational Database Design

InfoModeler, a new professionnal visual database-design tool, lets designers create high level conceptual models in plain English, and then automatically generates a logical, reliable and durable model of the database.

Fast Response Card - Circle number917

*Return to ICS - Tempus Business Centre - Kingclere Road, Basingstoke - Hampshire UK RG21 2XG - Fax : 0256 842362*

**FREE : Get An InfoModeler Demo Disk**

**Please send me :**

☐ An Asymetrix InfoModeler demo disk
☐ An invitation to a personal demonstration of InfoModeler

SURNAME/NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

_____

_____

POST CODE _____

TELEPHONE _____ FAX _____

EXE /11/94

InfoModeler generates code for Microsoft Access, Visual Basic and Foxpro, Borland Paradox and dBase for Windows, Oracle, SYBASE/MS SQL Server, Informix, Ingres and DB2

**InfoModeler™**
by Asymetrix

Distributed in the UK by ICS

**TEL 0256 469 460**



CIRCLE NO. 798

# More to RAD than a pretty face

Behind every great demo is an unfinished app. **Darrel Dixon** scrapes away the surface gloss and tries a tool which attempts to fill the gaps.

Rapid application development tools never cease to impress. All too often developers see demonstrations and mentally rub their hands thinking of the money that would be rolling in. Of course there's a catch! It's a technique Blue Peter presenters have tuned to a fine art - doing the real work before the cameras roll. All too often in RAD demos an ever-ready database table is picked-up from a magical directory where yet another matching table waits patiently to be picked, dragged or dropped into perfect referential integrity.

Typically the demonstration goes on to highlight GUI production having neatly sidestepped one of the major database application issues - good analysis and design. How many insidious minefields have been laid at this stage in the proceedings? Surprisingly there are very few tools on the market which really come to the rescue. Off-the-shelf DBMS products, which have a vested interest in empowering the end-user, seem to concentrate on GUI and query tools. Obviously, they enable database schema development but rely heavily upon the developer to design and resolve the data relationships. Asymetrix believes it has the answer with InfoModeler.

## Play role modelling

Asymetrix sees its product as a bridge between the real world, as an analyst would see it, and a logical model of data structures. The translation of simple phrases coupled with specific DBMS drivers takes an understandable concept into a common data structure. If the theory can be proved, ORM and the Formal Object-Role Modeling Language (FORML) step beyond the limitations of popular methodologies like E-R analysis. The claim is that this can be achieved by compiling a set of interacting facts expressed in a simple and understandable format, overlaid with constraints and roles. Unlike (Entity Relationship) E-R, which draws the line at equating its entities to the nouns in a language, ORM extends the scope to include verbs which it uses to distil the relationships. The actual vocabulary used seems almost immaterial other than for the comprehension of

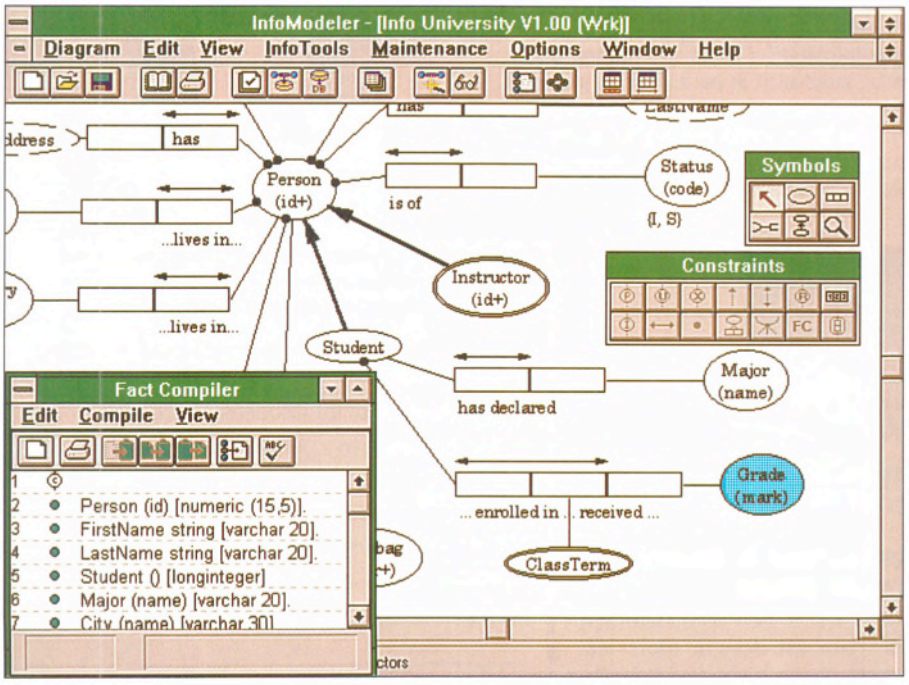
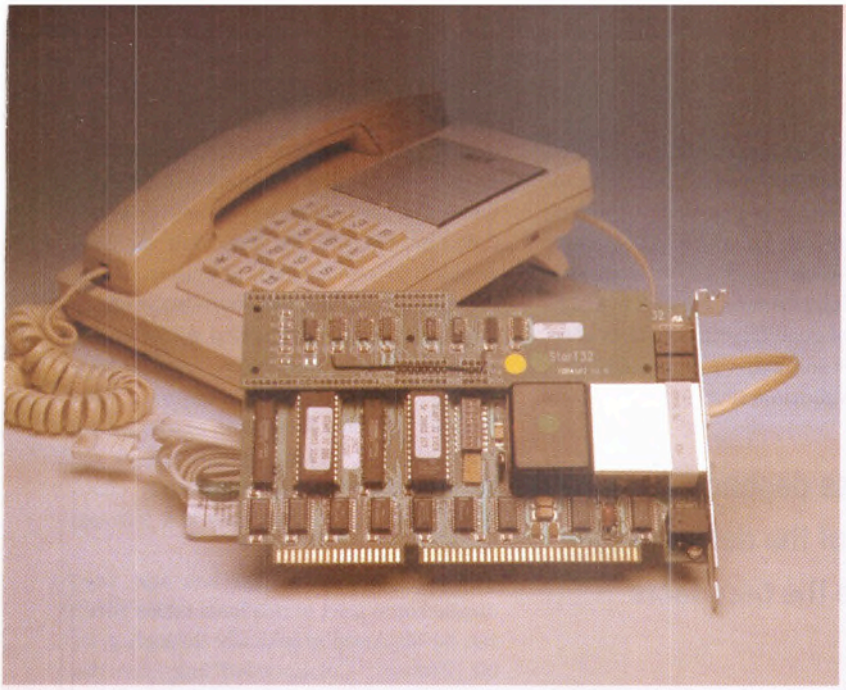



*Figure 1 - Diagramer at the conceptual model level*

**Certainly it offers a daunting task to us lesser mortals who lost track of academia many years ago**



# Voice Processing
# Interactive Voice Response
# Computer Telephone Integration

- WINDOWS DRIVER FOR WINDOWS V3.1
- SUPPORT FOR .WAV FILES
- VISUAL BASIC CUSTOM CONTROL
- TSR TOOL KIT FOR MS-DOS AND OS2 V2.x
- SPEECH RECOGNITION
- WINDOWS BASED SOUND EDITOR
- SCRIPT LANGUAGE FOR EASY PROTOTYPING
- MICROPHONE AND LOUDSPEAKER
- DTMF RECOGNITION AND DIAL OUT
- PULSE DIAL OUT
- 16 BIT DIGITAL SOUND QUALITY
- SOCKET FOR LOCAL PHONE
- RECORDING FROM LINE, MICROPHONE OR LOCAL PHONE
- PLAYBACK TO LINE, LOUDSPEAKER OR LOCAL PHONE
- TIME BREAK AND EARTH RECALL
- OFF HOOK SENSORS FOR BOTH CARD AND LOCAL PHONE
- JACK FOR ALARM EVENTS
- SOFTWARE READABLE SERIAL NUMBER

# ST32

## THE DEVELOPER'S CHOICE FOR SINGLE LINE TELEPHONY APPLICATIONS ON THE PC *

**A half length card for ISA Bus IBM compatible PCs**

**NEW!**

**Conformity to TAPI**

Staria has been developing single line telephony calls since 1988. Our customers have produced applications in voice messaging, message broadcasting, telemarketing, plant monitoring, computer monitoring, telephone servicing, network testing, caller conferencing etc. Now, with added Windows and Speech Recognition capability, the ST32 is available for personal desktop use.

**COMING SOON:**

- CALLING LINE IDENTIFICATION (CLI)
- FAX AND DATA MODEM OPTION

**PRICES:**

- DEVELOPER'S KIT: **£600** (INCLUDES ONE CARD) - SPEECH RECOGNITION **+£200**
- ADDITIONAL SINGLE CARDS: **£300**
- QUANTITY DISCOUNTS

*** ADDITIONAL CARDS CAN BE ADDED FOR UP TO 32 LINES**

IVR for the PC Staria

**Staria Limited** (Ask for Brian Atherton)
**TEL: 0989 768 687 FAX: 0989 768 980**
13 Market Place, Ross-on-Wye, Herefordshire HR9 5NU

APPROVED
for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them
S/2562/3/P/502756

the designer and, more significantly, those who also need to share the understanding of what's being created.

The key to the success of the methodology lies in the way the designer associates a conceptual meaning with various factual mechanisms structured in such a way as to analyse implicitly how the concepts are related to one another. This is called verbalising. Success depends on the ability of the designer to resolve the bare facts. If these cannot be identified database design is a lost cause, tools or no tools. InfoModeler can only provide the framework around which a designer weaves his understanding of the problem domain.

InfoModeler uses objects (doesn't everybody?), roles, constraints, reference modes, predicates, subtypes, kinds and a whole gamut of obscure Californian highbrow jargon. Some terms make sense others just have to be grappled with. As with many methodologies, ORM, with its graphical notation and FORML descriptive language, has evolved from an academic project. In this case the culprits are GM Nijssen and Dr TA Halpin. Their work (see bibliography) has been used as the basis for InfoModeler. Obviously, Asymetrix hold a greater level of responsibility for the way it is presented on our computers.

## Essential reading

InfoModeler falls into that category of Windows application that definitely requires a few long hours spent with manual in hand. In fairness, the Guide to FORML is quite well written, albeit too brief to cover the concepts involved. The same cannot be said for the online Help. In trying to be concise it regurgitates one of the most obscure dictionaries and often provides cyclic definitions. For instance, InfoModeler uses a generic property of an object called *kind* but that doesn't appear in the Glossary: its precise meaning evades detection elsewhere. According to the syntactic rules, this is a pivotal property! At least the validation routine thinks so. In general, the terminology is verbose. *Reference Mode* is the term used to describe a style - what's wrong with *Style* I ask. The learning curve for a new methodology is steep enough. As it is, developers are being bombarded with scripting languages, syntaxes and notations all in the name of usability. The shame is that many will be put off long before delving down to where the real power of InfoModeler lies... Time is money and the project leader wants productivity.

OK, once over the initial hurdles, a designer would typically use domain knowledge and a few leading questions directed towards the client, to discover the relevant facts. Armed with this knowledge, the conceptual model can be constructed using either a graphical interface or an explicit fact list. Having reviewed the initial design with the aid of good diagrams or lists of reports on facts and behaviour, the designer can invoke a validation routine to make sure there are no loose ends or missing essentials from the FORML point of view.

> **Success depends on the ability of the designer to resolve the bare facts**

## Meaningful relationship

The next step is to invoke the conversion of the conceptual model into a set of logical relational tables, achieved by clicking an icon on the toolbar. At this point, InfoModeler checks its repository to see if there are any naming clashes between the designer's scheme and the internals of InfoModeler or the selected target DBMS. Typically, clashes with reserved words are weeded out. Translation is by direct mapping. Certain symbols are substituted with defaults or specifically at the request of the designer. A list of terms from the conceptual model appear. Blanks are set against any terms which break the rules. A designer needs to bear in mind the limitations of the target DBMS at this stage. Long names may not map effectively onto short field names in FoxPro or the like. Alternative names for these attribute titles are simply inserted. Any changes will be preserved for subsequent passes through the process. Indeed, it is important that there is the ability to go back to the conceptual model at any stage. All too frequently requirements change necessitating revisions. InfoModeler provides the means of making adjustments and rippling it through to the physical data structures with minimal effort. What happens to legacy data is a different issue.

The conceptual design has now been mapped onto a set of relational tables which can be displayed graphically through a Table Browser. Colour-coded links are displayed between tables. The tables indicate the names of fields they contain with small icons to highlight primary and foreign keys. After reviewing the outcome, it is just a matter of selecting another toolbar icon to go ahead and generate the physical tables - or at least a script file that can be applied to the target DBMS.

## Under constraint

Looking in more detail at the conceptual stage, it's already been stated that the real life scenarios should be expressed as fundamental phrases. With experience, the scope of InfoModeler allows the designer to build compound associations through multiple *roles*. Similarly, a set of facts can be combined to produce a nested object which in turn can be referenced in other parts of the conceptual model. This technique keeps the design concise without obscuring the facts.

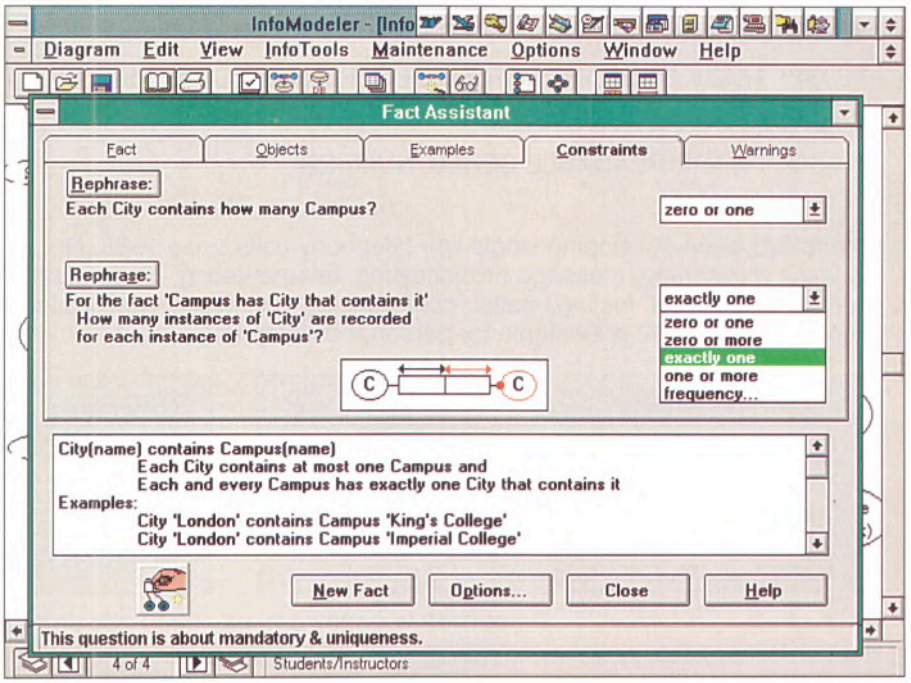
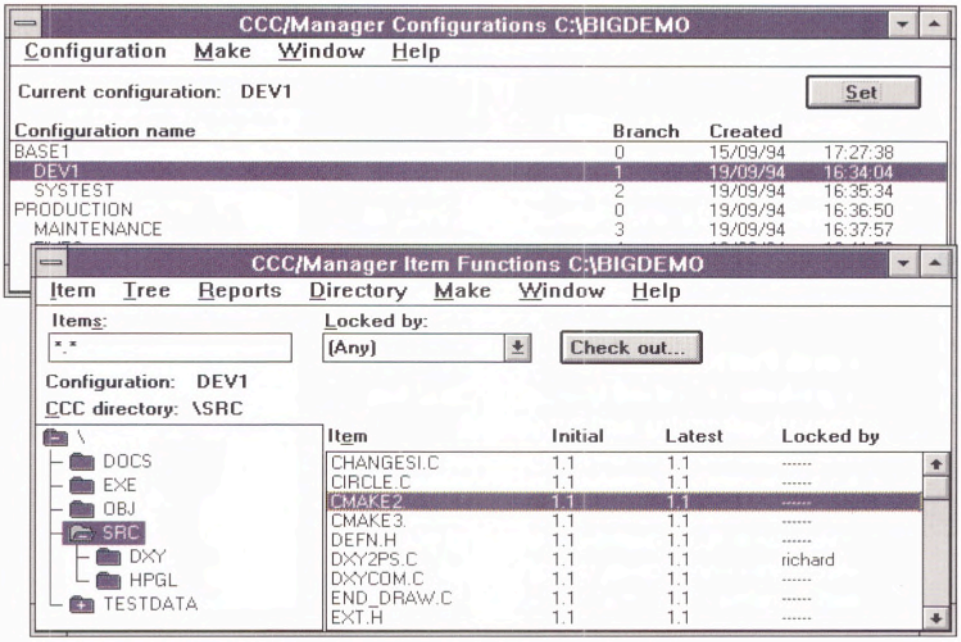



*Figure 2 - Fact Assistant in V1.5 helps to set up constraints*

# CCC/Manager for Windows, Windows NT, and OS/2

## Corporate-strength Software Change and Configuration Management for today's application development teams.

CCC/Manager is a powerful yet easy to use object-oriented development tool for Software Configuration and Change Control. CCC/Manager supports any sized PC application development team and gives complete control over all development and maintenance activities. CCC/Manager goes beyond basic version control utilities; its advanced functionality automates the management of version control, change packaging, staging, parallel and concurrent development, multiple releases, emergency maintenance and software customization. In addition, CCC/Manager has support for problem tracking throughout the entire software life cycle. CCC/Manager is extremely easy to set up and use; the system can be implemented quickly into new or existing projects to give users the control they need, right away. CCC/Manager users can be defined as individuals or groups with restricted access to files thereby improving team productivity. CCC/Manager has support for all leading networks and integrates seamlessly with popular development tools.




*CCC/Manager uses standard Windows conventions, eg. File Manager format.*

CCC/Manager features:

- *Process Modelling*
- *Staging*
- *Multiple Baselines*
- *Virtual Configurations*
- *Change Names*
- *Change Packaging*
- *Concurrent Development*
- *Interactive Merge*
- *Security / Flexible Access Controls*
- *File Type Independent*
- *Reporting*
- *Tool Integration through API*
- *Integrated Make*

CCC/Manager is a member of Softool's award-winning CCC family of change and configuration management solutions for software development and maintenance. Whether you need a solution for distributed development, client/server or PC LAN environments, Softool can help you take advantage of the new technologies that are re-inventing the way applications are developed and maintained. With thousands of installations worldwide, Softool maintains an experienced and dedicated staff of customer support representatives and on site consultants. Put Softool's seventeen years of leadership in configuration management to work for you! Call for more information or to arrange an evaluation.


**QBS Software**
10 Barley Mow Passage
London, W4 4PH
Telephone: +44 0181 994 4842
Facsimile: +44 0181 994 3441

***Softool Limited***
Kamone House, 63 St Leonards Road
Windsor, Berkshire, SL4 3BX
Telephone: +44 01753 620799
Facsimile: +44 01753 620750




CIRCLE NO. 800

# DATABASE PROGRAMMERS' RETREAT

# PROGRAMMERS TEACHING PROGRAMMERS

Database Programmers' Retreat is a branch of Software Design Consultants, who has taught database programming all over the world to many prestigious clients. Our goal is to offer top quality tuition, using the best instructors, in the most comfortable surroundings.

## CA-VISUAL OBJECTS Classes

| | | |
|---|---|---|
| ● VO Intensive | 5 days | £1125 |
| ● VO Intro | 3 days | £695 |
| ● VO Overview | 1 day | £149 |

## VISUAL BASIC Classes

| | | |
|---|---|---|
| ● VB Intensive | 5 days | £1075 |
| ● VB Intro | 3 days | £695 |
| ● VB Advanced | 2 days | £495 |
| ● VB Data Handling | 2 days | £495 |

## CA-CLIPPER 5 Classes

| | | |
|---|---|---|
| ● Database Basics | 3 days | £695 |
| ● Clipper Part I | 3 days | £695 |
| ● Clipper Part II | 3 days | £695 |
| ● Clipper Part III | 3 days | £695 |

**CALL (+44) 1452 814303 FOR DETAILED COURSE OUTLINES & SCHEDULES**

## Consultancy/Programming

Need help? Give us a call. We'll be pleased to assist and advise your development projects on a daily, weekly, or monthly basis.

CIRCLE NO. 801

All classes are taught hands-on, on state of the art, 486 and Pentium colour SVGA machines. Class sizes are small and each student has his or her own machine. We specialise in ***CA-Visual Objects***, ***Visual Basic***, and ***CA-Clipper***. Our instructors are practising developers with years of both development and teaching experience. We're flexible - just ask! We can ***customise classes*** for small groups, and we can offer the same classes ***on-site***, where they can be augmented with an element of consultancy.

**Rick Spence**

Rick is one of the original developers of Clipper, and the author of three best selling Clipper books. He is a contributing editor to both Databased Advisor and Clipper Advisor magazines, and technical editor of the new Visual Objects Advisor magazine. Rick writes all our VO and Clipper training material.

**Steve Berger, MA, PHD**

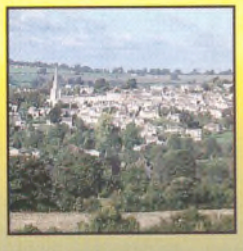
Steve Berger is an independent computer consultant based in Bristol. Starting with a degree in Maths and Physics, and a PHD in Machine Intelligence, Steve has been involved in computer programming for the last 30 years and currently specialises in VO and Clipper.

**Carol Paxton, MA**

A graduate of Oxford University, Carol has been programming and supporting microcomputers for most of the last ten years. An accomplished database programmer, Carol has written applications for a wide range of companies, from merchant banks to plant and machinery contractors, using Clipper, Oracle, and Paradox.

**Steve Hallam**

Steve has been developing microcomputer applications since 1980. He has written systems for Texaco, Rolls-Royce, Racal and many other customers, mainly using dBase, Clipper and Visual Basic. Apart from his training and development work, he also writes for the Visual Basic User Group magazine.



We are located in the heart of the beautiful Cotswold countryside - close enough to be convenient, but far enough from London to offer inexpensive, top quality accommodation. After a hard day in the lab, you can relax in a comfortable hotel, wander the quiet country lanes, or enjoy a drink in one of the many unspoilt country pubs.

TRAINING: VISUAL BASIC / CA-VISUAL OBJECTS / CA-CLIPPER 5


DATABASE PROGRAMMERS' RETREAT
LIMITED

**The Old Fleece, Bisley Street, Painswick, Gloucestershire GL6 6QQ**
**Telephone: (+44) 1452 814303 Fax: (+44) 1452 813918**

Within the objects, the designer can and, in some cases, must define certain properties. This could be the type of data anticipated or the range into which it must fall. There is a wide array to choose adding richness to the potential that models can achieve.

The function and understanding of Constraints is essential. Through these mechanisms, the behaviour of objects or facts can be modified and honed to give the conceptual model its meaning. The relationship between objects in a fact can be 1-to-1 or 1-to-many depending upon how a designer sets an item called the *internal uniqueness constraint*. That's one of the easier ones!

Don't be put off too easily though. There is a choice in how the conceptual part of the database model is constructed. For speed and those with something to prove, there is a pop-up list called a Fact Compiler to which all the facts can be added directly as objects and roles.

Conversely, a graphical Diagrammer tool gives the designer a far more intuitive way of composing a conceptual model. As illustrated in Figure 1, there are floating palettes of Constraints and Symbols. All the essential components to construct the facts, predicates, roles etc can be accessed through dialog boxes or these palettes. The Diagrammer is the only way Constraints can be added to a fact and configured. A large high resolution screen would be an asset for anything like a serious model.

## Draw not so perfect

The usual Windows facilities are available in InfoModeler however, although the haste in which the product has been launched has left a few cosmetic problems as well as one or two more fundamental flaws. InfoModeler v1.0 lacks some of the more usual features expected nowadays from graphical packages. There's no zoom facility and the whole model defaults to a series of pages, presumably to maintain scrolling performance. The inability of the window to sense mouse activity off the page actually leads to problems with objects being lost in the margins forever, albeit only visually. Fortunately, although inaccessible they are still registered in the schema and available through the Fact Compiler.

To review object allocations and enable quick navigation, there is a pop-up Object Browser which you cannot resize and which remains to obscure the Diagrammer even after you have selected an object to Goto. These will no doubt be resolved in due course.

## Version daft

The conceptual phase is the highest level of the design process and it's here where models are initialised, saved and controlled as versions. It is possible to branch a design by publishing a Draft then using a working copy. Care should obviously be taken further down the line because any generated tables or scripts will overwrite previous versions.

The workaround is to make a change to the destination path in the .INI file. However, this is not a facility that readily surfaces within InfoModeller. More limiting is the fact that InfoModeler v1.0 only ever produces a v1.0 of a model. A designer works within a Working Copy but can open a Draft Version previously published. However, that's read-only: to work on a previous version requires a revision which automatically overwrites the latest Working Copy - Beware! Perhaps an upgrade will rectify the limitation such that a designer can move between deltas and even nominate an arbitrary starting version, such as 3.1, 3.5, 6.0...

## Generating docs

There are a good selection of reports that can be printed to define the conceptual model. Collections of the elements can be grouped by category or as an across-the-board selection for a specific part of the model. These can be chosen and printed to various degrees of detail. A neat printout of the pages of the diagram always provides useful armament for the next project meeting - all in the interests of good communication, of course. Similarly, it is possible to spew forth lots of documentation at the logical model level. The table specifications can be printed individually or as a group showing various levels of detail.

# InfoModeler v1.5

While this article was being written, Asymetrix announced Infomodeler v1.5. The Asymetrix strategy is to migrate InfoModeler down from the highbrow analyst to become an everyday tool for corporate IS departments. More database drivers have been added and the pricing structure has been juggled to bring the entry level more within the grasp of independent developers. Apparently, the demand was for a single driver entry level product for the Desktop version. By un-bundling all but the customer's desired driver, the price has dropped to £350. Compared with the original pricing, this makes more sense and not far off the cost of the RDBMS you may be wanting to develop for. However, if this is too restrictive, an additional £170 will provide the other Desktop drivers. Not quite as attractive, but cheaper than v1.0. The client server kit has been reduced and yet comes with a bundle of all the drivers. It appears that there isn't an entry level issue with that version.

There are some interesting new features. The Fact Assistant is a dialog box which has been introduced to automate a process in much the same way as Wizards are doing for some Microsoft products. In v1.0, the InfoModeler Fact Compiler was lacking in the ability to add constraints and modify objects directly. Interestingly, things are taken a little further by allowing the designer to enter sample data from which the Fact Assistant deduces the relationships and constraints governed by the fact.

Importation of sample data is still not a feature. It's been mooted that a wizard-like routine with intervention from a designer coupled to pre-compiled associations could provide an inference technique to bridge the gap between E-R level and conceptual level reverse engineering - Version 2 perhaps? For the present, the Fact Assistant will obviously improve productivity by reducing the need for the designer to either work exclusively in the Diagrammer or switch continuously between it and the Fact Compiler. A one-stop-shop Assistant.

Designers have been given another tool to at the conceptual level. Formally termed the Verbaliser, it lists a selection of facts, showing the objects and combining all constraints into a compound sentence.

The Diagrammer has been endowed with Snap-To grids to make things a little neater and a much-welcome Zoom facility to allow closer attention to complex and congested models.

A criticism of InfoModeler v1.01 was the minimalist version control. Apparently a new Import and Export feature will allow model information to be transferred between different versions. It may be possible to extend this to the transfer of data between different models, thus enabling a form of object globalisation. Asymetrix is very buoyant about the power of the FORML approach. InfoModeler looks set to be destined for greater integration into 4GL systems... that's inevitably v2.0.

## Ch..Ch..Ch..changes

While languishing in the glow of having just developed a logical set of relational tables and having the documentation as proof, it is still possible to make changes. Treated correctly these changes can be carried back to the conceptual level and incorporated into the Fact Compiler listing by selecting the *Recompile* option in its menu system. By switching focus onto a specific table, an icon on the toolbar can expand the table to show table attribute types, sizes and the descriptions which map from the conceptual model. At this point it is possible to refine the attribute specifications before stepping forward to generate the physical tables. It's even possible to reduce the tables to a set of linked icons, but not really worth the effort involved.

## Direct drive

The Access driver is the only one which actually develops the tables directly. Perhaps there's a hint of nepotism, conversely it may simply underline that Access is a true contender as a desktop RDBMS. A lot of corporates seem to think so. Nevertheless, all other drivers require the produced script or program module to be submitted to the DBMS separately. There is some good justification for allowing the developer to intervene at this stage. The Desktop DBMS's obviously have a varying capability to perform as fully relational databases. The scripts and modules generated provide good documentation of the limitations and

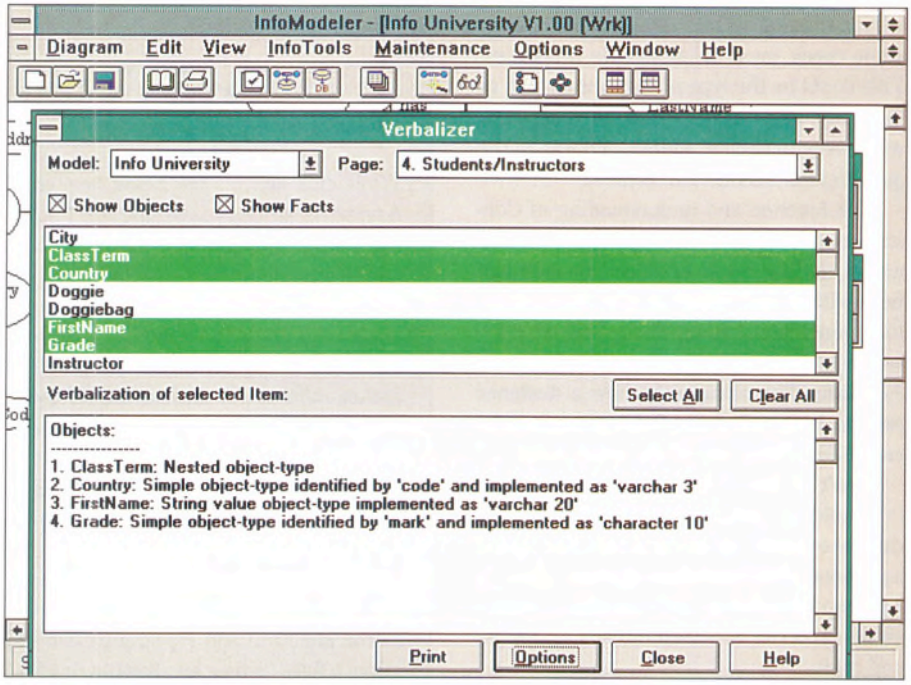
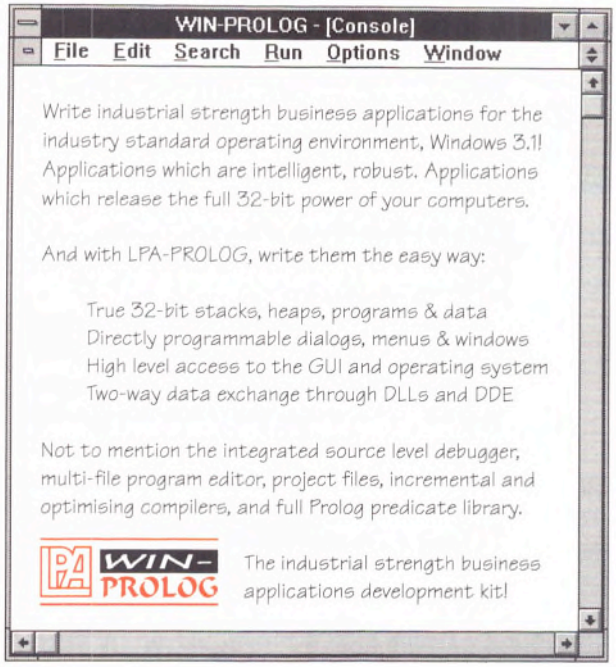



*Figure 3 - The selected objects are 'verbalised' to aid understanding*

# Industrial Strength

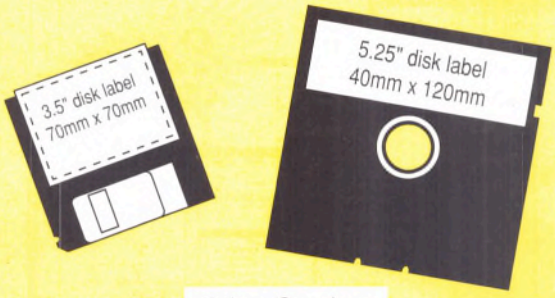



Logic Programming Associates Ltd
Phone (US Toll Free): 1-800-949-7567
Phone: +44 81 871 2016 - Fax: +44 81 874 0449
Email: lpa@cix.compulink.co.uk - Compuserve: 100135,134

CIRCLE NO. 803

# DISK LABEL PRINTING

*Customise your labels by adding your company logo or colour*




*Other Services*

MANUALS FULL ARTWORK/ORIGINATION
WIRE-O-BINDING TABBING SHRINK WRAPPING
DATA CONVERSION OVERPRINTED DISK SLEEVES
RING BINDERS/SLIPCASES PLAIN OR PRINTED

| Qty | Price one colour | Per extra colour |
|---|---|---|
| 1000 | £85 | £36 |
| per 1000 run-on | £22 | £22 |

*Supplied on A4 sheets - Permanent adhesive*
*Inclusive of delivery - VAT excluded*

Ridgeway Press, 13 Horseshoe Park, Pangbourne, Berks RG8 7JW
Tel: 0734 845331 Fax: 0734 845186

CIRCLE NO. 804

# Distinct® TCP/IP for Windows™

## Standard

- **APIs for Windows Sockets, Berkeley Sockets, ONC RPC/XDR, Telnet, FTP, NetWin, SMTP, POP2/POP3, and NNTP.**
- Up to 128 concurrent sessions with user definable buffers and timeout values.
- Supports NDIS, ODI and Packet drivers, SLIP, CSLIP and PPP with powerful scripting.
- BOOTP and RARP client and server.
- Co-exists with Netware, Lan Manager, Vines, Lantastic and Pathworks at no additional cost.
- Over 200 KB source code sample programs.
- Complete network configuration program with automated network detection technology.

NEW!

- **Includes C++ Class Libraries**

## Professional

- Includes all the above features **PLUS** Telnet VT emulator, drag and drop FTP client and server, TFTP, LPR, LPD, transparent printing, Network Monitor, Finger and more.

## Visual Edition™

- **TCP/IP custom controls (VBX) for Visual Basic** from the winner of the BasicPro readers choice award. Includes custom controls for Windows Sockets, FTP and Telnet.
- Ideal for writing Visual Basic front ends to client/server applications.
- Use as an add on to the other kits or alone.

**071 833 1022**
**System Science**
**3-5 Cynthia Street**
**London N1 9JF**

distinct

CIRCLE NO. 805

steps required. Considering the cost of some of these drivers, it is surprising that some sort of runtime module is not included.

## Impressions

Overall, in terms of cost, it is expensive. Quite apart from the former somewhat bizarre pricing structure (it used to be possible to buy the same product for a different price depending upon the order in which the modules were obtained) there is the commitment required in the initial learning curve and possibly support after that. It seems squarely aimed at the companies who have gained Access or who are pursuing the small-sized client server platforms. Training is almost a necessity, if only to get a translation of the terms. Certainly it offers a daunting task to us lesser mortals who lost track of academia many years ago.

ICS Solutions Ltd is the exclusive distributor in the UK. It also provides training and ongoing technical support contracts.

With perseverance and a few maintenance revisions, InfoModeler offers benefits to serious database developers, benefits which seem to be missing from almost all current DBMSs. To re-iterate a point made earlier, it is not a substitute for ability. It doesn't open Pandora's Box. It does help those designers under stress, unable to organise themselves or those with large complex projects to hang all the details on a rigorous framework. The discipline can save time, reduce mistakes and provide the uniformity for which organisations strive.

**In trying to be concise it regurgitates one of the most obscure dictionaries and often provides cyclic definitions**

An outstanding potential benefit lies in being able to migrate a conceptual model from one RDBMS to another with the minimum of fuss, yet still evoke warnings of what implementation problems may exist. Undoubtedly, it fills a gap in the developers' arsenal of database tools. Whether there is justification for the commitment depends upon each developer and the work on hand. For those already involved in structured analysis and design for applications, InfoModeler doesn't (yet) bridge the gap to such development methodologies. Asymetrix is keenly watching the marketplace and perhaps when repositories of some 4GLs become more open, the interchange will be made easier. It is intent on achieving Chicago compliance for v2.0 with all its attendant object-level benefits through OLE.

Database design is not easy at the best of times and although InfoModeler in its current guise may not gel immediately, nevertheless, given time and the right circumstances it could prove to be an indispensable aid. ■

## Bibliography

Conceptual Schema & Relational Database Design by GM Nijssen and Dr TA Halpin Publishers: Prentice Hall.

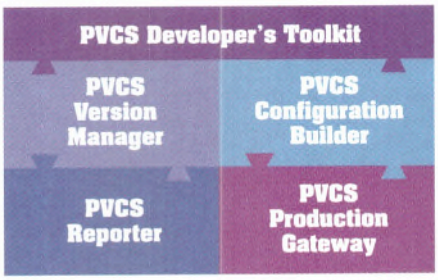
*InfoModeller is distributed in the UK by ICS Solutions Ltd, 0256 840494. Darrell Dixon is a Freelance journalist and independent application developer.*

*"We chose PVCS because the vendors of our new development tools recommended it. They told us Software Configuration Management was a necessity for productive development on the LAN. I'm glad we listened to them. PVCS has proven to be invaluable. We now have superb control over all development efforts."*

# The Major Development Tool Vendors Agree: PVCS Is Essential for Productive Development on the LAN

**Selected Vendors:**

Borland International IDE
Digitalk Team/V
Gupta Technologies, Inc.
HP SoftBench
IBM SDE/6000
IBM OS/2
Interactive Unix
Micro Focus COBOL
Microsoft Visual C++
Microsoft PWB
Powersoft PowerBuilder
SCO
SunOS
SunSoft
Solaris
Symantec C++ IDDE
And many more...




## Leverage Your Tool Investment with PVCS

There's a reason why all major Client/Server and LAN development vendors have formed alliances with INTERSOLV. It's PVCS—the standard for Software Configuration Management on the LAN. It's a vital ingredient for productive LAN development.

## Every Major Development Tool Vendor Partners with Intersolv

The list on the left is only partial. PVCS is available in all the environments developers work in—today and tomorrow. That means less training–you don't have to learn another SCM tool if there's a change. That means more efficient development and easily enforced standards. It means consistent audit trails for all development, and the ability to correct errors and anomalies at any time.

## Serious Application Development Demands PVCS

The trend is clear. Important applications in your company are moving to the LAN. They need the control and reliability that PVCS provides. Your development tool vendors know that–that's why they recommend PVCS.


**Call Today for More Information:**
**Tel: 071 625 5255**
**Fax: 071 624 9404**


**The Standard for Software Configuration Management on the LAN**

*Readmar Systems* **Ltd, 239 Kilburn Park Road, London NW6 5LG**

CIRCLE NO. 808

# Ctrl

## Cybercakes

**`Internet has been available for over 20 years' it says here, yep, that's true. `However, till now it has been the preserve of the elite men from academia, military and governments': this also has some foundation in reality. `Cyberia has changed all that'. Oh really? Now *that* I hadn't heard before. Cyberia, you see, is a recently opened cafe that, along with the usual coffee and danish, provides the opportunity to access the Internet.**

**Despite slightly unrealistic claims, it appears to be doing quite well. When Control Break visited, all but one of the available computers were being used and help seemed to be readily available. Easynet, purveyors of local call access to the Internet and Easynet software, are minority shareholders in this venture to bring Internet `power to the people'. Apparently, although both are London based at present, there are plans to expand to the further reaches of the country.**

**It seems unlikely that EXE readers will need to take advantage of Cyberia's £50 evening training sessions but, if you're in neighbourhood of the big bad city, you may wish to pop along: if only to try and spot `newbies' (Internet virgins) Led Zeppelin, hanging out whilst recording their new album.**

## Mysteria

It finally arrived. I'd seen the ad for MPC CD-ROM. Rung up for my `review' copy (`yeah, I've got absolutely no interest in it myself, I just feel that our readers should know what's out there...cough'). Got thoroughly over-excited, interrogated the post-boy every morning (relations are pretty strained now). And it's here.

Myst is everything you'd expect it to be. Which is actually pretty surprising. The promises of computer adventure games, for me, have always lived somewhere on the other side of advertising reality. Like when I first saw the Sindy dolls house on television: oh what *fun* me and Sindy could have together. Then my best friend's parents bought her one: we sat in dismay surrounded by assorted pieces of pink and blue plastic. And computer adventure games have always seemed pretty much the same. The advert looks good, the idea is sound: but you still end up with this little bitmapped icon walking around different Sonic-esque levels.

Myst, however, has put an end to my disillusionment. It's all those words that advertisers love: haunting, beautiful, intreaguing but most important of all, it's addictive. You're given no instructions. All you are told is that you have landed on a surreal island, with no option other than to explore. There is a goal: but you have to determine it.

When I've wrestled my copy back from the clutches of my Publisher (and I will). I'm going to get to the bottom of this fantasy world. I'm going to catalogue all the information, solve the puzzles and find out what's going on. If only so that I can stop dreaming about trees, space ships and combination numbers...

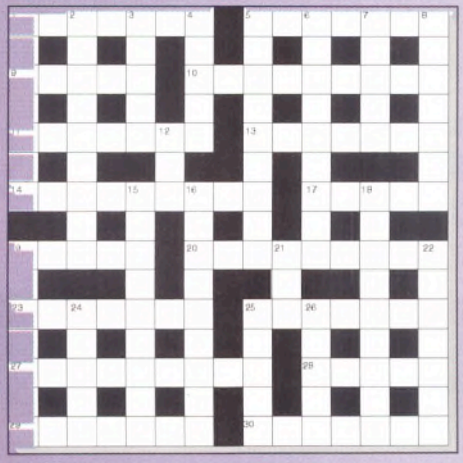
Please send your rants, raves and competition entries to:

**Ctrl/Break**
**EXE Magazine**
**50 Poland Street**
**London W1V 4AX**

## Reader of the Month

Last month, within these very pages, you bore witness to the commencement of Control Break's ceaseless quest for EXE Reader of the Month. We vowed to search far and wide, leaving no stone unturned, no bar unvisited and in particular no half pint of lager undrunk in our mission to find he who is truly deserving. The prize? The Venerable Vestment of Development of course: fashioned to the highest quality, with a bijou EXE logo above the breast pocket. How could you possibly resist? We already have a rogues gallery extraordinaire currently being displayed in the corridors of EXE: if all else fails Control Break sees a profitable future in extortion and blackmail. Next month sees the unveiling of the first ever EXE Reader of the Month: all you have to do is send in a photograph of the nominee, with a few words on what they're like, what they do and why you feel they deserve to win.


## PRIZE CROSSWORD



**ACROSS**

1 Channel Tunnel content? (7)
5 Capturing data in the Thames Valley (7)
9 Highly flexible musical input/output unit? (5)
10 What all channels do to 1 ac (9)
11 Name bit somehow surrounding... (7)
13 ... arrangement of matrix with aluminium (7)
14 Triplet code for Hooke's law (9)
17 British computer firm may become a great tree (5)
19 Fundamental coding environment? (5)
20 How the analyst copes with the bugged system (9)
23 Part of the cpu? (3-4)
25 Trapped like the items in a linked list (7)
27 Able, I calm rough waters that can be reimbursed (9)
28 Red Square saint is 19, but 50 not 10 (5)
29 Go round, led round the pivot (7)
30 How the device battles the current! (7)

**DOWN**

1 Memory holds silver, showing its function (7)
2 Optical disc capacity (9)
3 She got her gun with a Hall effect (5)
4 Little science and art make video connector (5)
5 Educated once more for new vocation (9)
6 They're rare, seamen with perpendiculars (9)
7 Information technology lay-about in southern state (5)
8 Men and girl make old bug... (7)
12 ... as son returns with negatives (3)
15 Given a familiar label? (9)
16 Highly sensitive and not in a good mood (9)
18 3 may link with philosophies to make living creatures (9)
19 Two way religions it splits down the middle (7)
21 Ron's glum girl makes the old third person form (3)
22 Prepares the horse with 3D points of inflection (7)
24 Two way start round crone with Indian onion cake (5)
25 Remove values from store (5)
26 French Fathers with monasteries, why not? (5)

ANWERS TO OCTOBER'S EXE
**ACROSS** 1. COMPUTERISATION 9. ANALYST 10. NOTHING 11. NESTS 12. INCREMENT 13. LIAISES 15. DISBARS 16. TRAFFIC 18. MISTYPE 21. INDUCTORS 23. OUTER 25. GENUINE 26. INERTIA 27. REDUNDANCY CHECK **DOWN** 1. CHANNEL 2. MOANS 3. ULYSSES 4. EXTRINSIC 5. TONIC 6. APTNESS 7. ITINERARY 8. NEGATES 14. ABANDONED 15. DUMPS RISC 16. TRIGGER 17. FICTION 19. STOLEIC 20. EARMARK 22. OMEGA 24. TITLE

This month's crossword prize is `Monty Python's `A Complete Waste of Time' CD-ROM from Longman Logotron. An additional `mystery prize' will be offered to the most ridiculous chicken joke.

# Break

## Yea, and the geeks shall inherit the earth

*"In highschool they called you a computer geek. Now, they work at burger joints and wear polyester uniforms. And you don't."*

Control Break was amused and delighted to see this advert in the most excellent *Wired* magazine. `Geekware', from Metrowerks, is an inspired invention. These shirts are still not available in the UK, and the situation looks likely to stay the same for some time. Apparently demand in the US has been so great, Metrowerks has had to stop running the adverts while it tries to keep up with orders. But your ever-faithful and wily Control Break has come up trumps again: we've got one of these shirts (wrestled from the jealous arms of the Editor) to give away to the lucky, lucky reader who can tell us which software product, recently reviewed in EXE, Metrowerks purveys.

Of course, if none of you feel like writing in, then we'll just have to keep it ourselves... what a shame: I feel a strange sense of foreboding with regard to the postman.

## EXE Readers Club

The third EXE Readers Club token is now within your possession. Cut it out and send it to us with the previous two tokens to receive your EXE Readers Club pack. If you've only just started subscribing, (where have you *been*?) don't worry: collect tokens from forthcoming issues and use these.

Join the EXE Readers Club for an impressive list of specially negotiated offers, discounts and bargains. Keep your eyes peeled. Scour Control Break every month for the latest selection.

You've read the review now buy the product! Silicon River is kindly offering EXE readers an extended chance to buy Poet for only £99. Turn to page 32 for Mary Hope's assessment.

Just a quick reminder that the EXE Gupta `SQL Windows Developers Day' will be held in London at the Church House Conference Centre, Deans Yard, Westminster on November 22nd. For a mere £50 you can attend the seminar and receive an additional two year's subscription.

If you haven't already, why not write in or phone for an information pack for the all new EXE Software Developers Challenge, taking place at the Software Developer's Forum on the 8th and 9th of February. Don't miss this exciting opportunity to compete with the cream of Europe's development community.

**'I read EXE because...'** Finish this highly original and intelectually challenging sentence and you could be the lucky reader who wins **The EXE Software Hamper!** Our special Christmas Gift to one of our lucky readers will be packed with software, games, an EXE Reader Anorak and **an EXE Christmas pudding** (yum).

**Ring Suzanne Chamberlain NOW on 071 287 5000 ext 3148 for details of all our special offers.**

### Free Books

**Taligent's Guide To Designing Programs (Well-Mannered Object-Oriented Design in C++)** by Taligent and published by Addison Wesley. Official documentation for developers working in the Taligent Application Environment. We have five copies to give away: send your postcards marked 'Taligent'.

**Fundamental Algorithms by Donald Knuth.** Published by Addison Wesley this is a programming classic and comes highly recommended by our former Editor, Will Watts. What more can we say? We have three copies to give away: send your postcards marked 'Knuth'.

EXE TOKEN No3 November

## GARBAGE COLLECTOR

```
StrVar = IIF (ISNull (AnyTable
("AnyField")) , Format$ (SOME_CONST)
, AnyTable ("AnyField"))
```

This code is part of a VB application using Data Access. (All on one line). Unfortunately it corrupts something or other, because at some random time later the program crashes at a database access type statement (not always the same one) with a GP Fault at 004A:0071. Re-writing the above as an IF THEN ELSE ENDIF statement (ie dropping the IIF) cures the problem. This took me three days to find. Congratulations Richard Clarke, you do indeed get an EXE t-shirt, mug and pen.

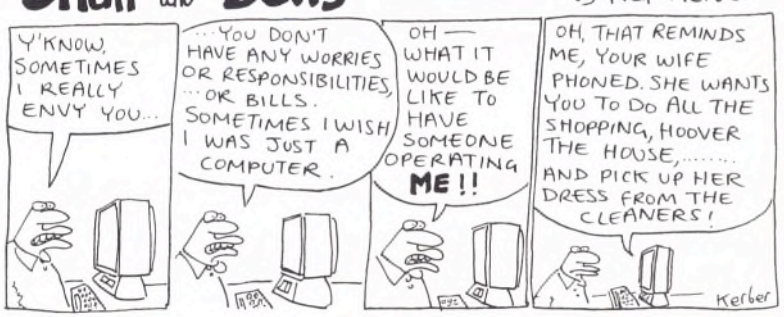
Why not send your own program hiccups to Garbage Collector. With enough mistakes you could have an EXE t-shirt collection to rival the Editor's!

### Cream teas galore! Hurrah!

**Gosh our publisher really is a brick. She's come up with this simply smashing idea for a comp. The first lucky guy or gal to write in and tell us which river is pictured in the adjacent snap wins a Bed and Breakfast weekend for two in Devon. (Hint: Look at the cover). We're sure you'll have a ripping time. Send your competition entries to 'What a jolly competition' care of the EXE address.**

## Brian and Betty

by Neil Kerber



# An easy route to Unix?

**Tim Joyce** from Protek looks at the potential attractions of using Visual C++ as a cross-platform tool, allowing Windows programmers to penetrate the Unix/Motif marketplace with existing applications.

With the current growth in the Unix Workstation market, there is an increasing demand for sophisticated applications on the Unix/Motif platform. You know the type, user-friendly, intuitive applications that Windows users now take for granted. So the question facing many a Windows application programmer is: 'How do I break into this lucrative and expanding market place?'

One approach is to re-engineer the application completely for Unix/Motif. For many Windows houses, this approach would involve investing in expensive development workstations and buying in Unix/Motif expertise. Then having spent a considerable amount of time redesigning the GUI for Unix/Motif you would have two sets of source code, adding to maintenance costs, and an application which behaves differently on each platform. Clearly not an ideal situation.

## Considering GUI portability

It is important at this point to examine two factors vital to GUI design, specifically where more than one platform is being targeted. First, the native 'look and feel' of a GUI is determined by the Style Guide. This dictates the layout of the interface and its underlying behaviour. As an example, the `Maximise/Minimise` buttons in MS Windows are always in the top right hand corner of a window and must always perform the same function. In Motif these buttons look completely different but behave in the same way. Next is integration. A GUI will have to integrate with the platform's operating environment to take advantage of its additional features. Integration with other applications can also be highly important for certain applications.

An application which lacks conformity to a platform's Style Guide and/or has problems with integration, will have features that do not quite behave in the expected manner. These can be small deviations from the style guide, giving the impression that the application is 'buggy'. The result of this will be user frustration, a drop in productivity and an unsuccessful product.

## Problems with porting tools

A common way of avoiding these problems is to use one of the many cross-platform solutions now available. The tools available fall into five main categories. *Binary Emulation* provides a mechanism for end users to run binary Windows applications on Unix. *Layered Toolkits* provide a proprietary virtual API that makes calls to the native APIs of target platforms. *Emulation Toolkits* use a proprietary virtual API to emulate the native APIs of target platforms *Portable Application Frameworks* offer a set of proprietary C++ classes that provide basic portability via a set of prebuilt application services. *Ported APIs* allow developers to program to an industry standard native API which is made available on another platform.

Let's take a look at the pros and cons of these one at a time. In Binary Emulation, such as the approach taken by SoftWindows from Insignia Solutions and Wabi from Sun Select, no additional development is required to run the application on Unix, but there are performance penalties. The application will *not* comply to the native 'look and

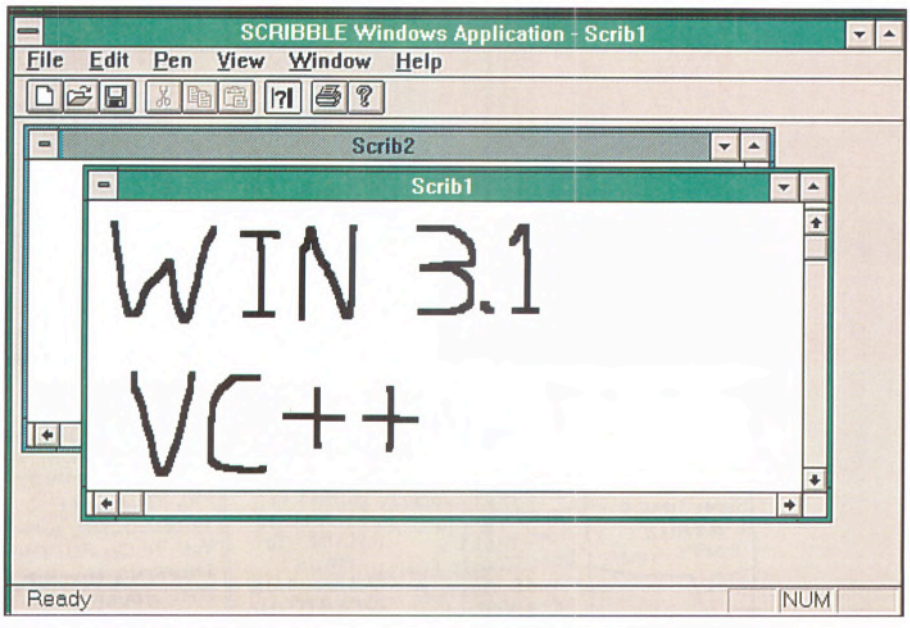



*Figure 1 - Scribble application running under Windows*

# IMSL for C

Whether you require complex mathematics or statistics, or presentation-quality graphics, IMSL C Productivity Tools gives you the flexibility and power you need for your C and Motif application development.

## IMSL® C Numerical Libraries

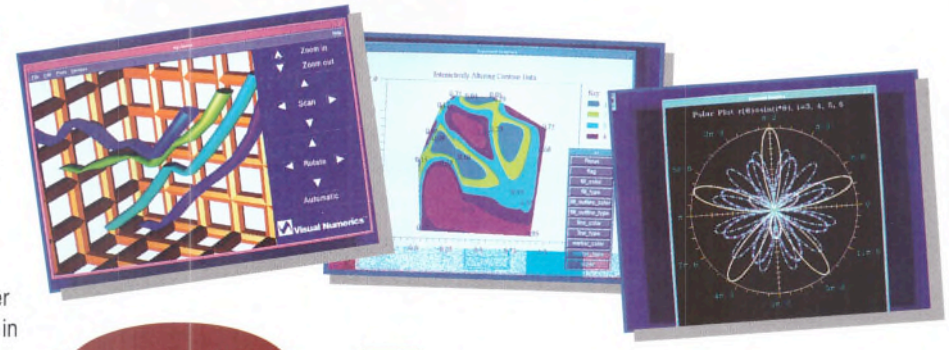
- Mathematical functions range from linear systems, to eigensystem analysis, to optimization.
- Statistical functions range from analysis of variance to time series analysis and forecasting.

## Exponent Graphics® for C

- Interactive graphics library produces over 30 different scientific and business plots in 2D and 3D.
- Built-in GUI allows you to quickly modify plots, access your data, prototype results and perform "what if" analysis.

## Exponent Graphics® for X

- Plot widget library designed specifically for the OSF/Motif application developer.
- Extensive widget hierarchy provides over 180 X resources




**Now Available for PC's**

**Visual Numerics™**

For more information or for a 30-day free trial, call your nearest office:

| | | | |
|---|---|---|---|
| U.K Office, | Tel: +44-753-790600 | Fax: +44-753-790601 | Email: info@vniuk.co.uk |
| French Office, | Tel: +33-1-46 93 94 20 | Fax: +33-1-46 93 94 39 | |
| German Office, | Tel: +49-711-7287 490 | Fax: +49-711-7287 499 | |

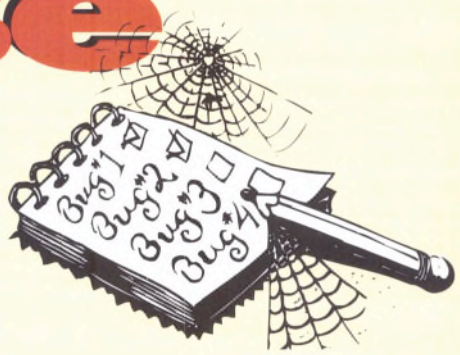
Supported on Sun Microsystems, Silicon Graphics, IBM®, Hewlett-Packard®, and Digital Equipment computing platforms.

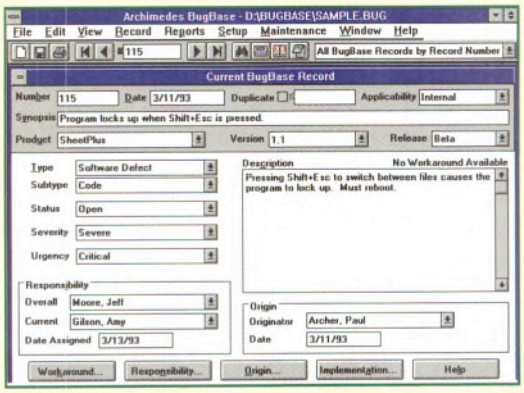


CIRCLE NO. 809

# BugBase™

## has retired the old standard for tracking bugs.




*"At a glance, you can tell the status of any defect or change order, who is responsible for correcting the defect or implementing the change, and when the updated version is expected."*

Wave goodbye to pen, paper and home-grown solutions.

**BUGBASE™ FOR WINDOWS™ - THE PROFESSIONAL SOFTWARE DEFECT TRACKING TOOL.**

- GENERATE POWERFUL REPORTS & GRAPHS
- IMPORT/EXPORT/MERGE DATABASES
- CUSTOMIZE THE SETUP TO YOUR NEEDS
- NETWORK SUPPORT

**FOR MORE INFORMATION IN EUROPE,**
**CALL: +47 67 15 67 00**
**FAX: +47 67 15 67 01**

**IN THE UK, CONTACT GREY MATTER,**
**CALL 0364 654100 • FAX 0364 654200**

ARCHIMEDES SOFTWARE

*Archimedes Software, Inc. 2159 Union Street, San Francisco, CA 94123, USA.*

CIRCLE NO. 810

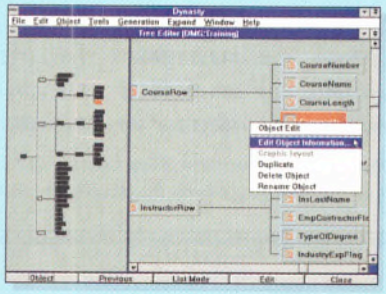
Are you looking for an application development tool to build cross-platform enterprise-class client/server applications?

DYNASTY

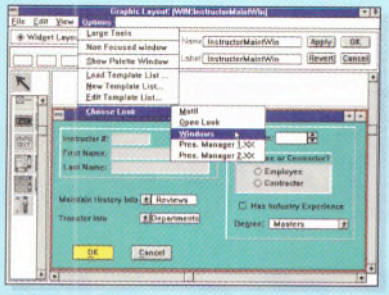
# IS THE NEW GENERATION

DYNASTY is a new generation enterprise class client/server development environment that supports the complete generation (C, SQL, Middleware) of high performance, cross-platform (Windows, Motif, PM, Mac, OpenLook) client/server applications.

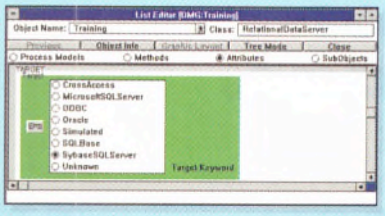
DYNASTY supports all major operating systems, RBDMSs and networks. These applications enable scalable deployment of dynamic, complex business systems supporting cross functional, core business process automation.



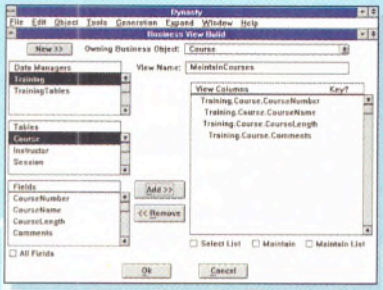
*DYNASTY'S graphic Object Editor.*



*Cross-platform generation from a single application design.*



*Graphically targeting a database.*



*Graphically building a Business View for database access.*

Overall benefits:

- Target independent cross-platform generation
- n-tier partitioning (not just 3-tier) and multiple partitioning schemes mean flexible, scalable applications
- Compiled C code for high performance
- Generation of C, SQL and middleware for a complete application
- Object management facilities to make OO benefits a reality for any developer
- Object repository for team development

Represented in the UK and Ireland by

## SYSTEMS FX

The Gables, Market Square,
Princes Risborough,
Bucks HP27 0AN
Telephone 01 844 275175
Fax 01 844 343615

*...Quality Tools for GUI and Client/Server Developers*

See us and DYNASTY at
WINDOWS EXPO 94
Olympia 1 - 3 November

SYSTEMS FX

CIRCLE NO. 830

feel' and will *not* interact with native applications.

Layered Toolkits such as XVT from XVT Technology build on the native API. This helps with conformity to the native 'look and feel'. While it works well with simple applications, this approach is of the lowest common denominator (LCD) variety, so only those features available on *both* platforms are supported. Developers have to learn and then depend on a new virtual API.

The LCD trap is avoided in Emulation Toolkits (eg Galaxy from Visix and Open Interface from Neuron Data), since they support features not available on native platforms. Again, they are reasonably easy to use, but retraining is required to learn a new virtual API. The very fact that these toolkits are emulations means that they will not interact with native applications. Although the 'look' may be close to the native environment, the 'feel' will not.

Portable Application Frameworks like zApp from Inmark provide the C++ equivalent to Layered Toolkits, plus a range of prebuilt application services. This solution falls into the LCD trap. Applications have to be rearchitected completely.

Ported APIs such as Wind/U from Bristol Technology build on the native API of the target platform, so the 'look and feel' is the same as a native application. A high percentage of source functionality is provided. Source is written in a native API (Windows SDK, VC++/MFC) so they are able to make the most of existing investment. These tools concentrate on a single API, so when porting to more than one platform it becomes necessary to deal with multiple vendors.

## GUI incompatible

Irrespective of the cross-platform solution you chose it is important to understand some of the basic differences between Windows and Unix/Motif. Windows and Motif differ in the fundamental way that a program interacts with the windowing system.

Motif is a distributed windowing system, allowing multiple applications to run concurrently, so programs must handle events asynchronously. This can cause problems when checking that calls to a library have been successful, although error handlers can be added. In Windows all events are synchronous. One can always check for the return value.

In Motif, events are used to notify a program to take certain actions. Programmers generally will not get involved with the X event loop. Widgets will interact with programs via callbacks, the XToolkit having taken care of the event processing and ensured that the Widget receives the correct event. In Windows, the programmer has to implement many message procedures to cope with the numerous messages sent to the application from the windowing system.

Unix is a 32-bit preemptive multitasking operating system, with protected address space. In contrast, Windows is a 16-bit operating system, is non-preemptive and allows applications to share resources.

Motif is distributed with a client and a server; Windows is not. This means that Windows is faster as it draws directly to the frame buffer, but Motif applications can be transported across a network to a variety of servers.

In Windows all user interface objects are statically defined in resource files. It is up to the developer to make changes. Motif supports geometry management: developers do not usually get involved in re-laying out objects. One can specify static resources via UIL.

Attributes such as fonts and colours can be changed by end users in both Motif and Windows. In Windows, changes made using the Control Panel globally effect all applications. In Motif, application attributes can be manipulated through X resources. The application developer can specify the attributes end users have access to.

## Missing features

There are a number of features available on Windows that are not available on Motif. Windows has a standard context sensitive hypertext help system. A program accesses this via one function call, `WinHelp()`. So all Windows applications have a common look and feel to their help systems. No such standard application help system exists for Motif.

# Incompatibilities when compiling MFC under Unix

### Example (1): Class Definitions

Visual C++ allows an extra semicolon at the end of class definitions:

```
// Non-portable Code
DECLARE_DYNAMIC (ClassName) ;
// Portable Code
DECLARE_DYNAMIC (ClassName)
```

### Example (2): Type Casting

Unix C++ compilers only support the C syntax for type casting

```
// Non-Portable Code
date.d_Day=unsigned char (i)
// Portable Code
date.d_Day=(unsigned char) i ;
```

### Example (3): Interchanging Types

```
//Non-Portable Code
BOOL WinCalApp: :ExitInstance()
//Portable Code
int WinCalApp: :ExitInstance()
```

### Example (4): Variable Declarations

Visual C++ allows variable declarations in switch statement cases without requiring a new scope

```
// a real day
default :
int real_day=d_CellType[cell];
Doit (real_day)
```

To make this portable, enclose the statement in a pair of braces to explicitly define the scope of the new variable

```
default :
{
   // a real day
   int real_day=d_CellType[cell];
   Doit (real_day)
}
```

### Example (5): Compilation

```
"afxwin.h" , line 1694 : warning : CStatic : : Create ()
hides virtual
CWnd : : Create ()
```

### Example (6): Word Sizes

The following is an example of working but non portable Windows code:

```
typedef unsigned short WORD;
  int function ( )
  {
    Word wTwo;
    int nOne;
    . . .
    wTwo=(WORD) nOne;
    . . .
  }
```

Windows applications have a common printing model too. This allows user selection of printers and printer resources and provides WYSIWYG printing. Although planned for the future, no such standard currently exists for Motif.

An increasingly important feature to any Windows developer is OLE (Object Linking and Embedding). It is becoming central to application development using Visual C++. Windows Controls do not always have an equivalent Motif Widget. An example of this is the combo box. There are several other features important to Windows that are not available on Unix/Motif. Notable amongst these are Dynamic Link Libraries (DLLs), Dynamic Data Exchange (DDE) and common dialogs. These will be well known to the Windows community.

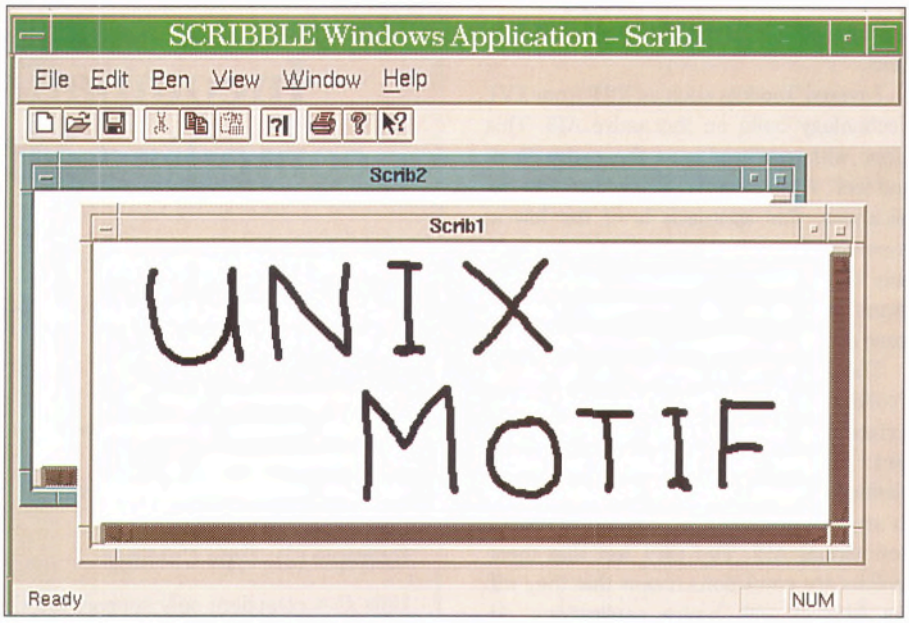



*Figure 2 - A Motif version of Scribble*

### Messy desktops

Integral to the functionality and behaviour of many Windows applications is the Multiple Document Interface (MDI) paradigm. This allows several documents to be open at once and contained within the application. The MDI children are clipped within the application, thus avoiding confusion as to ownership. The children can be tiled, cascaded, iconified and maximised. Motif applications use free floating application shells for multiple documents. This gives the 'messy desktop' paradigm.

When comparing the two windowing systems, it becomes clear that at the present time Windows is considerably more advanced than Motif. The Windows API is also the most prevalent of the available programming interfaces. This, combined with the numerous high-quality tools available for Windows provides a strong argument for using the Windows API as the cornerstone of your cross-platform development strategy. Figures 1 and 2 illustrate what can be used. The Windows application in Figure 1 has been ported to Motif in Figure 2.

Nu-Mega
TECHNOLOGIES INC

# AVOID EMBARRASSMENT!

## In Windows, DOS, Windows NT, Win32s - Even Chicago... With BOUNDS-CHECKER™ Tools, You Can Develop On Five Different O/S, And Catch Program Bugs!

***The BOUNDS-CHECKER Experience*** If you're a C/C++ programmer, it's a must! ***Here's why:*** BOUNDS-CHECKER puts you in control of software program bugs. It's that simple! No other development tool tracks down C/C++ program bugs so thoroughly and so automatically. ***Here's how it works:*** BOUNDS-CHECKER sets hundreds of breakpoints within your program to monitor its behavior. When a bug is detected, BOUNDS-CHECKER immediately stops your program and pops up with a detailed description of why the error occurred. You can then inspect your program's source, variable, stack and heap with BOUNDS-CHECKER's powerful display windows to help determine the exact cause of the problem. In addition, BOUNDS-CHECKER logs all Windows events, including API calls, API returns, and other important events. These events can be viewed with T-VIEW™, BOUNDS-CHECKER's exclusive event viewer - a tool designed to help you see the flow of your program.

***BOUNDS-CHECKER - Now Multi-O/S!*** Nu-Mega has just the right BOUNDS-CHECKER to see you through your next release - In Windows, DOS, Windows NT, WIN32s, and coming soon - Chicago! That's right! Nu-Mega has packed all the power of our16-Bit BOUNDS-CHECKER automatic debuggers plus even more features, into a family of 32-Bit tools that programmers must have! New 32-Bit features include thread control and API compliance capabilities. So tackle NT, take-on WIN32s, and look toward Chicago!

***Easy To Use*** There is no learning curve with BOUNDS-CHECKER. Simply select your program's name from BOUNDS-CHECKER's menu; all the rest is automatic. There's nothing to link-in and no macros to compile into your program. BOUNDS-CHECKER tools use the debug information produced by your own compiler. All this, plus the functionality of a *single comprehensive automatic bug finder!*

***Stop Bugs Like These At Their Source!***

- API Parameter Errors
- API Compliance Errors
- Resource Leakage Problems
- Processor Faults
- API Return Value Errors
- Data And Heap Corruption
- Memory Leakage Problems

***BOUNDS-CHECKER, Your Guide To Chicago!*** It's the newest BOUNDS-CHECKER, and it's coming soon! If your new application has you "Chicago-bound," - take this new wonder along for the ride. It'll help you navigate through even the most complex passages of Chicago, so you can make your new release on-time and error-free!


***Get It Right In Your O/S!*** Using BOUNDS-CHECKER during application development just makes sense. It's like a built-in first line of defense against program bugs. The fact is, using BOUNDS-CHECKER today can save you a lot of grief in the long run - Avoid Embarrassment, make sure all of your programs have been BOUNDS-CHECKED! Rely on Nu-Mega and BOUNDS-CHECKER to make your next release the best ever!

### Make Your Order A Trio And Save A Bundle!

Choose any three BOUNDS-CHECKER products **(including BOUNDS-CHECKER For Chicago)** - and get the third FREE!

- ❑ **BOUNDS-CHECKER For Windows**
- ❑ **BOUNDS-CHECKER32/NT**
- ❑ **BOUNDS-CHECKER For WIN32s**
- ❑ **BOUNDS-CHECKER For DOS**

**£195 + VAT each**

- ❑ **Chicago Reservation!** Yes, I want BOUNDS-CHECKER For Chicago Now! (Call us for ordering information)

**Special Trio Price: £415 + VAT! Single Orders: £195 + VAT each**

**Call System Science Now! (0171) 833-1022**
**Or Fax This Form! (0171) 837-6411**

❑ VISA ❑ MasterCard

Card # _____ _____ _____ _____ Exp. _____

Card Holder Name (Print) _____

Signature _____

Phone: _____

OverNight Delivery! Risk=Null/30 day money-back Guarantee



**Call: (0171) 833-1022**
**FAX: (0171) 837-6411**

SYSTEM SCIENCE

**RISK = NULL**
**30 DAY**
**MONEY BACK GUARANTEE**

**3-5 Cynthia Street**
**London N1 9JF**

**24 HOUR BBS**
**001-603-595-0386**

CIRCLE NO. 813

## Confused about the API?

Now that we have covered some of the fundamental differences between Windows and Unix/Motif, let's look at some specific examples of portability problems. Here I will concentrate on the use of Visual C++ and MFC (Microsoft Foundation Classes), the preferred UI builder for Windows, which can also be used as a cross-platform development tool. These problems also apply to other cross-platform solutions.

The first program facing the developer is that there are several Windows APIs: Win16, Win32 and Win32s. Of these Win32s is the cross-platform API. It is available on Windows 3.1, Windows NT, Macintosh System 7 (from Microsoft) and Unix/Motif (from Bristol Technology). Writing to Win32s and MFC can result in a single source code for all the above platforms. Win32s includes features from Win32 but non-portable functions from Win16 have been removed and should not be used for portable code.

Next is the question of which compiler. Generally speaking, Unix compilers are based on the AT&T CFront implementation and most Windows compilers are CFront 3.0 compatible. The Visual C++ compiler is, in the main, compatible with C++ compilers supplied by Sun, HP and IBM. However there are some minor differences to watch out for. As can be seen in Example 3, Visual C++ allows you to interchange type `int` and user defined type `BOOL`. With Unix C++ compilers these are different types, so the return value must match the base class return value type. Another incompatibility regards the scope rules. In Example 4, Visual C++ allows variable declarations in switch statement cases without requiring a new scope. MFC uses Visual C++ compiler `#pragma warning(disable : 4xxx)` directives to eliminate warning messages during compiles. So you can ignore warnings such as those found in Example 5.

> **Some Unix workstations have Big-endian byte ordering, as opposed to little-endian on Intel**

Example 6 shows a piece of working but non-portable Windows code. The reason that this code will not port to a 32-bit environment like NT or Unix is that integers in Windows are usually 16-bits wide but in NT and Unix they are 32-bits wide. Problems would occur if the value of `nOne` is greater than 65,535 because it would become too large to fit into `wTwo`.

Another point to consider is byte/word ordering. Some Unix workstations have Big-endian byte ordering, as opposed to little-endian on Intel. So code assumes that an internal order is non-portable. To avoid this problem use the `HIBYTE`, `LOBYTE`, `HIWORD`, `LOWORD` macros.

## Conclusion

The Windows API offers a rich and sophisticated Windowing environment. VC++/MFC allows application programmers to use a familiar and widely used programming environment as the cornerstone of their cross-platform strategy. By following some simple rules and avoiding a few portability pitfalls, Windows applications can now be recompiled to run on all the various flavours of Windows, plus Macintosh and Unix/Motif. ■

*Tim Joyce works for Protek, who distribute and support a wide range of Software development products including Wind/U in the UK. He can be contacted on 0628 75959 or via email: info@protek.co.uk*

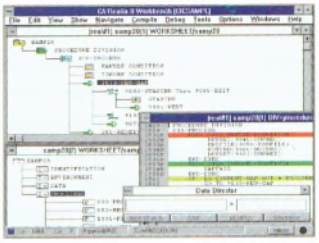
It's simple to get a self-running demo and a free copy of The Secret Of COBOL Maintenance. Just call 0753 577733.


Nothing else offers as much for the money.

£1,600 For A Limited Time.

| Feature | CA-Realia II Workbench |
|---|---|
| Fully integrated, intuitive programmer's workbench | ✓ |
| Debug both PC and mainframe-based programs | ✓ |
| Fast compiles and efficient execution | ✓ |
| Complete single-vendor solution | ✓ |
| Supports Windows and OS/2 | ✓ |
| Foundation for GUI Client/Server COBOL development with open DBMS access | ✓ |

CA- Realia II Workbench has all the features you need.



The point-and-click debugger simplifies testing.

"It's easy to use. And that makes me and my staff a lot more productive."

- GUI Editor
- GUI Interactive Debugger
- GUI Program Analyzer
- CICS Emulator Included
- Version Control Included
- Fastest PC COBOL Compiler*

# Avoid That Empty Feeling. Get The One COBOL Solution That's Fully Loaded.

CA-Realia® II Workbench is the most comprehensive client/server tool in the industry.

Providing an unsurpassed list of benefits and features which include: the world's fastest PC COBOL compiler*, a GUI editor and an interactive GUI debugger for code executing on a PC or mainframe, and integrated lifecycle management. Plus a COBOL-intelligent program analyser that's the smartest thing you've ever seen.

What's more, CA-Realia II Workbench includes a complete mainframe CICS emulator for no extra charge. And, all the features of the workbench apply to CICS programs as well as batch.

So whether you're in a Windows or OS/2 environment, CA-Realia II Workbench provides complete integration with your host-based systems. Which means unlike some other COBOL solutions, your programming choices are never limited.

**For A Self-Running Demo And A Free Copy Of The Secret Of COBOL Maintenance, Call 0753 577733, Dept. 26075 or Complete and Return the Coupon.**

You'll see when it comes to COBOL client/server development solutions, CA-Realia II Workbench is one that's fully developed.

Please return to Computer Associates Plc., Computer Associates House, 183/187 Bath Road, Slough, Berkshire, SL1 4AA.

__Yes, I'd like more information on CA-Realia II Workbench.

Name:_____

Position:_____

Company:_____

Address:_____

Telephone:_____ 26075

COMPUTER ASSOCIATES®
Software superior by design.

**CA-Realia® II Workbench**
**The Complete Client/Server COBOL Solution**



CIRCLE NO. 815

# Smoother operators

Elegance is fleeting in the world of programming, no less so in implementing C++ class operators. **Crosbie Fitch** claims his approach is an improvement.

Let's say you've got a non-trivial data structure; a bitmap, a 4x4 matrix, or a fixed array of some sort. You want to be able to treat it as though it were a simple value and provide arithmetic operator overloading, but without tearing your hair out figuring how to avoid passing by value. Briefly, the solution is to design a class that contains a pointer to a dynamically allocated instance of the large object. This is actually a common technique, rarely documented, because I suspect most programmers consider it too trivial to write an article about.

There is an enhancement to this technique which introduces a reference counter to delete the object automatically when all references have ceased. This is similar to the way in which some programming environments such as Smalltalk and LISP provide what's known as automatic garbage collection. In this article I will be describing how to implement this reference counter. I will also be presenting a variant of this technique that simulates values rather than references. In the former case the container simulates a value, but will reference the same value it was initialised with until a change to the value is attempted, whereupon it will create a new instance. The latter case is where the container simulates a reference to an automatically created instance. All copies of the container will always modify the original instance. However, when all references cease, the original instance is deleted.

Over the last four years I have generally found the reference counter a very useful and powerful way of making responsibility of creation and deletion of objects independent of where they were created. Thus if there are two or more repositories of objects, with objects being passed from one to the other, and either repository must be able to close before the other, it is very useful to know that the objects will only be destroyed when neither of the repositories requires them. It is also convenient, as is usual with referenced objects, to be able to make a single change to one object and have this change occur globally.

I must admit that the technique of simulating values is one that I have rarely, if ever, used. Even so, it appears to lend itself to the problem of manipulating large data structures within expressions which is the main subject of this article.

```
/* "LARGE.HPP": */
/*CLarge class, being a class containing large amounts of data */
#if !defined(LARGE_HPP)
#define LARGE_HPP
#include<IOStream.h>

class CLarge
{
private:
/* This could be a 100x100 matrix of 'double', say */
  int m_nBig;
public:
  CLarge(int=0);
/* Concentrate upon providing reflexive operators and */
/* implement binary ones in the CSimple class */
  CLarge& operator+=(const CLarge&);
  friend ostream& operator<<(ostream&,const CLarge&);
};
#endif
```

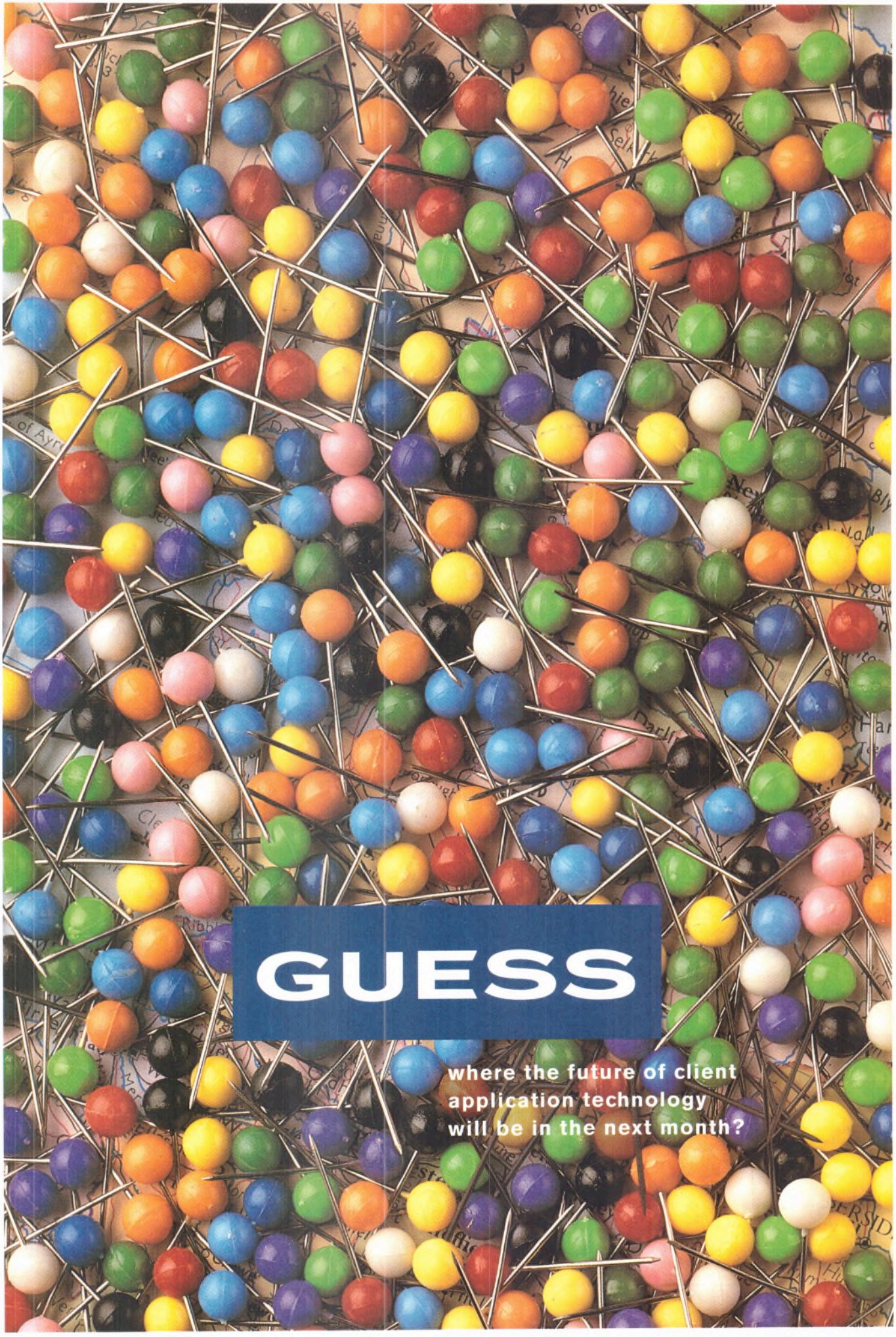
*Figure 1 - Large data structure class*

## Looking back

Francis Glassborow, decrying textbook methods, provided one way to avoid operators passing by value in EXE April 94. In belated response I wrote a letter (EXE September 94) defending my recollection of the textbook version. When developing a simple container class, it is important to consider whether the contained value must occupy the same storage for the lifetime of the container. If this is the case then you should use the contained classes' assignment operator.

## Wasted effort

Some compilers optimise the passing of huge data structures by value. They do this in a similar way, by passing by reference and only creating a new copy when an attempt to modify it is made (or its address is taken, say). This is one of the reasons why the `volatile` specifier is provided, to let the compiler know that a copy must always be made immediately, as the variable risks


GUESS
where the future of client
application technology
will be in the next month?

```
/* "LARGE.CPP": */
/* Definitions of members of
CLarge */
#include "Large.hpp"

CLarge::CLarge(int p_n)
: m_nBig(p_n)
{
}

CLarge& Clarge::operator+=
(
  const CLarge& p_Large
)
{
  m_nBig+=p_Large.m_nBig;
  return *this;
}

ostream& operator<<
(
  ostream& p_os,
  const CLarge& p_Large
)
{
  return
p_os<<"["<<p_Large.m_nBig<<"]";
}
```

*Figure 2 - CLarge class defined*

being changed by another process at any time.

But, we're getting into that thorny dilemma of who's responsible for efficiency: programmer or compiler? My own thoughts are that the compiler should not be an excuse for clumsy code. The programmer should never need to know how the compiler turns high-level code into low-level code and therefore should write according to implicit behaviour of the language's manipulation of data structures. You never know when you may have to use a compiler (or assembler) that does not provide particular optimisations. So, I wouldn't be lazy and ignore the apparent code improvements that can be made, even if it provides negligible runtime performance benefits. The important thing is that a compiler should not concentrate on providing performance through optimising lousy source, but on efficient coding of efficient source.

## Further advances

Now, on to improving my way of avoiding passing large objects by value. In my letter I suggested that you can introduce an instance counter to avoid replicating unchanged instances of the large object. Each copy increments the counter, each destruction decrements, causing deletion on zero. Obviously any need to change the large object can only go ahead if it's the only instance, otherwise a copy must be made. Well, if you've already done your homework you can compare your efforts with mine, because I now present my solution, which should save all the armchair programmers out there a bit of effort.

Most large data structures, especially those of variable length, can only be feasibly handled by dynamic allocation. A general purpose string class, for example, screams out for this approach: any other would soon end in tears. Developing a string class is a classic exercise that every programmer should have attempted. It automatically encourages the correct approach to similar problems such as developing a matrix class. Classes developed to contain such data structures tend to consist of pointers to the dynamically allocated storage, dimensional details and supplementary information. Typically, there is such overhead in manipulating the data that object passing overheads are not very significant.

If you've written a string class, it's unlikely you'd have any difficulty in developing a class to handle large data structures, but if you haven't, or you'd like to check you wouldn't have missed anything, read on.

## How it works

In Figures 1 and 2 we have the large class, appropriately named **CLarge** (only consisting of a single integer in order to reduce example code size). It would be most appropriate if this were a significantly complex, fixed length data structure. I am presuming that **CLarge** is an external class, or one that you do not have the source code to. Otherwise, you may find it easier to do things different to me.

```
/* "LARGEI.HPP":*/
/* CLargeInstance class, being a */
/* derivation of CLarge */
/* that provides a reference counted
*/
/* instance */
#if !defined(LARGEI_HPP)
#define LARGEI_HPP
#include "Large.hpp"

class CLargeInstance: public CLarge
{
private:
  /* This allows up to ULONG_MAX , */
  /* references typically 4 Billion */
 unsigned long m_ulReferences;
public:
 CLargeInstance(const
 CLargeInstance&);
 /* Duplicate CLarge's constructors */
 CLargeInstance(int=0);
 CLargeInstance(const CLarge&);
 ~CLargeInstance();
 CLargeInstance* Reference();
 int Dereference();
 unsigned long References() const;
};
#endif
```

*Figure 4 - Including a reference count by derivation*

```
/* "BIGOP.CPP": */
/* Program to test Simple class */
#include <IOStream.h>
#include "Simple.hpp"

int main()
{
  CSimple t_Sa(2);
  CSimple t_Sb(t_Sa);

cout<<t_Sa<<"+"<<t_Sb<<"="<<t_Sa+t_S
b
        <<endl;
  return 0;
}
```

*Figure 3 - Test program*

In Figure 3 we have a test program that uses the **CSimple** class as a container of the **CLarge** object. Now, to avoid replicating unchanged instances of the **CLarge** object, I have developed the functionality of the **CSimple** class and introduced a new class **CLargeInstance** - see Figures 4 and 5.

The **CLargeInstance** class is derived from **CLarge** to provide a reference counter. Now if **CLarge** were being developed from scratch you could do the derivation the other way around. You could even merge the two, which would save having to duplicate the constructors as has to be done in **CLargeInstance**.

The **CLargeInstance** class allows the tracking of multiple references to a single instance. The first time an instance is required, it is created. The second and subsequent requirements refer to the original. However, the management of the references is performed by the **CSimple** class. The **CLargeInstance** class simply provides member functions to access the reference counter. These are: **Reference()**, which increments the counter; **Dereference()**, which decrements the counter, returning **True** upon zero; and **References()**, which returns the value of the counter.

There is a check in the destructor that the object has no references. Note that the constructors initialise the reference count to zero. This is in case the compiler wishes to make its own instantiation for any purpose. Any time we create a **CLargeInstance** we will always be taking a reference, but you never know when your over zealous compiler will create one as a temporary.

The **CSimple** class is where the real fun starts. It's listed in Figures 6 and 7. Again, you have to duplicate the constructors of the original **CLarge** class, though if none of your code needs to handle **CLarge** objects, then you don't need to provide the respective constructors or conversions.

# The future is with Gupta. And you can see exactly what it holds for you at our programme of 1994 technical seminars.

**FREE**

## Free Technical Seminars.

This is one seminar that brings together the sharpest and brightest in software development.

You can expect a dynamic and productive presentation on the industry's quickest and most powerful PC development environment, designed by Gupta, a truly world-class provider of client server solutions.

So if you want to know how the future is going to affect you, you know where to come.

**FREE**

## Free copy of SQLWindows Solo.

In fact you will be able to take a little bit of the future away with you because all those attending will receive a free copy of SQLWindows Solo.

A highlight of each seminar will be a live demonstration of application development using SQLWindows and how you will benefit from other components like QuickObjects, TeamWindows and the first true 4GL compiler.

**FREE**

## Are you free to attend?

If you are, you will be giving yourself a unique glimpse into the future.

The Gupta 1994 Technical Seminar is where it's happening over the next month at the following dates and places.

**DUBLIN**.....4TH NOVEMBER
The Royal Dublin Hotel, O'Connell Street, Dublin 1.

**SLOUGH**.....8TH NOVEMBER
The Stoke Place Country Club, Stoke Green, Slough, SL2 4HT.

**CAMBRIDGE**.....10TH NOVEMBER
Imperial War Museum, Duxford, Cambridgeshire, CB2 4QR.

**BIRMINGHAM**.....15TH NOVEMBER
National Motor Cycle Museum, Coventry Road, Bickenhall, Solihull, West Midlands, B92 0EJ.

**LONDON**.....17TH NOVEMBER
New Connaught Rooms, Great Queen Street, London, WC2B 5DA.

**LONDON**.....22ND NOVEMBER
In conjunction with Exe magazine.
Assembly Hall, Church House, Smith Square, London SW1.

For details of a seminar in your area fill in the coupon below and post it to us.

Alternatively fax it to us on 0628 481076 or Freephone **0800 834399** now.

**GUPTA**

☐ Send me information about Gupta's products.
☐ Call me with details of your next technical seminar.

NAME:
POSITION:
ORGANISATION:
ADDRESS:
POSTCODE: PHONE:

SQLWindows Solo is a complete, single-user entry-level version of SQLWindows 5.0, with a 5m/b single-user version of Gupta's popular SQLBase database engine. For a quick start on client server development, SQLWindows Solo includes Gupta's new QuickObjects architecture, connectivity to desktop database formats, including Clipper, dBASE, FoxPro and Paradox, via ODBC drivers. Solo applications may be upgraded to run under SQLWindows Starter, Network and Corporate Editions.

EXE NOV

Post to: Gupta UK Ltd, Freepost (SL2 241), Lunar House, Globe Park, Marlow, Buckinghamshire, SL7 1YS.

CIRCLE NO. 817

```
/* "LARGEI.CPP" */
/* Definitions of members of CLargeInstance */
#include "LargeI.hpp"
#include <Assert.h>
#include <Limits.h>
#include <IOStream.h>

CLargeInstance::CLargeInstance(const CLargeInstance& p_LI)
: CLarge(p_LI)
, m_ulReferences(0UL)
{
}

CLargeInstance::CLargeInstance(int p_n)
: CLarge(p_n)
, m_ulReferences(0UL)
{
}

CLargeInstance::CLargeInstance(const CLarge& p_Large)
: CLarge(p_Large)
, m_ulReferences(0UL)
{
}

CLargeInstance::~CLargeInstance()
{
  assert(!m_ulReferences);
}

CLargeInstance* CLargeInstance::Reference()
{
  /* Else overflow */
  assert(m_ulReferences<ULONG_MAX);
  ++m_ulReferences;
  return this;
}

int CLargeInstance::Dereference()
{
  /* Else too many dereferences */
  assert(m_ulReferences>0);
  return !--m_ulReferences;
}

unsigned long CLargeInstance::References() const
{
  /* If 0, should have been deleted */
  assert(m_ulReferences>0);
  return m_ulReferences;
}
```

*Figure 5 - CLargeInstance class defined*

## It's CSimple when you know how

In the constructors and other member functions, every reference to a `CLargeInstance` object, whether an existing instance or a new one, uses the `Refer()` member function. This takes a reference of the supplied instance that replaces the current reference, which is then dereferenced. The instance is deleted if necessary. Note that I have heeded my own lesson I pointed out earlier. You take a reference before you dereference, just in case they are to the same object. Otherwise, you might delete what you were about to refer to.

I have been fairly liberal with the asserts. This is because things can get rather hairy, and you don't want memory leaks or references to freed storage. It's as well to check that every creation of a `CLarge` gets destroyed eventually (by putting diagnostic messages in the constructors and destructors).

The next member function worthy of note is the assignment operator. Since it is not possible to guarantee that the same storage is used for the `CLarge` object for the lifetime of the `CSimple` object, there is little point in using the `CLarge` assignment operator. This is unless the `CLarge` assignment involves more than just the duplication of the value.

All modifying operators should first call `Modify()` to ensure that a new instance is created if the current one has more than one reference. The `LI()` member function simplifies the replication of the `CLarge` operators. Note that it is probably most sensible if the operators that create a new instance are implemented in the `CSimple` class, and the operators that modify an instance are implemented in the `CLarge` class and duplicated in the `CSimple` class. Thus binary addition is performed by `CSimple`, by using the reflexive addition of `CSimple` (being a duplicate of the operation actually performed by `CLarge`).

## Public warning

If you do still need to convert between `CSimple` and `CLarge`, you must not (except with extreme caution) provide public references to the `CLarge` object instance of `CSimple`. Although it may appear unnecessarily inefficient, it is safest to convert `CSimple` into a `CLarge` value. If you use the `LI()` member function remember that it provides a non-const reference and that you should be careful of supplying it when calling any other non-local function. `Modify()` must be called if there's any risk that the current instance could be changed. Indeed, it doesn't hurt and may be wise to call `Modify()` before every modification, just in case another reference is taken between one modification and the next. Note

```
/* "SIMPLE.HPP": */
/* CSimple class provides simple container to be /* used for
holding CLarge object values */
#if !defined(SIMPLE_HPP)
#define SIMPLE_HPP
#include <IOStream.h>
#include "Large.hpp"
#include "LargeI.hpp"

class CSimple
{
private:
  CLargeInstance* m_pLI;
  void Refer(CLargeInstance* =
(CLargeInstance*)0);
protected:
  /* NB This may still provide non-const */
  /* access to instance */
CLargeInstance& LI() const;
  /* Call before modifying instance */
  void Modify();
public:
  CSimple(const CSimple&);
  /* Duplicate CLarge's two constructors */
  CSimple(int=0);
  CSimple(const CLarge&);
  ~CSimple();
  CSimple& operator=(const CSimple&);
  CSimple& operator+=(const CSimple&);
  /* Can't provide reference (const or not) as */
  /* instance location can easily change */
  operator CLarge() const;
  friend ostream& operator<<(ostream&,const CSimple&);
};
/* Doesn't need friendship */
extern CSimple operator+(const CSimple&,const CSimple&);
#endif
```

*Figure 6 - Container class*

# LDRA Testbed™

ELVEREX
Software Testing Solutions

## The Static and Dynamic Analysis CAST Toolset

Now you can test your Software Inside and Out

### STATIC ANALYSIS

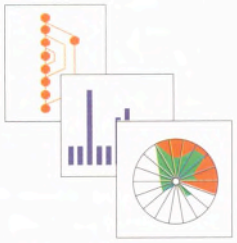
Programming Standards Verification
Unreachable Code Reporting
Complexity Metrics
Data and Information Flow Analysis

### DYNAMIC ANALYSIS

Conformance to Specifications
Control Flow Tracing
Execution Coverage
Profile Analysis
Data Flow Analysis

### GRAPHICAL PRESENTATION OF RESULTS

Histograms,
Kiviat Diagrams,
Dynamic Call Tree,
Flowgraphs,
allow you to extract maximum benefit from the results of your analysis.



### DETAILED REPORTS

Help you document the results
for ISO 9000, TickIT, DO178B, IEC and other standards.

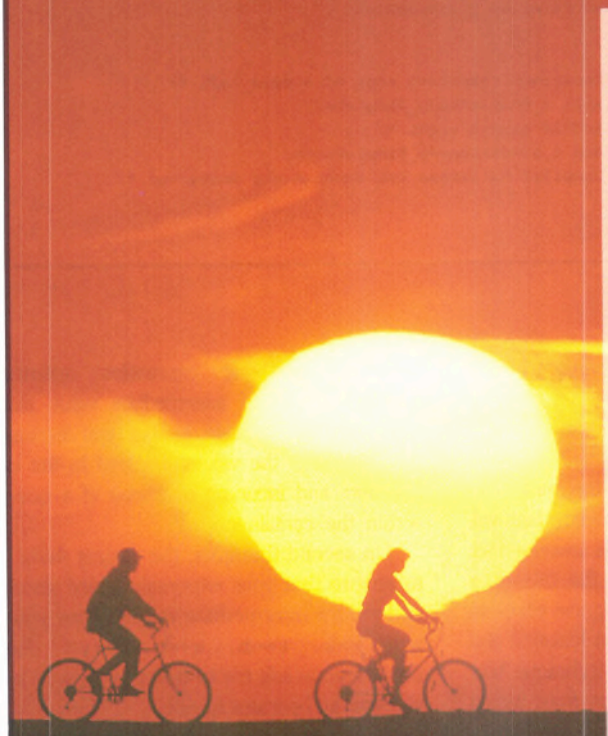
*LDRA Testbed*

is available on all major hardware platforms
for C, C++, ADA, PASCAL, FORTRAN, PL/MX86,
PL/1, COBOL, CORAL 66, and for
INTEL and MOTOROLA Assemblers.

*ELVEREX U.K. Ltd.,*
*Prospect House,*
*12 Oxford Road,*
*NEWBURY,*
*Berkshire RG13 1PA*
*Tel. 01635 47707 Fax. 01635 34448*

*LDRA*

# The Best Way to Test Your Software . . .



## EVALUATOR FT

**The easy way to produce test scripts for GUIs**

***Still wasting time writing test scripts?***

***Or generating scripts, which only work as long as your software stays the same?***

***Or worse still, doing it all by hand?***

**Evaluator FT speeds up QA testing by automatically generating test scripts - which can be customized later - and replaying them throughout the regression cycle. Use the Evaluator FT across Windows, Windows NT, C***o, OS/2, Motif and others. It's the perfect solution for testing stand-alone PCs, client-server applications, networks, minis and mainframes.**

- **Controls testing across multiple workstations.**
- **Tests without affecting the software under test.**
- **Features icon searching and pattern matching engine.**
- **Allows testing of custom controls and non-standard graphics.**
- **Synchronizes tests to allow for network/mainframe loading.**
- **Benchmarks disk access, graphics redraw and more.**
- **Generates comprehensive reports.**
- **Captures and tests PC I/O streams.**

***Do you really want to go on doing it the hard way?***

**. . is After Hours**

**ELVEREX**

**Elverex International Ltd.**
**Tel: +353 61 338177**
**Fax: +353 61 336607**

**Elverex U.K. Ltd.**
**Tel: +44 635 47707**
**Fax: +44 635 34448**

**Elverex Systems GmbH**
**Tel: +49 89 6095567**
**Fax: +49 89 6084117**

CIRCLE NO. 818

```
/* "SIMPLE.CPP" */
/* Definitions of members of CSimple */
#include "Simple.hpp"
#include <Assert.h>

/* Change current reference */
void CSimple::Refer(CLargeInstance* p_pLI)
{
  /* Copy pointer to current instance */
  CLargeInstance* t_pLI=m_pLI;
  /* Make new reference to supplied instance (if any) */
  m_pLI=p_pLI?p_pLI->Reference():(CLargeInstance*)0;
  /* If current instance, delete it if necessary */
  if (t_pLI && t_pLI->Dereference())
    delete t_pLI;
}

/* Convenient access for implementing operators */
CLargeInstance& CSimple::LI() const
{
  assert(m_pLI);
  return *m_pLI;
}

void CSimple::Modify()
{
  /* If not the only reference to current instance */
  if (LI().References()>1UL)
    /* Refer to new instance copy via copy constructor */
    Refer(new CLargeInstance(LI()));
}

CSimple::CSimple(const CSimple& p_Simple)
: m_pLI((CLargeInstance*)0)
{
  assert(p_Simple.m_pLI);
  /* Refer to existing instance via additional reference */
  Refer(p_Simple.m_pLI);
  assert(m_pLI);
}

CSimple::CSimple(int p_n)
: m_pLI((CLargeInstance*)0)
{
  /* Refer to new instance via int constructor */
  Refer(new CLargeInstance(p_n));
  assert(m_pLI);
}

CSimple::CSimple(const CLarge& p_Large)
: m_pLI((CLargeInstance*)0)
{
  /* Refer to new instance via copy constructor */
  Refer(new CLargeInstance(p_Large));
  assert(m_pLI);
}

CSimple::~CSimple()
{
  assert(m_pLI);
  /* Make no reference */
  Refer();
  assert(!m_pLI);
}

CSimple& CSimple::operator=(const CSimple& p_Simple)
{
  assert(m_pLI);
  assert(p_Simple.m_pLI);
  /* Derefer, and refer to existing instance via */
  /* additional reference */
  Refer(p_Simple.m_pLI);
  /* alternatively use: Modify(); LI()=p_Simple.LI(); */
  return *this;
}

CSimple& CSimple::operator+=(const CSimple& p_Simple)
{
  /* About to modify current instance */
  Modify();
  /* Add using CLarge's += operator */
  LI()+=p_Simple.LI();
  return *this;
}

CSimple::operator CLarge() const
{
  /* Create value copy */
  return CLarge(LI());
}

ostream& operator<<
(
  ostream& p_os,const CSimple& p_Simple
)
{
  return p_os<<p_Simple.LI();
}

CSimple operator+
(
  const CSimple& p_SimpleLeft,
  const CSimple& p_SimpleRight
)
{
  /* Construct temporary copy of simple left */
  CSimple t_SimpleSum(p_SimpleLeft);
  /* Add in simple right */
  return t_SimpleSum+=p_SimpleRight;
  /* Compiler optimises out unnecessary instances */
}
```

*Figure 7 - CSimple implemetation*

that references to `CSimple` objects are just as valid as with any other object.

## Other compilers

Although, I used MS Visual C/C++ version 1.0 to compile the test program, you should find my code fairly easy on any compiler, the only possible problems being whether you have the same standard libraries: `IOStream.h`, `Assert.h`, and `Limits.h`. By the way, the output you get from the program should be `[2]+[2]=[4]`. You will naturally be interested in trying it with far more challenging expressions, and inserting traces in appropriate places. As long as you understand how `CSimple` works, deriving from it should present no problems.

## A challenge

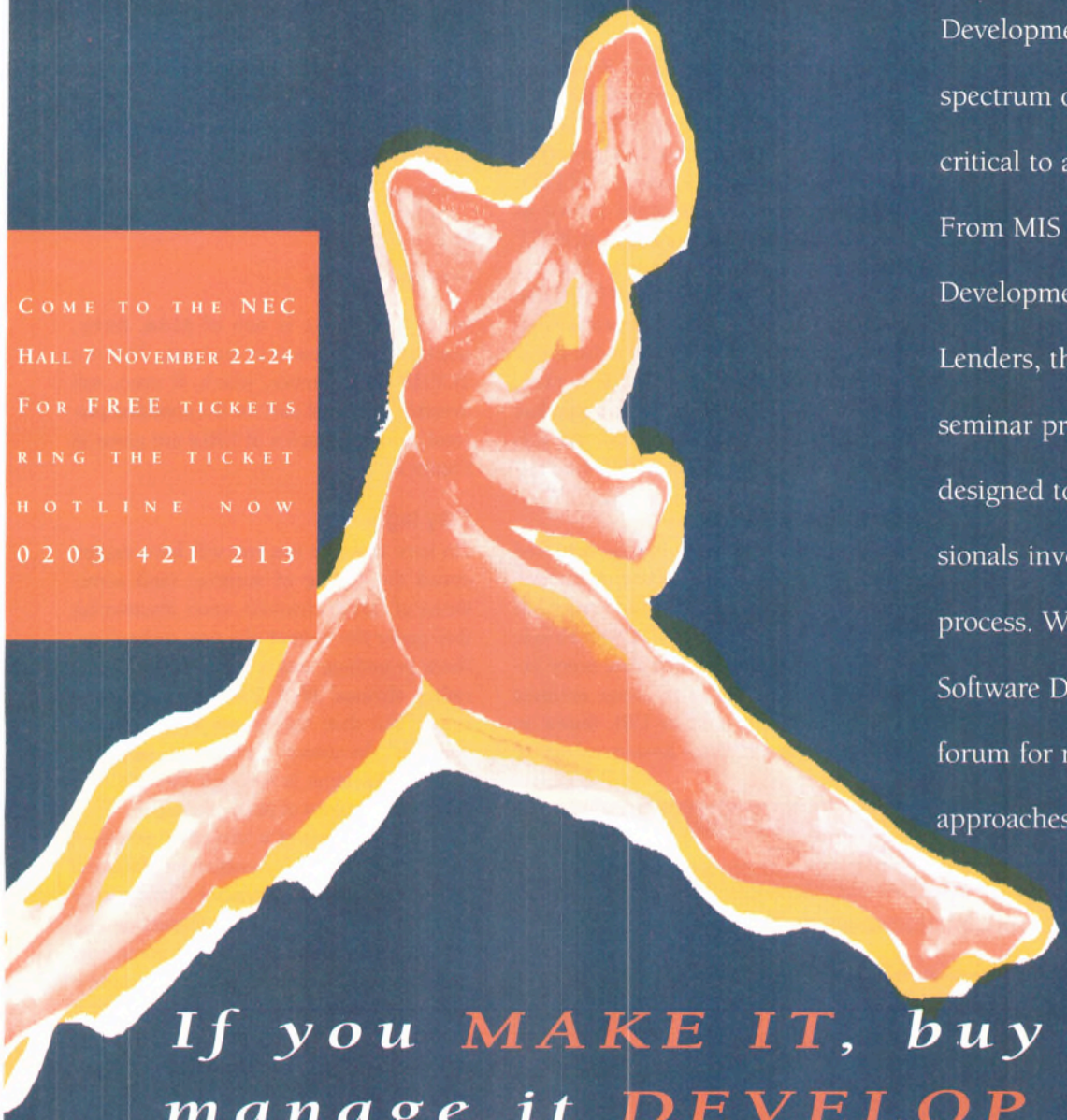
It might be possible to reduce the number of instances created for holding intermediate values in a long calculation such as `z=a+b+c+d`. You could add an attribute to the `CSimple` class such that you would recognise when an intermediate object is used in a calculation and reuse its storage. Now such a technique borders on unravelling expressions from within operators. If you must do such esoteric things then I'd recommend an operator queue, where rather than perform the operations, you queue them. When the value is required, the queue is processed, enabling expression optimisation and reuse of intermediate value storage. The disadvantage is that you increase the lifetime of the values involved in the expression, and incur an overhead of a queue within the container.

On second thoughts, the easiest thing is to ensure that your expressions are simple and reduce intermediate values. Thus you'd write `z=a; z+=b; z+=c; z+=d;`. Just don't anyone ask me to describe how to implement an operator queue... ■

*Crosbie Fitch is currently seeking sponsorship to be a contender in the 1995 World Pinball Championships.*

# MEET, *greet*, *exchange* and LEARN *at*

# software 94 DEVELOPMENT



COME TO THE NEC
HALL 7 NOVEMBER 22-24
FOR FREE TICKETS
RING THE TICKET
HOTLINE NOW
0203 421 213

As the UK's annual forum dedicated to development matters, Software Development 94 covers the full spectrum of issues that are most critical to all technical professionals. From MIS Directors to Systems Development Managers and Project Lenders, the Software Development seminar programme is specifically designed to meet the needs of professionals involved in the development process. With over 120 exhibitors, Software Development 94 is the only forum for new development approaches and user experiences.

## *If you MAKE IT, buy it, manage it DEVELOP IT or use it.....*

BLENHEIM

CIRCLE NO. 819

*. . . please send me futher information on Software Development 94.*

*Return to: Sally Gammon, Blenheim Online, Blenheim House, 630 Chiswick High Road, London W4 5BG. Tel: 081 742 2828, Fax: 081 742 3182*

VISITING SOFTWARE DEVELOPMENT 94 ☐ EXHIBITING AT SOFTWARE DEVELOPMENT 94 ☐

TITLE ..... INITIAL ..... NAME ..... JOB TITLE .....

ADDRESS .....

POSTCODE ..... TELEPHONE: ..... FAX: .....


M A B C D E F G H I J K

# Roll your own WWW pages

HTML is the hypermedia document format that underpins the World Wide Web. **Paul Richardson** tags his own home brew pages onto the Web...

In July I introduced the World Wide Web and the various tools and technologies that are used to form the basis for WWW. To recap, I covered the new Internet protocol - HyperText Transfer Protocol (HTTP), global addresses for resources known as Universal Resource Locators (URLs), HTTP hypermedia document servers, Browser utilities that at least speak HTTP, File Transfer Protocol (FTP) and Network News Transfer Protocol (NNTP) and a document description language known as HyperText Mark-up Language (HTML). It is this last item that we shall concentrate on this month, looking primarily at HTML syntax.

## Master the universe

First, as a taster of what can be achieved with HTML, look at Sun Microsystems' welcome page (often termed 'home page') in Figure 1 as viewed through NCSA's Mosaic for MS Windows; take note that every occurrence of blue text or an image outlined in blue is a link to another URL (more on URLs later). A Universal Resource Locator (URL) scheme is an important step forward for the Internet as it provides the means for referring to any document or service on the Internet. The syntax of a URL is:

```
protocol://host[:port]/path
```

or

```
news:newsgroup
```

where `protocol` is one of `file`, `http`, `gopher`, `WAIS`, `news` or `telnet`. Port is a TCP/IP port number, which, if used, will override the usual port for the specified protocol. Some examples of URLs are given in Figure 2.


*Figure 1 - Screen shot of Sun Microsystems' WWW home page*

## Play tag

I'm sure that like me you will have experienced the feeling of surprise (and sometimes of being cheated) upon discovering that under the bonnet of a new technology, there is nothing much to see: it all seems rather obvious. Well, I feel that HTML is rather like that; the means by which this portable document formatting language achieves its aims is through the use of a relatively small set of plain text tags.

A 'tag' consists of a 'directive' preceded and by a 'less than' (<) symbol and followed by a 'greater than' (>) symbol. This description will be made clearer by inspecting Figure 3 which contains a list of commonly used tags. As can be seen most tags have a closing counterpart which appears identical except for a slash ('/') that sits in front of the directive. Tags may be written in upper or lower case.

Rather than take you through the tags in turn, describing their use, I felt that it would be more effective to illustrate the use of the major features in an example given in Figures 4 and 5. Figure 4 is the raw HTML of an imaginary home page and Figure 5 is the same page as viewed through the Mosaic for MS Windows WWW browser. Now before I and EXE Magazine are inundated with requests for the URL for the 'UK Software Developers' Home Page', I must disappoint you all by telling you that it is just a product of my fertile imagination (although

# The *New* ButlerBloor Seminar 2000 series


# Desktop 2000

**In a recent Survey of mainframe sites, 17 out of 22 organisations said that they planned to enhance legacy systems by front-ending the mainframe with PCs using the Client/Server approach.**

## What risks are involved ?

**This seminar examines the major influences now at work in the Desktop world. It looks at the potential winners and losers among today's leading technology suppliers.**

**It offers a new framework to help those responsible to meet and beat the challenges of managing the corporate Desktop in the Client/Server world. It will help them make the most of their Desktop assets.**

## Price £495

**Includes your personal copy of ButlerBloor's Corporate Computer Strategy Report, worth £320.**

## 17 and 19 January

Orders and Payments received before 31 December 1994
£100 Early Bird Discount
£395+VAT

**The ButlerBloor Organisation**
Challenge House, Sherwood Drive,
Bletchley, Milton Keynes, MK3 6DP, England
Tel: +44(0) 1908 373311 Fax: +44(0) 1980 377470

| |
|---|
| http://www.demon.co.uk/ |
| http://info.cern.ch:80/default.html |
| file://src.doc.ic.ac.uk/README.TXT |
| news:comp.infosystems.www.announce |
| *For a more detailed definition of URLs see* http://info.cern.ch/hypertext/WWW/Addressing/Addressing.html *or* http://www.ncsa.uiuc.edu/demoweb/url-primer.html. |

*Figure 2 - Some useful URLs*

it is rumoured that EXE has a little 'special something' planned for the near future).

## Leading By example

Every HTML page must have a title tag, denoted by `<TITLE>` which should contain a description of the page. It also helps to remember that it is the title that is searched when performing Web searches, so you should cram as many keywords as possible into the title. The title is often displayed off the main page, for instance in a caption bar.

There are six levels of headings that can be employed. The syntax is `Hn`, where `n` is the level number, one being the top level.

One of the fundamental things to grasp about writing HTML is that, by default, it is the browser that is in control of the formatting of normal text. By that I mean you can add spaces, tabs, carriage returns throughout the document but they will all simply be collapsed down to one space. The browser will wrap the text when it wants to. It is rather important that the browser be left to handle this, as the number of characters on a line cannot be known when writing the page.

In order to wrest control from the browser and be able to impose some formatting to the text we need to make use of paragraph and line break tags, which are represented by `<P>` and `<BR>` respectively. The paragraph tag marks the end of a paragraph and will provoke the browser into starting a new line and maybe some intervening space before the next element. The line break tag forces a new line within a paragraph without ending it. In the example you can see that I have had to use it in the addresses at the end in order to format them correctly.

In the example I have made use of explicit character style tags such as bold (`<B>`) and italic (`<I>`). There are quite a range of these styles, some of which are explicit about what they would like the browser to do (like bold and italic), others are 'logical' styles such as 'ADDRESS' (`<ADDRESS>`) which leave the representation up to the browser. Indeed, with some browsers such as Mosaic, the user can configure the representation of logical styles.

The tag `<HR>` is much loved of HTML designers and represents the rather attractive bevelled horizontal line seen in Figure 4. It is useful for delimiting sections of the page.

Next we see the introduction of lists to the example. There are three types of list available to the HTML author; numbered lists, unnumbered lists and descriptive lists. This page makes use of the first two to present some useful links to other sites.

**Anchors need not point to documents but can also reference many other resources such as images, video clips, sound bytes etc**

All three list types share the same structure in that the start and end of the list are marked by tags indicating the type of list. Each list item is introduced by another tag, usually. As can be seen the tags that mark numbered and unnumbered lists are `<OL>` and `<UL>` respectively. Descriptive lists are a little different in that each list item is a heading with a corresponding description.

The hypermedia links (aka anchors) in HTML documents are delimited by the `<A HREF = "URL">` tag. These links can point to other parts of the same document, a different document at the same site or a document at a different site, thus paving the way for an information system that spans the globe. What I couldn't cram into the already Dickensian previous sentence is that the anchors need not point to documents but can also reference many other resources such as images, video clips, sound bytes etc.

Anchors can be created around text, as in the example, or inline images. From Figure 4 it can be seen that the browser highlights the anchor (in blue in this case). As it passes over a link, the cursor shape changes and the destination URL is indicated at the bottom of the screen.

If you intend to use an inline image as an anchor, then I suggest that there also be some accompanying text to describe the link. This is because many people access the Web over dial-up links and to conserve bandwidth work with the display of inline images turned off. The only remaining tag used in the example that I still haven't described is the `<ADDRESS>` tag. Which merely indicates to the browser that it should apply its standard formatting, used for addresses, to the bounded text.

| Tag | Description |
|---|---|
| <title>...</title> | Document title |
| <hn>...</hn> | Headings (where 1 <= n <= 6) |
| <p> | Paragraph end |
| a href="URL">...</a> | Link to another URL |
| <a name="bookmark">...</a> | Marks a bookmark |
| <a href="URL#bookmark">...</a> | Link to a bookmark in another URL |
| <a href="#bookmark">...</a> | Link to a bookmark in the current document |
| <img align = top src = "fname"> | An inline graphic |
| <ul>...</ul> | Start and end of an unnumbered list |
| <ol>...</ol> | Start and end of a numbered list |
| <li> | List item |
| <br> | Breaks the line without starting a new paragraph |
| <pre>...</pre> | Preformatted text (does not disturb embedded whitespace) |
| <address>...</address> | Apply the usual formatting for an address |
| <hr> | Place a horizontal rule at this point |
| ... | Italics |
| <cite>...</cite> | Usually italics |
| <B>...</b> | Bold |
| ... | Usually bold |
| &lt | '<' |
| &gt | '>' |
| &amp | '&' |

*Figure 3 - HTML tags*

# GENERAL

## Diagrammers

EasyCASE Prof. for DOS/Win ..... £335/£620
EasyCASE Des. for DOS/Win ..... £539/£895
EasyFlow v.8.0 ..... £145
Flow Charting III ..... £119
InfoModeler Desktop - *Special offer* ..... £399
MetaDesign for Windows v.4.0 ..... £229
RFflow v3.0 - *Lowest UK price* ..... £65

## Tools

BRIEF ..... £109
Codewright/Fusion for VC++ ..... £199/£129
Doc-To-Help 1.5 UK Version ..... £199
Multi Edit/Multi Edit Prof. ..... £65/£105
Track Record - *#1 Bug Tracking* ..... £110
WinScope v1.2 ..... £49

## Languages

Borland C++ v4.0 ..... £255
Turbo C++ Visual Edition ..... £79
Turbo C++ v3.0 for DOS ..... £55
Turbo Pascal v7.0 ..... £75
Borland Pascal ..... £229
Turbo Assembler ..... £69
dBASE IV 2.0 ..... £385
dBASE IV Compiler ..... £235
Visual Solutions Pack ..... £55
MS Access ..... £249
MS Delta ..... £225
MS Fortran 5.1 ..... £95
MS FoxPro DOS/Windows ..... £269
MS MASM 6.11 ..... £105
MS Visual Basic DOS/Windows Std. ..... £95
MS Visual Basic DOS/Windows Prof. .. £229
MS Visual C++ Std. ..... £65
MS Visual C++ Prof. 2.0 ..... £269
MS Visual Control Pack ..... £65
PowerBasic - *Lowest UK price* ..... £69
Symantec C++ Std. 6.1/Prof. ..... £69/£245
Smalltalk V DOS/Windows ..... £65/£245
Watcom C/C++ 10.0 CD - *Special offer* . £169

**SoftWerk Price pledge**
**If you find it cheaper elsewhere CALL US - we aim to beat ANY advertised price !**

# POWERBUILDER 3.0 SPECIAL OFFERS

**PowerBuilder Desktop 3.0a** Normally £490 ..... Our price £190
**PowerMaker** Normally £239 ..... Our price £135
**PowerViewer** Normally £139 ..... Our price £ 65
**PowerBuilder Desktop with FUNCky Library** Normally £649 ..... Our price £299
**PowerBuilder Desktop with Lotus Notes Library** Normally £599 ..... Our price £365
**PowerBuilder Client-Server Starter Kit - "Jump Start"** Priced individually would cost over £1,900 ..... Our Price £435
*Contains PowerBuilder Desktop, LogicWorks' ERwin for PowerBuilder Desktop, 3-user Watcom SQL Network Server for Windows and PowerViewer.*

# POWERBUILDER ADD-ONS

### CLASS LIBRARIES

**EXTRA Tools for P.B. by Attachmate** ..... £130
*The easy way to include access to mainframe data in your application*
**First Impression by Visual Tools** ..... £199
*Enhance your applications with graphics from the most complex data*
**Folio VIEWS 3.0 by Folio Corporation** ..... £330
*Manage free-format information*
**Formula One by Visual Tools** ..... £199
*Add a Microsoft Excel compatible spreadsheet to your application*
**FUNCky Library PowerBuilder by dLESKO Associates** ..... £169
*Library of over 500 easy-to-use additional functions*
**ImageStream by Visual Tools** ..... £199
*Add powerful file conversion and image management to your application*
**ObjectStart for PowerBuilder by Greenbrier and Russel Inc.** ..... £599
*Combines comprehensive class library with application generator*
**PowerBuilder NetWare Library by PowerSoft** ..... £199
*Seamlessly integrate with Novell NetWare management procedures*
**PowerBuilder Notes Library by PowerSoft** ..... £199
*Seamlessly integrate with Lotus Notes*
**PowerClass 3.0 Desktop/Enterprise by ServerLogic** ..... £330/£1,999
*A class library of over 50 objects and 12,000 lines of commented code*
**PowerFrame App. Framework by METASOLV Software** ..... £265
*Advanced suite of class libraries with a comprehensive Sample Application*
**PowerFrame Navigator Obj. by METASOLV Software** ..... £89
*Adds Windows' File Manager or Chicago Explorer type of G.U.I to your app.*
**PowerFrame Obj. Analyser by METASOLV Software** ..... £89
**PowerFrame Security Library by METASOLV Software** ..... £999
*Provides a comprehensive application security system to your application*
**PowerFrame TabFolder by METASOLV Software** ..... £89
*Add TabFolder window styles to your application*
**PowerGuide Desktop/Server by ajja** ..... £399/£1,330
*"Mission Control" for PowerBuilder Development*
**PowerPlate by PARADIGM** ..... £129
*Application development template with complete source code*
**PowerTool Desktop/Enterprise by PowerCerv** ..... £169/£799
**PowerTool Enterprise - 5 user/Unlimited by PowerCerv** ..... £2,999/£5,999
*Library of objects. Databased Advisor Best PowerBuilder add-on 1994*
**QuickApp for Windows by DCA** ..... £665
*Powerful communications middleware*
**TerraView 4.0 by TerraLogics** ..... £3,335
*Add geographical maps directly into your PowerBuilder application*
**Visual Dev. Kit by Software Integration Desktop/Enterprise** ..... £130/£265
*Adds a new dimension to visual interfaces*
**Visual Tools Pak 2 by Software Integration** ..... £119
*Add multi-dialog/tabbing system to PowerBuilder*
**VT-Speller by Visual Tools** ..... £69
*Seamlessly add spell-checking functionality to your application*
**Watermark Discovery Ed. by Watermark** ..... £99
*Add scanned or faxed documents to your application*

### TOOLS

**Automated Test Facility by Softbridge Inc.** ..... £12,000
*The only software testing product for client/server applications*
**Endevor Workstation by LEGENT** ..... £135
*PowerSoft & Legent team up for PowerBuilder Version Control*
**ERwin/ERX for PowerBuilder by Logic Works** ..... £2,199
*Award winning data modelling tool*
**QA Partner by Segue Software** ..... £1,999
*Powerful automated software testing tool*
**SpinList by OSoft Development Corp.** ..... £135
*DLL that allows you to layout a report in your WP and feed it to PowerBuilder*
**SQA TeamTest by SQA Inc.** ..... £999
*Automates the testing of a PowerBuilder GUI application*

### BOOKS

We stock over 20 books on PowerBuilder. Including; Design & Development of Client/Server Applications, Developing PowerBuilder 3.0 Applications, The Complete Developer's Guide, Secrets of the PowerBuilder Masters, Teach Yourself PowerBuilder in 14 or 21 days (sic). CALL FOR COMPLETE LIST.

**All prices exclude £7.50 carriage and VAT. 30 day terms to quoted Plc's, Educational & Government establishments. E&OE.**

## SoftWerk UK Ltd.

50 Lion Meadow, Steeple Bumpstead, Haverhill, Suffolk CB9 7BY • Telephone: (01440) 730121 • Facsimile: (01440) 730911

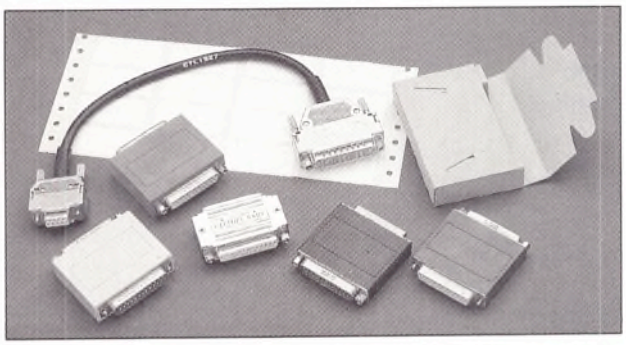
CIRCLE NO. 821

# SOFTWARE SECURITY MODULES

Hardware devices (dongles) are a recognised and proven means of protecting software from unauthorised use and piracy.

Our range of devices offers some of the most robust and troublefree solutions around. All units are cascadeable and can be uniquely coded for each customer. Features include:

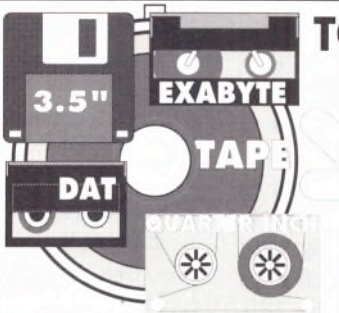
- *PC/non-PC.*
- *RS232/Printer.*
- *Internal memory (some units)*
- *Software drivers supplied.*
- *Minimum 2 year guarantee.*
- *From £14 to £50*



Control Telemetry of London
11 Canfield Place, London NW 3BT
Tel: 071 328 1155 Fax: 071 328 9149

CIRCLE NO. 822

# ARCHIVE YOUR DATA!




## TO YOUR OWN CD-ROM...


- **MASTERING**
- **REPLICATION**
- **ARCHIVING**
- **PRE-PRODUCTION TESTS**
- **MOST INPUT FORMATS**
- **ISO9660, MAC HFS, ROCKRIDGE**
- **AUDIO / CD-I DISKS**
- **NATIVE FORMATS FOR SUN / VAX / AKAI / ROLAND**
- **MULTI PLATFORM DISKS**
- **PRICES START FROM £100 (+VAT)**

## A.L. DOWNLOADING SERVICES

VOYSEY HOUSE BARLEY MOW PASSAGE LONDON W4 4PT
TEL: 081-994 5471 FAX: 081-994 4959 BBS: 081-994 9119
E-MAIL: cdmaster@aldown.algroup.com

CDAL1

CIRCLE NO. 823

## Other important tags

I would just like to mention a few more useful tags that I haven't made use of in the example, namely, bookmarks, preformatted text, inline images and escape sequences. Bookmarks work in conjunction with anchors and allow us to mark and jump to particular sections of an HTML document. Use the

```
<A NAME= "name">
```

tag to mark the bookmark and the

```
<A HREF="URL#bookmark">
```

tag to reference it, omitting the URL if the bookmark is in the current document.

The preformatted text tag (`<PRE>`) really allows us to break free from the tyranny imposed by the browser and express ourselves. It indicates to the browser that it should not treat our carefully inserted whitespace with such disdain but to honour its presence and hence is useful when we want to include, say, a fragment of program code.

The use of inline images are, of course, what gives the Web a lot of its instant appeal. Fortunately they are disarmingly easy to include in a page. The tag is denoted as `<IMG ALIGN=TOP SRC=filename>`, where filename is the pathname of some local image file in GIF or XBM format. The `<ALIGN>` clause is optional and indicates where any successive text should be placed, ie starting at the top right or the bottom right of the image. Text is placed by default at the bottom right and hence it is only ever necessary to use the `<ALIGN=TOP>` clause to override this.

Escape Sequences are merely ways of being able to 'escape' characters that mean something special to an HTML browser so that we are able to use them. The table in Figure 3 lists the most frequently used ones. A more complete HTML reference can be found by following the URL `http://www.utirc.utoronto.ca/HTMLdocs/NewHTML/htmlindex.html`.

## Portability

Platform portability was the prime consideration of the HTML designers. Considering that they had to bear in mind a variety of operating systems and hardware ranging from Unix workstations to mainframe VT100 terminals, this was a toughie. However, they succeeded. I will now briefly discuss those aspects of HTML that allow such portability.

First there is the decision to leave whitespace formatting and line wrapping up to the browser. This gives HTML the capability of being displayed on a variety of screen widths.

The implementation of character and paragraph style is non-prescriptive, allowing the browser to do the best that it can. For instance, a VT100 may only be able to underline a section of text marked as a level one header, whereas Mosaic for X would be able to employ different fonts, styles and sizes to achieve its aim.

Browsers are requested to ignore any tags that they are incapable or unwilling to implement. This also allows new tags to be adopted as they are invented with no fear of causing an older browser to hiccup on those tags.

**There are a variety of tools to aid the HTML authoring process**

The use of printable ASCII to describe the formatting tags is an important aid to portability, not only across platforms but across a variety of communications protocols as well.

## No worries

At this point in writing the article I'm reminded of a scene in Crocodile Dundee where Paul Hogan cooks Linda Koczlowski a dinner of roast reptile. Whilst she eats it, he takes a tin of food out of a bag and starts to prepare it for himself; sensing her surprise that he isn't going to eat the reptile too, he says 'well you can eat it if you like, but it tastes like sh...'

Why am I reminded of this scene? Well, because I've given you the impression that you have to hand code the tags which format the HTML page, save the file, and view it with your WWW browser to see the finished effect. There are times when coding or 'tweaking' by hand are necessary, but for the majority of situations there are a variety of tools to aid the HTML authoring process. I'm going to describe one such tool now - the Word for Windows HTML macros from the Chinese University at Hong Kong.

These macros are available for anyone to download from various Internet sites. I suggest that you use the following URL (it's about 60Kbytes):

```
file://src.doc.ic.ac.uk/computing/systems/ibmpc/windows3/winword/cu_html.zip
```

These macros work with Word for Windows 2.0 or 6.0 and allow the user to create

```
<TITLE>UK Software Developers' Home Page</TITLE>
<H1>The UK Software Developers' WWW
Home Page</H1>
<P>
<B>This page is brought to you by <I>EXE Magazine</I> in conjunction with <I>Motiv
Systems
Ltd</I>.</B><P>
   <HR>
Useful resources for software developers:<P>
<OL>
<LI><A HREF = "http://www.doc.ic.ac.uk/">Imperial College WWW server</A>
<LI><A HREF = "gopher://micros.hensa.ac.uk/">Hensa micro software archive
gopher</A>
</OL>
More useful resources:<P>
<UL>
<LI><A HREF = "gopher://unix.hensa.ac.uk/">Hensa Unix software archive
gopher</A>
<LI><A HREF = "ftp://ftp.demon.co.uk/">Demon Internet's FTP server</A>
</UL>
   <HR>
<ADDRESS>EXE Magazine<BR>
Process Communications Ltd<BR>
St. Giles House<BR>
50 Poland Street<BR>
London W1V 4AX</ADDRESS>
<P>
<ADDRESS>Motiv Systems Ltd<BR>
22 Hills Road<BR>
Cambridge CB2 1JP</ADDRESS>
```

*Figure 4 - Example HTML document*

# EXCLUSIVE INTRODUCTORY BOOK OFFERS
# Save £22.00

HEAVY METAL


**IDG Books announces the launch of the Heavy Metal range of programming books. OLE 2.0 Programming and Visual C++ Programming by best-selling software development writer Steve Holzner. These are available exclusively to EXE subscribers at...**

**£26.99 each, an £11.00 saving on Bookshop prices.**

Both OLE 2.0 Programming and Visual C++ Programming are 600 pages jam-packed with vital information to take you way beyond the basics. They teach you previously hard-to-find and hard-to-learn undocumented techniques.

You get all the programs in each book on a bonus disk of examples, source code, working programs and programmers tools.

## VISUAL C++ PROGRAMMING

**Squeeze the last drop out of C++**

- 600 pages
- Covers version 1.5 upgrade
- Visual C++ documentation
- "Behind the scenes" material
- Power programming techniques
- Bonus disk of source code and programmer's tools

## OLE 2.0 PROGRAMMING

**Get the Core of OLE 2.0**

- 600 pages
- Strategic technology for Chicago and Cairo
- Covers new OLE SDK
- Undocumented features
- Automation, drag and drop, zooming, in-place editing...
- Bonus disk of working programs and source code

### The Author

**Steve Holzner** has written 20 computer books, including 10 in the best-selling Peter Norton series. He holds a PhD in Physics at Cornell. He was contributing editor at PC Magazine for over three years.

Look out for **Visual C++ Programming and OLE 2.0 Programming** in leading bookshops. Or take advantage of this **exclusive** offer to EXE subscribers and **save £11.00** on either book. **Complete and return the coupon with your payment or phone Process Communications on 071 287 5000, fax 071 437 1350.**

CIRCLE NO. 824

(This offer is only available to EXE Subscribers. Please turn to page 64 for subscription details.)

**Please send me the following Heavy Metal programming book/s. I am a subscriber to EXE Magazine.**

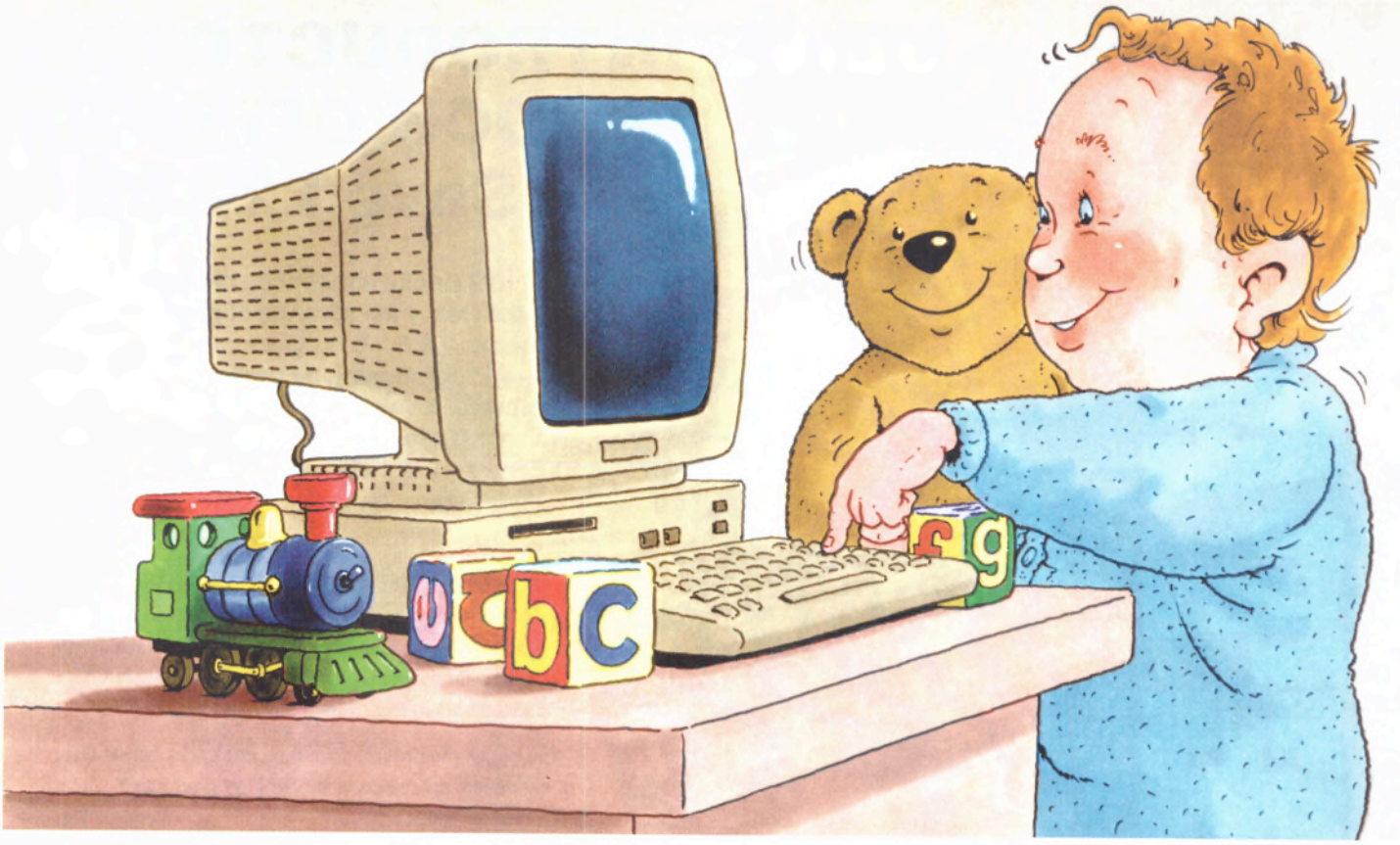
❑ **Visual C++ Programming at £26.99** ❑ **OLE 2.0 Programming at £26.99**

*Shipping* £ *Please add shipping at* (UK) £5.00 *per item*, £2.00 *subsequent items*, (Europe) £8.00 *per item*, £2.00 *subsequent items.*

*Total Payment* £ *I enclose a cheque for* £ *Please make cheques payable to Process Communications Ltd*

*Please charge my credit card* ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ *Exp date* __/__ *Access/Visa/Mastercard*

Send your order to EXE Subscriptions Department, Process Communications Ltd, St. Giles House, 50 Poland Street, LONDON W1 6JZ (Please allow 28 days for delivery)



# Software protection is childsplay with DESlock.


Millions of pounds is lost every year through the mis-use of software and even piracy. Policing of the industry is difficult, and sometimes ineffective or non-existent abroad. Therefore the emphasis falls on you to protect your own investment. You need to create and distribute more secure software products.

Thankfully now the whole process of software protection is made easy with the latest range of security products from Data Encryption Systems, the UK's leading software protection specialists.

DESlock and DESkey are the easy way to implement software protection, combining to create an impenetrable level of protection against illegal use of in-house and third party software. And it's so much quicker.

Until the advent of DESlock, you would have spent hours implementing software protection. But now it's as easy as typing a one line command or using the menu driven set-up programme. It will take you seconds not hours. And you don't even need to access any source or .OBJ files.

It really is childsplay.

DESlock is designed for DOS and Windows software and can also protect networked applications using only one DESkey.

All DESkeys are transparent in use and therefore do not interfere with the normal operation of the computer and its peripherals. This leaves your customer free to legitimately use your protected software any way they choose.

DESkeys are available in a variety of low-cost high-speed models from the standard DK12 to the immensely sophisticated and versatile DK2 and DK96.

If you would like to find out more about DESlock and DESkey, or would like a demonstration kit, please call us on 0823 352357 or fax us on 0823 352358.

Member of FAST
Promoting the legal use of software

**Data Encryption Systems Limited**

*Silver Street House, Silver Street, Taunton, Somerset. TA1 3DL*

*Telephone 0823 352357*
*Fax 0823 352358*

CIRCLE NO. 825

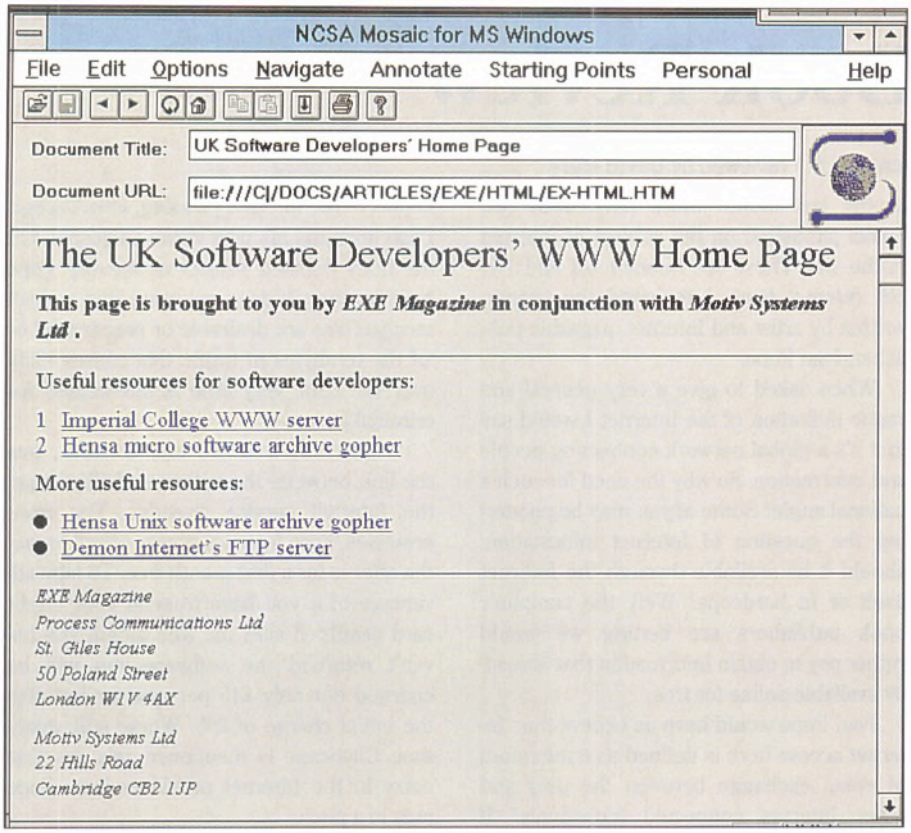



*Figure 5 - Screen shot of example HTML viewed using Mosaic for Windows*

HTML documents easily while being able to see the effect of changes immediately. This WYSIWYGness even extends to displaying inline images.

Upon loading CU_HTML.DOT, you will notice an additional toolbar, a new drop-down menu entitled HTML and a list of new styles. Making use of the new styles will apply formatting tags such as headers and lists, whilst the standard features of bold, italic and underline will also insert the appropriate tags.

The tags that CU_HTML.DOT supports are listed in Figure 6. Links to URLs or local files can also be inserted. When you think you have finished, just click on the `Write HTML` button and the macros will do their job, creating a second file with the extension `htm`. All this in addition to the existing power of Word, giving you features such as cut-and-paste, spell checking etc.

| |
|---|
| Headings 1 - 6 |
| Numbered lists (nested) |
| Unnumbered lists (nested) |
| Address |
| Preformatted text |
| Title |
| Horizontal rule |
| Inline GIF image |
| Anchors |
| Bold, italic and underline |
| Line break |
| Paragraph break |

*Figure 6 - Tags supported by CU_HTML*

## In conclusion

This is the point at which I confess to those things that I've simplified, ignored or just plain forgot. There is a side to writing HTML pages that I have not dealt with and that is user input. There are a variety of techniques which allow a user to interact with a Web server; fill-in forms and clickable maps are just two which will have to wait for another issue.

On the tools side there are many other editors available and filters for converting other document formats to HTML. Finally, there is a specification called the Common Gateway Interface (CGI) that describes a technique for generating HTML documents on the fly from other information servers.

There are plenty of helpful documents on the web which will extend your understanding beyond the scope of this article. I have mentioned a couple of good starting points in the text.

*Paul Richardson is a Director of Motiv Systems Ltd, a consultancy specialising in Open Systems, interoperability and the Internet. He can be contacted on 0223 576318 or by Email at PaulR@Motiv.demon.co.uk.*

# Book Review

Internet UK - reviewed by **David Mery**

In the last month there have been two books published on the subject of Internet in the UK. These are *Internet UK* and *The UK Internet Book*. I reviewed the former, written by artist and Internet magazine publisher, Ivan Pope.

When asked to give a very general and vague definition of the Internet I would say that it's a global network connecting people and information. So why the need for such a national angle? Some of you may be pondering the question of Internet information: should it be available through the Internet itself or in hardcopy? Well, the computer book publishers are betting we would rather pay to obtain information that is readily available online for free.

Ivan Pope would have us believe that 'Internet access here is defined as a minimum of email exchange between the user and other Internet connected individuals.' If that's all it takes to gain Internet access then quite a few online services should revise their marketing. Also Usenet is presented like an Internet service. That was the major criticism from Usenet participants about the otherwise excellent article that appeared in *Time Magazine* a few month ago. If you are interested in this subject then try to find archives of the `alt.internet.culture` newsgroup.

The justification for the title are the author's comprehensive lists of UK Internet providers and services available in the UK. However, in most of the book, what's happening in the US is described first, followed by what's going on here and how it compares. Perhaps the author is trying to tell us something we already know: that the UK's prehistoric Internet capability lags far behind that of the USA.

Pope then goes on to comment that 'Many Internet users are more likely to search for information by subject than by a specific tool or format'. Who would disagree with that? Obviously he does because the biggest part of the book is a list of services classified by tools!

While I would say that the book is mostly well structured, it certainly isn't well ordered. The different Internet tools are mentioned several times before being explained.

However, despite all these criticisms, I still found quite a lot of Internet UK interesting. The Internet providers list is very clear. There was only one additional detail that I felt was missing: the maximum speed for dialups. I found the discussion of the social impact of the Internet pleasing, even though Pope presents his own views as gospel. On the hotly debated subject of security Pope believes that: 'it does not seem that control mechanisms are desirable or practicable' or 'of the terabytes of traffic that passes daily over the nets, very little is intercepted for criminal purposes.'

What really troubled me, however, was the link between the author and CityScape, the Internet service provider. The front promises 'Free Internet access offer!' In fact the offer is for a first month free. To take advantage of it you have to send your credit card details. If after the free month you haven't returned the software you will be charged not only £45 per quarter but also the initial charge of £95. Worse still, every time CityScape is mentioned (it's the first entry in the Internet providers list), Pope puts in a pitch.

Does the author have an email address I wonder? Pope says: 'I currently have at least six, only one of which I really use.' I couldn't find it in the book, so I've done a little detective work but so far had no success. Not known from Whois (not very well documented), not from Knowbot Information Service (absent). Same thing on Compulink, Compuserve, MCIMail and I'm waiting for an answer from the MIT's Usenet User List service (also absent from the book).

A possible reason for publishing a book on the subject of Internet is so that newcomers not yet connected or in their first quest on the Internet can start to explore. This is one of the few strong points of the book. But it goes over the top by printing complete listings, easily available on the Internet itself. These take up a lot of space and will soon be outdated. Along with the extraneous information, I was disappointed by the author's insistence throughout the text that his opinions are 'the way it is.' As to the plug for CityScape: I feel readers should be warned. It starts with the offer on the cover and gets worse...

**Verdict: Not recommended**

| | |
|---|---|
| *Title:* | *Internet UK* |
| *Pages:* | *294* |
| *Price:* | *£19.95* |
| *Author:* | *Ivan Pope* |
| *Publisher:* | *Prentice Hall* |
| *ISBN:* | *0-13-190950-9* |

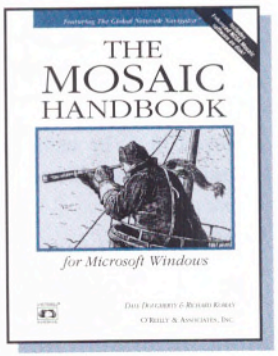
# All you need to know about navigating the Internet with Mosaic

Mosaic is an important application that is becoming instrumental in the growth of the Internet. These books, created for Microsoft Windows, X, and the Macintosh, introduce you to Mosaic and its use in navigating and finding information on the World Wide Web (WWW).

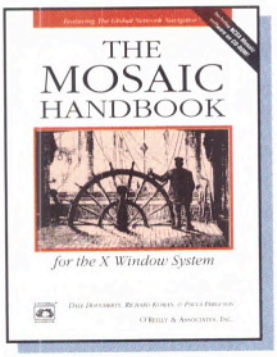
It shows you how to use Mosaic to replace some of the traditional Internet functions like FTP, Gopher, Archie, Veronica, and WAIS. For more advanced users, the books describe how to add external viewers to Mosaic (allowing it to display many additional file types) and how to customize the Mosaic interface, such as screen elements, color, and fonts.

The Microsoft and Macintosh versions come with Enhanced NCSA Mosaic on diskettes; the X Window version comes with NCSA Mosaic on CD-ROM. All three books come with a subscription to The Global Network Navigator(GNN®), the interactive guide that makes the Internet more enjoyable and easier to use.

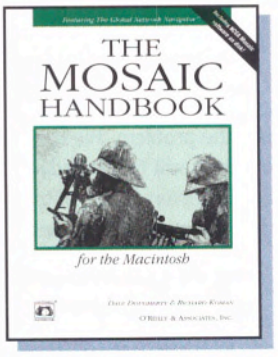
Another new O'Reilly book on a much-requested topic is *Managing Internet Information Services: World Wide Web, Gopher, FTP, and more*. It describes in detail how to set up information services to make them available over the Net. It begins by discussing why a company would want to provide Internet services and how to select which services to provide. Most of the book describes how to set up email services and FTP, Gopher, and World Wide Web servers. This book will be published in December.




Dale Dougherty & Richard Koman
1st Edition October 1994, 230 pages
ISBN 1-56592-094-5. With two diskettes containing Enhanced NCSA Mosaic for Windows, V1.0




Dale Dougherty, Richard Koman, & Paula Ferguson
1st Edition October 1994, 288 pages
ISBN 1-56292-095-3. With CD-ROM containing NCSA Mosaic for the X Window System, V2.4




By Dale Dougherty & Richard Koman
1st Edition October 1994 198 pages
ISBN 1-56592-096-1. With diskette containing Enhanced NCSA Mosaic for Macintosh, V1.0

INTERNATIONAL THOMSON PUBLISHING

*Available from:*

**International Thomson Publishing Europe**

Berkshire House, 168-173 High Holborn, London WC1V 7AA, United Kingdom

Tel: 44-71-497-1422 • Fax: 44-71-497-1426 • Email: ora.orders@itpuk.co.uk

CIRCLE NO. 826

# Letters

We welcome short letters on any subject that is relevant to software development. Please write to: The Editor, EXE Magazine, St Giles House, 50 Poland Street, London W1V 4AX or email **cliffs@dotexe.demon.co.uk.** Unless your letter is marked 'Not for publication', it will be considered for inclusion in this section.

## It's not fair

Dear EXE

I am writing to congratulate you on raising awareness of the problems which Universities face when recruiting women to study computer science, (Fair Play, EXE October 1994). I agree wholeheartedly with the sentiments expressed in the article. It is vitally important that women are not discouraged from studying an exciting and expanding subject which will be increasingly important in the future.

At the University of Southampton we have taken steps to remedy the problem. We have high hopes that our efforts will be rewarded. Together with the Southampton Group of the Women's Engineering Society we offer self-help groups for all women within the department (undergraduate and postgraduate students, researchers and academic staff), a bursary scheme (run with the help of local employers) and a summer vacation employment scheme which enables students to gain work experience with IBM UK Labs. We have a departmental equal opportunities co-ordinator and the University has a policy on language for equal opportunities. There is still a lot of work to be done, but attitudes are changing; the outlook is by no means all doom and gloom.

*Rachel Harrison (Dr)*
*Dept of Electronics and Computer Science,*
*University of Southampton*

## Access, why not Paradox

Dear EXE

As a reader of your magazine I enjoy EXE's eclectic and free-spirited style, but was troubled to read of your sponsorship of the forthcoming Access developer's conference.

Would EXE have been equally enthusiastic about sponsoring the European Paradox conference taking place on the 28th/29th November in London? This conference, which features a dedicated track of seminars on Paradox for Windows, was excellent last year, with many top speakers from the USA. This year should be even better and as a Paradox for Windows developer myself, I would urge those interested in database development on the PC platform to take a long hard look at Paradox. In my experience, its power, flexibility, connectivity and ease of use tend to mark it out as a better product than Access by those who have used both.

Of course, the snag with Paradox is you can't develop your programs in Basic! But any serious programmer who knows a smattering of Pascal or C should find they are able to understand ObjectPAL, the Paradox for Windows programming language.

*William Goodden,*
*Freelance Developer,*
*Cornwall*

## MS misled

Dear EXE

Andrew King's letter in your October issue misleadingly hints that v2.0 of MS Visual C++ is a solution to AppWizard's shortcomings in earlier versions.

It should be made clear that VC++ 2.0 will not run on Windows, but needs Daytona/NT v3.5 and all the disadvantages that brings: 16MB minimum RAM, sluggish performance...

*Mike Burton*

## Oh fuzzyhead

Dear EXE

I have read articles on fuzzy logic in other publications. All I have learnt from them is that fuzzy logic applies to feedback and makes decisions based not on 'yes or know' but on 'how much'. The articles have not made clear what makes fuzzy logic different from other programming approaches that fulfil these mundane conditions.

Kevin Yeandel's three pages told me no more than I've just expressed in two lines. It's true that he adds that fuzzy logic is connected with neural networks. In fact, towards the end, he quotes someone as saying that 'fuzzy logic is a subset of neural computing'. But if that's the case, what's the point of trying to explain fuzzy logic without trying to explain neural computing?

If three pages were to be spent on fuzzy logic, surely they could have been spent on a concrete explanation of how fuzzy logic is used to control (say) traffic lights (if it is used for that, as Kevin Yeandel says).

*Alan Leadbetter*
*Tunstall*
*Stoke on Trent*

## Return to functions

Dear EXE

I've only just seen the letter from Richard Prosser of Kenilworth (*Letters*, September 1993) so I must be at least the 1000th person to write in to point out that multi-value functions have been available for some time. All that is required is to have the function return a structure (`struct` in C, `record` in Pascal). Everything that Mr Prosser requires is here, ie all output from the function via return values, with type-checking. The only inconvenience is that the individual variables must either be referred to as members of the structure, or be extracted from it. A notation similar to that shown in Mr Prosser's letter can be achieved in C by using the preprocessor, though some care is needed.

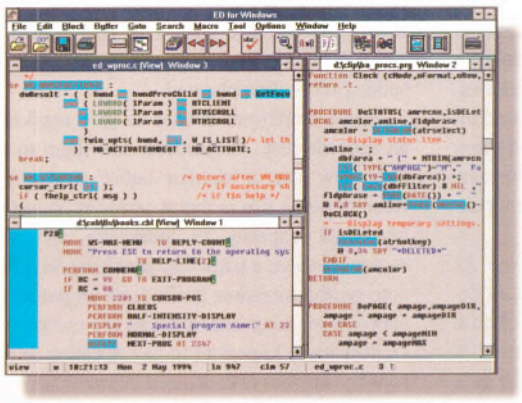
*Raymond Butler*
*Croydon*
*Surrey*

### Letter of the Month

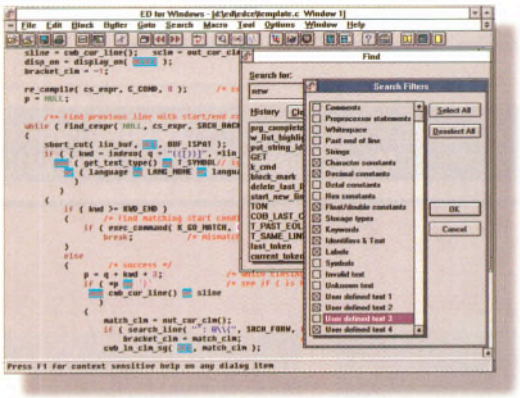
The writer of the best letter of the month, as judged by the Editor, will receive a £30 book voucher, courtesy of PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH (071 831 0022). The best letter is the one printed first. Please note that letters submitted to this page may be edited.

# Is your editor cramping your style?

IT'S SURPRISING how many programmers put up with those ho-hum editors bundled with their compilers. Or even DOS-hosted monsters which to be, errm, brief, haven't seen a proper upgrade since before Thatch left the throne. If you have ever found yourself picking through megabytes of material by hand to accomplish a task that you know should be a few keystrokes, then we have a suggestion for you.



*ED supports multiple windows, multiple files per window, and multiple languages too*



*ED's new advanced Search & Replace puts you in control*

## ED it

Introducing the new *ED for Windows* programmer's editor. ED is intelligent and language-sensitive - it knows all about your compiler. So whether you use C++, Clipper, Smalltalk, Eiffel or one of the other 24 languages that ED supports, you can be enjoying the benefits of colour syntax highlighting and compiler error tracking within minutes.

But it's the other stuff that makes the difference. Can't remember where you put a function? Just type its name in the File Open dialog. Lost in the on-line docs? ED will search through as many help files as you want at the click of a mouse. Like your menus and tool bars just so? A cinch with ED. There's a spelling checker that's smart enough to know about comments, a C-like macro language, and heaps more bits and pieces.

## Try it

The best way to find out what ED can do for you is to have a go. And you can. For free.

Just call us up, and we'll send you a full working demo*. (If you are Wired, you can download it from any of the places listed at the bottom of this advertisement**).

## ...or Buy it

Already convinced? We can ship out your copy of ED for Windows 3.0 today. ED for Windows costs just £145 (+ shipping and VAT).

### New Features in ED for Windows 3.0

Configurable Toolbars - Enhanced Compiler Support - New Spelling Checker - Easier Configuration - Precision Search and Replace - Improved File Open Dialog - Six More Languages including Smalltalk, Eiffel & Forth

*The programmer's editor*

QBS Software Ltd
10 Barley Mow Passage, LONDON W4 4PH
Phone +44 81 994 4842
Fax +44 81 994 3441
BBS +44 81 747 1979
Email qbs@cix.compulink.co.uk

QBS SOFTWARE

*Demo is fully functional, but won't let you save files > 2KB. **The ED for Windows V3.0 demo ED3DEMO.ZIP can be downloaded from the QBS BBS (tel 081 747 1979, baud rate 2400-14400, connect 8 N 1, in the DEMO section), from CIX (topic qbs/files), from CompuServe (GO CLIPPER, library 8) and from ftp site CICA (demo directory) and its mirrors (eg src.doc.ic.ac.uk, computing/systems/ibmpc/windows3).

# Employment in IT

**Kevin Yeandel** offers some advice to employers looking to recruit.

No feat too big, no fee too small. So who better to talk to than the experts armed to find the 'right people'? EXE asked Praxis Plc and Jones Resourcing to help explore the required measures taken to uncover the IT professional. Bath-based Praxis Plc is part of Touche Ross and employs 180 IT professionals in critical systems, consultancy and RDBMS. Jones Resourcing is based in Hertfordshire. It is a recruitment agency specialising in technical and RDBMS positions.

First is the hunting ground. Remember, it is far better to exercise some level of caution with advertisement. 'Degree qualified' eliminates potentially good candidates and is currently leading to shortages in disciplines such as C++. A colleague of mine acquired a £10,000 per month position following an informal interview with a computer graphics company by having a degree which, unbeknown to the employer, was in plant biology. Praxis told me it will not dismiss all applicants without a degree but it does expect very specific expertise to reach the next stage: to qualify for the 'Company Application Form'.

Here you should concentrate on essential requirements. A sentence may add mere pence to the cost, but an over-generous response costs you valuable time and additional unnecessary processing. Certain skills require costly national advertising. So do not under-estimate the agencies. Their success is based on skills in finding recruits. Companies will often return to an agency who, like Jones Resourcing, uses both experience and computerisation to find suitable candidates.

A good response leads to interviews. As well as all the mail, the array of CVs and 'details of experience', there will be a host of little temptations. Be warned though: often it is hard to see through all the responses to pick out applications containing the appropriate skills relevant to the post. The interviews themselves start on level ground. You should spend a little time to discuss briefly the applicants hobbies and interests. There are two reasons. The one most given is that it helps to relax the interviewee. But these questions also help to build a profile of the applicant in your mind. Applicants for the 'Oracle' post who spend all weekend SQLing may be dull and unable to relax. On the other hand, contrary to belief, motorcross style hobbies don't necessarily imply weeks off with injuries. The key point here is to make the interviewees do the work. You can use silence to good effect. A carefully administered pause often leads to spilling more than planned.

Some employers choose to give applicants an aptitude test. Alternatively ask them to explain how, say, a 'circular buffer' works. The value in doing this is that it provides an insight into their capacity to assimilate and subsequently solve a particular problem. As a final note on the interview itself: don't be put off by appearance. Long haired males are common in IT. It is more important to pay attention to personality in areas of expressed individualism.

You *will* find that the choice of suitable applicants is narrowed down to one. Offer the TRP (Total Renumeration Package). In the private sector this is at your discretion. If possible, ascertain the anticipated salary at an earlier stage. If you need further advice it may be possible to approach the agency which you are dealing with.

# West Yorkshire and the North

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 (0532) 504560 or write to:

**AIREDALE RECRUITMENT**

Realtex House, Micklefield Lane, Rawdon,
Leeds, LS19 6AX

**Airedale Recruitment**

# *Software Engineers*

## High-tech Product Development
## Salaries to £20K — Nr Bristol

Electrotech is a highly successful UK based company designing, manufacturing and selling semiconductor production equipment to a world market. Some of the products we are now developing are truly "state of the art".

We currently have a number of vacancies for both junior and senior Software Engineers to join our product development team.

Applicants should be educated to HND/Degree level in computer science or engineering and have experience in real time control, which should include familiarity with embedded systems and an in depth knowledge of "C".

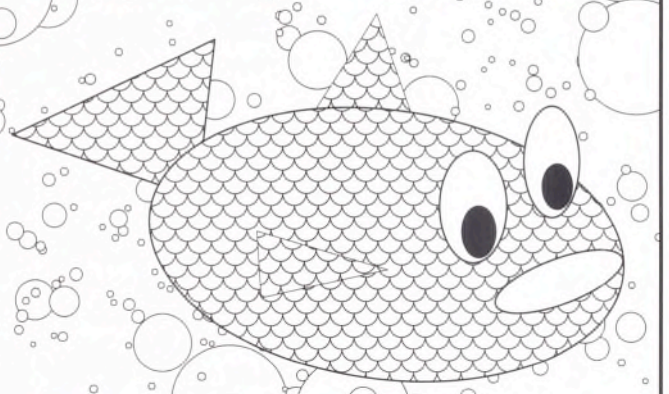
You can look forward to an informal yet professional working environment, a competitive salary and the normal benefits associated with a progressive high-tech company. Relocation expenses will be paid where appropriate.

To apply, please telephone Susan Holpin for an application form or write with full C.V. to Chris Matthews at the address below.

**Electrotech**

Electrotech, Thornbury Laboratories, Littleton-upon-Severn, Bristol BS12 1NP. Telephone (0454) 419008. Fax (0454) 417204.

# How wide do YOU cast for your clients?



# The EXENet casts wider

To find out more call Marc Green on 071 287 5000 ext 3138.

## WINDOWS / NETWORK MANAGEMENT

**Herts** — **to £26K**

Global data networking company are seeking to expand their Network Management Group. This group is responsible for developing state of the art applications for configuring and monitoring networks and network devices. They are seeking a SOFTWARE ENGINEER to work within the WINDOWS product group to develop and integrate software for Windows based applications. This is an exciting opportunity with an international company committed to UK R&D. Ideally you should be degree qualified, and as well as your MS Windows experience, knowledge of any of the following would be an advantage:- C or C++, OOD, Networking, Network Management. Please call for more info.

## C++, WINDOWS, OOA/OOD

**Surrey & Coventry** — **Circa £27K + Car**

We are seeking two Senior Software Developers to join this established company. You should be Degree qualified with at least 2 years commercial experience. Ideally your skills should include some of the following:- C, C++, MS-WINDOWS programming, OOA/OOD, Networking software, WAN data comms. Your benefits will include an excellent salary, company car and BUPA. For more details please call.

## USER INTERFACES

**Surrey** — **to £30K**

Small and successful Software House are seeking an innovative Software Engineer with the ability and desire to design from plain piece of paper upwards. You will be joining a company with a highly successful range of software products involving databases and data & analysis tools. Ideally you will be degree qualified with at least 3 years experience in Databases and User Interfaces, C and UNIX. This is a good opportunity for a creative engineer with flair and enthusiasm.

## VIDEO & MULTIMEDIA

**Berks** — **£18K - £25K**

A young and successful company specialising in Multimedia and Communications Systems have recently won some new major projects, and are now seeking real time software engineers to join them at this exciting phase of their growth. You should have experience in real time embedded software design using C and Assembler (68K) Ideally you will have worked in a PC environment using CASE tools We have full job descriptions.

**For more information please contact Paul Slough or Paul Jones on 0442 870770 at any time, or write enclosing your CV to the address shown below. You may also FAX your CV to the same telephone number during office hours.**

**Jones resourcing**

**Highfield House, 26 Lower King's Road, Berkhamstead, Hertfordshire HP4 2AB**

**JOB**
**OS/2 - PM/WINDOWS NT**

| LOCATION | SALARY |
|---|---|
| City | £25K |

Our client, one of the leading banking software houses in the City, has an excellent opportunity for a C/C++ Software Developer with a minimum of three years commercial experience with either OS/2 Presentation Manager (v2) or Windows NT skills. Successful candidates will be liaising with clients so good interpersonal skills are required. There will be opportunities to learn new skills such as Visual Basic and Sybase If you enjoy working on a variety of projects then contact us today for further details.

REF:EXE/1

**JOB**
**CD-ROM/WINDOWS/C++**

| LOCATION | SALARY |
|---|---|
| London | £25K - £35K |

If you have excellent Windows/C++ design and development skills and have had experience of working at a senior level in a team developing shrink wrapped products, then this is your opportunity to work with a Software House which works at the leading edge of technology. You will be involved with integrating Multimedia to CD-ROM technology and porting software to different platforms. If you enjoy a challenge, solving problems and breaking new boundaries, then this could be the job you've been waiting for.

REF: EXE/3

**JOB**
**C++/FINANCE DEVELOPERS**

| LOCATION | SALARY |
|---|---|
| Surrey | To £35K |

This large multinational financial investment house is looking for two Software Engineers to develop a dealing system for trading UK equities. The system is a client-server implementation, with the front-end applications and services being developed using Visual C++ and the MFC running under Windows. You will have at least six months Visual C++ experience and must be able to work well within a team. Excellent career prospects and highly competitive salary packages are on offer to the successful candidates.

REF:EXE/5

**JOB**
**C++ PROGRAMMERS**

| LOCATION | SALARY |
|---|---|
| Herts | To £28K |

These vacancies will appeal to dynamic, young software engineers who enjoy working in a product development environment using the latest Windows technology. Our client, an expanding company, is currently developing its next generation of terminal emulation products and is therefore seeking high calibre developers. Suitable applicants should have excellent MS Windows/SDK experience along with a fluency in C or C++ (Visual C++/MFC will be of particular interest) to work in this challenging development environment.

REF:EXE/2

**JOB**
**MULTIMEDIA DEVELOPERS**

| LOCATION | SALARY |
|---|---|
| City | To £30K |

One of Europe's leading CD-ROM publishing companies is seeking to recruit Windows Development staff at all levels of experience. They are building teams now to work on a number of new titles to be released next spring. Ideally you will have worked in a multimedia environment developing software under MS Windows or on the Apple Macintosh. Any experience of hypermedia, graphics, sound or animation would be useful but is not essential.

REF:EXE/4

**JOB**
**C/C++/MS WINDOWS**

| LOCATION | SALARY |
|---|---|
| Surrey | £18K - £25K |

Our client is a leader in the development of advanced GUI development tools for client\server applications. The expansion of their R&D team has led to a requirement for five high calibre Software Engineers. Suitable candidates will be graduates with between one and five years experience developing software in C or C++ under MS Windows or OS/2. These are exceptional opportunities for bright individuals to use their creative talents and work with like-minded individuals.

REF:EXE/6

# CONTRACT VACANCIES - UK WIDE

| | | |
|---|---|---|
| **Visual C++/MFC** | | |
| London | Developers | 6 months |
| **Visual C++/MFC** | | |
| Surrey | Programmers | 6 months |
| **C/C++** | | |
| Oxford | Programmers | 3 months |
| **C++** | | |
| London | Design/Development | 3 months |
| **C/C++** | | |
| W London | Progs X 2 | 6 months |
| **C++/Banking** | | |
| City | Programmers | 6 months |
| **C++/VB/Finance** | | |
| Manchester | Anal/Progs | 6 months |
| **Windows/C++** | | |
| London | Programmers | 6 months |
| **Windows NT** | | |
| City | Senior Programmer | 3 months |

REF:EXE/7

| | | |
|---|---|---|
| **Mac/Windows/Text Handling** | | |
| City | Programmers | 6 months |
| **Apple Mac** | | |
| City | Developers | 6 months |
| **Multimedia** | | |
| Cambs | Developers | 6 months |
| **Hypermedia** | | |
| Cambs | Developers | 4 months |
| **Sybase/SQL Server** | | |
| London | Software Engineer | 4 months |
| **Oracle/Vista** | | |
| Oxford | Software Engineer | 3 months |
| **Real Time C** | | |
| Cambs | Software Engineer | 3 months |
| **Testing/VB** | | |
| Manchester | System Tester | 6 months |
| **Testing** | | |
| London | System Tester | 3 months |

REF:EXE/8

| | | |
|---|---|---|
| **VB/Windows** | | |
| Herts | Analyst/Programmers | 2 months |
| **Windows/Visual Basic** | | |
| London | Programmers | 6 months |
| **Visual Basic** | | |
| S. London | Anal/Progs | 6 months |
| **Visual Basic** | | |
| Berks | Programmer | 4 months |
| **VB/MS Access** | | |
| Surrey | Developers | 3 months |
| **Visual C++/SDK** | | |
| Cambs | Developers | 3 months |
| **Windows/Financial Appls.** | | |
| London | All Levels | 6 months |
| **Windows/SDK/C** | | |
| W London | Programmers | 5 months |
| **Windows/SDK/C** | | |
| City | Developers | 4 months |

REF:EXE/9

**Logistix Recruitment Limited**
**Lamb House, Church Street**
**Chiswick Mall, London W4 2PD**
**Tel: 081-742 3060**
**Fax: 081-742 3061**

**We have a large number of PERMANENT and CONTRACT opportunities throughout the UK. Please call one of our consultants for further information or, alternatively post/fax a CV to us and we will contact you at a convenient time.**

**Logistix**

# the soft corporation

specialists in recruitment of software development staff

the soft corporation are recruitment specialists within the information technology industry with a particular bias towards the following technical areas:-

- ***Object Oriented Design***
- ***Relational Databases***
- ***Open Systems***
- ***Communications/Networking***
- ***C/C++ Programming Skills***
- ***Structured Methods***
- ***Graphical User Interfaces***
- ***Client/Server***
- ***Cross Platform Developments***

across a wide range of application areas. We have a strong candidate base in these fields. Our consultants have extensive experience and value their skills in offering a quality recruitment service.

We offer a full recruitment service including:

- ***Registered Recruitment***
- ***Advertising Negotiation***
- ***Advert Design***
- ***Relevant Media Consultancy***
- ***Agency Management***
- ***Executive Search and Selection***
- ***Contract Staff Assignments***

All our services are offered at highly competitive rates and we already have a large client base of satisfied companies.

If you or your Company require a professional Recruitment service and no aggressive sales techniques please call to discuss your requirements.

**John McBride - Managing Director**

Tel: **071-609 5501**
Fax: **071-700 5787**

We carry out all assignments within agreed time scales efficiently and cost effectively.

**the soft corporation**
10 Pakeman Street, London N7 6QN
Tel 071 608 5501 Fax 071 700 5787

# the soft corporation

Specialists in Software Development Staff Recruitment

**OOD/OOP, C, C++, VISUAL C++** — **ALL LEVELS**

As the market for Object Oriented skills gathers pace we have a number of clients designing systems in diverse application areas including: **Multi-media, DTP, Telephary, LANs, Electronic publishing, On-line information Feeds, Finance and Banking** in both a UNIX and DOS environment.

Positions available vary from traditional Programmer/Software Engineer and Analyst/Programmers to Designers/Senior Software Engineers in the overall strategic direction for end-user organisations.

**£17-£35K + benefits** — **REF: SC/01/EXE**

**WINDOWS OR X-WINDOWS/BANKING** — **ALL LEVELS**

Three city clients require windows skills at any level. Other relevant skills are SQL server, Transact, SQL, UNIX, VMS or MS-DOS, C, C++, Open Client (DB and Net library), MFC, Open interface and APT. Exposure to analysis, developing user interfaces and rapid development techniques. Full training in Middle Office/Production and Front Office Systems including: Financial and Management Accounting, Treasury, Equity, Fixed Income and Derivatives.

**£20-£25K + Banking benefits** — **REF SC/02/EXE**

**C AND C++ PROGRAMMERS** — **ANALYST PROGRAMMERS**

Excellent opportunities exist for bright graduates with one year + experience. Personal background requires a solid understanding of the project life cycle and a commitment to high quality coding. You will be trained in all aspects of Investment Banking, relational databases, 4GLs and Object Orientated Design. A good opportunity for a second career move.

**£17-£25K + Banking benefits** — **REF: SC/03/EXE**

**SYBASE/INGRES/VMS/C** — **1-3 YEARS £25-£30K + BONUS**

Excellent opportunities for Graduates with 1-3 years experience to join a Banking Organisation. Training will be given in the Derivatives/Financial Instruments market. Motivated self-starters who want to take on responsibility in a progressive organisation where skills are rewarded on merit.

**OTHER PLATFORMS/DATABASE CONSIDERED.** — **REF: C/04/EXE**

**INGRES/ORACLE/SYBASE/OOD AND OOP** — **ALL LEVELS**

Additional experience of: SQL, Forms, C and C++ required. We currently have client companies including Management Consultancies, Systems Houses, Systems Vendors, Bank and Finance clients looking for candidates with: Relational Database design, Database tuning, Systems Administration, DBAs, Pre/Post Sales and solid programming knowledge and expertise. Please call to discuss your particular requirements.

**£18-£40K + benefits** — **REF: SC/05/EXE**

**C/C++/VISUAL BASIC - UNIX OR MS-DOS** — **DEVELOPERS**

Software House and End Users in Finance, Banking, Manufacturing, Commercial, Scientific and Government application environments require excellent C skills. Both Windows development skills W/3, SDK, NT, X-Windows and Visual Basic or strong C, C++ solid operating systems and good application knowledge are again much in demand. Software development experience is the key, and being able to deliver high performance, high quality, well specified software incompetitive time scales. Opportunities vary from small to large software companies involved in expert systems, GUIs, Image Processing, GIS, EIS, Communications, Networking and Object Orientated Databases. Graduates through to senior software engineers/team leaders are required. Please call to discuss.

**£14-£35K + Benefits** — **REF: SC/06/EXE**

**UNIX/VMS/MS WINDOWS/NT MFC** — **ALL LEVELS**

A degree in computer or natural science, two years solid C programming experience and a sound understanding of UNIX, VMS or MS-DOS are required to work on large scale programs with user interaction. You will need an intelligent problem solving approach to work and be a quick learner to programmer software in an X-Windows, Windows SDK or NT environment, port software to different systems and liaise with customers to drive through product improvements. Excellent career opportunities for the right candidates.

**£16-£28K** — **REF: SC/07/EXE**

**LONDON/HOME COUNTIES WINDOWS SDK/NT DEVELOPMENTS**

**Senior Development Engineers** — **Analyst Programmers**
**To £30K + benefits** — **To £27K + benefits**

Strong programming skills in C or C++ and Windows NT are pre-requisites for these positions. Experience in some of the following areas is also required: MS-DOS 5.0, MS Windows 3.1, Windows NT, Windows SDK, MS C 7.0, MFC, Visual Basic, Visual C++ and Microsoft NT. Also desirable are Windows XUT libraries or networking skills. — **REF: SC/08/EXE**

**SOFTWARE ENGINEERS-SENIOR SOFTWARE ENGINEERS**

Various Client/End Users, Software Vendors and Software Houses dedicated to strategic implementation of leading edge technology and integration of applications across different hardware and operating systems platforms require candidates to degree level with a scientific/technical development bias and 1-3 years experience. There are two main options:

**TECHNICAL DEVELOPMENT:** Continued use of UNIX, VMS, MS-DOS, C, C++, MFC, Windows (SDK, NT or X-Windows and Toolkits), Networking and Communications with companies offering technolgy based careers and management responsibility.

**COMMERCIAL DEVELOPMENT:** Using technical based skills already developed, but offering opportunites to apply analysis and design skills rather than remain 'a technical guru' in various environments including finance. Please call to discuss your particular career, growth and potential.

**£12-£25K + benefits** — **REF: SC/09/EXE**
**VISUAL BASIC SKILLS MUCH IN DEMAND - PLEASE CALL TO DISCUSS** — **REF: SC/10/EXE**
**LEEDS - LOW LEVEL C++ WINDOWS COMMS DEV ALL LEVELS** — **REF: SC/11/EXE**
**LONDON COMMS SPEC X25, X400 £40-60K** — **REF: SC/12/EXE**

**the soft corporation**
10 Pakeman Street, London N7 6QN
**Tel: 071 609 5501 Fax: 071 700 5787**

PHOENIX

## CNE LECTURER

**£25,000 + CAR + HEALTHCARE**

**SURREY**

A lecturing role exists within reputable NOVELL training organisation delivering courses in classroom environment. You will possess a CNE qualification and have the ability to give both presentations and demonstrations to a wide range of customers.

## PC SUPPORT - MICROSOFT OFFICE

**£18-22,000**

**LONDON**

A complex array of PC packages integrated via workstations using OS/2 LAN Manager, exists to tax your brain! As Support Consultant you must either possess LAN Manager or in-depth PC WINDOWS applications software, ideally to Macro level.

## FLUENT GERMAN NETWORK SUPPORT

**£18,000 + BONUS + MEDICAL**

**SUSSEX**

Network Technical Engineer is required. Majority of time will be based on help desk with some travel abroad. Very good benefits and product training offered to PC Specialists with some UNIX and ideally UNIX networking experience.

## FOREST & TREES CONSULTANT TRAINER

**c£20,000**

**HERTS**

Expanding international consultancy and training firm require an experienced Consultant with two years (min) experience of FOREST & TREES and relational databases. Analyse at clients sites and run training courses. In return receive a company car after six months and the chance to grow within the company.

## SOFTWARE ENGINEER

**£25-30,000**

**WILTS**

Experienced Developer required to develop complex WINDOWS applications in C using SDK with either UNIX, WINDOWS NT, Client/Server Architectures or RPC/Sockets.

## UNIX/C ORACLE A/P's

**£18-22,000**

**LONDON**

City based software house require Analyst/Programmers with UNIX/C and ORACLE v6 or 7 experience to work on general commercial applications.

## PAYROLL PROGRAMMER

**£18,000**

**CAMBRIDGESHIRE**

Current and fast payroll experience is the key here to an excellent career with a stable organisation, who is willing to cross-train to COBOL or ASSEMBLER within an AS400 environment. If you have two years programming experience, call us now.

## RPG400

**£15,000**

**OXFORDSHIRE**

Enhance career prospects in this PC development environment using (RPG400) ADELIA, CASE Tool. Excellent career oppurtunities exist for self starter with 18 months to 2 years experience within the RPG400 environment.

## FOXPRO

**To £20,000**

**OXFORDSHIRE/NORTHANTS/LONDON**

Superb prospects exist for A/Ps with two years Foxpro experience within this growing multi-sited organisation. Foxpro for DOS or Windows welcome.

## GRADUATES (1993/1994)

**MIDDX**

Our client offers a first step up the career ladder to those who have earned a 'First' or 2.1 in either a Computing/ Numerical or Science subject and preferably achieved good 'A' level grades (preferably straight 'A's). This really is an excellent opportunity to establish youself within this international household name.

## SAP ANALYSTS/DEVELOPERS

**£100,000+++**

**UK & ABROAD**

We have been retained by several management consultancies and end user environments to recruit experienced (1 year minimum) SAP professionals on either a contract or permanant basis. To discuss which SAP career path you wish to follow, contact our SAP consultant now.

**For a confidential discussion about these or any of Phoenix's other vacancies, call, post or fax your CV to Shirley MacGowan at:**
**Phoenix Computer Recruitment Ltd**
**407 Uxbridge Road, London, W3 9SH.**
**Tel Office: 081 896 3110**
**Tel Eves/Weekends: 081 579 3576**
**Fax: 081 896 2912**

## RECRUIT 94 SHOW

**See us at the RECRUIT 94 show at The Connaught Rooms on 21st and 22nd October 1994 to discuss Contract or Permanant requirements.**

## Lotus Notes

**to 23K + Car** **Midlands**

TakeNote!
A leading software house is offering excellent opportunities for Lotus Notes Developers. As a result, we want to hear from candidates with a minimum of 6 months experience, good presentation and customer handling skills are essential.
These positions offer excellent career development within a flexible forward-thinking environment. All positions carry an attractive salary and benefits package, including company car.

*Ref M1*

## Windows/Comms

**to 20K** **E. Midlands**

This progressive end-user is looking to recruit an individual with solid Windows database/comms experience. The successful candidate will be involved in setting up central business and commercial systems, your analysis and design skills will immediately be called upon. Exposure to new technologies and techniques is guaranteed.

*Ref M2*

## Networks

**£Neg (High) + Car** **Midlands**

Due to the increased demands of an expanding client base one of the UK's leading network services companies are seeking to enhance their Midlands presence. Working within a centre of excellence you must combine a high degree of self-motivation, with the ability to work in a team.
We therefore seek candidates with a sound knowledge of Novell or OS/2 along with the relevant protocols. Accreditations in this area would be a distinct advantage. This is an excellent opportunity to join a dynamic, fast growing organisation, the generous salaries and benefits offered are commensurate with the importance of these positions.

*Ref M3*

## Networks

**To 22K + Bens** **Staffordshire**

This blue-chip, multi-national corporation is looking to recruit a Networks Administrator with solid Novell/TCP/IP experience. This is a 'hands-on' role with full responsibility of the company's UK LANS and WANS falling to the successful candidate. Installations experience across varied hardware platforms is essential. You will also be asked to give technical/strategic consultancy to a high progressive management team. This is a rewarding opportunity which offers genuine career progression and a highly attractive package.

*Ref M4*

## C++ Developers

**to 20K + Car**

A leading UK Computer Services company with a solid reputation for technical excellence is looking for substantial growth within their PC development division. Graduates with upwards of 1 year C++ development experience, (preferably gained within a Windows environment), are required to undertake challenging new development projects. Full training in Windows programming will be provided. Any exposure to Visual Basic or Visual C++ would be a distinct advantage.

*Ref P1*

## Informix Developers

**to 20K + Car** **North West & Home Counties**

Due to increased demand within its open syste,s division this UK software house is seeking several Informix developers. Candidates should possess a minimum of 18 months Informix development experience gained under either HP-UX or AIX. Successful candidates will also receive PC training, including techniques such as OLE2, ODBC etc.

*Ref P2*

## LAN Consultant

**to 35K + Bonus + Car** **North London**

This world renowned software house is seeking to appoint a new LAN Consultant within their European Network Services Division. Probably qualified to CNE level candidates must possess excellent communication and technical skills. A thorough knowledge of Novell and network design is required as is the ability to develop WAN solutions. This position will involve extensive European travel and future management of a UK based LAN support team.

*Ref P3*

## Progress AP

**to 22K** **Midlands**

A major US systems house is now looking to recruit a Progress Analyst Programmer for their UK Head Office.
Their market leading software, written in Progress and based under UNIX has gained wide acceptance throughout Europe and they are now embarking on a major phase of growth. You must possess a minimum of 12 months Progress experience preferably gained within a manufacturing environment.
The successful candidate will join a fast growing organisation with exceptional opportunities for career advancement and personal development.

*Ref P4*

## PC Development - Image Based Systems

**£ Neg + Car**

This specialist division within one of the UK's leading services organisations is seeking an experienced document image consultant to enhance and continue to develop their DIP system. This key role requires both PC development skills, (probably in C++/Visual Basic), and document image processing knowledge. Any exposure to IBM AS/400 hardware/RPG/400 would be a distinct advantage. The successful candidate will enjoy numerous benefits and continued training in new PC development techniques.

*Ref P5.*

## Information Warehouse

**to £30K + Car + Bens** **Mids/South East**

Build your own! A number of unprecedented opportunities exist within Blue Chip international organisations for motivated, business minded professionals.
Replacing existing operational systems with 'state of the art' MIS/Decision Support Systems provides one of the greatest challenges to business and developer alike.
We urgently seek candidates with a minimum of 5 years commercial systems experience. You will possess solid SQL, C and 4GL skills gained in a UNIX or Client Server environment, knowledge of prototyping, RAD tools and RDBMS (preferably Oracle) is essentiasl, as is general commercial awareness and an outgoing nature.
Successful applicants will be rewarded with an excellent remuneration package, (which may include relocation) and a career progression which will be truly unrivalled.
Call now for further details. *Ref AS1*

**Call NOW on 0543 415541 (day) or 0543 410176 (eves) for more information on all of these positions. Your call will be treated in the strictest confidence.**

GSA

**GSA Computer Consultants,**
**26 Bird St, Lichfield, Staffs WS13 6PR**

# 1001* GREAT OPPORTUNITIES

## VISUAL BASIC / ACCESS
**Berks / Surrey £16 - £25000**

These rapidly expanding software houses seek developers with VB , access, C/C++ and Windows SDK for dealing room and other challenging projects. *JS/JN401*

## MULTIMEDIA
**Surrey £20 000**

Software Engineer required by small design company in state of art multimedia systems. Realtime / windows environs. Training in C++. *JN1385*

## EMBEDDED SOFTWARE
**Devon £22 000**

Software Design Engineer required by this Electronics giant with 2 yrs C/C++ skills. Great career opportunity in glorious DEVON. *IN1386*

## WINDOWS DEVELOPER
**Southampton £20 000**

Leading edge software house and design company is looking for a graduate calibre Analyst Programmer with POWERBUILDER & ORACLE skills. GUPTA, Sequel base or Sequel server useful. *B1103*

## NOVELL TRAINER
**Bristol £18 000**

Specialist Software House seeks young graduate with 2 yrs experience of UNIX to KERNEL level. Growing European client base. *JN1383*

## UNIX SYSTEMS
**Bristol £18,000**

Specialist Software House seeks young graduate with 2 yrs experience of UNIX to KERNEL level. Growing European client base. *JN1383*

## LOTUS NOTES
**City / UK Contract ££'s**

LOTUS NOTES Developers urgently required for City and other clients. AD1 and / or AD2 an advantage. UNIX Developers & Administrators also required. *MD402*

## NOVELL DEVELOPER
**London Contract / Permanent**

Various types of Development work available for London based clients. NOVELL NETWARE 3.11 - financial based applications. *MD403*

## SAS / ORACLE
**S. East/Bristol Contract/Perm**

We have been retained by a prestigious Software House keen to recruit experienced SAS & ORACLE specialists for long term varied projects. Top rates. *JS404*

*** Binary Representation**

EF TECHNOLOGY
*Recruitment Consultants*

St Ives House, St Ives Road
Maidenhead, Berkshire
SL6 1QS

For full details please
Telephone: **01628-30405**
Fax: **01628-770398**

---

**QA Training is an eminently successful, high growth company, playing a central role in the IT services arena. Our track record is absolutely unmatched.....selected as the "Best Training Company" by Computing Magazine, the "Best Windows Training Company" at Which Computer, winner of Price Waterhouse Business of the Year Award, and placed in the top 50 growth companies in the UK by The Independent. We have major strategic relationships and programmes with the key IT industry players: Microsoft; IBM; Oracle; Compaq; Intel; Lotus. We also carry out strategic IT technical training for large corporates on a world-wide basis.**

We are expanding our team of Associate Consultants (freelance) and currently have the following positions available:

### C/C++ Programming

You will be delivering training courses from our Languages suite, including C Programming and C++ Programming.

You should have extensive experience of programming in C and C++ (at least a minimum of 3 years) and should be able to demonstrate considerable experience of software development using both C and C++. Your experience should have been gained within a DOS, Windows or OS/2 environment - ideally all three.

### Object Technology Specialist

You will be delivering training courses from our OT suite, including Object-Oriented Analysis and Design using Rumbaugh's OMT. You may also be required to provide consultancy in the introduction and use of OT, and OO Methods wiithin organisations.

You should be able to demonstrate considerable experience of software development using Rumbaugh's (OMT) OOA and Design techniques. Exposure to other OO Development methods such as Wirfs-Brock or Booch would be advantageous. Your background will have utilised your skills using OO languages, preferably C++.

### Visual Basic & Client/Server (PowerBuilder)

It is likely that you would deliver "client tools" courses, beginning with Visual Basic. Essential skills include solid practical programming experience with Visual Basic in a Client/Server database environment.

You must know SQL and have a working knowledge of programming with at least one relational database system such as Microsoft/Sybase SQL Server, Oracle, Ingres, Informix, or DB2.

Knowledge of a particular client tool other than Visual Basic - Power Builder and Microsoft Access in particular - would be extremely useful. A knowledge of networking protocols and APIs (especially for Windows or OS/2) would be an advantage.

We are also looking to recruit Associate Consultants in the following areas:

- **PowerBuilder**
- **Visual Basic & Client/Server**
- **CNI/CNEs**
- **Lotus & MS Applications Support**
- **Email & GroupWare**
- **OS/2 API**
- **OS/2 Support**
- **LAN Server/LAN Manager**

Please call for more information or to apply for any of the above positions, please send a detailed Curriculum Vitae, to:

QA TRAINING

ALICIA SMITH, PERSONNEL OFFICER,
CECILY HILL CASTLE, CIRENCESTER,
GLOUCESTERSHIRE GL7 2EF
TELEPHONE: (0285) 655888

# EXEnders

## It all started with a stolen camper van...

Kamikaze Ken. Data liberator. He who knows no fear. Editor of the dauntless EXEnders team. A man to be reckoned with and a man who was off visiting fellow Information Freedom Fighters in the depths of the urban wastes: Pan Estate. Pan-yer-face-in Estate. Having set the date for the next 'Free the Data' campaign Ken made the wearisome journey back down the 23 flights of stairs and was mortified to find that his beloved Dormobile was missing. His trusty vehicle, the cherished home which had transported him across the country, from Scunthorpe to Skegness, it was no more. *La Dormobile a disparue.* It had vacated its former space. It had gone.

So after a brief but moving memorial ceremony for the remaining shell Ken set about rebuilding his life with Grim Determination. So cue the music from McGuyver: we have a scene to set here. You remember McGuyver, that amazing gentleman who appeared on the television of a Saturday tea-time. Each and every week he escaped a sticky end by patching together a machine gun/laser blaster/army tank out of two cornflake packets and a roll of sticky back plastic. Blue Peter for guerillas. *Not* to be confused, I hasten to add, with the lowly A-Team, who stretched credulity to its limits. Who, each and every week, managed to 'bump' into the owner of an oxyacetylene torch/workshop/army tank. Who on earth would believe that? Pah! McGuyver was the real hero.

So cue the music I say, as we watch Ken rifling through his Knightrider video collection and poring over the EXE November 1994 editorial on DIY VR. (A quick note: EXEnders exists on a parallel dimension in a time indeterminate: *that* is how he managed to read the editorial before you did, alright?). You've all heard about the man who electrified his car door handle to stop people breaking in, well, so had Ken. The plot was hatched. After a little tinkering, a few attachments, several video discs and a dozen or so real-time circuits Ken sped off once more for Pan Estate. Cue music from *The Good, The Bad and The Ugly* (dudidulyngnow, wah, wah, wah...).

Abrupt change of scenery: switch to shot of large court house. Ken, accompanied by his lawyer hurries down the steps surrounded by a frenzied mob of baying journalists. (Journalists always bay - it's a little-known NUJ stipulation).

Bob Baud, ace reporter for Microtelly, was of course first on the scene:

'G'day, Bob Baud here. Bail was today granted for Ken Lydon: EXEnders superstar. Legal history is being made with this lawsuit as the prosecution struggles to bring a case against Mr Lydon. The three 'victims' who broke into his vehicle several weeks ago now are still suffering severe mental trauma and 50% burns, but are steadfastly refusing to make any statements to the Police. Mr Lydon is perhaps better known for his recent creation, the VR Dormobile (complete with talking navigator, fold down bunk bed and oxyacetylene machine gun). He is also the first person in recorded history to have his stolen vehicle returned to him *by the thieves*, with a little cake and an apology note.'

**M**


**EXE:** The Software Developers' Magazine is independent and not affiliated to any vendor of hardware, software or services. It is published by Process Communications Ltd, St Giles House, 50 Poland Street, London W1V 4AX.
**EXE** Advertising/Editorial/Production: 071 287 5000
**Subscriptions:** 071 439 4222 (Amina x2252, Fiona x2212) **Facsimile:** 071 437 1350 ISSN: 0268-6872
**Subscriptions. EXE.** is available only by subscription at £35 per annum (12 issues) in the UK: see subs card within this issue. The magazine is published around the 1st of the month. To subscribe or if you have a subscription query, please call 071 439 4222 or write to The Subscriptions Manager, **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 editorial enquiries and comments to The Editor, EXE, (address above) or email to **cliffs@dotexe.demon.co.uk.**

We welcome letters, opinions, suggestions and articles from our readers. Information contained in **EXE** is believed to be correct. If errors are found, we will endeavour to publish a clarification in the next issue.

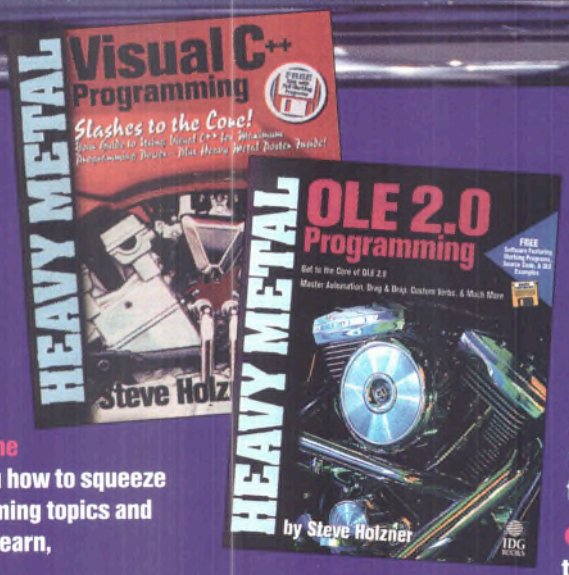


**Editor:** Cliff Saran
**Features Editor:** David Mery
**Sub Editor:** Melanie Welsh
**Production Manager:** Kate Adams
**Subscriptions:** Fiona Mitchelson (071 439 4222 x2212)
**Front Cover Picture:** Ken Laidlaw

**Display Advertising Manager:** Marc Warren
**Display Sales Executive:** Steven Miles
**Recruitment Advertising Executive:** Marc Green
**Marketing and Promotions:** Suzanne Chamberlain
**Subscriptions:** Amina Haque (071 439 4222 x2252)
**Publisher:** Sandra Inniss-Palmer

# Stop banging your head and start bending the rules! Get on your bike and get into...

# HEAVY METAL




Isn't it time you cranked up the action and shifted gear into some real programming? Take that quantum leap from introductory programming to power programming and load up with some HEAVY METAL!

**HEAVY METAL VISUAL C++ PROGRAMMING - a guided tour of the insides of Visual C++.** It'll show you how to squeeze the last drop out of many programming topics and teach you the hard to find, hard to learn, undocumented material

- Learn how to bend the rules to your advantage: get into Microsoft's code and change it to the way you want it to be!
- Customize controls, make your own menu items
- Find behind-the-scenes tips, programming secrets, stuff the manuals don't tell you
- Includes the HEAVY METAL VISUAL C++ PROGRAMMING disk, with the book's source code and a screen capture program, a database program, a word processing program, an OLE container program, an OLE full server program and a paint program, among many others

**HEAVY METAL OLE 2.0 PROGRAMMING - get to the core of OLE 2.0 -**

- Shows you how to build a container program to avoid code recreation - saving much valuable time
- You'll find coverage of important new OLE topics: automation, drag and drop, zooming, in-place editing and custom verbs, the undo command, OLE tools found in Visual C++
- All the programs in the book will be on the free disk: examples, source code and working programs.

**So, what are you waiting for? Take the easy ride to advanced programming with the rockin' HEAVY METAL series!**

PROGRAMMERS PRESS

IDG BOOKS

COMPUTER KNOW-HOW NOW!

CIRCLE NO. 828

# If you want to be in client/server tomorrow, we can jumpstart you today.

**Getting to client/server** is a great move for developers. Powersoft™ makes it easy with a new Jump-Start client/server kit for Windows. It has everything you need to convert your existing xBase datafiles to a multi-user RDBMS and begin developing powerful client/server applications quickly and easily.

**The client/server Jump-start kit** contains PowerBuilder Desktop, a desktop version of Powersoft's award winning PowerBuilder® Enterprise, ER*win* for PowerBuilder Desktop, a powerful data modelling and data pipeline tool to convert .dbf files to Watcom™ SQL, a three user Windows version of the Watcom™ SQL relational server and PowerViewer, Powersoft's end-user reporting tool. All for only £435!

**The FUNCky function library** - now there's a new PowerBuilder specific FUNCky Library, teamed with a copy of PowerBuilder Desktop, for only £299. FUNCky adds more than 500 xBase functions to PowerBuilder's PowerScript language.

**Lotus Notes** - another great companion for PowerBuilder Desktop. At the great price of £365 we've bundled PowerBuilder Desktop and PowerBuilder Library for Lotus Notes. This allows PowerBuilder developers to create client/server applications that seamlessly integrate both Notes and SQL data.

**The Watcom™ SQL database** underlies all of Powersoft's tools. It offers great performance and scalability. Multi-user server versions available for Windows NT, OS/2, NetWare, Windows for Workgroups, LANtastic and Personal NetWare. Prices range from £265 to £3,645.

* Components of the software bundles are available priced individually.

For more information call:

| | |
|---|---|
| **Corporate Software** | 081 479 0047/8 |
| **QBS Software Limited** | 081 994 4842 |
| **System Science Limited** | 071 833 1022 |



**Powersoft™**

CIRCLE NO. 829