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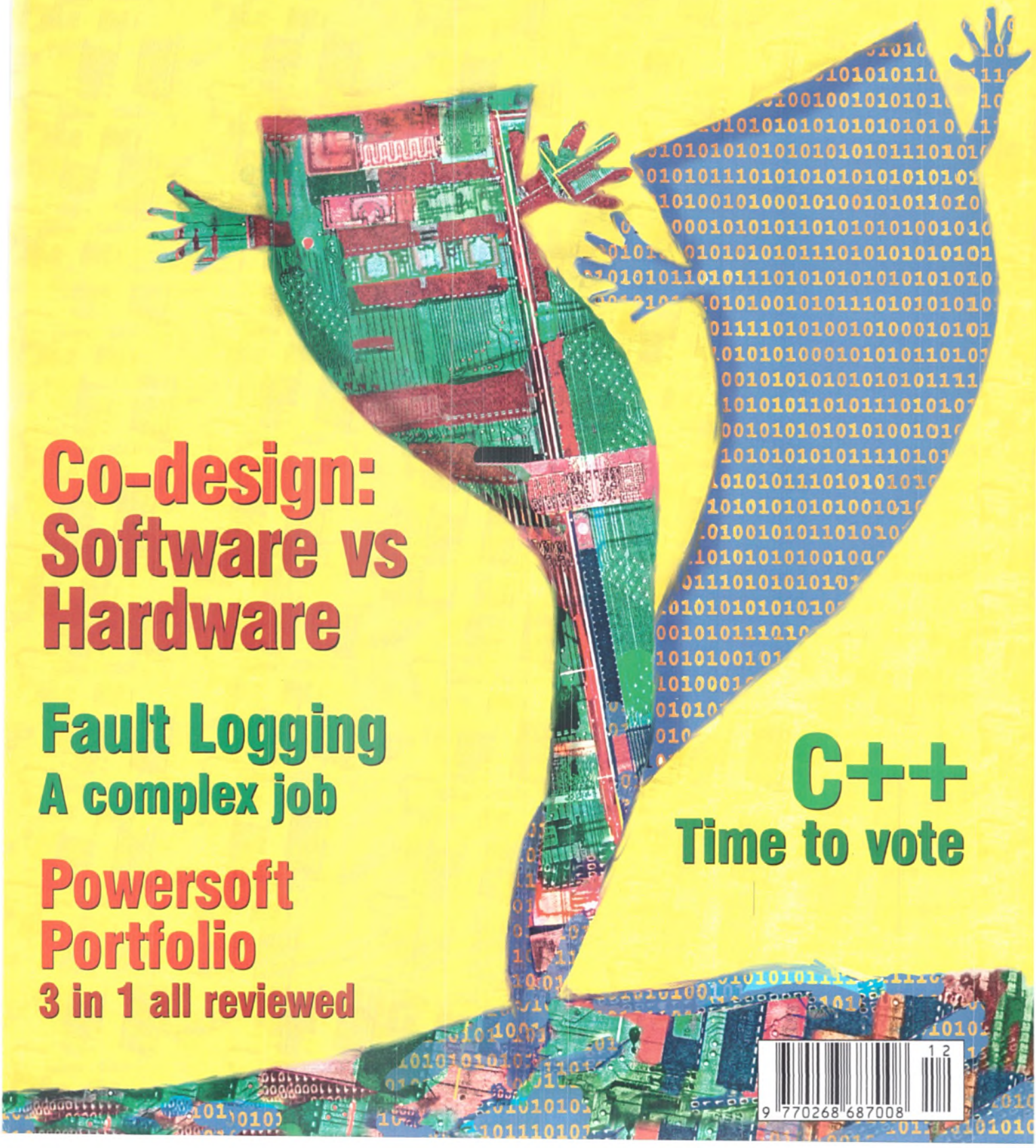

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SoapFlakes

People deserve better

I was a member of the first year to graduate with a Bachelor of Arts in Computer Science from the University of Essex. That was quite a few years ago now. It was a world where liquid crystal displays had just been invented and where computers were just beginning to be made from chips and not transistors. Those chips were packages that typically held two nand gates and were placed on boards that slid into racks. When your machine broke someone came and fixed it by diagnosing what went wrong and replacing the few chips that had died. We 'talked' to machines using punched cards and the machines 'spoke' back on line printer paper. The machines lived in huge rooms, protected by operators. There was much power consumption and air conditioning.

Of course, we look at history through those rose coloured spectacles containing strange lenses that distort the past into something that it probably was not. Computing today is certainly more accessible than it was then. Let's face it, using punched cards or paper tape to write programs was a pain. We all happily ditched that in favour of some form of interactive computing as soon as we could. With the VDU, at last we had a silent box on the desk that could communicate with the machine.

Then came the processor on a chip. The first ones were small and somewhat weedy in comparison to extant hardware. The chips quickly became widespread and started the workstation revolution on one hand and the personal computer on the other. Workstations were important because they radically altered what was then 'mainframe computing'. The workstation replaced the 80 column by 24 line VDU with a larger screen that could display many 'virtual' terminals. On each of these terminals, something could be happening. Workstations have remained expensive items, but the expense means that we expect them to be well engineered from both a software and hardware point of view. The same cannot always be said about personal computers.

I guess that you are aware of the personal computer revolution. The PC opened up computing to everyone by providing a rich set of accessible tools via Windows. Suddenly, what was important was the application and not the computer system. These applications generally work together nicely, so you can move text and images between them in an intuitive way. Many of the applications are excellent, I certainly use various PC based tools by choice.

The operating system that these tools runs on leaves a lot to be desired, it gives the illusion of user friendliness. If you use Windows every day, then how many times an hour do you find yourself in one of those browser boxes looking for the correct file or directory? Too many, much too many. The system does not make it easy for you to arrange the working set of files that you use. The system eats up your productive time, it may be doing this in a friendly way, but in the long run it's wasting your energy.

I feel that the PC revolution has spoon fed users. They are encouraged not to learn anything. They are told that the environment will always show them what is available to be done at any time in any program. There are now so many icons that little popup explanatory boxes are needed to ensure you press the correct button. Applications are rarely extensible in a simple way. My definition of WYSIWYG is 'What You See is What You're Given', implying constraint not user friendliness.

The PC revolution has taught a generation of new computer users that machines crash. Applications crash regularly, usually because some other program has written to their address space. Why is this acceptable? I certainly don't find it so. How can I be expected to put several hours of work into some document only to be told 'that's all folks' at some highly inconvenient point? I find it unreasonable to have to say 'Make sure you save it before trying to print it'.

Last weekend, my son and I were in Dover Castle looking at the sights. In the Keep, English Heritage has some PCs with touch screens that present you with multimedia information on Castles. It's a very well constructed application, I won't knock it. However, much to every one else's surprise, the machine we were using keeled over with a General Program Failure. We laughed. Windows strikes. It shouldn't happen.

Finally, if you have a Windows system that you depend on, do you quake with trepidation every time you install something new? Are you fed up with all those directories on the `C:` drive? Do you know what you are installing? What files is the setup program changing? Is it installing an older version of some DLL that means the death of some other utility? It seems that you can never completely uninstall a subsystem, except by keeping disk images and reverting to them. Have you ever completely re-installed a system and utilities to find that several things worked differently?

I'm not sure that Windows 95 is actually any better, in fact, folklore tells me that it's worse. I have a PC that runs Windows 3.1 in what is effectively a production environment and have not dared to try Windows 95. I need to be convinced that I am not a free Beta tester for Microsoft and that my existing software will continue to work. I now have this huge investment in software that I refuse to throw away just because of four funny coloured squares in the advert.

Perhaps what is interesting about Windows 95 is that people do seem to be saying no – at least at the moment. Whether this is a reaction to the hype or that finally people are beginning to realise things don't have to be flakey, programs don't have to suddenly crash. I am hoping that these higher expectations will result in better products on the desk. ■

Peter Collinson

Mayhem!

There's something mysterious and beautiful in the subtle interplay of voltage and current, the dance of feedback and cascade.

Electronics is funny old stuff. It's easy to recognise, but when you try to find a working definition, somehow the idea just keeps slipping away. I have a friend who is an electronics engineer – quite a good one, if his own accounts are to be believed. Surely he would know what it is. 'Electronics' he said, 'is anything which is too difficult to do in software'. 'That's funny' I said, 'I'd always thought of software being anything that's too difficult to do in electronics'. And so, we stayed friends, though I was no nearer to knowing what electronics actually is.

But, between the great rolling ocean of electronics, and the granular shifting dunes of software (good stuff, eh?), there lies a tideland, a twilight zone inhabited by crabs, limpets, and all manner of Rod Sterling (of Twilight Zone fame). This is where you find exotica like state transition evaluators, neural nets, ASICs, and PIC chips. And, it's to this tideland that I and my friend are being inexorably drawn, in search of the wet sand most suited to building sand castles.

I guess it's a sexy place. No longer is my friend fiddling with bias adjustments, or slotting prefabricated functions together like Lego. Now he can concentrate on just what he wants to achieve, knowing that the entire silicon is doing just what he wants and no more. From my point of view, I can do the same; I can concentrate on the job I want to do; I don't have to worry about user interfaces or filing systems; I know the stuff will work as soon as I connect the battery. It's a very pure form of engineering.

What's odd about this zone is that it's very digital. You use computers to create your machines instead of soldering irons. These things are all clocked, often by built-in oscillators, and the few which do take analogue signals convert voltages to binary at the very first possible opportunity.

Now that these things have become as cheap as op-amps, the digital route has a lot of advantages. No noise build-up, no adjustments to get wrong, and a simple trade-off between power usage and processing speed. But there's no such thing as a free lunch, and digital has drawbacks as well.

The first drawback is in transferring signals between these devices. If you transfer digitally, you need common clocks, which in a big system is awkward to the point of impossibility. There are compromises, but they don't scale

well. On the other hand, you can't solve the problem by transferring analogue, because then you get not only noise from two extra stages of digital/analogue conversion, you also get Moir noise from the slight differences in the local clocks.

Secondly, there's the problem of sensitivity. Traditional electronics is all about minimising the effects of variation; making a system which stays stable as you feed signals into it. Digital electronics is all about maximising the effects of variation, creating positive instead of negative feedback. Small input errors can cause enormous output errors (as any mobile phone user knows, digital dropout is a particularly offensive noise), and can even destroy the function of a program-driven device entirely by crashing the program.

And finally, there's radiation. The electronics world is all of a tizzy at the moment, as the new EC regulations on electromagnetic compatibility come into force in January 1996. The regulations seem to be very poorly drafted, and their requirements defy any serious attempt at quantitative measurement, but in outline their very sensible intent is to prevent one piece of equipment from upsetting the operation of another (and, after using a radio microphone surrounded by perhaps a hundred mobile phones, I can vouch for the necessity of some regulation). This is where the digital tideland is particularly vulnerable; not only do these devices amplify the interference they receive, but anything digital, by its very nature, produces a particularly filthy cocktail of emissions, sometimes at very high energy, and digital systems are more sensitive to this kind of interference.

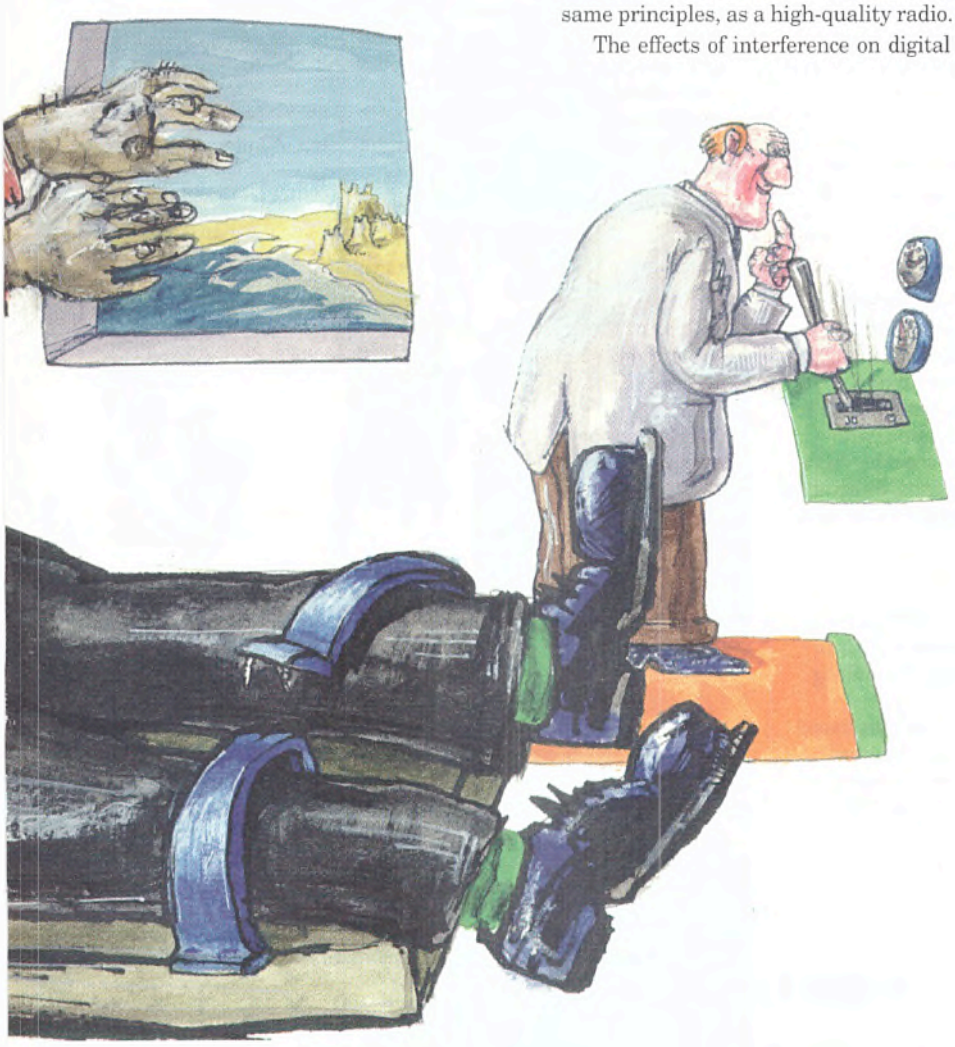
In spite of these disadvantages, the world is going digital, and these problems are being solved. But now, there's another kind of design requirement, and that's to minimise interference. A circuit can, in many instances, no longer be defined entirely by a traditional schematic; just as has been the case in radio engineering for many years, the behaviour of a circuit is defined as much by the shape of it as what its active components are. Even simple things like earths become active circuit elements, and must be designed properly. Then you have to worry about the kind of boxes you're going to put it all in, and how you're going to get signals into and out of the box. In effect, even the simplest digital clock now needs to be designed with the same care, and using the same principles, as a high-quality radio.

The effects of interference on digital circuits is wholly disproportionate, and now we have a vague legislative framework to force engineers to consider their designs in the context in which they're going to be used. In return, we can work at a far higher level of abstraction, and make complex chips and complex functionality without waiting for chip companies to design them for us. We can even create a market in custom-programmed chips with standard behaviour, and interconnection, such as digital clock chips which interface with anything. I think that's a very fair trade-off, and for those who disagree, the old-style analogue electronics is largely untouched by the new legislation. No, what worries me is that this technology is so attractive that, already engineers are beginning to forget how to design any other way.

I have been working on miniaturising a device which, although it contains a small amount of logic, spends most of its time shunting power around. 'How did you do it – a PIC chip?' asked my friend. No, these chips are no use for moving power around; all they do is logic, and the logic is the smallest part of the problem. More than half the volume of the device is devoted to conditioning the inputs so the logic can't be wrecked by power surges. But, they say that when all you have is a hammer, the world appears full of nails, and I'm worried that with the mass migration into the tideland, we'll forget all the skills that led us there, that current and voltage will die from neglect while we're all playing with the bits and bytes.

It has happened before. I know of perhaps two engineers who know how to use thermionic valves properly, yet valves are still the best solution to many problems. It has happened in computing too, where core skills from the sixties are now regarded as meaningless exotica. There's no reason why it shouldn't happen again.

Except for one thing. This interference is all about voltage and current. It's about tuned circuits, feedback paths, and inductive coupling. It's what real electronics, in a previous life, used to be. While half the engineers in the country are complaining about this new legislation signifying the death of innovative electronics, and the other half wondering how they can profit from the first half, I rather suspect that the legislation is going to save electronics. ■



Jules started in electronics before he moved into computers, and still feels the need to return to his roots occasionally. What's more, he grew up at the seaside, and once won a sand castle-building competition. He can be contacted as jules@cix.compulink.co.uk or 01707 662698.

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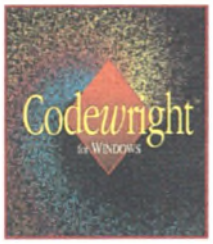

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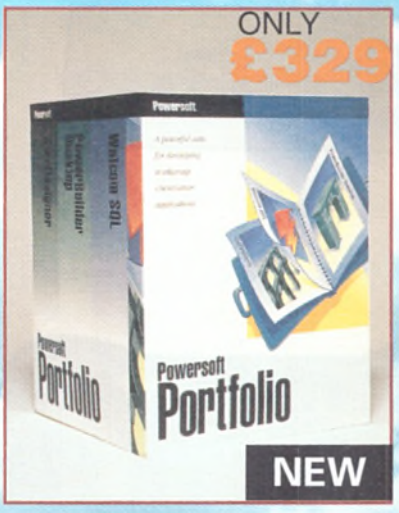

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CIRCLE NO. 412

EXE Challenge '96

The date: 27 February, 1996. The venue: a darkened cubicle, Olympia, Kensington. The company: a single colleague and an assortment of soft drinks, biscuits and crisps. The task: building a complete application to a previously unseen spec. in just eight hours.

If the above scenario excites you, then set your sights on next year's EXE Challenge. Based on a competition which takes place in the States, the EXE Challenge was set up this year to stimulate the talents of UK software developers and at the same time develop a real-world application that could be put to good use by a charity. Next year's Challenge will be to create a database application for recording fund-raising information for the Big Issue Foundation. The software is a real requirement of this charity which helps homeless people in the United Kingdom. Research consultancy Ovum has been selected to judge the competition, which is to be held at the Windows Show '96, Olympia.

To enter the EXE Challenge '96, call Sandra Inniss-Palmer on 0171 287 5000. Alternatively, for further information call Suzanne Chamberlain on the same number (or send a fax on 0171 437 1350). Any combination of PC-based development tools and programming languages may be used. A team of up to two developers may take part; the entry fee is £1000 plus VAT.

The judges

Too often the deadline rush results in applications that are hard to maintain and difficult to adapt to changing business needs. Ovum believes that *application adaptability*, one of the key dimensions in its evaluation of 4GLs and client/server development tools, is the most important issue in software development. The EXE Challenge will judge not only speed of delivery, but also the responsiveness and quality with which specification changes are implemented.

Ovum is an independent research and consulting company providing information and advice on computing and telecommunications for decision-makers world-wide. It researches key market, technical and regulatory developments, delivering the results via published reports, evaluation services and consulting assignments for suppliers, users and policy makers. Topics of recent reports include:

- *Applications for the Superhighway*
- *Middleware*
- *Distributed object computing*
- *Multimedia publishing*
- *Virtual private networks*

The Big Issue

The Big Issue is best known for its weekly magazine which is sold in all major UK cities. The award-winning *Big Issue* is sold on a 'help the homeless help themselves' basis where homeless people buy the publication for 30p and sell it for 70p, keeping the difference for themselves. Homeless people see selling the *Big Issue* as the first step towards integration back into society. The Big Issue Foundation was set up to help *Big Issue* vendors make the next step - towards employment and housing.

The Big Issue Foundation has been established to respond to the wider needs of *Big Issue* vendors and other homeless people, and shares the magazine's mission to help the homeless help themselves. The Foundation provides a range of support services for homeless people, including housing and resettlement, training for work, creative workshops and rehabilitation services.

The *Big Issue* is a unique publication which combines news, arts and features, while at the same time highlighting social issues and campaigning on behalf of homeless and marginalised people. It is currently sold in Aberdeen, Brighton, Bristol, Bath, Birmingham, Cardiff, Dundee, Edinburgh, Glenrothes, Glasgow, Leeds, Liverpool, London, Manchester, Newcastle, Norwich, Nottingham, Sunderland and Swansea.

EXE Challenge '95

This year's Challenge saw fourteen teams strive to develop a fully-functional payroll application for the Royal National Institute for the Blind. Thirteen of these were teams of two.

The race commenced at 8.00 am sharp. In their little cubicles the teams had until 4.00 pm to complete the job using their favourite RAD tools. Cans of fizzy drink, packets of biscuits, chocolate bars, all the extras real programmers need, were neatly arranged on the desks. In the true spirit of competition it was a fun event.

The mix of development tools the competitors chose to use ranged from the well established to the new and even the unreleased. But it was not only the development tools that were pushed to the limits.

1995 results

Contestant(s)	Company	Tool
1. Bruce Lomasky	Magic	Magic
2. Alistair Ramsey/Ian Sharp	Dunstan Thomas	Borland Delphi
3. Meni Gani/Alex Skorohod	Pilat	Magic

The overall results were a combination of the skills of the team members and the power and ease-of-use of the tools.

The eventual winner was Bruce Lomasky, of tool vendor Magic, who made use of the company's development tool of the same name. Bruce had this to say about the competition. 'I think the most important thing to remember is to read the spec., design to it and set out a time management schedule to the hour. Practice before hand, drink plenty of soda and coffee, and have lots of sugar.' So now you know.

I was impressed at both the level of commitment and the quality of the work by all teams that took part.
Steve Pear, Judge, RNIB

The competition provides one of the few accurate gauges on the industry to prove which application development tool provides the highest productivity for developers.
John Milway, General Manager, Magic Software

Working in a team is like synchronised swimming - you have to communicate well together.
Bruce Lomasky, Winner, 1995

DSDM standard version 2

The Dynamic Systems Development Method (DSDM) Consortium, a non-profit organisation dedicated to providing a common Rapid Application Development (RAD) methodology, is finalising version 2 of the method. The new version wil be launched at the European RAD Conference, in London, on 5-6 December. BT, an active member of the consortium, will be implementing the DSDM standard amongst its 6,000 developers and 130,000 internal customers. DSDM can be reached on 01233 661003.

Client/network computing?

In a follow-up to its May 1995 report entitled *CIO Meets Internet*, IT consultancy Forrester has coined the phrase 'client/network' computing to refer to a new Internet-based application architecture. In this model, finely crafted client/server applications are replaced by a rapidly growing population of applications that can be downloaded by Internet clients. Java and Netscape presage the new paradigm, which Forrester (01753 831634) believe will change the world.

Novell starts DeveloperNet

Novell UK has announced a new DeveloperNet developer relations programme that will become the primary channel for delivering it's corporate technology to developers. Subscriptions include the DeveloperNet SDK with quarterly updates and other software and documentation. Novell is also starting new technical support programmes, and a variety of electronic support services. Call 01344 724000 for details.

Literary aspirations

Birmingham-based Wrox Press is inviting ace programmers to the first of a series of informal evenings at the PC Bookshop, London, in the hope of meeting prospective writers for next year's publications. Hot topics include NT, SQL Server, visual development and the Internet and Java. Worth a visit if you could be the next Petzold. Call 0121 706 6826 for details.

Ada becomes object-oriented

Ada 95 is now an ISO and ANSI standard, and as such is the first internationally standardised object-oriented programming language! Ada 95 adds OO to Ada 83's existing programming facilities, with 100% upward compatibility. A number of tool vendors, including Rational and Sun Microsystems, are planning Ada 95-compliant compilers. Email adainfo@sw-eng.falls-church.va.us.

Putting the Blue into Bloomsbury

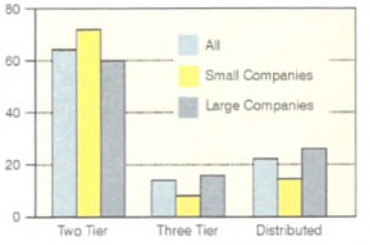
Bloomsbury Software, UK distributor of Digitalk's Smalltalk/V and PARTS products since 1990, has decided to turn its back on Digitalk's product line and instead forged an alliance with IBM. Twelve months ago Bloomsbury considered becoming a reseller of IBM's products, but felt that at that time they were technically inferior to Digitalk's offerings.

Since then, according to Bloomsbury managing director Peter Day, IBM Smalltalk has improved to become the fastest on the market. He added that Digitalk-ParcPlace, which merged in September, has been 'bogged down' with the unification of its two Smalltalk product lines, and was unlikely to arrive at a 'clear technical direction' in the near future.

4 December	IBM Manchester
5 December	IBM Warwick
6 December	IBM Bristol
7 December	IBM South Bank
8 December	IBM Edinburgh
12 December	IBM Dublic (TBC)

To consummate their partnership, IBM and Bloomsbury are holding a series of seminars to demonstrate IBM Smalltalk at the venues listed. Bloomsbury will continue to support existing Visual Smalltalk and Smalltalk/V users until ParcPlace-Digitalk is in a position to take over. Call Bloomsbury Software on 0171 436 9481.

Client/Server World Survey



Types of client/server system (Sorce: Tate Bramald Consulting)

A survey commissioned by Interactive Group has found a generally favourable response from the IT industry to the third generation of computing architectures: client/server.

Of the respondents, 43.2% had already implemented client/server within their organisation, with a further 34.5% considering future implementation. The major benefits of client/server were found to be distributed processing, access to data, the user interface, and the flexibility of being able to choose different platforms for parts of an application. Of course the route to client/server is not plain sailing - particular problem areas are cost, which most companies were unprepared for, and a lack of skills, both within the company and on the market.

Interactive Group, an independent consultancy, commissioned Tate Bramald Consultancy to conduct the survey in order to understand client/server's impact on UK businesses. Some 20,000 Computer Weekly readers were asked for their opinions. A sample of 750 responses forms the basis of the results, with 84.8% of respondents coming from managerial ranks. The survey is available directly from Interactive Group for £95. Tel: 0181 541 5040. Email: 100335.3172@compuserve.com

Door open to DB connectivity

As part of its effort to standardise database access, the X/Open SQL Access Group last month published the first version of its CLI (Call Level Interface) specification. The document, entitled 'Data Management: SQL Call Level Interface', defines a common platform- and database-independent API for accessing databases. Since its publication, the ISO version of the specification has become an International Standard, a milestone which Roger Sippl, chairman of the Group, heralds as 'an acknowledgement of the fact that writing a program once, to a standard API... has become mainstream in the computer industry and user requirements'

The most significant development, however, is Microsoft's recent announcement that its upcoming ODBC 3.0 will fully align with the functionality introduced into the X/Open CLI since ODBC's creation, including the X/Open descriptor architecture.

The X/Open SQL Access Group was formed earlier this year from the union of the X/Open Data Management Technical Committee and the SQL Access Group. The combined group has representatives from Informix, Oracle, Progress and Sybase, among others. The ongoing work of the group will involve specification of standards for additional data access technologies such as stored routines, asynchronous calling mode, array fetch, and extended data types.

The X/Open CLI specification (document number C451, ISBN 1-85912-081-4) can be ordered from X/Open, on 001 415 323 7992.

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Standard C++ Library

Rogue Wave Software has released Standard Library 1.0, an implementation of the draft ANSI/ISO Standard C++ Library. It includes the data structure and algorithm classes previously known as the STL, plus the templated string class, the complex class, the numeric limits class, and others. Standard Library 1.0 also provides thread-safe extensions to the ANSI/ISO classes. The product is available from Hypersoft Europe, on 01273 834555, for £166.

Out of bounds

Automated error-detection specialist NuMega has announced that it has provided certain components of its award-winning BoundsChecker for inclusion in Microsoft Visual Test 4.0. The BoundsChecker components are fully integrated into Visual Test 4.0 and report all detected errors via the Microsoft Developer Studio. Detectable errors include memory leaks, resource leaks and pointer errors. Additional error-detection facilities are available with the full version of BoundsChecker.

New heights for ISE

Interactive Software Engineering (ISE) has shipped version 3.3 of its Eiffel visual development environment. Enhancements vary from better symbolic debugging facilities to compiler optimisations. Under Windows it is now possible to call a DLL-resident function whose name and library are not known until run-time. The product is available for most Unix platforms immediately; Windows, DEC Alpha OpenVMS and UnixWare versions will be released later this month. As expected, ISE Eiffel is fully source-compatible between platforms. Call Everything Eiffel on 01772 687525 for prices.

Aide-de-Camp's change sets

A new software configuration management tool, Aide-de-Camp/Pro, uses patent-pending 'Change Set' technology to simplify management of parallel software development. More than just a crude file delta, a Change Set represents a logical view of changes to a baseline, and can be merged with other Change Sets to produce a release version. The tool, from US company True Software, also has code scanners for Ada, C, C++, COBOL and FORTRAN which identify dependencies such as calls and includes. These dependencies are maintained for release building and impact analysis. Aide-de-Camp/Pro is available from Fullduplex Computer Professionals, on 01737 769898.

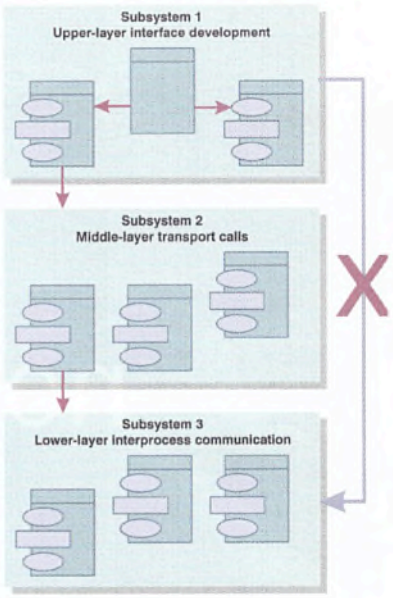
Rational round-trip

Tool vendor Rational has announced Apex C/C++, its new integrated development environment for C++. Apex C/C++ integrates a compiler, debugger and browser with configuration management capabilities and version control. The high level of integration is achieved by the use of a persistent intermediate representation, or repository, to capture semantic information about programs that with stand-alone tools is only available to the compiler.

Most large C++ projects use some notion of subsystem to reduce dependencies and maintain layers of abstraction, but rely on manual checks to ensure that the application architecture is not violated. Apex C/C++ automates this process. First, it allows the specification and enforcement of project-wide coding standards. Secondly, it provides 'architectural control', a way of formally defining relationships between subsystems.

Rational completed a 'definite agreement' to acquire Swedish software company Objectory in October. Ivar Jacobson, founder of Objectory and inventor of use-cases, has joined Rational as vice-president of business engineering. Objectory's flagship product and namesake adds requirements capture through use-cases to Rational's support for all phases of the development cycle.

Apex C/C++ runs on Digital Alpha AXP, Sun SPARC and HP 9000. Rational is on 01273 624814.



Apex C/C++ prevents unauthorised direct access to lower layers

SunSoft Workshops

SunSoft has introduced the next generation, version 2.0, of its Workshop integrated product suites. SunSoft claims that the new tools offer performance boosts of up to 15% on SPARC-based systems, and as much as 30-50% on systems based on Sun Microsystems' new UltraSPARC processor.

The Workshop 2.0 product family includes development environments for C++, C, Fortran 90, Fortran 77 and Ada. Bundled with release 2.0 of all the tools is the SunSoft Performance Library, a highly optimised implementation of the most widely used numerical algorithms, for such applications as structural analysis, computational fluid dynamics, reservoir modelling, and simulation.

The new compilers use an advanced optimisation technique called feedback profiling. After initial compilation, the program is run and an application profile generated. This information is then fed back into the next compilation to ensure that the compiler makes the appropriate optimisations to realise performance gains.

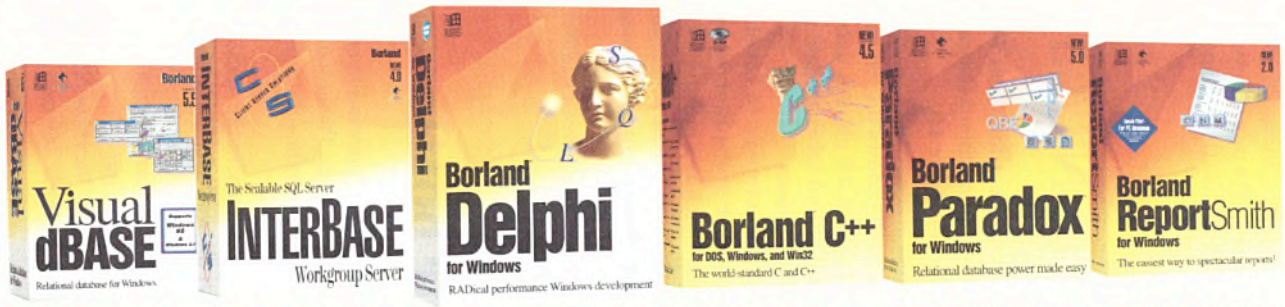
SunSoft is also introducing enhanced versions of SPARCworks/iMPact and SPARCompiler C that work together to automatically 'parallelise' (thread) C code. The new extensions provide performance improvements on both uniprocessor and multiprocessor systems.

SunSoft Workshop prices range from $2195 for the C programming language to $12,500 for Ada. Upgrades are available. Sunsoft also recently released Solaris 2.5 edition for the Intel platform (suggested retail prices start at $300). For information call SunSoft on 01494 472900 or browse http://www.sun.com/sunsoft/.

OpenDoc available... for Mac OS

The 'OpenDoc for Mac OS SDK' is now available from Apple. It contains the final version (of the first release) of OpenDoc as well as sample code and development tools. The SDK has software for both Power PC and Motorola based Macintosh.

IBM is now responsible for all Windows, AIX and OS/2 versions. OpenDoc for Windows is expected beginning of 1996. The Mac OpenDoc SDK can be requested at *opendoc@apple.com* (to receive a CD) or downloaded from: *http://www.opendoc.apple.com*.



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CIRCLE NO. 414

Prolog for Windows 95

Logic Programming Associates has ported its range of Prolog development tools to Windows 95. The new release supports long filenames and Windows 95 common dialogs, and provides an enhanced 32-bit inference engine. Products are available in two editions - the basic Programmer Edition, and the Developer Edition which includes a run-time generator for creating stand-alone applications. LPA Prolog for Windows 95 starts at £745. Tel. 0181 871 2016 for availability.

Groupware for reuse

Integrated Work's latest software tool, Object Publisher, encourages and monitors object reuse within the corporation. The tool manages corporate software libraries, allowing controlled reuse of objects and application fragments. It provides browse and search facilities, automated import of objects into a library, and flexible classification of library contents. Since Object Publisher also provides statistics on reuse, the potential impact of changes to an object can be monitored. A starter pack, available now, contains one Administrator and five Browser licences for £1,500. Integrated Work can be contacted on 0171 302 3000.

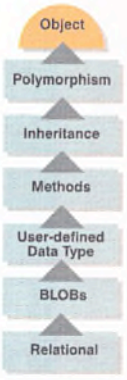
Pure software for NT

The NT version of Purify, a run-time error detection tool from Dutch company Pure Software, is due in the first half of 1996. It uses proprietary Object Code Insertion (OCI) technology to analyse an entire application, including shared and third-party libraries, with minimal impact on performance. The product works in close combination with other tools from Pure Software such as PureCoverage, which can tell you how often each function in your code is executed. Purify is already available for a variety of Unix platforms. Phone Pure Software on 0031 2503 85401.

VBAssist 4.0 for VB 4.0

Sheridan Software has released version 4.0 of its productivity toolkit for Visual Basic. Compatible with Visual Basic 4.0, VBAssist 4.0 comprises some 57 tools, including Resource Assistant for editing resources from within VB, DB Assistant, Project Wizard, and an improved Nudger for moving and sizing controls without using a mouse. Improvements include reduced memory and resource consumption and a customisable toolbar. VBAssist is available from Sheridan's UK distributor, Contemporary Software, for £130. Contemporary is on 01727 811999.

Hybrid vigour



Migration path to OODBMS

Current fads in IT such as data warehousing, multimedia, interoperable components and the Internet are all pointing towards the object database being the storage medium of the next decade. At least, that's the story according to John Carolan and Rob Hailstone of Computer Associates, who believe that the ability of Object-Oriented Database Management Systems (OODBMSs) to store complex data structures and package 'methods' with data will give them the competitive edge over traditional RDBMSs in the years to come.

However Computer Associates, which sells the Ingres RDBMS, has decided that a small step might be less dangerous than a giant leap. Its new product, CA Open Ingres, is (to use OO jargon) an 'iteration' of Ingres towards a true OODBMS. The RDBMS paradigm has already been extended a number of times since its conception - for example the concept of a trigger violates the notion of purely passive data storage - but CA Open Ingres goes further. For example, the product will ship with an SDK with which users can create and store business objects. In an RDBMS, objects are either mapped to relational tables or stored as BLOBs (Binary Large Objects).

Such hybrid relational databases are not new: both Illustra, which actually started as an Ingres project, and UniSQL are similar. There are also databases, like ObjectStore and Objectivity, which allow the persistent storage of C++ objects. None of them provides the features or rich data-modelling capacity of a fully-fledged OODBMS. Yet Carolan thinks this shortcoming may be an asset. It's taken a long time for the RDMBS to become the core of corporate IT: it will take an equally long time for the object database to replace it. Like C++, technology that doesn't require a huge 'paradigm shift' is likely to have more takers.

IONA brings CORBA 2.0 to NT/95

The latest version of IONA Technologies' Orbix object request broker for 32-bit Windows enables developers to create and control CORBA (Common Object Request Broker Architecture) objects using desktop tools such as Visual Basic 4.0.

Orbix is IONA Technologies' implementation of the Object Management Group's CORBA standard. Orbix runs across 20 platforms, including Windows 3.1, 95 and NT, and 12 flavours of Unix. Developers can now create CORBA 2.0 objects using OLE custom controls (OCXs), allowing previously desktop-bound OLE objects to communicate across the network with other OLE or CORBA objects.

Previous versions of Orbix for Windows 3.1x allowed developers to invoke remote CORBA objects, by generating OLE Automation server stubs that 'wrap' CORBA Interface Definition Language (IDL) calls but which look like a normal OLE Automation server to Windows applications. Support for OCXs in the new version makes it possible for Orbix to provide a two-way link so that Windows applications can be activated by, as well as activate, remote objects.

Orbix 2.0 for Windows NT costs £1,760. The Windows 95 version is priced at £700. Contact IONA Technologies' Dublin office on 00353 1 668 6522.

Finding the neck in your bottle

A new product from systems management tool vendor Landmark Systems promises to troubleshoot slow client/server response times and analyse performance trends. PerformanceWorks uses intelligent SmartAgents to automatically gather performance data from application 'pressure points', including CPU, memory, I/O, and the network.

PerformanceWorks' SmartAgents are available for client and server operating systems, RDBMSs and end-user applications. The agent-based architecture allows PerformanceWorks to support dozens or even hundreds of servers with equal ease. The five PerformanceWorks applications use the information gathered by SmartAgents for real-time monitoring, historical reporting, forecasting and budgeting, and capacity planning and modelling.

'Operating system SmartAgents' include AIX, HP-UX, SunOS, Solaris, Windows NT and Windows 95 versions. 'Database SmartAgents' are available for Sybase, Oracle, Informix, SQL Server and CICS for AIX. Call Software Products on 01203 630630.

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If Edwin Hoogerbeets were a developer, he'd be a proud man. Because new Microsoft® Visual C++ 4.0™ is based on the very principle he lives by: Never create from scratch.

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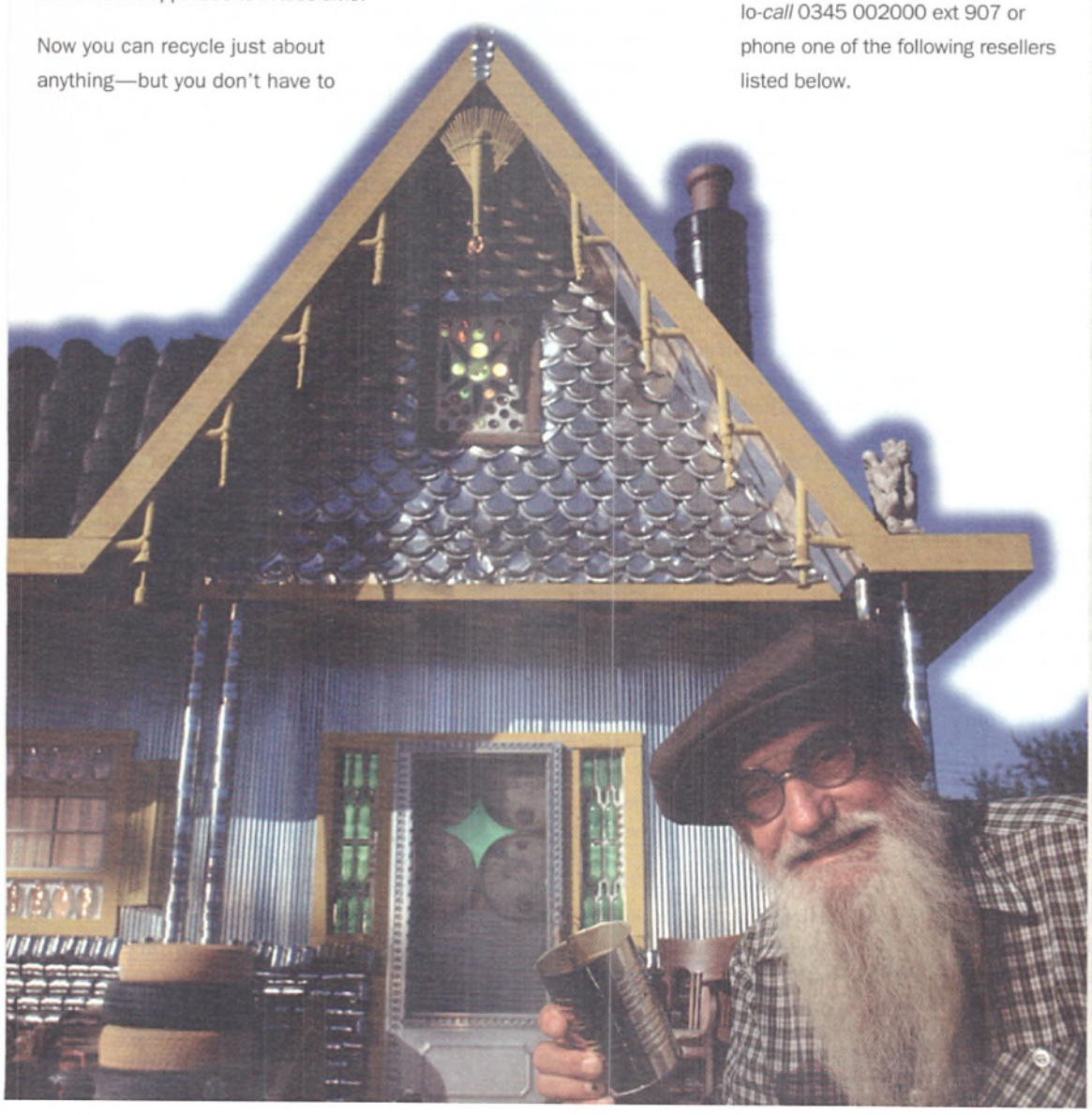
Now you can recycle just about anything—but you don't have to be a genius to do it. The new Component Gallery allows you to store and reuse your own C++ components and OLE controls, as well as 3rd-party components. And, MFC 4.0 gives you more than 150 classes and 120,000 lines of code you don't have to write or test.

The new Developer Studio makes reuse intuitive. With ClassView, you can view the relationships between classes. You'll even have one-click access to the MSDN Development Library, Microsoft Visual Test, Fortran PowerStation, and Microsoft Visual SourceSafe™ version control system. And of course, expanded C++ language support, including namespaces and RTTI, gives you added flexibility.

Now that you have a better idea of what's possible when you recycle, start with a Visual C++ Subscription, which includes the Visual C++ development system 4.0, plus three additional Subscription Releases shipped automatically.

For more information about Visual C++ 4.0 Subscription, or any of the Microsoft Visual Tools and the name of your nearest stockist call the Microsoft Connection on lo-*call* 0345 002000 ext 907 or phone one of the following resellers listed below.



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CIRCLE NO. 415

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 **editorial@dotexe.demon.co.uk** Unless your letter is marked 'not for publication', it will be considered for inclusion. Letters may be edited.

Assignment operators

Dear Sir,

Anthony Youngman (*EXE* Letters, November '95) thinks that `a=-1;` is ambiguous, and goes on to say this is 'ANSI's fault, not K&R's'.

There is no assignment operator '=-' in ISO C. This was a problem in some very early versions of C, though dusting off my copy of the 1978 edition of the K&R book I can't find mention of it, so it's about time Anthony got an upgrade to his compiler!

I assume the comment 'no whitespace' next to his example means that he thinks the ambiguity used to be resolvable by adding whitespace. According to Harbison & Steele, 'In the earliest versions of C, the compound assignment operators were written in the reverse form... the ambiguity was arbitrarily resolved by requiring the latter interpretation [compound assignment rather than assignment and unary minus].'

This is not a discussion of how many angels can stand on a pinhead. Maintenance programmers may encounter bizarre code such as '`a =- 1;`' (note the spaces) and they should know what it really means.

PS Why does *EXE* usually say 'Internet address supplied'? I'm happy for my email address to be published — isn't this true for (some of) your other correspondents?

John Washington
john@wash.demon.co.uk

It's probably true for some, but others might not want to receive any (more) email. If you don't mind your email address being published, please mention it at the end of your letter. As for your first point...

Do What I Say I Mean

Dear Sir,

Anthony Youngman takes an earlier letter writer to task for his comments on C operators. Unfortunately, he then makes an error himself which rather undermines the intention of his message [...] however, his point about the ease of accidentally substituting '=' for '==', and vice versa, is well made. Many coding style guides now recommend tests for equality of the form `if (5 == a)` rather than `if (a == 5)` since the slip of the finger that produces `if (5 = a)` will now evoke a compile-time error that `if (a = 5)` might not.

Michael Wilson
Internet address supplied

Recursive corrections

Dear Sir,

In the November issue of *EXE*, you published a letter from Anthony Youngman correcting an earlier letter from Robert Sproat which was itself attempting to correct an earlier article by Francis Glassborow. (Which, as it happens, wasn't incorrect anyway.)

Unfortunately, Mr Youngman's letter contains an error and (you guessed it) I would like to correct it. (Is there a maximum nesting level for letters of correction?) [...]

Ian Cargill
Internet address supplied

We're running out of stack space as far as this topic is concerned - your word may have to be the last one!

Verity Stob's Yorkshiremen

Dear Sir,

Folks with them fancy paper tape things were lucky. Did Verity Stob never drop a stack of cards?

Adrian Russell
Internet address supplied

Thoughts on writing programs

Dear Sir,

After reading EXE for a number of years with, at times, the thought: 'Why the hell are we paying for this subscription?' I was very pleased to read something that is directly applicable to the programs I write here at work.

I have arrived at the same conclusion as Peter Collinson (*EXE* September '95, pp. 45-50) regarding configuration files, and have written 'C' procedures to parse such files, but not as neatly as described in the article. Now I can make my procedures shorter and sweeter.

So PLEASE, more *real-hands-on-error-segmentation-type-programming* articles!

For the record, I'm involved in hardware and software design for the production testing of advanced digital consumer products. Platforms are mostly PC-DOS due to cost-effectiveness but there is a move towards UNIX & UNIX clone OSs (such as Linux).

Video meliora proboque, deteriora sequor.

Mark Aylott
Internet address supplied

The truth is out there

Dear Sir,

I have just become acquainted with your magazine, due to the good fortune of searching through a pile of magazines at my work place, I thought it a good idea to send your magazine a letter for publication if you so wish in the hope that you may offer me a subscription in return (cheek).

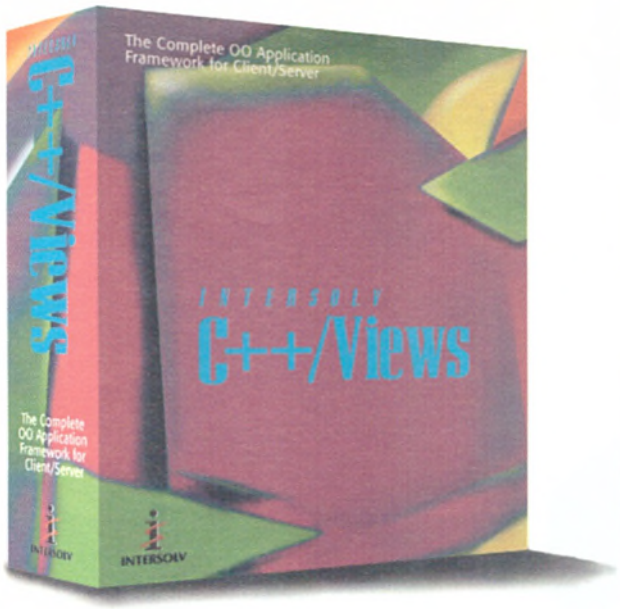
My point I would like to make is that there is a link between the National Lottery and Computer Programming, what is this you ask! No the answer is not that computer programmers were of course used in the development of their system, the answer lies in the fact that they are both highly addictive activities.

This point is backed by the case of a friend of mine, we shall call him 'Bloke A'. Since being introduced to the Spectrum as a child 'Bloke A' has been addicted, starting with 'Classic' games such as 'Chucky Egg' and 'Zombies' he began to spend more and more time playing these games, even leaving his machine on for days, weeks so not to have to load them again. From this point his money was firmly in the grip of organisations such as Ocean, Sega, Nintendo and now MicroSoft, his addiction fuelled only by the dream of such wealth as 'Bill Gates' one day being within his grasp.

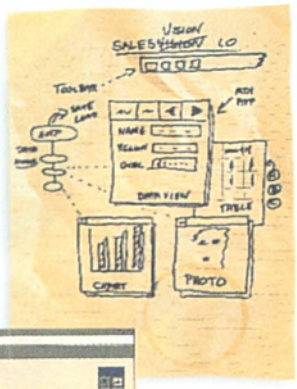
Ahh, but the addiction does not lie entirely on possible monetary income, it relies on the strange attraction that electrical signals within a computer generate, these signals unresearched by man are what make Programmers and 'Bloke A' alike think in Binary, these signals stop him from watching TV or talking to his wife these signals make him dream of the processing of complex floating point operations in a single clock cycle.

But is it addictive? that is the question, what is the answer. We all know that computer games are believed to be addictive but is computer programming, perhaps there is some truth in these electrical signals. But one thing I know for sure is that 'Bloke A' is somewhere in the majority of us all.

M. Powell
Notts.



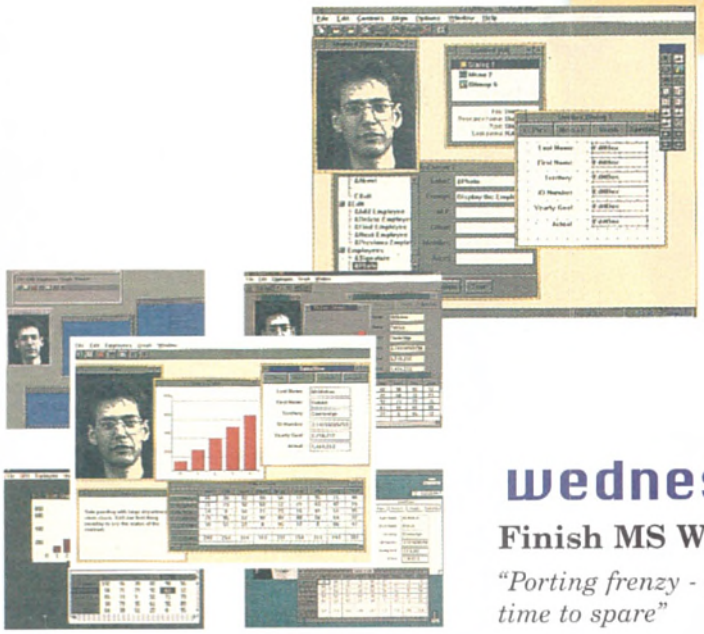
When the Deadline Demands Action...



monday....

The assignment

"OH NO! I agreed to get this application built by Wednesday... on Windows, Motif and OS/2."



tuesday....

Use C++/Views visual interface builder & C++/Browse

"I'm already ahead of schedule! I've got my dialogs laid out - I just have to finish the menus. Then, I'll use the class browser to create my classes and attach them to the dialogs and menus."

wednesday....

Finish MS Windows version

"Porting frenzy - hit the deadline with time to spare"

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CIRCLE NO. 416

Elastic Reality meets PowerPC technology.

PowerPC

When the folks at Elastic Reality wanted to make their special effects software even more special, they turned to today's PowerPC microprocessor technology.

They saw that its superior price/performance and faster floating point operations were ideal for graphics-intensive applications like theirs, in effect, speeding up the creation of visual effects. So users would be free to handle far more complex tasks. The results of their efforts have stretched the boundaries of films, TV and commercials.

It's just what you'd expect from a technology jointly developed by IBM, Apple and Motorola. And it's just what Elastic Reality was looking for when it joined the growing ranks of companies that are adopting the PowerPC platform.

What kind of special effect can it have on your business? To find out more, visit us on the net at http://www.chips.ibm.com

It'll be a real eye-opener.

(And special effects haven't been quite the same since.)

IBM

Solutions for a small planet

Elastic Reality is a registered trademark of Avid Technology, Inc.

CIRCLE NO. 417

Apple Computer meets PowerPC technology.

PowerPC

When Apple Computer wanted to find new and exciting ways to bring information to life, they turned to today's PowerPC microprocessor technology. And the results have been truly amazing.

With the increased processing power and speed designed into the PowerPC platform, it's possible to combine video, voice and data to create a more interactive environment. One that's transforming the way people relate to technology and, more importantly, to each other.

In fact, from multimedia to video-conferencing to 3-D graphics, Apple's PowerPC computers are enabling people in business, government and other fields of learning to see and do things they never imagined possible.

It's the kind of thinking that inspired IBM, Apple and Motorola to create the technology in the first place. And that's leading other companies to adopt it for themselves.

To find out how PowerPC technology can open up your business to a world of new ideas, visit us on the net at http://www.chips.ibm.com

You'll be amazed by what you just might learn.

(And learning hasn't been quite the same since.)

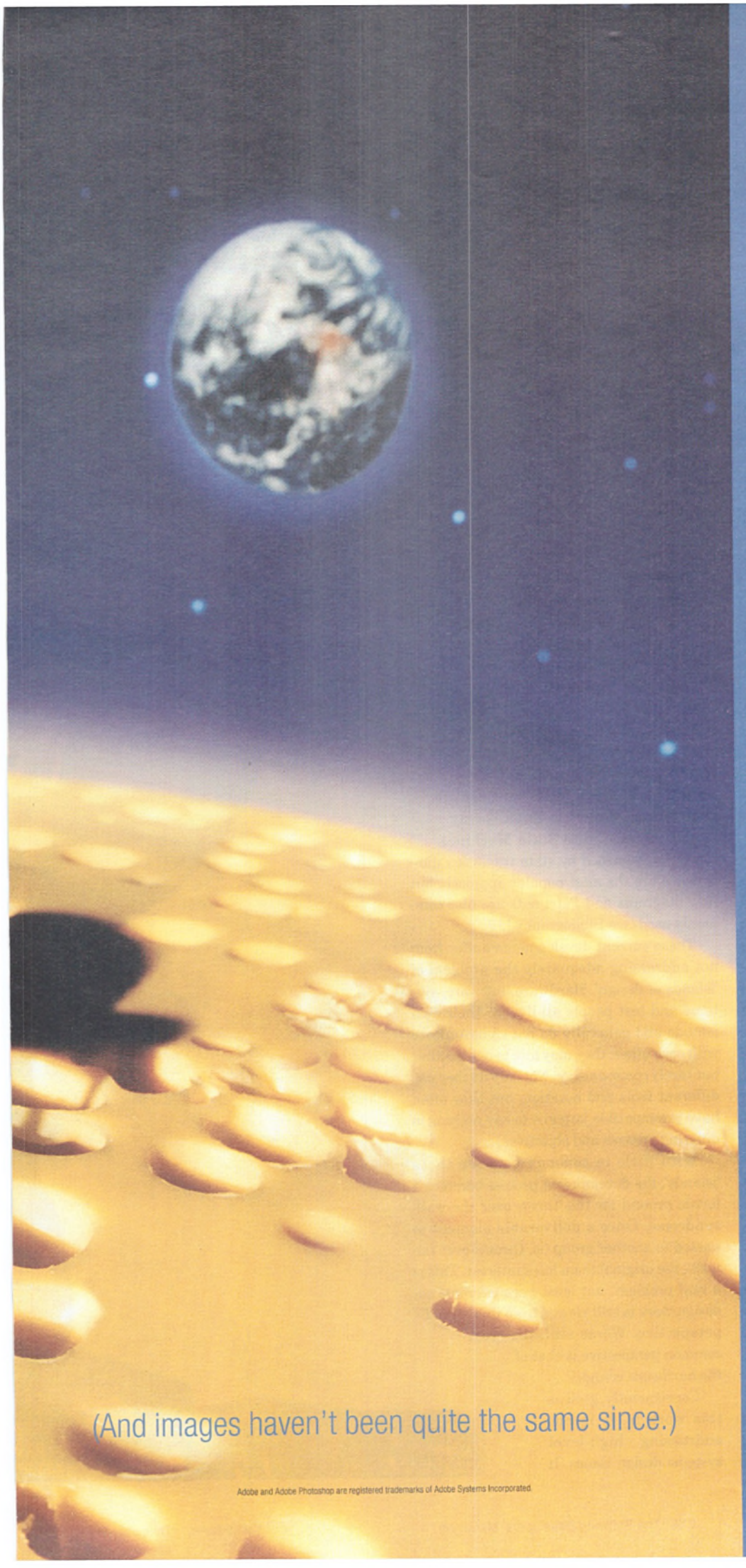
IBM

Solutions for a small planet

Apple Computer is a registered trademark of Apple Computer, Inc.

✎ CIRCLE NO. 418

Adobe Photoshop meets PowerPC technology.



(And images haven't been quite the same since.)

Adobe and Adobe Photoshop are registered trademarks of Adobe Systems Incorporated.

PowerPC

When the software designers on the Adobe Photoshop team set out to give graphic designers on the Macintosh a new way of looking at the world, they turned to today's PowerPC microprocessor technology.

What caught their attention was the added computing power and faster floating point operations the PowerPC platform provided. With it, layers, filters and other advanced Adobe Photoshop design tools can be used to create wondrous works of art that challenge the imagination. All in much less time and at a lower cost than was previously possible.

It's one more reason Adobe Photoshop continues to set new standards in image editing, graphic design and production.

Of course, setting new standards is exactly what IBM, Apple and Motorola had in mind when they envisioned this technology. A vision that Adobe Systems shares with scores of other companies adopting the PowerPC platform.

To find out how PowerPC technology can give your products a whole new look, visit us on the net at http://www.chips.ibm.com

It'll do wonders for your images.

IBM

Solutions for a small planet

CIRCLE NO. 419

Co-Design

where hardware & software meet

Co-design - the integration of hardware and software models in system design - has till now been driven by hardware engineers. **Niall Cooling** suggests it's time for software developers to take the lead.

The concept of software/hardware co-design is based on the hypothesis that it is possible to model an electronic system and then partition it, manually or automatically, into discrete hardware and software elements. The goal of co-design, as of most things, is to maximise performance while minimising cost.

To have any chance of achieving a good co-design it is necessary to use an integrated design environment. A unified simulation environment needs to be capable both of investigating the functionality of a system and modelling it in such a way that its performance can be assessed. Sadly there has been very little commercial work focused on these issues. The most advanced work, not surprisingly, has come from the academic world. Most notable are the Ptolemy Project of the University of California at Berkeley and the Cosyma synthesis tool suite developed at the University of Braunschweig, Germany (see Bibliography [1] and [2]).

A hardware bias

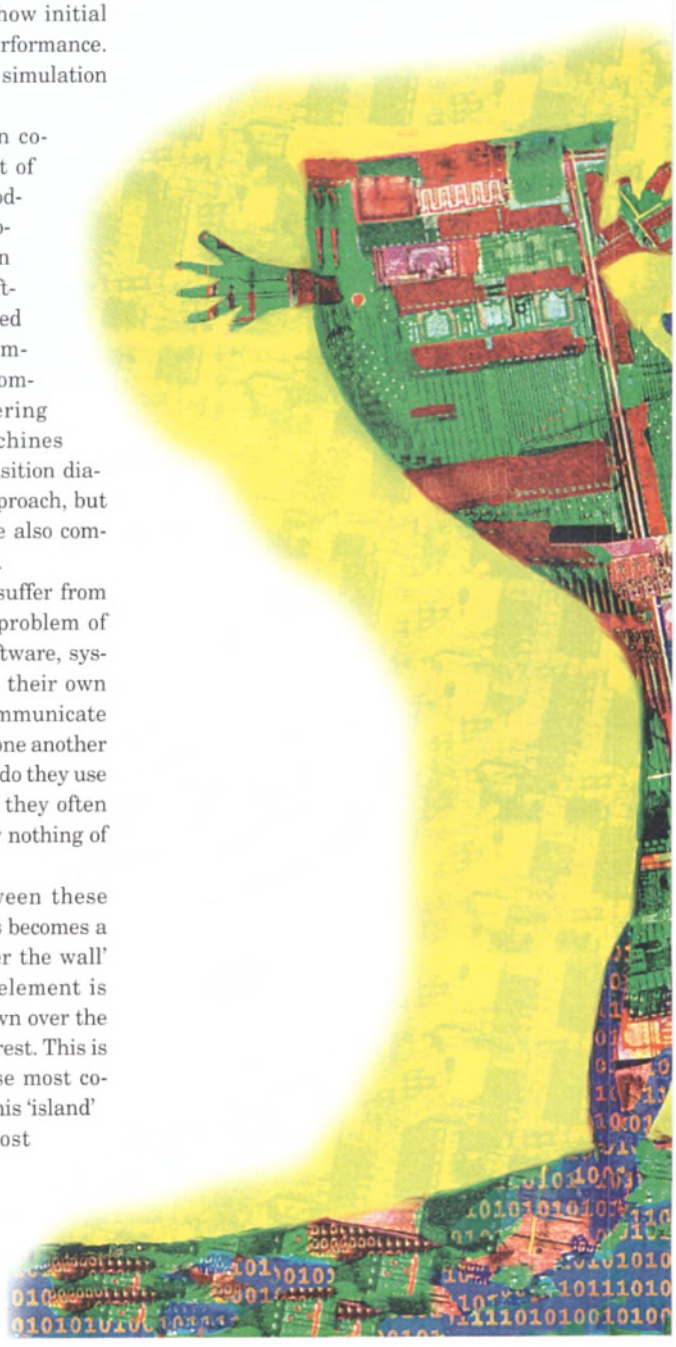
Nearly all existing co-simulation work has a strong hardware bias. This is not surprising. Historically, the original push for co-design came from work in caching and pipeline design, and trying to estimate how initial design choices affect software performance. Certainly, this is an area where simulation tools have been used heavily.

The work now being done in co-design involves the development of graphical representations of a model's dynamics. The goal is to establish an integrated design methodology for hardware and software systems that can be supported by automated tools such as Computer Aided Design (CAD) or Computer Aided Software Engineering (CASE) tools. Finite State Machines (FSMs) – described by state transition diagrams – are the most popular approach, but flow diagrams and Petri nets are also commonly used (see Bibliography [3]).

These current developments suffer from not addressing adequately the problem of 'islands of design'. Hardware, software, systems and test people all live on their own islands and generally do not communicate with each other: they may *talk* to one another but rarely *communicate*. Not only do they use different tools and notation, but they often have incompatible jargon – to say nothing of differing motives and objectives.

With little in common between these 'islands', the development process becomes a fertile ground for the 'throw over the wall' syndrome. Once a deliverable element is passed to another group (ie, thrown over the wall), the original team loses interest. This is a real problem, not least because most co-design work is still viewed from this 'island' perspective. Worse still, the most common perspective is that of the *hardware* island.

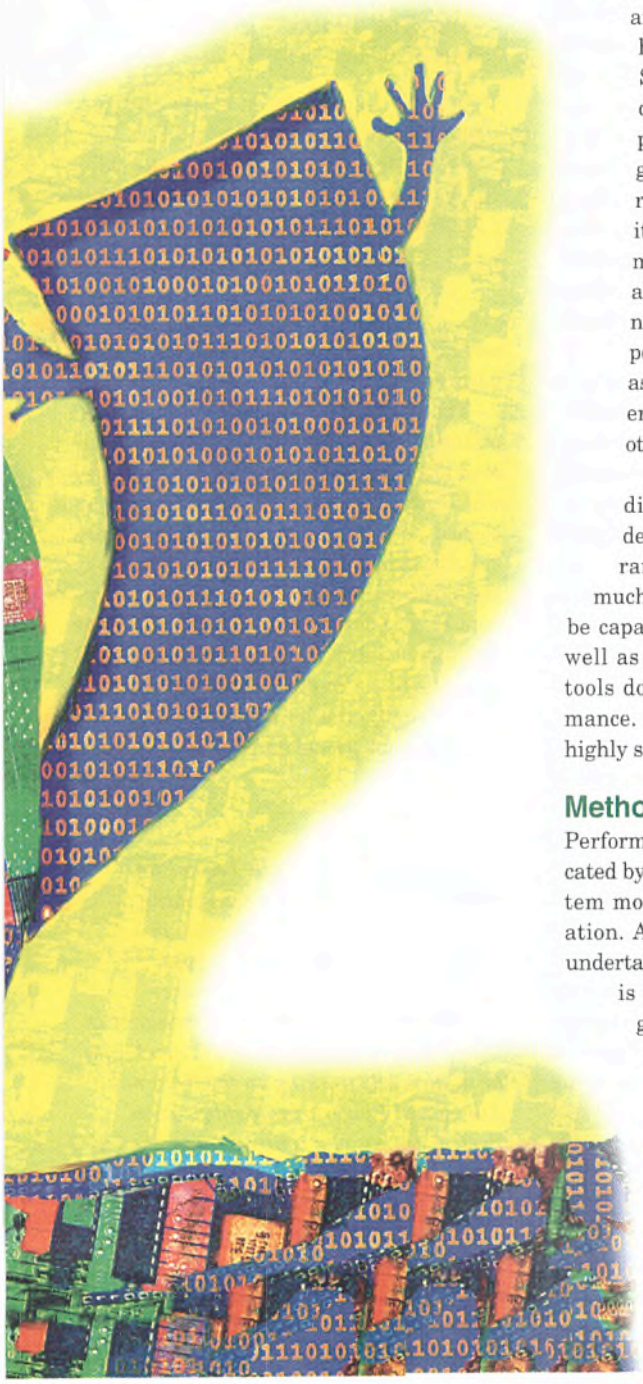
Consequently, good as this work is, it is not addressing high-level systems design issues. It



is taking a bottom-up approach to the problem when a top-down approach would be more appropriate. But why is this such a common phenomenon?

Bottom-up

The first problem with system design is defining what a system is. This is always tricky. A hardware person's view of a system is different to that of a software person which will be different again to that of a systems person. Also, since software has grown in complexity and come to dominate over hardware (especially in embedded systems), team members increasingly have a software rather than hardware background. And finally, there is no established technique for modelling at the system level; this is partly to blame for the lack of a suitable notation for co-design that is not biased towards either hardware or software.



It is the system modeller's responsibility to take user requirements and partition them into functional and non-functional subsets from which can be derived functional and architectural views (see Bibliography [4]). The architectural view includes the environment the system has to function in, ie processors, buses, operating systems and the like. See Diagram 1.

The most common notation used for this is the block diagram. Typically, the majority of 'blocks' are passed to the software team (in charge of addressing functionality), and the remainder end up with the hardware group, for Application-Specific Integrated Circuit (ASIC) design. Architecture is usually the preserve of the hardware-oriented group. Once these tasks are separated, each team will then develop its own models, in its own environment, often creating whole new visualisations of the problem. It should be noted that having different viewpoints can be beneficial to the project as a whole, identifying omissions and errors that might not have surfaced otherwise.

One alternative approach to block diagrams is using a CASE tool to develop system-level models. This is rarely appropriate and has not had much success, as a system model must be capable of abstracting performance as well as functionality. Traditional CASE tools do not have any concept of performance. I will return to this point as it is highly significant.

Methods-driven

Performance modelling is further complicated by the remoteness of the abstract system model from its physical implementation. Although modelling is necessarily undertaken at a high level of abstraction, it is critical to keep in mind that it is going to be a physical system at the end of the day.

In contrast, the software team addressing the system's functional requirements is driven by a very different set of needs. A tool for the 'software island' must serve four purposes (see Bibliography [5]). It must:

1. model functionality in detail (eg data flow diagrams),
2. model dynamic behaviour and the states the system can be in (eg finite state machines),
3. investigate the structure of functional interrelationships (eg structure charts),
4. and model the inherent relationships between data and system (eg entity-relationship models).

Current CASE tools will support most, if not all, of these different models. However, CASE, unlike CAD, is driven by methodologies. In fact, the software world as a whole is heavily driven by methodologies, the most notable being Real Time Structured Analysis and Object Oriented Analysis. This approach is too widespread to be changed easily and so must be accommodated if co-design is to be successful. Areas such as traceability requirements, multi-user support, version control and code generation are highly important to a software designer.

What is generally not important to them is predicting software performance. Sounds crazy, but that's the way it is.

Performance

All software methods focus on functionality rather than performance. In addition, software designers are typically only given a functional specification by systems analysts. It is therefore not surprising that performance is not on a software engineer's issues list. Finally, software developers' work is assessed in terms of functionality, whereas hardware people are assessed on the basis of the system's performance. The logic of this means that it is left to the hardware people to make the system perform.

This difference in focus is a major reason why the drive for co-design originates in from the hardware world rather than the software one. Generally, CASE tools do not support the representation of physical components such as buses, processors and communications channels. Neither can they simulate or animate the design, or provide the means for any useful performance verification analysis. Links with architectural models are simply not supported.

However, there is a growing impetus for change. Even though CASE tools don't support performance modelling, standards bodies are beginning to recognise the importance of such measurements. Unfortunately, we appear still to be some way from any real demand for hardware co-design from the software community, so for the present we are left with co-design being driven by hardware people.

Top-down

The case is anything but lost however. The latest versions of simulation environments

offer the software community a simulation and model animation facility which both is natural to use and has links to an architectural model to enable co-simulation. Co-simulation of hardware and software using this approach, however, is fundamentally different from everything else that has gone before it, in that it takes a top-down rather than a bottom-up approach.

The question then becomes how much of the system needs to be modelled. With this approach the system could be anything from an entire frigate down to a printer. The level of detail which needs to be modelled must also be defined.

There is only a finite amount of time and processing power and this must be borne in mind. It's pointless spending two years on a model investigating performance if you have to deliver the system in eight months. Historically, the choice has been between looking at an abstract model of the entire system without going into great detail, and looking at a narrow part of the system in far greater detail.

A top-down approach combines these two alternatives to create a third possibility: developing a broad-based model which identifies potential problem areas that can then be modelled in greater detail, the results incorporated back into the original broad model as required.

Determining the appropriate level of abstraction is critical. Since most co-design tools currently available have a hardware bias, they are tend to provide a fine-grained modelling environment. My experience with users, while working at SES, suggests that the best models are achieved by high-level abstraction modelling followed, where necessary, by detailed investigation of specific areas of potential risk.

All of these problems and conflicts can ultimately be traced back to the fact that the bulk of performance is almost always passed to the hardware designers. The classic response to inadequate performance is to throw more hardware at the system.

A cultural challenge

My experience leaves me in no doubt that if co-design is to be accepted by systems engineers, more of whom now have software than hardware backgrounds, it needs to be based on a top-down approach. But this, in itself, will not be enough to ensure the mainstream adoption of co-simulation. There is a long way to go before bridges are built between the islands. I firmly believe that the biggest challenge facing co-design is cultural. Providing a technical solution is not enough. It has to be easily accessible by all contributing parties. Indeed, most of recent technological developments address cultural requirements rather than technical issues. Time and again, it is cultural requirements that have consistently proved the single most important inhibitor of the adoption of these technologies.

Ultimately, systems designers should be the most significant driving force behind co-design. At the moment, however, systems designers are being drawn predominantly from the ranks of software developers who are historically more interested in methodologies than system performance.

The future for co-design really depends on where the breakthroughs occur. Software people need to generate code and documentation, whereas hardware people are required to deliver silicon that has to work and perform at an easily measurable cost. It's difficult to escape the fact that currently the main measure for software is 'does it meet the functionality?', while the main measure for hardware is 'does it perform?' and 'how much will it cost?' It is hard to envisage a radical change in the cultural standpoints such diverse imperatives engender, without the motivators themselves being changed.

The lack of a strong software-oriented drive for change is not helped by the fact that, should the hardware not perform, the very high cost of rectification is all too obvious. The cost of software correction is perceived – often mistakenly – as being comparatively low.

The practical consequences of these competing factors is that co-design will only succeed if the software team uses a CASE tool which satisfies its need to focus on methodologies, but which also offers direct links to a suitable modelling tool which can be used by the hardware team. If the CASE tool component of a co-design environment offers any less functionality than a stand-alone CASE tools, then the co-design tool will not succeed. Equally, the hardware team will not accept any functional diminution of its tools. ■

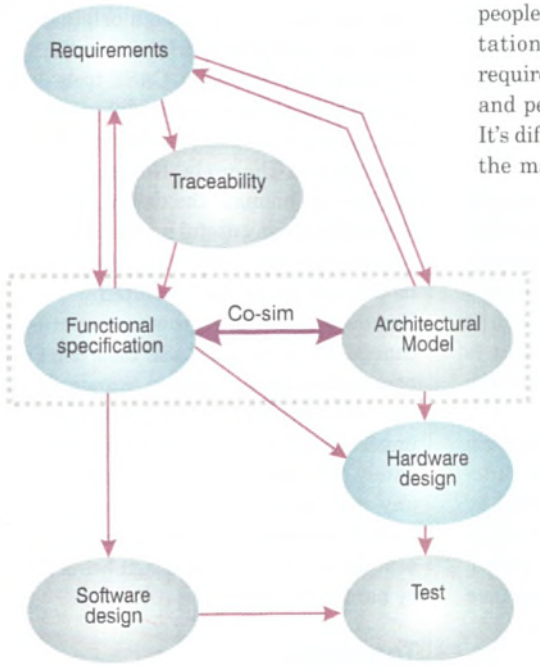


Diagram 1 - Architectural view of co-design

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Niall Cooling has recently become an independent consultant undertaking consultancy and support services in Object-Oriented Analysis & Design (OOAD) and Software Performance Engineering (SPE). As well as conducting training for a number of CASE companies he is currently working on the National Automated Fingerprint Identification System as part of a contract let by the UK Home Office. Immediately prior to this he worked for SES, publisher of the simulation and model animation tool SES/Workbench (SES has a Web page at http://www.ses.com/). Niall can be contacted by phone on 01488 686432 or by fax on 01488 686435.

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Bidirectional parallel ports

The most common use of a parallel port is connecting a printer to it. **Michael Covington** explains how to read data from this port when you want to dock to it some more experimental designs.

Many new PCs, especially laptops, have *bidirectional* parallel printer ports – that is, they can read Ffrom, as well as write to, the port's eight data lines. As a result, the parallel port can be used, like the bus of an 8-bit microprocessor, both to send and to receive data. Numerous 8-bit devices can be connected to this port, not only parallel printers. In this article I'll explain how to use a bidirectional parallel port to the full.

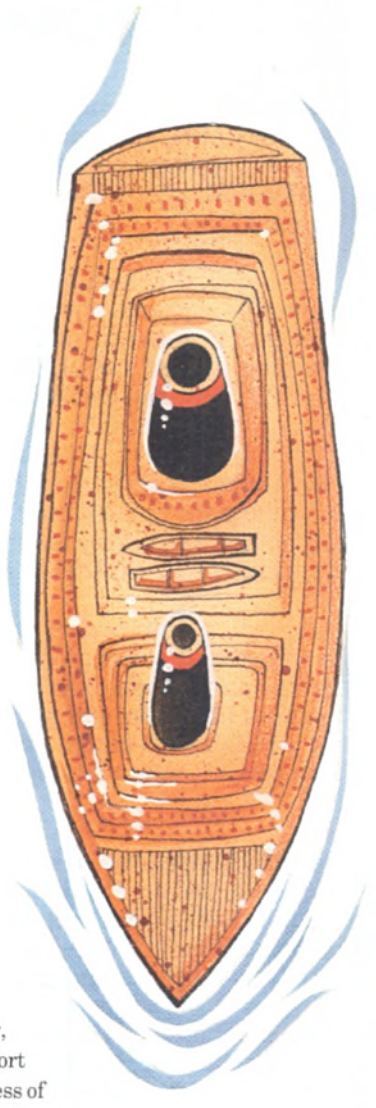
To avoid any misunderstanding, note that even an old unidirectional port can perform some input operations, so long as it doesn't use the data lines to do so. A number of interfacing strategies (including DOS's INTERLNK utility) exploit this feature. But a truly bidirectional port is one whose data lines, not just the status and control signals, are capable of input.

To receive input through the data lines of aparallel port, you have to do three things:

1. *enable bidirectionality;*
2. *switch the port to read mode;*
3. *read the data.*

Enabling bidirectionality is the hard part. Parallel ports aren't bidirectional unless you explicitly set them up that way; that's to keep old software from accidentally putting the port into read mode by mistake. To make the port bidirectional, you need to either set a jumper (on the majority recent multifunction I/O cards) or run a setup program (on certain laptops, such as those made by Toshiba and Zenith).

One special case is the IBM PS/2. On a model 50 or higher, the only way to enable bidirectionality on the built-in parallel port is to run the program shown in Listing 1. This program uses PS/2's Programmable Option Select (POS) facility to make the parallel port bidirectional. The port remains bidirectional until you reboot. Parallel ports on cards can generally be set to bidirectional mode via a setup program.



Switching to read mode

Even with bidirectionality enabled, the port is still an output-only device. It can drive a printer in the usual way. To switch it to read mode, you need to set bit 5 or bit 7 in the control register. There's no harm in setting both bits; some computers use one and some use the other. In BASIC, the instruction to set both bits:

```
OUT control, INP(control) OR &HA0
```

where `control` is the address of the control register, ie the base address of the parallel port plus 2. For example, if the port is at address `&H0378`, `control` will be `&H037A`. To return to write mode, just run the following instruction:

```
OUT control, INP(control) AND &H5F
```

Figure 1 shows how bidirectionality is implemented. All parallel printer ports have the ability to read back data that is output to them; the original IBM PC used this feature for testing. The only difference with a bidirectional port is the ability to disconnect the output from the data line while the read-back inputs remain connected. You can read these TTL-compatible inputs by reading from the base address of the parallel port, like this:

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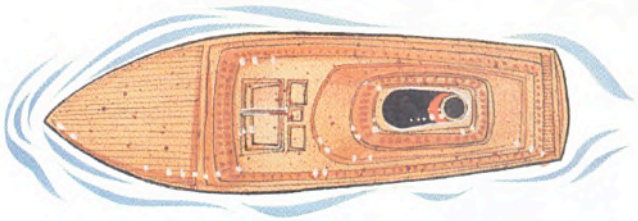


```
result = INP(addr)
```

where `addr` is `&H037C`, `&H0378`, or `&H0278` depending on the port. The data bits aren't inverted: a bit is 0 if the corresponding data line is low, and 1 if it is high. Disconnected pins usually read as 1, but may pick up random noise if your parallel port uses CMOS or NMOS technology.

If the port is still in write mode and you try to read from it, you'll get back whatever data was last written to it. You can exploit this fact to test whether a printer port is really bidirectional: write a distinctive bit pattern to it (not `11111111` or `00000000`, which might correspond to disconnected pins), switch the port to read mode (or try to), and then read from. If you get the same bit pattern back as you wrote to it, the port is almost certainly not bidirectional, or at least is not in read mode.

Listing 2 shows a program that puts all this together. Output 1 shows how the bits of all three parallel port registers are displayed. To fin out if a port is bidirectional, use the circuit in Figure 2; the lowest data bit should toggle back and forth as you flip the switch. The 1000-ohm resistor protects the parallel port against shorted outputs should it turn out not to be in read mode when you perform the test.

Experimenting

Figure 3 shows how to approach interfacing. From the moment your computer boots up until you put it into read mode, the parallel port is an output device. Yet it's connected to the outputs of your external equipment, hence the need for protective resistors.

Shorting outputs to each other can easily damage logic ICs unless the current is limited to a safe level. The 330-ohm resistors

```
' PS2BIDIR.BAS - M. Covington
' For IBM PS/2 Models 50 and up.

' Uses Programmable Option Select (POS) to
' make motherboard parallel port bidirectional.
' Effect lasts until next reboot.

DEFINT A-Z

OUT &H94, INP(&H94) AND &H7F     ' unlock POS
OUT &H102, INP(&H102) AND &H7F   ' clear bit
OUT &H94, INP(&H94) OR &H80      ' lock it back

PRINT "PARALLEL_1 (LPT1) is now bidirectional."
END
```

Listing 1 - QBASIC code to enable PS/2 bidirectional port

```
Which LPT port? (1, 2, 3, or 4) 1
Press Ctrl-Break to exit.

Control bits    at    3BE    11001100
Status bits     at    3BD    01111111
Data bits       at    3BC    11111111
```

Output 1 - Output is continuously updated.

```
' PPORT.BAS - M. Covington
' Displays all bits of PC or PS/2 printer port
DEFINT A-Z

top:
  CLS
  INPUT "Which LPT port? (1, 2, 3, or 4) ", N
  N = (N - 1) * 2 + 8

' Get port address
  DEF SEG = &H40
  addr = PEEK(N) + 256 * PEEK(N + 1)
  status = addr + 1
  control = addr + 2
  IF addr = 0 THEN
    PRINT "No such port." : BEEP : GOTO top
  END IF

" Output 01010101.  If same pattern is read
" back in, port is probably not bidirectional.
  OUT addr, &H55

" Set direction bit to READ
  OUT control, (INP(control) OR &HA0)
" To undo this: OUT control, (INP(control) AND &H5F)

" Display parallel port bits over and over
  PRINT "Press Ctrl-Break to exit."
  DO
    LOCATE 5, 1
    PRINT "Control bits at", HEX$(control), BIN$(INP(control))
    PRINT "Status bits  at", HEX$(status), BIN$(INP(status))
    PRINT "Data bits    at", HEX$(addr), BIN$(INP(addr))
  LOOP
  END

FUNCTION BIN$ (i)
  ' Like HEX$, but binary.
  j = 128
  s$ = ""
  WHILE j > 0
    IF (i AND j) <> 0 THEN
      s$ = s$ + "1"
    ELSE
      s$ = s$ + "0"
    END IF
    j = j / 2
  WEND
  BIN$ = s$
END FUNCTION
```

Listing 2 - Program to display all parallel printer port bits (see also Output 1).

```
' ADC0803.BAS - M. Covington
' Interfacing an analogue-to-digital converter
' through a bidirectional parallel port

  DEFINT A-Z
  CLS

' Assume it's LPT1; see PPORT.BAS
  N = 8

' Get port address
  DEF SEG = &H40
  addr = PEEK(N) + 256 * PEEK(N + 1)
  control = addr + 2

' Set direction bit to READ
  OUT control, (INP(control) OR &HA0)

' Initialise ADC by taking STROBE low, then high
  OUT control, (INP(control) OR 1)
  OUT control, (INP(control) AND &HFE)

' Display data over and over
  PRINT "Press Ctrl-Break to exit."
  DO
    LOCATE 5, 1
    PRINT INP(addr); "   "
  LOOP
  END
```

Listing 4 - Program to read data from analogue-to-digital converter (see Figure 5).

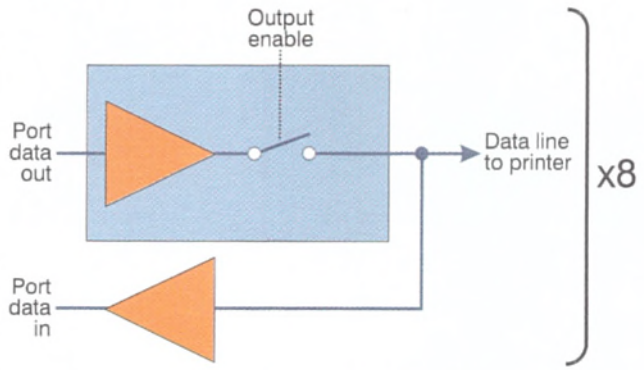


Figure 1 - All PC printer ports can read back their own output; bidirectional ones can disconnect the output driver in order to accept input.

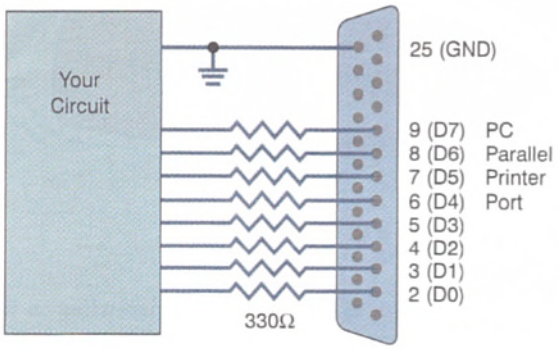


Figure 3 - General scheme for interfacing to a bidirectional parallel port. The resistors protect ICs when both devices are in output mode.

pass TTL-level signals transparently but limit current to 10 mA when a 'low' output gets shorted to a 'high' one or vice versa. This is a good way to recycle the 330-ohm resistor terminator packs that floppy disk drives used to be fitted with. If your parallel port has MOS inputs (most bidirectional ones do) and you're using the data lines for input only, you can usually get away with much larger resistors for added safety.

Figure 4 shows a practical interfacing setup: an ADC0803 analogue-to-digital converter interprets its input voltage, 0 to +5V, as a value from 0 to 255. Listing 3 shows a program that reads this input and displays it. The eight data lines carry the data, through 330-ohm protective resistors. The strobe line is used to reset the ADC so it will start running at the beginning of a session. No protective resistor is needed because, unlike the data lines, the strobe line isn't a TTL totem-pole output: it's open-collector, with a 4.7kilo-ohm pull-up resistor, and cannot drive excessive current into the ADC.

Finally, a word about 'brute-force' bidirectionality'. Some experimenters have found that a standard unidirectional PC parallel port can work bidirectionally if driven by a circuit that can sink a lot of current (like 20 mA) in the 'low' state. The technique is to write all 1's to the base address of the port, then pull some of the data lines low and read the data back in. Sure enough, the lines that are pulled low read back in as 0, not 1. But this technique risks overheating the output chip, originally a 74LS374, nowadays often a special NMOS or CMOS LSI circuit. A better technique, if you have an original

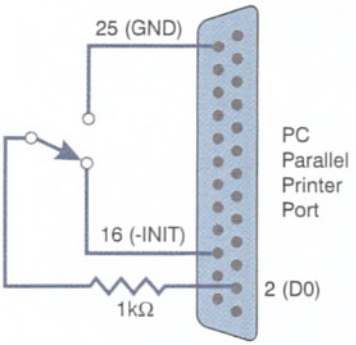


Figure 2 - Simple demonstration of input through a parallel port data line. The -INIT line is normally high (+5V).

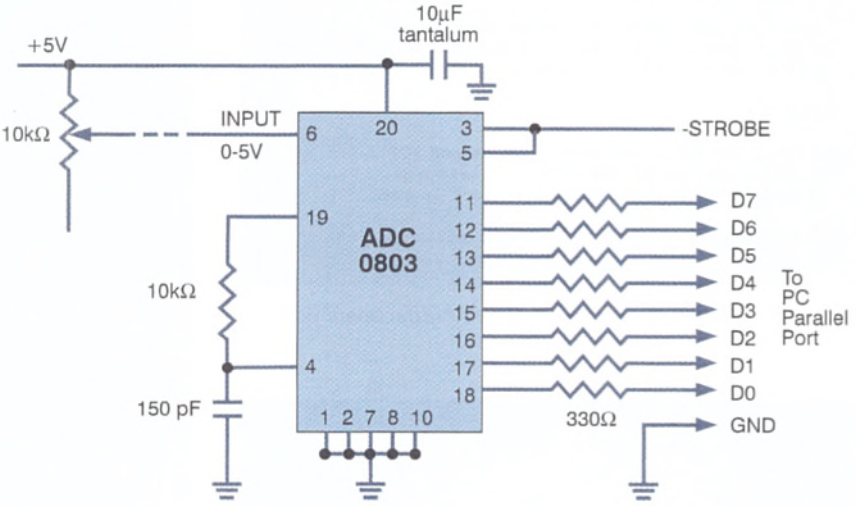
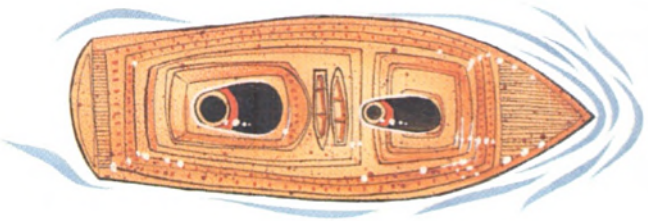


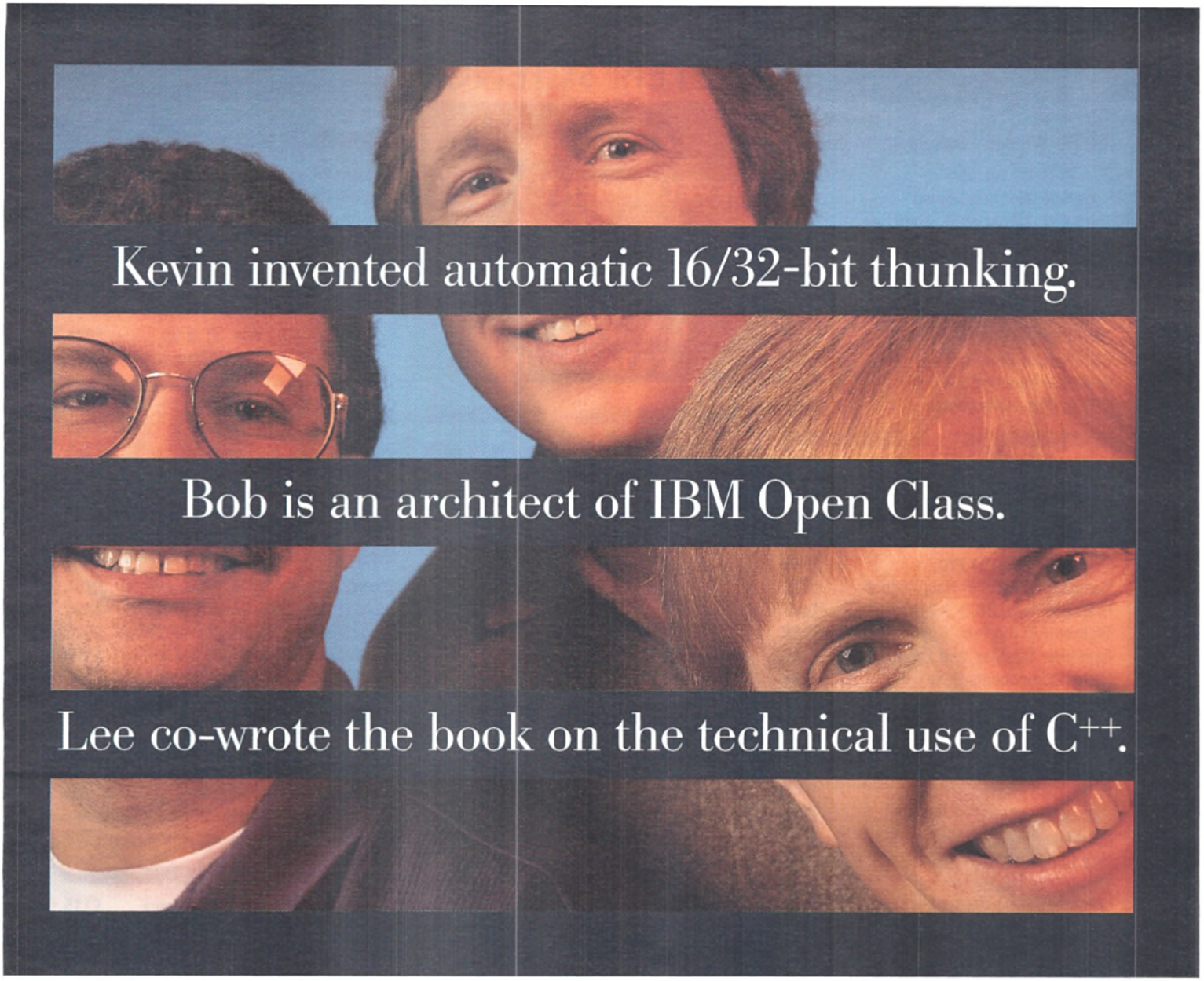
Figure 5 - The ACDC0803 analogue-to-digital converter works as well with bidirectional parallel ports as with 8-bit microprocessor buses. The potentiometer varies the input voltage, for testing. (The ACDC0803 can be replace by an 0801, 0802, 0804 or 0805.)



IBM parallel port or near equivalent, is to find bit 5 of the control register (it's decoded at the output of a 74LS174, but never used) and route it to the output enable pin of the 74LS374 that drives the data lines. This will require a bit of circuit tracing and should not be done blindly.

Alternatively, buy an I/O card that includes a new-style bidirectional parallel port. Be wary of connecting experimental circuits to your main I/O card if it also hosts disk controllers and other vital parts of your PC. Such ports are very vulnerable to static damage, and when zapped, will crash the whole computer. ■

Michael Covington manages the artificial intelligence lab at the University of Georgia, is a researcher in computational linguistics, and enjoys tinkering with electronics in his spare time. This article first appeared in MicroComputer Journal.



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Pictured, from left to right: Lee, Bob and Kevin. John, Rod, Christina and John Barton (Lee's co-writer) were being consumed by code and had to pass on the photo opportunity.

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✎ CIRCLE NO. 424

Christmas Quiz

Questions

A. Bill's boys

A.1. What was the original name of what became MS-DOS?

A.2. What was the original name of Windows?

A.3. What was the original name of Windows NT?

A.4. What is the significance of 'MZ' at the start of every .EXE file?

A.5. What is the name of Microsoft's co-founder?

A.6. After which MS programmer is 'Hungarian Notation' named?

B. This year events

B.1. Which musical CEO stepped down in 1995?

B.2. Which computer features a multiprocessor OS and a 'GeekPort'?

B.3. Can you name the old city located on the south slopes of Mt Parnassus which became famous in the software industry this year?

B.4. How do you display Windows 95's hidden credits?

B.5. It's an Indonesian volcanic island, it's also a language starting to attract lots of attention, what is it?

B.6. A networking company that changed to focus on its roots. It bought and sold Unix. Which company is it?

C. Algorithmic

C.1. How many volumes of *The Art of Computer Programming* were published and how many were planned?

C.2. From which mathematician's name is the word algorithm derived and from where does he come?

C.3. Which founder of a well-known software company also invented a famous algorithm?

C.4. Who considered gotos harmful?

C.5. Which is the odd one out: A, BB[a], D, finger, elm, parse?

C.6. What are the different parameter-passing methods?

D. Languages

D.1. What is the connection between fortran, overload and entry?

D.2. What did the command LISTO 7 do on the legendary BBC Micro?

D.3. What is the meaning of the expression: `(synonym 'meta_eval 'eval)`?

D.4. Complete the sequence: C++, C, B, BCPL...

D.5. Who admitted that Pascal was not his favourite language?

D.6. Who said: 'Ada is good; object oriented is good; so Ada is object oriented'?

E. Telecomm & Internet

E.1. What was the previous name of the ITU-TSS?

E.2. Many telecomm standards have a 'bis' or a 'ter' in their name. What is the meaning of these two words?

E.3. How many networks can be coded in IP addresses of classes A, B and C?

E.4. In which document is defined the format of email messages?

E.5. Who created the Internet Worm on November 2, 1988?

E.6. Which standard has versions 1, 2 and 2.0?

F. Acronyms

F.1. What does Unix stand for?

F.2. What does ADA stand for?

F.3. Which is the odd one out between SMTP, NNTP, POP2, POP3 and IMAP2?

F.4. Name an API that allows an application to access multiple database formats.

F.5. Name an API that allows an application to control a scanner.

F.6. Name an API that allows an application to control phone calls.

G. Of colours and books

G.1. What is the Dragon Book?

G.2. Who promised one of the longest vapourware products and said 'literature is a debugged system'?

G.3. What is the White Book?

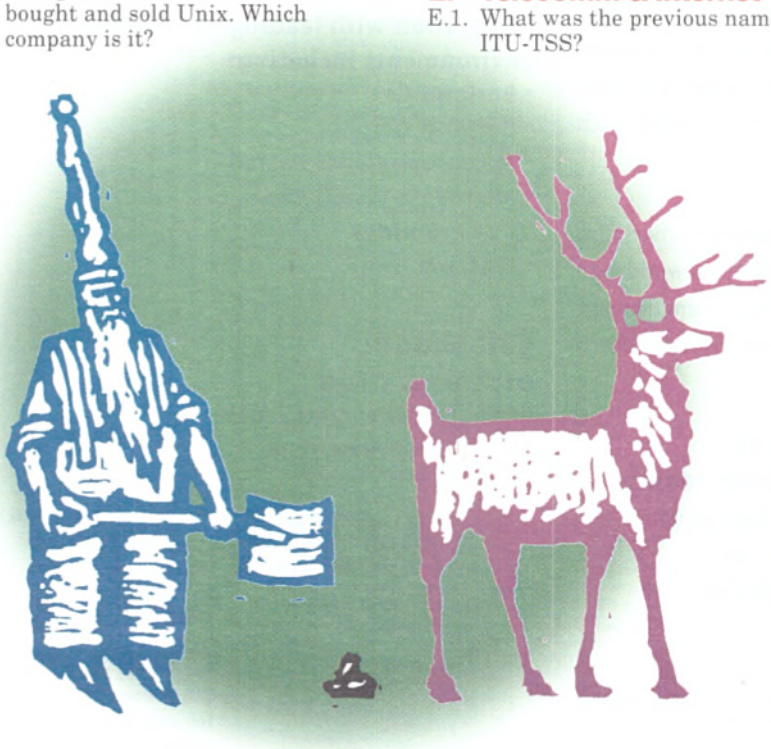
G.4. What is the relationship between white, red, green and blue?

G.5. What is the relationship between red, green and blue?

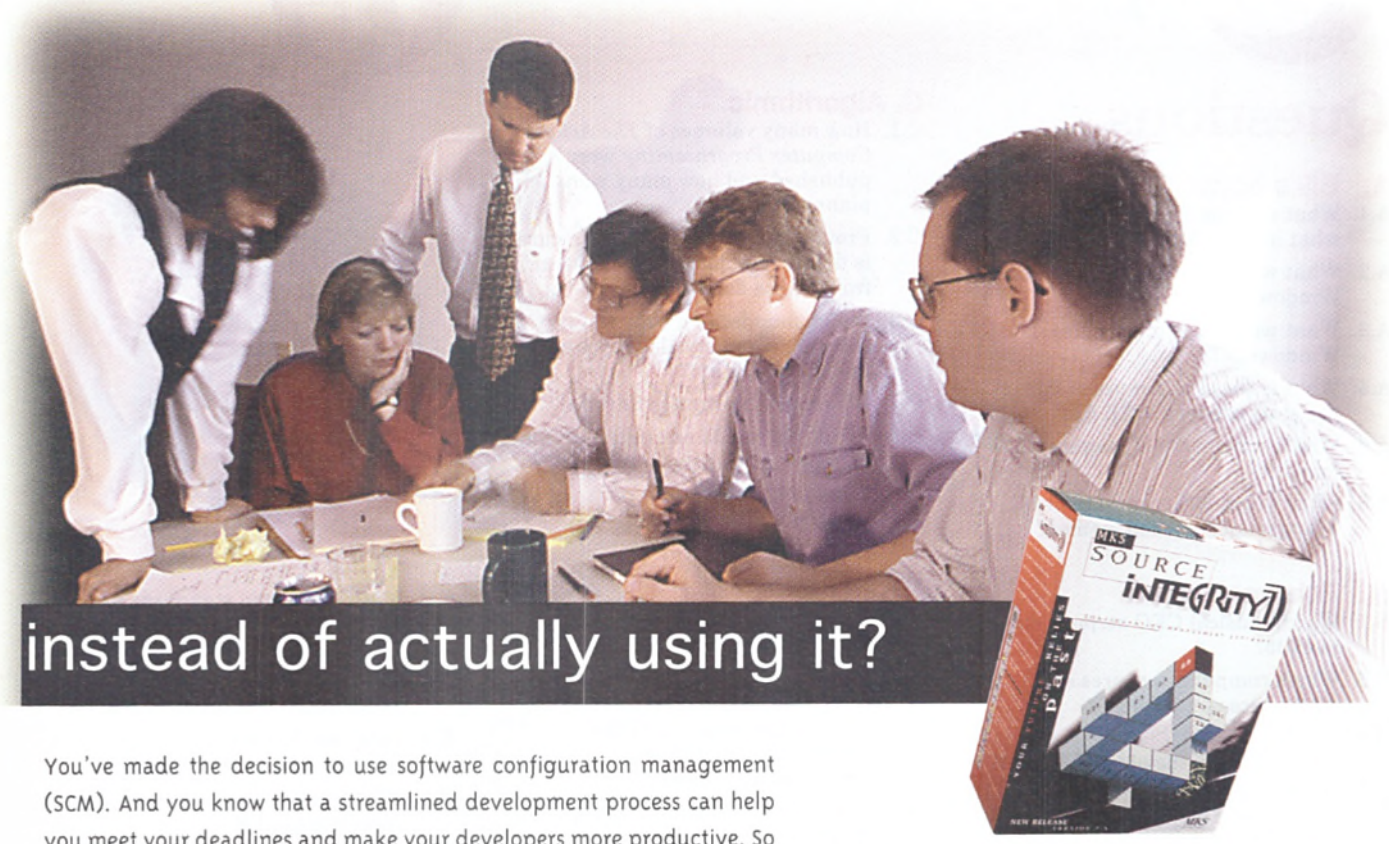
G.6. What is the relationship between red and blue?

G.7. What is the Orange Book?

G.8. What is the Yellow Book?



How much time are you spending learning your configuration management system.....



instead of actually using it?

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Answers

A. Bill's boys

A.1. QDOS - Quick & Dirty Operating System.

A.2. Interface Manager.

A.3. OS/2 V3.0.

A.4. 'MZ' are the initials of Microsoft programmer Mark Zbikowski.

A.5. Paul Allen.

A.6. Charles Simonyi.

B. This year events

B.1. Philippe Kahn.

B.2. The BeBox announced in November.

B.3. Delphi.

B.4. On the desktop, create a new folder called 'and now, the moment you've all been waiting for'. Then rename it to 'we proudly present for your viewing pleasure'. Rename it once more to 'The Microsoft Windows 95 Product Team!' and open the folder.

B.5. Java.

B.6. Novell.

C. Algorithmic

C.1. Three were published so far. Seven were planned; it is said that Donald Knuth is finishing volume 4.

C.2. al-Khorezmi lived in Khorezm (now part of Uzbekistan) from 780 to 850.

C.3. John Warnock of Adobe.

C.4. Edsger W. Dijkstra in 'Goto statement considered harmful' (Communications of the ACM, March 1968). This is the most famous article but Donald Knuth in Structured Programming with go to Statements (Computing Surveys, Dec. 1974) mentions D. V. Schorre as the first programmer to avoid gotos.

C.5. 'A', because I've never heard of an A-tree.

C.6. Call by value (pass the rvalue), call by reference (pass the lvalue), call by name (pass the name, ie text) and call by value result (also called copy-in/copy-out).

D. Languages

D.1. Abandoned or obsolete keywords in C and C++.

D.2. It pretty-printed your code.

D.3. The simplest (meta-recursive) Lisp evaluator possible.

D.4. CPL, ALGOL 60. You could even add Fortran.

D.5. Brian Kernighan wrote a paper in 1981 called 'Why Pascal is not my favorite programming language.'

D.6. Bjarne Stroustrup (at ECOOP 1987).

E. Telecomm & Internet

E.1. The CCITT

E.2. It just means second and third in French.

E.3. 128 for class A, 14,284 for class B and 2,097,152 for class C.

E.4. Standards for the format of ARPA Internet Text Messages, RFC 822.

E.5. Robert Tappan Morris.

E.6. EIA Fax modem classes.

F. Acronyms

F.1. Nothing, it's a pun on the Multics operating system.

F.2. First it should be Ada, then it's not an acronym. The Ada language was named in honour of Ada Lovelace, the world's first programmer.

F.3. NNTP. It's a news transfer protocol. All the others are mail transfer protocols.

F.4. ODBC, IDAPI...

F.5. TWAIN.

F.6. TAPI, TSAPI.

G. Of colours and books

G.1. The Dragon book identifies the compiler bible. The Green Dragon refers to the old: 'Principles of Compilator Design' written by Aho and Ullman (1977) while the Red Dragon is used for 'Compilers Principles, Techniques and Tools' by the same two authors plus Sethi (1986).

G.2. Ted Nelson. The famous project that we're still waiting for is Xanadu.

G.3. The K&R. One of the PostScript reference book.

G.4. They're all colours of PostScript reference books.

G.5. They're all colours of Smalltalk-80 reference books.

G.6. Red is the colour of the standards issued by the CCITT in 1984, blue is the colour for the 1988 edition.

G.7. A US standard on computer security.

G.8. A proposed nickname of the print version of the Jargon File published under the title of The New Hacker's Dictionary. A wonderful reference, used heavily to check answers of this quiz.

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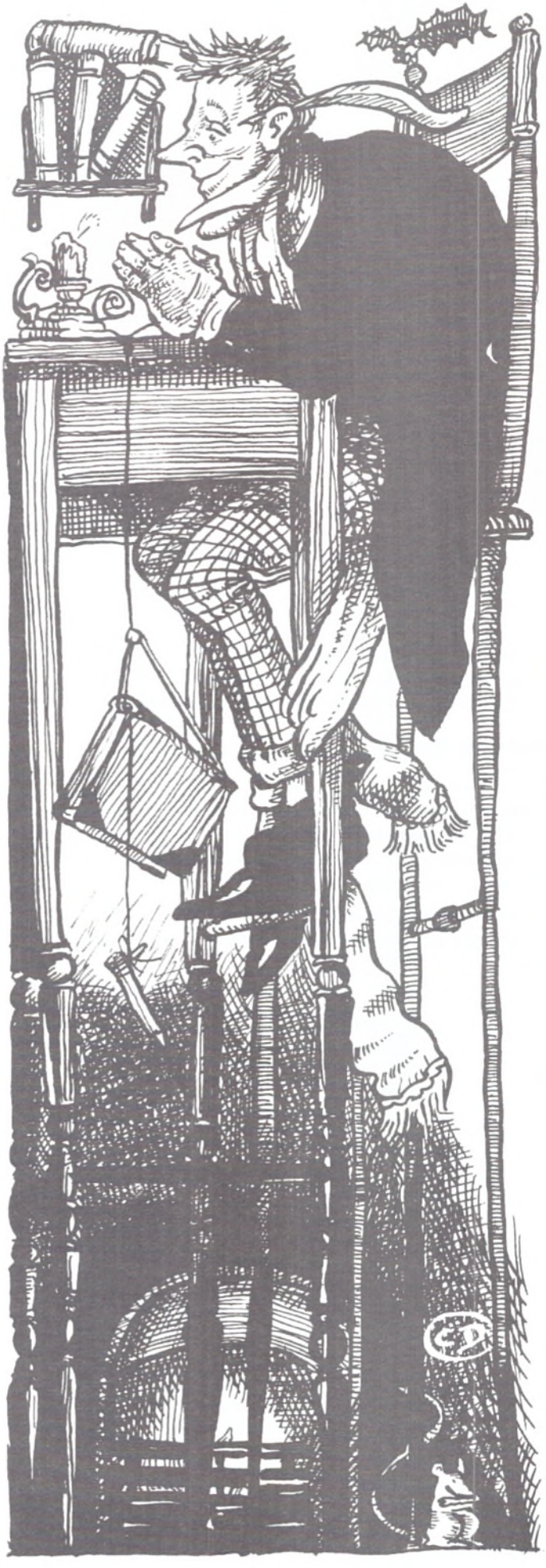

Logging faults

By centralising fault reporting in one configurable system, syslog removes the need for ad hoc logging facilities. **Peter Collinson** explains why logging to a file is not as simple as it seems.

In October, *EXE* published my interview with Eric Allman. He is perhaps best known as the author of sendmail, a program which people love to hate but which is still used as the main mail routing software on the Internet. In my introduction to the article, I mentioned that Eric is also responsible for the syslog system. If you have a UNIX-based workstation, there's a good chance that there will be a descendent of the original syslog running on it.

The ideas behind syslog are simple. First, it provides the application programmer with a way of maintaining log files using a standard API and mechanism. Second, it allows the system administrator to choose where those log files should be written, and in fact whether the data should be logged in the first place.

Writing logs

If you include some logging facility in your program without using syslog, there's a good chance that you'll insert the name of the log file as a constant into the code. The fact that pathnames were often burnt into programs was a widespread problem with UNIX from the very beginning. Programs that created log files tended to drop them in inconvenient places.

For example, many programs store some files in `/usr/lib` or one of its subdirectories. Their authors felt that it was reasonable to put log files into that directory. Well, I've always tried to keep *system* files on a file system that is mostly read-only, as this helps to preserve file system integrity when you experience sudden power failures and other catastrophes. I never wanted those log files littering up the file system. I always wanted them in one place so that I could monitor them easily and do any necessary housekeeping, or gardening, as I prefer to call it (at least when you're pruning and weeding files).

Of course, these days I can replace a log file by a symbolic link that points to some more convenient place in the file system. This assumes that the person who wrote the logging code never deletes the log file. Actually, this is the case with most logging systems; some of the reasons for this are given later on. Alternatively, if I am creating a log file from a program, I can try to be nice and offer you the option of specifying the pathname of the file from the command line.

Before syslog, everyone who wanted to maintain a log file had to write all the intelligence required to do it into their program. This seems pretty easy: just open a file, seek to the end, write your data to the file and then close it when you are done. Yes? Well, it's

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somewhat harder than that on a multiprocessing system.

Consider the situation of two processes writing to a single log file. Both processes open the file, seek to the end, and then go off and do something. If the first process writes some data, it will appear at the end of the file. The act of writing the data advances the seek pointer of that process, so a subsequent write will append data at the new end-of-file position. So far, so good.

Now let's see what happens to the other process. This process's seek pointer is now pointing at the data that was written to the file by the first process. It's pointing at the *old* end of the file. If the second process writes some data, it will obliterate the data written by the first process.

This is not good. What can be done? Well, we could make all processes perform a seek to the end of the file immediately prior to the writing of the data. This is not a cast-iron solution because the kernel may reschedule the process after the seek, allowing another process to change the file before the data is written. We need some way of ensuring that a `write` system call will always append to the end of the file.

This is the reason behind the `open` system call's `O_APPEND` option. When a file is opened with this bit set, all `write` calls are guaranteed to ignore the per-process seek pointer and place data at the end of the file. Of course, the alternative is to lock the file so that it is only controlled by one process at a time. Using `O_APPEND` is far simpler and sufficient for our needs.

We can now guarantee to write data to the end of a file. If we want to make sure that all the data from a given process is kept together, then we need to use a single `write` system call. We cannot safely use the standard I/O library because we don't have control over the buffering strategies that the library implements.

Next, let's consider how we manage this log file. We must assume that the people running the system will not want a file to sit there growing indefinitely. They may not want the file at all. Many programs that use log files directly are coded so that they never create their file log, but just append to it. This means that a system administrator must create a zero-length log file for things to start happening.

To refresh the log, the administrator will type something like:

```
% cp /dev/null log
```

This is actually quite a good way of losing log data, if you know that the file is being written to in `O_APPEND` mode. It will create the file if it doesn't exist. If the file does exist, it will suddenly be truncated to zero length, so that a subsequent `write` system call from any process will append data to a zero-length file. It's actually not too wise to use this command if you suspect that the process writing the data is doing a `seek` and then a `write`: you stand a good chance of getting a file that appears to contain zillions of null bytes and then some data. UNIX allows files with holes, so the null bytes are a hole, but it's not what you wanted. It's perhaps safer to type:

```
% rm log
% touch log
```

It's more usual to want to keep at least yesterday's log, so you'll type something like:

```
% mv log log.old
% touch log
```

or some variant that retains even older log files.

What happens if some process has the log file open during the `mv` command? Well, any new data written by that process will appear in `log.old`. If the process writing to the log file is a short-lived one, perhaps springing into life, doing something and then dying, this is not much of a problem. We will just get the odd message written to the `log.old` file.

However, if the process is a long-running background task, this behaviour is not desirable. We don't want data to be written to `log.old`. The process perhaps needs to be coded so that it opens the log file, writes to it, and then closes it immediately for each message that is to be logged. This way the log file can easily be moved about.

Opening and closing the file like this also means that you avoid the sometimes counter-intuitive business of worrying about available disk space. Imagine that you have a long-running background process that opens a log file when it starts, writes to it, but only closes the file when the process exits. I now decide that the 20 MB log file you have created is excessive and delete it. I'm hoping to increase the free space on the disk.

Well, nothing happens. I have deleted the file but the 20 MB have not reappeared on the free list, because your long-running process still has the file open. Although the file has no name, it's still a file in the file system and will continue to grow until your process closes it or the system shuts down.

A logging routine has to choose between opening and closing the log file for every write operation, or arranging to be told that it should close and then reopen it. Often, long-running processes will trap signal number 1 (SIGHUP) and take that opportunity to re-read configuration files and close and reopen any log files. This adds to the complexity of logging routines in a program.

syslog

Writing a logging routine is perhaps not as trivial as it first seemed. The routines described above have one further flaw: they only operate on one machine. There are several circumstances in which I might wish to log one machine's activity on another. The ability to do this would enable my printer or Ethernet gateway sitting on the local network to log error messages on some convenient UNIX machine.

The syslog system has three parts. First, we have a daemon called `syslogd` that runs on the machine taking care of the logging. The daemon is configured by a text file, usually `/etc/syslog.conf`. Second, there are three simple routines that can be called by programs. Essentially these are clients of the `syslogd` server and send messages to the logging system. Finally, there is a user program `logger`, a simple interface to the logging system that can be used to test the system or generate log entries from shell scripts.

The `syslogd` program is started early on in the system bootstrap sequence. It reads configuration data from `/etc/syslog.conf` and then starts listening for messages. Where it listens depends on your system. Messages that come from the network are sent in a datagram using UDP to port 514. Messages from programs running locally are usually written to `/dev/log`, which is either a UNIX domain socket, a named pipe, or a STREAMS module, depending on your system. `syslogd` will read messages from this file. Some systems have an additional location, `/dev/klog`, used to transfer kernel messages to `syslogd`.

A message is characterised by a *facility* number and a *severity;* `syslogd` will use this pair to look up the message's destination from `/etc/syslog.conf` and forward it appropriately. Since `syslogd` is a long-running process, we need some way of moving log files and changing the configuration file. We use our friend the 'hangup' signal to do this. Actually, `syslogd` helps us because it publishes its process id in a file. Often this is `/etc/syslog.pid`, although it has been moved on some systems. To reload `syslogd`, you can usually type:

```
% kill -1 \
    `cat /etc/syslogd.pid`
```

There are few predefined facility numbers. The values are defined in `/usr/include/syslog.h` as `LOG_something`; `syslogd` understands the name *something*. Here are some sample names: `kern` is used for messages from the kernel, `mail` for the mail system messages, `daemon` for messages from system daemons, `auth` for messages that come from security or authorisation subsystems, and `lpr` for messages from the line printer spooler. There are also eight names called `local0`, `local1`, etc that can be used for your own purposes. I use one of these to indicate messages from my Netblazer gateway handling IP on ISDN to the outside world. I also have a TCP/IP wrapper program on my machines that logs all TCP/IP connections to a file, using another local number. At night, a script scans this data for 'normal' events and passes information on any odd connections to me via email. Thus I am alerted to any probes of my machine from the Internet.

There are eight severity levels: `emerg` for panic situations, `alert` for urgent messages, `crit` for critical conditions, `err` for errors, `warning` for warnings, `notice` for unusual events that might need investigation, `info` for informational messages, and `debug` for debugging data. The order of these is important and is used in `/etc/syslog.conf` to specify what severity levels will or will not be logged.

In `/etc/syslog.conf`, you will see lines of the form:

```
facility.severity action
```

The simplest action is to specify a file name where the message is to be logged. For example:

```
lpr.debug  /var/log/lpd-errs
```

will cause all messages tagged with the `lpr` facility that have a severity of `debug` to be written to the file `/var/log/lpd-errs`, which must exist. In addition, messages of a higher priority will also be written to the file, and since `debug` is the lowest priority, all `lpr` messages will end up in the file. If the line in `/etc/syslog.conf` instead reads:

```
lpr.err  /var/log/lpd-errs
```

Then only messages whose severity is `emerg`, `alert`, `crit` or `err` will be written to the file; other `lpr` messages will be quietly thrown away. This mechanism allows you to 'turn up' the logging if something odd is happening, but minimises disk writing under normal circumstances. Some programs make more use of this than others: sendmail is a good example of a program that is heavily 'bugged' with logging calls.

The configuration file may contain several lines, depending on the logging strategy adopted by your site or perhaps by your system vendor. It's surprising how few people change settings provided by their vendor. When a message is received by `syslogd`, it is matched against each line in the file and thus may be sent off to several destinations, perhaps being logged to a file and also to someone's screen.

It's quite common to see lines like:

```
*.err  /dev/console
*.err  /var/adm/messages
```

The asterisk here matches all facilities, meaning that all messages, regardless of facility, of severity `err` or above will be written both to the console and to the file `/var/adm/messages`.

There's a magic severity value, `none`, which prevents a facility from taking the associated action. For example:

```
*.err;lpr.none  /dev/console
```

will cause the same behaviour as before, except that no line printer messages will be logged to the console. Incidentally, it's common to have several semicolon-delimited clauses associated with a particular action.

There are basically three types of action that can be taken in most systems. As we have seen, you can write a message to a file; you can send the message to another machine using the form `@machine-name` or `@ip-address`; and, you can send it to all logged-in users by using an asterisk, or to named users by specifying their login name. I recently found that I wanted to fire a message into a program, and felt that not being able to do so was a serious deficiency of the system. I see that the IRIX `syslogd` has been enhanced to allow this.

If you look at `syslog.conf` on your system, you may find that there's one further complication. On some systems, you'll find that the daemon passes the file through the `m4` macro package before processing it. The idea is that, on a network, you can have one copy of `syslog.conf` on all machines, but nominate one computer as the main logging host for certain classes of message.

The syslog API

The programming interface is very easy to use. There is a routine to open a log:

```
void openlog(char *id, int opt, int facility);
```

We've already seen the `facility` value. The first argument is a string that is prepended to the message when it's logged. This string is usually set to the program name, so were we logging with a facility of `daemon`, we might pass the string `"ftp"` to `openlog()` to show that we are the `ftp` daemon. The `opt` parameter changes the behaviour of the system slightly; look at the manual page for details.

Once the log is open, you can simply send messages:

```
void syslog(int severity, char *fmt, ...);
```

The `severity` parameter is self-explanatory. The rest of the parameters are similar to `printf`'s. To help with system error decoding, an occurrence of `%m` in the format string instructs `syslog()` to insert a description of the error into the text of the message. It's like `perror()`. Finally, we can call:

```
void closelog(void);
```

to close the open log, ie to lose the open file descriptor.

You can omit the call to `openlog()`, if you are happy not to supply an `id` string. It's also possible to call `syslog()` with its first argument set to the bitwise-or of a facility and a severity value.

Finally, if you want to use `syslog` from a shell script, you can use the `logger` program. It's also an invaluable aid to testing your `/etc/syslog.conf` settings. The program has parameters which allow you to supply a *`facility.severity`* pair and an `id` string. For example:

```
logger -t lpx -p lpr.error \ "some error message"
```

Further reading

I consulted three sources for this article. *Advanced Programming in the UNIX Environment* by W. Richard Stevens is published by Addison-Wesley and is ISBN 0-201-56317-7. *UNIX System Administration Handbook* by Evi Nemeth, Garth Snyder, Scott Seebass and Trent Hein, is published by Prentice Hall and is ISBN 0-13-151051-7. *Essential System Administration*, by Æleen Frisch is published by O'Reilly and Associates Inc. ISBN 1-56592-127-5.

■

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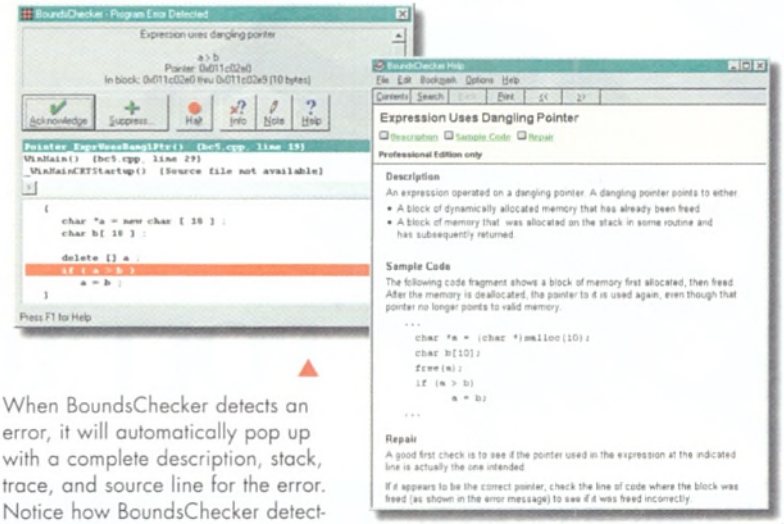

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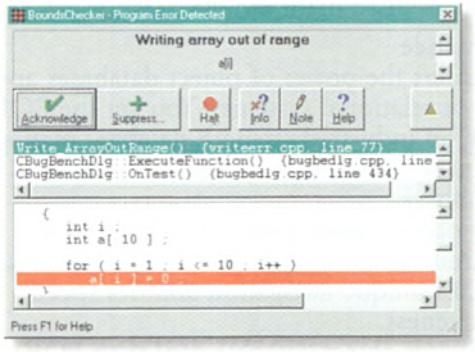
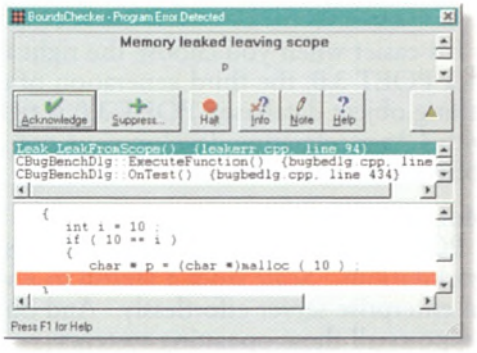


Here the array has a range of 0 to 9 rather than 1 to 10. As a result, some piece of memory would have been overwritten leading to unpredictable behavior.

Here memory was not freed before leaving the function, resulting in a memory leak. BoundsChecker detects this error instantly, because as soon as the function ends, it knows the leak has occurred. As a result, the problem is identified as it happens!



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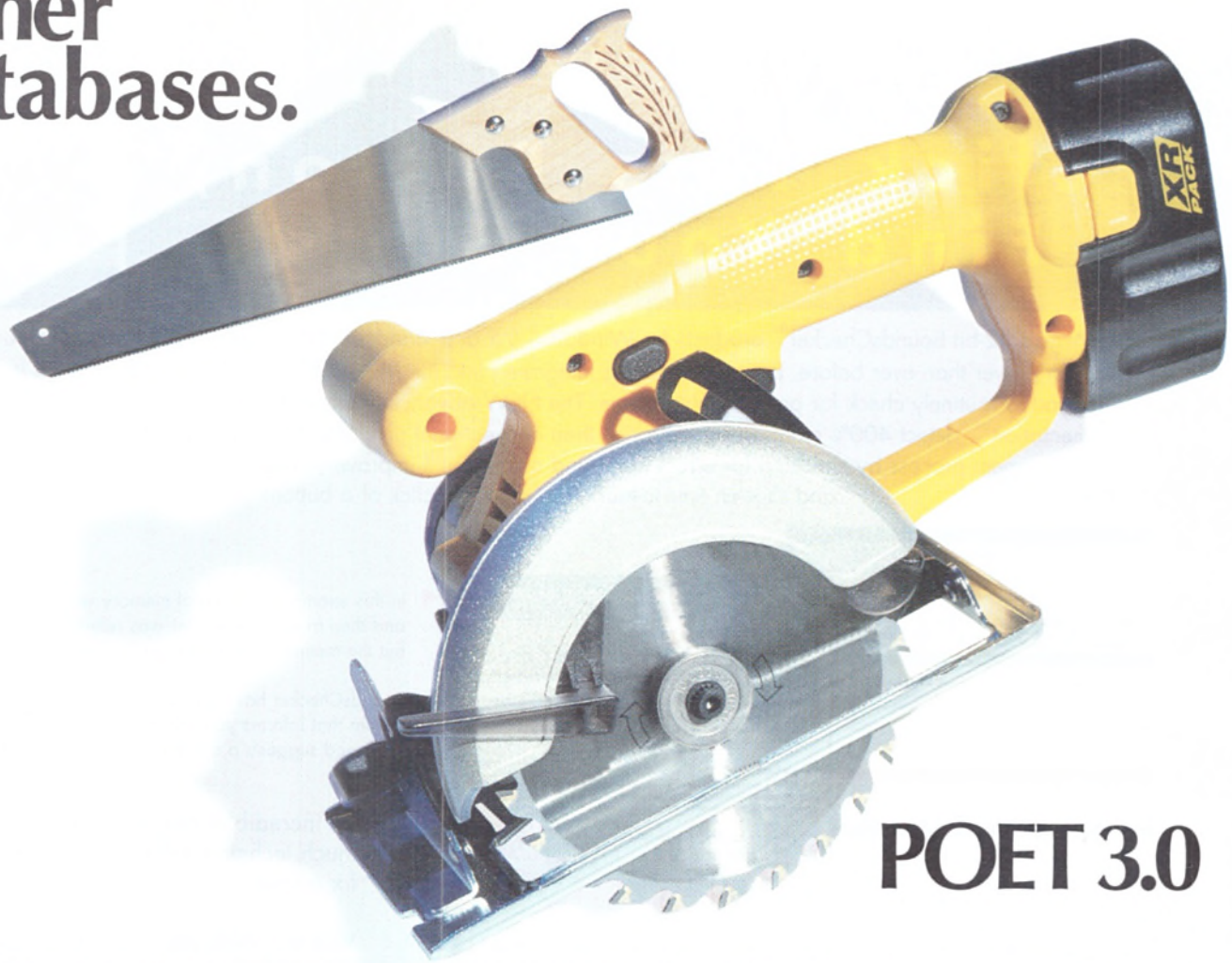

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Out & About

The final voting on the C++ Committee Draft brought its share of surprise. **Francis Glassborow** reports. But first mull over his latest puzzle.

Before I explain the solution to last month's conundrum, have a look at the following two versions of a small function and see if you can determine why one is better than the other. The function itself is pretty meaningless and is only intended as a minimalist example of a problem that surprises many C programmers.

```
void test1 (const int *cip, int *ip) {
   *ip += *cip;
   printf ("%d",*cip);
}
```

versus:

```
void test2 (const int *cip, int *ip) {
   printf ("%d", *cip);
   *ip += *cip;
}
```

I'll provide an answer and an explanation next month. And before you ask, yes - the two functions are identical apart from the two lines being interchanged. However, the code generated will be significantly different, and the output will not always be the same.

Last month's problem

If you remember, I asked, 'What should be the return type of a function that must return success/failure information that cannot be easily abused or used out of context?' The surprising answer, to those who have not seen it before, is '`void *`'.

Neither C++'s new `bool` type nor the old C alternatives (via `typedef`, `#define` or `enum`) are sufficiently type-safe. They all suffer from the same fundamental problem: automatic conversion to integral types. It isn't only novice programmers who fall foul of this problem. Recently the Library Working Group of the ANSI X3J16 and ISO WG 21 committees realised that, in providing the iostream classes with a conversion operator to type `bool` to support idioms such as `if (!cout) ...`, they had broken the iostream concept by enabling manifestly silly code like:

```
int i = cin + cout;
```

They will now have to revert to the earlier provision of a conversion to `void *` (or fix the type hole created by implicit conversions from bool to integer types).

For those still puzzled, the key point is that, in C++, there are no implicit conversions from `void *`, and yet (like all pointers) a `void *` *can* be used as a boolean expression in an `if`, `while` or `do` statement. A null pointer is treated as false (zero); a non-null pointer is treated as true (non-zero).

The C++ Committee Draft

There were several surprises in the final votes from National Bodies. Several active participants switched their straw votes of 'yes' to final votes of 'no'. This was a welcome surprise because it shows that those concerned respond to reasoned argument and not just to the demands of private agendas. Much more surprising was that the US abstained. (I am not sure that the rules actually allow this option - I think it amounts to 'no' - but, in the circumstances, I do not think that anyone is going to complain.) Even more surprising was the fact that Australia voted with an unconditional 'yes'. This vote is completely perverse because Australia has been one of the most consistent critics of the present draft. The explanation reveals a flaw in the voting system. There are only three responses allowed to an ISO vote: 'yes', 'no with comment', and a recently introduced 'yes with comment' to tackle the cultural problems of nations that find voting 'no' too discourteous to contemplate. Apparently the Australian National Body could not get its comments together in time, and so felt compelled to make the only vote that did not require comment.

The final surprise (considering all the cultural issues) was that Japan politely voted 'no with comment'. The new revised schedule is aiming at producing a Draft International Standard for C++ in the third quarter of 1997.

While I'm on this subject, I was surprised to find that the usually well-informed *C/C++ Users Journal* jumped to the conclusion that a recent article of mine (*Diary of an Observer*, in the August issue of *Overload*) meant that I was relatively happy with the current state of the C++ Working Paper. Those who follow my opinions know that I think that the WP is still some way from the stability I would require before I would even support a vote to make it a Committee Draft. There are still too many items of which we have no substantial practical experience. The recently revealed misconceptions about namespaces and the above-mentioned problem with iostreams are clear indicators that there is still work to do.

Request for Comments

I recently received a letter strongly criticising the shortage of comments in my code. Dense commenting styles are a hangover from low-level languages where even those fluent in the language could have difficulty following their own code. As we have matured in our general experience and moved to higher-level languages, our code should be readable with minimal support from comments.

I believe that comments serve just four purposes:

- explaining choices of algorithms (such as why a specific sort algorithm was chosen instead of another one);
- documenting low-level information (addresses of memory-mapped ports, for example);
- 'signing off' the use of suspect code (like commenting the use of an assignment statement as a boolean expression);
- highlighting areas that may need specific attention should certain implementation details change (eg noting the fact that the compiler-generated copy constructor for a class is currently satisfactory, but that this decision may have to be revisited).

Verbose commenting styles are dangerous, as they can hide essential comments, just as a compiler that issues too many warnings can hide important ones. If your code seems to need a lot of comments, then it's time to attend to its readability.

Multiple file experiments

One of the major initialisation problems in C++ is that of the order of initialisation of global objects declared in different files. While there is a strict algorithm to determine the order of initialisation of all globals in a *single* file (not simply the order of declaration, but that is another story), C++ has notably failed to provide a rule for the sequence of global initialisation across different files. It seemed to me that `Pause` objects (see last month's column) could be used to explore this ordering. It would be nice if we could continue to use a dataless type, but just add a constructor to indicate the file in which the instance could be found. (Like C, C++ supports the `__FILE__` macro.)

It only took a moment to determine that the One Definition Rule (explained in September's *EXE*) was going to bite: a constructor, like all member functions, must behave as though it has the same definition in all contexts. So my thinking turned to template classes. I tried:

(In file PAUSE.H)

```
template < const char * file >
struct Pause {
        Pause () {cout << file << endl;}
        ~Pause () {cout << file << "globals destroyed" << endl;}
};
```

Then I attempted to place the following line early in each file:

```
static Pause<__FILE__> p;
```

The compiler wasn't having it. It informed me that a non-type template argument must be a constant expression; `__FILE__` would not do. I tried changing the template parameter to a `const string`. That was worse – I was roughly informed that non-type template parameters have to be either scalars (integer types etc) or pointers. Well that was news to me – I don't see why such a constraint is needed.

I finally solved the problem with what I consider to be a particularly ugly bit of code:

```
#include "pause.h"
static const char y[] = __FILE__;
Pause <y> t;
```

I do not pretend to understand why I should be allowed to initialise an array with `__FILE__` and then use the address of the array as a template argument. I would be delighted to hear from readers who can provide a rationale.

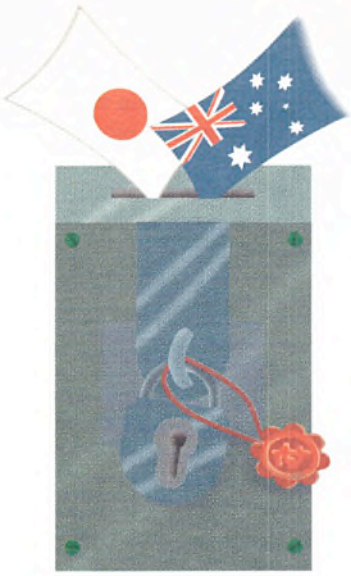
Deep exits

C programmers are used to calling `exit()` whenever they wish to end a program prematurely. The guarantees provided by the C language ensure a clean-up of everything except dynamically-allocated resources, which are always the programmer's responsibility. The problem in C++ is that the designer of a class may be relying on destructor calls to release resources of this nature that objects have acquired.

Good C programmers who intend to exit from deep within a program make sure that all dynamic resource allocation is tidied up by functions registered with `atexit()`. Dynamic memory management needs particularly care, though many programmers assume (wrongly in some cases) that the operating system will recover any allocated memory when the program terminates.

The question is: how can we provide a deep exit from a C++ program? That is, how can we make sure that destructors are called for all local objects? One group of experts wants this to be guaranteed by the language specification for `exit()`. Others argue that this would be a mistake, as a programmer who calls `exit()` from deep within a program may well have a reason for wanting the dynamic resources of local objects left alone. Whichever side of the fence you stand on, I can assure you that those on the other side have a legitimate case.

We can almost achieve our objective by having a special exception object which can be thrown to a `catch` clause in `main()`. I



say 'almost' because one thing gets in the way: the existence of the `catch(...)` handler (catch everything). If we can find a practical solution, this will be the correct way out of a program. However, it relies on programmers learning to write exception-safe code. We will have to learn to replace our old C-style pointers with new C++ smart pointers wherever we use dynamic objects.

As always, increasing the power and variety of a tool set is fine for the craftsman, but just allows everyone else to do even more damage. An old-fashioned saw ensured that few who were not woodsmen cut down trees; chain-saws empower almost everyone to wreck whole forests. Power should be tempered with discretion – and that requires experience and training. Asking programmers to use or learn C++ without training is like giving a chain-saw to day-trippers so they can cut themselves some firewood.

And finally

I understand that Symantec is about to release version 7.2 of its C++ compiler (supporting Windows 95) as a free upgrade to all registered owners of version 7.0, which will be followed by a low-cost upgrade to 7.3 providing namespaces etc to support MFC 4.0. Borland also has a new version (5.0) of its compiler in preparation that will comprehensively support the current state of C++. I think the next stage of the battle for development tools may centre on providing efficient compilation and linkage of templates, without which using the Standard Template Library is going to mean extensive coffee breaks. ■

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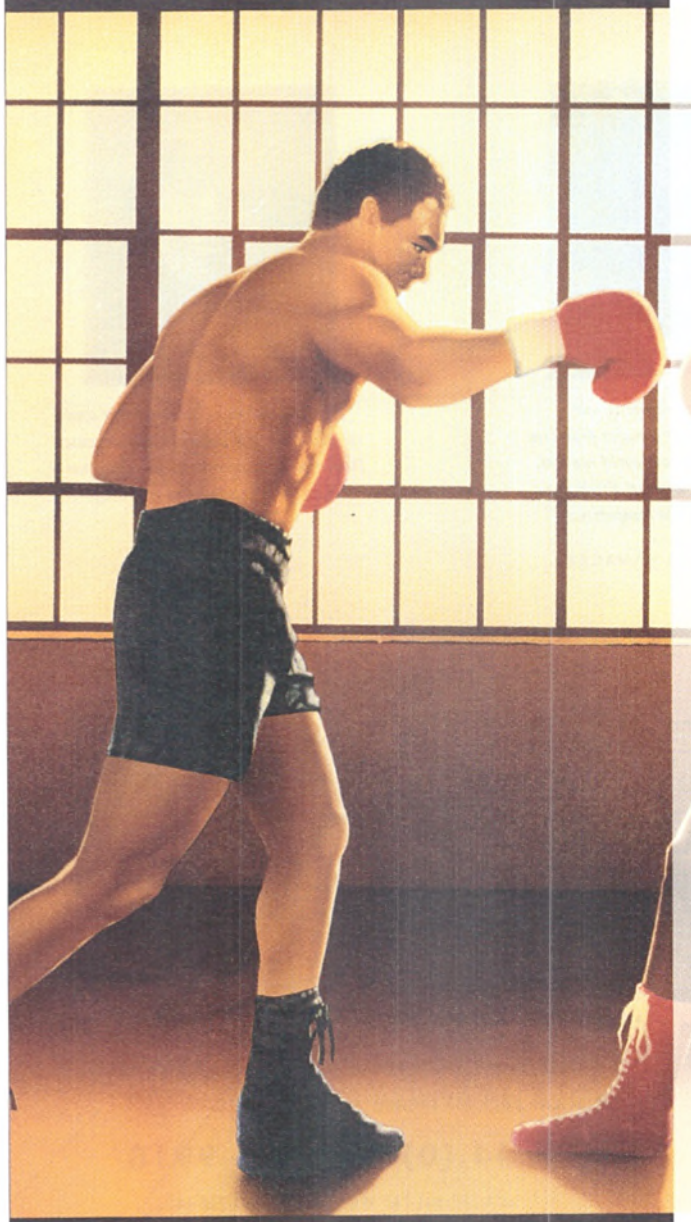

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Portfolio Power

Powersoft has bundled two of its existing client/server development tools and a relational database into one product. **Roland Perera** finds out if Portfolio is as complete and integrated as it purports to be.

With client/server development tools two-a-penny, developers and project managers are often tempted to try one of the never-ending supply of new packages instead of sticking to software they are comfortable with. There's always a tool that promises even *more* rapid application development than the one you're using, still higher levels of integration, and other enticing carrots of the client/server world.

Powersoft Portfolio is a suite of three applications which together constitute a complete 'solution' for client/server development. To be viable, Portfolio must offer not only three individual components of quality, but also a high level of integration.

Portfolio comprises:

- **Watcom SQL Network Server 4.0**, a full-blown relational database with a three-user license.
- **StarDesignor 1.0**, a data modelling and database creation tool.
- **PowerBuilder Desktop 4.0**, an object-oriented client development environment for Windows.

The three-user license is for the database only, and is intended for deployment purposes. StarDesignor and PowerBuilder Desktop are both supplied with single-user licenses.

Portfolio also ships with the latest volumes of the Powersoft and Watcom 'Infobase' CD-ROMs, which contain technical documentation and information on Powersoft support services.

Big box, small footprint

Portfolio comes on five CD-ROMs - the two Infobase volumes, and one for each of the three core products listed above. PowerBuilder Desktop is supplied with a single-local-user version of Watcom SQL Server, enabling you to test the database functionality of your application locally before you deploy it. I'll cover deployment in greater depth later on.

Platforms: PowerBuilder Desktop and StarDesignor are 16-bit Windows applications, although both are claimed to be Windows 95 'compatible'. (32-bit versions of both for Windows NT are available as separate products.) Generally I encountered few problems running either package under Windows 95, apart from the expected responsiveness

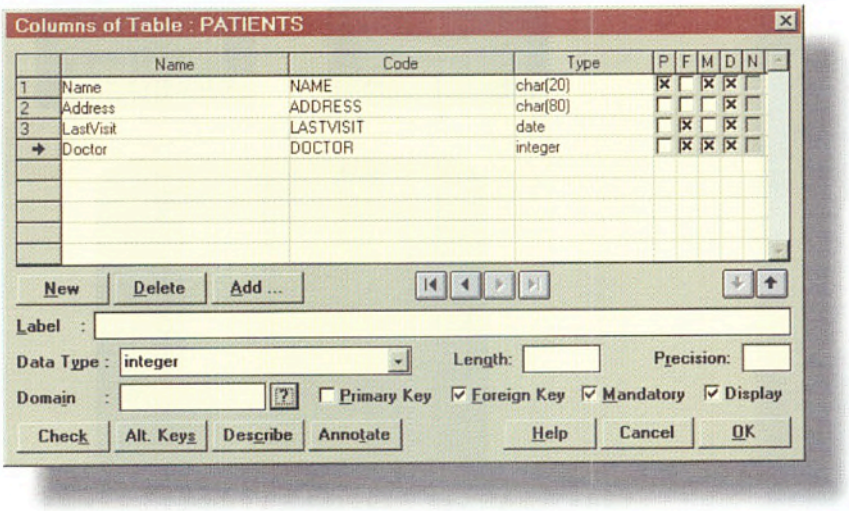

Figure 1 - Editing tables in StarDesignor

hit during the loading of a 16-bit application. Watcom SQL Server comes with native binaries for 16- and 32-bit Windows, OS/2 2.x, NetWare 3.11 or higher, and MS-DOS.

Despite the number of CDs, the software can be installed fairly quickly and has a surprisingly small footprint (less than 30 MB including the database server).

Watcom SQL Server

At the heart of a huge number of workgroup applications lies a relational database, and so Portfolio's success as a complete solution depends largely on Watcom SQL. Unfortunately, I won't be able to tackle scalability or performance issues in this review.

Watcom SQL provides comprehensive database security features, through user IDs, user groups (to simplify user management), and permissions. Administrator-level authority is required to add users to the database. As users are added, they are granted permissions ranging from 'resource authority' (the right to create and drop database elements such as tables, views and stored procedures) to permission to execute a particular procedure. Should a procedure attempt to update information in a table, the user must have update permission for the table as well as execution permission for the procedure.

As far as integrity is concerned, again Watcom SQL 4.0 has the standard features

we've come to expect of relational databases. Columns can have default values and can be declared to be non-null. Uniqueness, primary key and foreign key constraints can all be applied to columns, as can more arbitrary constraints or 'checks', such as requiring that a SEX column hold only MALE or FEMALE. Foreign key references can ensure that DELETE and UPDATE operations cascade (propagate) to parent tables. With earlier versions of Watcom SQL, the database engine would merely signal an error if an attempt was made to update or delete a primary key while there were corresponding foreign keys elsewhere in the database. Finally, triggers can enforce more complex integrity rules, though I'd be tempted to keep that sort of functionality in the application rather than in the database.

Interactive SQL

My only gripe with Watcom SQL is its lack of a proper maintenance utility like the Object Manager supplied with Microsoft SQL Server. The only way to maintain user profiles, create and drop tables and indexes, and carry out other housekeeping tasks is by typing commands into an SQL interpreter called Interactive SQL, or ISQL. I'm not a die-hard proponent of the command prompt, and found having to edit database objects via SQL commands laborious and error-prone. ISQL is also limited in its ability to display the results of a query. It's not possible to change the width of a displayed column, for example.

Important!

Some initial copies of PowerBuilder Desktop that shipped with the Portfolio bundle contain a corrupt main help file PBHLP040.HLP. *Make sure you check with your reseller before you buy.* A 2.4 MB self-extracting archive containing the fixed help file can be found at:
ftp: //ftp.powersoft.com/pub/maintfls/pbhlp040.exe
CompuServe: PSForum, Maintenance Files library [17]
To receive it by mail call 0800 444455.

Powersoft has addressed this issue in the next release of the Watcom SQL product, entitled Sybase SQL Anywhere. (Powersoft and Sybase merged in February.) The new version, which won't be available until the fourth quarter of next year, provides an Explorer-style graphical administration tool called SQL Central.

StarDesignor

In fairness, some of the limitations of ISQL can be worked around with another Portfolio product. StarDesignor is a database design tool that allows you to 'draw' tables and their relationships, and then generate an SQL script which when executed will build a real database that matches your design. It's possible to choose what gets exported to the SQL script, so you can generate commands that will simply add an integrity check to an existing table.

Database elements, such as tables and foreign key references, are added to the physical model by selecting the appropriate tool from a toolbox and then clicking on the model. Objects can be edited by double-clicking on them, which brings up a dialog box of the objects constituents and properties. Figure 1 shows the dialog for editing table objects.

Formatting commands are provided for aligning elements, setting their colours, and similar layout-related operations. One neat feature of StarDesignor that no design tool should be without is the ability to define object 'synonyms'. A synonym is a reference or link to an existing entity in the model, and can be used to avoid the spaghetti-like tangle that can result from attempting to represent an *n*-dimensional network on a two-dimensional screen.

StarDesignor can generate scripts for most DBMSs, ranging from desktop systems like Access and Paradox to Oracle and Informix. It will tailor its SQL output to take into account the specifics of the chosen DBMS, and in fact you can edit the generated scripts yourself should you need to - the scripts are pretty-printed to make this easier. However, the whole point of the tool is to avoid such hackery, and in this spirit,

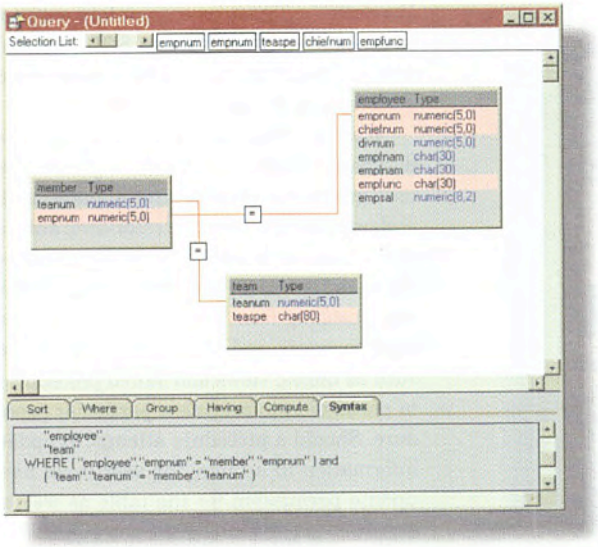

Figure 2 - Visual joins with PowerBuilder's Query Painter

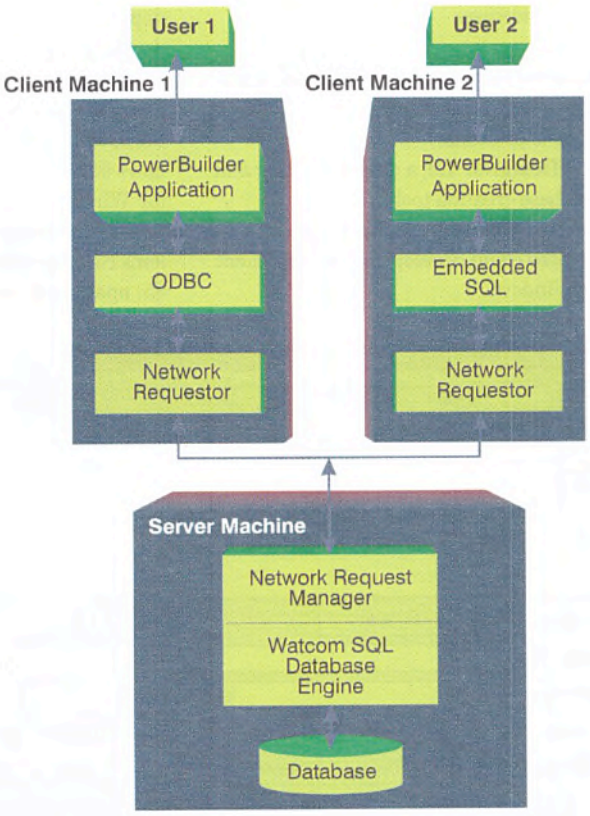

Figure 3 - Portfolio deployment architecture

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Delphi	Multi-Edit
383	228
Keystrokes	Keystrokes

C:\MEWIN\td.pas

```
{*************************************************************}
  Tree.AddNodePrev - 9/29/95 4:55pm
{*************************************************************}
Function Tree.AddNodePrev( NewNode : TreeNodePtr ) : Cardinal;
  Begin
    If( PrevNode = Nil )Then Begin
      AddNode( NewNode );
      AddNodePrev := 0;
    End
    Else Begin
      If( PrevNodeDir )Then Begin
        PrevNode^.uplink := NewNode;
        AddNodePrev := 1;
      End
      Else Begin
        PrevNode^.dnlink := NewNode;
        AddNodePrev := 2;
      End;
    End;
  End; {Tree.AddNodePrev}
```

(*Does not include repeated asterisks or typos which are more likely with Delphi's editor.)

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StarDesignor can be told to generate ODBC-compliant SQL.

The tool's most impressive feature is its ability to reverse engineer a database model, either from a previously-generated SQL script, or directly from an ODBC data source. StarDesignor will import tables, views, indexes, keys, checks and triggers, build an internal model of the database, and then render a view of the model on the screen. The reverse-engineered model can be merged with an existing one if required.

I was disappointed with StarDesignor's help support. No tooltips or status bar descriptions are provided for the modelling toolbox, which means consulting the on-line or printed manual until you learn what each tool does. The on-line help - interestingly titled 'StardDesignor' rather than 'StarDesignor' - is pretty scant on information, and there's no SQL information. For this you have to open the Watcom SQL help files. Overall, though, StarDesignor serves its purpose very well.

PowerBuilder Desktop

Two-tier database-oriented client/server applications tend to have their logic divided between two places: the database, in the form of triggers and stored procedures, and the client. Often the client does most of the work, with the database only ensuring that various business rules are not violated and that the data's integrity not compromised. If your application's architecture implies this kind of 'fat' client, a powerful front-end development tool is vital.

On this premise, the minimal set of features you would require of such a tool might be: GUI-building functionality; database connectivity; interoperability with other tools and languages; support for object-oriented programming; and rapid prototyping.

The GUI design element of PowerBuilder consists of the usual form and menu 'painters' (editors) and Windows widget toolboxes. Event handlers can be edited by double-clicking the appropriate control. VBX custom controls are supported: OCX controls are not.

As shown in Figure 2, you can use the Query Painter to create SQL queries visually. PowerBuilder provides ODBC and native database connectivity via data-aware controls, or *DataWindows*, and embedded SQL. DataWindows support the OLE 1.0 container model. So, it's possible to link an OLE 1.0 document into a DataWindow column and then store it as a BLOB (Binary Large OBject) in your database.

OLE 2.0 containment can be achieved with a special container control which appears in the Window Painter toolbar. PowerBuilder supports OLE Automation, as a client only, and DDE, as both client and server. It's also possible to call DLLs from a PowerBuilder script.

Object orientation is something most developers expect from a programming language, and to that end PowerBuilder's *PowerScript* language provides single inheritance, encapsulation, and polymorphism, offering much of the power of C++ with a Pascal-like syntax. While on the topic of language, PowerScript doesn't support exception handling, apart from a single application-level call-back for handling fatal errors. So be prepared for trickle-back mayhem should you need to unwind a deep call stack!

As for prototyping, workgroup development, and general ease-of-use, PowerBuilder provides form previewing, debugging facilities such as 'stops' (breakpoints) and watches, and integrated version control. Still, I feel that the IDE needs a major revamp to compare favourably in usability terms with some other recent products.

Documentation

I've already mentioned that the on-line help could be improved. The same can be said for the printed documentation, which is really just a collection of reference manuals and user guides for each of Portfolio's constituent products. This leads to a certain level of redundancy and confusion, and a lack of a real 'overview' of the product's use, as each manual tends to focus on a particular development tool. For example, the documentation repeatedly refers to manuals called *Connecting to Your Database* and *PowerScript Language*, neither of which ship with PortFolio.

Aside from these integration problems, however, the documentation is adequate. The *Building Applications* book gives some basic tips on designing and managing client/server applications. And let's be grateful that Portfolio actually ships with hard-copy manuals - many vendors expect you to shell out extra cash for printed information.

Deployment

Once you've created an application, you'll probably want to deploy it. Portfolio applications may be based around a single-user local database or a centralised database server.

For your application to use a local database, you must install the Watcom SQL Desktop Runtime System on each user machine. This is a cut-down version of the database engine which does not require an additional user license. The Runtime System allows retrieval and modification of data, but does not support multiple users, transaction logs, stored procedures or triggers, or any kind of modification to the database schema.

For most applications you'll want to install Watcom SQL Network Server. Under NT, a Service Manager utility is provided for registering the database engine as an NT service; under NetWare, the engine can be installed as a loadable module. At the client end, the network 'requestor' (DBCLIENT or DBCLIENW, depending on the client platform) must be running in order for calls to find their way to the server. The requestor is a proxy that routes requests across the network to a Network Request Manager, which is actually part of the database engine. Figure 3 shows this architecture.

The PowerBuilder CD-ROM contains a program called the Desktop Deployment Kit which allows selective installation of various run-time components onto a user machine. The run-time system consists of the PowerBuilder deployment DLLs, the Powersoft database 'interfaces' (native connectivity drivers), ODBC drivers, and the Runtime System database engine. Not all of these components will necessarily be required for a given application.

The Deployment Kit registers the Watcom SQL ODBC driver in the user's ODBCINST.INI file, but you'll need to configure individual ODBC data sources manually.

Releases for Windows 95

PowerBuilder Desktop	Q1 '96
StarDesignor	Q2 '96
Sybase SQL Anywhere	Q4 '96
Powersoft Portfolio	?

Power software?

For £319, including the three-user license for Watcom SQL, Powersoft Portfolio does the job. Most importantly it does the whole job - it has a complete back-end database, a neat database design tool, and an adequate front-end builder. None of these products is revolutionary on its own, and in fact all three seem a little dated. Nowadays CASE support for business objects would probably be more appropriate than a tool for designing database schemata.

Portfolio is suited to the single developer who wants to be able to develop an application on a standalone machine and then deploy it in a client/server environment. In this context it's a handy and cost-effective solution. If you'd like to deploy a 32-bit client, though, you'll have to wait for Portfolio for Windows 95... ■

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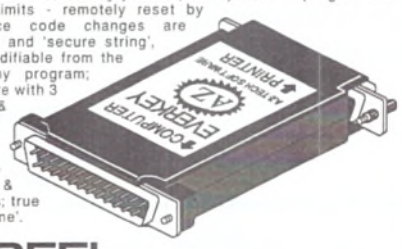

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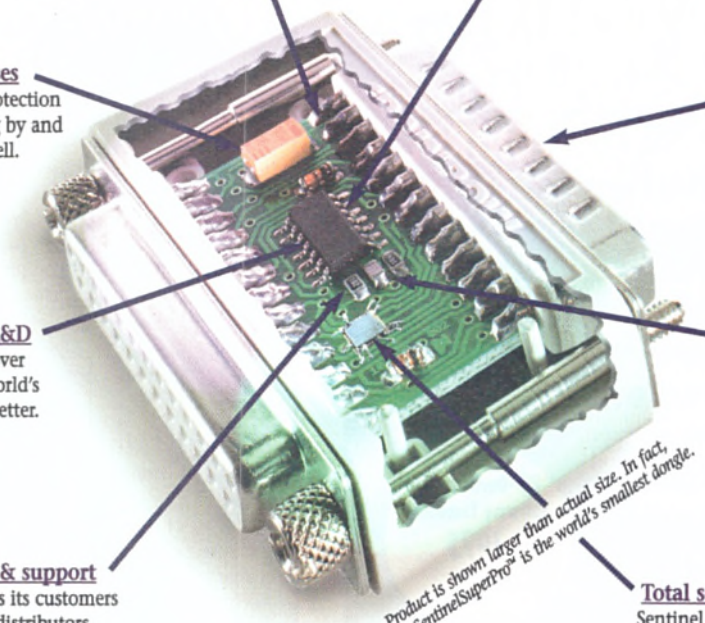

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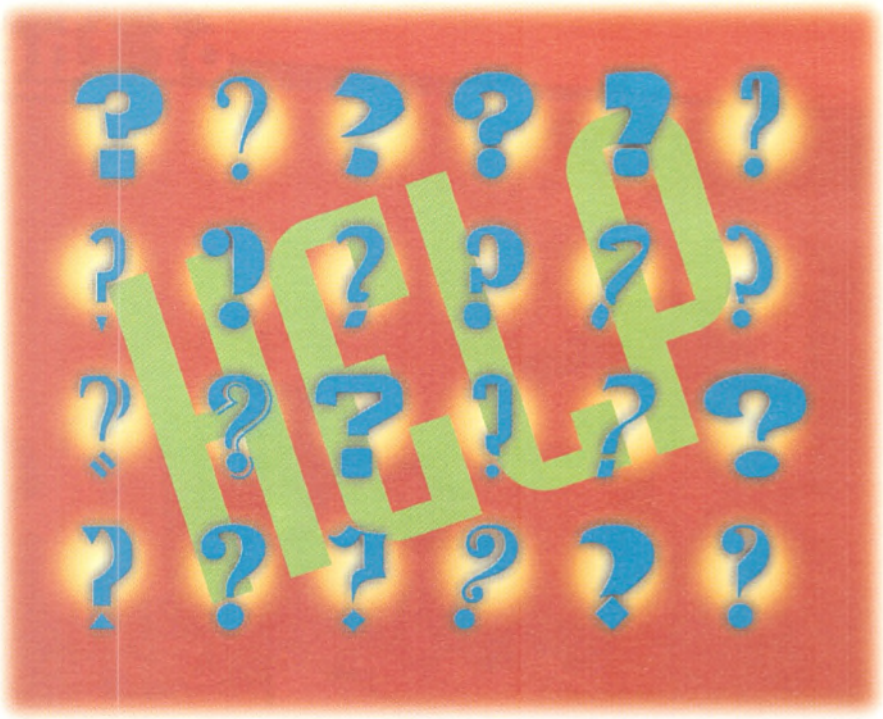
Microsoft's WinHelp engine has defined a standard format for Windows help files. **Kevin Townsend** reviews three tools that let you create your own hypertext resources for use with WinHelp.



Help authoring tools

One of the strengths of Windows is its consistent help interface. Regardless of the program, the method of obtaining help is the same. But the quality of the help system summoned varies from application to application. Some are excellent; some are pitiful. The problem is two-fold. WinHelp, the Windows help engine, is more versatile than it was intended to be, and so is being used more imaginatively; and Microsoft's recommended authoring technique is a bit nonsensical: you are expected to use a linear WYSIWYG word processor, Microsoft Word, to produce non-linear, non-WYSIWYG hypertext data. Such problems have led to a strong demand for help authoring tools, or HATs.

The 'official' way of producing a help file is to author it in Microsoft Word, save the result as a Rich Text Format (RTF) file, and then use a help compiler, usually HCP.EXE, to generate the finished .HLP file. The compiled .HLP file is then 'driven' by WinHelp.

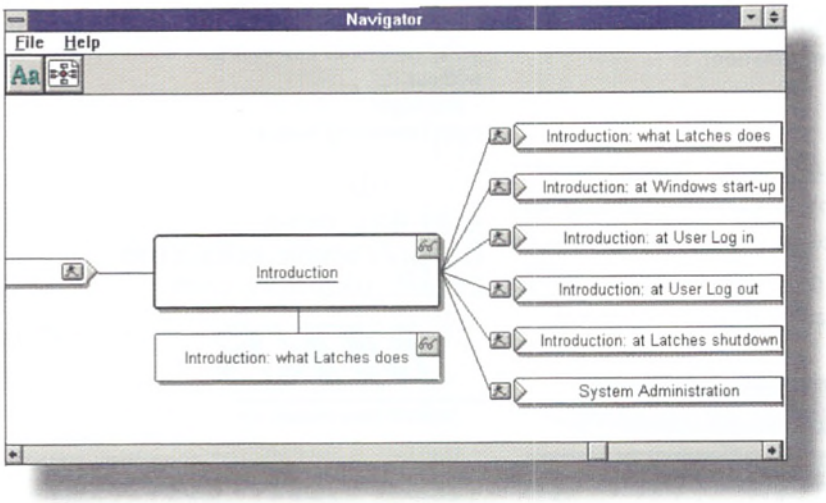


Figure 1 - The Navigator shows the links and relationship between different topics

The Word method

This approach to help authoring has many shortcomings. WinHelp is a *hypertext* system, but Microsoft has designed its help compiler to take *linear* RTF files as input. Hypertext has no single entry nor exit point; indeed, each reader traverses his own path from entry point to exit point. The help author must create a web of associative links that will guide both the newcomer and the nerd to the correct destination.

The linear nature of the word processor tempts people to produce linear help files and make little use of the hypertext potential of WinHelp. Indeed, some 'help' files are nothing more than compiled versions of

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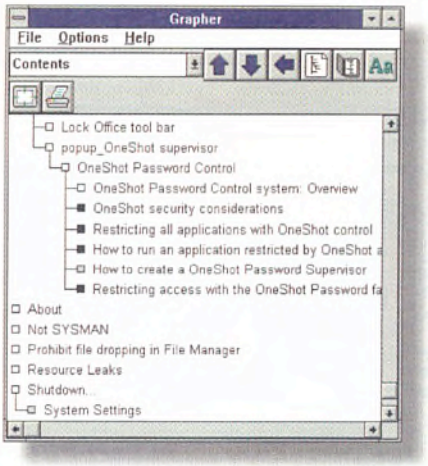

Figure 2 - The Grapher is particularly useful in locating orphan topics

written manuals – and suffer from being so. The fact that WinHelp is badly documented and poorly understood by the majority of users doesn't help. Microsoft has never been particularly forthcoming about it.

Another problem is that the special codes used to define jumps, popups, keywords, titles, tags and so on need to be embedded in the Word document. Ensuring that everything is accurate and in the right place becomes a maintenance nightmare.

Design is also an issue. Help files are read on-screen, whereas user manuals are read from the printed page. The former are notoriously more difficult to read, so the design of an on-line help system is of paramount importance. But with so many special codes embedded in the Word source document it is often impossible to obtain more than a general impression of the finished screen. WYSIWYG it is not.

The larger and more complex the on-line help system, the more difficult it is to produce with a linear word processor. It is little wonder that there is a large market for help authoring tools that simplify and automate the process of developing Windows help files.

ForeHelp 2.0

ForeHelp is an excellent tool for producing good, solid help systems. The recent version 2.0 is a vast improvement on its predecessor: bugs have been eliminated, new features have been added, and it's easier to use.

ForeHelp provides Grapher, Navigator and Reporter Windows. The Navigator shows the links and relationships between topics (Figure 1). The Grapher Figure 2 shows the same information in tree form, and is particularly useful for locating orphan topics that might otherwise have been missed. The Reporter produces printed reports on jumps, popups, macros, etc associated with selected topics. Together, these tools are invaluable for team development, when a new author is taking over or maintaining someone else's help file.

What I like most about ForeHelp is the way in which you can think about and develop your help file: It's as close to true WYSIWYG as you're likely to get, even displaying graphics and correctly wrapping words around them (see Figure 3). If you realise that you need a sub-topic to provide further information you can add it instantly. You can define its context string, specify whether it has a non-scrolling banner and whether the title is a keyword, enter all the text for the topic – and then return to exactly where you were at the press of a button.

ForeHelp includes a comprehensive and intuitive set of commands for moving around a help file under development. If you want to check a jump or a popup, simply hold down the CTRL button and click the mouse over the hotspot. If you want to move back to the previous topic, press ALT-B. ALT-C takes you straight to the Contents topic, ALT-+ to the next topic in a browse sequence and ALT-- to the previous one. ALT-G presents you with a list of all topics from which you can select a target.

The ability to update a graphic without having to redo its hotspots can save hours of work. You can slide a new graphic under the existing hotspots, and then move the hotspots about or add new ones if necessary.

ForeHelp's macro coding facility is also excellent. If you select the Macros command from the Topic menu, you generate a macro that relates only to the current topic. If you select the Macros command from the Project menu, then the macro is project-wide and is automatically built into the HPJ file during the 'build' phase. In either case you invoke a window that automates and verifies macro expansion. You first select the required macro from a list, and then enter the parameters in a separate field. ForeHelp inserts each parameter between the correct pair of quotation marks. It is simple, efficient and error-free.

A `RegisterRoutine` macro let you include your own macros from a DLL. Macros that are thus 'registered' become available as topic macros.

ForeHelp is a very good product for straightforward help authoring. It is so easy that it is a genuine productivity tool, allowing the production of help files in considerably less time than with the traditional method. You need never consider the intricacies of hypertext mark-up.

The danger is that, while ForeHelp doesn't lure you into a linear mode of thought, it's

Figure 3 - ForeHelp's edit mode

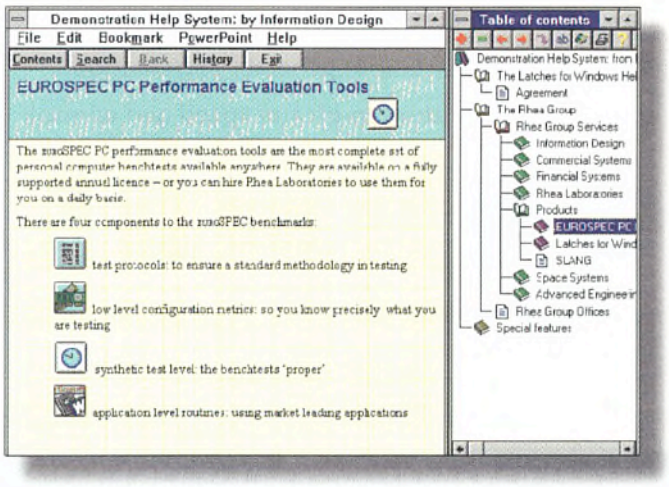

Figure 4 - HDK's table of contents and a watermark left.

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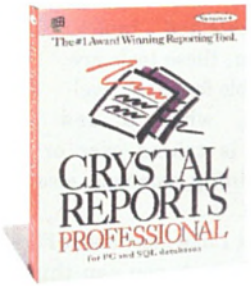

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Figure 5 - A bitmap of 12 frames to produce a rotating clock with HDK

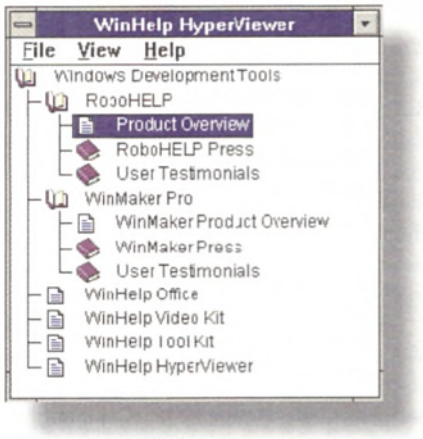

Figure 6 - The WinHelp HyperViewer table of contents window

so self-contained that it can trap you in Fore-Help-thought – you simply don't think of anything more adventurous.

ForeHelp is produced by ForeFront in Boulder, Colorado, and is distributed in the UK by Oxford Computer Consultants. It is completely self-contained and includes the Microsoft help compiler, HCP.EXE.

HDK2

HDK2 (Help Development Kit 2) is a help authoring tool for the 'professional' author. It is harder to use than Fore-Help, but includes a number of additional features.

HDK uses Microsoft Word, but installs an extensive range of macros. It is not the most intuitive interface. Problems are compounded by an unusual form of documentation. There's a printed tutorial that will get you started, and an on-line knowledge base that contains everything you might want to know about both HDK and WinHelp, if only you can find it. When you do find it, it tends to lacks consistency. HDK needs an additional document somewhere between the two (and such is apparently under development).

Help design and implementation is made as easy as possible with HDK, though not for the beginner. I particularly like its handling of graphics: if you don't like the look of a particular picture, you can invoke the relevant graphics package from within HDK and make your changes without ever leaving it. Preferred editors can be specified, eg, Notepad to view the error file after compilation, or Paintbrush for .BMP files.

Using Word as the authoring environment means that you do not see what referenced graphics look like until you compile and test the help file. To accelerate the authoring cycle, HDK allows a single topic or page to be compiled and tested. It makes a temporary RTF file for the topic concerned and invokes the help compiler. Since it is only a page, it takes a matter of seconds, and what you get is exactly what you see after full compilation.

HDK provides a range of unique features through proprietary DLLs which you are allowed to distribute with your application. Three features are worth mentioning: watermarks, animations, and tables of contents. Watermarks are transparent graphics that lie between the foreground text and the background colour. They can be placed in a variety of set positions, or tiled across the whole window, and they can be topic or project-wide.

An animation is generated from a single bitmap that is divided into a number of identically-sized frames. You just enter the name of the bitmap, the number of frames it contains, and the speed with which frames are to be changed. You can even specify whether the bitmap should be transparent and whether you wish the animation to repeat (see Figure 5).

Finally, a table of contents is an automatically-generated secondary window that displays the help file's topic structure as an expandable/collapsible tree (see Figure 4). It provides an excellent way for the user to see what help is available, and move to the required information quickly. It is presented in a very attractive manner.

HDK's documentation is fine for the novice, excellent for cognoscenti, and a bit lacking for anyone in between. Its macro facility is good. HDK is not as clean and simple as ForeHelp for the average user, but is more suited to the advanced user wanting to incorporate additional custom macros. It lacks ForeHelp's ability to 'jump to error' from the build and compilation error list, but conversely includes many excellent touches such as the ability to use true 'curly quotes' and em-dashes in the compiled help file. Being Word-based, it is not WYSIWYG, but its ability to compile a single topic provides perfect 'WYSIWY *will* G' in seconds. It is indeed a curious mixture: not as good as ForeHelp for the mainstream help author, yet better for the advanced author who wants to provide that little bit more than usual.

HDK is published by Australian Virtual Media Technology Pty. It is supplied and supported in the UK by SoftKlone Ltd.

WinHelp Office

The WinHelp Office package comprises RoboHelp (an authoring tool) and a number

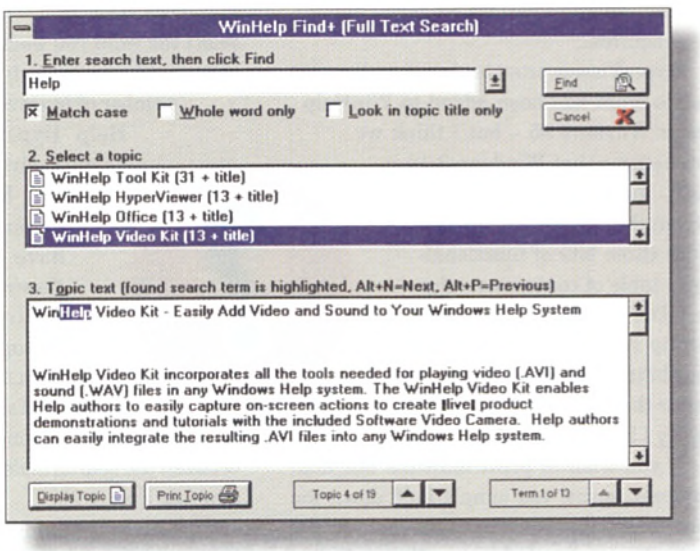

Figure 7 - The text of the topic appears in the full text search dialog

of specialist tools: HyperViewer, Help to Word, WinHelp Inspector, BugHunter, Graphics Locator, Graphics Library, Video Kit, and a few other bits and pieces. Without these tools, RoboHelp has serious competition from some of the other HATs – but with them it is definitely worth considering. RoboHelp is similar in concept to HDK, but is somewhat easier for the novice to get started with – although my preference is HDK.

The Graphics Library contains a number of small images that you can copy to your project directory; the Graphics Locator will help you find and copy BMP, ICO and CUR files from one location to another.

WinHelp Inspector provides details and statistics on any compiled help file, while Help to Word converts a help file to a Word document. This latter tool does not reconstruct the HPJ file, nor does it break the document into topic-oriented pages. It does, however, provide a starting point should you need to maintain a help file for which there is no existing HPJ or source file.

My three favourite tools are Video Kit, BugHunter and HyperViewer. Video Kit makes playing an AVI file from within Help simple. You should be able to do it with any HAT, but it is unlikely to be as easy. The Video Kit even includes Microsoft's CAPSCRN.EXE (from MS Video for Windows) to enable you to record the AVI file in the first place.

BugHunter intercepts and reports calls made to WinHelp by a running application. All help authors are familiar with the dreaded 'Help topic does not exist' message. It means that there is an error in the context links. But where? Is the error yours, or did the software developer supply incorrect codes, or even omit some? BugHunter will report the context link code sent by the application to WinHelp, which means you, at least, know for certain what the application requires...

HyperViewer provides functionality similar to what has been added to WinHelp under Windows 95 – but I think we can assume that Windows 3.1x is not going to disappear overnight. HyperViewer provides three bits of functionality: a table of contents similar to HDK's; a full text-search facility superior to HDK's; and the ability to print selected topics better than any other help printing utility I have come across.

If you wish to print multiple but non-adjacent topics, you simply hold down the control key and click on each topic in the table of contents window (see Figure 6). But to my mind the real plus comes from HyperView's full text search capability. HDK has similar functionality, but it is not implemented as well: it's basically the same as the standard Help search facility where you select the word you wish to locate from a list of indexed words likely to include a large number of irrelevant ones. With WinHelp HyperViewer the user must, first of all, specify the word he is seeking. So although irrelevant words have been indexed, they're not visible. Also, the text associated with the topic appears in window on the Full Text Search dialog itself, so there is no need to jump back and forth between the search dialog and the topic window (see Figure 7).

RoboHelp is not my favourite HAT. But it's better than many. WinHelp Office, however, is something else. Its tools and utilities are well worth having on their own.

RoboHelp can be bought alone or as an integral part of WinHelp Office. Produced by Blue Sky Software in the States, it is distributed in the UK by Oxford Computer Consultants, company which incidentally also produces a utility called the Help Browser that bears a surprisingly close resemblance to WinHelp HyperViewer.

Types of HAT

A help file is generated by compiling an RTF file. All HATs must therefore produce an RTF file for presentation to the help compiler. This much is common: what differentiates HATs is their chosen method for generating the RTF file.

There are two main ways of creating this RTF file. The first is to use Word itself to create a template containing specialised macros to automate the help authoring process. The second is to develop a self-contained application which will generate its own RTF file and does not rely on any specific word processor. Commercial and shareware products are available that adopt each of these two approaches.

WinWord add-ons

The obvious advantage of using a Word template is that you have the support of all Word's features to do the actual writing. There are some disadvantages associated with this choice. If you do not own Word, it is an expensive route; there is no chance of WYSIWYG authoring; using Word is overkill for what you really need; and loading all of Word and the required macros can become tedious on a slow system. Not to forget that Word has its own bugs and of course leaks like crazy, which can cause a resource problem if you're using other applications at the same time such as Paintbrush or Corel to capture and save screenshots of the target application.

Self contained HATs

One advantage of a self-contained HAT is that you don't need Word. The tool must include a word processor, and the help author is limited to the capabilities of that word processor. Most such products use an underlying database, and as a result the authoring environment more closely resembles non-linear hypertext than does a traditional word processor.

The main advantages of this approach, then, are: you are not forced into a linear mode of thought by a linear authoring environment; since each topic is authored in isolation, you can get closer to WYSIWYG development; the author has control over what appears on the screen, so the display is generally uncluttered by embedded codes; and it is likely to be cheaper and easier if you don't already own Microsoft Word.

One difficulty with a self-contained HAT is that you are insulated from the wider world of help authoring – since all you can do is what the HAT lets you do, you tend not to consider anything else.

It's all RTF

All HATs ultimately have to do the same thing: produce an RTF file. The main issue is whether they do this in a stand-alone manner or through a word processor like Word. Some also support extra functionality through proprietary DLLs. However, since they all eventually produce the same thing, there is nothing of a technical nature to prevent you from using more than one HAT to get the special features you want, and then manually merging the RTF files before compilation. Messy, but possible. ■

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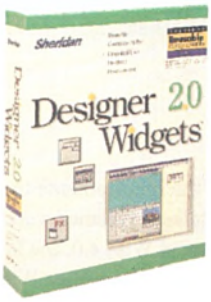

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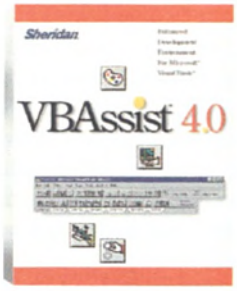

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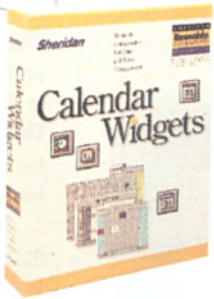

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Getting Wise to Windows 95

In last month's *EXE*, I described some of the requirements that apply to a well-behaved Windows 95 installer. It seemed a good idea to follow up this month with a review of Wise 4.0, the latest version of this increasingly popular installation utility. With the exception of Stirling Technologies' InstallShield, which Microsoft ships with the Win32 SDK, Wise 4.0 is to my knowledge the first installation utility which is Windows 95 compliant.

Of experts and wizards...

Installation utilities usually fall into one of two categories. They either use a sophisticated and often complex script language, which can involve quite a bit of programming effort on your part, or else a 'wizard/expert' approach that generates all the necessary configuration information behind the scenes. InstallShield falls into the former category, while the excellent Eschalon Install Pro is an example of the latter. Install Pro is extremely easy to use and I'm very impressed with it, but it does have a couple of limitations. Firstly, it's difficult to do anything overly complex as there is no script language to 'get at'. Secondly, it doesn't yet support Windows 95.

Wise 4.0 takes something of a hybrid approach. First of all, you run the Wise Installation Expert, which allows you to enter the basic details of the program to be installed: what directory you want it to go in, which files are to be included with it, and so forth. You can see the Installation Expert in Figure 1. You'll notice from this screenshot that Wise now supports the Borland Database Engine (BDE), allowing you to specify a database that will be set up as part of the installation process. This option is particularly useful for Delphi developers whose programs often make use of BDE.

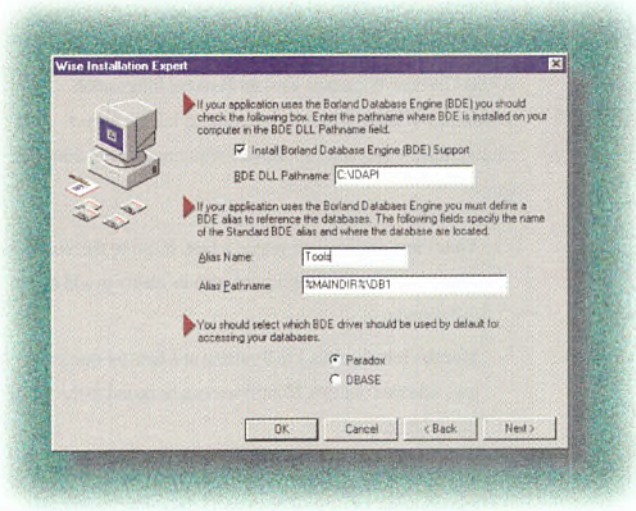

Figure 1 – The first step is to use the Installation Expert to create a basic script. The Borland Database Engine is supported

Script tweaking

Once you've created your basic installation script using the Expert, you can then 'tweak' the newly-generated script in various ways. Wise's script language isn't as sophisticated as InstallShield's, but it's adequate for most purposes. It provides a couple of control statements, such as conditional branches (`If...then...else`) and `While` loops.

Figure 2 shows the main editing environment. On the left-hand side of the window is a scrollable list of primitives from which an installation scripts are built. On the right-hand side is the script generated by the Installation Expert. If you want to add to the script, you simply position the caret where you want the new entry to be inserted and then double-click on the appropriate action in the left-hand column. You can also drag and drop script primitives directly from the left window to the right.

The script generated by the Expert often requires minor work. For example, when I specified a product name of 'TimeFrame 3.0' the Expert generated a welcome screen which included the line, 'This program will install the TimeFrame 3.0 onto your computer.' In order to delete the extraneous 'the', I double-clicked on the corresponding Display Message entry in the script and was then able to edit the dialog box text. The same idea applies elsewhere – just double-click on a command in the script window to edit its associated parameters.

At any point during the development of a script, you have the option of 'test flying' the script from within the Wise environment. In test mode, no file copying or system updates take place, but you immediately get a feel of what your script is going to look like from the user's point of view.

When your script is complete and working to your satisfaction, you can build the finished SETUP.EXE file by pressing the Compile button. The scripting environment allows you to specify the size of the distribution disks – should the size of your SETUP.EXE program exceed this, one or more auxiliary data files will be created.

There are a number of options for controlling the look and feel of the installation process. For example, Figure 3 shows the Background property sheet which can be used to specify the background colour of the main installer window. It's not obvious from the dialog shown, but you can choose to 'tile' the background with a corporate logo or other bitmap.

Version 4.0 of the popular Wise installation utility supports Windows 95.

Dave Jewell takes a look.

Three Wise platforms

Wise supports both 16- and 32-bit Windows, including Windows NT. In either case, the SETUP.EXE program that Wise creates is a 16-bit application that can be executed on any Windows platform. This is a useful feature since it means that you don't have to build different versions of SETUP.EXE for each target platform. Instead, the program will automatically detect the platform it's running on and change its behaviour accordingly. For example, under Windows 95, it will offer to set up designated program icons on the Start Menu. I'm not too sure how a 16-bit program manages to do this, but it seems to work very nicely!

Although Wise only generates a single 16-bit SETUP.EXE, there are both 16- and 32-bit versions of the scripting environment. This means that you can create an installation script under Windows 95, for example, try it out under Windows 3.1, and then edit the same script without rebooting into a 32-bit version of Windows.

Another nice feature of Wise is the inclusion of an 'uninstaller' option. If you want, you can arrange for an uninstaller utility to be copied to the user's hard disk along with the actual application, and for the corresponding icon to be set up in the Program Manager group or Start Menu. By default, the installer will create a file called INSTALL.LOG which records every action taken during the installation of the application. The uninstaller will parse this log file and reverse the effects of the installation. Although it's unthinkable that the user will want to delete your programming masterpiece (!), giving them the option is obviously a user-friendly thing to do.

When an application is installed into a directory that already contains a copy of the application (an update installation), Wise can copy any replaced files into a new sub-directory so that the previous version of the application can be restored if necessary.

More on scripts

Ultimately, the usefulness of the Wise installation utility is closely tied to the flexibility of its script language. Although you can create simple installer programs based solely on the script generated by the Installation Expert, sooner or later you'll need to roll up your sleeves and start using the script language.

In addition to the simple control statements mentioned earlier, there are primitives for adding strings to WIN.INI, SYSTEM.INI, AUTOEXEC.BAT and CONFIG.SYS. It's possible to search for arbitrary text strings so that new lines can be added after a certain point in the file. This can be important, for example when a certain device driver must be loaded after some other driver. Wise maintains a number of 'meta-variables' which are set up in response to user input. Thus, if your program is to be installed into C:\WOMBAT, and you want to add this path to a section of your WIN.INI file, you might use a string like this:

```
HomeDir=%MAINDIR%
```

At run-time, the meta-variable `%MAINDIR%` will be replaced by the path the user has chosen as the destination directory. There's also a command to add a directory to the PATH environment variable. Whenever a configuration file such as AUTOEXEC.BAT is modified, your Wise-generated installer will automatically create a backup

Figure 2 – You can modify a script by dragging primitive 'actions' into the script from the list on the left-hand side

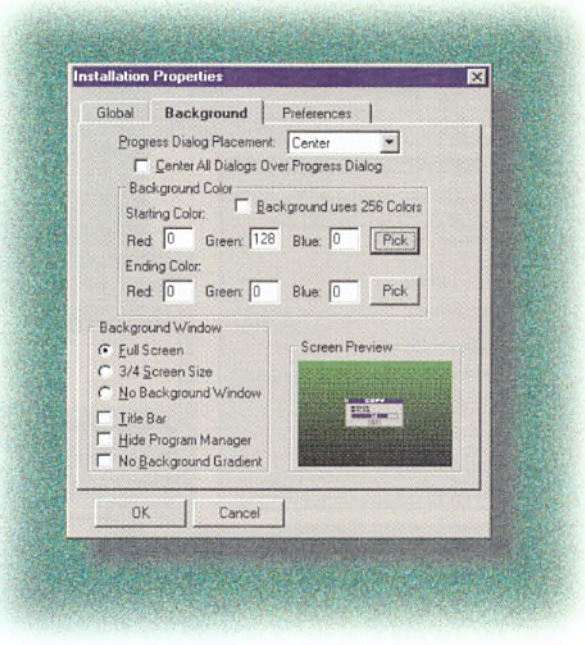

Figure 3 – A number of options are available for controlling the look and feel of the installer program

copy first, and will not add directories to the PATH variable if they are already present. If only all installation programs did the same!

There are script commands for browsing directories, confirming that a file or directory exists, and even checking whether a specific module is currently loaded in memory. You can call functions in custom DLLs and conditionally branch depending on the result of the function call. There's a 'Check Configuration' call which supplies information about the machine on which your software is being installed, including the kind of processor, the presence of NT, whether it supports VGA (or better) graphics, the amount of RAM available, and multimedia support. You can install ODBC drivers and configure ODBC data sources, edit the Registry, execute other Windows programs, search for files, search for the first CD-ROM drive, and more.

Bitmaps can easily be included in your installer and you can arrange for these to fade into view or slide in from one corner of the screen. You can also use the built-in graphics editor to create your own custom graphics. This little editor is surprisingly capable. For one thing, it's a proper drawing package rather than just a bitmap editor, so you can drag objects around and resize them. Also, because it's object-oriented (in the non-OOP sense of the phrase!) rather than bitmap-oriented, it produces internal metafiles that can be readily scaled for different screen resolutions.

There's also a custom dialog editor (see Figure 4) so you can create your own dialog boxes for the installation process. Custom dialog boxes can retrieve and set meta-variables. Wise comes with a number of dialog templates that you can use as a starting point for your own dialogs, including ones for standard Wise dialogs such as Select a Program Manager Group and Choose a Destination Directory.

Where did all those files go?

Wise has always been unusual in being able to create a single, self-extracting setup file. Effectively, the various files which comprise your product, and any ancillary files needed by the installer itself, are compressed and hidden inside a single executable. This approach is extremely handy for users downloading software from bulletin boards. Instead of using zipped files and hoping that the user both has and knows how to 'drive' PKZIP, you can distribute a single, easy-to-manage setup file. (In the case of floppy disk distribution, the first disk contains the SETUP.EXE file proper, and subsequent disks each contain a single data file consisting of further compressed files.)

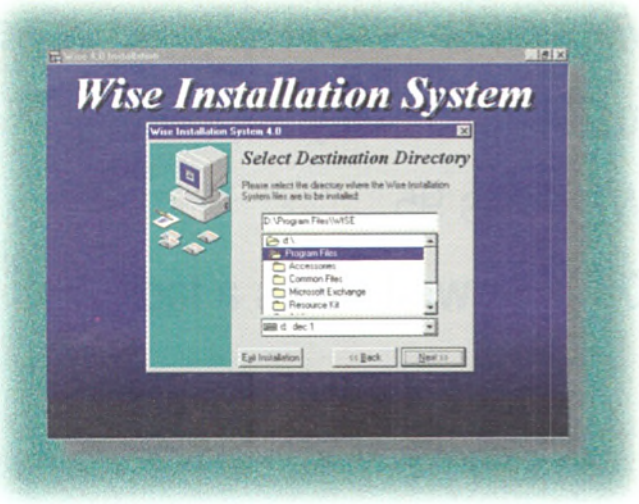

Figure 5 – This is the installer for Wise itself. It uses a 'Wizard'-style (chained dialogs) approach

Actually, Wise can generate .EXE files that are compatible with PKZIP. Special file headers used by PKZIP to navigate a .ZIP file are included in the SETUP.EXE image, and a PKZIP-compatible compression scheme is used. There is one reason why you would want to do this: viruses. Many virus scanning programs are able to examine individual files within a PKZIP archive. If your self-extracting executable is PKZIP-compatible, bulletin board operators can scan the software for viruses without having to install it. It's advisable to use this option if you plan to upload your software to a bulletin board.

Thumbs up

Wise 4.0 is a delightful installation utility which produces a single executable for both 16- and 32-bit versions of Windows. The combination of the Installation Expert with a flexible script language makes for an easy-to-use yet versatile system. For those occasions when you need to do something beyond the power of the script language, you can always write a custom DLL (several example DLLs are provided). I found the software very reliable and only managed to crash it once. Hint: don't tell Wise to centre a bitmap horizontally while at the same time telling it to tile the bitmap – it gets rather confused.

I wholeheartedly recommend Wise 4.0 as a straightforward, no-nonsense installation utility for Windows 3.1, Windows 95 and NT. It is priced at £149 and is available from QBS Software Ltd, tel. 0181 747 1979. ■

Dave Jewell is a freelance consultant/programmer and technical writer specialising in systems-level Windows and DOS work. He is the author of Instant Delphi published by Wrox Press. You can contact him as djewell@cix.compulink.co.uk

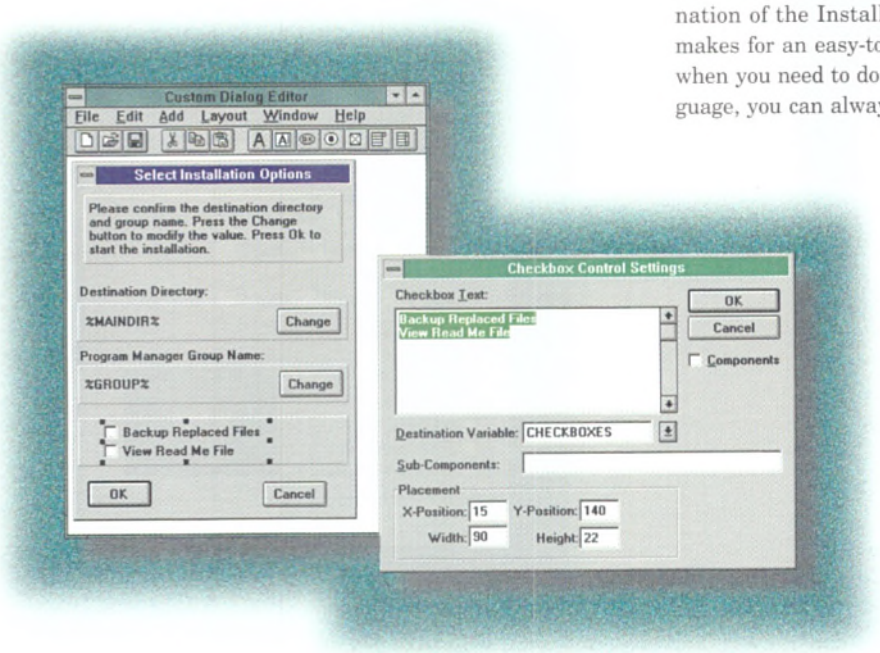

Figure 4 – Using the dialog editor, you can create custom dialogs from scratch or use the templates supplied

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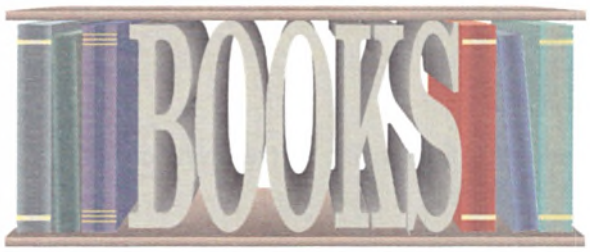


Action Arcade Adventure Set reviewed by **Colin Smith**

Diana Gruber has a history of writing platform games – or 'side-scrollers' as she prefers to classify them – in the Apogee vein, marketing them as shareware. Her aim in writing this book was to share some of her knowledge of what it takes to write an 'arcade action game'. *Action Arcade Adventure Set* offers an entry point into the insular world of game development, by providing you with the tools and game engine to construct your own game (albeit a side-scroller).

The book starts by concentrating on game development tools: if you want to get anywhere, you need to create tools along the way. A very stylish game editor is built up over these chapters. It integrates sprite and tile editors, and a level designer. You also get a 256-colour palette utility, to fix any colour-matching problems between sprites and level art, and a 'tile ripper' to convert background art into manageable and reusable tiles.

Gaming fundamentals such as efficient screen updating, the compulsory definition of sprites, simple collision detection, etc are explained. An assembler routine to reprogram the system clock to a finer resolution is included. This is crucial if you want a good frame rate for your animated sprites, and the same synchronisation on different computers.

The C code examples make extensive calls to Fastgraph, a graphics library written by the author's husband. The deal was that Ted Gruber would provide the low-level routines, and Diane would do something with them! So if you're looking for code for low-level transparent blt routines, you'll be disappointed. A lite (but fully usable) version of Fastgraph is supplied with the book as a TSR. It comes with a substantial (600-page) online manual. Should you 'fall in love' with the library, you can get the full-blown package that lets you statically link.

The game engine uses VGA's 'secret' X video mode, but resizes the physical video page size to 352x744 to permit a clever (and fast) scrolling/page-flip technique. A two-level game, called Tommy's Adventures, proves that the engine works. You can easily design new levels with the game editor to create your own masterpiece. The only glaring omission is sound – there isn't any in this code.

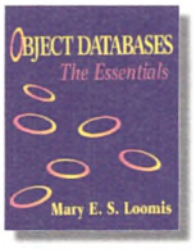
As Gruber is a 'real' developer as opposed to an academic one, she has a real- world view of game development. To get across the point that there is more to game development than just programming, she finishes on the marketing issues.

All round the book is bursting with enthusiasm, and should act as a catalyst for you to develop games. To go further, there is a competition to create a game using the tools and code that come with the book. Alas, the closing date of the competition has passed, but the winners' contributions should appear in the next revision of the book.

✔✔ **Verdict: highly recommended**

Title:	*Action Arcade Adventure Set*
Author:	*Diana Gruber*
Publisher:	*Coriolis Group Books*
ISBN:	*1-883-57706-3*
Pages:	*511 (soft cover) with code disk*
Price:	*£38.99*

Object Databases: The Essentials reviewed by **Mary Hope**



Mary Loomis is probably the most well-known guru in the object database world. Her column in the *Journal of Object Oriented Programming* is always lucid and informative so I came to this book with high hopes. My initial reaction was disappointment as the opening chapter on the role of Object Database Management Systems (ODBMSs) was rather general and had a well-worn feel to it. But as the book progressed I kept finding gems that answered many of my not-yet-properly-formed questions. By the end I was converted.

It is not a book that names products and points you towards the 'best buy': rather it explains the concepts behind the technology. In summary, it covers what an ODBMS is (from both programming and traditional database perspectives), the difficulties of mapping an object model onto a relational database, the underlying object models, and how ODBMSs handle the storage, retrieval, sharing and querying of objects. Too much information can be paralysing rather than enabling: deciding which product is right for you is very complex!

The sections that I particularly appreciated were those that related ODBMSs to the better understood (and more mature) RDBMS. There is an excellent example of flattening an object model with inheritance into relational tables, showing the extra code and semantic loss that results. Another example shows the ease with which time series information can be handled by the object model. Whereas most books on the subject tend to generalise about joins versus traversals, object ids versus unique keys, the long transactions of ODBMSs compared with the short transactions of RDBMSs, Loomis has the experience to paint a more detailed picture.

At the end of the day, databases exist to be queried. The book gives a useful analysis of the types of queries relational users expect and concludes that object databases have some way to go in this respect. The book is good on how SQL relates to ODBMSs: the fit is not comfortable, as SQL in its current form deals with sets and has limited types. Loomis considers how it can be extended to handle objects and gives one of the clearest descriptions of the philosophy (and syntax) of the ODMG's Object Query Language. But as Loomis is one of the founding members of the ODMG, this reference to emerging standards is not surprising.

Whereas object technology is now firmly on the map, there are those who express scepticism about object databases, arguing that relational vendors will extend their products to capture the market. Unfortunately, although this book looks at the future of ODBMSs, it does not consider the opposition. So while you emerge with a full set of criteria for evaluating proper object databases, you are less well equipped to judge whether one of the rapidly emerging hybrid products would fit the bill.

✔ **Verdict: recommended**

Title:	*Object Databases: The Essentials*
Author:	*Mary E S Loomis*
Publisher:	*Addison-Wesley*
ISBN:	*0-201-56341-X*
Pages:	*230 pages*
Price:	*£21.95*

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The year reviewed.

We give you a summary of what's been on offer to our subscribers during 1995. You are still welcome to order our seriously discounted books well into 1996.

Selection	RRP	EXE	Covered in	Description
Windows 95 Programming Unleashed	£46.95	£35.20	November	The most complete and comprehensive reference available.
32 Bit Programming	£37.51	£28.15	November	An ideal book for C/C++developers eager to port their applications to 32 bit.
Navigating the Internet with Windows 95	£22.95	£17.20	November	Easy to understand introduction to using Windows 95's lineup of Internet access tools.
Windows 95 Secrets	£38.99	£29.25	October	Learn hundreds of undocumented features and shortcuts for optimum performance.
Power PC Programming for Intel Programmers	£48.99	£36.75	October	An invaluable, in-depth reference to the Power PC architecture.
Foundations of Visual C++ Progr for Windows 95	£38.99	£29.95	October	Everything you need to master the MS Development Foundation Library.
201 Principles of Software Development	£20.95	£16.80	September	Provides a firm understanding of fundamental software engineering principles.
Oracle: The Complete Reference, Third Edition	£25.95	£20.80	September	Reference of all Oracle commands, functions, syntax, keywords, concepts & products.
Teach Yourself Delphi in 21 Days	£23.00	£17.25	August	Program efficiently in Delphi by combining the power of visual programming with Pascal.
Delphi Unleashed	£35.50	£26.65	August	Professional tips and techniques to create powerful applications with Delphi.
Visual FoxPro Developer's Guide	£41.67	£31.25	August	Brings FoxPro developers right up to date - database and application development
Heavy Metal Visual C++ Programming	£37.99	£28.50	July	Guide to using Visual C++. For intermediate to advanced programmers.
Delphi Programming for Dummies	£18.99	£14.25	July	Basic primer for those with no Pascal background. Loads of sample code.
OLE Wizardry	£28.95	£23.30	June	How to build OLE applications using Microsoft's new development tools.
C: The Complete Reference	£25.95	£20.80	June	Everything you need to know about C, by internationally acclaimed C expert.
The Visual C++ Handbook	£25.95	£20.80	June	Authoritative guide, explaining Visual C++ concepts and the traps to avoid.
Guide to the Best UNIX Tips Ever	£23.95	£19.20	June	From shell short cuts and mail tricks to password ageing strategies and crisis control.
Object-Oriented Graphics Programming in C++	£29.95	£22.50	May	Designed to to provide the information needed to produce realistic pictures on the PC.
Video Compression for Multimedia	£29.95	£22.50	May	Thoroughly covers and demonstartes the latest compression technologies.
The Fuzzy Systems Handbook	£34.95	£26.25	May	A practitioner's guide to building, using and maintaining fuzzy systems.
Leaping from BASIC to C++	£27.00	£20.25	May	Covers the transition from BASIC to C++. Hands-on, no nonsense primer.
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Database Developer's Guide with Visual Basic 3	£41.67	£31.25	April	Expert techniques for building powerful and efficient database applications.
Object Oriented Programming in C++	£27.50	£20.65	April	A complete tutorial. Explores all features of C++, offers platform independent approach.
Win 32 API - Desktop Reference	£46.30	£34.75	April	Learn the nuts and bolts for application development in Windows NT.
Developing PowerBuilder 4 Applications	£35.50	£26.65	April	Comprehensive and detailed instruction through practical examples and clear advice.
Heavy Metal OLE2 Programming	£38.99	£31.20	March	Helps you to produce easy to use, document-centric and OLE aware applications.
Unauthorised Windows 95 Developers Resource Kit	£38.99	£31.20	March	The ultimate book for anyone interested in Windows 95.
Free $tuff from the Internet	£18.99	£15.20	March	A guide to show you what you can get free from the Internet.
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Crucial Competitions

VM100 Telesound from Reveal

*** 1 copy to give away ***

The world's first PC-based phone system for less than £50 has been launched. VM100 Telesound includes an answerphone, voice mail and speakerphone. The breakthrough system is a combination of easy to install software, microphone and a small external device connected to the serial port adapter which enables users to convert a single PC into a complete home business or household message centre. Key features include

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For further information please call Reveal on 0181 845 7400. The Telesound system is priced at £49 including VAT.

To win a copy send a postcard to the usual address marked 'VM100'. The first card to be drawn on the 5 January will win.

Delphi Software Learning Video

*** One copy to give away ***

You may recall that Will Watts reviewed this video in the October issue of EXE (page 68). He summed it up by saying 'good clean fun, a trillion times more watchable than US offerings of this type, and informative with it.' This three hour video tape is intended to give new converts to Delphi a head start. It is presented by Stephen Berry from SoftVision and Guy Martin of Borland. Guy introduces almost all the facilities in the Delphi repertoire and implements them on screen. After watching this video, novice Delphi users will be capable of and eager to knock out a simple Delphi application.

SoftVision produces other titles in the Software Learning Video series. For more information call 01703 701470. The Borland Delphi Software Learning Video costs £99.

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October issue competition winners
Crossword: Ray Crowther, Essex
Rage: Jane Durbin, Edinburgh
Discworld: David Starr, Dundee, Ms S Fergerson, Watford, Ms H Gordon, Swindon, E Crosby, Middlesex, Lawrence Saville, Essex

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Ref: DL/121E

CREATIVE C++ DEVELOPERS
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The Position: True Windows NT development using visual C++ & MFC and object orientated design methods.
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The Person: Experience of MSWindows Visual C++ with some knowledge of MFC would be an advantage. Any knowledge or interest in Image Processing, Motion Control or Geometric co-ordinate calculations also an advantage.
Ref: JJ128E

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Please send your CV to: BOX NO. 2/1295, EXE Magazine, St Giles House, 50 Poland Street, London W1V 4AX
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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:
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Ctrl Break

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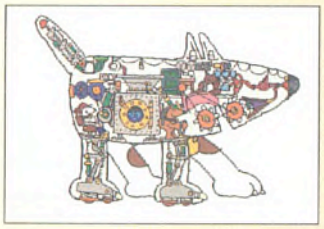
How much is that doggy?

In these PC days of enlightenment, giving a dog for Christmas is thankfully a big no-no. But for those of you who still feel the need to provide their children with man's best friend this year, technology has come up with an acceptable answer. It's PAWS - the Personal Automated Wagging System, or Dog Simulator.

Being of a youthful aspect ourselves, Ctrl Brk has become a big fan in a short space of time. Digging for bones, chasing cats and flying around with a rocket pack on your back can be seriously addictive. Another nice feature is that, as the version installed on your hard disk is used more frequently, it 'adapts', effectively growing up with your children.



At last a dog that's for Christmas and for life.

PAWS is available on CD-ROM for PC and Macintosh, priced £34.99

Re: Progress Report and Remuneration

Dear Santa,
Just a quick note to let you know the state of play so far. In the face of adversity and Windows 95 we have struggled on regardless, ever mindful of your good opinion.
Achievements over the last twelve months have included:

- only swearing after the 25th reboot
- taking it in turns to kick the server (to minimise damage)
- only trying to log on to Demon at 6.30pm in cases of extreme emergency

Really rather good behaviour, we think you'll agree. And in case you should still have any doubts, please accept our assurance that next year we'll be moving on to yet greater ambitions, such as (?)
Yours sincerely,
Ctrl Brk

Laughing, ho, ho, ho, all the way to bank

Santa appears to be a little strapped for cash at the moment. So much so that he's been forced to start charging for the little extras. He also appears to be having something of a residence crisis at present - being forced to appear at several dozen web addresses at the same time.

Ctrl Brk couldn't resist a quick compilation of our Top Three Santa Services in order of value for money:

number three

http://www.electricit.com/fvalues/

At $5 for a letter, or a mere $10 for a genuine phone call, we think you'll agree that it's very reasonable for a few moments of the real Father Christmas's time

number two

http://www.branch.com/santa/santa.htm

Just $4.95 for a fax, or $6.95 for a letter. PLUS the chance to receive a special 'Nice Adult' or 'Naughty Adult' letter yourself. Unfortunately, Santa forgot to specify his judgement criteria... but Ctrl Brk feels confident that taking money off small children will be fairly low down on the list of misdemeanours

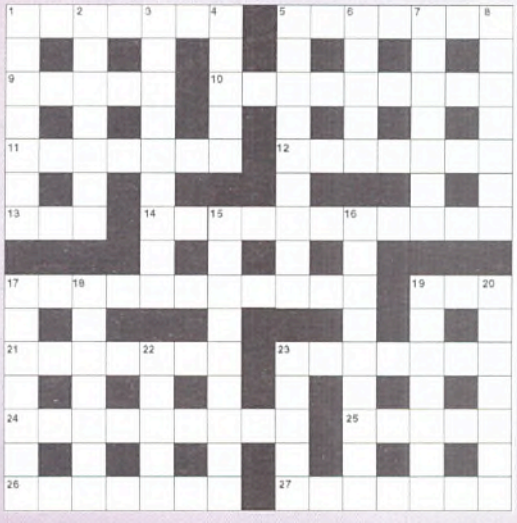
number one

http://www.midwest.net/creator/santa/

Santa's Workshop Cyberlog. St Nick has obviously been working flat out on this masterpiece of taste and choice in one electronic catalogue. Rather heavy on the Gingerbread motif, with Gingerbread hotpads, hand towels, tree ornaments, tins, candles, gift bag sets, candle holders, postalettes (what?) and napkin rings. Call us foolish but Ctrl Brk went for the lot. Plus of course, the the Almond Bark and Creamist of Carmels (sic).

Crass commercialism? All Ctrl Brk is prepared to say is that unbelievers had better be prepared to forfeit their visit from the jolly fat man who comes down the chimney.

PRIZE CROSSWORD



ACROSS

1. Greeting confused without thousand million - whole number (7)
5. Objects made up of 26 characters you can count on (7)
9. Peace needed for work - quite (well,almost) (5)
10. How a computer differs from a manual system with a gun (9)
11. Flips the bits to make a mirror image (7)
12. Sort routine gives what you want to eat with hesitation (7)
13. Positive 17 value (3)
14. US payment order with fingers to provide parity numbers (5,6)
17. Sightless as bent double with eyes covered (11)
19. How many values 17 has! (3)
21. Back from the sea — —— firma (2,5)
23. Software suite may squeeze data into a structure and take a long time (7)
24. Gathering data from applicants two ways cycling (9)
25. Rum fat comes back as I hold an article (5)
26. Main data type in a spreadsheet (7)
27. Beautifully dressed with a tree and denary beginning (7)

DOWN

1. Searching input (7)
2. Set hive for robbers (7)
3. Be followed from instruction to instruction (3,6)
4. 5 with a point like Scottish dances it seems (5)
5. Linked into a star, say, and interacted ... (9)
6. ... and acted without lines (5)
7. Type in 3.14159... and somehow print the start of every ending (5,2)
8. Ties down home counties' remedies (7)
15. One always thinking of number one (9)
16. Flag used like pH paper perhaps ... (9)
17. ... but it's a binary flag (7)
18. Mean while in upset merit (7)
19. All the bits rushing round a busy system (7)
20. Operator's target in computer arithmetic (7)
22. Top dog helps word processor line layout ... (5)
23. ... and electronically calls the chunks of text (5)

SOLUTION TO NOVEMBERS CROSSWORD

ACROSS: **1.** PALMTOP **5.** POINTER **9.** NAMES **10.** INTERRUPT **11.** HANDSHAKE **12.** TOTAL **13.** DOTTILY **15.** NONUSER **17.** UPSHIFT **19.** SYSTEMS **21.** ASCII **23.** UNLIMITED **25.** DIGITISED **26.** NIHIL **27.** DISUSED **28.** STEPPER

DOWN: **1.** PUNCHED **2.** LAMINATES **3.** TASKS **4.** PRIMARY **5.** PATTERN **6.** IRRITANTS **7.** TRUST **8.** RATTLER **14.** INITIATES **16.** SWEATSHOP **17.** UNAIDED **18.** TRUSSED **19.** SOLIDUS **20.** SADDLER **22.** CAGES **24.** MINCE

Ctrl Break

A Friend in Need

STOB
The All-New Adventures of Verity

Ms Stob has heard that the Samaritans organisation is looking to recruit more telephone operators. Where better to look, she argues, than from among the experienced ranks of the UK's software tech support line operators?

Brrurp Brrurp, Brrurp Brrurp, Brrurp Brrurp, Brp, Click!

Thank you for ringing the Samaritans...

Ah, thank God! Listen, I'm really embarrassed about this, I'm not in the habit...

... touch tone phone, you can press one for violent suicides such as throwing yourself under a Tube train, press two for those intending to overdose on aspirin, press three if you feel a bit down and need a chat but probably won't top yourself in the next hour or two, press four if you have PND or PMT or some other gender related affliction, press five...

Beep!

Press one if you are troubled by a marital problem or affair of the heart, press two if you are about to be ruined by financial difficult...

Beep!

I'm sorry caller, all our operators are busy on other lines at the moment. Please hold the line.

(Musical interlude: sixteen bars of 'Gloomy Sunday' played by the Rolf Harris Stylophone orchestra.)

Hello?

Hello, yes. Yes. Listen, I'm terribly embarrassed about calling you, but...

...Stephen your personal counsellor. Can I have your phone number please?

Sorry?

Please can I have your phone number, sir? In case I need to call you back with a solution?

You what?

We can't solve everybody's problems on the spot, sir. Sometimes we need to kick the thing around, look through the manuals, maybe even contact the manufacturer. So can I take your phone number? And fax number too if poss?

I thought you guys were supposed to guarantee caller anonymity...

Certainly sir, if that's how you want play it. Can you give me your anonymous email address?

But I'm calling from a phone box, and...

So you can't be reached by fax?

NO! I can't be reached by phone, or by fax, or by anonymous bloody email. All I want is...

Don't worry sir, I can still assign you a problem number, even though we aren't really supposed to without a return contact. Ok, your number is, and you should make a note of this, seven three one eh oblique five two ess tee ee...

I don't want a problem number, I just want to speak to Katie...

I quite understand, sir. How long has Katie been gone? Did she leave you for another man? Tell me all about it, and we'll soon have you feeling chipper.

No, YOUR Katie, you idiot!

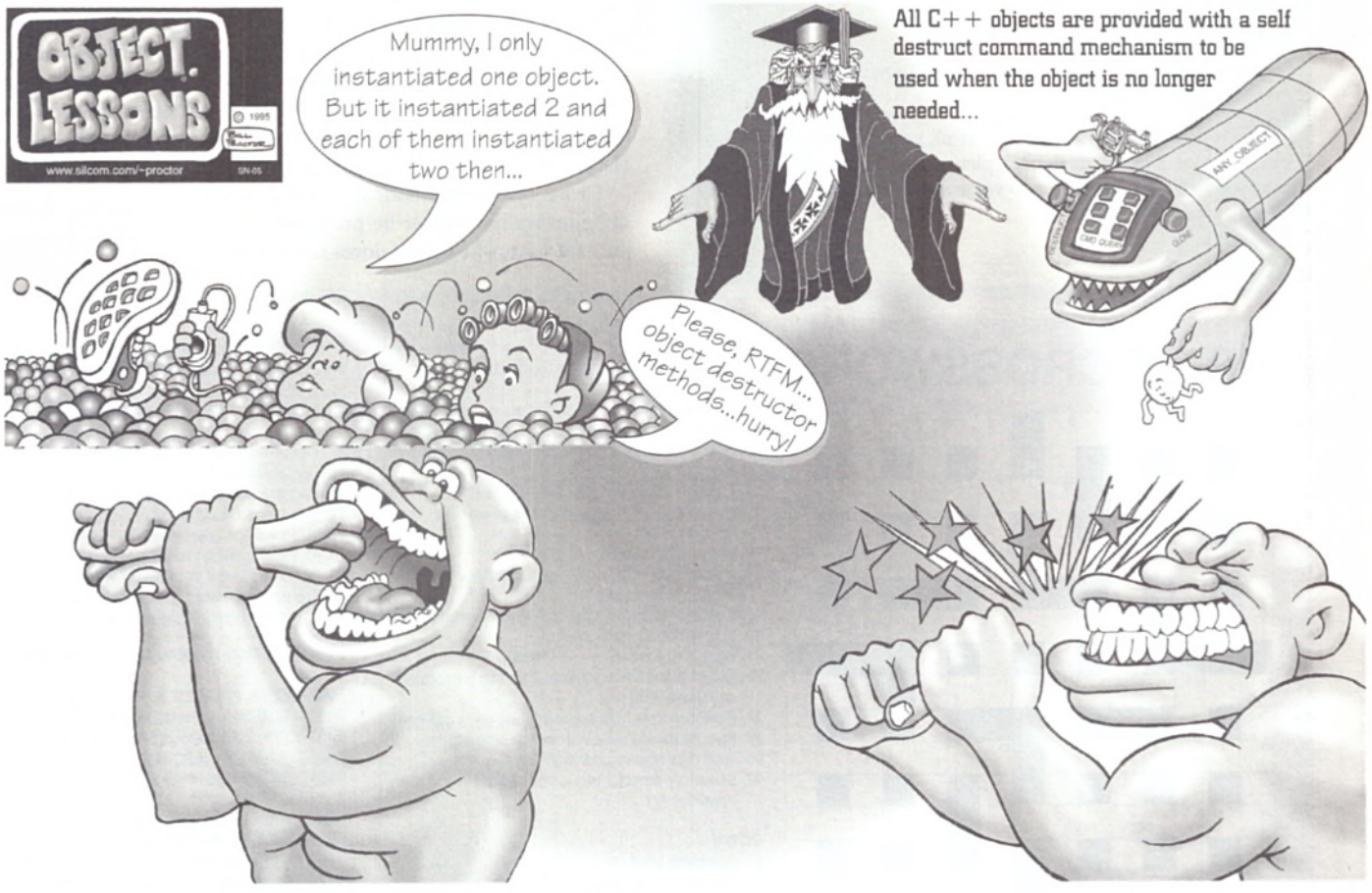
That's all right, sir, call me names if it makes you feel better...

No, No, NO! You don't understand! I am not suicidal! I just want to speak to...

I'm sorry sir - if you are not suicidal you have come through to the wrong department. I'll just put you back to switchboard...

...dropped the flat key into the drain, so I'm calling Katie, who works with you, to see if I can arrange to pick up...

...on our BBS, in our Usenet newsgroup, or on our World Wide Web site. If you have a touch tone phone, you can press one for violent suicides such as...

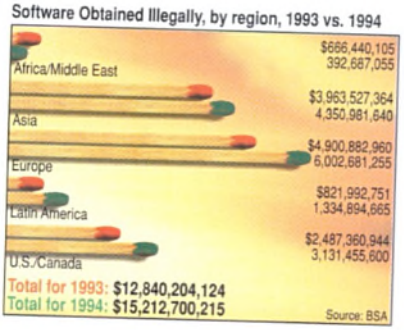


Software Developers:

Software Piracy Burns Your Profits.

Each year, the illegal use of software consumes nearly 50% of your potential revenues. With the flames of piracy eating away at your profits, can you afford not to protect your software?

Software Obtained Illegally, by region, 1993 vs. 1994



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NSTL Study Rates HASP As Number One!

A recent test conducted by the National Software Testing Labs compared the flagship products of four leading software protection vendors. The result? HASP was rated the clear overall winner - and number one in all the major comparison categories. And if the world's leading independent testing lab says HASP is the best, who are we to disagree?

NSTL TEST RESULTS, OCTOBER 1995†

Scoring Category	Aladdin HASP	Rainbow Sentinel	Glenco/FAST Hardlock	Software Security Activator/M
Security	9.3	6.3	6.9	6.2
Ease of Learning	9.1	7.1	8.8	7.7
Ease of Use	8.3	7.2	6.8	6.3
Versatility/Features	10	8.7	8.8	8.6
Compatibility/ Power Consumption	6.7	6.5	6.6	7.4
Speed of API Calls	0.9	1.2	10	4.1
Final Score	**8.5**	6.5	7.5	6.6

*For a full copy of the NSTL report, contact your local HASP distributor.

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