SYSTEM DESIGN

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DECEMBER ■ 1988

DEC Professional

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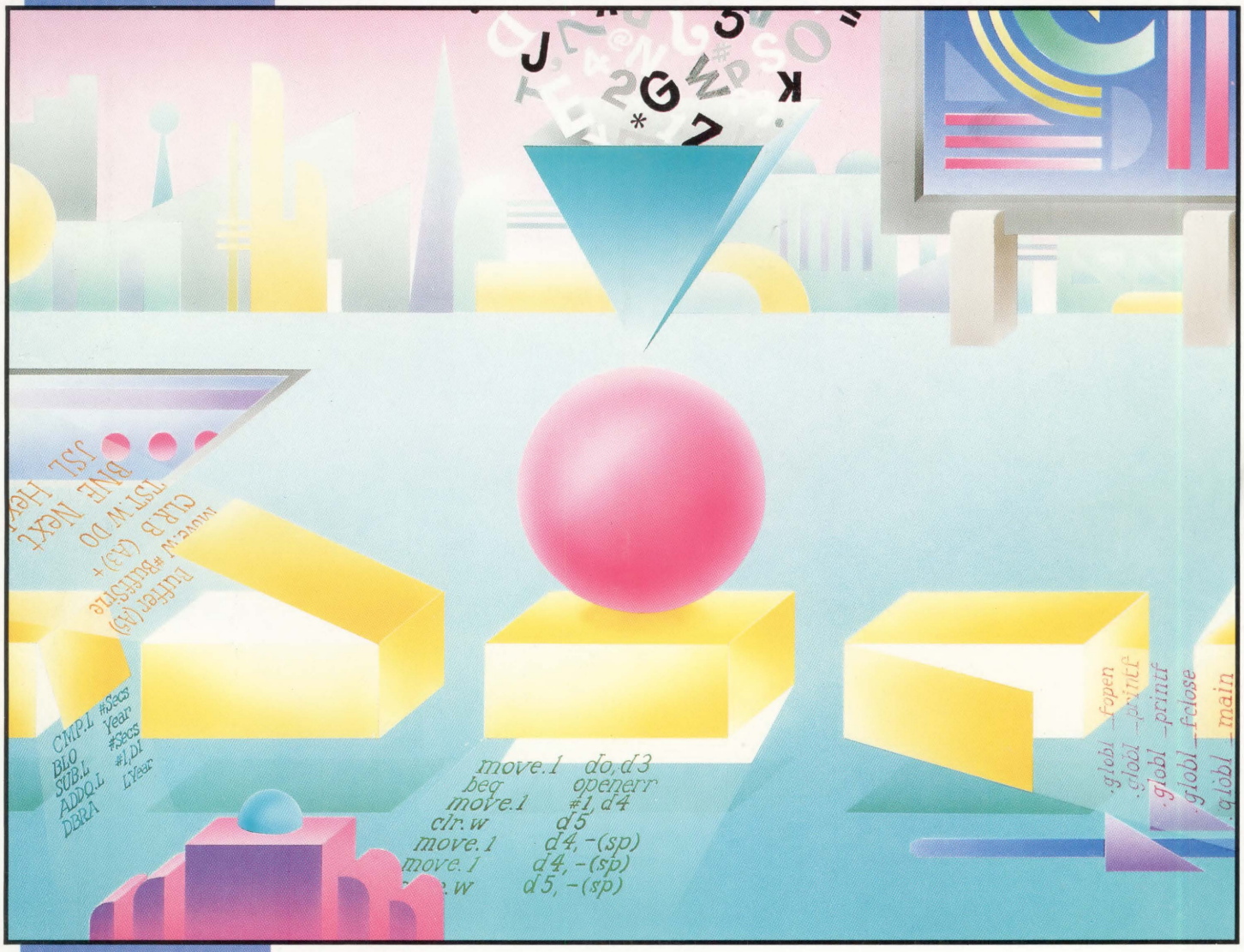

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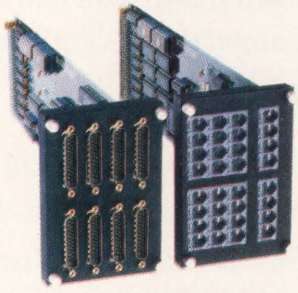

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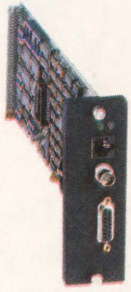

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This month's cover illustration, an artistic interpretation of the programming process, is the work of Pennsylvania-based airbrush artist Jim Serfass.

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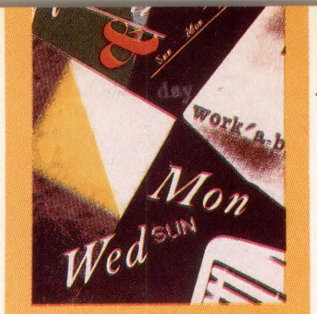

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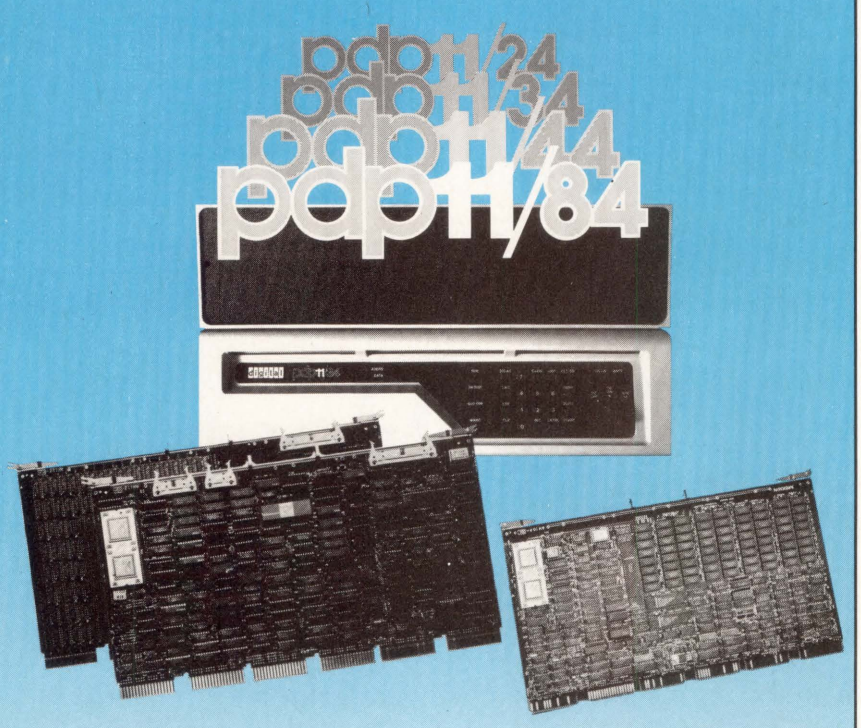

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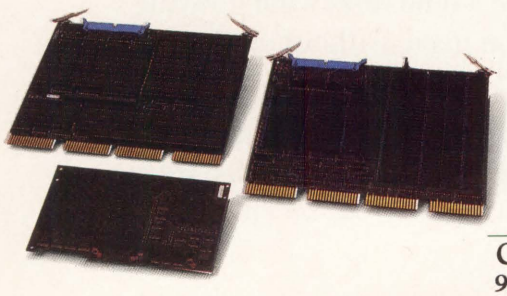

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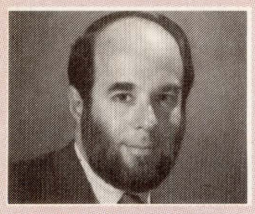


PUBLISHER

Carl B. Marbach

Tell It Like It Is

DEC recently announced that it's restructuring its maintenance offerings. The press release announced, "Digital Expands Warranty Program For Customized Support." Sounds like a new benefit for DEC customers, right? Wrong. This release is just announcing a hidden feature: a price increase.

Until now, DEC equipment was covered by a one-year, on-site, four-hour-response agreement as part of the basic warranty. The new warranty is a "return to Digital" program that works only for smaller systems. If you want on-site service, you'll pay extra: the "standard warranty support offering will increase from six to nine percent over list price for most average system configurations." This is an announcement of a price increase "double-speaked" as an expanded warranty program.

A friend's father once gave me good advice when he said, "Look them in the eye and tell them the way it is." For some reason, DEC hasn't looked us in the eye and told us that it's raising prices. This lack of public relations, or of respect for its installed base, is a major problem for DEC and one of the reasons it's the "company you love to hate." "I love the computers, but I hate the company," is heard in more than one office around the country. DEC hasn't for some time been the kind of company that its customers like.

It doesn't have to be that way. IBM customers, for example, are among IBM's biggest supporters. If you want an HP endorsement, just ask Hewlett-Packard users. They'll tell you how much they like HP. DEC's loyal but largely ignored installed base will tell you how much they love DEC computers, but in the same breath let you know that the company isn't responsive to their needs, ideas or concerns.

Who from DEC *ever* asked the installed base what kind of personal computer they want? No one. Instead we're *told* what we want and what we're getting. The result? Two desktop failures, first the Rainbow and now the VAXMATE.

In the past, I've faulted the DEC sales force for being order takers instead of salespeople. Now I'm faulting top management for not understanding the people who use their computers, and worse, for not paying attention to them.

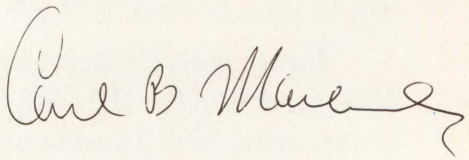
To DEC's credit, it doesn't always do things wrong. Ethernet, and DEC's support for it, was far in advance of what the installed base knew about or could have commented on. But the installed base is a gold mine of good ideas on what DEC computing should look like, and it's a resource that has been underused and too often ignored.

The new DEC workstation product that's likely to come from its recent affiliation with Mips Computer Systems Inc. of Sunnyvale, California, could be the next desktop casualty or the next product with which DEC proudly will announce that it "has it now." Has anyone from DEC talked with potential users of these desktop workstations? Does top management know what a focus group is? Should it speak UNIX or VMS, should it be clustered, how big a screen is necessary, and what kind of performance will *we* require?

A company producing graphical software for workstations has found that the VAXSTATION compares unfavorably with a PC/286, and is outperformed woefully by the new PC/386 boxes. A workstation that can't do graphics isn't a viable product.

It's time the big boys from Maynard started treating their users with some respect. If Wall Street demanded bigger profits and a price increase was the only way, then tell us, don't hide behind a bogus field service announcement. If the VAXMATE didn't make it, tell us and we'll help you find the right way. But please, before you cram another workstation down our throats, ask us what it should do.

DEC's computers are still the best, but its corporate image, both among its installed base and, as is reflected in its stock price, on Wall Street, is tarnished. It's tough to change after so many years, but maybe now is the time. It's time for DEC to be more responsive. DEC could start by telling us the truth.



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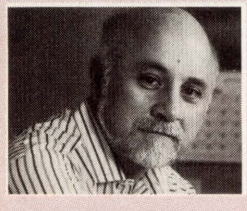

EDITORIAL

Dave Mallery

Sizing Up The X Window System

Let's look at the X Window System interface from a slightly different angle. There's more here than meets the eye. A friend once told me that if you want to know what's really happening, don't listen to what they say, keep your eyes on the money.

Now that X is an integral part of VMS and DEC is winding down the largest single software project of its history, we see where the money went. Now let's determine why.

The core concept in X is that the application, called the client, is totally separate from the user presentation, called the server. The client communicates with the server via a standardized bit stream that's entirely independent of the graphic particulars of the server (presentation) device. The communication can be between two tasks on the same machine, or over a network.

The client application can be written without regard for the internals of the server, its hardware or operating system. The server uses whatever graphic smarts it has at its command to deliver the presentation, but it will work on the lowliest workstation (albeit slower), and even on the new generation of server terminals.

It's a huge mistake to believe that X is just a graphic interface and that you don't need it because you don't do graphics. X is a *user* interface and will bury the character-oriented terminal. Why else would DEC have added X to VMS and converted almost every utility and layered product to the X interface?

The X concept is remarkably similar to the OS/2 Presentation Manager, which is the first incarnation of the SAA Presentation Manager. SAA is the future of IBM. The same idea is there: separate the process from the presentation. After all, CPUs are virtually free.

The separation of client from server, of application from presentation, produces a *major* change in our industry. The kinds of platforms and operating systems aren't nearly as important as they used to be. They can be chosen for their aptitude for the task at hand, and not for their brand name. The unified presentation across the bedlam of operating systems effectively eliminates this problem.

It's easier to ride a horse in the direction it's going. DEC, IBM, HP and many others are astride this horse and are hanging on for dear life.

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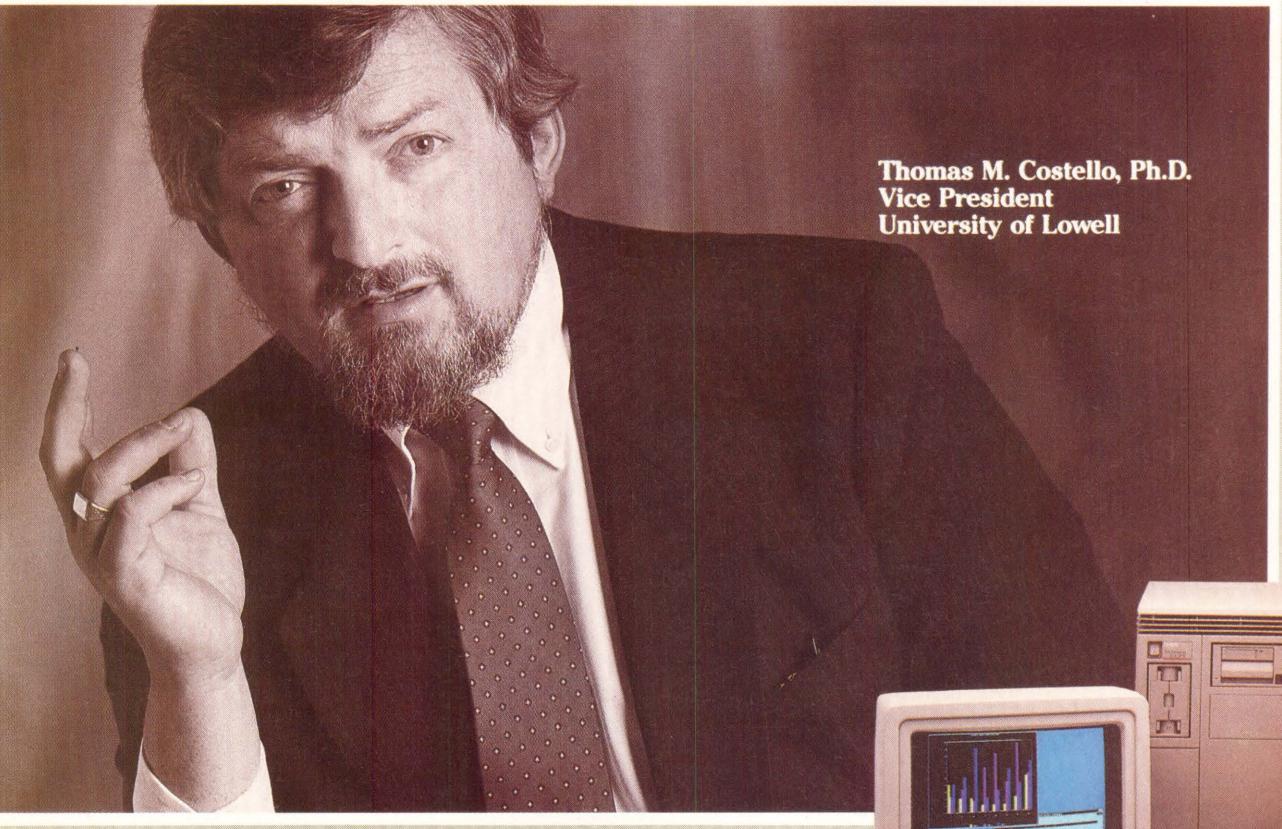
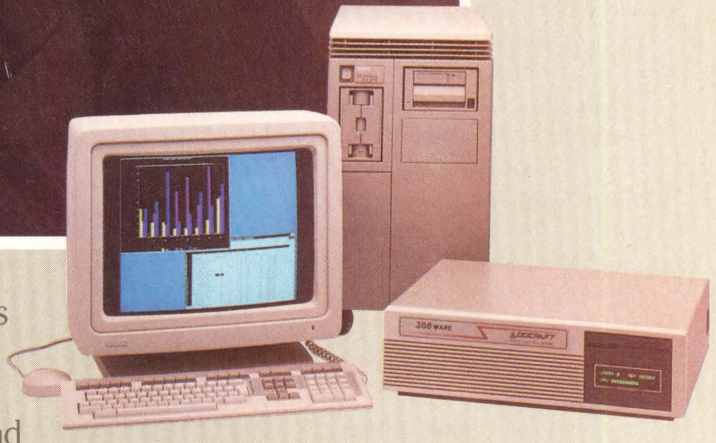


Thomas M. Costello, Ph.D.
Vice President
University of Lowell



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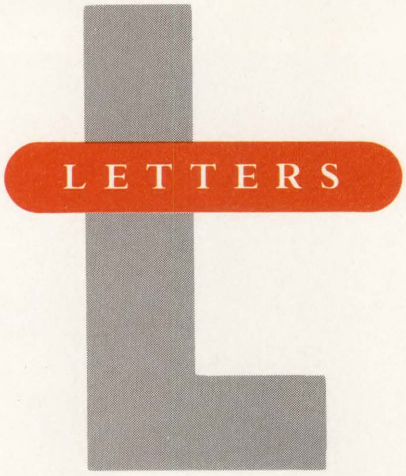

Address letters to the editor to *DEC PROFESSIONAL* magazine, P.O. Box 503, Spring House, PA 19477-0503. Letters should include the writer's full name, address and daytime telephone number. Letters may be edited for purposes of clarity or space.

SECONDING THE MOTION

I register my heartfelt agreement with Carl Marbach's "Who Has It Now?" (August 1988). The AS/400 is a threat to the VAX that DEC doesn't take seriously enough.

In terms of price/performance and customer support, IBM has broken ground against the VAX. It's perhaps not new ground, but ground that the VAX has owned for a while, among systems from first-tier manufacturers.

For $23,000, you can buy an AS/400 that's similarly configured to, but better than, a $30,000 MICROVAX 2000. That MICROVAX 2000 is topped out. But there's a 50 percent disk expansion and roughly 50 percent CPU power expansion available going from the $23,000 AS/400 Model B10 before you have to box-swap to get into the higher-end AS/400 systems.

Hardware support on AS/400s runs about 6 to 6½ percent of the hardware value per year, compared to 10 to 15 percent in the DEC world. And that buys you 24-hour, seven-day coverage with a two-hour response target.

I now find myself negotiating Business Partner contracts with IBM. DEC has no cost-effective products for the small business environment. It doesn't understand the small business environment and has no attractive generic software offerings. Many DEC OEMs are left out in the cold through distributor-affiliated OEM programs that don't work, new contract terms and conditions that are discriminatory, unreasonable and non-negotiable, minuscule profit margins, and a lack of sales support and market presence.

VAXs offer wonderful advantages, but they're only advantages if they mean something to the end user. The typical small business end user can't justify $1,000 per user for VMS.

OS/400, the AS/400's operating system, costs $5,500 on a B10 system for as many users as you want and includes a relational DBMS. AS/400 Office, which is what A-to-Z should have been and what ALL-IN-1 is too large to be, costs about $1,500. And there are no software support charges.

DEC is doing something I never thought possible. It's "selling" me an IBM system.

Editor's note: The name of this reader is withheld by request.

RESTORE TIMES

Thanks for the interesting article on the Exabyte 2.2-GB backup device ("MTI's Exabyte," August 1988). It would have been helpful to include restore times for files at different distances from the beginning of the tape. If it takes seven hours to back up 2.2 GB, does it take over six hours to get to a file that is 2.0 GB into the tape?

L. Helbers
Ambler, Pennsylvania

John F. McGlinchey, MIS Manager: On the average, my restore time is 10 to 15 minutes to search to the last file on the tape. It kicks into fast-forward to search for specific files. The controller that MTI uses emulates a standard TK50 tape drive, so there are no patches required to any drivers to attain this speed. If you're restoring the whole tape, be ready to spend the same amount of time to restore the files that you did to back up.

LOOKING FOR WORDPERFECT-ION

We read with interest G. Thomas Kurdy's review of WordPerfect version 4.2 for VAX/VMS ("WordPerfect Version 4.2," August 1988). As extensive users of WordPerfect on VMS and on an IBM PC, we found some of his comments and criticisms unfounded and inaccurate.

First, he states that WordPerfect's formatting method, using invisible codes, is confusing. Although moving around the codes can be difficult at first, after you get accustomed to the codes, they're not even noticeable.

Kurdy also complains that there's no on-screen display of the margin settings and tabs. However, by choosing

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CIRCLE 218 ON READER CARD

not to display the margin and tab settings on the screen, there's more room to show the actual text. If you want to display a ruler line, split the screen into two windows, making sure the second window has no lines in it. This shows the ruler line with the loss of only one line of text in the display.

When proofreading documents, we never have trouble spotting formatting problems on the screen without printing the document. We've never had a problem with text not printing as expected, because all of the problems can be seen on the screen, especially if Reveal Codes is used. Also, if Print Preview is used, you can see on the screen exactly what your printed document will look like, and even switch between the preview screen and the document screen to correct problems.

We've experienced none of Kurdy's compatibility problems when using WordPerfect on different machines. We've transferred IBM WordPerfect version 4.1 and 4.2 files to VMS WordPerfect with no trouble. We've also transferred VMS version 4.2 files to WordPerfect version 5.0 on the PC. Kurdy is correct in saying that you can define a macro by executing the commands. However, if you make a mistake in entering the macro, you don't have to redo it, as Kurdy suggests. VMS WordPerfect provides a macro editing utility that lists all of the keystrokes in the macro and lets you delete or add any keystrokes you want.

David Carrigan
Andy Paradis
Edmonton, Alberta

G. Thomas Kurdy: Mr. Carrigan and Mr. Paradis reiterate my point that codes can be difficult. As far as the ruler line, Carrigan and Paradis again make my point that there is no on-screen current ruler display.

Using Reveal Codes is like learning a second language to create a document. It's a useful feature, but you shouldn't be required to learn how to edit the codes. You must print a document to be 100 percent certain of the outcome. Print Preview is a print feature. Whether printed to the screen or to paper, you can't see the outcome while actually editing a document.

I had some transfer difficulty with the versions I reviewed. WordPerfect supplied me with conversion tables across a variety of processors such as the PC, Amiga, Apple and VAX. Many, if not all, of the problems will be addressed when WP V5.0 is released for all processors.

Finally, the macro editor works well, as Carrigan and Paradis point out. However, I found that, until a successful Creation, there was no macro file to edit. Creation was done by executing the commands.

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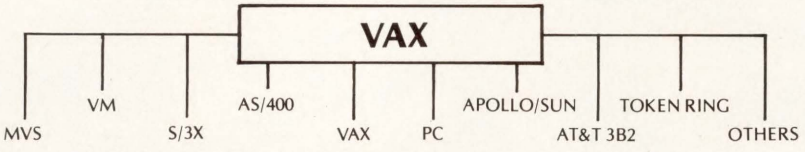

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SERVICE SPOT

Ron Levine's Field Service column, "Where To Go For Repairs And Spares" (August 1988), was informative, but the list of depot services for DEC systems didn't include National Support Group.

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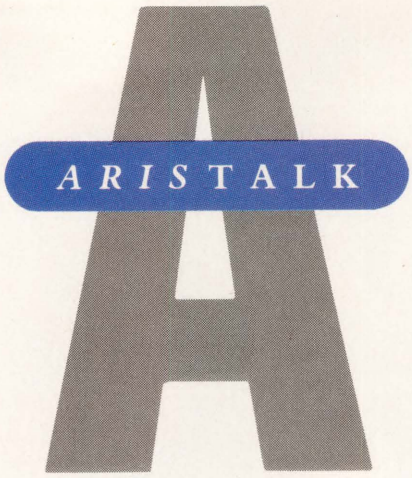

SIZE OF VAX

QUERY:

Bruce Eckert *(SIG 26/MESS 42):* We're thinking of installing a VAX exclusively to provide PC-type applications to our users, i.e., word processing and a spreadsheet.

We estimate 20 to 30 concurrent users, with maybe a total of 100 users. As part of a cluster, it would have to be a DECNET end node on Ethernet. It wouldn't have a direct port and would manage its own disk drives (non-HSC controller) and a tape.

We're considering several options, including two 750s, a 780, a MICROVAX II or 2000 with a large third-party disk, or an 8200. In any case, we shouldn't need more than a single RA82 for disk.

I'd appreciate any CPU sizing information or applicable experience that anyone can provide.

REPLY:

Richard B. Gilbert *(SIG 26/MESS 43):* Be cautious about buying the 11/700 VAXs. The 780 requires three times the space, power and air conditioning of the 8200.

The 750s are superb machines, but they're obsolete and physically large. You can pick up these machines at bargain prices, but the upkeep is the killer.

Compare DEC's maintenance contract on a 780 to the contract on an 8200. Compare the power and air conditioning bills for the two machines.

I think the MICROVAX 2000 would be a poor choice for supporting 20 to 30 simultaneous users. The disk controller on the 2000 is brain-dead.

How To Use ARIS

If you're a subscriber to *DEC PROFESSIONAL*, you can call up our VAX and log into ARIS, our **A**utomated **R**eader **I**nformation **S**ervice. In ARIS, you can download programs from this publication, communicate with our editors, request a change of address, find additional information about advertisers, order books and back issues, check the guidelines for submitting articles, take a peek at our editorial calendar for the year and communicate with other VAX users.

To log in, you'll need your subscription number from your mailing label. Set your terminal to seven data bits, one stop bit and space parity, or eight data bits, one stop bit and no parity, and dial (215) 542-9458. Baud rates: 300, 1200 or 2400.

Recent Changes

As a *DEC PROFESSIONAL* subscriber, you can download any of the programs marked with an ARIS symbol in *DEC PROFESSIONAL*. *VAX PROFESSIONAL* programs are available only to subscribers of *VAX PROFESSIONAL*. For subscription information, contact Karol Hughes at (215) 542-7008.

The ARIS lines in California are up. Northern California: (415) 873-2135. Southern California: (818) 577-9100.

XMODEM is available.
KERMIT is available.

SIG Identification

The SIG categories referenced in this month's *ARIS*talk are:

22 .....Mass Storage
26 .....CPUs
41.....Applications
45 .....Programming
92 .....Open Forum Third-Party
101 .....Miscellaneous

You don't notice it with a very small number of users, but 20 to 30 would stretch it past the breaking point. Your best choices would be either a MICROVAX II or an 8200/8250.

Your notion of the disk space required to support 100 users seems optimistic. That's something like 6.2 MB per user without allowing for software.

Take 50 MB for VMS, paging and swapping files, a layered product or two, and you're down to maybe 5.7 MB per user. You can start out with an RA82, but plan on adding another in a year or so.

VAX SPREADSHEETS

QUERY:

Bruce Eckert *(SIG 41/MESS 241):* Anybody using AOK.abc or a spreadsheet besides 20/20? I'd like to hear about your experiences. We're considering AOK.abc, because it's supposed to be a Lotus 1-2-3 clone for the VAX.

REPLIES:

Urbie Watrous *(SIG 41/MESS 242):* Take another look at 20/20. It just came out in version 2.3, which now reads and writes Lotus 1-2-3, PC Excel and DIF files.

It has a couple dozen new functions that correspond to Lotus @ functions. So, 20/20 now has all of Lotus's functions, plus a few that Lotus doesn't have.

It's not a total work-alike, largely because it existed before Lotus, but it's got a lot going for it.

20/20 runs under VMS, DOS, PRIMOS, AOS/VS and just about every kind of UNIX.

Version 2.3 also has an optional

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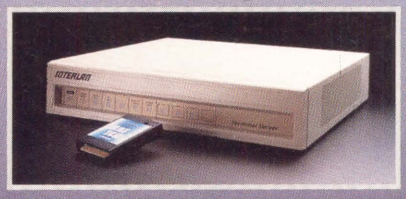

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feature called the Database Connection, which lets you pull data from DATATRIEVE or ORACLE DBMS files. You can pull in or export documents from WordPerfect, WPS-Plus and a few other word processors.

Jim McRae *(SIG 41/MESS 246):* We use C-CALC PLUS from DSD Corporation. It claims C-CALC PLUS can load Lotus spreadsheets and also convert back. We've never tried that feature, because we don't use Lotus.

It easily loads any type of data file and has access to user-written functions that can load figures or large amounts of data into the spreadsheet. And we've had a good rapport with the technical people there.

EMULEX SC03 AND MICROCOM MODEMS

QUERY:

David P. Meyer *(SIG 92/MESS 72):* I have a MICROVAX II running VAX/VMS version 4.7 with an Emulex SC03 communications board emulating two DH11 controllers. The Emulex board cycles the DTR pin approximately every 30 seconds. This stops the dialing out and in on the port, if it happens before a connection is made. Has anyone had this problem with Microcom or any other modem?

REPLY:

John Briggs *(SIG 92/MESS 73):* I can't help you on the Emulex side of things except to note that the 30-second cycling is a problem shared by DEC controllers. Unless modem control signals are provided, the controller periodically goes through a hang-up sequence.

You can put the Microcom modem in a mode where it continuously will assert DSR, CTS and CD, except for a brief interval during hang-up. This way, the terminal port doesn't try to do its 30-second hang-up, because it's fooled into thinking a connection is active.

I know this can be made to work in SX mode. I'm not sure about the Hayes-compatible AT mode.

The same trick can be made to work with other modems. It's possible to build a piece of hardware that will loop back DTR as DSR, CTS and CD and drop CD and CTS when the modem hangs up.

RUMORS REDUX

RUMOR:

Dr. R *(SIG 101/MESS 398):* The alleged 6722 and 6742 systems were to have been prepacked 6200 cluster systems similar to the 89xx systems. However, sanity prevailed, and the VAX family of fine processors remains unsullied with these questionable configurations.

Try these on for size: Processor 009, Kapri (VWSK2000), VAX 6250, VAX 6260, VAX 6270, VAX 6280, VAX 6215/25/35/45/55/67/75/85, MICROVAX 3400 and VAXSTATION 3400. These unannounced beauties were unearthed after a particularly productive session with STARLET.REQ.

According to a confidante, the mysterious Processor 009 also goes by the sobriquet Virtual VAX. Could it be that this clandestine CPU is actually the unique CPU type that will be associated with the VAX Secure Virtual System, an NCSC A-1 secure VMS (and ULTRIX) system now undergoing time trials with the NSA?

BI BUS SLOT

QUERY:

Marty Chamberlain *(SIG 22/MESS 206):* Does anyone know of a replacement for DEC's KDB50 disk controller that only takes one BI bus slot?

We currently run an RA81 and three RA82s on a KDB50. We want to add more disk drives but are out of BI slots. The KDB50 is a single BI node but takes two slots on the bus.

I can get more disk space by replacing the DEC drives, but I prefer to use different controllers that work with RA drives. Going to an HSC50 or HSC70 isn't a viable solution, because we're not clustered.

REPLY:

Dr. Gonzo *(SIG 22/MESS 207):* There are no licensed VAXBI options on the market other than what DEC calls complimentary. According to rumor, the BIIC chip has been reverse engineered, but don't hold your breath until there's an announcement. The legal issues have to be resolved, and you don't want to spend $8,000 on a board that might be declared illegal.

Check your machine's memory. Are you using 2- or 4-MB boards? If so, replace them with 16-MB boards.

SENDING ASCII FROM OPS5

QUERY:

Kent Cearley *(SIG 45/MESS 252):* How can I send ASCII codes to a terminal from an OPS5 program? I want to clear the screen and position the cursor without a series of (WRITE (CRLF)..).

Also, is there an easy way to call DCL command procedures from the RHS of a production rule?

REPLIES:

Loling Song *(SIG 45/MESS 318):* I was pleased to find another person using OPS5, although I can't answer your question. However, have you any experience using vector-attribute to manipulate vectors or even 2-D arrays? I'm creating a small expert system for medical image analysis of cells and am inexperienced with OPS5.

Kent Cearley *(SIG 45/MESS 327):* Vector-attributes in OPS5 are manipulated via the RHS function, SUBSTR. Combining SUBSTR with LITVAL and BIND provides the necessary primitives to implement arrays, linked lists, and so on. A good reference is *Programming Expert Systems In OPS5: An Introduction To Rule-Based Programming* by Brownston, Farrell, Kant & Martin, Addison-Wesley Publishing Company.

Looking over the issues in my question, solutions seem to be entering terminal control sequences via EDT and entering ESC codes, etc., after the WRITE verb. For executing DCL procedures, you'll have to write an interface through some other language like C. ■

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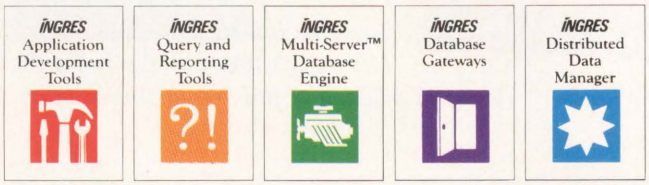

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CIRCLE 155 ON READER CARD

PRODUCT WATCH

Relisys Terminal Challenges DEC In VT320 Market

RA320 Interfaces With All DEC Computers

Relisys, of Milpitas, California, recently introduced the RA320, a challenger to DEC's VT320 terminal.

In addition to its VT320 compatibility, the RA320 offers a higher-quality display. The dot matrix for both 80- and 132-column modes is larger than the VT320, but within a tighter cell. This results in improved character clarity and intensity.

The RA320 connects to all DEC computers. Monitor choices are amber, green or paper-white phosphor on a 14-inch non-glare screen. Twenty-four data lines and an optional 25th line for terminal status can be displayed in either 80-column or 132-column mode. Character attributes include reverse video, underline, bold, blink and blank, as well as double-high, double-wide. The terminal also includes split-screen and screen-saver capabilities.

All DEC VT320 character attributes, character sets and downline-loadable features are supported by the RA320. Included in these features are ASCII and DEC special and supplemental graphics characters, as well as ISO Latin and National Replacement character sets. The RA320 also is compatible with the VT52, VT100 and VT220.

The DEC 423 and RS-232-C serial communications and printer ports support baud rates from 75 to 19.2K. Communications are full-duplex with selectable local echo and full modem control.

A low-profile DEC-compatible keyboard features 15 programmable function keys, five user-selectable control keys and four LED status indicators.

Other ergonomic features include a tilt-and-swivel monitor, sculpted controls for common functions and power modes for either 115V or 220V use.

With standard terminals still in demand, Relisys sees a bright future for VTxxx-compatible units. "We recognize the potential in this $200 million market," says Glenn Schiller, terminal sales manager for Relisys. "This aggressive introduction package of price, technical features, warranty and higher-reseller margins indicates our determination to be a market leader in the terminal industry."

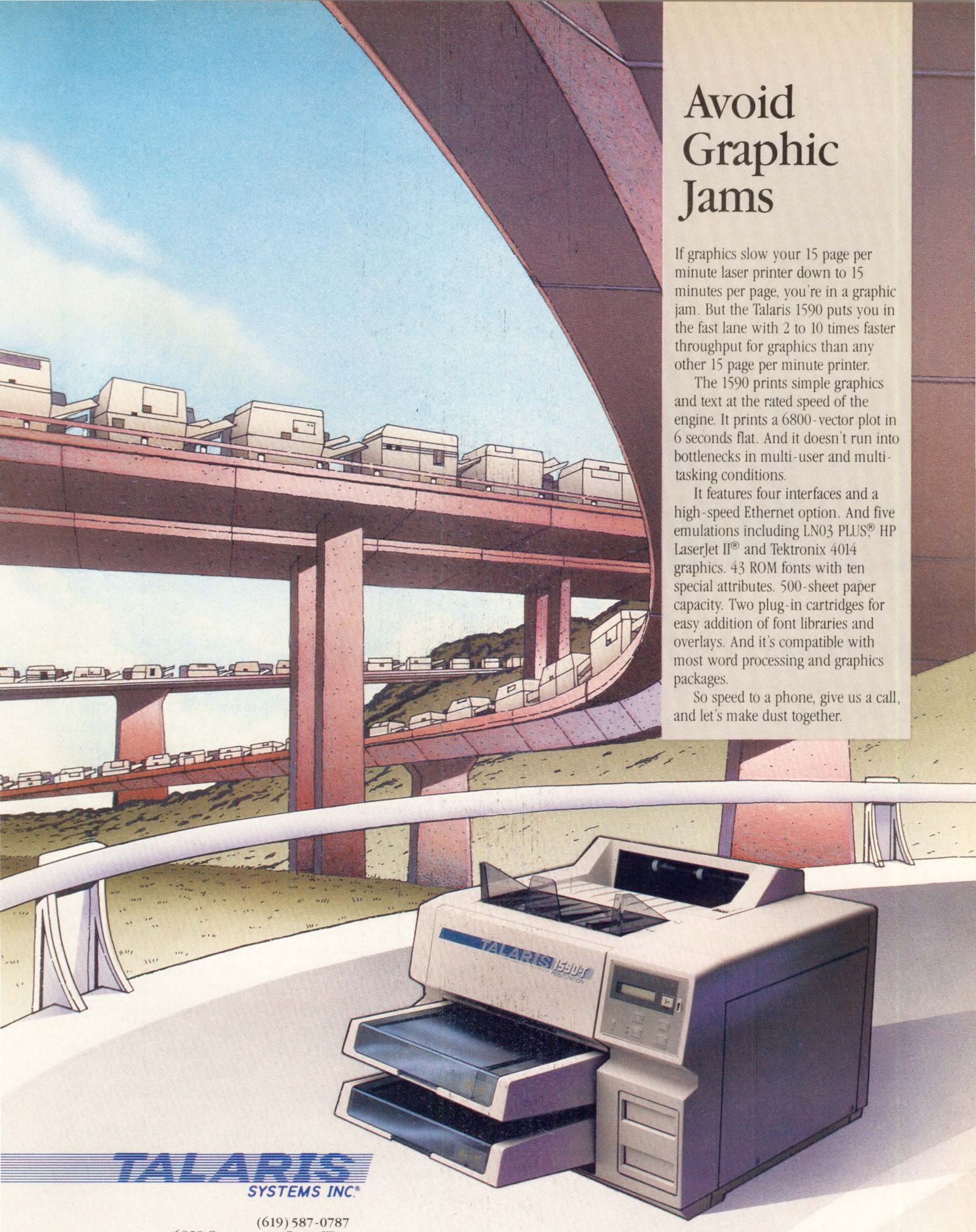
The RA320 is priced at $545. A two-year parts warranty and a 15-month labor warranty are standard.

For more information, contact Relisys, 320 S. Milpitas Blvd., Milpitas, CA 95035; (408) 945-1062.

Circle 439 on reader card

— David B. Miller

The Relisys RA320 boasts character clarity in addition to full VT320 compatibility.



Avoid Graphic Jams

If graphics slow your 15 page per minute laser printer down to 15 minutes per page, you're in a graphic jam. But the Talaris 1590 puts you in the fast lane with 2 to 10 times faster throughput for graphics than any other 15 page per minute printer.

The 1590 prints simple graphics and text at the rated speed of the engine. It prints a 6800-vector plot in 6 seconds flat. And it doesn't run into bottlenecks in multi-user and multi-tasking conditions.

It features four interfaces and a high-speed Ethernet option. And five emulations including LN03 PLUS,® HP LaserJet II® and Tektronix 4014 graphics. 43 ROM fonts with ten special attributes. 500-sheet paper capacity. Two plug-in cartridges for easy addition of font libraries and overlays. And it's compatible with most word processing and graphics packages.

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San Diego, CA 92126

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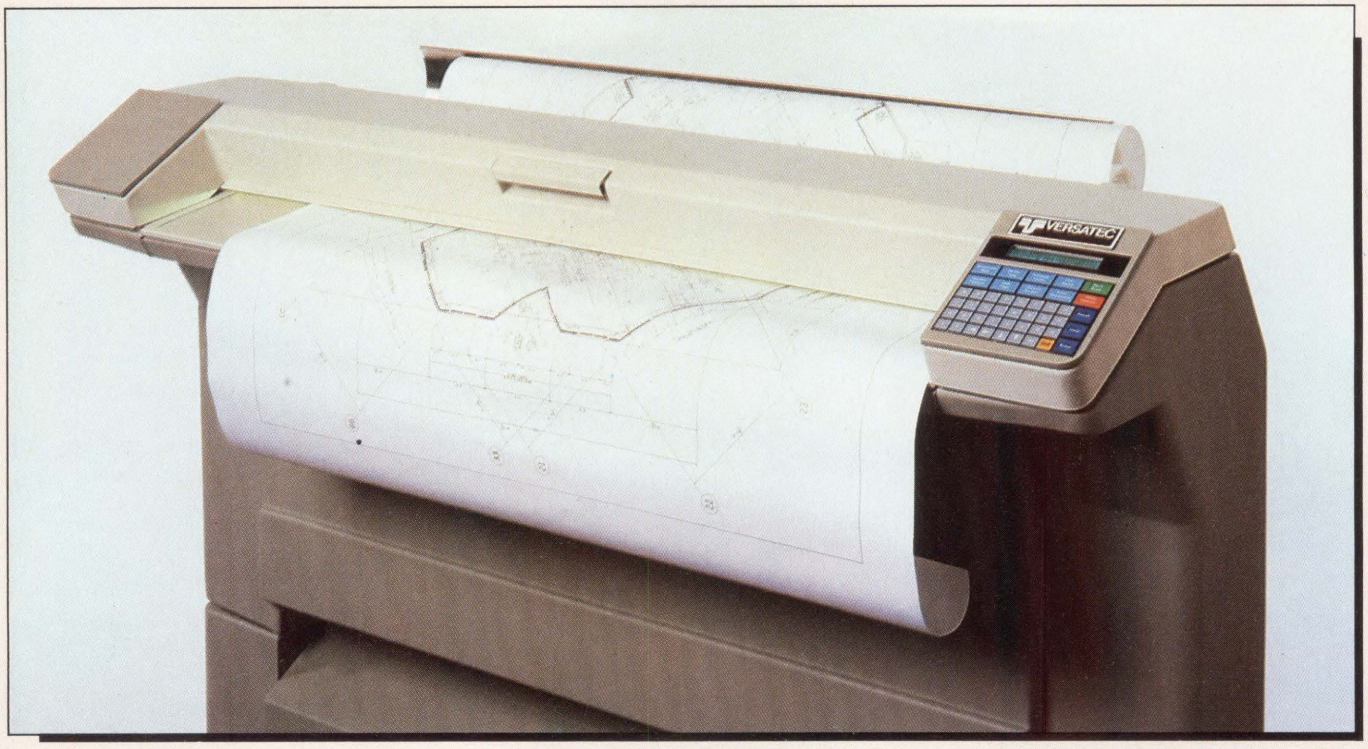
CIRCLE 162 ON READER CARD



Versatec's 900 series scanners translate drawings into digital data in seconds.

Industrial-Strength Scanning

Versatec 900 Series Scanners Handle Large Drawings

A line of time-saving image scanners, able to handle large engineering drawings, is available from Versatec of Santa Clara, California, a Xerox company.

Versatec's 900 series image scanners are sheet-fed manually. They're available in widths of 30, 42 and 60 inches. E-size (34 × 44 inches) or European AO drawings can be scanned, enhanced and can have the scanned data transferred to a host system in less than one minute.

Two standard scan resolutions are available.

Models 923, 924 and 926 support 200 points per inch (ppi) for paper in widths of 30, 42 and 60 inches, respectively.

Models 943 and 944 support user-selectable scan resolutions of 200, 300 and 400 ppi for paper in widths of 30 and 42 inches, respectively.

Target markets include architecture, reprographics, electronic publishing and mechanical computer-aided design (CAD).

Because substandard drawings are a problem to scan accurately, the 900 series features contrast enhancement to improve line-edge quality.

Dynamic thresholding sets the intensity level that distinguishes black from white. This feature can compensate for poor-quality drawings.

Thresholding is user programmable and can be selected manually to produce optimum results. Sixty-four levels of gray scale are used to capture the best possible image.

A number of media can be used in the three widths. Blueprint paper, sepia paper, chart paper, mylar, double matte polyester film, vellum, tracing bond and newsprint can be scanned. Media thickness can range from 3 mils to 12 mils. Poster board can be accepted.

The wide range of media types and thicknesses that are acceptable means that old or fragile documents can be scanned without fear of damage.

A liquid crystal display (LCD) and a keypad provide a simple user interface. An operator need only supply the media type and size of media to be scanned. Additional help is available for every key.

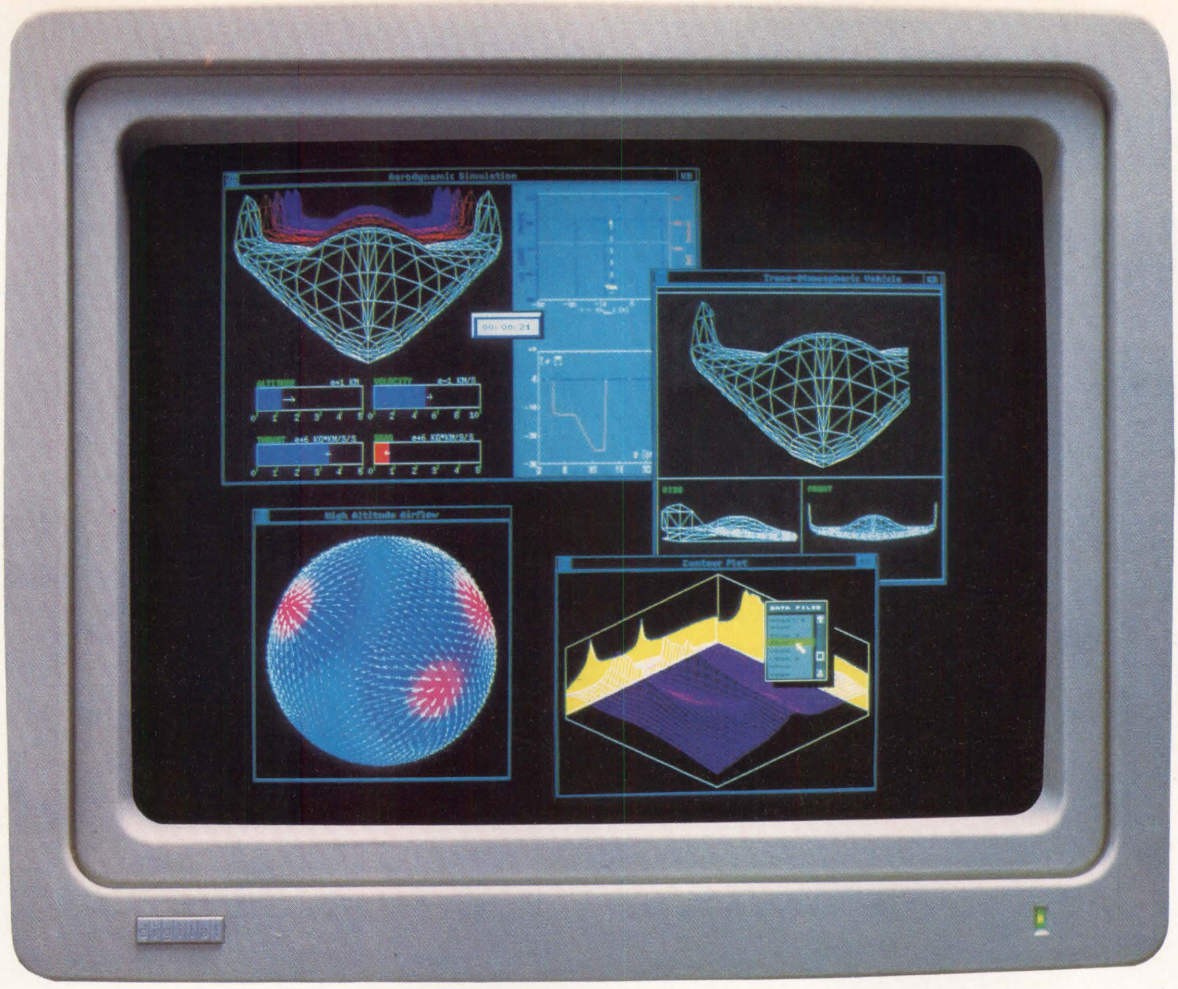
The 900 series can be used with DEC systems through a variety of third-party interfaces. Versatec electrostatic monochrome and laser plotters can be used in conjunction with the scanners to produce hard-copy output.

Prices start at $37,000, depending on model and options selected.

For more information, contact Versatec, 2710 Walsh Ave., Santa Clara, CA 95051; (408) 988-2800.

Circle 448 on reader card

— David B. Miller



Multiple graphics windows and multiple views are shown in this aerodynamic simulation application. One view is dedicated to rapid updates of data, shown as a strip chart. This view is selectively updated as data changes; the model's view is updated only when the application requests the update.

Software simulations may be disabled on a per-view basis, providing rapid view update.

Pop-up menus and custom cursors are created using GFX-4000's raster operations.

GFX-4000™ from Precision Visuals

Graphics Software Tools for Technical Workstations

The Product GFX-4000 is a high-performance graphics software tools package for application developers. With functionality drawn extensively from the proposed PHIGS* standard, GFX-4000 is enhanced to improve control over functions like windowing and viewing. Our software is optimized for VAXstations to get the most from your hardware.

The Performance GFX-4000 is built for speed. Pictures can be modified quickly using the quick update viewing feature. Graphic information can be sent directly to the screen using temporary data structures, rather than accessing central structure storage. Structures are "posted-to-views," saving time by updating views of the same graphics structures independently. Raster operations are also available to store and manipulate images.

The Integration GFX-4000 will fit your current and future programming environments. It's tightly integrated with the VWS (also known as UIS) window manager, giving the application full control over window management. A forthcoming release will provide easy application transition to DEC Windows. GFX-4000 supports the CGM standard so you can exchange pictures with the outside world, and you can display your images on most hardcopy devices.

GFX-4000 supports VAXstations running VMS (including models 2000, II, II/RC, II/GPX, 3200, and 3500). Written in 'C', GFX-4000 allows programmers to use either 'C' or FORTRAN subroutine interfaces.

The Features Hierarchical Structures and Structure Editing ■ Multiple Graphics Windows Within a Single Process ■ Multiple Views Per Window ■ Nameset Filtering for Selective Display/Suppression of Graphics Elements ■ Presentation-quality software fonts, in addition to support for hardware text ■ PHIGS standard graphics primitives plus added 2D/3D planar and 3D shell primitives ■ Extensive user support is available through Precision Visuals' telephone HelpLine service and local technical support engineers.

The Applications Software developers use GFX-4000 in a variety of graphics applications, such as data analysis, data display, process modeling or control, molecular modeling, manufacturing simulation, ME, EE and AEC CAD, and earth sciences.

The Offer To qualify for a free demonstration copy of GFX-4000 or to get complete technical information, phone Chris Logan at 303/530-9000. If your software project requires graphics on a VAXstation, give us a call!

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*Programmer's Hierarchical Interactive Graphics System

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CIRCLE 148 ON READER CARD

Graphics Chip Set Coupled With VAXSTATION II/GPX

Star's G1700 Workstation And Simulator Meet Tempest Specs

Star Technologies Inc.'s Graphicon Products Division, Durham, North Carolina, has upgraded its G700 graphics engine with a 3-D, four-card set called the G1700.

The G1700 is available as either a graphics subsystem or, when specially configured with the VAXSTATION II/GPX, as a Tempest workstation suitable for government and defense applications.

The system is designed for real-time visual and vehicle sensor uses, CAD/CAM applications, and command, control, communications and intelligence (C3I) applications.

A G1600 graphics processor without the 3-D capability also is available. Both systems combine 11 custom VLSI chips with a dual-bus, pipeline architecture.

The 8-MB-per-second, 32-bit VME bus is used for interprocessor communication and control, while the 40-MB-per-second, 16-bit DLM bus facilitates object processing and display list traversal. The system's 4 MB of dual-port display list memory is upgradeable to 16 MB with optional boards. The workstation supports four RS-232 peripherals.

The G1700 can be microprogrammed by the user, using its Graphics Subroutine Library (GSL) or its Simulation Subroutine Library (SSL). A G1700 with GSL is intended for use in design or simulation applications requiring Gouraud shading of objects or hidden surface removal. The Graphicon Simulator G1700S workstation is designed for real-time movement of graphics models.

The GSL, which is available in both FORTRAN and C, has more than 300 graphic subroutines that can be called from an application.

Software in the processor can complete 30,000 Gouraud-shaded polygons per second or 225,000 3-D vectors per second, according to benchmarks performed by Star.

Housed in a 30- × 29- × 38-inch enclosure, the G1700 features several improvements over the model released in April 1986. These include 24-bit true color, an 8-bit overlay plane with windowing hardware, and 2- × 2-pixel antialiasing, which reduces line jags. New software features include solid primitives, depth cuing on polygons and vectors, and VT52/VT100 emulation.

The interface between the GPX and Graphicon processor is provided through a DR11-W parallel interface developed by Star.

While the Graphicon processor offloads the workstation's computational and graphics display functions, the GPX is freed to increase the speed and compute power of specialized applications.

In most instances, a graphics model database is downloaded from the GPX to the G1700 and stored in the processor's local display list memory.

The application that's running sends vectors and other executions to the G1700.

The interface also can be a bidirectional serial link or Ethernet TCP/IP.

The workstation is compatible with Tempest. Tempest is a specification outlined in the National Communications Security Information Memorandum (NACSIM) 5100A. It describes a method of limiting the emission of electromagnetic signals during computer use that could be intercepted by monitoring systems.

The G1700 was designed to adapt to many host computers, including systems from Convex, Masscomp, Sun, Gould and Harris, as well as other VAXs.

Unit prices for the workstation are $135,000 for the G1700-based system, and $128,000 for the G1600-based system, in quantities of 10.

For more information, contact Star Technologies Inc., Graphicon Products Division, 4020 Stirrup Creek Dr., Bldg. 2A, Durham, NC 27703; (919) 361-3800.

Circle 471 on reader card

— Evan Birkhead

Star Technologies' processor interfaces with the VAXSTATION II/GPX over a DR11-W.

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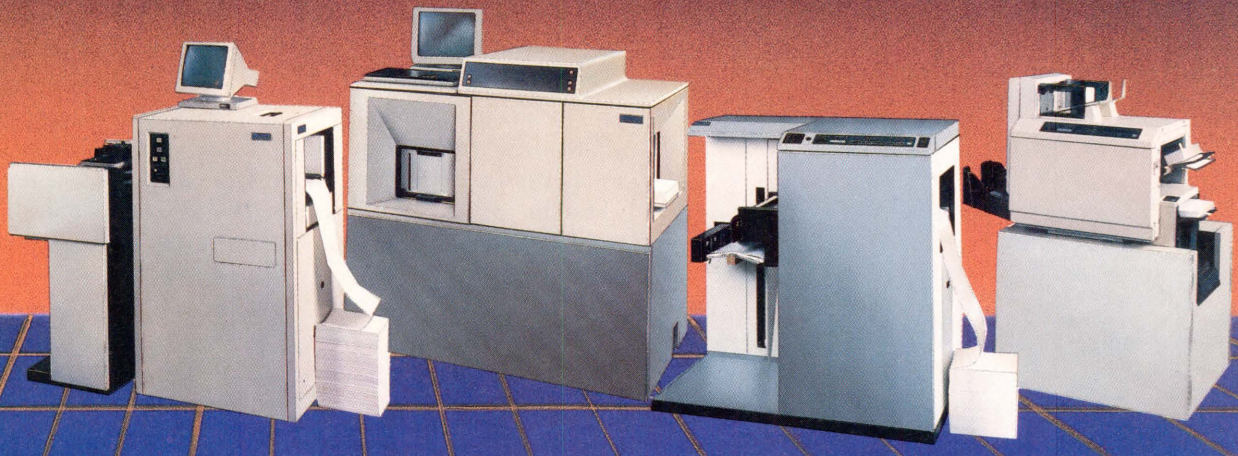

Miltope's FAMILY of Non-Impact 'ion' deposition page printers affords letter quality printing at 'less than a penny' per page.

Miltope provides multifont alpha/numeric printout, "true" electronic forms overlay plus sophisticated graphics for generation of signatures, logos, bar codes, OCR and special characters.

Miltope's page printers eliminate time-consuming bottlenecks by combining speed, high-duty cycle, reliability and versatility in electronic printing systems that are plug-to-plug compatible and fully emulate:

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- QMS® MAGNUM® (Printronix Graphics)
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- Dataproducts or Centronics Interface
- Mini/Super-Mini Interface (i.e., DEC, DG, Wang, Unisys, etc.)

The choice is YOURS!

MODEL	SPEED	FORMAT	RESOLUTION	MONTHLY VOLUME
3801	90 PPM	Continuous Form	240 × 240 DPI	Over 1 Million Pages
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Miltope Printers use Delphax ion deposition engines.

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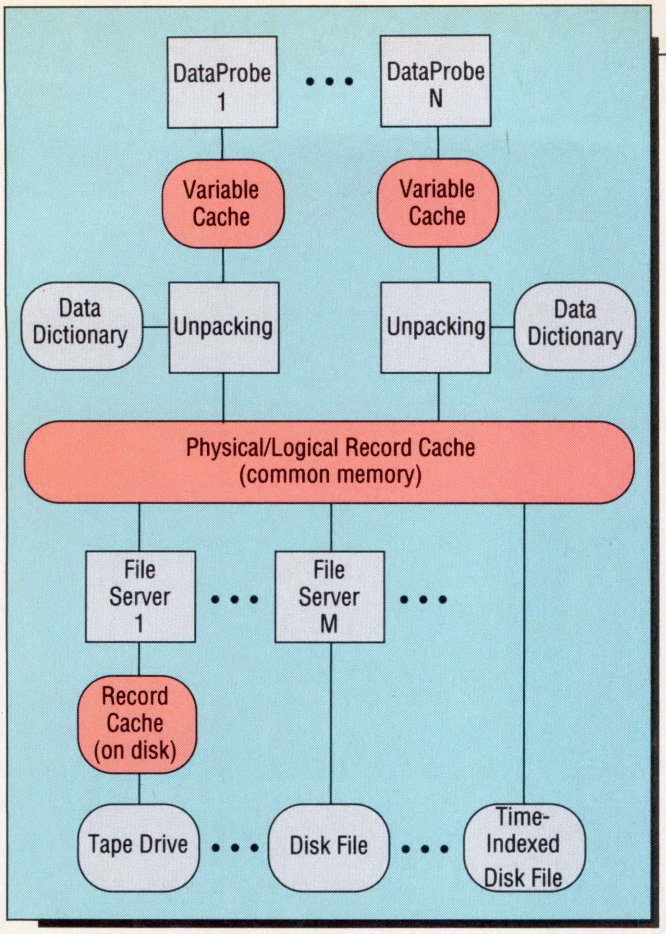
CIRCLE 357 ON READER CARD



DataProbe's architecture, shown on a single host, has three levels of caches plus a dictionary that unscrambles raw data to be read by the user.

Time-Critical Data In Real-Time

BBN Software Products' DataProbe Displays Continuous Bit Streams

DataProbe, from BBN Software Products Corporation of Cambridge, Massachusetts, a subsidiary of Bolt Beranek Newman Inc., is a data analysis software package that's capable of displaying characteristics of events that exhibit huge bursts of data within a short time span.

It's generally applied to areas where decisions need to be made quickly, or where events that happened quickly need to be studied in-depth. Some examples are tests on automobile crash dummies, propulsion systems and aircraft collision avoidance systems.

Engineers and other analysts are provided with shareable access to gigabytes of source data, potentially including thousands of variables.

The first application of DataProbe tracked the behavior of a torpedo seeking a target. Because there were about a half dozen computers inside the torpedo, and so many characteristics and tactics of its flight that had to be tracked, this has proved to be one of DataProbe's most complex applications.

The system also has been used to analyze data for computer simulations, biological and physiological data, and telemetry and recording systems.

DataProbe is interactive. The user requests specific data from an event and the system produces charts, graphs or tables containing that data.

Release 9.0 includes extensions designed to track data patterns in real time through animation techniques. Charts and dials in on-screen windows respond to changes in data immediately.

The raw data can be synchronous or asynchronous, and is retrieved by independent file servers that operate transparently to the user. (Often, compatible A/D converters are required at the event site.) This data is converted to a readable format by the system's database dictionary.

The database dictionary stores recorded variables separately from the executable code, so each application has its own unique dictionary. Direct access to the data is performed using a hierarchical storage and retrieval manager called DataCache. Access is achieved at the following three levels (see Figure):

1. A record cache that stores the most recent records read from tape drives, bypassing the need to access tapes.
2. A physical/logical memory cache, common to all simultaneous users, that temporarily stores data that's passed from sources to the system.
3. A variable cache, unique to each user, that lets several types of analyses be performed on the same data sets.

DataProbe's command language lets users set up either comprehensive analyses or at-a-glance reports. The language controls I/O, data extraction and graphics, so users decide all display formats and tabulations. Additionally, modular applications can be developed for DataProbe.

Several graphics and mathematics functions are built into DataProbe. The graphics capabilities include time plots of variables, x/y plots, histograms, 3-D time-variable spectral plots, and auto- and cross-variance plots.

Only the first few letters of each command need to be typed. The system completes the phrase. As the commands become more complex, the need for this capability becomes apparent.

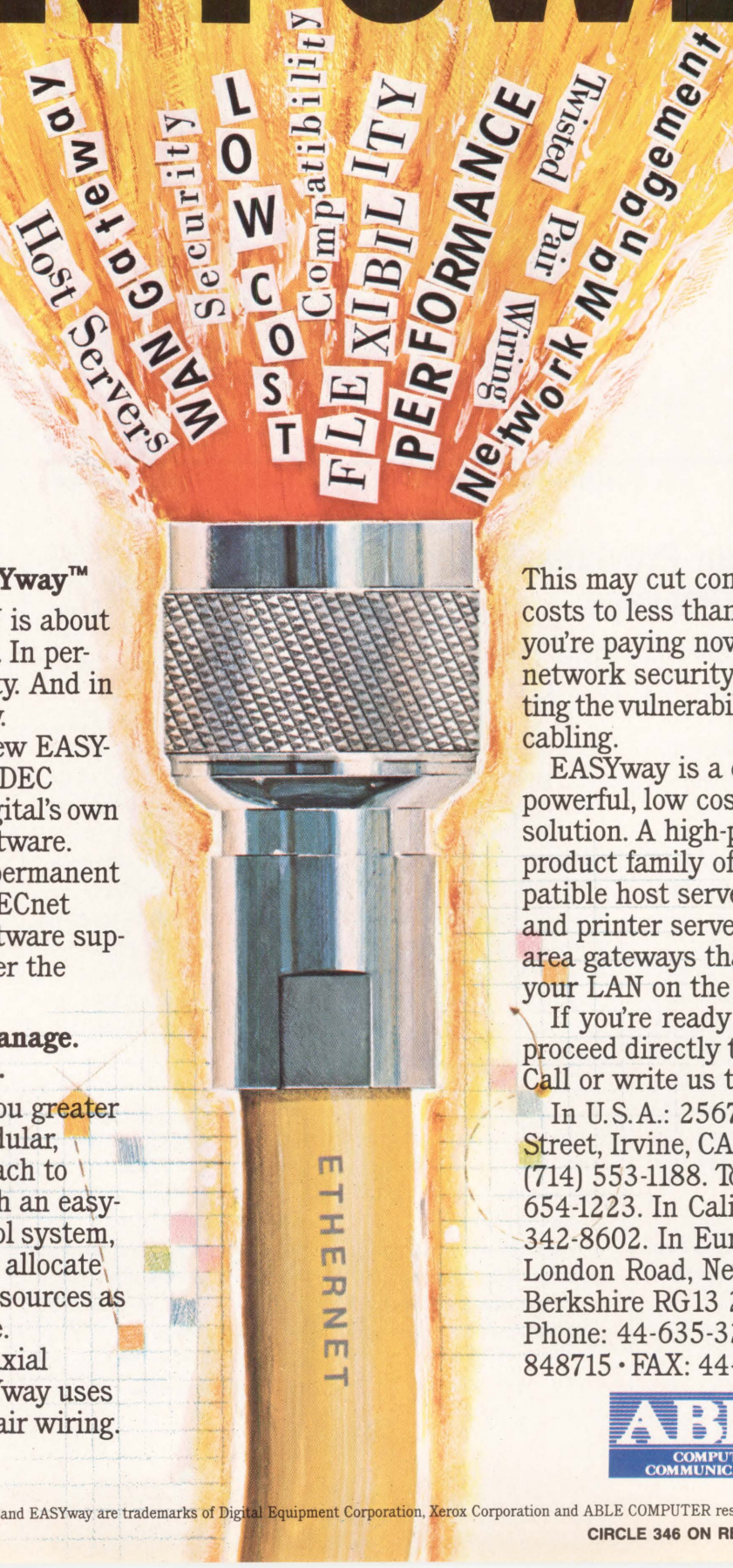
DataProbe was written in RATFOR, then ported to C and UNIX. It recently was brought to VAX/VMS, where it can be distributed over networked or clustered VAXSTATIONs. The software has been modified to accommodate performance on distributed systems through revisions that minimize the data traffic on the network.

For more information, contact BBN Software Products Corp., 10 Fawcett St., Cambridge, MA 02238; (617) 873-8108.

Circle 438 on reader card

—Evan Birkhead

LAN POWER.



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EASYway brings you greater flexibility with a modular, building block approach to networking. And with an easy-to-use network control system, making it possible to allocate and control system resources as you never have before.

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EASYway is a complete, powerful, low cost networking solution. A high-performance product family of DECnet-compatible host servers, terminal and printer servers, and wide-area gateways that will put your LAN on the road to power.

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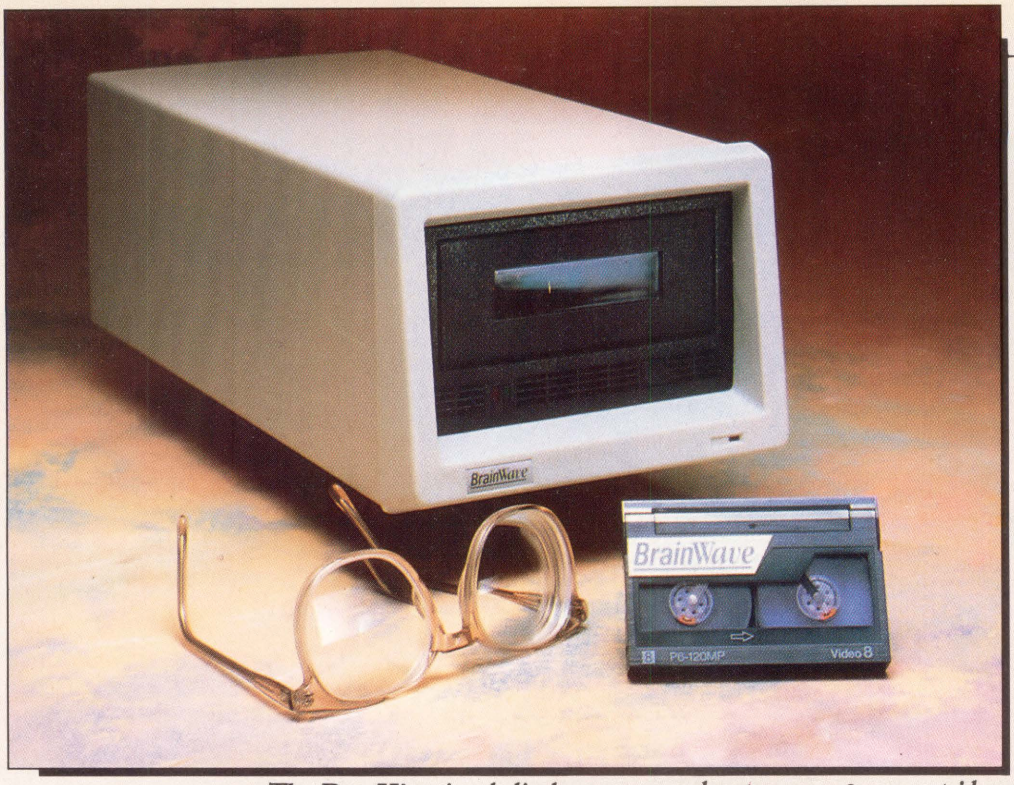
CIRCLE 346 ON READER CARD



The DataHistorian helical scan tape subsystem uses 8mm cartridges.

DataHistorian Provides Storage In A Small Package

BrainWave's Tape Subsystem Plus Software Archives Up To 2 GB

BrainWave Systems Corporation of Broomfield, Colorado, is shipping the DataHistorian, a tape subsystem that's capable of storing 2 GB of data on an 8mm tape cartridge. The Exabyte device was optimized as a direct recording device for the BNW, BrainWave's 80386-based Neuroscience Workstation. But its capabilities as a standalone backup and restore file management system address the large storage requirements of a LAN.

BNW is the optimal platform for BrainWave's two scientific software programs: Discovery, for single-unit recording in real-time laboratory data acquisition and experiment control; and WorkBench, a general-purpose system for neuroscience research environments.

"We knew when we reached sites with the workstation that it would need a tremendous amount of archiving," explains Jerry Zebrowski, BrainWave's president. "Neurological research typically generates lots of data."

A common application in neuroscience environments might include stimulus and response measurement in an electrophysiology lab.

BrainWave is targeting DataHistorian for *Fortune* 500 and government networks. It runs on DEC's Q-bus and UNIBUS, IBM PCs (XT/AT) and PS/2s, and the Mac II. On the VAX-compatible DataHistorian Series 200, VMS sees the device as a TMSCP tape drive.

Software on the DataHistorian has been optimized to take full advantage of the hardware's capabilities, and to allow it to back up single workstations or PC networks. For example, a bi-directional tape-seeking facility avoids the process of scanning the entire tape.

You're guided through installation and backup with pull-down menus. On the installation menus, tutorials are available. Archive menus guide the backup transfer of files.

An updatable directory that organizes the entire file structure is located at the beginning of the tape. Collections of files are stored in one file volume called Savesets, which save space and seek time. Files also can be stored as singles.

Special configuration files help customize the drive to specific applications. They also oversee the usage of journal files, which are audit trails that log errors. On-line data verification between disk and tape files during backup and restore is provided by the configuration files. A file-compare utility provides this function at other times. The data transfer rate for backups and restores can be as fast as 11 MB per minute.

The system includes a power enclosure, an 8mm tape cartridge, a data cable-to-host adapter, floppy disks and a manual. For programmers, BrainWave offers an optional Universal File Format (UFF) Library for writing applications to run with the DataHistorian on PCs and PS/2s. Basically a C-callable record and file management system, UFF lets you get on-line read/write access to the tape drive.

In the near future, BrainWave plans to further its portfolio of large-capacity backup and restore devices. Zebrowski says that the company is developing products that use 4mm DAT and optical technology.

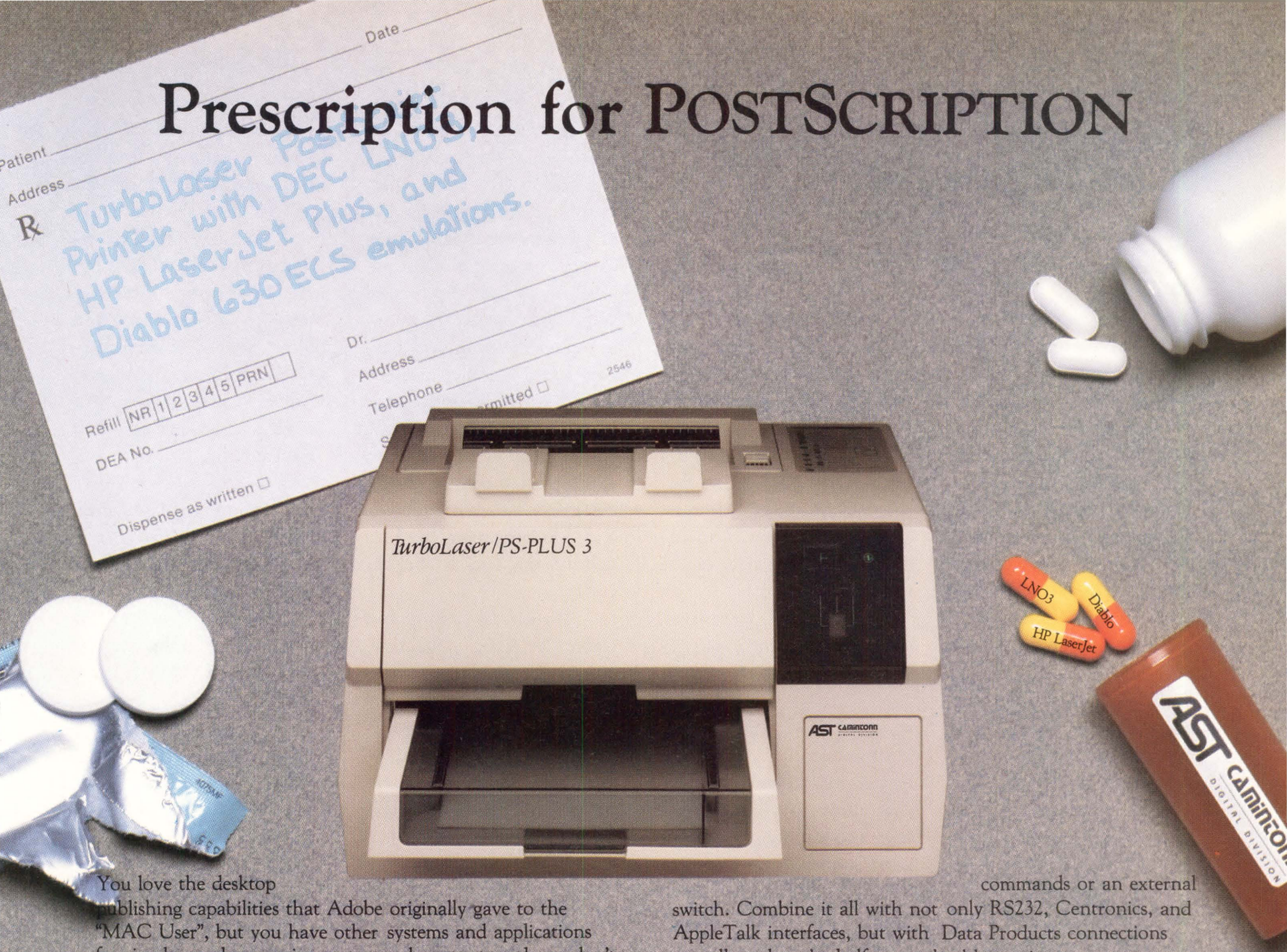
The Q-bus and PC versions of the DataHistorian are priced at $5,995, the UNIBUS at $6,195.

For more information, contact BrainWave Systems Corp., P.O. Box 1043, Broomfield, CO 80020; (303) 466-6190.

Circle 437 on reader card

— Evan Birkhead

Prescription for POSTSCRIPTION



You love the desktop publishing capabilities that Adobe originally gave to the "MAC User", but you have other systems and applications for simple word processing or text-only output, and you don't know which laser printer to buy?
Feel like indigestion?

All your users want to access the printer, but the software filter for translating LNO3 files limits the usage of your DECnet configuration, so now everyone wants their own laser printer.
What a headache!

Many of your users will have HP LaserJet and Diablo 630ECS files to print. They're also thinking of occasionally printing some special graphics with their text, but aren't quite ready for desktop publishing.
Could this be the beginning of an ulcer?

AST Camintonn has the prescription for your printing ills. We start with Adobe's most recent version of PostScript with 35 resident type fonts, 3MB of RAM, and the fastest processor available.
The *TurboLaser/PS-PLUS 3* provides the correct dosage of hardware to perfectly emulate DEC LNO3, HP LaserJet Plus, and Diablo 630ECS. To make printer mode selections easier, we've given you the choice of software commands or an external switch. Combine it all with not only RS232, Centronics, and AppleTalk interfaces, but with Data Products connections as well, and you're halfway to healthy again.

Just in case you need to treat high volume paper demands, AST Camintonn offers an optional 1,000 page sheet feeder.

AST Camintonn eliminates all the aches and pains associated with buying the right laser printer. And, our emergency room staff of application support personnel is standing by to answer any questions you may have to ease post-purchase syndrome.

Take to the *TurboLaser/PS-PLUS 3*, and call us in the morning!

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CIRCLE 354 ON READER CARD

Putting Your Products Behind Bars

Integrated Software Design's On-Tap VMS Generates Bar Codes

Bar codes are used in a variety of applications, including inventory management, check and document processing, mailing labels and for identification purposes. While the concept is simple, implementation isn't as easy as you may think. There are seven symbologies of bar codes, some of which are divided into subsets.

The automotive and health industries and the Department of Defense use a symbology called Code 39. International applications require the European Article Numbering bar-code scheme. Some bar-code sets are strictly numeric, while others are alphanumeric. Some sets are fixed length, and others are variable length.

Thus, a distributor might need to label his products with different codes, depending on where the products are being shipped. This requires a comprehensive, flexible system of generating bar codes.

Many high-end printers have bar-code capability. However, their expense can be prohibitive for small businesses. And some printers don't support all symbologies.

Enter On-Tap VMS from Integrated Software Design of Mansfield, Massachusetts. On-Tap VMS can generate a variety of bar codes on DEC and other well-known printers.

Including the subsets of symbologies, 13 bar-code sets currently are supported. On-Tap can print them on DEC LN03, LA75, LA210 and LJ250 printers. The IBM Proprinter, HP LaserJet+, Epson and Epson LQ printers, as well as printers compatible with these models, can be used.

The only operation necessary to print bar codes is to surround the text to be translated by a predefined special character. During configuration, a print queue is selected to be the queue that allows bar-code printing. You simply indicate the proper queue, and all text surrounded by the special delimiters is translated to bar code. Before printing, you can adjust a number of parameters to ensure proper printing. Options include the type of symbology to use, the width of wide, medium and narrow bars, whether a check digit is to be included, the plot density, how high the bars should be, whether to allow text to print over the code or start after the code, and the character used to delimit the text to be bar coded.

"Prior to using bar codes for data collection, companies need to print information in bar-coded format on their business documents," remarks Ramin Khoshatefeh, president of Integrated Software Design.

"On-Tap is an excellent tool for both programmers designing specific bar-code applications and for end users who wish to generate bar codes from existing software applications, such as accounting, inventory, database managers, order entry and billing systems, manufacturing software or a common word processing package." Standard scanners can read On-Tap's bar codes.

On-Tap VMS requires no programming experience. If the form fits in a supported printer, bar codes can be printed on it.

Prices for On-Tap VMS range from $1,995 for the MICROVAX to $4,995 for the VAX 8xxx series.

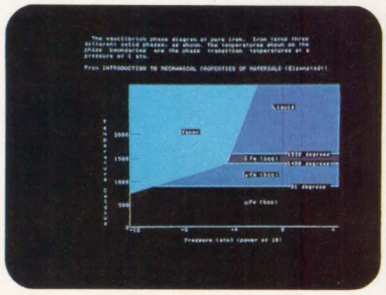
For more information, contact Integrated Software Design, 171 Forbes Blvd., Mansfield, MA 02048; (617) 339-4928.

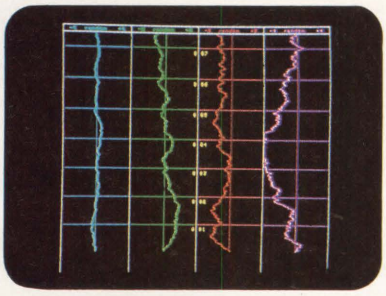
Circle 498 on reader card

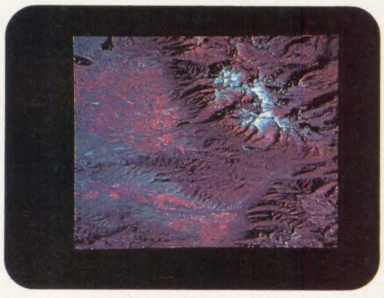
— David B. Miller

On-Tap VMS can generate bar codes on laser printers including the DEC LN03 (pictured) and HP LaserJet+. Dot-matrix printers, including the LA75, LA210, IBM Proprinter and the Epson FX80 series, also are supported.

Put exactly what you want on screen.

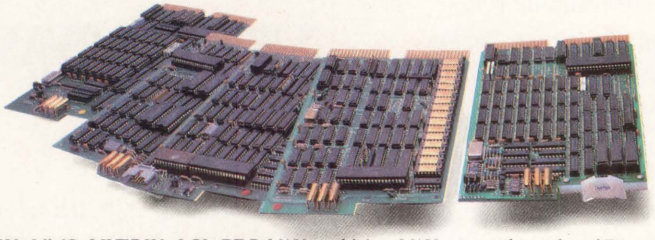






	MODEL	Q-BUS/ UNIBUS*	PIXEL GRAPHICS	ALPHA-NUMERICS	COLORS
COLOR	VCK8	Q & U	1024 × 1024	64 × 85	256
	VCK24	Q & U	1024 × 1024	64 × 85	16 million
	VCX8	Q & U	512 × 512	48 × 80	256
	VCX24	Q & U	512 × 512	48 × 80	16 million
	VCH	Q	512 × 512		256
	VCG512	Q	512 × 512		16
	VCG640	Q	512 × 640		8
	VRC	Q & U		24 × 80 48 × 80	64 64
MONOCHROME	VRH	Q	1024 × 1024	64 × 128	
	VRS	Q	512 × 512	48 × 80	
	VRG	Q	512 × 512	32 × 64	
	VRA	Q & U		24 × 80 48 × 80	

*Q-BUS for LSI-11 and MicroVAX, UNIBUS for PDP-11 and VAX.



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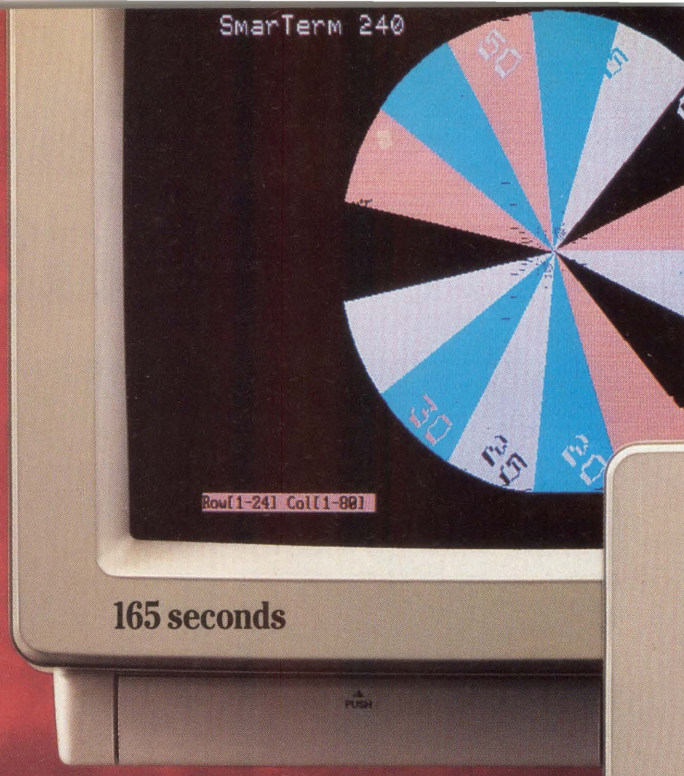

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**Poly-STAR/240 ignores the ReGIS polygon fill command used to color the stopwatch.

Test was run on an IBM AT with an EGA and high-resolution color monitor. Screens were timed locally using one data file. Files photographed are identical, except for product names. Software versions: Reflection 4-3.1; SmarTerm 240-2.0b poly-STAR/240-1.1.

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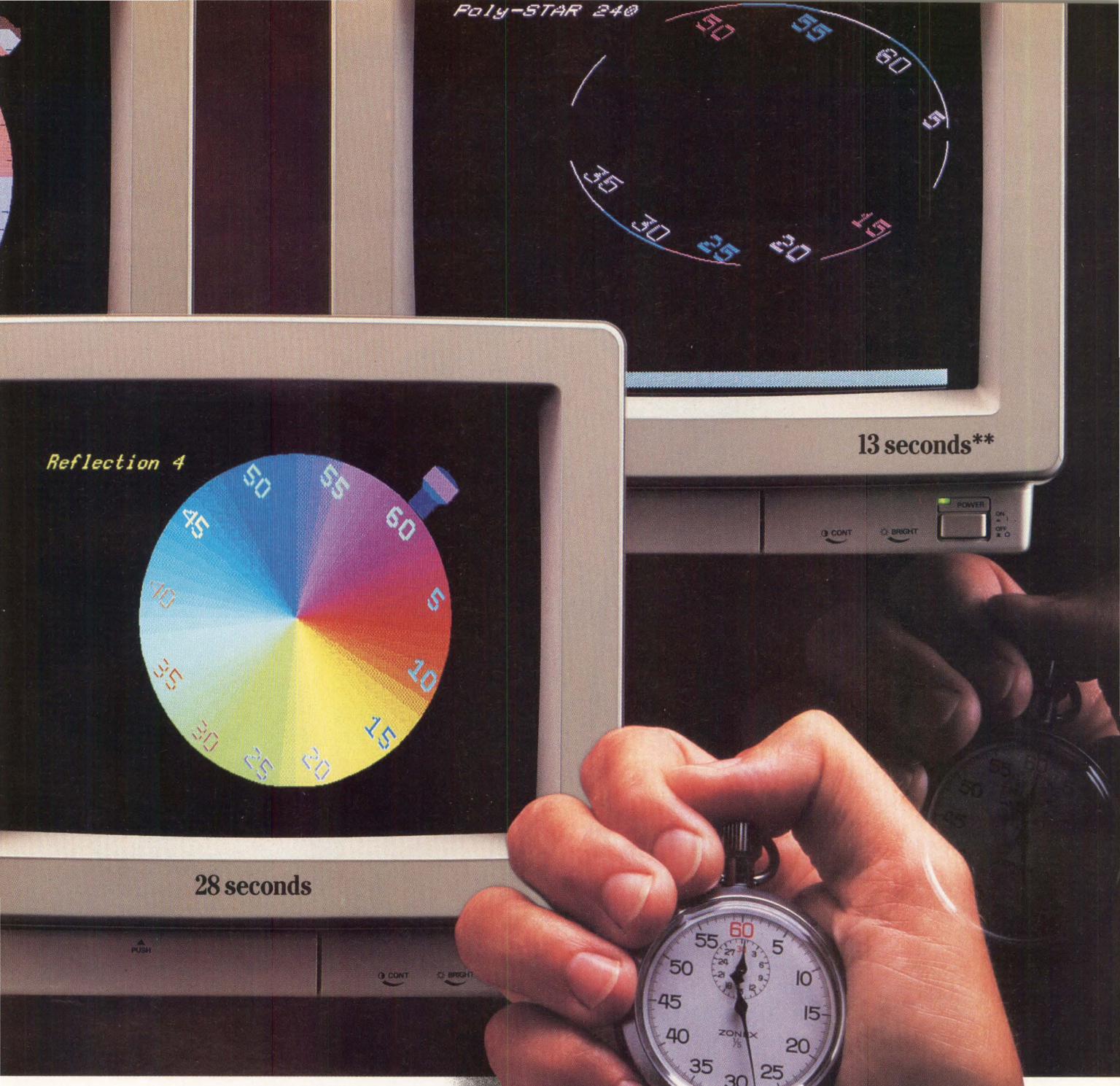

	Reflection® 4 PLUS	SmarTerm® 240	poly-STAR® 240
VT241 Terminal Emulation	**Yes**	**Yes**	**Yes**
VT340 ReGIS Graphics	**Yes**	no	no
16-Color Display	**Yes**	no	no
Polygon Fill	**Yes**	**Yes**	no
Background Multitasking	**Yes**	no	no
RAM Used	**220K**	375K	430K
Complete Keyboard Remapping	**Yes**	no	**Yes**
Back up PC Files to VAX	**Yes**	no	no
Variables in Command Language	**Yes**	no	no

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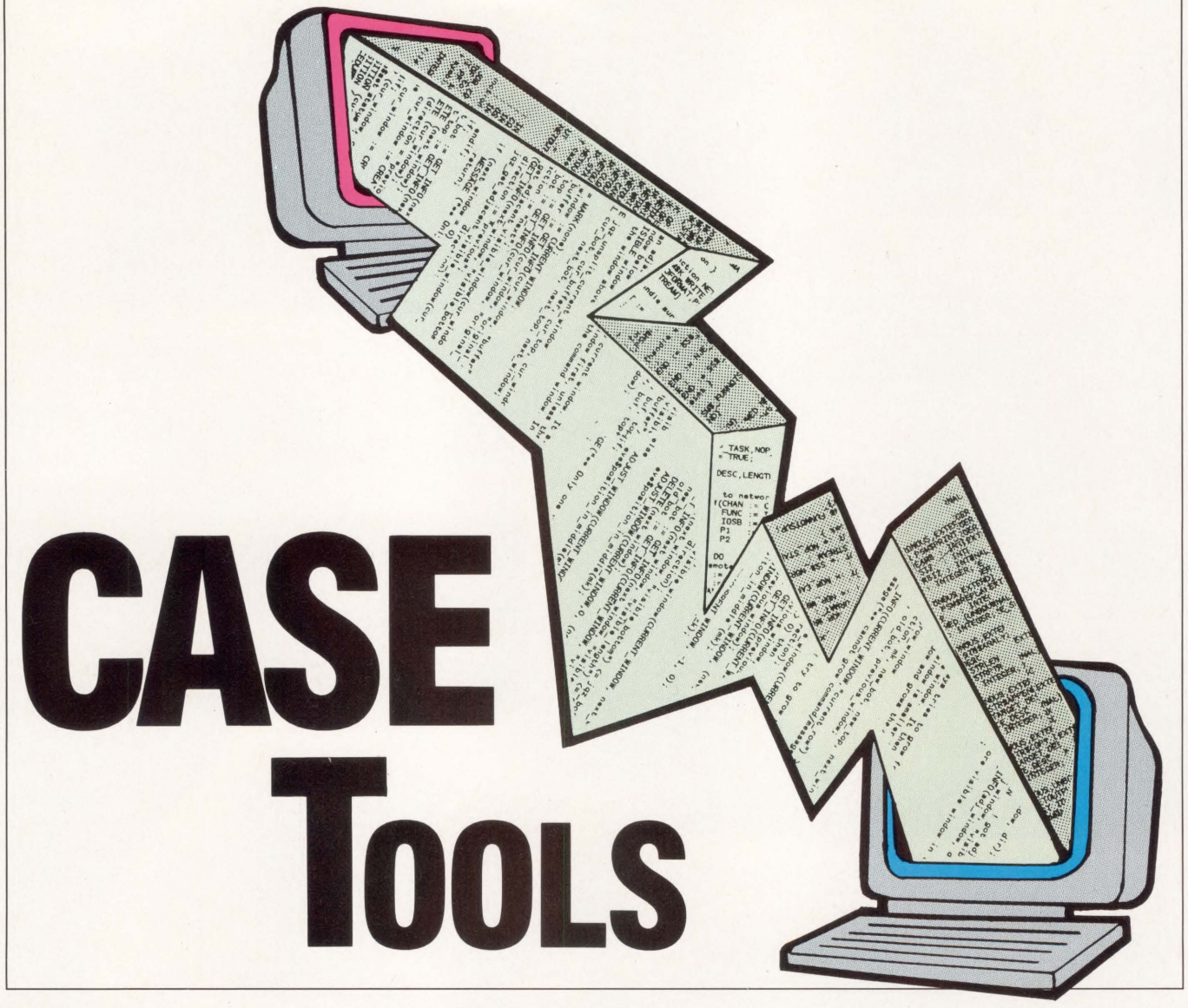


CASE Tools

Productivity for the masses.

BY MARK ALLEN HANNER

COMPUTER-AIDED SOFTWARE ENGINEERING (CASE) has attracted the attention of all types of users. The current crop of CASE tools offers a diversity of features.

Some concentrate on the specification and generation of program code. Others manage the process of designing software and organizing work by multiple programmers. Some specialize in a particular type of application such as Computer-Based Training. Others are for general programming. No two CASE tools possess the same range of features, and this diversity causes some confusion.

The term CASE applies to any tool that helps users develop programs. A good CASE tool meets a user's particular requirements. You should select a CASE tool with capabilities that are useful to you.

Different Strokes

Users who do their own "programming" need to produce working applications as quickly as possible. Users of dBase and Lotus 1-2-3 are typical end-user programmers who build ad hoc applications.

A consultant or programmer who develops projects on his own needs custom application features, documentation and code management. Target environments can be single user or multiuser. He primarily uses third-generation languages (3GLs) such as FORTRAN or C, although he might try his hand at fourth-generation languages (4GLs).

Large development projects demand exacting application specifications, multideveloper support, extensive internal and external documentation, and multideveloper code management and maintenance. These projects require high transaction rates in multiuser, and possibly distributed, systems. Older systems usually are in COBOL, FORTRAN or Assembler, augmented with database management systems (DBMSs) and specialized code management tools.

Although CASE tools target many kinds of users, no CASE tool can do everything. As a result, large organizations demand various CASE tools to meet the needs of different users. This situation can be an MIS manager's nightmare: data and programs using different CASE tools can't be shared.

The mechanisms in the CASE tool can provide a solution to this problem. Through a consistent CASE architecture, developers cooperatively can create applications, even in large organizations.

ALTHOUGH CASE tools target many kinds of users, no CASE tool can do everything. As a result, large organizations demand various CASE tools to meet the needs of different users.

CASE Tool Architecture

CASE tools enhance productivity. They help professionals to develop applications with less effort and end-user programmers to build their own applications. CASE tools provide this support with an integrated set of tools that work together to generate applications. CASE tools use a similar architecture to provide an integrated toolset (see Figure 1).

The User Interface provides a graphic display allowing you to create and edit applications visually. A valuable technique for users and developers, visual interfaces provide more contextual information for ease of use and allow multitasking capabilities for greater productivity.

Although this interface is best suited to bit-mapped workstations, many CASE tools work in terminal environments with limited visual representations. The target deployment interface for most current CASE tools is a terminal, even if the CASE tool itself uses a bit-mapped display. As graphic displays populate the user market, CASE tools increasingly will provide graphics capabilities for the resulting application.

The Application Definition layer is the syntactical representation of an application. The CASE tools you interact with will generate a programming language (either a 3GL or a 4GL) and will issue commands to perform such tasks as changing the data schema for the application.

With this syntactical layer, you can use CASE tools to customize applications by manipulating a language to access capabilities not directly provided by the CASE tool itself.

CASE tools that are targeted at end-user programmers might hide the language completely, while those targeted at professional developers can provide an integrated textual program editor. This layer can, but doesn't always, provide hardware and operating system portability for the resulting applications.

Application Data is the data that's defined by the developer for use in the application. CASE tools produce database schemas for the user's application that are turned into files or tables for the application's data. This layer defines domains for data used in applications.

By allowing definition of standard data types, you can ensure consistency and compatibility between different applications. Typical capabilities include integrity constraints, validation procedures, output masks and synonyms. Although not normally recognized as application data, the forms and reports of an application relate directly to the data.

Application Modules are procedures and internal data used by an application. Applications normally include access to standard libraries of routines that are shared between applications. These libraries are maintained by registering all procedures to the CASE Data Dictionary. The diagrams and other internal application elements also must be stored in the Data Dictionary to maintain information about the structure of the program.

The CASE Data Dictionary is the linchpin of a CASE system. It tracks all the information about an application, including the internal and external elements. This layer allows tools to cooperate with each other and allows multiple tools to manipulate the same objects.

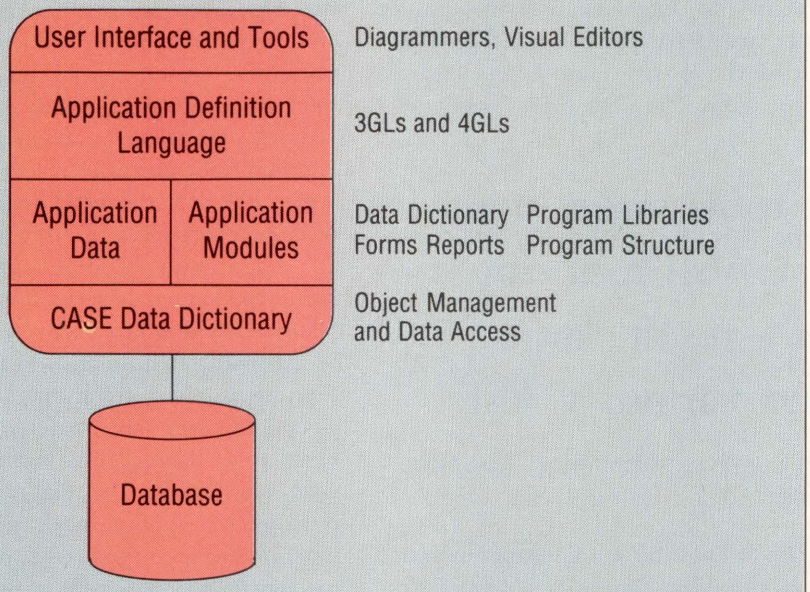
By using a common Data Dictionary layer, CASE tools can be integrated fully, thus allowing an Entity-Relationship database design tool to interact with a Data Flow Diagramming tool to construct an application.

A database is used to store both internal and external application data. The database can be either a general- or special-purpose DBMS, or a custom file access method. In most cases, the access method is hidden from the developer.

The database must be capable of supporting both the CASE Data Dictionary and the user data manipulated by the application. Single-user systems often can rely on simple access methods. Multiuser systems generally require a complete multiuser DBMS.

The User Interface layer places CASE tools into different user types. The layers beneath the User Interface repre-

Figure 1.



CASE tools.

sent various levels of integration that can be established by different tools.

The CASE Data Dictionary level provides the ability to share definitions of objects between tools. The Application Data and Modules layer offers the data and structure definitions that can be shared by multiple programs. The Application Definition Language layer provides portability of application specifications.

CASE tools can be compatible on any (or none) of these layers. The most productive set of CASE tools has all the lower layers in common. These tools can make intelligent assumptions about the interaction of CASE objects and can automate a greater portion of the application development process.

CASE Toolkits

CASE tools can encompass every computer user and activity. Vendors bundle CASE tools into toolkits aimed at particular user problems:

1. Specialized decision support tools such as Lotus 1-2-3, dBase, SAS, RS/1, 20/20 and DataTalker, typically targeted at more sophisticated end users solving ad hoc problems.
2. Specialized tools such as authoring systems and CAD, typically used by non-programmers to build applications for other users.
3. General and specialized programming tools for differing classes of programmers, from the sophisticated user who writes FORTRAN programs to large multideveloper projects.

A CASE toolkit contains a user shell that's directed at the needs of the target user. The tools in a toolkit fall into several basic categories:

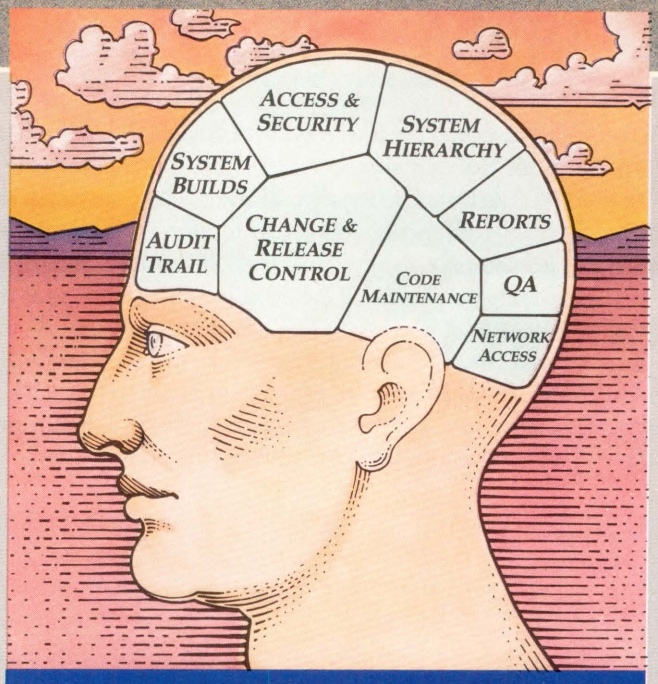
1. Window, screen, report, graph and other output formatting editors are needed by all applications. These editors normally are tuned to the target application of the CASE vendor. Examples of customized editors include report editors with built-in statistical analysis functions and screen forms that support display of arbitrary graphics.
2. Program flow editors such as Data Flow Diagrams and traditional flow charts allow you to describe the structure of the application and the algorithms and procedures to be used within it.
3. Schema design and Data Dictionary managers are needed to build and maintain the data used by applications. The Data Dictionary must include some maintenance capabilities to keep track of possible orphaned or redundant data objects.
4. Code management is needed for applications that will be maintained or upgraded to keep track of program changes and versions.
5. Program deployment tools are necessary to prepare new releases of the application produced by the CASE tool to external users.
6. Bug reporting and tracking allow support of automated program maintenance cycles linking problem reports to program changes.
7. User and network management tools are becoming a requirement, because so many systems are networked.

These tool types are fairly recognizable in CASE toolkits designed for professional developers, but are hidden within the paradigm that's appropriate for that toolkit for user-oriented CASE tools. Authoring systems, for example, have no obvious database schema interface, but data elements that perform all the database construction and access procedures found in a general-purpose database will be created and used internally by the system.

Common CASE Features

There are several characteristics of CASE tools that bridge all user types:

1. Visual/graphic exposition of programs and data through Data Flow and Entity-Relationship Diagrams makes CASE tools easier to use and more productive. This combines visual information such as display attributes, graphs and diagrams with context-sensitive help and help levels to adapt to various user experience levels.
2. CASE tools reduce programming errors through automated consistency checking of data and program elements. CASE tools can notify the programmer when there are unintended conse-



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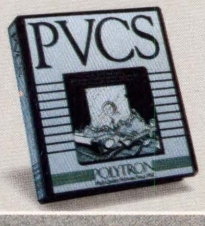

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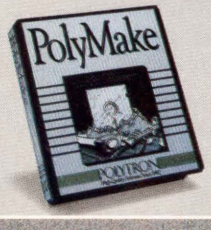

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quences of modifications to an application. With global registration of application objects in the CASE Data Dictionary, you can perform global changes to applications that share common libraries.

3. Prototyping allows you to build an application interactivly through immediate execution of program modules. Interactive debugging and testing eliminates the traditional editing, compilation and execution cycle of applications development.

4. The Data Dictionary tool allows easy cross-referencing and access to all objects known to the CASE tool. It must be integrated with all the other tools you use so that it's easy to share application elements and easy to keep track of.

5. Multiuser data access is an important feature, even to the single user. In large organizations, there's a need for concurrent data access by multiple users. But because of the rapidly growing networks to public and private data sources, single-user developers are motivated to link to multiuser systems. To gain access to this data, single-user systems will need to conform to multiuser requirements.

These features combine to increase your productivity by decreasing the number of things you must specify to

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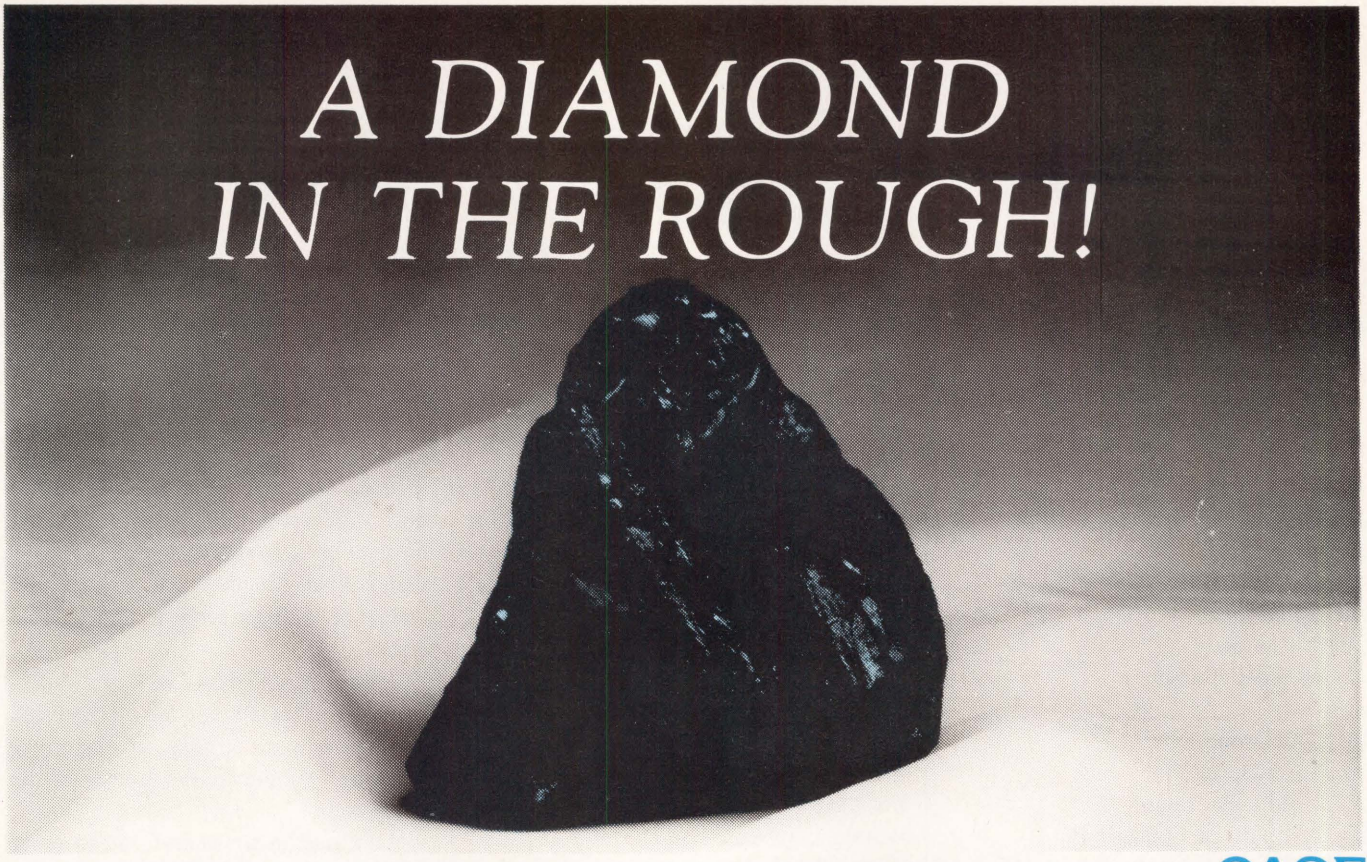

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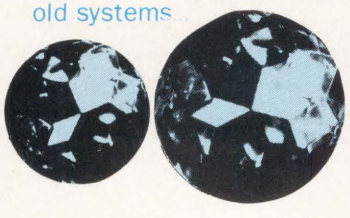

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build an application. Removing the human element from much of the programming process eliminates much of the time spent tracking and fixing low-level programming errors and maintaining code changes.

3GLs Vs. 4GLs

Most CASE products produce C or COBOL code that handles all aspects of the application. This results in two problems:

1. Support for multiuser applications is difficult, at best. The amount of program code needed to interact with an indexed file access method with manual data locking is about 10 times greater than embedded SQL statements, and the code is much more prone to undetectable errors.
2. Code produced by CASE application generators frequently can't be modified and limits your ability to customize software beyond the capabilities of the CASE tool.

To meet these needs, CASE tools are beginning to incorporate 4GL and relational databases to provide a more concise Application Definition interface and allow transparent multiuser application support.

Fourth-generation languages can be used to describe how to perform tasks. These high-level languages provide all the capabilities of 3GLs through a more concise syntax using a more powerful command set. Much of the brevity of 4GLs results from the use of the application's Data Dictionary definitions to eliminate declarations of data elements, and the use of visual layout editors for specification of forms and reports. Fourth-generation languages thus provide a mechanism to specify data access and manipulation, and user interface management.

A 4GL must be able to handle all types of user data and provide some mechanism for accessing and manipulating data selectively. Data access within 4GLs typically allows you to interact with the data on a logical level that hides the underlying data access methods. This generally shortens query

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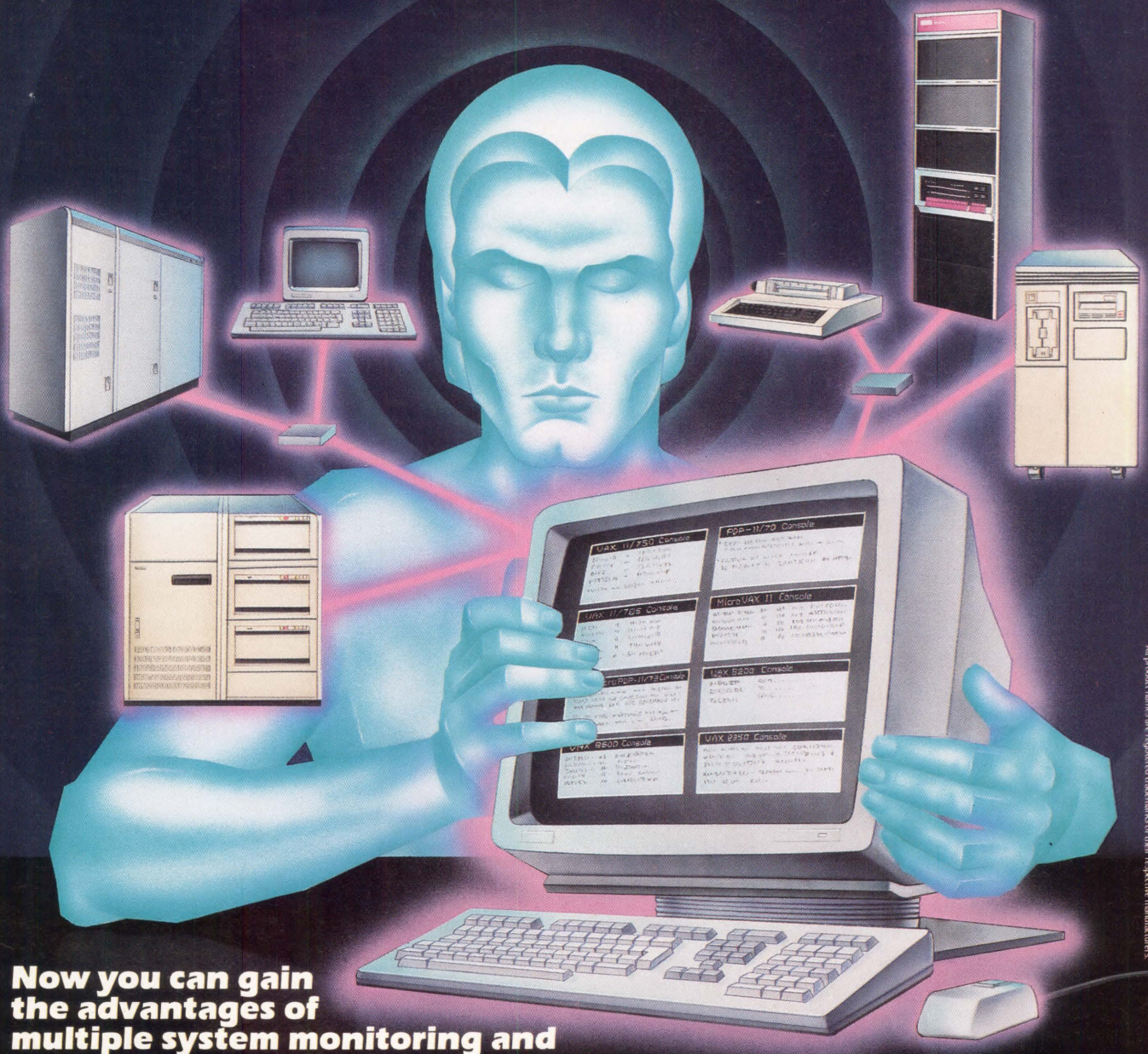

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specifications in programs.

Fourth-generation languages have been described as non-procedural. But data update commands that affect an entire set of data — the standard procedural constructs found in 3GLs like "if-then-else" and "do-while" — are essential constructs for describing algorithms.

> CASE TOOLS must allow direct access to the Application Definition Language.

The User Interface of an application is defined in a 4GL environment usually by means of a visual editor for forms, reports, graphs, spreadsheets and other common displays. These objects then define the fields and other display elements with which the 4GL interacts.

In a 4GL, it's typical for the assignment statement:

```
Name = select name from emp where mgr='Joe'
```

to put a data value on a display screen automatically. The equivalent 3GL can take up to a page of code to specify the query, retrieve the data and put the data into fields on the display.

CASE tools must allow direct access to the Application Definition Language. At the level of a CASE tool, a program can be viewed as different diagrams representing the specification of the program's elements. These diagrams are converted by the CASE tool into the language representation of the application.

Individual elements, however, can require special programming beyond the capabilities of the CASE tool. In such situations, CASE tools allow you to modify automatically generated program text or to write the module from scratch.

Therefore, CASE tools that interact with 4GLs are more productive than those that use 3GLs exclusively. Even so, a 4GL isn't sufficient for many applications. An automated factory complex, for example, needs 3GL coding for robot control and still requires CASE design for the entire factory system with 3GL routines entered into the CASE environment as calls from 4GLs. For maximum flexibility, you need access to all these layers in any combination.

The DBMS Link

Many current CASE tools use custom file access methods based on the classic ISAM, B-Tree and other techniques. Although adequate for single-user applications, these methods are difficult to use in multiuser environments, especially when many DBMSs are available that eliminate the complexity of multiuser support.

But DBMSs are needed in the CASE environment to implement the CASE Data Dictionary. DBMSs not only provide multiuser access, they keep track of logical links between different data elements. For example, an employee record is related to records of the department and manager he works for.

CASE tools need this feature to record relationships between various application objects. If the CASE Data Dictionary uses a DBMS, it's easy to add new functionality to the CASE tool, and even allow the user to access the dictionary directly for customized applications through the DBMS interface.

Using a DBMS, CASE tools can make use of the DBMS mechanisms to define and maintain relationships between data elements. This reduces the internal complexity of applications and enables the CASE tool to make intelligent assumptions about how data is to be manipulated within a program. For example, update operations can be restricted automatically, based on the integrity constraints defined in the DBMS, rather than explicitly in 3GL or 4GL commands in the application definition.

Another major benefit of a DBMS is the existence of tools for automated backup and recovery of data. Because the DBMS automatically can maintain logs of changes to an application's data, no special code is required within the application definition (other than to define logical "multistatement" transactions) to protect the database and maintain its consistency.

When system crashes occur, the DBMS backs out partially completed transactions and restores the database. Applications can resume immediately after the system is restarted.

Although a CASE tool needs a DBMS as a foundation, relational

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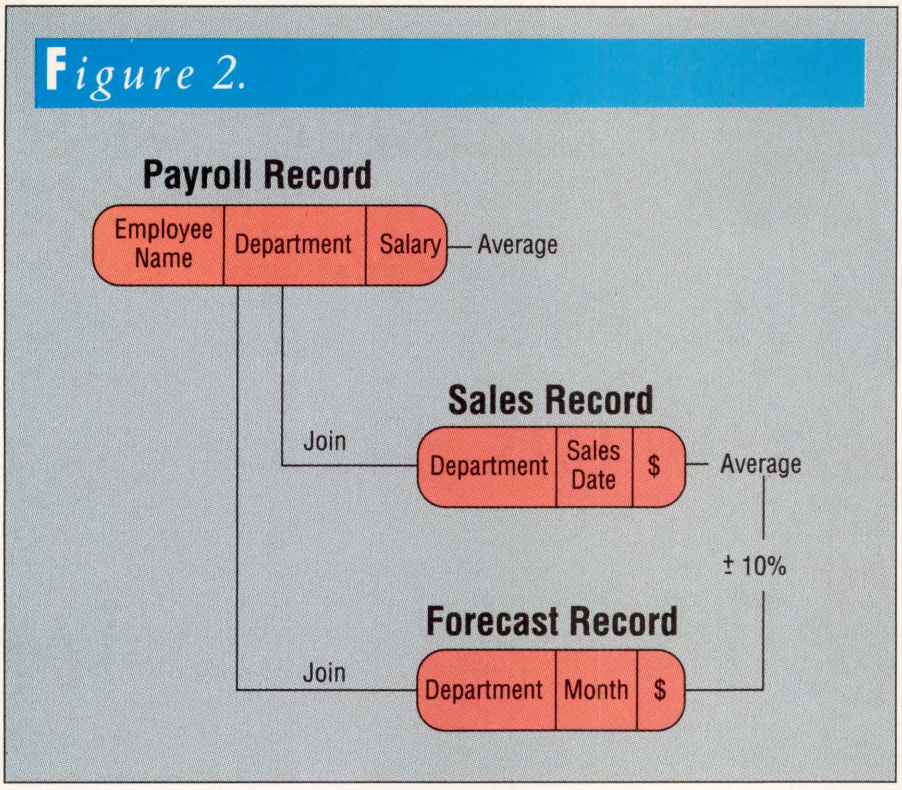

A typical RDBMS query.

databases are often considered a necessity, because of the dynamic and unpredictable needs of both CASE tools and the applications generated. Relational databases enable CASE tools to manipulate the data definitions for applications easily and allow those definitions to be expanded by new applications without disruption or performance cost.

In organizations in which there's significant sharing of data for different purposes, a relational database is unique in its ability to adapt to a wide range of user needs. Fixed file access methods and hierarchical and network DBMSs are inflexible in solving requests that are at cross-purposes with the original database designer's intent.

A relational database can meet unforeseen needs. For example, analysis applications often are built on top of existing production systems such as payroll and sales. A typical analysis request might be, "Find the average payroll for territories where the average sales price exceeds the forecast average sales price by 10 percent" (see Figure 2).

Because the relationships or joins between the payroll and sales records are based on averages rather than the predefined links in flat file, hierarchical or network systems, these systems can't solve this request without using tremendous CPU resources. Relational database management systems (RDBMSs) can devise query execution plans in real time to minimize the resources necessary to solve a request.

There's an increased demand for requiring applications to handle ad hoc queries. With an underlying relational database, applications with flexible data manipulation capabilities can be designed easily. Developers can build tailored applications in which users define their own data structures and manipulate them. Such applications can meet needs that developers don't foresee.

Because of their popularity among existing relational databases, 4GLs now commonly provide integrated SQL support for access to data. Interactive SQL statements can be placed directly into program code without change to combine prototyping with production program development.

At the CASE level, Entity-Relationship Diagrams can generate and modify database schemas of tables, and the Data Dictionary catalogs can be used to provide control over all objects used within an application. SQL commands within the 4GL provide a high-level, non-procedural interface for manipulating data concisely and flexibly.

CASE Directions

An industry-standard CASE Data Dictionary that allows all CASE tools to cooperate is still a few years away. CASE toolkits only now are beginning to use the underlying capabilities of 4GLs and relational databases to gain the advantages of productivity and flexibility within their own environments.

It will take a considerable amount of time and effort to bring the CASE market under the umbrella of a standard CASE Data Dictionary. Before this step can be taken, the CASE industry must bring 4GLs and relational databases into its systems.

Another concern in the CASE market is how to integrate with the multitude of window management systems that are proliferating on various popular bit-mapped workstations. CASE tools must provide the ability to span different window managers to achieve success. The 4GLs must provide abstractions that will overcome these differences that can be incorporated into CASE tools.

CASE tools are starting to evolve into this potential world of completely shared resources. Standards will be as important here as SQL has been to the database world. Only through a standard will large organizations be able to satisfy the entire range of user needs without wasting time and resources. *—Mark Allen Hanner is product manager at Relational Technology Inc. of Alameda, California.*

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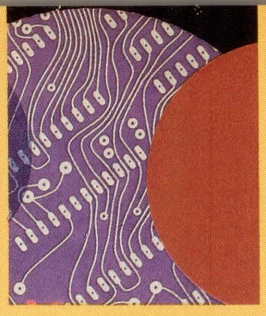

BUS DESIGN

THE BATTLE OVER BI

By Dr. James Meade

Although Controversy Swirls Over The BI Bus, Customers Should Be Safe.

It's easy to argue over whether DEC's BI bus has been successful. After all, it hasn't enjoyed the support of third-party products in the way the Q-bus and Unibus have.

And it's easy to raise dander over how well DEC will fare in enforcing its recently issued patent on the BI interface. Opponents easily square off over whether DEC will accept reverse engineering from a third-party manufacturer without a court challenge.

DEC reiterates that it's aggressive in enforcing its intellectual property rights. "We've been selling a BI memory product for a year and haven't heard anything about a suit," counters Brian Fitzgerald, spokesman for EMC Corporation.

People take sides over whether DEC will sue memory manufacturers, such as Clearpoint and EMC, and storage systems suppliers, such as System Industries (SI), who reverse engineer BI products. They square off over whether the suits hurt those who get sued or boost their sales and reputations. And they take sides over whether the suits hurt or help DEC.

Despite the flap, they agree on the answer to one question: Is the customer who buys an unlicensed BI product taking a risk of being sued or of buying a product that he might not be able to service or use? The answer, from DEC to third-party manufacturers to customers, is no.

DEC Litigation

Considering DEC's lawsuit record in the '80s, litigation from DEC is no surprise. "We invest more than $1 billion a year in research and development, $1.3 billion last year," explains DEC spokesman Mark Fredrickson. "Our general position is that our intellectual property helps protect that investment, and it's of great importance to us. Accordingly, we take it very seriously. And we expect others to take it seriously."

During this decade, DEC has filed at least eight patent infringement suits against a half dozen competitors, including SI, Emulex, C. Itoh and Clearpoint.

The Clearpoint suit, settled in September 1988, is the first to involve directly the interface to DEC's closed BI bus. It followed the same pattern as the others. The parties agreed to settle out of court. Clearpoint agreed to pay damages. Both parties claimed to be happy with the settlement, which both were legally bound not to discuss.

But DEC might be happier than its opponent. Although insisting that Clearpoint was happy with the settlement, Vice President John Stadler admits, "We're upset, but that's all I can say."

Clearpoint withdrew its VBIRAM controller board, which it had proclaimed a "stroke of creative genius" in its annual report for 1987. In addition, Clearpoint "immediately recalled and destroyed all copies of the software program it had distributed that contained substantial portions of Digital's VMS software," explained a press release from the two parties after the settlement. And Clearpoint agreed to pay compensation to DEC for in-

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fringement of intellectual property rights.

Regardless of the suits, the effects on DEC, third parties and customers aren't as they appear.

If The Suit Fits

Now a $140 million company, SI was half that size in 1980 when DEC initiated a patent infringement suit against it that was to last seven years. "SI was not well-known until then. It took off like a bandit after the suit," explains Larry Tashbook, director of product management and planning at SI.

Nor are DEC's apparent victories all they might seem. "Minicomputer companies, including DEC, are all struggling to find a way to survive," insists John McCarthy, a consultant with Forrester Research of Cambridge, Massachusetts.

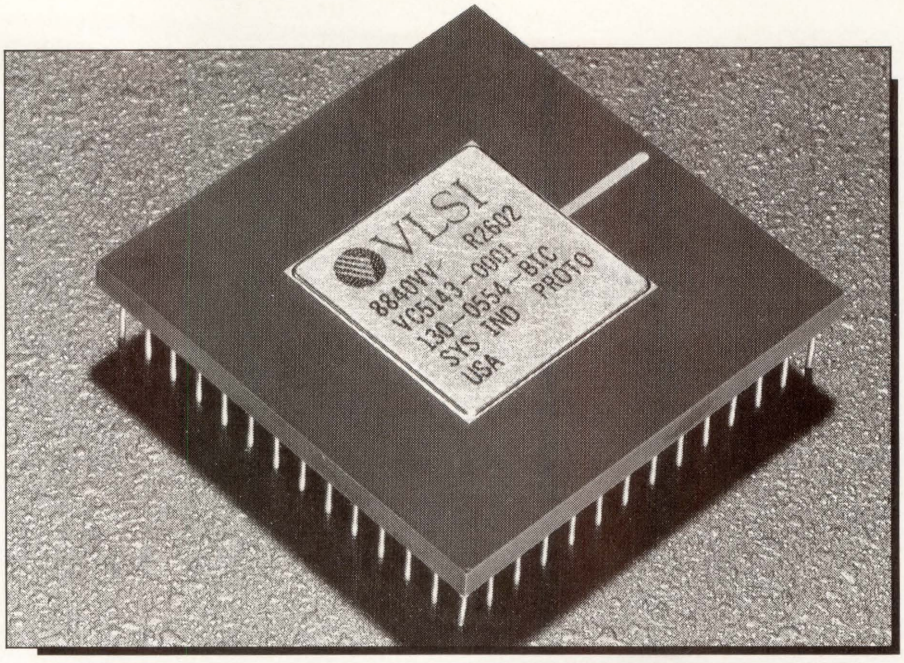
"The closer they can align the mini with the PC model, the better off they'll be. They should publish specs openly. If they close out third parties, they won't get the new technologies that will help them get into new markets."

The closed architecture has slowed the growth of technology for the BI. "The threat of legal action was definitely a barrier to our entering the BI market. If the architecture had been open, we would have been in the market in six months," says Ron Bingham, SI's vice president of research and development.

Dozens of companies offer products for DEC's open buses, the Q-bus and Unibus. Other than Clearpoint, which says it will continue to offer BI-compatible memory, only EMC currently has a BI-compatible product that hasn't been licensed by DEC.

As a rule, DEC grants BI licenses only to those companies that make complementary or non-competitive products, such as array processors or communications processors. But as some companies have found, what DEC gives it can take away.

"DEC did a great job of taking over the DEC-compatible market, and letting others take over in the workstation and minisuper markets," charges Clearpoint's Stadler. "In the short term, they gutted the compatible market effectively. I really believe that most of those players have adapted and gone elsewhere.



Prototype of System Industries' BI Controller chip.

"They've lost a segment of the marketplace you can't afford to lose, namely, engineers and scientists. DEC effectively just let them walk. Those people buy the new systems that turn into the big systems tomorrow," says Stadler.

When asked about the possible financial repercussions of closing the bus, DEC's Fredrickson responds, "That's not why we do it. We're trying to get the message across that [DEC's intellectual property rights] are not something that can be violated selectively."

A Glimmer Of Hope

For third parties hoping to find a way around litigation through reverse engineering, DEC offers a faint glimmer of hope. "If the result does not infringe on our patents, it might be legitimate," says Fredrickson.

"However, we have five patents already issued on different aspects of BI technology and more pending. A patent is a legal description of intellectual property. If it's infringed, it doesn't matter how it's infringed."

Asked about the plans of companies like SI, Clearpoint and EMC to reverse engineer, Fredrickson says, "It would be inappropriate to speculate on specific future legal actions. But we will enforce properly, thoroughly and vigorously our intellectual property rights."

But patents can be difficult to challenge. "Patents require a certain degree of originality," said an IBM attorney at a recent symposium on patents, partially sponsored by Clearpoint. "If you can't prove they are original, that is, that they do not have a lot of prior art, they won't be allowed as patents."

Corporate Strategy

Whatever the likelihood of being sued, SI admits that it's reverse engineering a BI chip and is going ahead with plans for BI products. Its corporate strategy gives it no choice, SI insists.

"SI provides shared storage systems," explains Robert Duncan, chairman of SI. "We don't sell a chip set.

"We have three kinds of products. The first is storage substitution prod-

ucts, what used to be called plug-compatible products." The second type of product, Duncan explains, is direct connect storage products that add value that the DEC products don't have.

"But what we really aim to provide is central storage, that is, storage systems," says Duncan. "Our strategy is to move toward providing more high-end products. At the low end, with plug-compatible products, the issue is cost reduction. With high-end products, it's technology."

If DEC sues SI for its BI products, SI has two advantages it didn't have before.

"It's a tremendous help, having been through it," explains Duncan. "We've had eight years of learning to coexist with DEC. We've been in the marketplace with them every day, even with a suit going on."

SI's second advantage is the alternative of reverse engineering. The purpose of patent law is to protect inventions, and patents can be quite specific, according to those who reverse engineer. If you invent a different way to accomplish the same objective and do not replicate the original method, the reverse engineered alternative doesn't violate the patent.

SI has been engineering its own version of the BI interface for two years. "We set out to replicate the function but with different logic," says SI's Ron Bingham.

"For instance, we generate random vectors to the chip and get information back from that. Then we use that information to duplicate the function. Also, we build a software model and simulate the output. Then we devise our own logic to duplicate that.

"We have built a chip that generates less heat, has a faster, denser logic than the DEC BI chip, and that looks dramatically different from it." SI anticipates that it will have products for the BI bus in February or March of next year.

But as much as SI is trying to avoid a confrontation, many, including SI, suspect that it might face a court challenge from DEC.

The Customer Perspective

As debate rages, customers sit in the eye of the storm. They might be hurt because there aren't alternatives to DEC's BI bus. But they're free to turn to Sun and other vendors instead and to some extent have been doing so. Further, they're pressuring third-party suppliers to build BI-compatible products.

Customers still can reap the benefits of open competition, even when faced with a closed architecture. "Our customers have told us that sometimes

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DEC even gives them better service when they have third parties in there," says Clearpoint's Stadler.

Customers don't face much risk of being sued. DEC agrees with SI that suing customers isn't a good way to do business. Although reluctant to say it would never sue a customer, DEC's Fredrickson says, "Historically, DEC has chosen to pursue legal action against the suppliers of such products, not customers."

In fact, both DEC and the vendors go to great lengths to protect customers. Following the recent Clearpoint settlement, Stadler emphasized, "The only issue as far as we're concerned is being sure our customers are protected. They're unaffected by the settlement."

Nor do customers who buy BI-compatible products face much risk of technological obsolescence. Asked if customers would be at risk if they buy BI-compatible products, Greg Cline, senior consultant with the Boston-based Yankee Group, replies, "The short answer is no. A fundamental part of DEC's product philosophy is upward compatibility. Given the fact that this BI-compatible product works now, I'd say the risk of obsolescence isn't that great.

"What is the risk of DEC changing its strategic bus? When you look at what kind of bus technology we'll be seeing in the next three years, the 13.3 MB maximum of the BI doesn't seem that much. The danger isn't that the product will stop working in the next few years. The danger is that DEC will change its strategic bus policy."

But even that danger seems minimal to customers. DEC's code-named XMI high-end bus is an open secret.

Although the BI bus runs at 13.3 MB per second, the XMI bus on DEC's new 6000 series VAXs runs at 80 to 100 MB per second. Considering speed alone, there are stronger reasons to reverse engineer for the XMI than the BI. And, says SI's Bingham, "As a policy, we will go after other buses. We will do XMI."

The customer, then, is in the driver's seat. He faces little risk legally or technically for using products based on a non-DEC interface to the BI bus.

Still, being well-protected doesn't satisfy customers. Most would prefer open competition and open architectures. *—Dr. James Meade is a freelance writer based in Fairfield, Iowa.*

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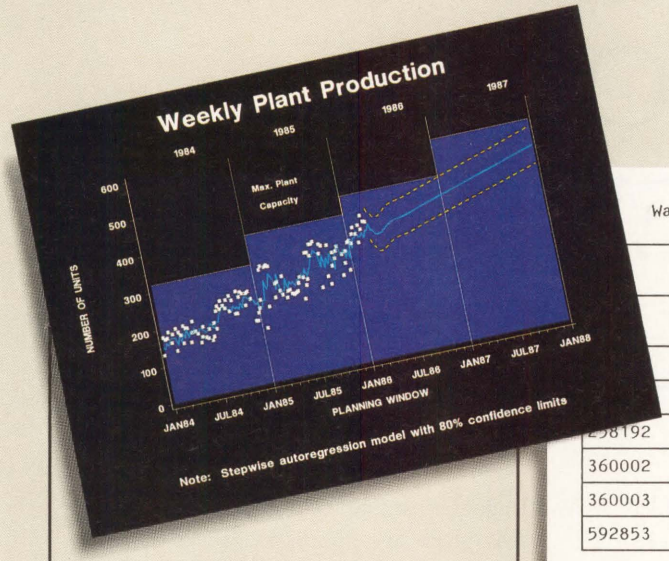

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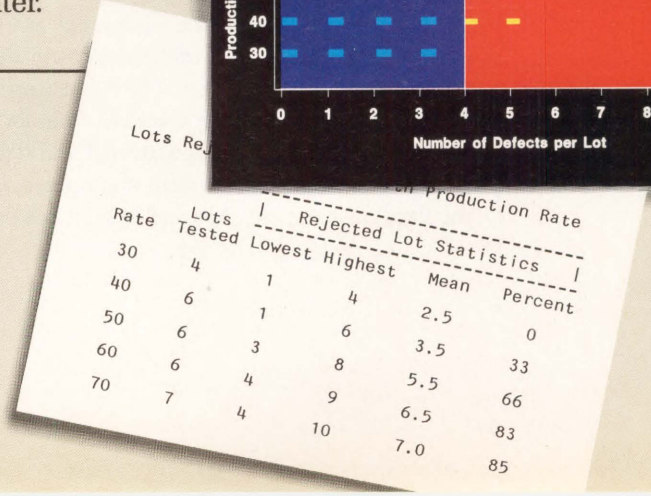

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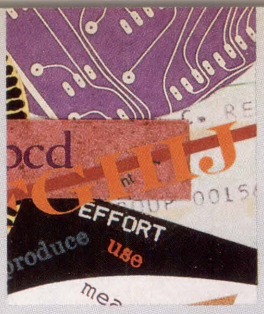

SYSTEM DESIGN

DAS FOR EMBEDDED APPLICATIONS

By Ron Levine

Solutions To Processor Design And Programming Problems.

There are certain types of embedded computer applications that can never have a surplus of performance. Tasks such as signal processing, real-time artificial intelligence and image processing use the highest performance level available.

Higher performance means better solutions and lets you approach larger tasks. Although these applications have an unlimited appetite for performance capability, they're usually constrained by factors such as power, weight, size, reliability objectives, cost and project schedule.

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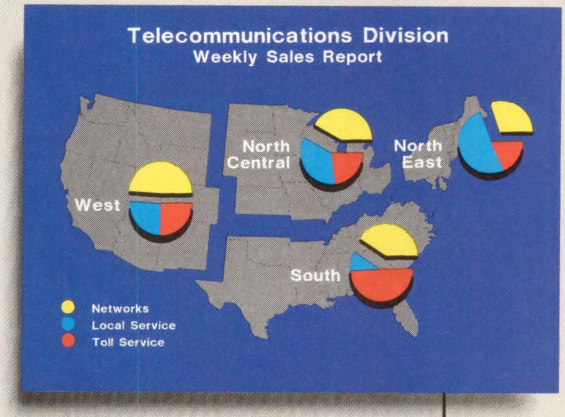

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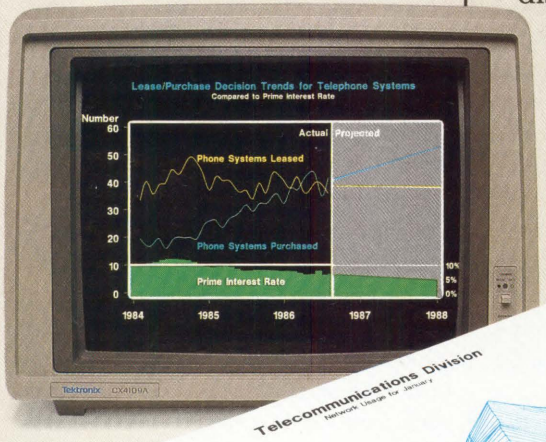

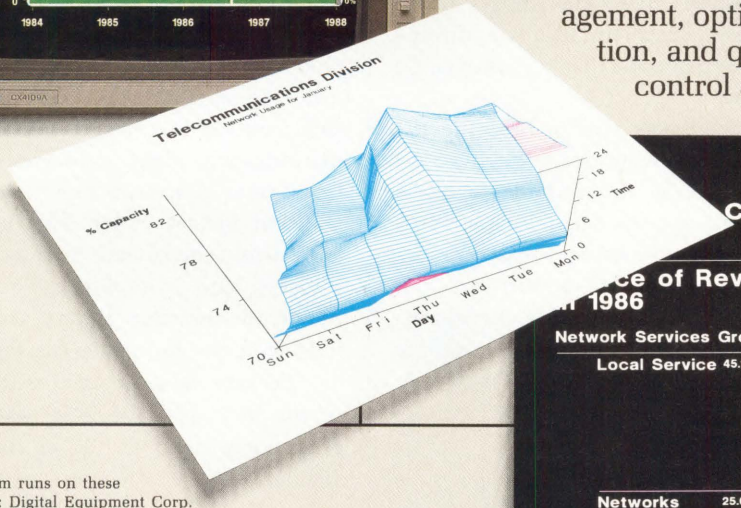

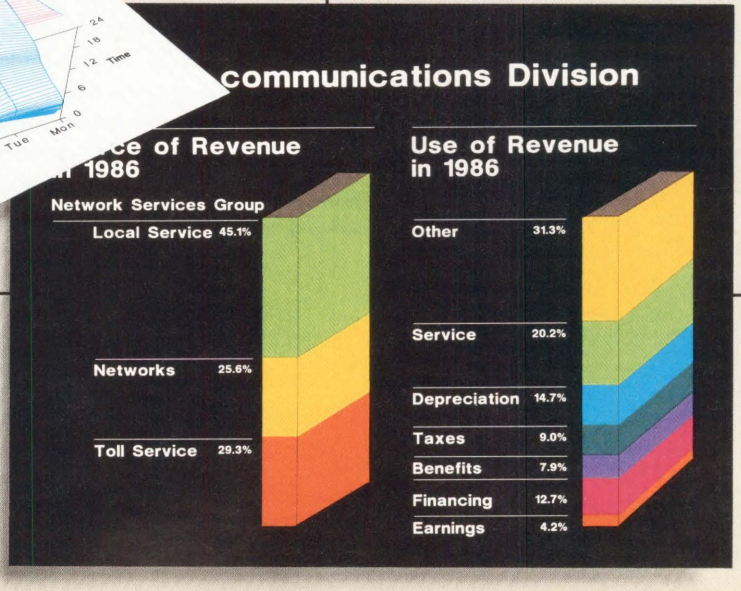

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totyping tools, rapid design tradeoff facilities (hardware versus software) and rapid measurement of design quality and detection of design weaknesses (see Figure 1).

For any new or modified horizontal machine design expressed in VHSIC Hardware Description Language (VHDL), IDAS automatically generates the environment to evaluate the effectiveness of the design against its specifications, expressed as Ada benchmark programs.

In hours, IDAS automatically generates a full Ada-to-microcode compiler to support the new or modified hardware design and a simulator (using the VHDL system) on which to evaluate its performance. In 1989, C and FORTRAN also will be supported.

Benefits Of IDAS

Within a few hours, the automated design system generates a prototype evaluation capability for an arbitrary machine. Using normal design methodologies, this usually takes more than one year. This enables you to explore many more designs and results in greater savings. Further, the sophistication of the generated Ada environment enables a more thorough evaluation of each alternative design considered.

The generated Ada environment is the true software production environment, not simply a research and development operation. This makes the evaluation process much more accurate and relevant.

Using IDAS, you can do objective hardware/software cost/benefit tradeoffs. You can make a change in the hardware (for example, add an ALU, reduce the amount of power available or delete a multiplexer) and directly measure the impact of the change on the performance of an application program. Or you can examine the performance of alternative software implementations on different hardware configurations and measure the differences quantitatively.

Armed with the powerful capability to modify or completely change the target environment, you can analyze numerous alternatives and perform cost/benefit tradeoffs on any parameters of interest.

To further aid design or programming decisions, the IDAS software provides guidance on design weaknesses and on how to improve a design implementation. For example, the software can point out bottlenecks and recommend additional hardware, if appropriate. Similarly, IDAS can notify you of software constructs that are unsupported or that don't map well on a target machine.

IDAS assists you in bridging the hardware/software gap during the design process and provides a high-level language-to-machine code compiler for effective microcode generation. IDAS also provides a software-first design approach in which the benchmark software is used as the specifications for the machine being designed.

IDAS Features

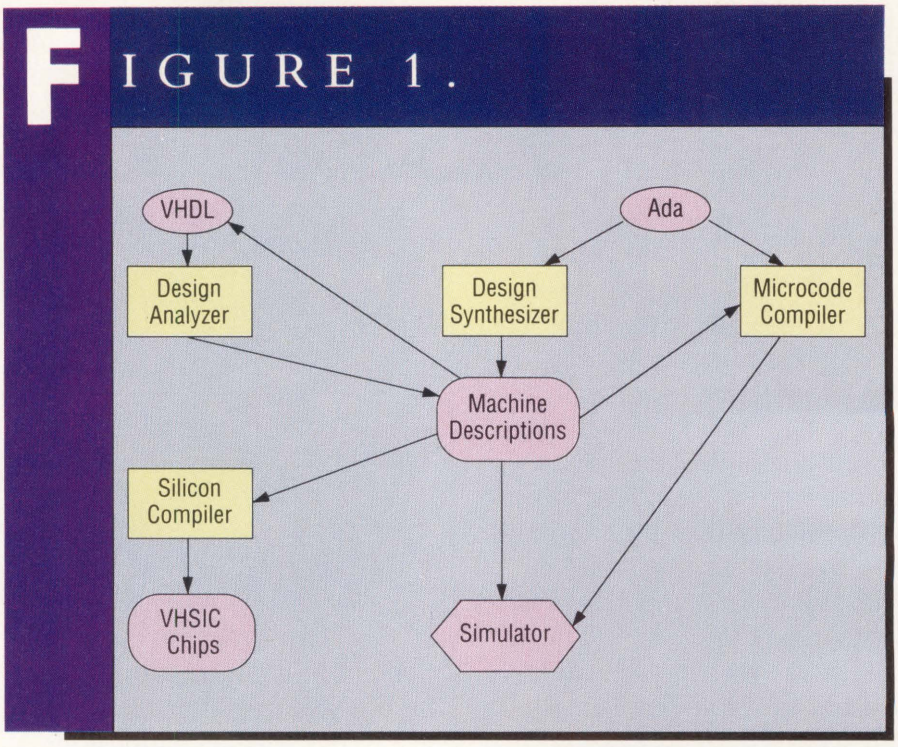
The heart of the IDAS package is its Ada-to-microcode compiler. IDAS uses Ada as the application programming language for embedded high-performance computers and translates the resulting programs directly into microcode.

The microcode then executes at the microengine level of the target machine. This provides substantial performance advantages over compilers that work to instruction set architectures.

The Ada-to-microcode compilation function is accomplished through a large number of elements, including an Ada front end with dictionary and library facilities; a software representation language; a machine-independent simulator, optimizer and linker; and a machine-dependent optimizer, translator, code generator, linker, resource allocator and assembler. Also provided are machine-dependent microcode optimizers and compactors, a hand-microcode insertion facility and other translators and formatters (see Figure 2).

Perhaps the most significant feature of the IDAS package is its automatic retargeting capability. Using the IEEE-standard VHDL, you can enter the

FIGURE 1.



IDAS top-level diagram.

description of a machine into the system and automatically create a simulator for that machine. Then you automatically can retarget the Ada-to-microcode compiler system to the defined machine. In hours, IDAS will generate a complete test and evaluation environment for the arbitrary horizontally microprogrammed machine.

This feature represents a true rapid prototyping capability. With it, alternative designs and the performance of design tradeoffs can be evaluated comprehensively in a short time.

The hardware description inputs can be at two levels: component and machine. Components are either existing physical devices (e.g., TRW and Texas Instruments chip sets) or primitives of a silicon compiler (e.g., Seattle Silicon Corporation's [SSC's] Concorde Silicon Compiler System).

Machines are collections of interconnected components and are digital and synchronous in nature. Documents and program analyzers aid you in representing hardware input data in suitable VHDL format. IDAS translators convert the VHDL entry data into data representations used internally in the automated design system.

The automatic retargeting capability of the design system uses complex programs to perform elaborate analyses and transformations on the input hardware description data (entered in VHDL form). Analyzers compute all possible machine paths and generate useful micro-operation sequences. Behavioral, structural and physical models are built and maintained internally to support the code generation, simulation and synthesis features of the design system. All machine-dependent elements of the Ada-to-microcode compiler and the Ada-to-VHDL synthesizer are retargeted from a common hardware database.

Using IDAS

IDAS is simple to use. You begin with a known specification, usually a benchmark, depicting the design objective. Using the IDAS software and the VAX's workstation, usually a PC, you enlist Ada as the design tool.

You can write your own programs or query the existing IDAS library (database) of known benchmarks. The PC and VAX talk via software controllers over an Ethernet communications line. The PC link is mobil, i.e., you can move to another workstation. A password scheme and standard VAX/VMS protection features are employed to control program access. All design work is performed at the workstation, which can be used as either a standard PC or as a VAX emulation terminal.

At the PC, start the session by typing in "IDAS" to establish the PC-VAX

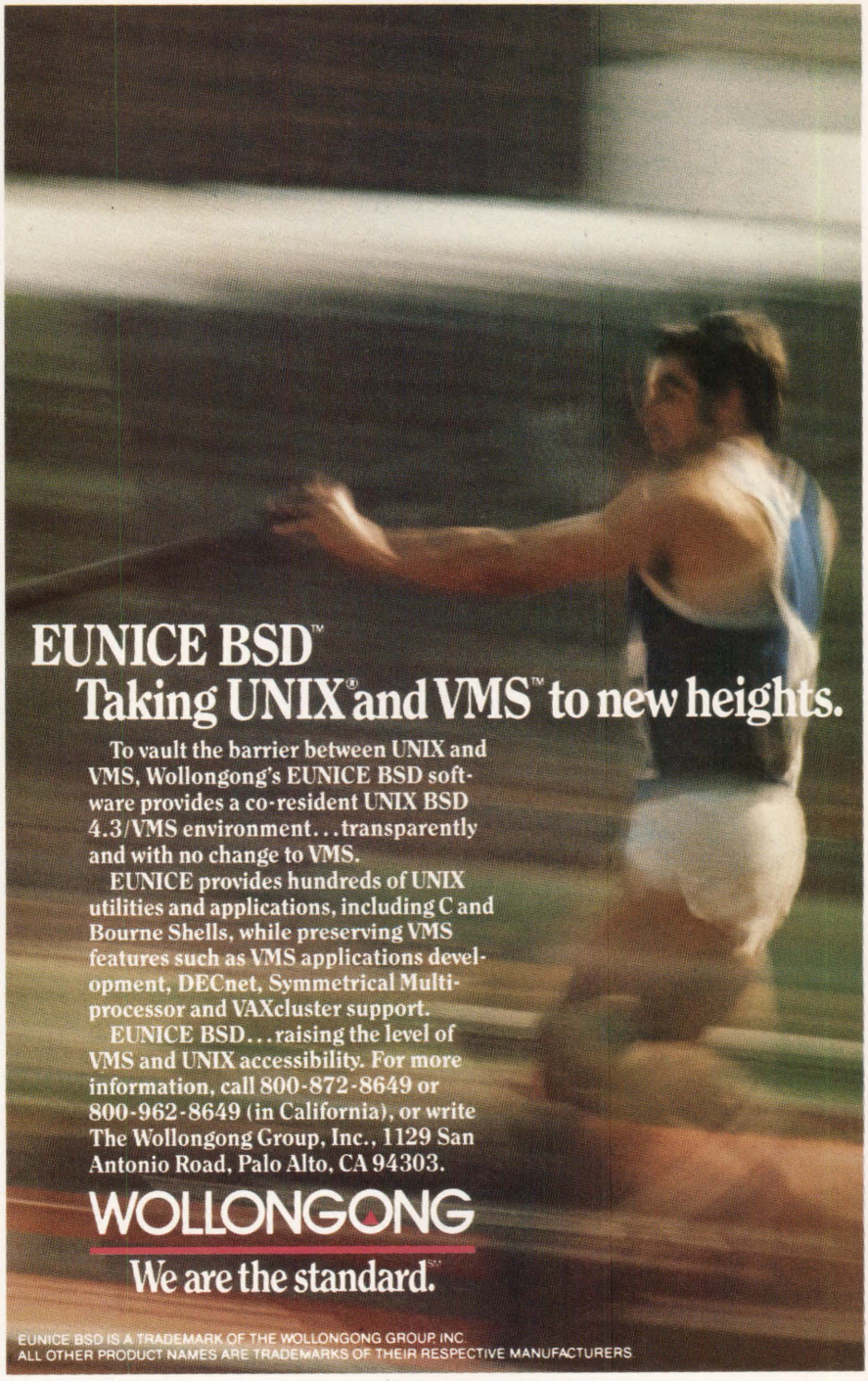


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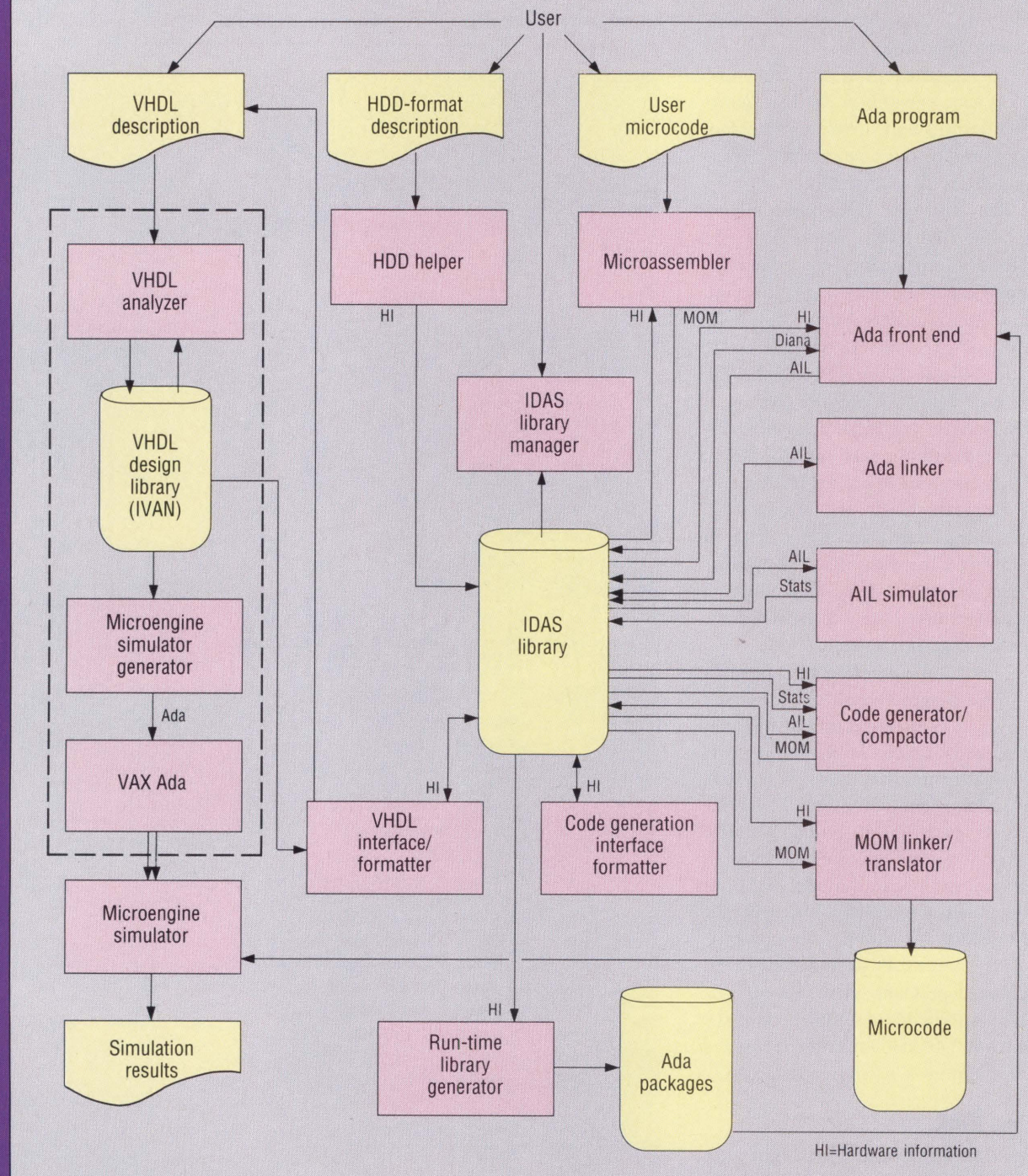
FIGURE 2.



IDAS functional relationships.

The Ada compiler is generated automatically for the target machine.

connection and load an image file from the VAX to the PC. From this point, the design process is menu-driven. A mouse is used to select appropriate menus and submenus. Shortened commands and extensive help files are available for all processes.

The project is started by designing Ada programs and/or VHDL programs. The information on the PC is then transferred to the VAX for Ada (or VHDL) compilation and inclusion into the database. At the workstation, you can analyze the Ada program. User information is displayed on the PC's screen.

For the novice, after the Ada program is written, compilation, microcode generation, simulation and report result analysis can be provided automatically by the IDAS system. For the expert, these functions can be individually manipulated and optimized.

The IDAS system supports all DEC Ada functionality, as well as some additional features. For example, individual compilation units automatically can be checked or recompilation can be done using new switches or switches already in the database from previous compilations. Or IDAS can recompile obsolete files (compilation units) from either the database or anywhere on the VAX-PC network. Software switches also can be used to force user options. You can have all processing done automatically, including recompilation of obsolete Ada programs (units).

IDAS has four software menus: Ada Creation, User-Written Microcode, IDAS Microcode (Auto) and Simulate & Report. From these menus all required software operations are performed.

The IDAS hardware menus are I/O & Verification, Synthesis and Configuration Management. These menus are activated by the Activate Hardware Menus command.

When using IDAS, you can enter hardware descriptions in either the standard VHDL format or in JRS Research's own hardware description database (HDD) input language. VHDL programming consists of:

1. Entering the component description and component connection programs from the workstation keyboard.
2. Analyzing the completed VHDL program, including error messages, for HDL code. Analysis of the hardware design points out bottlenecks in the machine and zeros in on detailed design data down to the port level and to individual bits within the micro instruction word.
3. Transferring the corrected program to the database.

With the Ada programming and the VHDL machine specifications completed, the next step in the design process is to run the Ada file on the newly created machine. This results in the production of VHDL machine code generation, causing the automatic generation of a microcode compiler, an Ada-to-microcode environment and a VHDL simulation environment.

This VHDL and Ada automatic code and compilation technique, which takes a couple of hours, would require months on a manual system.

With this model built, you can analyze the machine information and make hardware changes to optimize component usage. You'll be able to see immediately how performance is affected by each change. When you're satisfied with the computer's design, the final machine definition is constructed by IDAS. This requires about 1½ minutes of CPU time.

The Ada compiler is generated automatically for the target machine. A VHDL simulator is included with the compiler. On a MICROVAX, this process typically takes less than two hours. You're now ready to calculate target machine performance, i.e., evaluate your finished product. How well does the software map to the target machine? Where are the bottlenecks? Have size and weight limitations been met?

A full comparative analysis of alternative hardware and software can be made. Evaluation of how the specification benchmarks map onto the final machine is the most important result of the IDAS design process.

THE ADA-TO-VHDL SYNTHESIS capability, an important feature of IDAS, allows software-first design. By accepting the Ada application programs first and using them as specifications for a machine, IDAS automatically synthesizes hardware that will execute the programs in as few machine cycles as possible. Thus, an optimal machine is designed for running the specified set of Ada programs.

You direct the design process and can impose constraints on parameters during the process through an interac-

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tive user interface. For example, you can limit the number of hardware registers or establish limits on the amount of power or weight required by the machine. IDAS can be directed to build the new machine using only selected existing components. Or, you can make multiple selections and the design system will provide a comparative analysis of the results of the choices.

The final output of the synthesis process is the design of a synchronous, digital, programmable machine. The output is expressed in both the internal system format and in VHDL format. The final design can be used to generate a simulator for rapid prototyping or to retarget the Ada-to-microcode compiler for the new machine.

Replacing VHDL Programming

By selecting the Synthesis menu option, IDAS automatically will generate a machine description without doing VHDL program inputting. IDAS will combine a previously input Ada program and component set from its existing internal library to form the specifications for a target machine.

IDAS builds the fastest machine possible from the components selected for that benchmark (application). At completion, the final machine can be analyzed and evaluated, and changes incorporated as if the design were produced via the regular VHDL programming method.

Additional IDAS Features

Because IDAS software has been integrated with the SSC Concorde Silicon Compiler System, the IDAS synthesis processes recognize a library of SSC's silicon compiler primitives. IDAS can synthesize machines constructed with these primitives and can pass the designs to the silicon compiler for chip implementation. The silicon compiler creates an output suitable for driving National Semiconductor's VHSIC 1.25 line.

A basic problem in the design of high-performance embedded computing systems is associated with the mapping of a specific set of algorithms onto a selected machine. Data path conflicts, control field conflicts and resource conflicts, along with software constructs not supported in the hardware, are typical problems encountered when attempting to create a hardware/software design solution.

Designing a machine to execute key algorithms and, conversely, structuring an algorithm to execute on a specific hardware architecture are primary objectives of the automated design process. IDAS contains extensive instrumentation to collect relevant design data and pass this information to you for use in improving designs and finding high-quality solutions to existing problems.

IDAS contains the capability to stylize the Ada coding for the target hardware. In the past, the use of Ada for high-performance embedded computer applications has been limited by the mismatch between the power of the Ada language and the requirement to limit features in embedded computers to optimize their reliability, power, weight and size. IDAS addresses this problem by providing optimizers and translators that tailor the Ada compiler code to match the behavioral features of the target machine.

For example, IDAS can translate real number operations into equivalent integer expansions for machines without floating point hardware. It can translate selected pointer operations to the specific functionality available in the address generators in particular machines. The automatic retargeting of an Ada run-time environment also is possible.

These stylized programming tools provide full Ada functional support for any target machine. This minimizes reprogramming requirements and maximizes software reusability. The retargeting features of the IDAS package enable this objective.

THE JRS IDAS PACKAGE provides a set of tools, techniques and concepts that facilitate the tasks of designing, testing and evaluating high-performance embedded hardware/software systems. System designers, computer designers, analysts, programmers and system integrators will find the rapid prototyping capabilities of the IDAS software invaluable.

The ability to make design tradeoffs and immediately measure their impact, explore alternative designs objectively and reuse existing designs efficiently enable you to achieve high-quality solutions to current and potential problems. The feedback presented to you during the design process pinpoints possible hardware/software conflicts that otherwise wouldn't become apparent until later phases in the development cycle.

By eliminating some of the guesswork during the design phase, IDAS saves time and money in the design and maintenance of a project, and it makes more productive use of project personnel. By switching from a manual design methodology to IDAS, you can reduce project time significantly.

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HARDWARE

WINDOWS TO ICONS

By Dave Chestnutt

Shrinking Windows And Labeling Icons With A Single Keystroke.

Do you want to squeeze a little more pizzazz out of your VAXSTATION? If you're like me, when you have a screen with windows on it, you open several and toggle between them. Soon, the screen gets cluttered, so you shrink some of the windows to icons. Now you've got lots of icons, but you must reopen them to see what you were doing.

It would be great if you could eliminate some of this clutter. Well, there is a way to shrink windows with a single keystroke from several programs and a method to label the icons. The icons are labeled with the name of the application, specifically DCL, MAIL, NOTES and EVE. For EVE, the label includes the name of the file you're editing.

First let's look at the OSC strings. These are the escape sequences that let you play with the User Interface Services (UIS) terminal emulator window. The *VAXSTATION Manual* describes several of these, for example:

```
Changing the Banner: <157>21;title<156>
Shrinking to an Icon:<157>22;;label<156>
```

These strings can be embedded in a program or used directly from DCL.

There are two things you must know, however, before using these strings:

1. They only work on VWS V3.0 or later.
2. You have to define the logical UIS$VT_ENABLE_OSC_STRINGS to be "TRUE" at system level.

To define this logical, add this command to your system startup file, SYS$MANAGER:SYSTARTUP.COM:

```
$ Define/System UIS$VT_ENABLE_OSC_STRINGS "TRUE"
```

If you have system privileges, you can try out these OSC strings without rebooting by defining this logical at this point (with SYSNAM privilege). Then log out and back in, and the examples here will work.

Let's look at an example that changes the terminal window banner (the title at the top of the window that usually says "VT220 Terminal") to any arbitrary string. Type in as shown:

```
$!-----------------------------------
$!
$! BANNER.COM -- Change the Banner in
$!               the UIS Terminal Window
$!
$! Requires VWS V3.0 or later
$! Requires UIS$VT_ENABLE_OSC_STRINGS to
$!          be defined at system level
$!-----------------------------------
$!
$   osc[0,8]=157
$   st[0,8] =156
$   write sys$output "''osc'21;''p1'''st'"
$!
$!-----------------------------------
```

Then define a symbol, like this:

```
$ Banner :== @Banner.Com
```

Now, you can change the banner by

specifying the text in quotes:

```
$ Banner "Main Work Window"
```

Here's how to shrink windows with a single keystroke. For consistency, use F17 as the key for shrinking the terminal window to a labeled icon from the different applications. Thus,

For consistency, use F17 as the key for shrinking the terminal window to a labeled icon from the different applications.

one key does all, no matter what application you're in. The underlying definitions vary, but the user interface stays the same.

DCL

Because DCL is a simple OSC string command, define the key like this:

```
$ Osc[0,8]=157
$ St[0,8] =156
$ Shrink == "Write Sys$Output ""''Osc'22;;DCL''St'"""
$ Define/Key F17 "Shrink" /Term/NoEcho/Erase
```

After typing these definitions or adding them to your LOGIN.COM, if you press the F17 key, you will shrink the window to an icon and set the title to "DCL". You can, of course, change the title to anything you want.

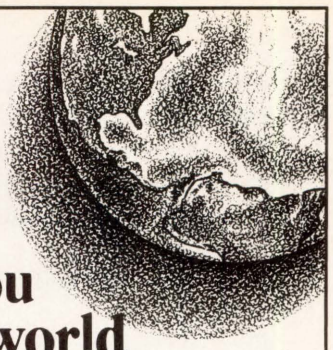
MAIL

Mail doesn't have a simple command to dump a string to the screen. One way to accomplish that is to spawn the SHRINK command defined above for DCL, but that's inefficient. Other methods of dumping the escape sequence reshrink the screen when you use command recall. To shrink the screen without having the string go into the recall buffer, define a key with a comment. Although not elegant, this method gets the job done:

```
Define/Key/NoTerm/Echo F17 "!SHRINK -- <157>22;;MAIL<156>"
```

You must replace the "<157>" and the "<156>" with the actual special characters. If you're using EDT or a similar editor, enter those characters like this while in the editor:

```
[pf1]157[pf1][kp3]    --- for "<157>"
[pf1]156[pf1][kp3]    --- for "<156>"
```

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Here's one way to define keys for MAIL:

1. Create a file called SYS$LOGIN:MAIL_KEYS.COM.
2. Put the DEFINE statement in the file, taking care to get the "<157>" and "<156>" special characters right.
3. Add this logical definition to your LOGIN.COM:

```
$ Define Mail$Init Sys$Login:Mail_Keys.Com
```

When you're at the MAIL prompt, the F17 key shrinks the window to an icon labeled MAIL.

NOTES

You probably think that it will be as easy to define F17 for NOTES as it is for DCL and MAIL. After all, NOTES lets you define keys, too. But NOTES doesn't have a simple way to dump escape sequences to the screen. As a result, you'll first have to create a procedure that can dump characters to the screen, and then bind a key to it. We'll also look at the simplest method of adding a key to NOTES.

The procedure and key definitions are:

```
procedure dump_string ( strng )        !dump a string with
                                       !special characters

    local
        cur_pos,
        cur_text;
    cur_pos := mark (none);
    position (message_buffer);
    cur_text := get_info(message_window,'TEXT');
    copy_text (strng);
    set (text,message_window,NO_TRANSLATE);
    update (message_window)
    set (text,message_window,cur_text);
    erase_character (-length(strng));
    position (cur_pos);
    endprocedure;

! Type this define_key statement on ONE long line
!
define_key ("dump_string(ascii(157)+
    ""22;;NOTES""+ascii(156))",
    F17, "Shrink", "notes$user_keys");
! Type this define_key statement on ONE long line, too
!
define_key ("dump_string(ascii(157)+
    ""22;;NOTES""+ascii(156))",
    F17, "Shrink" );
```

Type the lines exactly as they appear, with no extra spaces. Also, type each "define_key..." statement on a single line.

Here's one method for adding a key to NOTES:

1. Create a file called SYS$LOGIN:NOTES$COMMAND.TPU.

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2. Put the "procedure" and "define_key( )" statements in it.
3. Add this define statement to your LOGIN.COM:

```
$ Define Notes$Command Sys$Login:Notes$Command.Tpu
```

Now, you can press the F17 key when you're in NOTES. The window will shrink, and the icon will be labeled NOTES.

There are two key definitions for NOTES, because it has two key definition tables. One is used when you're at the Notes> prompt, and the other is used when you're in the EVE or TPU editor. If you use an editor other than callable TPU, the second key definition won't work, and you'll only be able to shrink at a keystroke when you're at the Notes> prompt.

EVE

With EVE, the icon label includes the name of the file you're editing, making it very useful.

The method you use for EVE is similar to the one for NOTES. You use the same "dump_string" TPU procedure, but you have a different key definition for the F17 key that includes the filename you're editing. The TPU statements for extending EVE look like this:

```
procedure dump_string (strng)       !dump a string with
    ...                             !special characters
end procedure;

! Type this define_key statement on ONE long line
!
define_key ("dump_string(ascii(157)+
    ""22;;EVE ""+file_parse(get_info(
    command_line,""file_name""),""""",""""",name)
    +ascii(156))",F17,"Shrink");
```

If you've never extended your EVE or TPU section, here's a simple way to add these commands:

1. Create a file called SYS$LOGIN:TPU$COMMAND.TPU.
2. Put the "procedure" and "define_key( )" statements in it.
3. Define a logical to point to this file:

```
$ Define Tpu$Command Sys$Login:Tpu$Command.Tpu
```

When you start EVE and press the F17 key, the window shrinks and is labeled "EVE <filename>".

THESE METHODS of labeling icons require little effort, and save you the aggravation of opening them unnecessarily. With a single keystroke, you can shrink windows and label icons, simplifying life with your VAXSTATION. *—Dave Chestnutt resides in Nashua, New Hampshire.*

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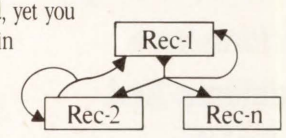

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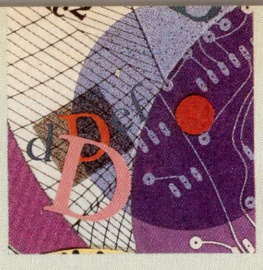

SYSTEM MANAGEMENT

PERFORMANCE MANAGEMENT

By Terry C. Shannon

Part 2: Troubleshooting Performance Problems And Optimizing Performance.

Editor's note: In this second and final part of a two-part series on system performance management, the author takes a look at troubleshooting performance problems, along with methods to optimize performance.

If your performance monitoring effort indicates that your system suffers from a resource bottleneck, you should isolate, diagnose and resolve the resource limitation through system troubleshooting. This involves the manipulation of various software parameters that are related to a computer's memory, I/O and CPU subsystems.

Because of the manner in which they interact, these subsystems form the components of a troubleshooting equation. All three components must be examined when troubleshooting, and they must be analyzed in a certain order. Begin by investigating memory, then the I/O subsystem, and lastly the CPU.

The symptoms of a memory limitation include excessive memory management activity, which places an extra load on the CPU, and excessive paging and swapping, which places an extra load on the I/O subsystem.

Likewise, an I/O limitation manifests itself in excessive I/O processing, which places an extra load on the CPU. By adhering to a memory-I/O-CPU precedence during a troubleshooting exercise, you reduce the likelihood of treating the symptoms of a resource limitation rather than its underlying cause.

Here are some general strategies that can be used to help diagnose memory, I/O and CPU limitations. As a rule of thumb, first evaluate clusterwide or systemwide memory, I/O and CPU statistics. Then, focus your attention on the resources consumed by individual processes. As you evaluate each resource, ask:

1. How well is the resource responding to requests for service?
2. Is the capacity of the resource sufficient to meet demand?
3. Does the resource have any excess capacity? If so, does the excess capacity exist because the resource is blocked by another overcommitted resource?

Diagnosing Memory Limitations

Limited physical memory is the most common VAX/VMS performance constraint. VAX/VMS memory limitations also can be caused by inappropriate use of the VMS memory management subsystem or inappropriate assignment of memory resources to system users.

The principle symptoms of a memory limitation include excessive paging and swapping activity as well as the absence of free memory. Physical memory constraints often can be isolated by examining systemwide page faulting activity.

For example, the operating system's page fault rate should be less than two faults per second. A higher rate could indicate that insufficient memory is set aside for the VMS working set.

If hard faults account for more than 10 percent of your system's overall page faulting rate, the free and modified page caches are probably too small to support a desirable soft-fault-to-hard-fault ratio.

Similarly, if more than 35 percent of the aggregate paging activity is attributable to

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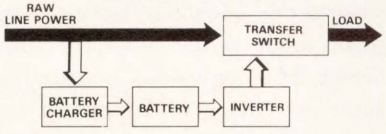
Shown below are three traditional UPS configurations. Each has its advantages and disadvantages.

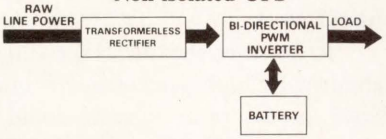
Standby Power System



Advantages:
- Low cost
- Inverter normally off
- High efficiency

Disadvantages:
- No derived neutral
- Break in transfer
- Poor isolation
- Poor brownout protection
- Poor high line protection
- Poor lightning protection

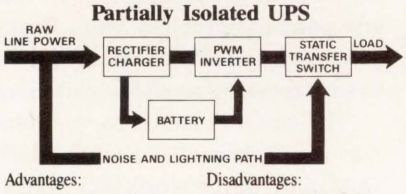
Non-isolated UPS



Advantages:
- Moderate cost
- Brownout protection
- High line protection
- No break system

Disadvantages:
- No derived neutral
- Poor isolation
- Inverter on continuously
- Poor lightning protection
- Non-linear load

Partially Isolated UPS



Advantages:
- Brownout protection
- High line protection
- Partial no-break system
- Separately derived neutral

Disadvantages:
- Break in transfer to line
- Poor isolation
- Poor lightning protection
- Non-linear load
- Poor efficiency
- Expensive

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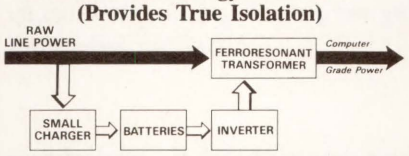

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- Low cost
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- High isolation
- No-break transfer
- Brownout protection
- Lightning protection

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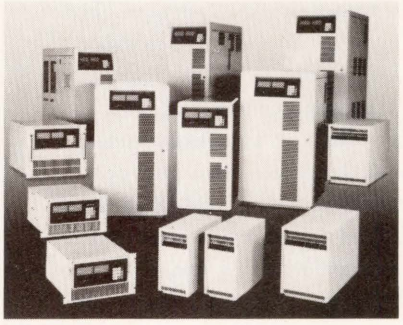

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TABLE 1.

I/O Loads	
0-8 I/Os per second	Light
9-25 I/Os per second	Moderate
More than 25 I/Os per second	Heavy
Queue Lengths	
Average queue length less than .20	Light
Average queue length .20 to .50	Moderate
Average queue length greater than .50	Heavy

Representative I/O loading and queue length characteristics for DEC RA-series disks.

demand zero faults, the system might be suffering from an excessive number of image activations.

A large percentage of free and modified faults on a memory-rich system might indicate that one or two processes that can't maintain adequate working set sizes are compensating for this limitation by using the free and/or modified lists as extensions to their working sets.

After investigating systemwide memory management activity, focus on such statistics as process-level page faulting, page fault I/O and working set quotas. To pinpoint those processes that place excessive demands on your system, perform a descending sort on key process-level memory management statistics.

Diagnosing I/O Limitations

I/O limitations occur when the number or speed of a computer system's mass storage devices are insufficient or when poorly designed applications place excessive demands on specific devices.

To isolate potential I/O bottlenecks, examine I/O statistics at the system, device and process level. Table 1 lists suggested I/O loading and queue length characteristics for DEC RA-series disks.

Begin by examining systemwide I/O rate and queue length statistics. Sort these statistics to see if a single device, such as the system disk, is responsible for an I/O bottleneck.

If you're conducting a VAXCLUSTERwide diagnostic effort, apportion the activity of each disk drive across all the nodes on the cluster. This technique pinpoints situations in which the I/O demand placed on a shared disk by a single CPU is reasonable but the cumulative clusterwide I/O is sufficient to saturate the disk.

Examine the direct I/O rates of individual processes. Perform a sort of I/O statistics to see if one or more users are responsible for an inordinate amount of disk activity. What appears to be a systemwide I/O bottleneck could be the result of a single user or application that places abnormally high demands on the computer's mass storage subsystem.

Diagnosing CPU Limitations

Your system's CPU might become the limiting factor when the workload places excessive demand on it. To diagnose a CPU bottleneck, determine how the CPU is being used. Examine the percentage of time that the CPU is spending in Interrupt, Kernel, Executive, Supervisor and User modes (see Figure 1).

Interrupt handling routines and I/O processing take place in interrupt mode. If the CPU spends more than 15 percent of its time in Interrupt mode, probably the system is experiencing excessive buffered I/O, remote locking or Mass Storage Control Protocol (MSCP) serving.

The VMS I/O subsystem, job scheduler, memory management subsystem and various System Services execute in Kernel mode. If Kernel mode activity accounts for more than 25 percent of total CPU time, look for excessive paging and swapping, local locking, image activations, I/O processing or file system overhead.

Record Management Services (RMS) file system and some VMS System Service processing takes place in Executive mode. There are no hard guidelines for CPU time spent in Executive mode, but a sudden change in the percentage of time that your CPU spends in Executive mode could indicate poor RMS file tuning or other file system problems.

Likewise, there are no recommended values for time spent in Supervisor mode. However, because Supervisor mode is the processor state in which DCL commands are executed, a high percentage of Supervisor mode time could indicate excessive DCL usage.

User mode indicates the percentage of time that the CPU is performing the work of system users. If your CPU is spending a high percentage of its time in User mode, your system is doing useful work.

If, however, the CPU is spending an abnormally high percentage of time in User mode, your system could be saturated and unable to keep up with user requests.

Also, investigate CPU use at the process level by sorting processes based on their CPU consumption to isolate any potential problem areas. Examine process types and process base priorities to see if resources should be redistributed.

If you're unable to pinpoint a resource bottleneck through the examination of memory, I/O and CPU statistics, focus on specific time periods and on specific system parameters. This

Examine the direct I/O rates of individual processes.

strategy can help you isolate peak resource demand periods so that you can concentrate subsequent collection and reporting efforts on those time periods.

Also examine average, minimum and maximum values to determine resource use trends across time and among specific statistical groups. Look at delta values across time to pinpoint fluctuations in values from one sample to the next.

This information can be derived from the analysis and integration of statistics collected by standard VMS system management utilities and commands. Some third-party performance monitors allow you to generate custom reports that detail selected time periods and statistical groups.

Formulating A Solution

After you have isolated a system performance problem and its underlying causes, you're equipped to formulate a solution. Before you adjust memory, I/O or CPU-related system parameters, attempt to improve system performance through the following general resource management techniques:

1. Workload management — A sound workload management strategy helps to eliminate the peaks and valleys in the system use picture. Try rescheduling resource-intensive applications to run during off-peak periods.
2. Equitable resource sharing — Ensure that each system resource is shared equitably among processes by establishing reasonable SYSGEN and AUTHORIZE parameters.

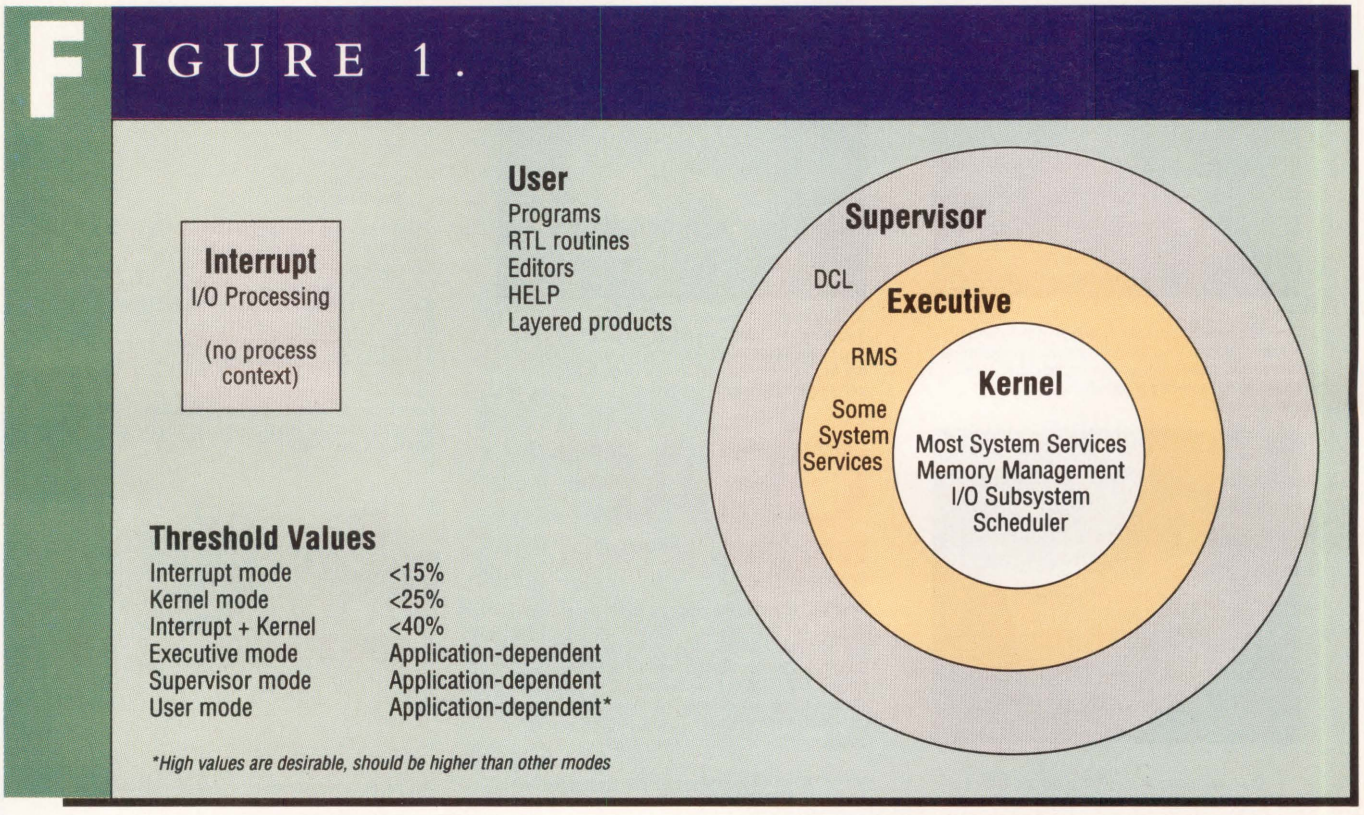
For example, if memory is scarce on your system, reduce the working set sizes of processes that could run efficiently with less memory, and reassign these pages to the processes that would benefit most from additional memory.

If resource contention remains a critical problem, consider resetting your system's maximum number of interactive log ins to a value that ensures acceptable response times for all system users.

3. VMS overhead reduction — You can make a greater proportion of system-wide resources available to users by reducing, if appropriate, the amount of overhead that's attributable to the operating system. For example, VMS memory consumption can be reduced by decreasing the size of the operating system's data structures, non-paged pool and working set.
4. System resources reallocation — Offload some of the activity of a heavily used resource to another, less heavily used resource.

For example, on a system with ex-

FIGURE 1.



VAX/VMS processor modes and suggested threshold values.

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cess memory capacity and inadequate disk I/O capacity, trade memory for I/O by enlarging the file system caches. Such an exchange reduces the amount of I/O activity at the expense of physical memory.

5. Load balancing — Consider using load balancing to redistribute the demand for resources.

For example, a terminal server can be used to distribute users across various nodes of a VAXCLUSTER. Similarly, batch jobs can be routed to a VAXCLUSTER node that's dedicated to batch processing.

After you have exploited these general performance-management strategies, address specific performance limitations. Here are some possible solutions to memory, I/O and CPU-related performance problems, listed in order from easiest and least expensive to most difficult and most expensive to implement.

Reducing Memory Limitations

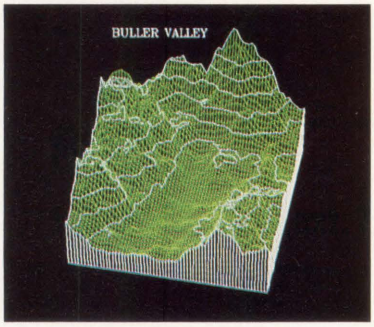
1. Ensure that total WSQUOTA for all processes is less than available free memory.
2. Reduce default working set sizes so that idle processes don't consume significant amounts of physical memory. This technique warrants special consideration when managing low-end VAX workstations, because the limited physical memory resources of such workstations are consumed easily by multiple inactive windows.
3. Install frequently used images with shared access. You also might speed image activations by installing key images open and header-resident.
4. Decrease your system's free and modified page cache low limits, so the memory available for process working sets isn't constrained by excessively large caches.
5. Enable or adjust automatic working set adjustment to make it more responsive to process page faulting habits.

For example, consider enabling working set decrementing by setting the SYSGEN PFRATL parameter to a nonzero value.

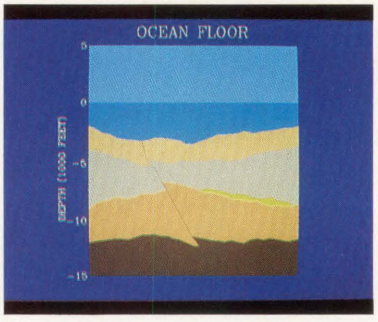
6. Because the efficiency of a VMS system is proportional to program locality, consider rewriting applications that are characterized by inefficient memory referencing patterns.

If an application's arrays and data structures can be maintained in physical memory throughout the execution of the application (i.e., memory-resident throughout the execution of the program), costly hard page faulting activ-

Contours
Scientific contours are easily drawn with color fill capabilities to quickly see the relative distribution of data points. Labeling is accomplished during program set-up, allowing all graphs to be drawn automatically.



3D Surface
The 3D surface application plots a perspective of a function of two variables with hidden lines removed.



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If your system is configured with multiple paging and swapping files, relocating the largest files will provide the best results.

ity will be minimized.

7. As a last resort, buy more memory. Although hardware upgrades should be avoided whenever possible, physical memory remains the least expensive hardware-based performance enhancement.

Reducing I/O Limitations

1. Perform image backup and restore operations or use a defragmentation utility to restructure fragmented disks.

2. Ensure that I/O is distributed equitably across your system's physical disks by relocating paging and swapping files from the system disk to other available disks.

If your system is configured with multiple paging and swapping files, relocating the largest files will provide the best results.

3. If excessive system disk activity is still a limiting factor, relocate key files such as SYSUAF, RIGHTSLIST and VMSMAIL from the system disk via logical name assignments. Move key system images from the system disk by defining a searchlist for SYS$SYSTEM.

4. If excessive I/O is coming from Files-11, increase the size of the XQP caches, particularly ones with high attempt rates.

5. Disable high-water marking, unless this mechanism is required to meet elevated security needs.

6. Improve inefficient use of RMS in key applications. For example, using the CONVERT command on volatile indexed files can reduce bucket splits and file fragmentation. This technique also helps to reduce CPU overhead.

7. Improve RMS record buffering by using bigger bucket sizes, multibuffering and better record referencing patterns in your key application programs.

8. Improve inefficient algorithm design so that applications issue fewer I/O requests. For example, you could reduce I/O activity by building temporary data structures in virtual memory and referencing these structures instead of accessing disk-resident data.

9. Consider using global buffers on heavily used files (such as SYSUAF) that are accessed by multiple users, particularly if the files are accessed primarily for reading.

10. As a last resort, buy more disks and/or controllers to spread I/O.

Reducing CPU Limitations

1. Modify poor user work habits, such as excessive interactive program compiling and linking. In a mixed development and production environment, use Access Control Lists (ACLs) to ensure that program compilation takes place in Batch mode.

2. Disable IMAGE LEVEL ACCOUNTING. If your site requires the level of detail provided by IMAGE LEVEL ACCOUNTING, enable the utility selectively or consider purchasing a third-party VMS resource management and chargeback package.

3. Ensure that lower-priority processes have low base priorities and that timesharing users haven't used ALTPRI to raise their process priorities.

4. Ensure that batch queues have lower default priorities than interactive processes.

5. Ensure that batch queues don't allow too many concurrent processes.

6. When backing up files to a TK50 or other device that provides hardware-based cyclical redundancy check (CRC), use the BACKUP utility's /NOCRC switch to save CPU overhead.

7. If your system workload includes both real-time and interactive processes, ensure that the CPU resources consumed by real-time processes don't adversely affect timesharing users.

8. Careful application design can reduce terminal I/O interrupts and resulting CPU overhead. For example, conserve on I/O by updating a window on a CRT rather than repainting the entire screen.

9. Decompress library and HELP files to eliminate the processing overhead that's incurred each time a compressed file is accessed.

10. Avoid using ACLs unless they're required to meet elevated system security requirements.

11. When using an optimizing compiler, disable optimization during program development and testing. There's no need to incur optimization overhead during the compile-link-debug cycle.

12. On VAXCLUSTER systems, ensure that file sharing applications run on the same node.

13. Make sure that file sharing in key applications matches actual requirements. For example, opening files with read access instead of read-write access saves significant CPU overhead, because locking won't be performed at the record level.

14. Improve inefficient or faulty algorithm design in key application images.

15. As a last resort, buy a faster CPU.

—Terry C. Shannon is a Massachusetts-based author who specializes in DEC systems.

Editor's note: A similar article appeared in the October 1988 issue of DEC USER, *published in the United Kingdom and Europe. Used by permission.*

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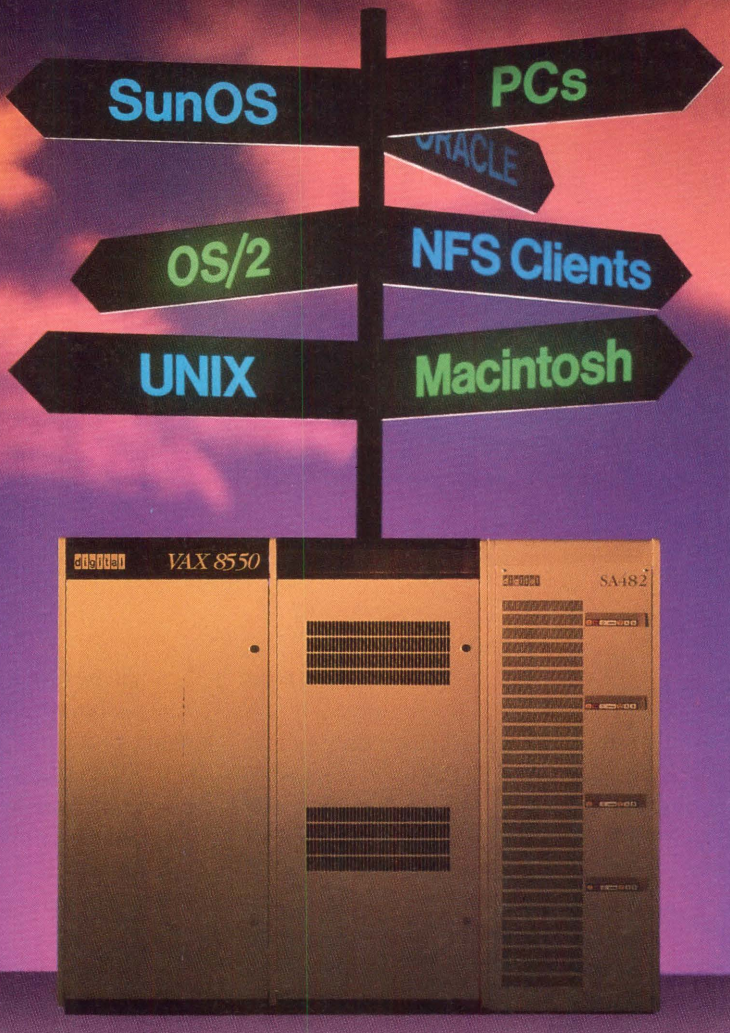

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CIRCLE 325 ON READER CARD

TEXT PROCESSING

CORPORATE ELECTRONIC PUBLISHING

By Ashley D. Grayson

DEC Approaches This Task With A Strategy, Not A Product.

Corporate electronic publishing is to desktop publishing what an express train is to a sports car. Like a sports car, desktop publishing empowers you with speed and style, while providing flash and dash. It's for those who want to move their own way.

Like an express train, corporate electronic publishing provides reliable access to specific communication routes and enables many people to arrive in one place quickly.

Although desktop publishing enables you to compose complex documents that used to require many people and devices, it focuses on layout, one of the final steps in publishing. It overlooks the handling of material that precedes publication: the drafts of memos, reports, charts and tables that circulate for approval.

Thus, a corporate electronic publishing program must include desktop publishing tools, traditional printing services and an understanding of how people communicate.

DEC approaches corporate publishing with a strategy rather than a product. Its computers and networks provide the highway for that prepublication exchange. DEC's strategy is supplemented by partnerships with products such as Interleaf and PageMaker, and by imaging products from Kodak.

While DEC's networks and uniform computing environment facilitates communication, DEC overwhelms users with point-product applications that solve only parts of the corporate publishing problem.

Six Steps

There are six tasks associated with corporate electronic publishing:

1. Information Gathering.
2. Document Creation.
3. Editing, Revision and Review.
4. Formatting and Layout.
5. Printing and Distribution.
6. Document Storage and Archiving.

1. Information Gathering — Before a document is created and pushed through the publishing cycle, it must be developed, usually with information from various sources. The publisher might deal with files in different word processors, formats and writing styles. Also, images, tables and other non-text information must be assembled.

Most documents are built from other documents and references. The corporate electronic publishing cycle should include access

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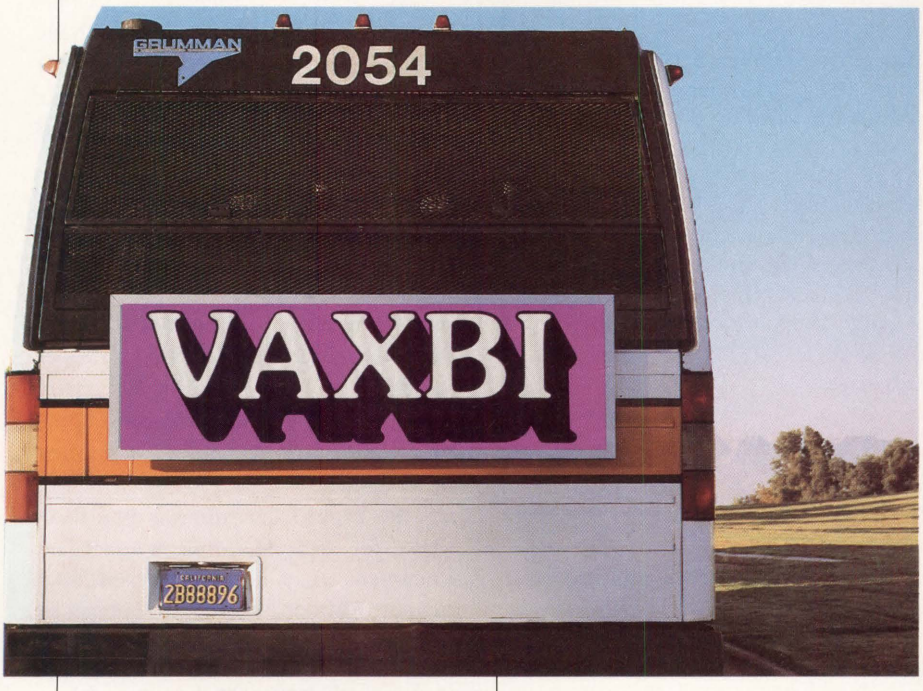

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CIRCLE 139 ON READER CARD

Searching For The Publishing Solution

If DEC doesn't have a complete corporate electronic publishing solution, who does? The likely candidates are Apple, Hewlett-Packard (HP) and Xerox.

Apple

Apple certainly is noisy in the publishing arena, but it doesn't have a corporate solution. The Mac is excellent for page composition and layout, and Microsoft MAIL is effective. But Apple networks lack volume throughput and a backup mechanism, and Apple only makes a single, low-duty-cycle laser printer.

Apple has mind share, however. People get excited about using Macs. Even without the Apple-DEC joint venture, users have been tying Macs to VAXs. There's currently no uniform standard for document exchange, but there's no dearth of innovative products.

Hewlett-Packard

HP joins the list because it makes the HP LaserJet family of printers and several larger printers. Its Vectra line of PC-compatible computers is capable, and its HP 3000 line is comparable to the VAX. Its recently introduced NewWave product shows that HP is capable of building the infrastructure needed to support a corporate electronic publishing system.

Still a couple of years away from having the needed components, NewWave will depend on support by Microsoft, Aldus and Xerox. DEC or some third-party vendor can join this arena for the price of writing a NewWave driver for the VAX.

Xerox

Xerox meets the requirements of a complete corporate electronic publishing system. Its network includes DEC products at many levels. Xerox has a uniform standard for handling fonts. Any document created on the network can be read as a document by any Xerox workstation on the network. A Xerox Document Network can coexist on an existing Ethernet system with VAXs or be part of it. The Xerox Network structure alleviates the prepublication bottleneck by electronically circulating documents during the information-gathering and preconsensus stages.

Xerox holds so many of the goodies because it developed much of the technology: the mouse, the icon-oriented desktop, the bit-mapped display, the font server network, Ethernet and the laser printer.

to all previously published documents.

2. Document Creation — After the information is gathered, document creation can begin. DEC provides word processing under ALL-IN-1 and supports PC word processors on VAXMATE and attached Mac and PC-type computers.

But corporate publishing involves more than word processing. Forms are more common business documents than memos or technical manuals. Catalogues often are created by a database program. Technical drawings also must be created.

DEC and third-party vendors have products that handle each of these tasks, but the products don't produce consistent output. The text can be filtered from one word processor to another, but no two are alike.

3. Editing, Revision and Review — To get consensus on the content of a document, the document must be printed in draft mode for review. This may range from a dot-matrix-printer page to a file that can be reviewed on-line. Here the DEC network and products such as ALL-IN-1 begin to pay off. Fewer meetings are required if content can be reviewed and amended electronically.

4. Formatting and Layout — Usually the final step, layout provides the first clear picture of the finished document. DEC has several point-product offerings for design and layout. Attached PCs can run Ventura Publisher or PageMaker and collect text and possibly illustrations over the network.

Interleaf, another DEC associate in the publishing arena, offers a document composition system that runs on the VAXSTATION. A system for composing whole documents, not just pages, Interleaf complements products like PageMaker. Interleaf also runs on workstations such as Sun under UNIX and personal computers such as the Mac and IBM PS/2.

Although Interleaf is user-interface-compatible across these machines, its paradigm is different from those of the VAX, PC and Mac. VAX skills don't move to Interleaf and vice versa.

5. Printing and Distribution — VAX-based networks provide a channel for the electronic distribution of a document. VAX departmental systems can provide remote printing, but there are some limitations, such as fonts. Proper handling of the fonts specified in a document is probably the most complex issue in distributed document processing.

PC PageMaker running on a VAXMATE, for example, can print an elegant document on a local PostScript laser printer. Although the document can be sent across the country using VAX communications services, the network can't ensure that it prints properly.

If a PageMaker user wants to print a document in three remote locations accessible through a VAX network, what should he send? He could send the PostScript output file if all three sites were equipped with PostScript printers.

He could load different printer drivers into PageMaker and print to disk

an output file for each remote printer. But he wouldn't know if the correct fonts were in each printer.

He could send the PageMaker document file if each site operated a copy of PageMaker and someone at the remote site printed the document. But there's no single solution to this problem.

6. Document Storage and Archiving — The VAXCLUSTER should provide a natural environment for managing documents. Unfortunately, each user has to manage the files as files, not as documents.

A possible solution to this problem is the Xerox Document Network. This product runs on VAXs and Xerox products in a communal mix.

Document Characteristics

In addition to accommodating the traditional publishing process, a corporate electronic publishing system must be built with reference to the documents themselves.

Documents can be characterized by three key qualities: length, complexity and lifespan.

1. Document Length — The length of a document specifies the type of system required to process it. One-page memos can be produced on a typewriter. A 20-page technical summary is the natural domain of a Mac running Quark XPress or PageMaker. The average desktop publishing system easily can publish a typical company telephone directory.

Composition capability isn't necessarily the key issue. Many desktop publishing systems might be capable of publishing a long document, but the typical laser printer with a 10,000-copy-per-month duty cycle and $100-per-cartridge toner cost might not be a viable output device. DEC should offer attractive options in routing the output to a large Kodak or Xerox printer in the data center.

2. Document Complexity — This can mean the complexity of the finished document or the complexity of the process that produced the document. If executives need to agree on the points in a position statement, for example, they can use VAXMAIL to pass around the draft document. But if they want to discuss the appearance of the printed document, they must work with paper, because most page composition packages target the output for the printed page, not electronic distribution.

3. Document Lifespan — The lifespan of a document sets requirements for the type of system that should process it. A telephone message has a very short lifespan. A corporate procedures manual, on the other hand, probably needs revision every year. Tax records must be stored for years. The document with the longest active lifespan is the template used to specify a form.

As an example of how two complimentary products don't quite connect, the Mac has all the tools necessary to design and publish forms, such as merged text and graphics, multiple fonts and extensive object-drawing capability. But electronic forms frequently are used to capture input data for database applications or for encapsulating report data. These applications are best delivered on terminals attached to a VAX.

IN THE LONG TERM, DEC should do well in corporate electronic publishing. Its VAX networks already carry the information traffic that begets the documents to be published. Of all the major firms that are pursuing real corporate electronic publishing solutions, DEC has key products that are incorporated within the solutions provided by the other vendors (see box). Users are excited about connecting the Mac to the VAX. Hewlett-Packard, an honorable competitor, will get its biggest boost if DEC embraces NewWave, a graphical interface for multitasking. And Xerox, a leader in imaging and printing, includes VAX networks in its products.

—Ashley D. Grayson is founder of ADG, a marketing services organization in San Pedro, California.

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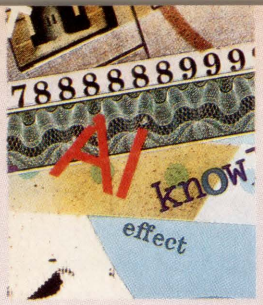


AI

SEEING IS BELIEVING

By David G. Goldstein

The New Field Of Computer Vision Provides The Answers To An Image Processing Riddle.

Two of today's richest topics in computer science, graphics and artificial intelligence (AI) have met in a relatively new field of exploration: computer vision. Computer vision has many applications, ranging from medicine to music.

In many ways, computer vision is the apex of computer science. Besides incorporating concepts useful as part of most other automated endeavors, the effort to create a seeing, thinking machine is also one of the most philosophically interesting endeavors in the computer field.

A subset of image processing, computer vision uses knowledge from many diverse areas of computer science. For example, acquiring, storing and displaying images, each on the order of 1 MB, raises database, real-time data collection and graphics problems.

To simplify matters, the focus here will be on the process of training a machine to recognize objects that are embedded in an image for some later data processing, real-world manipulation or as simple statistical evidence for some larger problem.

The first consideration is how does the VAX "see"? A number of input devices, including optical scanners, graphics tablets and digitizing cameras, can serve as eyes. Choosing the proper device depends on your application.

The characteristics of the most readily available devices include:

1. Digitizing cameras — Excellent for obtaining real-world images for processing. These are necessary in applications like robotics or scene analysis. The main considerations are the size of the camera, hardware synchronization and the level of noise (imperfections).
2. Graphics tablets — Fine for hand-drawn pictures and graphic-analysis applications. Although the tablets are useful in obtaining human-guided information of the images, they can't be used to enter real-world images.
3. Optical scanners — Useful in analyzing static images like drawings or UPC bar codes. Whatever is being analyzed must be scannable, so a given scanning device has severe limitations as to what it can process.

As Clear As Black And White

The first step in processing an image is to simplify the information. Even in the least sensitive applications using cheap equipment, graphics require large amounts of memory.

Also, some popular applications and noise reduction techniques (i.e., methods to lessen imperfections added in the translation process from real world to computer via the camera and its connections) require many pictures to be in memory at one time, which further compounds the problem. Therefore, the quicker you eliminate useless information, the easier the processing.

For example, if the graphics supported are

> In many ways, computer vision is the apex of computer science.

of good quality, the resolution might be 1,024 x 1,024 pixels. Assume that the number of colors available at any one time is 256 (2^8). Then, 1,024 x 1,024 x 8 bits, or 256K 32-bit words per picture, will be used. When 10 such pictures are in memory at once, a VAX moans pitiously.

There are several solutions to this problem, but perhaps the simplest is a technique called binarization. This incorporates the assumption that the image has two distinct regions, foreground and background. Each can consist of many objects, but both must have distinct ranges of color values that they assume. This convenient assumption often can be used in manufacturing environments.

For example, in Screen 1, the background consists of various light shades and the foreground of dark shades. If the computer knows the approximate range of values the regions reasonably can take on, the shade information can be reduced to two values, one signifying foreground (on) and the other background (off).

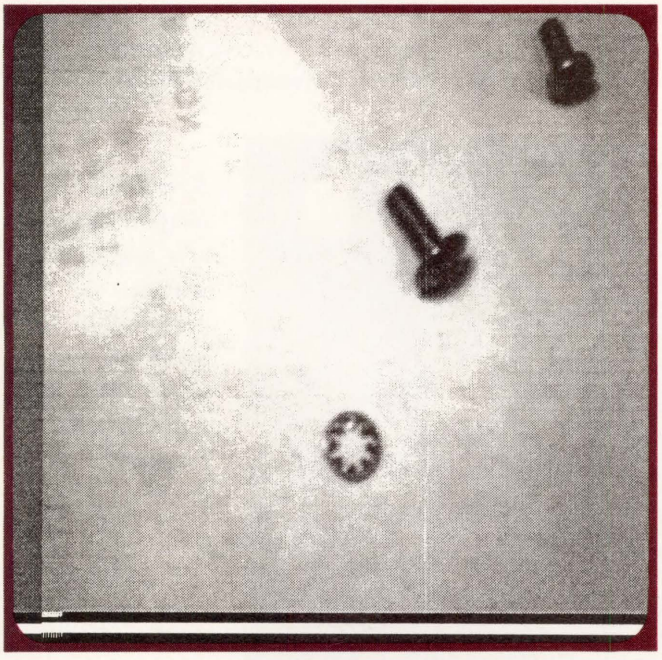
Another advantage of this technique is that it can aid in handling noise. If you know the approximate size of objects, you can determine what specks in the image are noise introduced as the image is obtained from the real, analog world.

Screen 2 shows the image after being processed by the binarization technique. In this example, all foreground (dark) regions have been set to zero and all background (light) regions to 255 (absolute white). Because the entire image now comprises only two distinct values, storage requirements can be reduced from eight bits per pixel to one. All comparisons are simpler. If BLACK is set to zero, any lighted coordinate can be determined by NOT(BLACK). Any one of a huge number of compression algorithms can be used to store the new image in a fraction of the original memory.

Golden Rules

After the image has been simplified, the process of identification is easier. First, identify which points belong to which objects. Then:

1. Identify objects on the screen via a system of rules.
2. Add unknown objects to the list of objects, along with the true rules associated with them. A good general approach to identifying difficult, possibly noise-obscured objects is by assigning probabilities to the various shapes an object might be and investigating specific attributes of the object further. This search is guided by the probability of the object being a specific item, as supported by evidence of common



Screen 1: An example of an image prior to binarization incorporating the assumption that an image has two distinct regions, foreground and background, which can be treated as black and white.

Screen 2: An example of an image subsequent to binarization. All dark regions have been set to zero and all light regions to 255 (absolute white).

FIGURE 1.

		1	1	1	1		2
2	2	2	2				2
			2	2	2	2	2
			2	2	2		
		3	3	3	3		
		3	3	3	3		

Before

		1	1	1	1		1
1	1	1	1				1
			1	1	1	1	1
			1	1	1		
		3	3	3	3		
		3	3	3	3		

After

Hypothetical image before and after numberings of pixels in the merging process.

characteristics of both the object and the prototype.

For example, if an object was either a ring or a washer, you could concentrate your search on determining the thickness and reflectivity of the object, disregarding other types of characteristics. As you become more sure that it's a gold ring, you could continue to make tests that prove rules that are true only with rings.

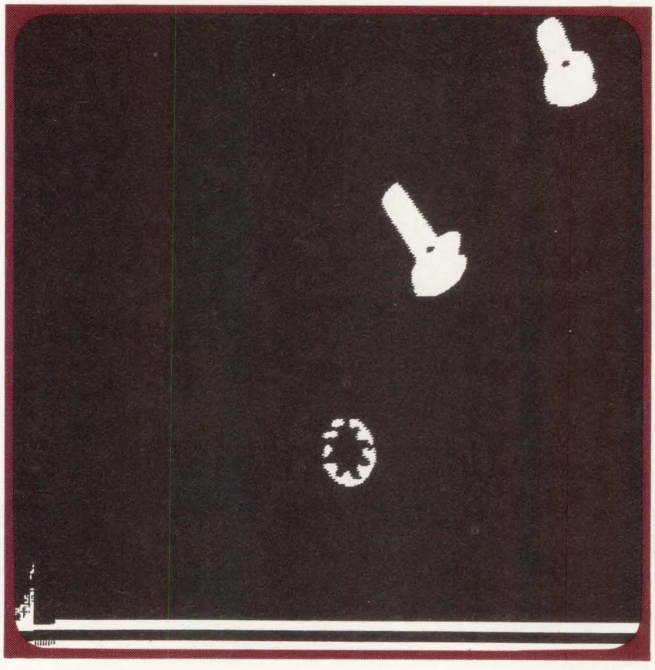
3. Discard undesirable items that have escaped noise detection. Points of noise often enter the system as phenomena of lighting, "stuckixels" (i.e., totally black points in the image due to the internal structure of the camera) in the camera apparatus or from an unsynchronized hardware arrangement. The rules governing objects can be simply-derived mathematical constructs from geometry, trigonometry and calculus. Because you know which points are illuminated, you can apply their coordinates on the formulas and, using error tolerances, determine which ones hold true.

Object Detection

The algorithms you can use to detect objects can be divided into two classes: recursive and non-recursive.

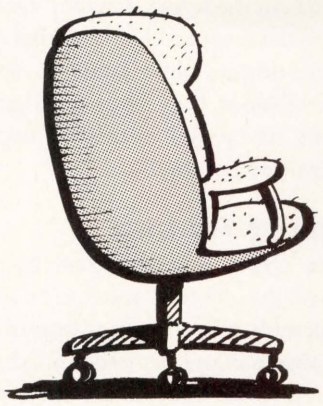
Recursive algorithms, those that operate by referring to themselves, are common in image processing. That's because of their intuitive nature. However, they're slow because of the stack manipulation involved and sometimes they're unavailable because of language limitations. Therefore, this procedure is non-recursive and can be implemented in any language to segment an image of non-overlapping items into its appropriate components:

1. Initialize the number of objects found to zero, and all collisions of objects to point to themselves. When all objects are labeled properly, each object should comprise only one numbered type of object, surrounded by background, and



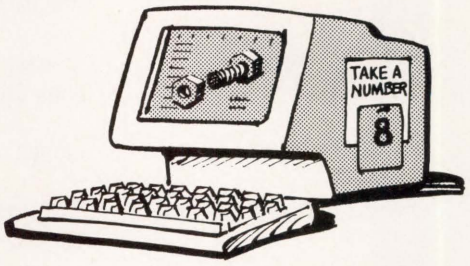
Screen 3: This image is the result of a non-recursive procedure for detecting objects, which can be implemented in virtually any language.

Three Things You Shouldn't Have To Share At The Office



Chair

Coffee Cup



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CIRCLE 124 ON READER CARD

TABLE 1.

Property	Determination
1. Straight line	Compare a closest fit line to points computed from; you can use "leastsquares" method or Hough domain (error-bound).
2. Filled	At least one point has neighbors in all directions (absolute).
3. Parallel lines	Slopes of two lines are similar (error-bound).
4. Lines intersect	Two already determined lines have a point in common (absolute).

An example of a few of the properties that can be attached to objects.

TABLE 2.

```
Button :- round, x_mass_moment = y_mass_moment,
holes_present>1.

Tire :- ring, large.

Ring :- round, x_mass_moment = y_mass_moment,
holes_present=1.

Gold :- shiny, heavy.

Shiny :- reflectance>1.

Heavy :- pressure>10.

Engagement_ring :- gold, ring.
```

A Prolog description of a few common items.

where no two objects should collide.

2. Scan the screen in raster-like fashion. At each lighted point, determine the object number to assign the point. If currently in an object (last point checked was illuminated), this number is the current object number. Otherwise, it's a new object, so increment the current object number and label the point as such. Check the neighboring points already scanned, and if any have lower object numbers than the current one, record a collision from this object to the lowest numbered object of these neighboring points.

3. Resolve the collisions that have been recorded. Resolving collisions is analogous to panning for gold: you sift the objects until the junk disappears. More specifically, repeatedly map all higher-numbered objects into the lower-numbered objects with which they collided, until all objects collide only with themselves. Figure 1 depicts the merging of two colliding objects into one.

4. Rescan the points, labeling each object to the mapped object number of the point's original object number. After all the collisions have been resolved, the points are labeled to their appropriate object (see Screen 3).

Breaking The Laws

After object numbers have been assigned, the objects' points can be applied to formulas. Two types of formulas exist: absolute and error-bounded.

Absolute criteria are used where any deviation from the rule causes the property to be considered FALSE for the object. Only logical (true or false) values of the characteristic are possible.

Conversely, error-bounded criteria have an associated percentage chance of the characteristic being true for the object (depending on how well the characteristic held true) and can be used either as that percentage or as a Boolean value if it exceeds some threshold, i.e., TRUE if greater than 85 percent. These types of associations often are thought of as fuzzy logic, where truth is sought but can't be thought of in absolute terms.

An endless number of properties can be attached to objects (see Table 1). These are simple to compute; others require complicated mathematics.

In The End

Rules like those above lead to AI solutions that look familiar, as in Table 2.

Because you have characteristics, you can incorporate them into rules. Then, the objects can be tested by the rules, and those that apply determine their identities.

As an example, consider the task of identifying letters on a printed page. Some easy letter definitions consist of:

I — One line; no other properties.

V — Two lines, 30-degree angle; no

other properties.

L — Two lines, perpendicular; no other properties.

O — Closed line; no other properties.

However, it's possible that some garbage objects can avoid detection by the binarization routine. Therefore, numerous properties should be tested so that all valid objects have at least one rule that applies, allowing any object with no TRUE qualities to be thrown out. Such systems form the basis of many of the character recognition algorithms used in optical scanners.

> An endless number of properties can be attached to objects.

Consider the seemingly endless variation of objects in the real world. Suppose, for example, that in a medical application, you're trying to detect an organ of the human body in an X-ray. Even though an object is computed to have at least one property, it might not have *all* the properties of the particular organ you're seeking. Also, the differences between the desired organ and the others in the system could be more important to the inquiry than the similarities.

The sensor information driving your system could be imprecise, or the quantity being measured might be inherently ambiguous. One effective method for handling these problems is to maintain the database of rules such that in the event of unusual occurrences, the machine asks for user verification. Responses can be to:

1. Discard the object.
2. Name the questioned pixels with the object having the most fitting rules.
3. Add a new object to the database with the corresponding appropriate TRUE rules.

As processing speed increases, camera resolution improves and mathematical techniques become more sophisticated, computers will be able to see a wider variety of objects with better detail. With parallel processing and dedicated vision hardware, the philosophical concepts become reality.

—David G. Goldstein is an independent consultant from Philadelphia, Pennsylvania.

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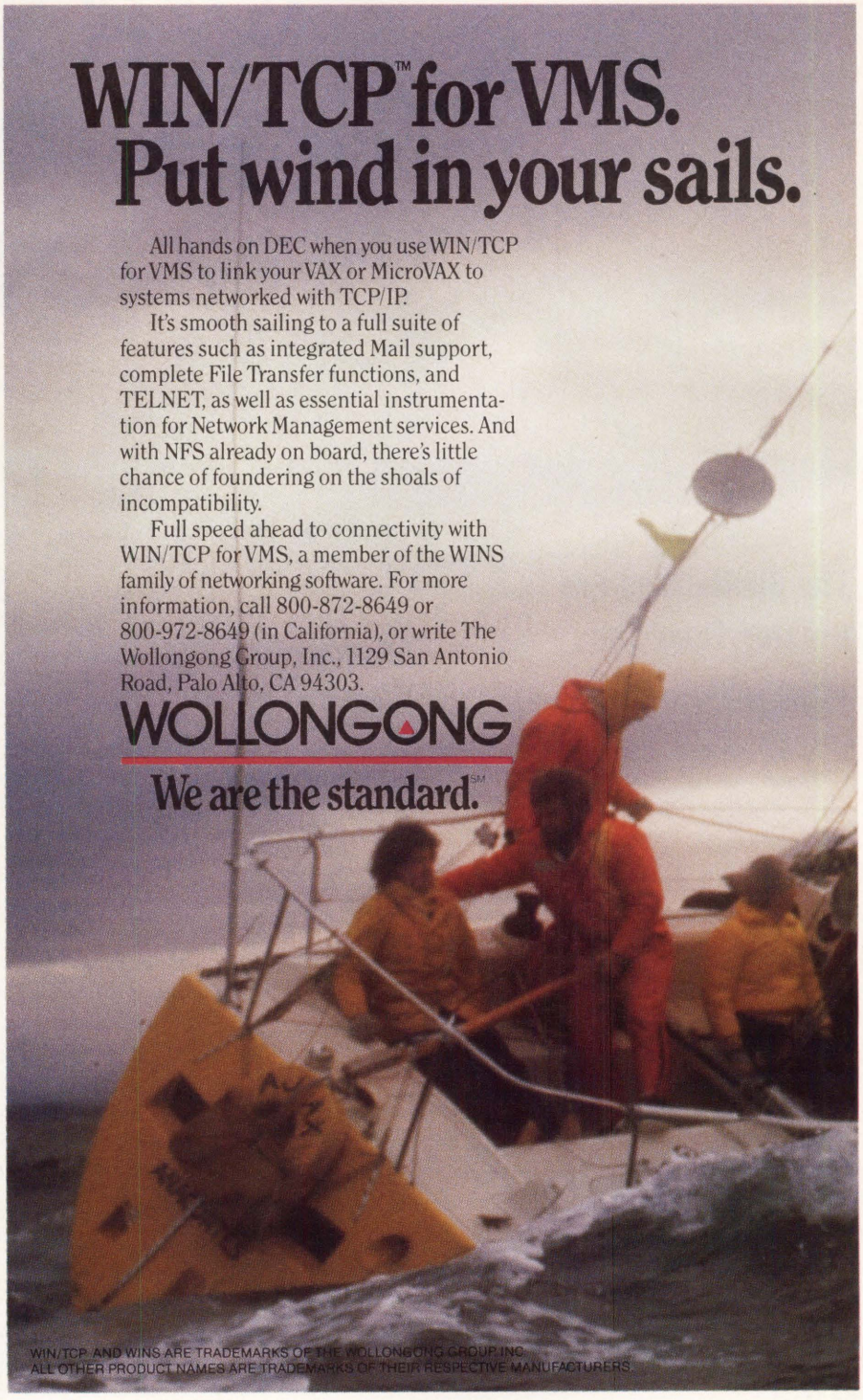

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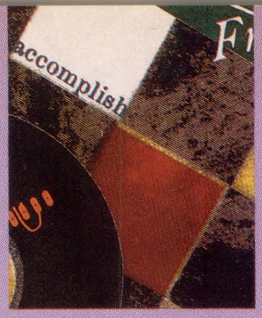

UNIX

SWITCHING BETWEEN VMS AND UNIX

By Bob Besner

The Similarities Are Greater Than The Differences.

Both VMS and UNIX have gained a significant hold in the marketplace over the last 10 years. The operating systems have a dedicated group of followers and are found on DEC hardware. However, there still are many people who haven't been exposed to both systems and perceive the other suspiciously because of a lack of knowledge. In fact, some programmers, who haven't crossed the boundary between the camps, dismiss the other. If they only had the opportunity to work on both systems, they would realize that the similarities between them are more outstanding than the differences.

Comparisons are inevitable when two systems are involved. However, by adopting an attitude of acceptance of the commonalities, it becomes easier to switch systems and learn the nuances of the products. The following observations will clarify some aspects of the other operating system and help you make the transition between these growing environments.

I am writing this article under the assumption that you have a solid background on at least one of the systems and are aware of the requirement for switches, options, filespecs and other parameters on commands. I'm also assuming that you accept that a function may be accomplished in more than one way and you acknowledge that commands and utility programs are interchangeable terms.

Directory Structure

A hierarchical directory structure is one of the most obvious similarities between the systems. An identical structure of directories leading to files can be set up under both environments. Even the utility programs or commands are similar with the techniques used to work with directories (see Figure 1). Note that UNIX is case-sensitive.

In VMS, the combination of logical names and DCL symbol tables, often set up through LOGIN.COM, provides a way of defining keywords that will navigate you efficiently to an object or directory. ASSIGN statements and command procedures can be run any time to further tailor your directory usage environment.

In UNIX, your directory search path can be defined in .profile. Your request to find a file or execute a program will be serviced by following, in order, the series of directories specified as your PATH. This lets you optimize access to frequently used objects. You also can place other unique path statements in the .profile file that will be used only by select programs. For example, WORDPATH = :/user/word: defines a path to word processing software with the keyword WORDPATH known and

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FIGURE 1.

Directory Operation	Command	
	VMS	UNIX
Show current path	SHOW DEFAULT	pwd
Create/make	CREATE/DIR	mkdir
Delete/remove	DELETE	rmdir
List contents	DIRECTORY	ls
Change directory	SET DEFAULT	cd

Techniques used to work with directories in UNIX and VMS.

FIGURE 2.

File Operation	Command	
	VMS	UNIX
Find a file	DIR	find
Move or rename	RENAME	mv
Copy	COPY	cp
Delete/remove	DELETE	rm
List contents	TYPE	cat
Print	PRINT	lp

This command summary demonstrates how to handle files under VMS and UNIX.

FIGURE 3.

Operation	Command	
	VMS	UNIX
Show users	SHOW USERS	who
Show processes	SHOW PROCESS	ps
Show devices	SHOW DEVICES	du
Show printer	SHOW PRINTER	lpstat
Show print queue	SHOW QUEUE	lpstat
Mount	MOUNT	mount
Dismount	DISMOUNT	umount
Mail	MAIL	mail
Kill a process	STOP/ID=	kill

Standard operations performed on VMS and UNIX.

used by the vendor's word processing package through UNIX control.

Files

File naming conventions and attributes also are similar. However, VMS has noticeably longer filenames with 39 characters versus 14 for UNIX. You still could adopt the same naming standard for both systems and find only the significance of extensions slightly different. VMS attaches an importance to extensions and supports version numbers, something not available in UNIX. Fortunately, both operating systems use the From/To approach to provide filespecs in commands and support wildcards. The wildcard * essentially works the same on both systems as a substitute all, and a VMS % and UNIX ? serve to substitute a character. VMS also supports search up directories with . . . and down with -. The command summary in Figure 2 demonstrates how to handle files under the two environments.

> VMS attaches an importance to extensions and supports version numbers . . .

In VMS, filetypes generally are specified by the last three characters of the filename: e.g., an extension of .COM indicates a command file. This identification technique is used by some VMS software; however, it isn't mandatory. Further typing of files is accomplished through the definition of file attributes, organization and record format. A DIR/FULL will show you the details of a file definition.

The only filetypes recognized by UNIX are d directory, — ordinary, b block and c character. You have no option on the use of these and can view this flag with ls -l or file command. On occasion, setting the protection of ex-

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ecutable on non-executable text files causes problems in UNIX.

Access Control

The basic approach to account creation and password control is identical on the two operating systems. In UNIX, a system manager edits two files, /etc/group and /etc/passwd, to introduce a new user. UNIX interrogates these files from the log in program to identify a prospective user and place him within his proper directory. Log in also examines .profile in the user's directory to initiate a set of default parameters and invoke any particular series of commands or programs that the user wants run at the beginning of a session. The passwd command will change a password.

In VMS, AUTHORIZE and ALFMAINT maintain the two files that form its foundation for access control, SYS$SYSTEM:SYSUAF.DAT validates log in requests and SYS$SYSTEM:SYSALF.DAT supports automatic log in of terminals. A user's LOGIN.COM file is used in much the same manner as UNIX .profile to initiate session parameters. SET PASSWORD maintains passwords.

VMS also has an extensive list of interesting optional restriction enhancements, such as a password generator, nodialup, days and hours of access and various quotas. A scheduling priority also can be assigned to a user.

Protection

The concept of system, group, owner and world user classes, and read, write, execute and delete permission masks is used on both systems with a slight variation in implementations. A full UNIX directory report, ls -l, or VMS DIRECTORY/PROTECTION, will show you the protections placed on files. In VMS, SET and DIRECTORY are used to change protections. In UNIX, the chmod, chown and chgrp commands are used.

> The control and protection mechanisms of both environments are adequate to keep cooperative users out of trouble, if the system's capabilities are used.

In addition to the default protections provided by defining objects under VMS (i.e., users, files, devices), VMS supports customized access control lists (ACLs) with access control entries (ACEs) and an alarm journal of certain successful or failed accesses.

The control and protection mechanisms of both environments are adequate to keep cooperative users out of trouble, if the system's capabilities are used. The trick is getting users and system managers to use more than system defaults and take some care in implementing security features. We often forget that the majority of security infractions are performed by our own employees, not the outside world.

Other Interesting Features

On all computers, we need (or like) to perform some standard operations (see Figure 3).

The user environment under VMS has HELP, command line recall and editing, a fine editor (EDT), a capable backup utility, the ability to define function keys, command procedures and logical names. VMS also has a basic functional set of utilities, with a reasonable number of options to extend the user's work envelope. These features are appreciated immensely by users.

In UNIX, a valuable capability is a pipe. This is a series of commands performed in succession with data passing from one utility to the next, e.g., the command:

```
ls | sort -r | lp
```

will do a directory listing, sort it in reverse order and send it to a print queue. In addition to pipes, UNIX has I/O redirection with the symbol < opening a file for reading, > opening one for output and > > opening one for appending. A command:

```
ls >> Rep
```

will append the directory listing on the end of a file called Rep. UNIX shell programming resembles DCL command files.

The breadth and versatility of UNIX commands and utilities are astounding with a combination of more than 300 available under the standard AT&T System V definition. These programs usually support a dozen or more switches and options, sufficient to boggle most users.

THE SIMILARITIES BETWEEN these two environments make the transition simple. Of course, detailed procedures and techniques must be learned the hard way with manuals and repetition. As most people take PC operating systems in stride, a working knowledge of VMS and UNIX will become commonplace. The two will coexist for many years and users will require a familiarity with both to get the job done effectively. I've made no attempt to qualify one operating system above the other, and suggest approaching both systems with a get-down-to-business attitude. *—Bob Besner is a systems analyst at the Department of National Defense, Ottawa, Ontario.*

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DIGITAL WATCH

Evan Birkhead

Parallel Emphasis

With the release of ULTRIX version 3.0, late this summer, DEC certified that it's moving in a new direction. DEC now is placing "parallel emphasis on ULTRIX and VMS," explains Bill Strecker, vice president of product strategy and architecture. Other sources at DEC confirm that it's devoting equal capital to research and development for both operating systems.

This is a complete turnaround for a company that a few years ago offered ULTRIX as an afterthought. But even then DEC claimed the number one spot among UNIX-based CPU vendors. DEC also has slipped ahead of Apollo into the number two spot among workstation vendors, delivering more than 30,000 workstations in 1987.

Further UNIX-related hardware developments are expected soon from DEC. You easily can see DEC's image of its future: UNIX plus workstations, workstations plus UNIX.

Networking Emphasis

DEC's ULTRIX strategy stresses network integration. Also inherent in V3.0 are tightly integrated paths to VMS and DECNET. The major new facilities include:

1. ULTRIX NFS Clusters, which allow VAXs and HSC 70 controllers to interoperate over a 70-Mbit link based on NFS protocols.
2. The VMS/ULTRIX Connection, which enables file sharing via NFS by layering TCP/IP and NFS on VMS (see Figure 1). With this connection, VAXCLUSTERs can be configured as NFS servers to UNIX-based workstations, allowing them to take advantage of many cluster features, including volume shadowing.
3. DECNET/ULTRIX V3.0, which ties ULTRIX systems to networks running DECNET Phase III/IV operating systems. This also supports the newer 6210/6220 and 8810/8820 VAXs. Significantly, an ULTRIX system can serve as a gateway between DECNET/OSI and TCP/IP networks.
4. The ULTRIX Mail Connection, which integrates ULTRIX and other UNIXs with VMS-based mail over the MAILBUS, allowing mail exchange between IBM PROFS, SNADS, X.400, SMPT and other gateway users (see Table 1).

Many VMS features that were lacking in ULTRIX have been added in V3.0, e.g., VAX C, VAX FORTRAN and VAX LISP. Three major relational DMBS systems, Informix-SQL from Informix Software Inc., ORACLE from Oracle Corporation and INGRES from Relational Technology Inc., immediately demonstrated support for the new facilities in ULTRIX.

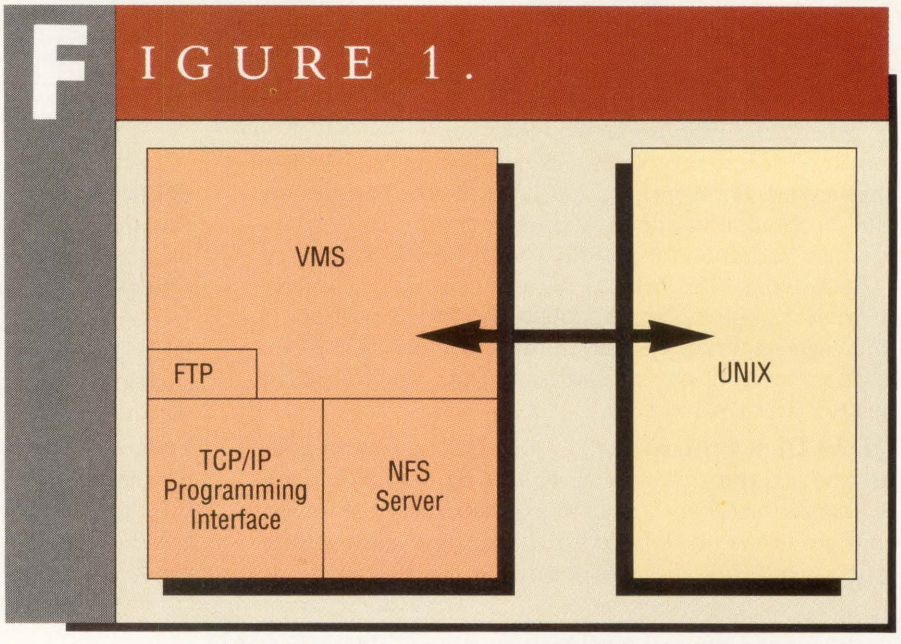
Third-party solutions will enhance V3.0's capabilities substantially. Using VAX Link, a V3.0-compatible software system from Systems Strategies Inc., ULTRIX processors can access and exchange data with IBM mainframe and midrange computers.

Standards Compliance

With ULTRIX V3.0, DEC backed standards commitments in several areas. Boasting that the new ULTRIX is the first OSF-compliant (Level 0) UNIX, DEC also staked ULTRIX compliance with POSIX specifications (fresh from approval in IEEE committee 1003.1), OSI, X Version 11, X/Open and the National Bureau of Standards.

DEC's ability to produce a flavor of

FIGURE 1.



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ULTRIX version 3.0 stresses network integration tying ULTRIX together with VMS using NFS protocols.

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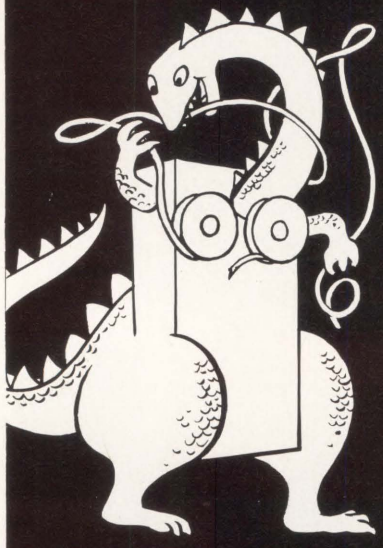

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TABLE 1.

ULTRIX-32 Upgrade Price List

ULTRIX-32 version 3.0	From $2,100 on a VAXSTATION 2000 to $56,058 on a VAX 8820
DECNET-ULTRIX version 3.0	From $525 on a VAXSTATION 2000 to $9,870 on a VAX 8820
ULTRIX Mail Connection	From $656 on a VAXSTATION 2000 to $15,876 on a VAX 8800
VMS ULTRIX Connection	From $7,500 on a MICROVAX 360 to $126,000 on a VAX 8978 and equivalents
ULTRIX Worksystems Software version 2.0	From $1,575 on a VAXSTATION 2000 to $3,150 on a VAXSTATION II/GPX

Courtesy of Digital Equipment Corporation

TABLE 2.

DSV11 Synchronous Interface	$4,650
DECROUTER 2000	$12,500
X25ROUTER 2000	$16,500
DECNET/SNA Gateway for Channel Transport	$44,500
DECNET/SNA Gateway for Synchronous Transport	$20,500
VMS/SNA version 1.3	From $630 on a VAXSTATION II to $17,290 on a VAX 8840
DECNET/SNA Data Transfer Facility version 2.0	From $2,100 on a MICROVAX 2000 to $21,000 on a VAX 8800
VAX FTAM – File Transfer, Access and Management	From $900 on a MICROVAX 2000 to $21,600 on a VAX 8800

Courtesy of Digital Equipment Corporation

Price list for new connectivity software and hardware from DEC.

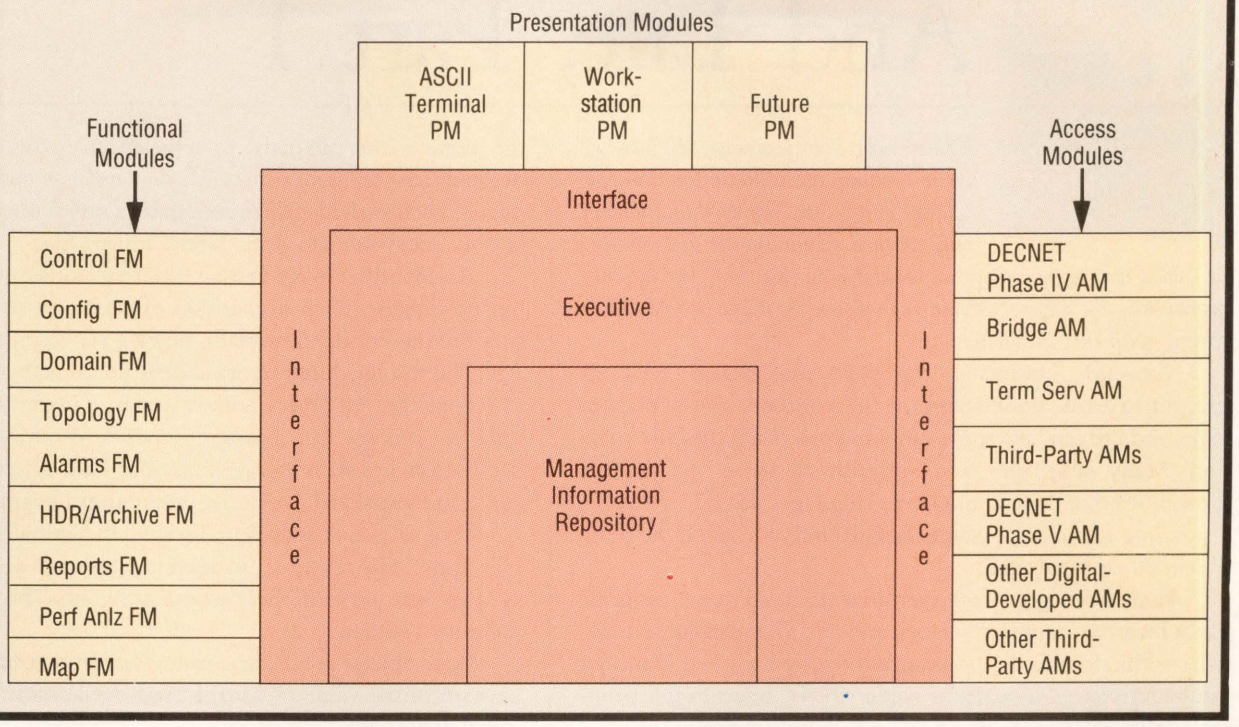
UNIX that satisfies the goals of the OSF so soon after OSF's birth is significant. By quickly providing a workable, compliant product, DEC quelled many critics. Not only does ULTRIX V3.0 make industrywide UNIX compatibility seem achievable, it validates the motives of OSF, which had come into question. Level 0 is the first set of compatibility requirements specified by OSF.

The X User Interface (XUI) toolkit is available in a separate operating system offering called ULTRIX Worksystem Software, a configuration of ULTRIX optimized for VAXSTATIONs.

Connectivity Products

The commitment to OSI underscores DEC's pledge to "enterprise network-

FIGURE 2.



Courtesy of Digital Equipment Corporation.

DEC's Network Enterprise Management Architecture.

ing," i.e., connecting networks throughout a multivendor enterprise (see Figure 2). Complementing DECNET/OSI, DEC released VAX File Transfer and Access Management (FTAM), software based on the OSI model.

The debut of the DEC ULTRIX platform coincided with the introduction of new connectivity software (see Table 2).

The SNA Interconnect was enhanced to include DECNET/SNA gateways for Channel Transport (CT) and Synchronous Transport (ST). DECNET/SNA Gateway CT allows bidirectional data exchange over the DEC Channel Server, which attaches to an S/370 channel.

DECNET/SNA Gateway ST provides many of the same features over the DEC MicroServer, a new communications server. A hardware system also was announced to support these links, the DSV11 wide-area synchronous interface, a two-port device supporting VMS device drivers and several communications protocols.

Another layer, DECNET/SNA Data Transfer Facility (DTF), now in version 2.0, transfers data between MVS/SNA networks and DECNET/OSI networks.

VMS/SNA version 1.3 is the most recent upgrade to the software. This lets VAXs participate in IBM SNA environments by accessing databases, exchanging files, emulating a 3270 terminal, or booting distributed applications designed to run between the IBM and host.

DEC also released new router systems for ULTRIX and VMS: the DECROUTER 2000, a four-line message center, and the X25ROUTER 2000, which operates over X.25 connections. ■

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Rex Jaeschke

Identifier Scope And Life, Part 1

Editor's note: Four years ago, Mr. Jaeschke wrote a column titled "Recursion, Variable Classes And Scope." Because that column only touched on the subject and ANSI C has added new terminology and capability in this area, Mr. Jaeschke has rewritten the original column and will present it as a two-part series starting with this installment.

Although mastering the type mechanism of C is straightforward, understanding the concepts and syntax of scope and life can take some time, and practice is the only solution. Many languages don't provide all the scope and life capabilities that C does, but some languages provide more. So, depending on your language background, you might be overwhelmed or frustrated.

Apart from type, each identifier declared in a C program has at least two properties: scope and life. The scope of an identifier is the domain of the program over which that identifier can be referenced directly by name. ANSI C refers to this property as *linkage*.

The life of an identifier applies only to data objects, and it refers to the time during which an object actually exists. ANSI C calls an identifier's life its *storage duration*.

The three kinds of linkage are external, internal and none. External linkage permits an identifier to be accessed by name from any part of the program in which that identifier has been declared properly. In effect, the identifier is a global symbol that's exported to the linker for final linkage resolution.

An identifier with internal linkage only can be accessed by name from any part of the source file in which it's declared. All references to such identifiers can be resolved by the compiler, and as such, these names aren't exported to the linker.

Consequently, many identifiers with internal linkage and the same name can exist in a program, provided each is declared in a separate source file or *translation unit*, as ANSI C calls it. Each such identifier designates a different entity, which is only accessible from its parent source file.

An identifier with neither external nor internal linkage has no linkage. Each declaration of such an identifier refers to a unique entity. Automatic objects are examples.

The storage duration of an identifier directly corresponds to its linkage. An object with external or internal linkage, or with no linkage but a storage class keyword **static** in its declaration, has static storage duration. That object is allocated space and initialized once only before **main** begins execution.

Typically, this space is allocated and initialized at compile time. However, C programs running on embedded systems must perform these actions at run time, because they're memory resident.

Such objects retain their value across function calls. They have an initial value of zero if their declaration contains no initialization list.

Any object not having static storage duration has automatic storage duration. This applies to all identifiers with no linkage and no **static** class keyword present in their declarations.

These objects only can be declared inside a function definition, and each time their parent block is entered, a new instance of them is created.

If an initialization list is provided, the object is initialized provided the block is entered normally, i.e., by dropping into

FIGURE 1.

```
main> i = 5200, ul = 12345, d = 7.649152e-056
   f> i = -100, ul = 5454172, d = -3.454000e-001

main> i = 4369, ul = 12345, d = 1.801076e-226
   f> i = -100, ul = 286331153, d = -3.454000e-001

main> i = 3933, ul = 12345, d = 2.679508e-277
   f> i = -100, ul = 10355163, d = -3.454000e-001
```

FIGURE 2.

```
Please enter an alphanumeric character: #
Please enter an alphanumeric character: $
Please enter an alphanumeric character: A
B1> i = A, d = 10.50
B2> i = 675, d = A
B1> i = A, d = 10.50

Please enter an alphanumeric character: Z
B1> i = Z, d = 10.50
B2> i = Z, d = 432, j = 123
B1> i = Z, d = 10.50
```

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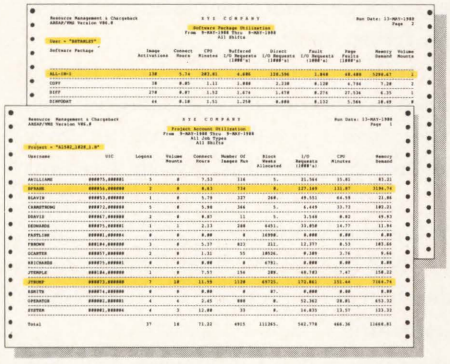

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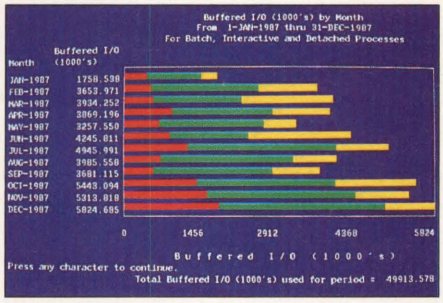

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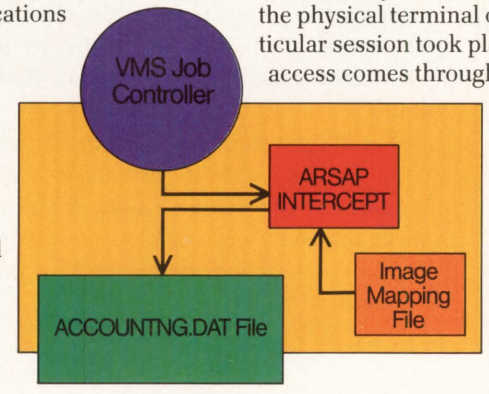

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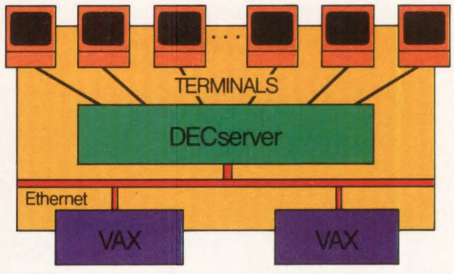

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it. Otherwise, the initial value is undefined.

When the block in which the object is declared ends, the storage space no longer is guaranteed to be allocated.

Linkage and storage duration are determined by the presence or absence of a class keyword in a declaration, and whether the declaration occurs inside or outside a function definition. Here, an identifier declared outside a function definition will be called an external identifier, and one declared within a function definition will be called an internal declaration.

The class keywords available in C are **auto**, **register**, **static** and **extern**. If a declaration contains a class keyword but no type specifier, the type **int** is assumed. For example, **auto i;** is equivalent to **auto int i;**.

If the class keyword is omitted, the type must be stated explicitly. If both class and type keywords are present, they can be specified in any order, provided they both come before the identifier being declared.

However, always place the class keyword first, because it's obsolescent to place it elsewhere, according to ANSI C.

The auto Class

The **auto** keyword is optional. If an internal object declaration has no class keyword, class **auto** is assumed. Because automatic objects only can be declared inside a function definition and **auto** is the default class, this keyword rarely is seen. Its use always documents the default behavior. Some examples of automatic declarations are:

```
#include <stdio.h>

main()
{
        auto int i;
        auto unsigned long ul = 12345;
        double d;
        void f(void);

        printf("main> i = %d, ul = %lu, d = %e\n", i, ul, d);
        f();
}

void f(void)
{
        int i = -100;
        unsigned long ul;
        double d = -345.4E-3;

        printf("   f> i = %d, ul = %lu, d = %e\n", i, ul, d);
}
```

The output produced by three different compilers is shown in Figure 1.

Both **main** and **f** contain three automatic declarations, each occupying a different memory location. All six variables have automatic storage duration and no linkage.

In **main**, only **ul** is initialized explicitly, so the initial values of **i** and **d** are undefined, and the three lots of output show different values for these variables.

In **f**, **i** and **d** are explicitly initialized, whereas **ul** isn't, and this is reflected in the output.

The three variables declared in **main** are allocated space when **main** is invoked, and they continue to exist until **main** terminates by dropping through its closing brace, i.e., an implied **return** without a return value.

Although **main** transfers control to **f**, all of **main**'s automatic variables remain in existence across the function call.

When **f** is invoked, space is allocated for its three automatic objects, and this space is released when **f** returns control to **main**.

The scope of each function's automatic variables is their parent block. However, their life lengths differ. The variables of **main** exist for the duration of the program, but **f**'s variables only exist while **f** is executing.

As **f**'s variables disappear when **f** terminates, their addresses never should be passed back to their caller or used after **f** has terminated, because the addresses point to where the variables existed previously.

Even if these addresses are accessible (and they're not on some machines), their contents might not be intact.

Note that automatic variables can be returned by value, because this involves returning a copy of them. The copy returned can exist beyond the life of the original automatic variable.

The life and scope of an automatic variable span the same amount of source code. It exists and is visible only in its parent block and any subordinate blocks. A block is a piece of source code delimited by a pair of braces occurring inside a function definition. A function contains at least one block delimiting its body.

CORRECTION

The following example and text appeared in "Reading And Writing Declarations, Part 1," October, page 150:

When these two pairs are erased, you get:

```
int (*fp)( );
```

Now there's one pair left. . . . If they were removed, as in **int *fp( );**, **fp** would become a function that returns a pointer to an **int**. That's not the goal, and that's as far as you can go.

This should have read:

When these two pairs are erased, you get:

```
int *(*fp)( )
```

Now there's one pair left. . . . If they were removed, as in **int **fp( );**, **fp** would become a function that returns a pointer to a pointer to an **int**. That's not the goal, and that's as far as you can go.

A function can have an unlimited number of blocks, some of which are subordinate to others, and all of which are subordinate to the block enclosing the whole function body, as in:

```
#include <stdio.h>
#include <ctype.h>

main()
{
            int i;
            double d = 10.5;

            while (1) {
             printf("Please enter an alphanumeric character: ");
             i = getchar();
             if (isalnum(i))
                         break;

             getchar();  /* ignore new-line terminator */
            }

            printf("B1> i = %c, d = %.2f\n", i, d);
            if (i > 'M') {
             int j = 123;
             int d = 432;

             printf("B2> i = %c, d = %d, j = %d\n", i, d, j);
            }
            else {
             long int i = 675L;
             char d = 'A';

             printf("B2> i = %ld, d = %c\n", i, d);
            }

            printf("B1> i = %c, d = %.2f\n", i, d);
}
```

Some examples of the output are shown in Figure 2.

In this two-part series, a block within a hierarchy will be referenced by number. Considering block level 0 to be outside all functions, the outermost block of any function is at block level 1.

The above example has three blocks at level 2, consisting of the body of the **while** loop, and the true and false bodies of the **if** construct. These three blocks are mutually exclusive so only one of them can be in scope at any one time.

C permits declarations at the start of any block, including blocks at level 0. No declarations are present in the first level-2 block, but they're in the second and third blocks at that level.

Variables **i** and **d** at level 1 are allocated space and initialized when their parent block is entered, i.e., when **main** begins execution.

If the true path of the **if** is taken, two automatic variables, **j** and **d**, are created and initialized. They exist until that block terminates.

Note that now two automatic variables are called **d**, and they even have different types.

Within the level-2 block, all expressions containing **d** refer to the innermost declaration of that identifier, namely to the **int** version initialized to 432. In other words, the inner identifier **d** hides the outer one of the same name.

Although such name hiding is possible, it's considered bad programming style. It provides no capability, possibly leads to confusion and prohibits access to identifiers declared in outer blocks.

In the **else** block, both outer variables, **i** and **d**, are hidden.

When execution returns to level 1, all references to **i** and **d** pertain to the variables declared at the level, as shown by the output.

Why is **getchar** called twice? It's typically implemented using buffered I/O, such that it requires a terminating new line to be entered before the character read is given to the program. In doing so, the input buffer contains both the character entered and the terminating new-line.

If the first character isn't alphanumeric, the **while** loop causes the next character to be read from the buffer. If the terminating new line wasn't flushed first, it would be read into **i** the second time, causing **isalnum** to return a value of false.

To flush the new line, read it using **getchar**, and throw away the character by ignoring **getchar**'s return value.

Frequently, a block is used in place of a single statement. With the exception of the main body of a function, we typically only use blocks to identify the body of a **while**, **for**, **do-while** or **if-else** construct. However, a block doesn't have to be subordinate to one of these or any other language construct:

```
#include <stdio.h>

main()
{
            int i;
            int j;

            /* ... */

/* insert some debugging code here -------------------- */
            {
             int temp = i * (j + 6);

             printf("i = %d, j = %d, temp = %d\n", i, j, temp);
            }
/* end of debugging code ------------------------------ */

            /* ... */
}
```

Opening up an arbitrary block as in that example serves little purpose, unless that block contains one or more declarations. Here, space has been allocated for **temp**, and this declaration hides any identifier of the same name in an outer block. The value of this approach is with debugging. If you wish to create temporary variables for local use, create a new block and declare them at its start. Then you never need worry if something by that name already exists.

If it does, it's hidden from this block and all its subor-

dinate blocks. All the debugging code and local declarations are localized, simplifying their creation and removal during debugging. By using the appropriate code, the entire debugging block can be ignored by the compiler without removing it.

Note that if the debugging block contains any comments, it can't be deactivated by enclosing it in a comment, because comments can't be nested. In such cases, use the conditional compilation directive #if 0.

Although automatic storage duration objects can be initialized by falling into their parent blocks, it's possible, but not good style, to enter a block another way:

```
main()
{
        int i, j;

        /* ... */

        if (i > 0)
                goto label1;
        else if (i < 0)
                goto label2;

        /* ... */

        if (j <= 100) {
                double d = 1.234;

                /* ... */
label1:
                /* ... */
label2:
                /* ... */
        }
}
```

Assuming **j** is less than or equal to 100, if **i** is equal to zero, the block body of the second **if** is entered by dropping into it. If **i** is positive, the block is entered through the label **label1**, and if **i** is negative, it's entered through **label2**.

Regardless of how you enter that block, space is allocated for the automatic variable **d**. However, it's only guaranteed to be initialized if you fell into it. Otherwise, the initial value is undefined.

To implement this function, many compilers allocate the space for **d** when **main** is entered. In other words, they allocate it at block level 1, even if the inner block never is executed.

Nevertheless, the scope of **d** still is restricted to the block in which its declaration occurs.

A compiler can allocate *all* automatic storage for a function at the time that function is entered, rather than doing it a bit at a time, when each lower-level block is entered. In other words, you're not guaranteed that automatic storage in blocks at the same level in a function shares the same memory locations.

In a recursive function, space is allocated for all automatic variables each time that function is called. If a function has been called and it calls itself three times, four different sets of its automatic variables exist simultaneously, with each set accessible only from that version of the function that created it.

By using the appropriate code, the entire debugging block can be ignored by the compiler without removing it.

The register Class

An automatic object declaration can include the **register** class keyword instead of **auto** as follows:

```
main()
{
        register long int rli;
        register char rc[10];
        register ri = 100;
        int i;
}
```

Syntactically, **register** is identical to **auto**. It only can be applied to internal declarations. However, the semantics can be different.

The **register** class is a hint to the compiler that the object being declared is to be used more heavily than other variables and that the compiler might wish to place that object in some fast memory location such as a machine register.

The operative word here is hint. The compiler is under no obligation. If a compiler can't or won't store a **register** variable in fast memory, that variable is treated as if it had class **auto**.

An implementation doesn't need to support **register** other than recognizing it as a legal class keyword and replacing it with **auto**. Many compilers simply ignore the **register** keyword and implement their own register allocation scheme.

On the other hand, some compilers document their register allocation algorithm so you can take advantage of it. For example, they can honor the first two **register** declarations in lexical order that they see in the source. In the example, this would appear to honor the **register** request for **rli** and **rc**.

However, **rc** is an array of 10 **char**, and many compilers don't have registers that size, in which case **rc** would be treated as having class **auto**, and **ri** is implemented in a register.

Now let's consider the types an implementation actually can store in registers. Typically, signed and unsigned versions of **char**, **short** and **int** should fit into a register for any given implementation if they choose.

ANSI C Standard Meeting Report

I attended an ANSI C Standards Committee meeting in Sunnyvale, California, September 26-30. The purpose of the meeting was to consider all registered comments from the two-month public review period that ended a few weeks earlier. These comments, and numerous other informal comments received through other channels, were considered by the committee. Although they resulted in a large number of editorial changes to the Draft Standard and accompanying Rationale document, no substantive changes were made to the Draft. As a result, the committee unanimously voted the Draft out as a final Standard, after five years of work.

Now the editorial changes have to be made to these documents. After they've been proofed, they'll be forwarded to the ANSI X3 Secretariat for further processing. They ensure that we've followed their rules. Then they submit the documents to a ballot of the X3 voting members, drawn from principal companies and institutions in business and industry. Unless we've upset one or more of these companies (and we don't believe we have), our job is done. A final Standard could be approved by ANSI in March or April 1989.

The ISO C Standards Committee last met in London early this year and I attended that meeting. The group hasn't planned its next meeting, but it's expected that they'll begin final efforts to adopt the ANSI Standard as we voted it out. The only vocal opposition to that Standard came from Denmark, which wanted more readable versions of some of the trigraphs. This proposal was defeated at the last ANSI meeting and it remains to be seen whether Denmark will get sympathy from other ISO members to make the ISO Standard different from that of ANSI. My feeling is they won't. If ISO adopts the ANSI Standard, they should have an ISO Standard by the end of 1989.

On the domestic front, the National Institute of Standards and Technology (NIST), formerly the National Bureau of Standards (NBS), is requesting information in order to beg, borrow, adopt or build a C language validation suite so that translators that claim ANSI conformance can be verified. This will be primarily for the U.S. Government's use. I have volunteered to be the ANSI Committee's liaison to NIST for this task.

Assuming there are no flies in the ointment, the ANSI committee goes into hibernation, meeting once or twice a year for a few days to respond to public inquiries and proposals. However, before five years expire, the committee must consider revising or reaffirming the Standard, and they must have done so before 10 years pass.

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Depending on the implementation, signed and unsigned **long int**s also might fit. If not, **rli**, in the above example, can get class **auto**.

An implementation might choose to use multiple registers to store one object. For example, a 16-bit system can allocate two adjacent 16-bit registers to honor a **register long** request. Machines such as the Cray have a large number of 64-bit registers and conceivably could accommodate large **register** variables.

An implementation also can store an **auto** object in a register. There is no way to tell whether an automatic object was stored in a register without looking at the code generated. Even if it was, you have no control over which register was used, unless the compiler documents otherwise. In short, the **register** class is syntactic sugar. If it results in register storage, you have gained. If not, you haven't lost anything. It merely is treated like **auto**. In either case, the default value of a **register** class variable is undefined.

The only discernible difference between an **auto** and a **register** variable is that a **register** variable can't be used in any context where its address is required, because few machines have general-purpose registers that are addressable as data objects.

Class And Function Arguments

Consider the following function:

```
void f(int i, double d)
{
        int j = 100;
        char c;

        /* ... */
}
```

All four variables declared are local to function **f**. In other words, the formal arguments have automatic storage duration. Space for them is allocated each time function **f** is called, and frequently it's allocated on the run-time stack like variables with **auto** and **register** class.

The formal argument list isn't outside the function definition, and it's not inside it either. What is the block level of the declarations of **i** and **d**? ANSI C defines them to be at block

level 1, the same level as for **j** and **c**.

Formal argument declarations then are **auto** declarations, except they can't have initialization lists, and space for them isn't allocated within **f**.

What happens if an automatic variable in block level 1 has the same name as a formal argument to that function?

```
void g(int i, double d)
{
        int i = 100;
        char d;

        /* ... */
}
```

Because ANSI C considers the block level of the formal arguments **i** and **d** to be the same as that of any automatic objects in block level 1, you should get a compilation error.

However, prior to ANSI C, some implementations behaved differently. They considered formal arguments to have a block level higher than 1 (somewhere between level 0 and level 1), such that the automatic declarations hid the identifiers of the same name in the argument list.

This wasn't helpful, because you never could get at the arguments passed in. They were hidden from you by the inner names of the same spelling.

Although the default class of formal arguments is **auto**, the **auto** keyword must not appear. Only one class keyword can appear in a function definition's formal argument list, and that's **register**. For example:

```
void f(double d, register int ri)
{
        /* ... */
}
```

Although a compiler needs to pay no attention to a **register** class request, if it cares to honor such a request when compiling this example, the value of **ri** is copied from the stack into a register each time function **f** is called. Then, all references to **ri** in the function use the register copy rather than the version on the stack.

If an argument is passed by address (i.e., by reference), a copy of that address is moved to the register. The result for both calling by value and by address is the same as if the **register** declaration were absent.

A compiler always could choose to put a non-**register** class argument into a register.

The next installment will discuss the **static** and **extern** keywords as they apply to data and functions. It also will summarize storage duration and linkage in a simple table.

Readers are encouraged to submit any C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, Virginia 22091.—*Rex Jaeschke is an independent consultant, author and lecturer. He is the C language editor of* DEC PROFESSIONAL *and our representative on the ANSI C Standards Committee.*

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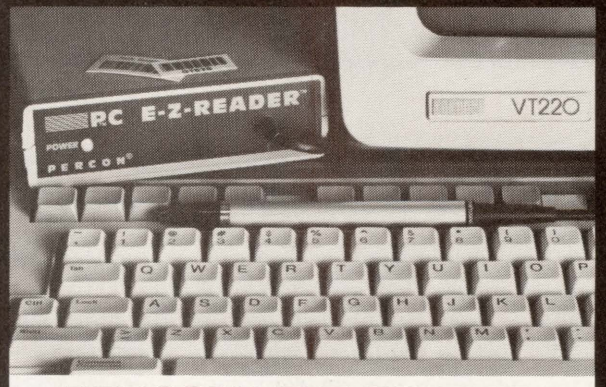

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CIRCLE 126 ON READER CARD

DCL DIALOGUE

Kevin G. Barkes

End-Of-Year Close-out

Before plunging into 1989, there's a small but important matter of backlog in DCL Dialogue.

The mail has been heavy lately, and the letter pile has become rather formidable. Complicating matters is a recent spate of letters without return addresses. I answer all the mail I receive and eagerly look forward to printing user submissions, but I can't without your return address. So please, before you drop me a line, make certain I can get in touch with you.

More Stupid DCL Tricks

The record counting procedure, REC.COM, published in July, elicited more mail than any other topic. What began as a simple idea has mushroomed into a major issue, and it's time to sort things out.

As Joseph Pasquale of Montgomeryville, Pennsylvania, and Jim Laing of Wilmington, Massachusetts, noted in Letters (September 1988), the SEARCH command executes much faster than the APPEND command contained in the original procedure. But there's a problem, as Dale M. Kilgus, data processing manager at Nordica USA of Essex Junction, Vermont, and several readers on CompuServe's VAX Forum discovered.

The SEARCH command can't read records greater than 2,048 bytes in length. If you use the modified REC.COM on files with immense record lengths, SEARCH will complain heartily.

This is an example of what I call My Application Myopia. Most of the work I perform on VAXs relates to text processing and publishing. Rarely do record lengths exceed 100 or 200 bytes. So, I test the procedures on files with relatively small records. It never occurred to me to run some enormous records. It should be noted that the *DCL Dictionary* has no explicit information concerning SEARCH's record length limitation.

> ***"The record counting procedure, REC.COM, published in July, elicited more mail than any other topic."***

It's possible to rewrite the procedures to work around the generated error message, but doing so complicates things. We leave the realm of stupid DCL tricks and enter the area of full utilities.

Perhaps the best solution is to use the SEARCH-based procedures for small files, and the slower APPEND flavor in other circumstances.

George W. Holbert and his associates at Northrop Corporation of Pico Rivera, California, developed a nifty command procedure that counts both records and bytes in a file and supports wildcard input. If you'd like a copy of the procedure, send me a self-addressed, stamped (45 cents) business-sized envelope at the address at the end of this column. It's also available on ARIS as COUNTREC.DOC.

Gerald Kaman Tsui, a reader from New York, points out a useful facility within the EVE/TPU editor that many, especially those new to VMS or TPU, have overlooked. It permits you to switch between DCL and the editor without having to EXIT and endure the lengthy EDIT startup. It's particularly useful for programmers in their debugging phase.

In addition, Gerald notes, everything in the edit session stays (such as number of files opened, paste buffer and cursor position). "This is possible because VMS allows users to SPAWN jobs and use the ATTACH command to switch among them," Gerald says.

"Define these two symbols in your LOGIN.COM file:

```
$ INIT_EVE :== SPAWN/WAIT/-
  PROCESS=SEVE EDIT/TPU
  (/SEC=your section file)
$ SEVE := ATTACH SEVE
```

"To use the procedure, at the DCL prompt type INIT_EVE file_name.ext.

"At the TPU Command: prompt, type WRITE, then ATTACH. Compile your source code or do whatever else you need at the $ prompt, then type SEVE to return to the editor. Repeat these steps until you're complete, then enter EXIT at the TPU command prompt to terminate the SEVE subprocess." Gerald suggests defining WRITE and ATTACH keys in the editor to speed the process.

You may have to check with your

PROGRAM.

```
$         Verify    = F$Verify(0)
$!
$ Define_Variables:
$! ++ Variables needed to screen display.
$       Esc[0,8]  = %x1B
$       W         = "Write Sys$Output"
$       Default   = F$Environment("DEFAULT")
$!
$ Ask_Input:
$! Ask user for input and see if the user-
$! specified directory exists.
$       Inquire Root_Directory "Root Directory ''Default' "
$       If Root_Directory .Eqs. "" Then Root_Directory = Default
$       Parse_Root = F$Parse(Root_Directory + "*.*;*")
$       If F$Search(Parse_Root) .Eqs. "" Then Goto Error
$       FileSpec = Root_Directory + "*.DIR"
$!
$ Declare_DRAW_Variables:
$! Declare variables needed to draw a box onto the screen.
$!
$       Level = 1
$       Indent = ""
$       Length = F$Length(Root_Directory) + 2
$       Division = Length / 2
$       Chars = F$Fao("!''Length'*q")
$!
$ Draw:
$! Using the variables defined above, draw the box.
$!
$       W Esc,"[H",Esc,"[2J"
$       W Esc,"(0","1",Chars,"k"
$       W "x ",Root_Directory," x"
$       W Esc,"(0m",Chars,"j"
$       W Esc,"[4;''Division'HW",Esc,"(B"
$       Tree_Symbol = "''Esc'(0t''Esc'(B"
$       Indent = Indent + " "
$       Division = Division - 1
$       Division = F$Fao("!''Division'* ")
$!
$ Start:
$! Extract each DIRECTORY-SPEC from the user-specified
$! directory and display it on the screen. Then check to
$! see if the DIRECTORY-SPEC has subdirectories; if it
$! does, then branch to EXTRACT or else goto CHECK and
$! extract the above directories.
$!
$       Search_For_Dir      = F$Search(FileSpec,Level)
$       If Search_For_Dir .Eqs. "" Then Goto Check
$       Spec_Parsed_'Level' = F$Parse(Search_For_Dir,,,"NAME")
$       Length              = F$Length(Spec_Parsed_'Level')
$       Spec_Parsed_'Level'[1,'Length'] := "''F$Edit(F$Extract(1,Length,-
          Spec_Parsed_'Level'),"LOWERCASE")'"
$       W Division,Tree_Symbol,Indent,Spec_Parsed_'Level'
$       Goto Extract
$!
$ Check:
$! Extract each above directory (POP up a level).
$       If Level .Eq. 1 Then Goto Exit
$       Level = Level - 1
$       Sub_Directory =     "." + Spec_Parsed_'Level'
$       FileSpec = FileSpec - Sub_Directory - "]*.DIR" + "]" + "*.DIR"
$       Indent = Indent - " "
$       Goto Start
$!
$ Extract:
$! Extract each subdirectory (PUSH down a level)
$       Sub_Directory =  "." + Spec_Parsed_'Level'
$       FileSpec = FileSpec - "]*.DIR" + Sub_Directory + "]" + "*.DIR"
$       Level = Level + 1
$       Indent = Indent + " "
$       Goto Start
$!
$ Error:
$! There is an error in processing user-specified directory.
$       W "Error parsing directory ",Root_Directory,"."
$ Exit:
$       If Verify Then Set Verify
$       Exit
$!
$! Author: Shishir Gundavaram
$! $ TREE :== @Disk:[Directory]DIRECTORY_TREE.COM
$! $ TREE/OUTPUT=filename disk:[directory]
```

system manager to make certain you have sufficient privileges and quotas to spawn subprocesses. Also, you should use a process name other than "SEVE", because process names must be unique. If you eliminate the /PROCESS=SEVE line in the first symbol definition, VMS will create a subprocess named YOUR_PROCESS_(n), where (n) is the current number of subprocesses owned by your parent process. You'll have to change the SEVE symbol to NAME_1 or, if you're heavily into spawning, "manually" enter the command ATTACH NAME_(n).

This is an old trick for TPU buffs, but the EVE manual is intimidating and it's easily overlooked. You also may want to write a short .COM file to automate the procedure. Gerald wrote one, which is available on ARIS as SEVE.DOC.

Odds And Ends

Russ Allen submitted a procedure that expands file name wildcards to pass to C programs, making VMS act like UNIX. We'll take a closer look at this in a future column, provided Russ contacts us and provides his address.

This month's reader-submitted procedure, DIRECTORY_TREE.COM, was submitted by Shishir Gundavaram, a sophomore at Marlboro High School in Marlboro, Massachusetts (see Program). This utility draws a tree-like display of the directory the user specifies. By directing output to a file, you easily can generate roadmaps to your convoluted subdirectory structure.

For a listing of all DEC-related bulletin board systems (BBS) in the U.S., send a self-addressed, stamped business-size envelope to Kevin G. Barkes Consulting Services, BBS List, 4107 Overlook St., Library, PA 15129.

The list is also available on-line from my SYS$OUTPUT system; (412) 854-0511.

—Kevin G. Barkes is an independent consultant in VAX systems software, management, tuning and training, based in Library, Pennsylvania.

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MANAGING YOUR MICROVAX

The PC Of The '90s

David W. Bynon

Over the years I've watched and participated in the evolution of the personal computer. In the late '70s and early '80s, I had a Z80-based S-100 bus computer. It started with 8 KB of memory, and I thought that was a luxury. At that time, the thought of a VAX 11/780 with 2 or 4 MB of memory was enough to make you pay homage.

In 1982, the 64-KB memory limit of the Z80 processor was conquered by the Intel 8088 processor used in the IBM PC. Many jumped on the IBM bandwagon, even though the original PCs had no more than 64 KB, because memory was scarce and expensive. Two years later, the PC reached its memory potential.

With my "I'd rather fight than switch" attitude, I opted to upgrade the S-100 system. Like many others, I couldn't afford to lose my investment in CP/M software. I wasn't impressed with the IBM PC architecture, either.

By 1984, my S-100 system had four slave processors. Each slave had its own memory, which could be accessed by the other processors, and two serial ports. Each slave loaded its own copy of a CP/M- or MS-DOS-compatible operating system from a master. From the slave processor you were logged in to, you could attach to any free processor or submit batch jobs. It was a PC architecture ahead of its time.

VAX Back Then

As luck would have it, just as support for the S-100 system was dying, DEC reduced the 32-bit VAX architecture to a personal computer, the VAXSTATION I. With this first VAXSTATION, DEC's struggle to produce a full range of compatible computers began.

Those of us who purchased the early VAXSTATIONS found ourselves in a quandary. We could afford the hardware, but the cost of VAX software was prohibitive. No one wants to pay $5,000 for a compiler or $3,000 for a spreadsheet on a single-user computer.

The software price issue wasn't addressed until 1987, after DEC introduced the VAXSTATION 2000. Then, several software vendors realized they could penetrate this new market if their prices were commensurate with the computer. The problem is still with us, however, as many software vendors fail to see the VAXSTATION market for what it is: a high-end personal computer, not a multiuser VAX.

There's yet another problem to conquer: getting software companies to engineer software specifically for the VAXSTATION. Since its inception, most users have used the VAXSTATION in a limited way, because there's little software that takes advantage of its abilities. Most of this problem is DEC's, for assuming the VAXSTATION would be used only by engineers or other high-end users. The VAXSTATION software is a good graphics platform and user interface, if you're a programmer.

Companies Mentioned In This Article

Apple Computer
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Cupertino, CA 95014
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CIRCLE 401 ON READER CARD

Ardent Computer Corp.
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Sunnyvale, CA 94086
(408) 732-0400
CIRCLE 489 ON READER CARD

Cray Research Inc.
608 Second Ave. S.
1200 Northstar E.
Minneapolis, MN 55402
(612) 333-5889
CIRCLE 490 ON READER CARD

Digital Equipment Corp.
146 Main St.
Maynard, MA 01754
(617) 897-5111
CIRCLE 400 ON READER CARD

IBM
Old Orchard Rd.
Armonk, NY 10504
(914) 765-1900
CIRCLE 443 ON READER CARD

Intel Corp.
3065 Bowers Ave.
Santa Clara, CA 95051
(408) 987-8080
CIRCLE 488 ON READER CARD

Massachusetts Institute of Technology
77 Massachusetts Ave.
Cambridge, MA 02139
(617) 253-1000
CIRCLE 567 ON READER CARD

Mips Computer Systems Inc.
930 Arques Ave.
Sunnyvale, CA 94086
(408) 720-1700
CIRCLE 491 ON READER CARD

Prime Computer Inc.
Prime Pkwy.
Natick, MA 01760
(617) 655-8000
CIRCLE 492 ON READER CARD

Tandy Corp.
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3700
CIRCLE 494 ON READER CARD

Let's Make A Deal

Acknowledging wounds suffered in this year's sluggish stock performance, DEC has begun to move away from its own hardware engineering labs to purchase outside technologies. Although DEC historically has been a midrange producer, the company apparently gave in to pressure from investors to develop a strategy at the low end, specifically workstations and personal computers.

This fall, DEC unveiled a "technology exchange" with Mips Computer Systems Inc. that could result in DEC's owning up to 20 percent of the Sunnyvale, California-based RISC workstation manufacturer. The Mips chip technology was hurried into production and will appear in several ULTRIX-based workstations to be released in the next few months.

Shortly afterward, DEC signed comprehensive agreements with Tandy Corporation of Fort Worth, Texas. In this "joint development" pact, Tandy will design and manufacture its Tandy 3000 and 4000 microcomputers to DEC's specifications and with the Digital nameplate. While some analysts speculate that the deal was struck to spur DEC's lagging development of the P-VAX, others say DEC has been feeling the heat to show PC profitability for several years.

Criticism and poor sales brought about the demise of DEC's powerful Rainbow personal computer, and, for many investors, branded DEC as a PC failure.

Since then, DEC released the MS-DOS-based VAXMATE, but the significance of the VAXMATE now is being downplayed by DEC. When announcing the Tandy agreement, Deane Curran of the Small Systems Group said that the VAXMATE is "an applications terminal. It is PC-compatible, but not a PC."

The 80386-based Tandy computers will be tied into DEC's Network Applications Systems (NAS) program, and will be supported by DECNET/ISO. VAX/VMS Services for MS-DOS, the software that supports the VAXMATE on Ethernet, is certain to have a role in the Tandy connection so that the PCs will be able to play in clusters.

The price versus performance problems of the VAXSTATION have been well-documented, and the Mips chips should help the VAX compete better in this cut-throat market, just as the chips helped workstations from Prime Computer Inc. and superminis from Ardent Computer Corporation. But to many DEC watchers, the Tandy deal is a superficial patch and a misuse of research and development funds.

Nonetheless, through agreements with supercomputer producer Cray Research Inc. and now Tandy, DEC is not only established at the midrange, but at the far ends of the computing spectrum.

—Evan Birkhead

DEC failed to take a lesson from Apple, with its what-you-see-is-what-you-get Mac interface. If a small concern like Apple can do it, why can't DEC?

Maybe it can.

VAX To The Future

Within the next few months, DEC formally will announce a Personal VAX, the P-VAX. There are several significant characteristics about this new system, none of which are related to its hardware.

First, the P-VAX is the first VAX designed from the bottom up as a VAXSTATION for the masses. In other words, the software and price problems have been overcome.

DEC addressed two issues: a common user interface and software compatibility. The common user interface is the long-awaited DECWINDOWS, Digital's implementation of the X Window System from MIT. DECWINDOWS on any VAXSTATION is special because it lets you manipulate many windows and icons on the large screen. The speed of the P-VAX, with its CMOS CPU and 32 MB of memory, makes it even sweeter.

The software compatibility issue isn't solved with VMS, the VAX architecture, or DECWINDOWS, but with an MS-DOS emulator. The P-VAX will have an MS-DOS operating system that runs under VMS in a DECWINDOWS window. The MS-DOS window presents an AT-class system to the user. So, at last, VMS and MS-DOS come together in a single system.

There's only one question left unanswered: Does DEC have the momentum and marketing ability to make the P-VAX the personal computer of the 1990s? After the PRO and Rainbow disasters, you have to wonder.

But consider this: MS-DOS, now in its fourth major revision, is still going strong, while OS/2 is all but a flop. VMS, with its virtual memory and multitasking, has everything needed to solve the shortcomings of MS-DOS. Conversely, MS-DOS has the application support needed to make the P-VAX usable now.

MS-DOS is just a taste of what the P-VAX (and VAXSTATIONs to follow) can emulate. VAX and VMS are so robust that they can emulate almost any machine or operating system. Could an ULTRIX-32 emulator be next?

IT'S UP TO the DEC community to make sure the P-VAX succeeds. Personal VAX systems must become consumer products, like a Mac or IBM AT. This is an arena DEC never has been able to compete in.

It's not all DEC's fault though. DEC consumers have viewed VAX products with a bargain price as cheap or bad. This is one of the reasons VAXSTATION software prices are inflated artificially.

VAX software companies will respond when PC and Mac software developers realize the sales potential for their programs on the VAXSTATION. The microcomputer software companies learned that selling in volume makes big money, too.

The P-VAX presents another issue: Wouldn't it be nice to manage a single computer architecture? As it stands, we have Mac-to-VAX, PC-to-VAX and UNIX-to-VAX connectivity products. Doesn't it tell you something when everyone wants to connect to the VAX? ■

Selecting An Ethernet Protocol Analyzer

NETWORKING EDITOR

Bill Hancock

Every network manager must know what's happening on the network. Although this sounds easy, it can be difficult and time consuming, depending on the network architecture. To understand this, try to use, for example, the DECNET Network Control Program (NCP) utility.

Network Control

Managing the network resource requires more than using a vendor-supplied host network control utility. Because many networks use different architectures, confusion exists over how to control the various network products from one place.

Many network architectures share the same physical transmission resource. The management problem escalates as the system uses more than one network product attached to the same network resource.

For example, DECNET uses Digital Data Communications Message Protocol (DDCMP) for normal DECNET activities (file transfer, task-to-task) plus other higher-level protocols for full network functionality. These include Network Information and Control Exchange (NICE) for network management functions, Data Access Protocol (DAP) for file transfer, and Network Services Protocol (NSP) for session control. DECNET also uses Maintenance Operation Protocol (MOP) for down-line task and system loading, and it's treated as a separate data link protocol when connected to the network.

If a system has terminal servers connected to it, it will likely use the LAT protocol, and that has a completely different architecture and data link protocol. To compound the problem, many systems also connect to UNIX systems, which can require using TCP/IP, again more protocols and more network overhead.

If these network architectures are connected to an Ethernet, the problem increases. All the data link protocols share the same Ethernet controller and attempt to use the same Ethernet cable.

There's no consolidated network management and analysis tool that can control all network packages from a single command utility. That's difficult and tricky to implement. Unfortunately, the hardware and driver software that connects the hardware to the operating system aren't smart enough to provide adequate network management and performance information.

Another way to collect the information is to use a network analysis tool, such as a protocol analyzer. Although protocol analyzers can collect network packets and provide some rough statistical information, you must perform the analysis. Therein lies the rub.

Instead of dissecting one particular protocol analyzer, let's concentrate on how to select a protocol analyzer and on which features are desirable when selecting an analyzer.

Why An Analyzer?

To understand the necessary components of an analyzer, you first must determine if you need one.

Your analyzer salesman recommends one for network control, network monitoring, problem isolation, traffic loading analysis, packet content breakout and so forth. But this assumes you know how to use the output. Therefore, you must be willing to learn how to use the analyzer properly.

It can give you a lot of information about what is happening on the network and point out tell-tale problems, frequently before they get serious.

For example, you buy an analyzer with state-of-the-art features, and you

Because many networks use different architectures, confusion exists over how to control the various network products from one place.

hook it up to your Ethernet. After collecting gross packet counts for two days, it tells you that you have an average load on the Ethernet of 25 percent.

But you heard that any load over 18 percent means that the Ethernet is overloaded. What should you do?

In reality, studies have shown that when an Ethernet approaches a 20 to 25 percent load average, it causes connected machines to wait too long to access the network and to provide a reasonable response time to network operations.

On an Ethernet, only one system at a time can have control of the actual cable. Other systems must wait until the sending station completes its message.

So, you need to determine why the load on the Ethernet is so high. It can be caused by nodes sending out too many HELLO messages at close intervals, many routing nodes on the network, frequent node failures, improperly tuned network software and im-

Analyzer Features

What features should you look for? All analyzers need a set of basic features. Otherwise, they will be less than productive for most environments.

1. Packet identification of:
   a. Destination address.
   b. Source address.
   c. Protocol type:
   d. Total packet length.
   e. Errors in interpretation.
2. Counters for:
   a. Total packet count.
   b. Protocol types.
   c. Size of packet ranges. How many are 50-100 bytes, 101-200 bytes?
   d. Occurrences of destination or source addresses. How many packets are addressed to specific destinations and how many are generated from a particular source address?
   e. Appearance of unknown protocol types.
   f. Frames out of format or "broken."
   g. Oversized or undersized packets.
3. Collection of entire packets and ability to display in hex or ASCII to the user for analysis.
4. Long-term statistical collection of counter information for accumulation over weeks, months and possibly years.
5. Report generation capabilities to allow production of printed reports on collected information or statistical information generated over time.
6. Generation of packets to test other components on the network. Such capabilities might include the ability to generate broadcast packet destinations (FF-FF-FF-FF-FF-FF) to load up the entire network for stress analysis, capture and replay of sessions to emulate live traffic, and original packet protocol generation for testing of applications or new protocol types.

Although this list isn't all-inclusive, it gives you an idea of some features that are necessary if your analyzer is to provide useful service.

properly set network timers in software. If links are timing out, there are a lot of reconnection requests and retransmissions.

An improperly tuned system on the Ethernet also can cause problems. Consider a 10-node Local Area VAXCLUSTER (LAVC) with one system acting as BOOT system containing the only disks on the cluster.

In this situation, all disk I/O must go to or from the system with the disks on it. If the individual satellite LAVC members don't have their user account parameters set up correctly, the network can experience a severe degradation.

If a large image, say one that took 2,500 pages to activate, were to be loaded from disk, that's 1.28 MB of data. If you activated such an image from a terminal on one of the diskless machines, the 2,500 pages would have to be transmitted across the Ethernet from the disk server system to the diskless machine.

Because the higher-speed Ethernet controllers can handle only about 3.6 MB (about 450 KB) per second when running at best speed, load time is long, and there are about 900 full Ethernet data packets on the network. Then, add in processing overhead and other determinants.

If you've been given a working set size on the diskless VAX system that allows your process to allocate all possible memory necessary for the image being activated, there's 2,500 pages of data plus a small amount of pages for image activation and other system needs.

If your working set were smaller, say 512 pages, the diskless VAX system would page fault the pages in the diskless system's working set many times over to get in the necessary work-

> ***"An improperly tuned system on the Ethernet also can cause problems."***

ing set pages to support the desired image activation.

This does not translate into simple division of the expected working set usage by the actual working set allocation. The pages in the image must be faulted many times to support the activation, sometimes as much as 10 times the amount of pages being stored.

With a conservative factor of five, the data being transferred across the network equals 2,500 pages times the paging factor of five, or 12,500 pages would need to be faulted for the process.

In other words, 6.4 MB of data must be faulted into the diskless machine to support the image activation! Because the controller can handle about 450 KB, 14.2 seconds minimum would be required for the image to activate on the diskless system, assuming it's the only process activation on the diskless system, exclusive and total access to the network and no overhead other than the paging operation.

A single process activation data requirement rose from 1.28 MB to 6.4 MB, because the working set was too small on the diskless system. This could mean that the network load is induced falsely.

An increase of working set size increases throughput (activation time could be as low as 2.8 seconds) and

reduces the network traffic by about a factor of five. More systems running the image and more users on each system compound the problem.

Thus, proper tuning of system resources, especially in the diskless environment, can reduce network overhead substantially. If the system were tuned wrong, the network might show an inflated data load figure.

Although a 25 percent load on the Ethernet is high, it might result from bad system tuning. A simple adjustment to the user's account could reduce network overhead significantly.

Retransmission also affects load. For example, if controllers and bridges in the communications path become congested because of inordinate traffic levels, many Ethernet components start throwing away packets.

If the number of Ethernet packets being transmitted is large, and the intermediate bridges or controllers in the path get congested, some packets might be lost. Ethernet doesn't guarantee delivery of packets.

Lost packets require retransmission as requested by the destination, thereby increasing traffic.

It becomes a vivious cycle. Packets get lost because of congestion, retransmission occurs and causes more congestion, resulting in more congestion, greater packet losses, more retransmissions, and so on.

An analyzer is useful because:

1. An analyzer usually can tell not only how many packets, but which protocol types are the most common. This can help pinpoint a particular network architecture that is causing problems.
2. Analyzers might be able to identify who is sending what to whom. An advanced feature in most analyzers, it's useful, because it identifies not only the protocol but the volume of traffic, which tells you which systems probably need fixing.
3. The overall packet count for the Ethernet segment is useful as it identifies that there's a loading problem.
4. If the analyzer can break out the protocol, the user can determine if the packets are original data or retransmissions. A high retransmission count means that the problems are more serious than simply high traffic volume.
5. If a bridge is used, comparing traffic volumes with protocol types seen (and source/destination addresses) between segments enables you to identify whether intermediate connectivity products are the source of problems.

So, an analyzer, properly configured and used, can help you to properly identify problems on the network and isolate systems that need remedy.

However, the analyzer is simply a collection tool. You must understand the results of the collection.

What Features Are Necessary?

Vendors offer various features and collection tools. Some vendors include all features in their package. Others require you to purchase collection tools and products as required for your needs.

There are good and bad points to each approach. With everything in one package, you could pay for features that you don't need.

Conversely, under the module approach, you might purchase necessary modules at inflated prices and encounter confusion and licensing problems.

I prefer the "all-together" approach, because it avoids module licensing and feature omissions. It's also easier for the vendor support staff and the salespeople. If all parts are with every system, there's no what's-missing-now issue nor piecemeal approach to configuration.

It also simplifies ordering, maintenance and customer expectations. With the all-together approach, you get what you expect (see box).

What An Analyzer Can't Do

Most buyers of network analyzers don't necessarily understand what the analyzer is trying to tell them and what the analyzer is capable of producing.

Some forward-thinking analyzer vendors are developing functionality that will allow managers to derive more information from the network.

Still, an analyzer is useful. It can tell you traffic load metrics and which protocols are doing the most damage so you know where to investigate problems and when to seek professional help. To an expert, your analyzer can indicate traffic matrix, security risk levels, protocol violations, overall noise metrics, traffic throughput profile, network parameter adjustments, and other information.

For an analyzer to be an effective tool, you must know how to use it and understand the information it collects. Learn to use and understand an analyzer before the network breaks, so that it can be useful when the network does break or when an analysis is necessary.

Analyzers Of The Future

Some forward-thinking analyzer vendors are developing functionality that will allow managers to derive more information from the network. This information might be a reiteration of collected data or, in some cases, interpretation tools.

Real-time collection of data on an Ethernet is almost impossible for any analyzer. There are too many packets for most systems to handle, so some loss is to be expected from all analyzers. But some can collect almost all network information.

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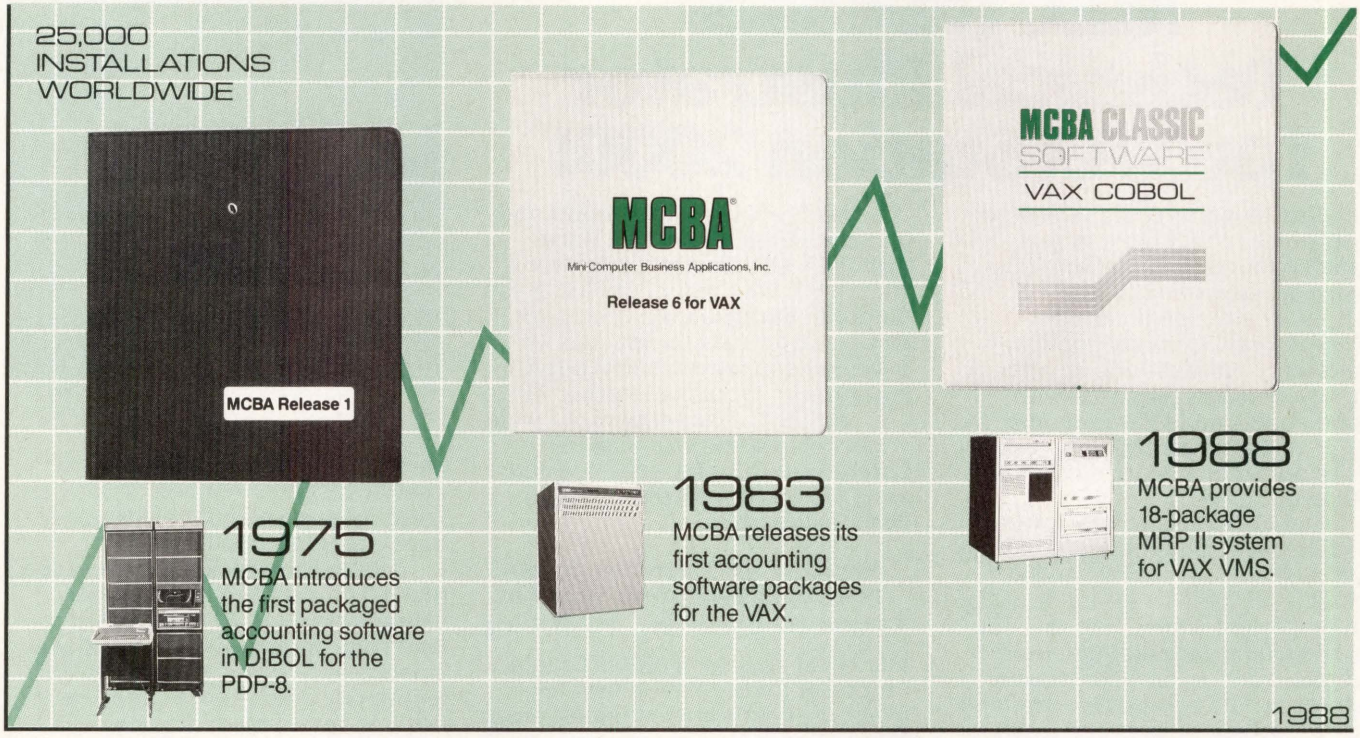

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CIRCLE 237 ON READER CARD

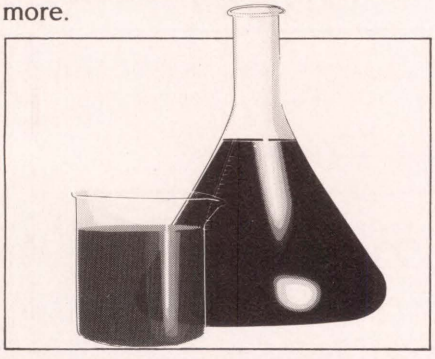
MASS communications

LATE BREAKING NEWS FROM MEC

MEC Releases Technical Illustrator for VAXStation 2000!

The most powerful object-oriented illustrator for the IBM PC is now available for the VAX*Station* 2000. Design teams working in the VAX/PC environment can use MASS-11 Draw to create sophisticated technical illustrations, edit and improve graphics prepared with spreadsheets and CAD programs and produce typeset-quality composite documents more efficiently than ever before.

MASS-11 Draw for the VAXStation offers the same powerful editing tools available on the PC version, including editable freehand drawing; paragraph text; interactive text editing, stretching and rotating; zoom and pan; symbols libraries; tracing features; spline curves; flip; combine and uncombine objects and much more.



Now VAXStations can produce sophisticated freehand drawings in 100 shades of black.

MASS-11 Draw can import and improve HPGL, Lotus.PIC, Macintosh.PICT, MDL metafiles, Tektronix 4010/4014, DXF and CGM files. It can output to Encapsulated PostScript, HPGL and formats compatible with page makeup and technical publishing systems, including Interleaf TPS.

MASS-11 Draw supports a wide variety of printers including HP Laserjets, PostScript, LNO3+, Talaris and QMS (QUIC), HP plotters, and QMS Smartwriters.

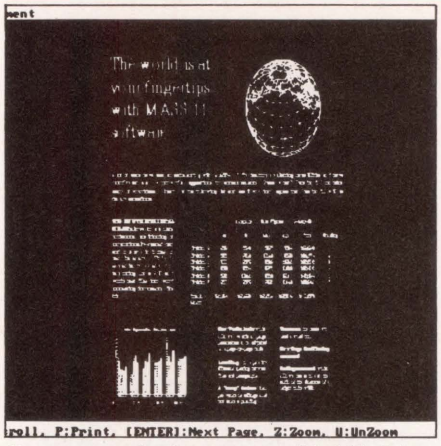
MASS-11 GP 5.0 Incorporates Tektronix Users into World of Corporate Electronic Publishing

The latest version of MEC's Graphics Processor for the VAX allows Tektronix users to include their files in a MASS-11 word processing document or print them directly on a wide variety of laser printers or HP plotters, including the 7447, 7470, 7475A, 7550, 7580, and 7586.

MASS-11 GP can also translate graphics formats from HPGL, Lotus.PIC, Macintosh.PICT, Molecular Design Limited metafiles, CGM and DXF.

Page Preview Heads List of Enhancements in MASS-11 WP Version 8.0

MASS-11 WP, the leading independent word processing software in the VAX/PC environment, is now an even more powerful tool for corporate electronic publishing.



You can see exactly what your page will look like before you print it, right on your PC screen.

Page Preview lets PC users see the full page of text and graphics integration on-screen, correct line and page endings with proportional spacing and correct point sizes. An entire document can be previewed without returning to the editor. To enhance hardware performance, VAX users will see the graphic depicted as a bounding box.

By referencing the graphics at print time, MASS-11 WP provides a *live link* to graphics files so that if the graphic is changed, it's changed in the document automatically. The *live link* also saves space on your system since the graphic is not stored multiple times in multiple documents and backups.

Other features for electronic publishing include horizontal and vertical rulers in inches or centimeters, total control over line spacing (leading), the ability to hold headings with the text that follows, document scaling, and enhanced macros.

And, as always, Version 8.0 of MASS-11 *will be released simultaneously for both the* VAX *and* PC, *ensuring compatibility between systems.*

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AMERICA IS MOVING TO MASS

CIRCLE 231 ON READER CARD

To analyze a network, start with a regular sampling to identify possible problems and migrate to a more refined sample as problems manifest themselves.

Take the VAX Software Performance Monitor (SPM), for example. The default collection value for data is once every 12 minutes, sufficient to determine if there's a problem. If an unfavorable issue arises, the collection interval can be shortened. Then, more data accumulates, causing the problem of data storage and processing. So, in most cases, a network analyzer collects periodic data followed by times of intense collection where detailed analysis can be performed.

Even if the analyzer is capable of collection of such data, it may signify that the skills of the network analyst may need to be greater. Collection of raw data requires the ability to sort out what is valuable and what is not. Since most analyzers do not necessarliy provide this feature without some knowledge of network architecture, packets, and operational features, it is difficult to expect network analyzers to improve much as analysis aids in the near future.

One hope is using expert systems to troubleshoot and manage networks. At least one company is writing VAX-based software for its analyzer to assist you in understanding what was collected and what it means. This software collects very long-term data and provides a variety of what-if capabilities and analysis tools.

In the future, the product should have a multisegment collection capability and a frame-based expert system that will allow non-networking-oriented users to understand information collected from the analyzers on the various segments.

Other features include the integration of network chargeback accounting and on-line alarm generation when predetermined network thresholds are detected.

Some vendors include an on-line time domain reflectometer (TDR) capability in their analyzer. A TDR allows you to locate a break or short in the Ethernet network segment, assuming the cable was marked properly. This feature can be expanded to help you locate bad transceivers and other network components.

ETHERNET ANALYZERS are useful systems if you're willing to learn how to use the analyzer and its capabilities. Full-featured analyzers cost from $15,000 to more than $40,000. For that kind of expense, understanding the analyzer's capabilities is essential. *—Bill Hancock is an independent systems and network consultant in Arlington, Texas. He also serves on the DECUS Board of Directors as head of the Leadership Relations Committee.*

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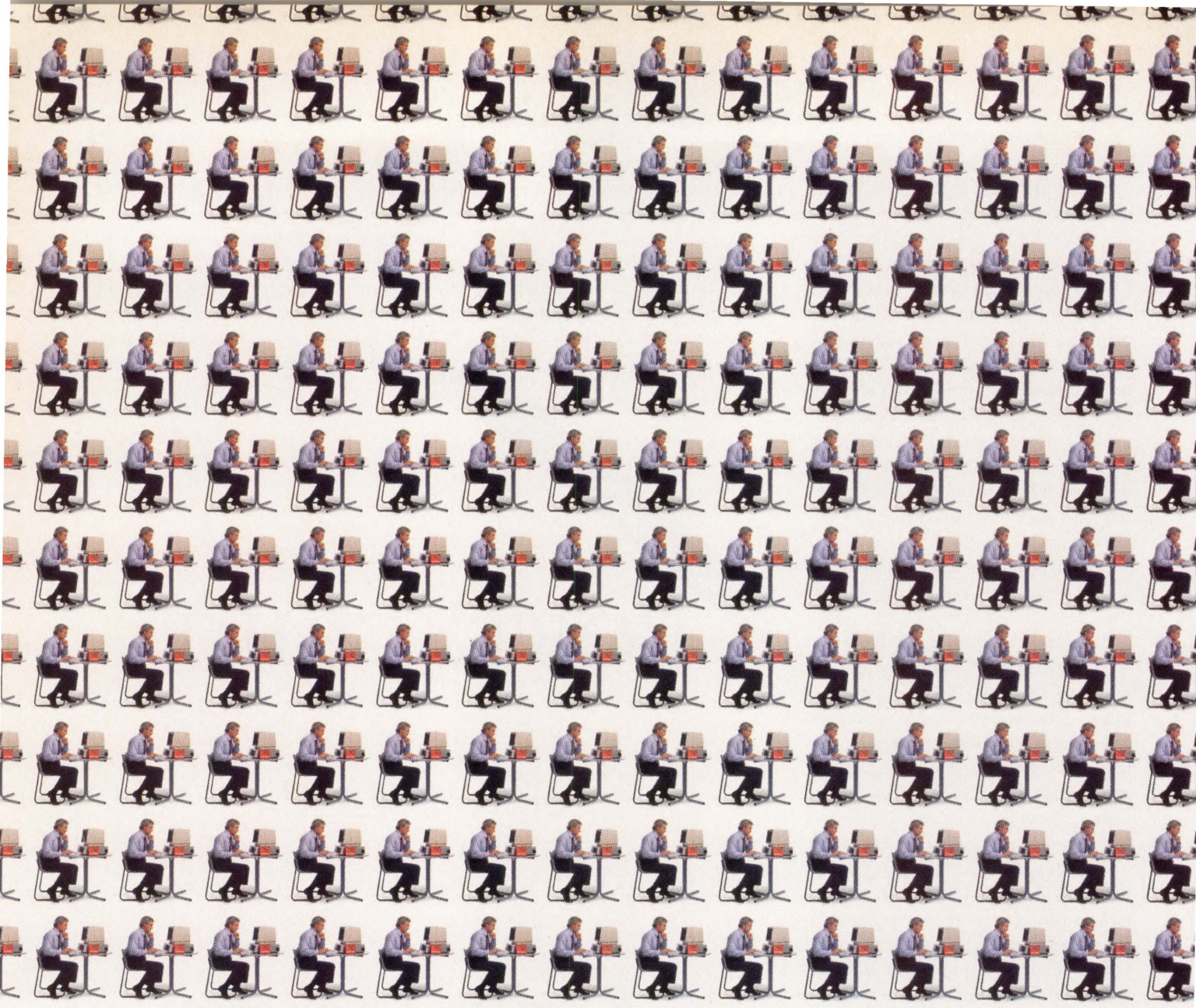

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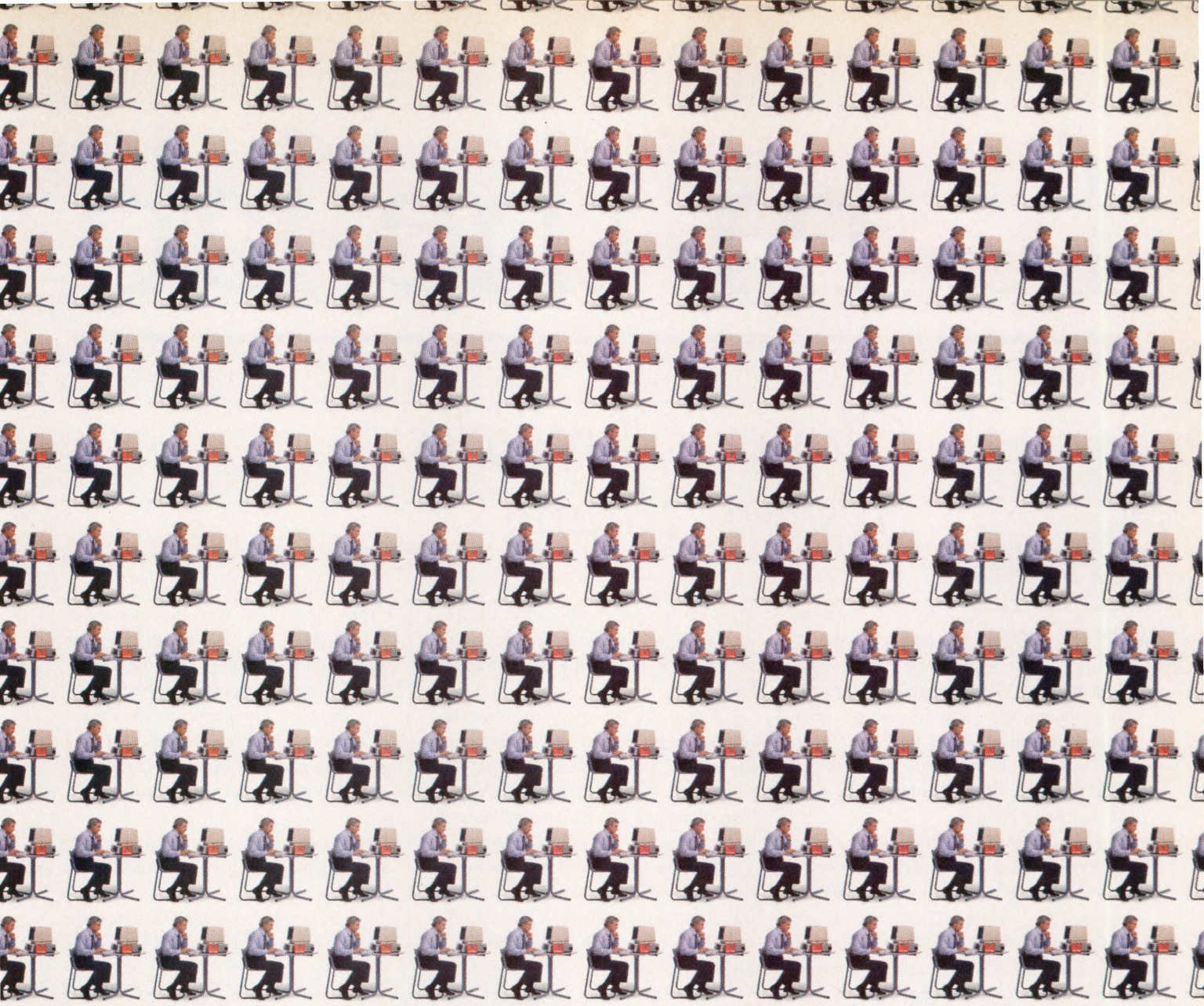

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For network solutions, you should be seeing red.

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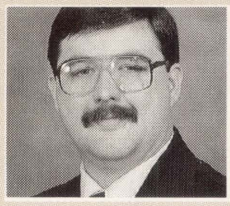
from the lab



John F. McGlinchey

Cluster Chronicles: System Tuning

Every system manager hates to hear, "The system is slow. Can you make it faster?" Immediately you jump into action, grab your 2,000-mips spare VAX processor and stuff it into the card cage with six billion GB of RAM. Wouldn't it be nice if this were reality?

At Professional Press' home office in Spring House, Pennsylvania, we're moving from old-style disks to DSA-compatible drives. These drives are dual-ported between THORIN::, our 8250, and BILBO::, our 11/750. I moved the largest of our files onto a 1.2-GB disk from Micro Technology Inc. (MTI).

Recently, THORIN:: received a memory boost of 24 MB of EMC BI Memory to make him the muscle node in our LAVC. Soon afterward, he went into convulsions and was slower than any other node, even with only a few users. It was time to tune the system.

After some monitoring, I noticed that THORIN:: spent up to 80 percent of his time in INTERRUPT mode. This struck me as unusual. I checked the usual causes of INTERRUPTs: someone pressing the return key on a terminal, and other devices on the bus that could be tying things up.

I then called DEC Field Service. They couldn't find a board in the 8250 that was causing the problem, so they referred me to their Colorado Support Center.

I had to get past the first-line defense, who helped me optimize my file caching ("Do a MONITOR FILE and keep those averages over 80 percent"). Then I talked to someone who really knew the MSCP serving function.

I knew the problem involved a batch job we were running on one of our VAXSTATION 2000s. This station is used by the editorial department to review software. When not in this use, we were trying to use it as a batch engine.

The batch job, running VSELECT from Evans Griffiths & Hart Inc. (EG&H), was performing large asynchronous I/Os using the $QIO system service of 127 blocks per $QIO. This is more than 65 KB per $QIO. The default size of an MSCP packet is 8,197 bytes. This means that there were at least eight INTERRUPTs per $QIO on the file-serving node, maybe more if the INTERRUPT wasn't processed the first time.

The DEC support center helped me in optimizing some of the MSCP_* parameters, but in this case it only increased performance marginally.

THE RESULT WAS an eye-opening change in the theory we used in building the LAVC.

The best use of a satellite node is for interactive users who do small, sporadic

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I/Os. Make sure that a small disk is directly on the satellite for paging and swapping. The best use for a boot/file serving node is for file serving and batch processing. If you have two boot/file serving nodes, make sure that batch jobs are put on the node where most of the files they need reside.

This method makes a lot more sense. In the future, we'll add compute server nodes for interactive users and steadily remove the interactive users from the file serving nodes.

Many thanks to Phil Naecker, our West Coast editor, and the Colorado Support Center. Both went the whole mile in identifying and resolving our problems.

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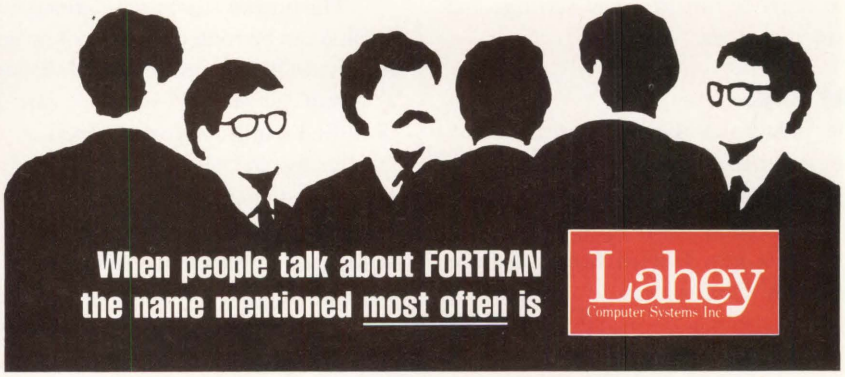

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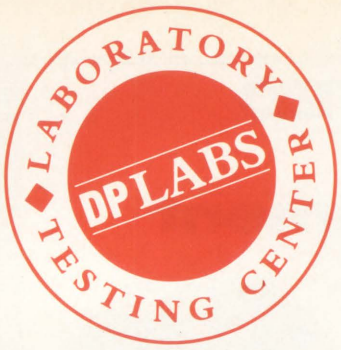

from the lab

The Lanpar MAX 331 Graphics Terminal

David B. Miller Lanpar, of Markham, Ontario, designed the MAX 331 terminal to accommodate users who need both text and graphics capabilities in one unit.

The MAX 331 emulates the VT330, including VT52, VT1xx, VT2xx and VT3xx text-mode emulation. It can handle Tektronix, ReGIS and SIXEL graphics as well.

The amber, 14-inch tilt-and-swivel screen features 800-by-500-dot resolution with 20 scan lines per character. Letter-quality characters make text easy to read. A screen-saving feature blanks the screen after 10 minutes of disuse. Refresh rate can be set at 60 or 70 Hz.

Printer and modem settings, date, time and cursor position can be displayed on a status line. You also can write other information to the status line, such as function key settings and error messages.

The Keys

The detachable keyboard features 15 programmable function keys. Key arrangement mimics the LK201 except for a Line-Feed key to the right of the space bar and a key, labeled MAX, directly above the Control key.

The Lanpar MAX 331 features a number of DEC emulations and can display ReGIS, SIXEL and Tektronix 4014 graphics.

The MAX key is used in conjunction with other keys to perform setup operations and to program function keys. It also is used with the up and down arrow keys to adjust screen brightness. There's no dial on the monitor to control brightness. A total of 256 characters can be programmed into the 15 function keys.

The output from user-defined keys (UDKs) can be routed to the host or kept locally. UDKs are programmed through a Setup screen. They also can be modified using host commands.

Using the DEC Multinational or ISO Latin-1 character sets, characters can be composed with two-key or three-key sequences. Hexadecimal sequences also can be composed to send to the host.

The Keyboard Language setup option provides 14 national keyboard layouts in addition to the standard DEC layout. Available character sets include U.S. ASCII, DEC Multinational and ISO Latin-1, DEC Special Graphics, DEC Technical Character Set and 14 national character sets.

The main port supports baud rates from 75 bps to 19.2 Kbps. In Terminal Setup, you can choose parity, XON/XOFF, number of stop bits, character size and modem options. The printer port supports DEC-compatible printers with serial interfaces.

In Text mode, screen contents can be printed via the Print Screen key. Pressing Control and Print Screen keys simultaneously prints each line as it's displayed. In Tektronix mode, the Print

1989 digital review TARGET AWARDS NOMINEE

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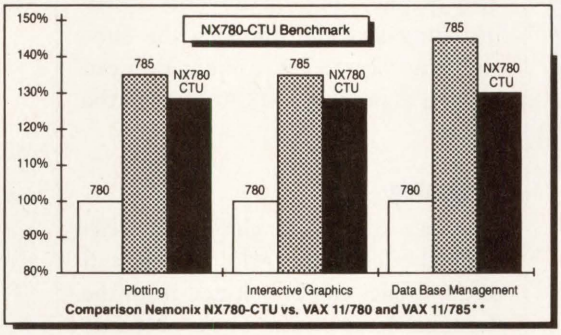

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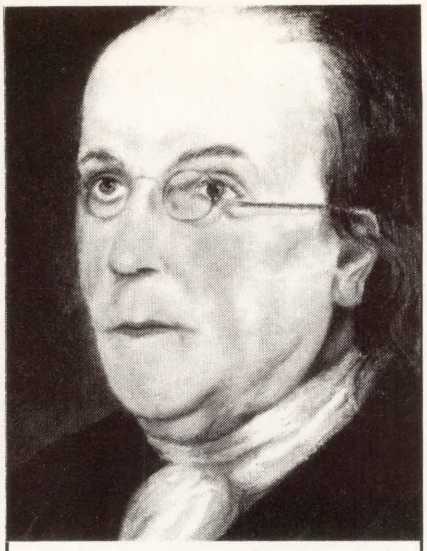

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LABORATORY DPLABS TESTING CENTER

Screen key produces a SIXEL dump of the display.

The Print Screen key prints text only in ReGIS mode, but the ReGIS Hardcopy command can be used to print graphics. To print the entire screen, including text and graphics, the Shift and Print Screen key combination can be used to produce a SIXEL dump to the printer.

Graphics

Graphics display is clear and well-defined. Tektronix 4014, ReGIS and SIXEL modes can be selected from the Terminal Setup screen. The appropriate graphics cursor is displayed for each mode.

In Tektronix mode, the graphics cursor can be moved using the arrow keys. The displayable area on the screen is 3,096 x 4,096. The text display area is 800 x 480 dots, and the graphics display area is 623 x 479 dots.

ReGIS graphics are supported fully, including polygon fill and macrographs.

Monochrome and color SIXEL data can be displayed. Color data is translated into shades of gray. Printers that support SIXEL graphics can have output sent to them directly from the terminal in Compressed, Landscape, Expanded, Rotated and Portrait modes. Output can be initiated by a host command or by using the Shift and Print Screen key combination.

Setting up the terminal is easy. Maneuvering through the various menus and windows is simple. The documentation clearly explains each setup option and its effect.

The MAX 331's documentation is extensive. Explanations are clear. A glossary explains commonly used terms, and an extensive index is included.

There are some differences between the MAX 331 and the VT330 it emulates. The MAX 331 lacks the built-in mouse support, dual-session and multipage memory features of the VT330. If these features aren't important to you, the MAX 331's $1,195 price tag will attract you.

The Lanpar MAX 331 can span both worlds of text- and graphics-capable terminals. If you need this capability, check out the MAX 331.

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CIRCLE 400 ON READER CARD

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CIRCLE 435 ON READER CARD

Lanpar MAX 331 Graphics Terminal

PLATFORMS: Emulates DEC VT52, VT1xx, VT2xx and VT3xx terminals, as well as ReGIS, SIXEL and Tektronix 4014 graphics

PRICE: $1,195

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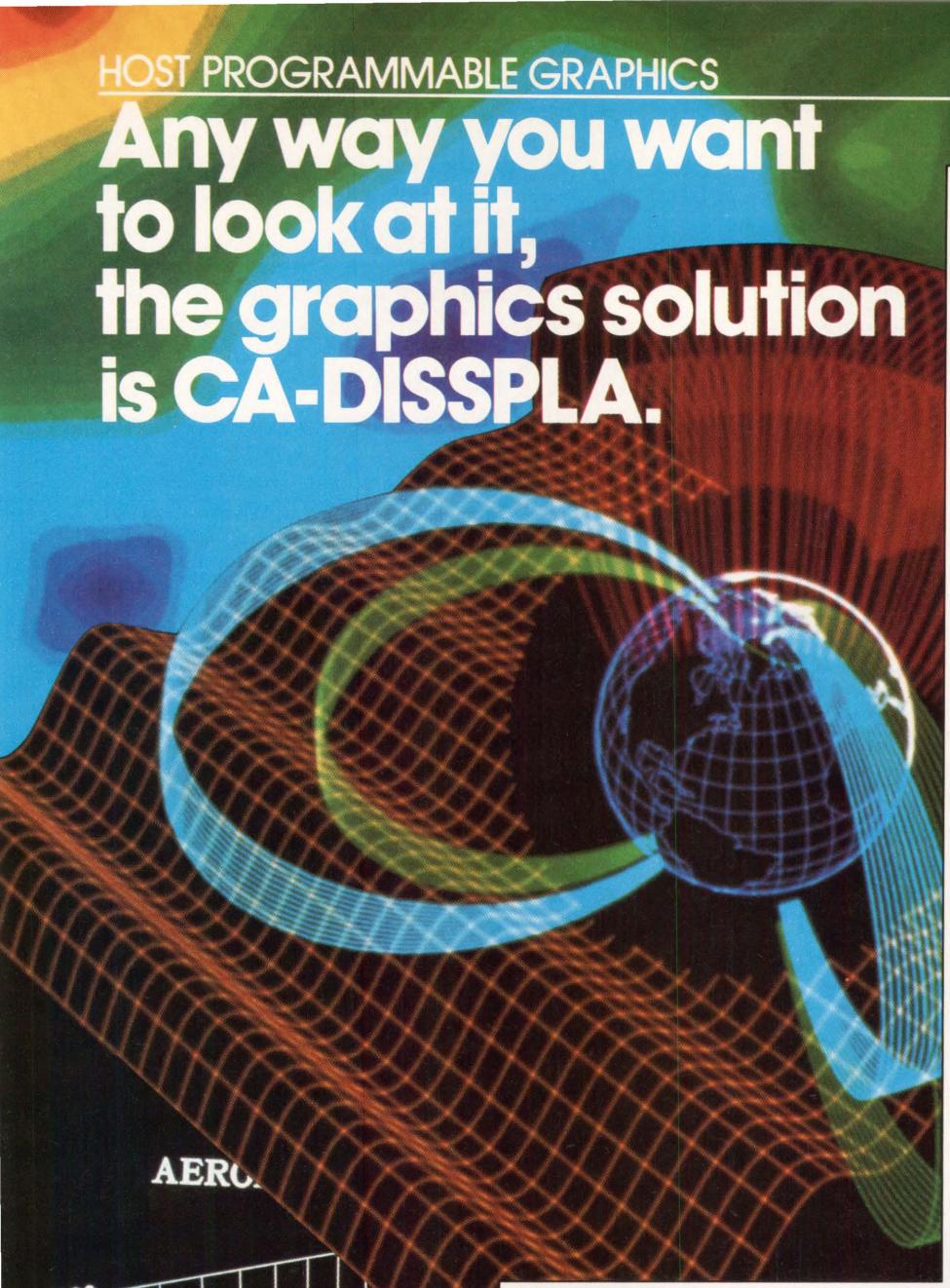

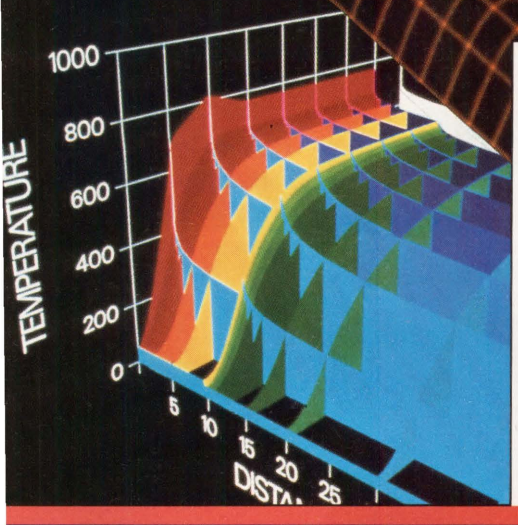

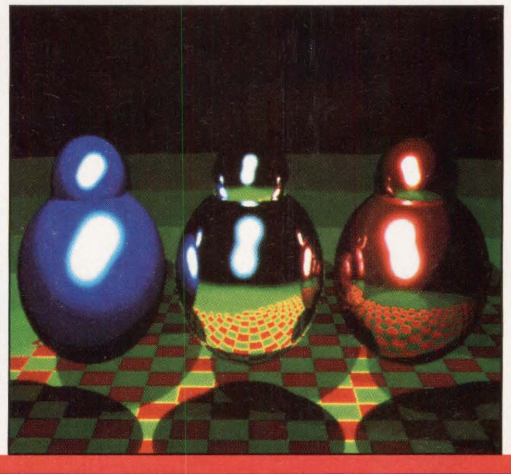

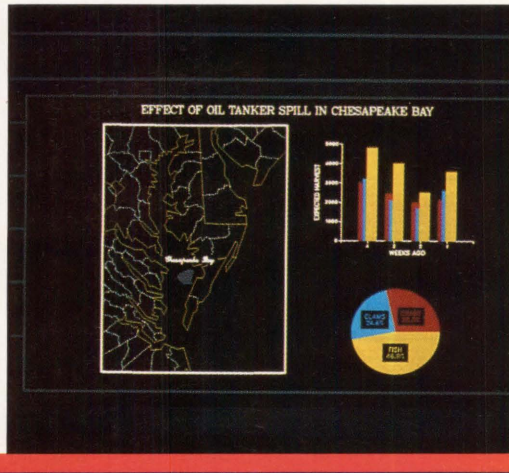

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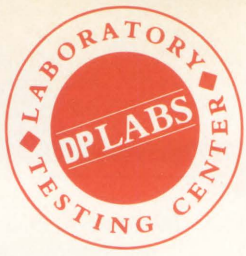
CIRCLE 193 ON READER CARD



Digital's Scholar Plus

David B. Miller

Modems are your computer's doorways to the outside world, and that's where security problems arise. Computer tampering and break-ins always have concerned system managers, but electronic viruses give MIS personnel even more reason to worry. And dirty data that's not sent deliberately can also cause problems.

DEC's Scholar Plus line of modems boasts security features that allow you to govern access to your system as well as determine the level of error checking you desire. The line includes the DF242, the rack-mountable DF124+, and the 1200-baud DF212.

Our test model DF242 is a compact unit that is 1.19 inches high, 6 inches wide and 8.62 inches deep. It weighs two pounds, including the power supply. Eight front-panel LEDs keep you informed of what's going on. One external switchpack, one internal switchpack and a number of internal jumpers allow you to hard-configure the modem. You also can configure the modem through commands issued from a terminal or program.

The unit operates at baud rates of 2400/1200/300 bps and can switch speeds automatically to match the rate of the modem at the other end of the line. The modem's speed buffer, which can operate at baud rates of up to 9600 bps, eliminates the need to adjust your terminal's speed to match the speed of the modem.

Thirty phone numbers of up to 36 characters each can be stored in nonvolatile dial memory. Each can be referenced by user-defined labels. A number can be redialed automatically if the line is busy and up to 30 numbers can be linked together. The modem will try successive numbers until an available one is found. Mixed dialing and combined pulse and touch-tone modes also are available.

A callback memory area can hold 30 telephone numbers as well as passwords for remote users. This memory is used when the callback security feature is activated.

Both Digital Modem Command Language (DMCL) and the Hayes AT command set are supported. DMCL commands closely resemble DCL commands. For example, the DIAL command dials a phone number. LIST and SET commands view and change modem parameters. READ and WRITE commands load modem parameter data from, and write parameter data to, nonvolatile memory. The DCL nature of DMCL makes the command set easy to use, even for those not comfortable with DCL and VMS.

Don't worry if you're a Hayes AT command set fan. The DF242 is fully compatible with the AT commands. The command set is expanded to accommodate the DF242's extended features.

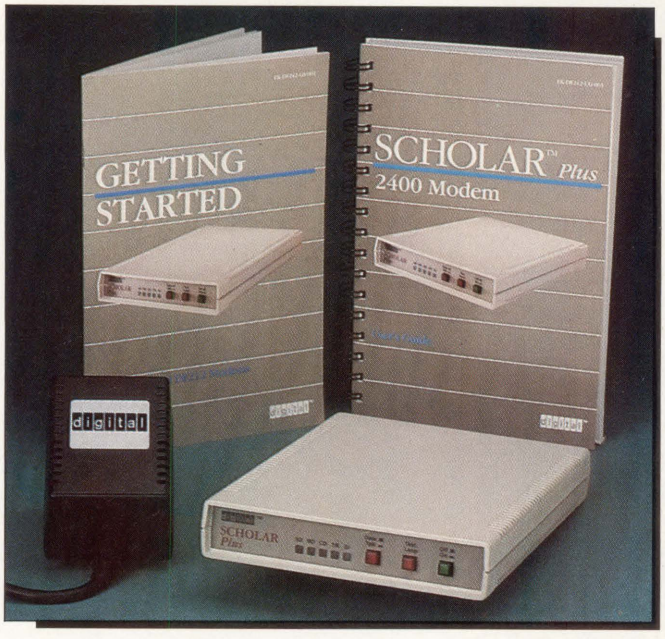
Protection Plus

The DF242's security features can be classified as data security and access security. To ensure data integrity, two error-correcting protocols are provided: Microcom Networking Protocol (MNP) and X.PC for communications via TYMNET Value-Added Network. You configure the modem to use the protocol you require.

MNP's popularity has grown among vendors of high-speed modems. If modems on both ends of a link run MNP, the protocol will remove the asynchronous start and stop bits and provide faster communications. In addition, MNP's error checking ensures that data is transmitted cleanly.

X.PC provides many of the same capabilities as MNP with some added networking benefits. It's ideally suited for communications over packet-switched networks.

Access security can be classified as modem access security protection and callback security protection.



The compact design of the DF242 Scholar Plus modem makes it well suited for the desktop.

Scholar Plus Modems

PLATFORMS: Dialup lines; leased-line version available

PRICE: DF242, $795; DF124+, $850 for board, $1,000 for desktop option; DF212, $645

DIGITAL EQUIPMENT CORP.

HEADQUARTERS:
146 Main Street
Maynard, MA 01754
(617) 897-5111

FOUNDED: 1957

PRODUCT LINE: Computer systems, subsystems, networks, software and service products

REVENUES: $9.4 billion

NET EARNINGS: $1.1 billion

OWNERSHIP: Public (NYSE: DEC)

CIRCLE 400 ON READER CARD

Modem access security protection guards against tampering with modem parameters and memory. It's valid in DMCL mode only. Parameters are protected with a user-defined password. Commands to change configuration options or memory locations must include the password. Although it's possible to reset all modem parameters to factory settings, the reset also clears memory, thus denying access to critical information.

Callback security protection is available in both DMCL and AT operating modes and is used to control remote access to your computer system. Before enabling callback security, callback memory must be initialized with phone numbers and passwords of authorized remote users. Four callback security levels are provided:

Level 1. No callback — The modem requires a password only. If the password is correct, you can proceed to log onto the host in the normal fashion.

Level 2. Callback and password security — After you establish a connection and enter your assigned password, the host modem issues a callback attempt request. If you answer yes to the request, the host modem disconnects, searches for and dials the number previously associated with your password found in callback memory. Upon successful reconnection with your modem, normal VMS password and log in procedures can resume.

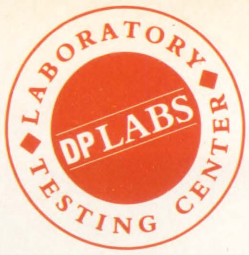
Level 3. Callback, password security and telephone number verification — Level 3 incorporates the features of level 2. However, the host modem also requests that you enter the phone number of your location. The host modem then checks its callback memory and verifies that the number you entered is the same as the number stored in memory.

Level 4. Callback to a user-specified phone number with password security — This level allows you to enter a callback number that can be different from the one stored in the host modem's memory. The host modem gives you three attempts to enter a phone number with the correct syntax. There's no invalid callback number; the host modem simply checks for syntax.

In addition to the four security levels, the DF242 maintains an audit trail that records the last valid password and the last 30 invalid access attempts. The security level and phone number for each of these attempts also is recorded. You can list these entries to perform security checks.

Another model, the DF124+, offers rack mounting and a leased-line capability that will detect line problems and automatically fall back to normal dialup lines if required. The line also includes the slower DF212.

Whichever model you choose, you're sure to feel more comfortable about your system's data.



Digital Business Systems' ExecuDesk

David B. Miller

Desktop organizer software has been available for microcomputers for some time. Microcomputer users enjoy the convenience of a calculator, notepad and appointment calendar at their fingertips. ExecuDesk, manufactured by Colt Software Technologies of Red Bank, New Jersey, and distributed by Digital Business Systems Inc. of Eatontown, New Jersey, is a similar product for VAX systems.

Installation

VMSINSTALL is used to install ExecuDesk. The product can be integrated with A-TO-Z if you're running that on your system. ExecuDesk requires a Dibol run-time library that's included with the distribution in the event your system lacks one. A call to Digital Business Systems for a license number key is all that's required to start using the program.

You can grant varying levels of access privileges to your users. Your VMS rights database must be modified to allow this. For example, GRANT/IDENTIFIER CST_SECURE MILLER gives user MILLER full access to ExecuDesk's security functions. Other identifiers exist to allow either full access or read-only access to the Company Events Calendar, the Equipment Calendar and Corporate Phone Book.

Logical names for the printer queues you wish to use with ExecuDesk then can be defined. Up to 10 print queues can be associated with ExecuDesk. We had problems trying to print across cluster nodes. Digital Business Systems is aware of the problem and will issue a fix for the next release.

Features

Calendars — Four calendar types are provided: Company Events, Personal, Equipment and Master.

1. Company Events Calendar — This is a group calendar designed to let employees know the time and date of meetings, seminars and other company functions (see Screen 1).

Event data includes the beginning and ending times and dates of the event, the event's location and who's to attend. Event calendars can be printed for up to 50 locations. You can view the Events Calendar for three locations at a time. The display can be scrolled to allow you to see more of the calendar.

Calendar files fill up fast and can use a lot of disk space. ExecuDesk includes an option to purge the calendar database. You supply the cutoff date so that all records dated earlier than the cutoff will be purged.

Because the Company Events Calendar addresses a wide audience, you need to give individuals security clearance. You do this when ExecuDesk is installed by modifying your system's rights database.

2. Personal Calendar — Each of your users has a Personal Calendar. Appointments are scheduled in 15-minute intervals. Other information, such as a person's name and company, can be included along with any appropriate notes.

Your Personal Calendar can be viewed by week, month or year. Appointments are highlighted so you know what to expect that day.

ExecuDesk can search for free 15-minute blocks of time. You supply the date on which to start searching and how many consecutive 15-minute blocks you need. ExecuDesk stops at the first free-time block. You can continue to search forward or backward for more time periods.

A default daily schedule can be established, and you can set up your vacation and holiday periods in advance to remind yourself of those events.

As with the Company Events Calendar, your Personal Calendar can be printed and the calendar files can be optimized to save disk space and enhance performance.

3. Equipment Calendar — This allows you to schedule and keep track of pieces of equipment. For instance, an audio-visual department can use the Equipment Calendar to schedule when and where overhead projectors, VCRs and

ExecuDesk

PLATFORMS: VAX/VMS systems running VMS version 4.5 or later. Can be integrated with DEC's A-TO-Z office automation system

PRICE: Until 1/1/89, $595 for any CPU. After 1/1/89, from $995 for a MICROVAX 2000 to $5,995 for the VAX 8900. Documentation ranges from $300 to $500

DIGITAL BUSINESS SYSTEMS INC.

HEADQUARTERS:
22 Meridian Rd., #5
Eatontown, NJ 07724
(201) 542-7600

FOUNDED: 1978

PRODUCT LINE: Distributors for VMS and UNIX-based software

OWNERSHIP: Private

CIRCLE 496 ON READER CARD

What's the difference between a backup and an archive?

System Backups. They're time-consuming and painstaking, but backups guard against the dreaded disk-head crash. But even if you have a file backed up, getting it back—finding it on dozens of backup tapes—costs your company time and money. And sometimes the file is no longer there.

The difference is organization.

An archiving system, on the other hand, automatically transfers files from disk to tape or optical disk. It gives you more disk space. It organizes the data you need to keep for easy and instant access. An archiving system catalogs off-line information.

The difference is security.

With file protection to prevent accidental reads, and checks to prevent data being written over, you'll know your data is safe. In addition, there's no danger, as with backup tapes, that someone may restore sensitive information. Plus, there's no chance the wrong tape may be mounted and last quarter's accounting records destroyed.

The difference is ARCHIVE 2000.

Until now, the only way to store information was to save backup tapes—for six months or ten years. Now ARCHIVE 2000 gives you a better way. Whether your business is chemicals or construction, agriculture or accounting, ARCHIVE 2000 saves you money, because you keep only the information you need on low-cost media.

Now, the difference between a backup and an archive is ARCHIVE 2000. The most advanced archiving system for VAX/VMS systems. Call today for more information on how ARCHIVE 2000 can make a big difference in helping you handle your data storage problems.

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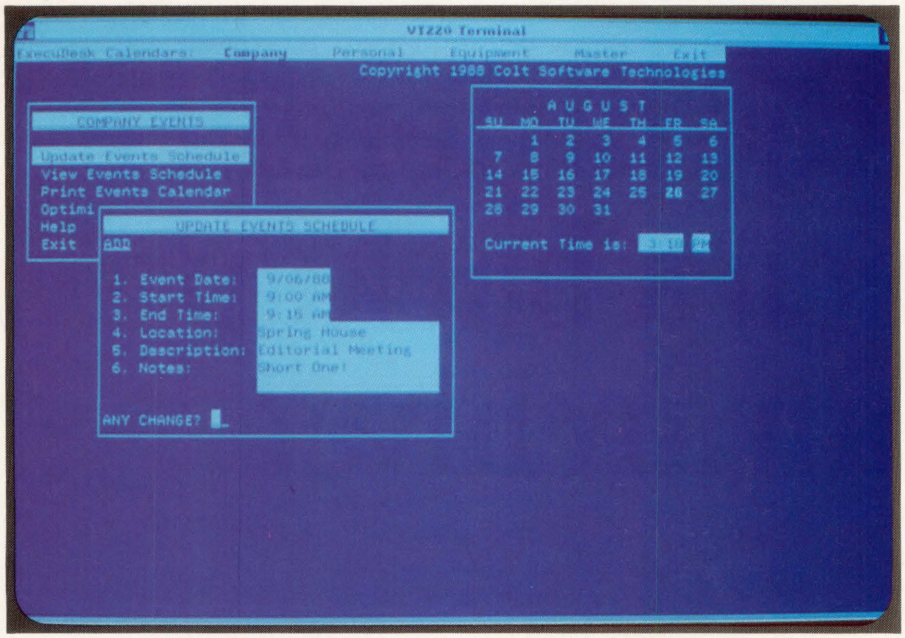
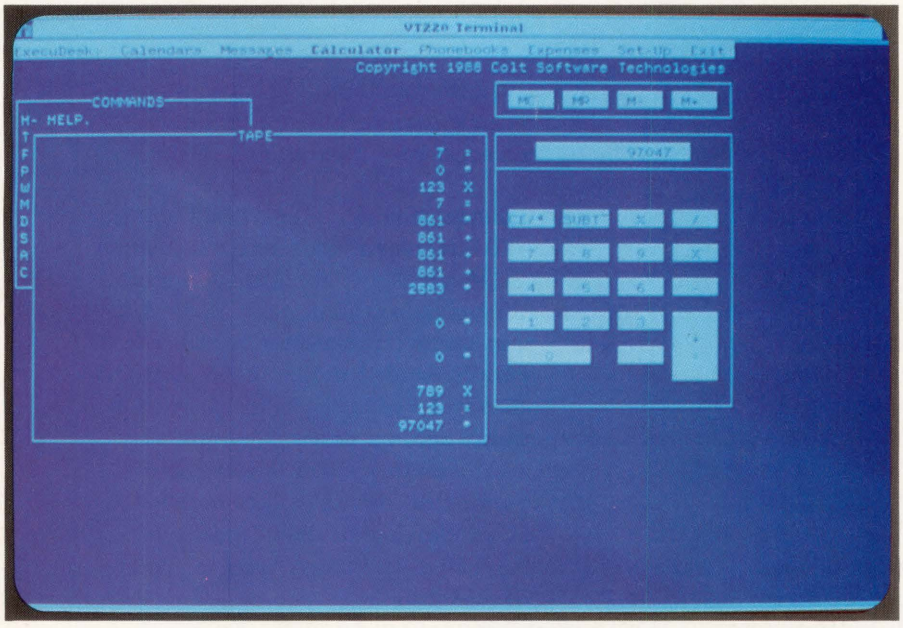
CIRCLE 269 ON READER CARD



Screen 1: The Company Events Calendar can be updated only by privileged users but can be viewed by all.



Screen 2: The Calculator functions as a business calculator, complete with a paper tape display.

other equipment is needed.

The schedule can display three pieces of equipment simultaneously. It can be printed and optimized in the same fashion as the other calendar types.

4. Master Calendar — This allows privileged users to schedule appointments for other persons and groups. Group scheduling is done by means of distribution lists. All affected users have their Personal Calendars updated with the scheduled event. It's important that you carefully grant access to users of this feature to avoid problems such as scheduling too many or too few persons.

Messages — You can send reminders, consisting of 30-character messages, the recipient, the date and the time, to yourself and other users. Currently, a Mail option spawns directly to VMS Mail. A more comprehensive user interface is due in a future release.

Calculator — ExecuDesk makes use of the VT220's keypad and function keys to simulate a business calculator, complete with a display that mimics paper tape output (see Screen 2). Standard mathematical functions, including percent, are implemented. Memory also is included. Output to a local printer is possible.

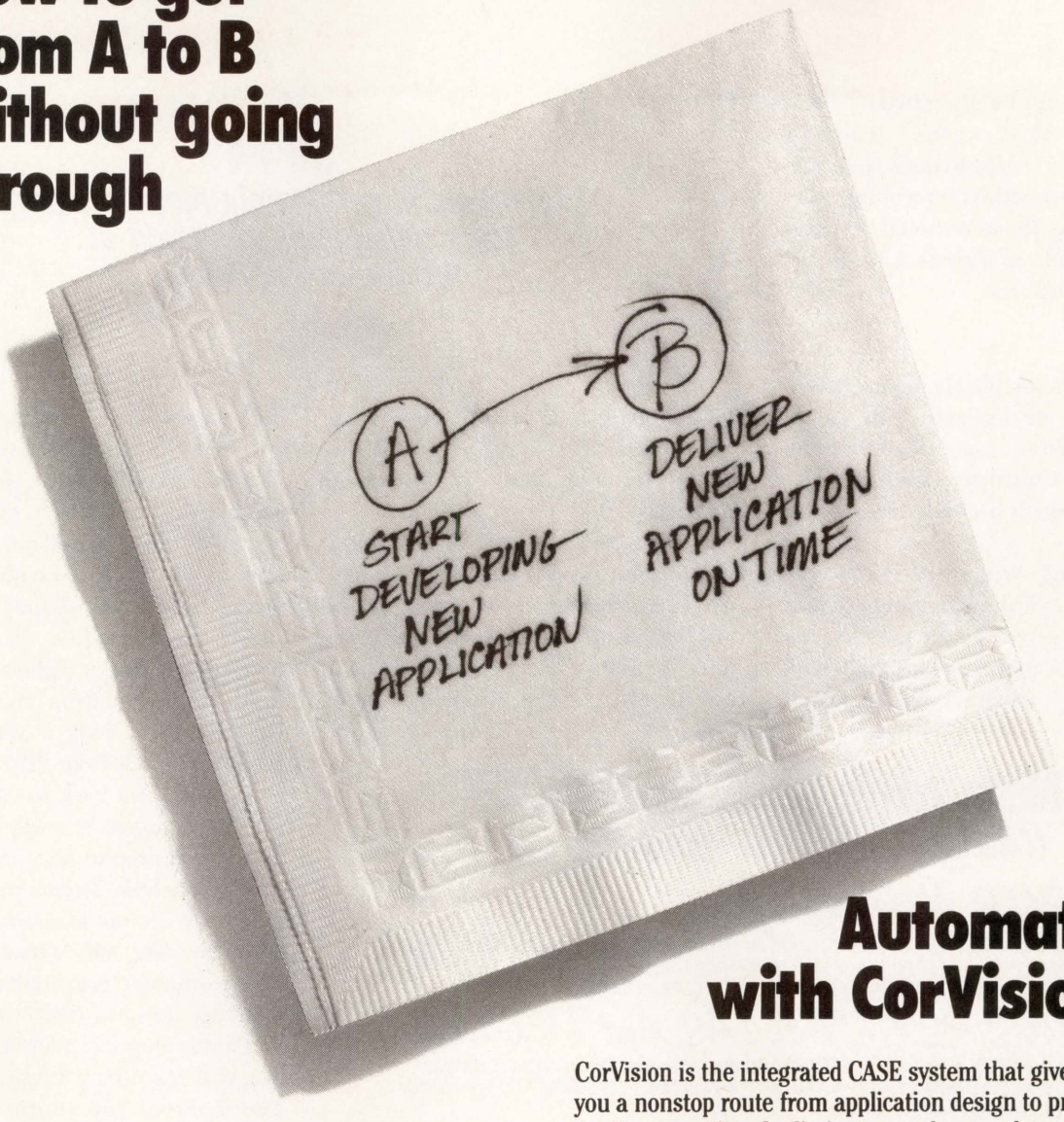
Phone Books — As with appointment calendars, both Personal and Corporate Phone Books are available.

Phone Book information includes address data and personal comments in addition to the required phone information. Searches can be initiated by name or company. Printing options include phone lists and mailing labels.

Expenses — You can define up to 250 expense types. ExecuDesk divides your expense types into seven categories: automobile, education, hired transportation, operating expenses, travel, miscellaneous and entertainment. One expense transaction per type can be recorded daily.

A number of expense reports of various levels of detail and for different

How to get from A to B without going through H.



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CorVision is the integrated CASE system that gives you a nonstop route from application design to production operation. It eliminates unpleasant detours—like missed deadlines, unmet user requirements and budget overruns—that are often unavoidable when using conventional development methods and programming tools.

CorVision is the fastest, safest, most direct route to application development success. It automates more stages of the application software life cycle than any other development system for Digital VAX computers. From application design—using entity relationship diagramming and screen painting tools—to automatic code generation, source documentation, testing and maintenance, CorVision will increase overall development productivity by as much as 6:1.

If you're looking for the best way to shorten the distance between A and B, we urge you to test drive CorVision. Call or write today for more information.

CORTEX

Cortex Corporation, 138 Technology Drive
Waltham, MA 02154 (617) 894-7000

CIRCLE 173 ON READER CARD

time ranges can be generated.

ExecuDesk's expense reporting methods make it easy to track employee expenses. The method is recommended highly by the IRS, so it should be easier to gather employee expense data for tax-reporting purposes.

Interface

ExecuDesk is completely menu-driven. Main menus are displayed at the top of the screen. Within a specific application, such as the Calendar, menus are displayed to best fit around windows on the screen.

By using windows, ExecuDesk allows you to view multiple applications on the same screen by interrupting the current application and starting a new one. Although windows can't be pushed behind or pulled in front of others, they can be moved to another area of the screen to clear the way for other windows.

"ExecuDesk is completely menu-driven. Main menus are displayed at the top of the screen."

If you're accustomed to PC desktop managers, it might take a little time to get used to the slower feel of ExecuDesk on a VAX. The functionality is there, but it takes more time to paint terminal screens and generate windows than it does with faster PC products.

Keep ExecuDesk's documentation nearby to reference special key assignments. Some keys, such as EXIT, assigned to the F10 function key, work only at certain places within the software. Others work all the time. Within the Calendar module, the Tab key is used with a left- or right-arrow key to move you to and from daily schedules. But Tab also is used to change the appointment mode from ADD to CHANGE to CANCEL and back to ADD.

There should be a way to SPAWN to DCL if you need to do something outside ExecuDesk. There's no hot-key to get you in and out of other applications as is the case with memory-resident microcomputer organizers. There's an interrupt key (F6) that can be used if you're running ExecuDesk in conjunction with the A-TO-Z Integrated System. The interrupt key returns you to the A-TO-Z interrupt menu.

The documentation is written clearly and contains many sample screens. You'll learn ExecuDesk by using it often and keeping the manual handy to reference special keys or features.

EXECUDESK IS WORTH a close look for any site interested in providing a common desktop solution for its user base.

Colt Software Technologies
P.O. Box 8716
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CIRCLE 153 ON READER CARD

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The MAP-4000 performs a 1024 Complex FFT with bit reversal in 1.4 milliseconds. You get 40 MFLOPS single-precision or 20 MFLOPS double-precision performance, and your application will run 10 to 100 times faster, depending on the amount of vectorizable code.

MAP-4000's basic configurations include either 2 or 8 Mbytes of memory. Up to 40 Mbytes of additional memory are available, and there's address space for up to 1/4 gigabyte for future expansion. MAP-4000 prices start at $18,995* —that's $475/MFLOPS!

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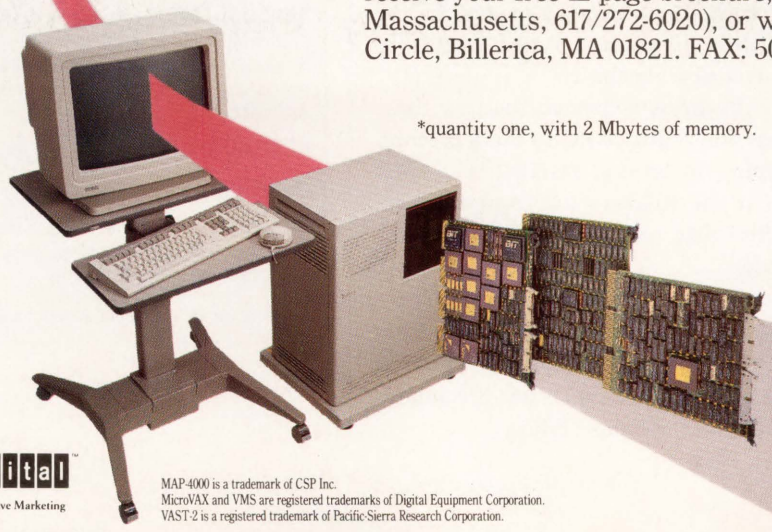
*quantity one, with 2 Mbytes of memory.



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CIRCLE 261 ON READER CARD

Progress Software Corporation's Progress

Evan Birkhead The Progress software design environment from Progress Software Corporation of Bedford, Massachusetts, consists of a powerful relational database manager that's specifically tailored to writing applications, as well as a tightly integrated fourth-generation language (4GL).

The Progress database runs only with the Progress 4GL and vice versa. The company produces VMS, UNIX and DOS versions of Progress and soon will release version 5.0, which will read SQL statements and be combined with an architecture suitable for On-Line Transaction Processing (OLTP).

When these advantages are added, Progress will be an exceptional product. The developing procedures and flow of writing in Progress are learned easily, and moving through screens during design is like taking a guided tour. The resulting applications, with highly complex underlying code, are easy to use.

Although the VMS version is new, it's a full-fledged VMS, rich with techniques familiar to VAX users. We ran it on our local area VAXCLUSTER (LAVC).

Five Components

Five integrated software components, not add-on modules, make up the Progress system:

1. An RDBMS, with up to 1,000 files and 1,000 indexes per database, that can be built across multiple disk drives. A Roll Forward facility retrieves data stored before disk drives crash or otherwise are damaged.
2. A 4GL that designs applications portable across VMS, UNIX and DOS systems. Because the language is complete, you never need to code in 3GLs, such as COBOL, BASIC, FORTRAN and C. However, it can call C routines.
3. A Data Dictionary that stores all of the descriptive information about your database files. The indexes are stored in a B-tree structure and include any of five data types: characters, integers, decimals, logicals and dates.
4. A Procedure Editor. The procedure-writing area is between two horizontal lines on the editing screen, which appears immediately after log in. Progress automatically compiles your procedures before running them. CTRL-C returns you to the editor.
5. An automatic Screen and Report Formatter that lets you design multiple, overlaying windows. This facility determines how the entry screens are displayed to the user of the designed application.

Designing An Application

On our LAVC, Progress' opening prompts didn't quite match the documentation. After typing PROGRESS/CREATE at the $ prompt, the system asked me to ENTER DATABASE NAME:, and I typed EDITOR. At the next prompt, P2:, which is a request for the database location, I typed EMPTY to start a new database.

Progress generated the new database and returned me to the $ prompt. Typing PROGRESS EDITOR then took me to the Welcome to Progress screen. After that, everything followed the script.

The pattern for application development is easy to catch on to. After you define a database using the Data Dictionary, you can write procedures with the Procedure Editor.

At the Welcome screen, you're provided with the procedure editing area. From this point, you can define databases, write or edit procedures, or run applications. The Help key is your route to the dictionary, VMS or applications you've written.

The Data Dictionary

Typing DICT in the editing area or typing d on the Help screen brings up the Dictionary Main Menu (see Screen 1). Selecting 1, Display/Change Data Definitions, brings up a form used to specify properties of your database files, such as

Progress 4GL And RDBMS V4.0

PLATFORMS: VAX/VMS version 4.5 or later, IBM PC and compatibles and many UNIX-based systems

PRICE: From $5,500 on a VAXSTATION 2000 to $80,000 on a VAX 8800

PROGRESS SOFTWARE CORP.

HEADQUARTERS:
5 Oak Park
Bedford, MA 01730
(617) 275-4500

FOUNDED: 1981

PRODUCT LINE: Progress' integrated components include an applications development language, an RDBMS, a data dictionary, a procedure editor and a screen and report formatter

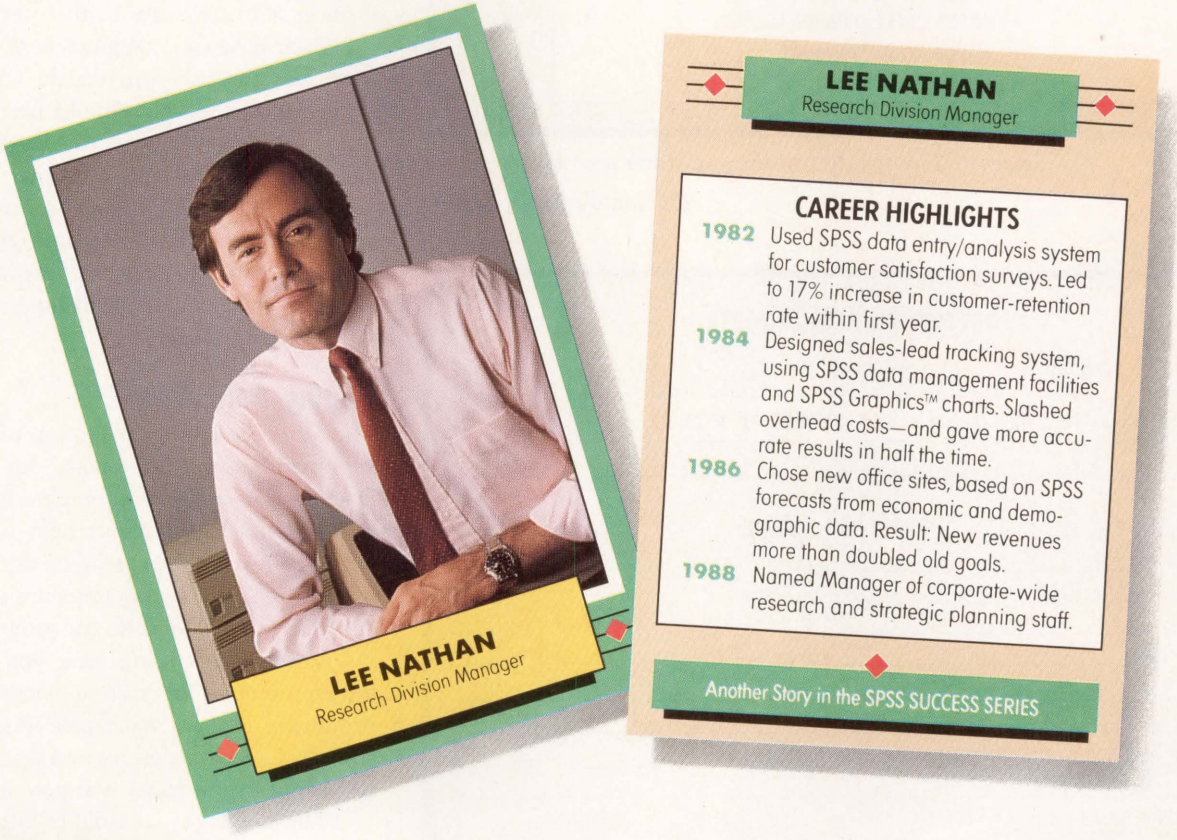
REVENUES: $12 million, 1988 (projected)

OWNERSHIP: Private.

BRANCHES: Atlanta, San Diego and Washington, D.C. Fourteen international sales and service offices

CIRCLE 499 ON READER CARD

Put us on DEC and we'll make you Manager of the Year.



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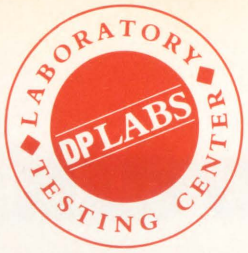
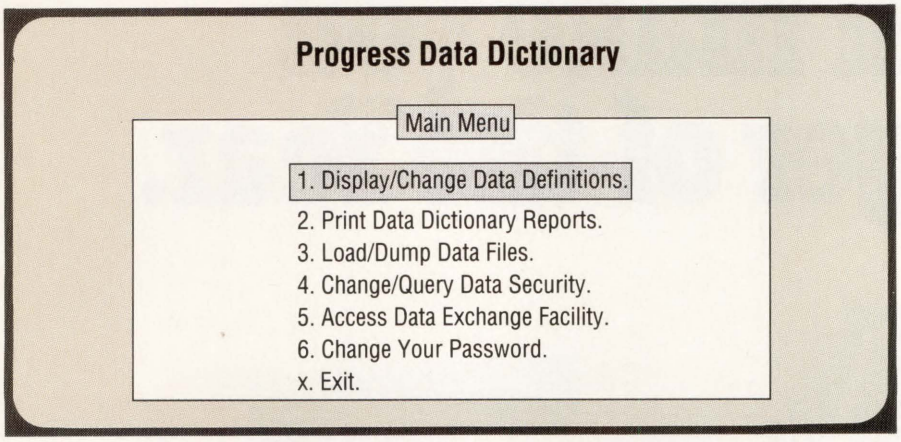
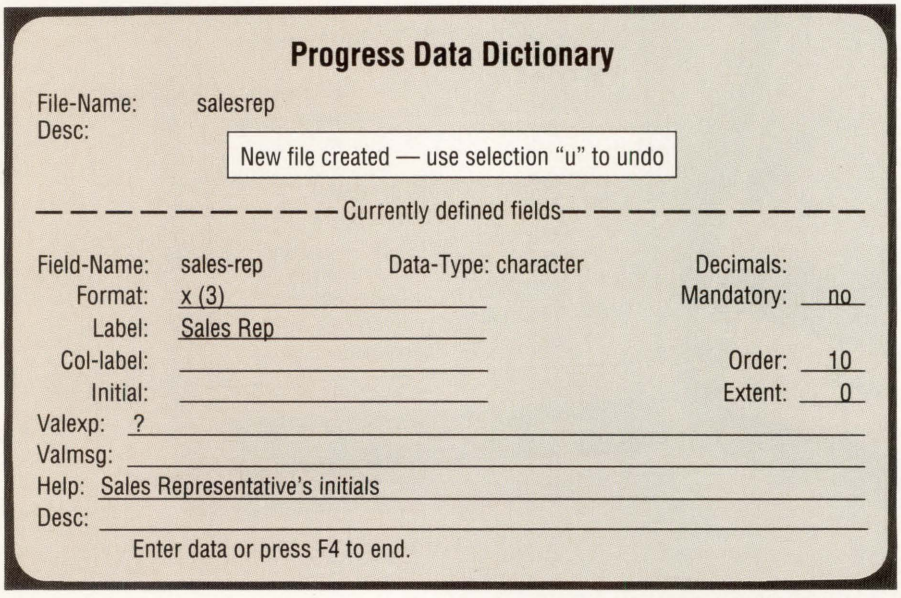
CIRCLE 159 ON READER CARD

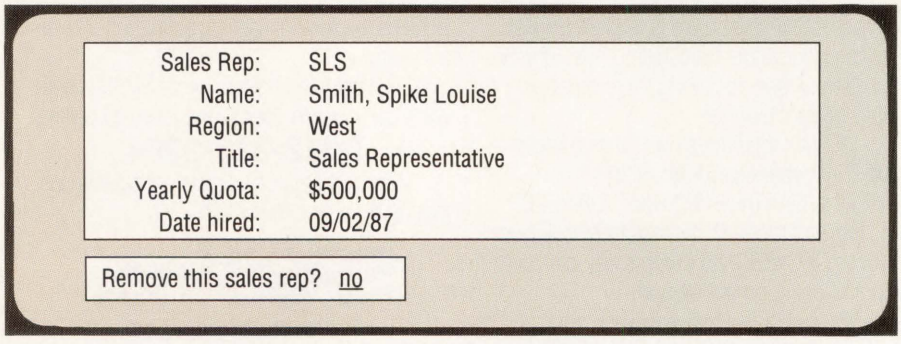




Screen 1: Typing DICT in the procedures area brings up the Dictionary Main Menu.



Screen 2: The top Data Dictionary form.



Screen 3: A Progress-generated input screen with data entered.

file names, field names, screen formats and data attributes (see Screen 2).

Here, Progress lets you set the way data is entered on input screens. For instance, Data Type specifies such things as decimals and integers. Label is what the Field will be called on the entry screen. Valexp lets you set a range for numbers or quotas. Help is where you write system messages to the user.

Each field can contain several entries, and the user can decide which attributes of the field should be relational. When you type F1, Progress automatically formats screens (see Screen 3). Using these same user interfaces, you then can run the program as an application. Progress automatically validates input data or prompts you with error messages.

Writing Procedures

The function (F) keys at the top of the keyboard move you throughout the Data Dictionary and within procedures. F1 is Execute, F2 gets screen help, F3 inserts new data at the cursor, F4 exits an operation, and F5 gets procedure data. All 14 keys have specific functions.

Within the editing area, you can write procedures for creating menus and producing reports. Each procedure is stored as a separate entity and is called according to the name you give it.

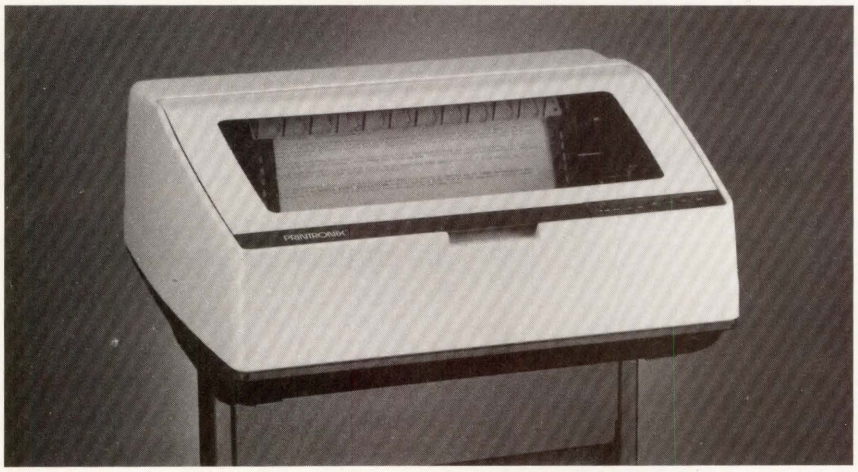
The language is as close to English as any I've seen. Programmers skilled in any 3GL will have no trouble.

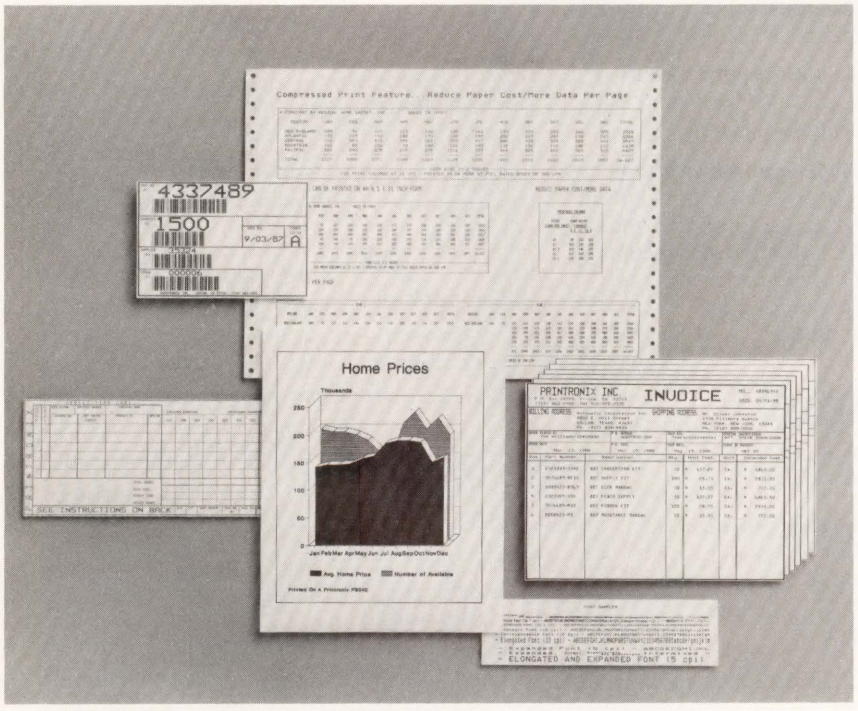
I also used the RECOVERY facility. This rebuilds your procedure up to the point of failure, similar to the way many word processing systems restructure documents.

Documentation

The lunchbox-sized documentation kit includes a concise *Tutorial* that, combined with the well-written *Test Drive* manual, provides a full understanding of

OUR NEW PRINTER PUTS YOU AT THE HEAD OF THE CLASS.





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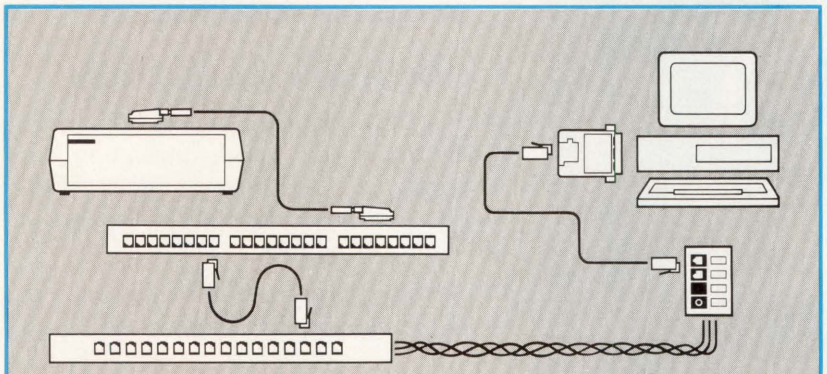
Tech Tip No. 5

DECconnect Solutions



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LABORATORY TESTING CENTER — DP LABS

the system's capabilities. The *Test Drive* is a great way to get to know Progress. Also included in the documentation is the *Reference Guide and Programming Handbook*, a quick-reference handbook called *Pocket Progress*, special booklets for using the RECOVERY facilities and multivolume databases, a description of the user-support plan, and a registration form.

> ***"The language is as close to English as any I've seen. Programmers skilled in any 3GL will have no trouble."***

Additionally, Progress sends Technical Bulletins and a Product Update Description to licensed users when new versions are issued. The V4.0 bulletin includes a list of scheduled training classes.

PROGRESS HAS ADDED a menu-driven builder called Progress FAST TRACK. This facility guides users with a screen painter, report writer and forms generator that designs database queries. You simply select fields from pop-up menu choices. FAST TRACK simplifies the system for unsophisticated programmers and lets experienced programmers look at quick screen or report prototypes of applications they're building.

This appeal to both technical and non-technical users is an important characteristic of Progress. It's a powerful tool in the hands of either kind of user.

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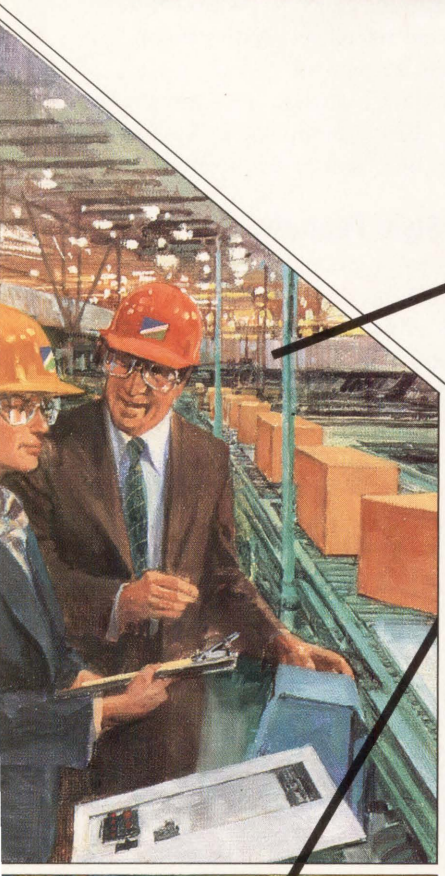

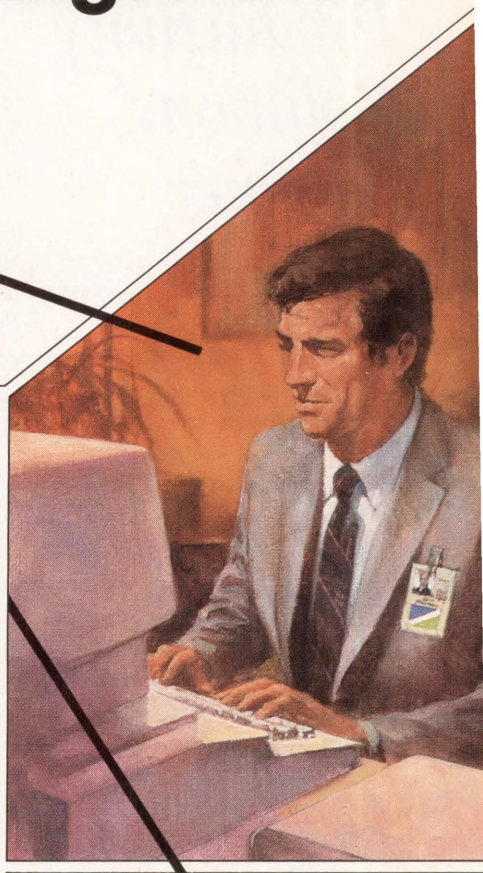

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- Forward/Backward Planning
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- Flexible Planning Units
- Custom Calendar
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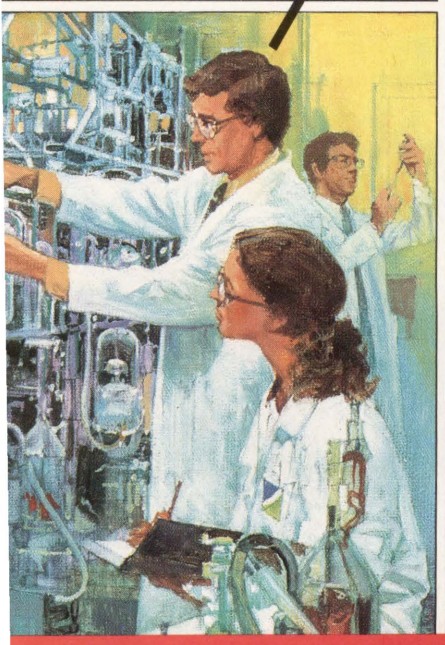
- Micro-to-Mainframe Integration



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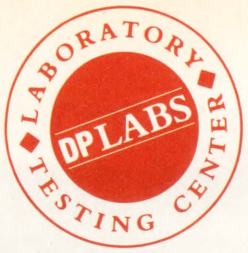

Productivity Solutions' Planner

Evan Birkhead Productivity Solutions Inc.'s (PSI) Planner project management system can best be described as interdisciplinary software. It combines different disciplines to work toward the goal of completing a project.

The foundation of Planner is a hierarchy that consists of user-defined or imported libraries that correspond to one another. These include budgeting, materials and other resources, as well as graphics, notably Gantt charts. Together, these form the trunk of a tree that branches into descending tasks.

Planner's menu structure is easy to follow, and its branches are organized logically. We tested version 5.1 on our VAXCLUSTER.

Designing A Project

The software installation was effortless, thanks to concise documentation. I defined my system "key" by adding a personal code to the SYLOGIN.COM file.

First, you're prompted to create a new file, which Planner loads (there's a default to your system directory). You then get the main menu (see Screen 1). This allows access to all of the system's capabilities. I chose Define Project to set up a directory — my writing projects.

Define is a form for assigning a name, number and start/complete dates to your project. From here, you can set up Macro (subproject) files or an annotation database, or define a calendar.

Next, I built a Resource Library. After Planner sets up the database using the A-Add function, it lets you M-Modify, D-Delete or S-Search. The database, rather than holding data, holds resources. The system requests a Resource ID, a description of the resource, how many hours per week the resource is available and the cost per hour. These resources can be accessed from anywhere in the system. After you've finished a form, Planner asks you to press ENTER.

By default, Planner's Gantt charts cover 12 weeks in an 80-column display, but they can be modified. PF1 allows you to switch among calendar units. A drop-dead date for the entire project can be added to the Gantt chart and highlighted in reports. Target dates can be input into the Milestone function.

Pressing Keypad 0 in the Gantt chart brings up its menu. From here, you can set up Micro Projects within Macros, and Explode to add information or to examine the Micro Projects (see Screen 2). M-Modify puts you in a form that defines the time and material parameters of each task (see Screen 3). R-Allocate Resources takes you to the Resource screen without going through M-Modify.

Department codes and resource class fields can be added to the Resource Library. Planner also lets you specify different time lengths for resource availability.

Gantt notation is standard, e.g., * for a unit completed on a current project, #... for a unit completed on a finished item.

Choosing New Project puts you back at a File Name prompt to create another root project.

Reports

The Create Reports form asks for printer parameters as well as what calendar units to use and whether you want to see Gantt charts. After a preview, the report can be queued to your system printer.

Reports in Planner are complete and easy to generate, with contents pages and references. With version 5.1, there are 22 reports.

Within branches, PF2 gives you help at every prompt, and CTRL-Z takes you up one level in the hierarchy.

VMS-Style Features

With version 5.0 and more recent versions, PSI has added features that take better advantage of VMS and VT keyboard features. For example, there's a Keypad 0 function that brings up a window with a directory of all file names. When in the resource facilities, for example, Keypad 0 can be used to look at the Resource Library files.

The Advanced Options menu (see Screen 4) includes a smooth transition to VMS to use mail or other VMS utilities. Everything in the Planner database is saved and uninterrupted. From this menu you can send reports to a printer or enter EDT or TPU to edit reports without leaving Planner. Resource Unavailability, which details

Planner Version 5.1

PLATFORMS: VAX/VMS version 4.4 and higher

PRICE: Ranges from $2,500 on the VAXSTATION and $4,900 on the MICROVAX II to $19,500 on the 8974 and 8978. Cluster discounts are available

PRODUCTIVITY SOLUTIONS INC.

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Waltham, MA 02254-9164
(617) 899-8900

FOUNDED: 1986

PRODUCT LINE: Project management system for VAXs

OWNERSHIP: Private

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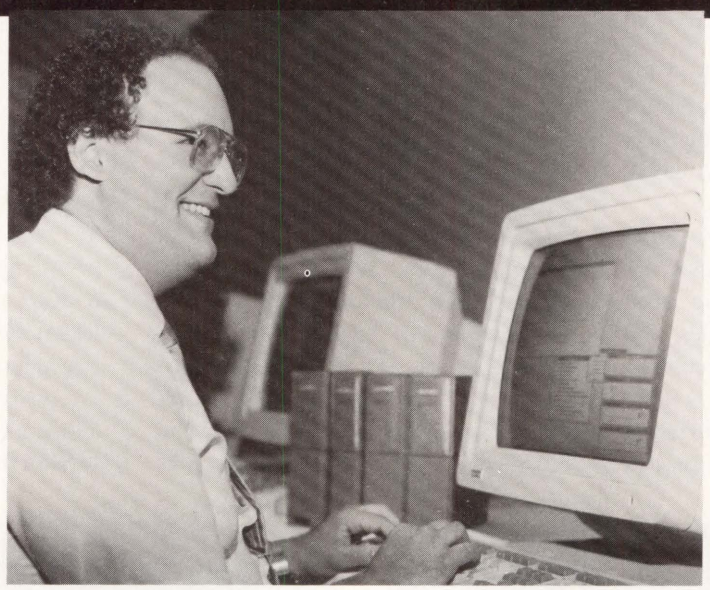
"The DECUS Library Has All the Answers."

Ted Nieland, Systems Research Laboratories, Inc.



Mr. Nieland has been a DECUS member for 6 years.

He first became involved with DECUS as a Programmer in College doing PDP-11, RT work. His first connection with DECUS was through his DECUS Local Users Group. Two years later he started to attend the national symposia.

Q. How did you get management to consider using public domain software from the DECUS Library?
A. Management came to me seeking alternatives for specific problems. Commercial packages had been recommended to the company at an expensive price, in the range of $18K - $25K.

Q. What was the cost of purchasing the packages from the DECUS Library?
A. About $400.00.

Q. What would you say are some of the benefits of using the DECUS library and its software products?
A.
- Sources are included in most cases
- Slight modification to code can be done easily to adapt product to own needs
- Products can be used as a model for other products
- Benefits of other people's experience
- Solutions are worth the risk in terms of cost
- The Library has a large selection of products to solve a host of problems
- No license problems, products can be installed on every machine
- Library products cost is for reproduction only
- If use product for a project and that project is terminated, software cost is minimal.
- In some cases, many years can be saved in development time.
- Prototypes of projects can be done inexpensively and in a short period of time.

Q. What are some of the DECUS Library products you have used?
A. Kermit Collection, TeX Collection and VAXnet Package. Kermit Collection is a group of programs that allows the transfer of data between Digital to Digital computers and also Digital to non-Digital computers. Features include: Covers all Digital Machines; each Kermit is complete; documentation is good; covers non-Digital computers also; easy installation. **Summary: If you have various Digital computers that you need to transfer information between, then Kermit is your answer.**

TeX Collection is a complete typesetting package. Features include: powerful typesetting utility; high quality output; in most cases, camera-ready output.; and it is equal to or superior to some commercial packages. **Summary: "I believe everyone who is doing written documentation should use TeX and LaTeX."**

VAXnet Package allows dial out capability for VAXes; supports many different manufacturers' modems; easy to use and install; good documentation; supports general common protocols. **Summary: VAXnet is the easiest product to use with a minimal amount of training.**

To receive the **DECUS Library** catalog, call **(508) 480-3635** or use the Reader Service Card.

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resources that currently can't be used, also is accessed from this menu.

True to VAX-style computing, different users can enter or manipulate data in different hierarchies at the same time.

New Functionality

A feature called Hierarchical Roll Up allows you to go to another level in the Planner tree. Planner asks you how many levels you want to move. Or, you can enter ALL to go to the top.

Planner also lets you generate Hierarchy Consistency Reports. This prints a project summary with basic, at-a-glance information about the files. This is helpful if you've lost perspective on the project. The Root Project is listed first, with its name, number, directory location, most recent modification date and Macro file information. This is followed by the same information for all subfiles, in descending order. Hierarchy inconsistencies are highlighted in the report.

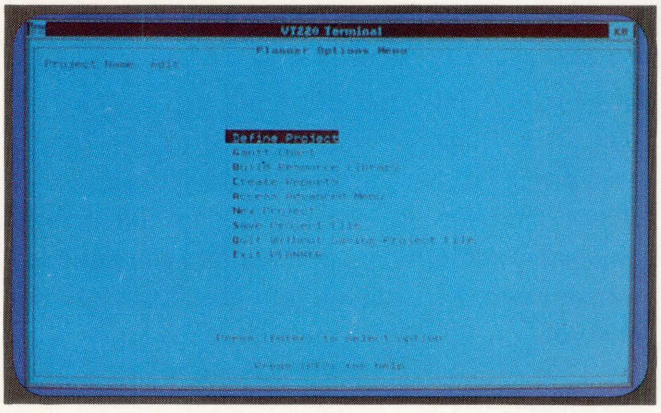
PSI's list of specification revisions is revised and updated constantly. Version 5.1 has everything from version 5.02, plus a few extras. Some of the more important extras include:

1. Flexibility for Gantt charts. The 132-column Gantts are supported, and you can toggle back and forth between 80 and 132 using Keypad -. The Gantt charts I used could be manipulated by mnemonics: AT for Add Task, AI for Add Interrupt, AM for Add Milestone.

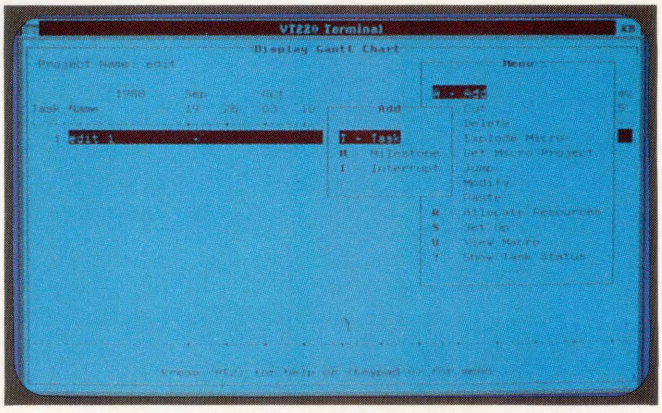
This lets you bypass the Gantt Add Menu. In addition, a Set-Up window lets the user set days, hours and weeks.

2. The ability to keep a database of notes in EDT or TPU in a Project Text Library.
3. A Load Template and an import/export function for flat files that can interface Planner with accounting systems or other project management systems. This runs from the Advanced Options menu.
4. Threshold settings for Resource Overallocation and a new Resource Underallocation report.
5. Gold-S in the Reports Screen, which brings up user-selectable resources.
6. Keypad 0, inside Define Task or Set Milestone screens, which calls up a user-selectable list of predecessor files.

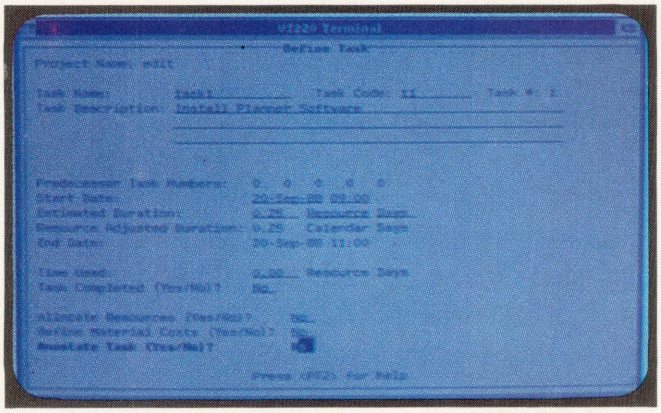
PSI reports that it's developing an add-on graphics module for a future version that will produce histographics.



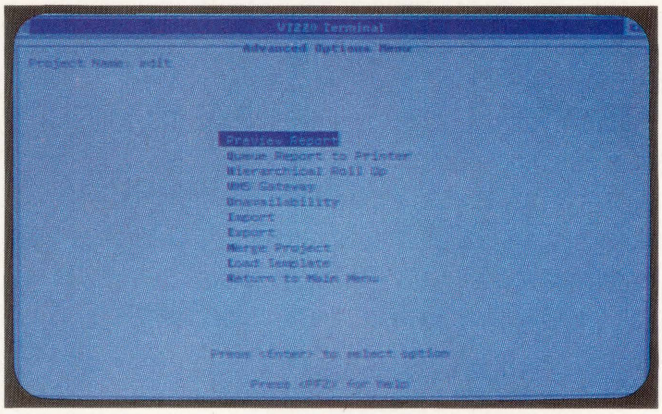
Screen 1: Planner's main menu.



Screen 2: Gantt chart and two levels of file windows.



Screen 3: Task definition screen for the Gantt chart.



Screen 4: The Advanced Options menu.

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Tom Stewart
Security Pacific Automation Co.
Digital News, June 13, 1988

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David Miller
DEC Professional
June 1988

"PAKMANAGER is a valuable tool for the system manager in the day-to-day struggle to optimize disk storage and performance. It provides a structured mechanism for displaying disk information...This easy access makes the job of disk management simpler, and provides a means for making a more timely analysis of disk problems and for taking corrective actions..."

Allan Towl
Digital News
June 13, 1988

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CIRCLE 115 ON READER CARD

Russell Information Sciences' Calendar Manager

David B. Miller

Scheduling appointments and arranging meetings while keeping your own schedule in order can be a headache. Calendar Manager, from Russell Information Sciences of Laguna Hills, California, provides a robust calendar and scheduling system for personal and business use. We tested version 3.1 on our VAXCLUSTER.

Installation takes 20 minutes and is accomplished via VMSINSTALL. Calendar Manager runs across network nodes running DECNET, if a licensed copy is installed on each node. A server is provided to make interactive use of Calendar Manager across the network possible.

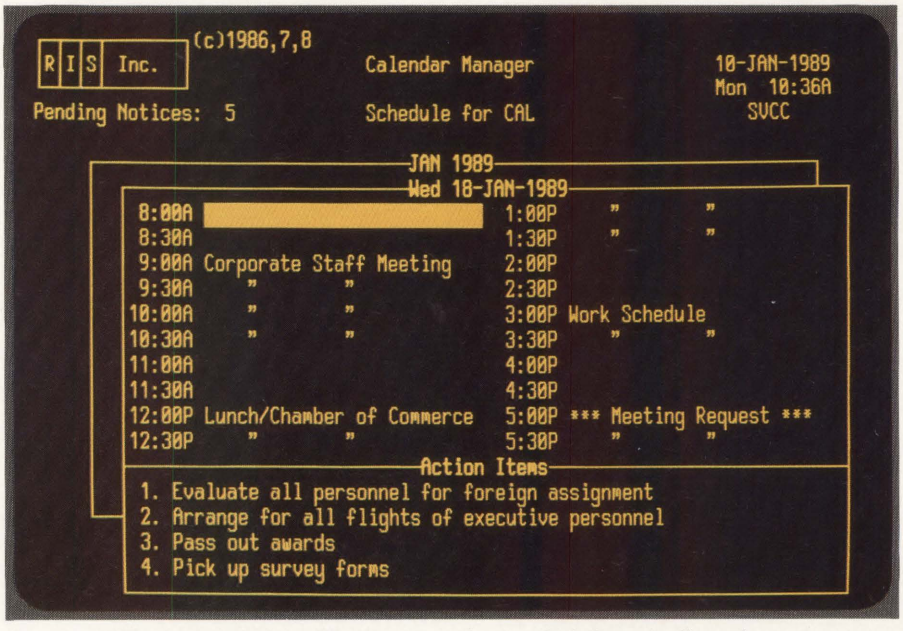
Using the RCMMGR facility, you can change a number of parameters to suit your installation:

1. Search parameters — Calendar Manager needs to know the length of time for each day and the number of days per week when searching for available meeting times.
2. Alias names — Because some sites use cryptic usernames, it's convenient to set up more sensible alias names. For example, the username ZQX34C could be given the alias CLAIRE. Aliases can be set up on both a systemwide and personal basis. Calendar Manager searches your personal alias list, then the system's alias list and finally the system User Authorization File (UAF) for a username.
3. Holiday management — You establish all company holidays with this feature. Each user's calendar is marked by a blinking date for each holiday. However, you still can schedule appointments for holidays.
4. Printer management — Up to 100 print queues can be assigned a unique number from 0 to 99.
5. Cluster management — Each node in a cluster must be specified to Calendar Manager.
6. Network support — This feature allows you to start or restart the network server.
7. Set log in notice — Upon logging in to the system, Calendar Manager displays appointments for the number of days you specify with this option.
8. Designate resources or facility — Calendar Manager also can schedule resources, such as overhead projectors or VCRs, and facilities, such as conference rooms. A limit of 10 items exists for resources with common names such as VCR0 and VCR1. Names must be changed to accommodate more items.

   You can designate full access or view-only privileges for resources and facilities. Full access privileges allow you to schedule resources and facilities, whereas view-only privileges don't.
9. Set tickler length — An on-line message is sent to you before each appointment. The tickler length is the number of minutes prior to the appointment the message will be sent.
10. Updating the license — This is used to change a temporary license to a permanent one.
11. Reorganizing files — If performance degrades because of file fragmentation, use this option to reorganize the files.
12. Purging shared record file — Calendar Manager maintains a shared file containing all appointments ever scheduled. This option lets you remove unnecessary records.

Using It

Calendar Manager is a window-driven system and requires a minimum amount



Screen 1: The Day window displays your day's schedule as well as the action items you plan to finish that day.

graphics terminals, designed from scratch. You can look forward to any product Pericom will bring to the graphics market. *—David B. Miller is associate director of computer services at Beaver College in Glenside, Pennsylvania.*

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Well David, here's the latest

Terminal emulation software for PC's is probably not what he was expecting because we're famous for our graphic terminals.

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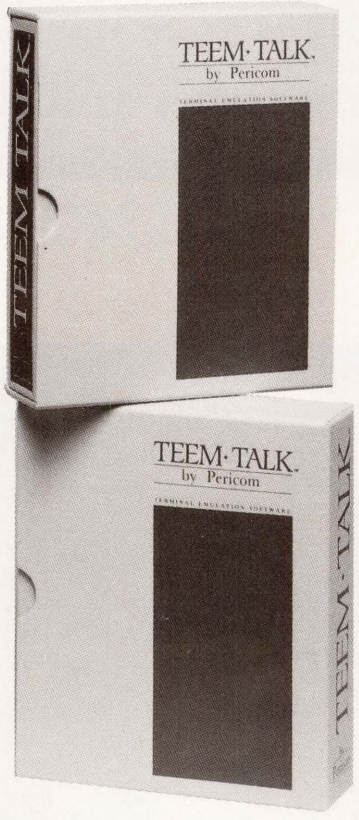

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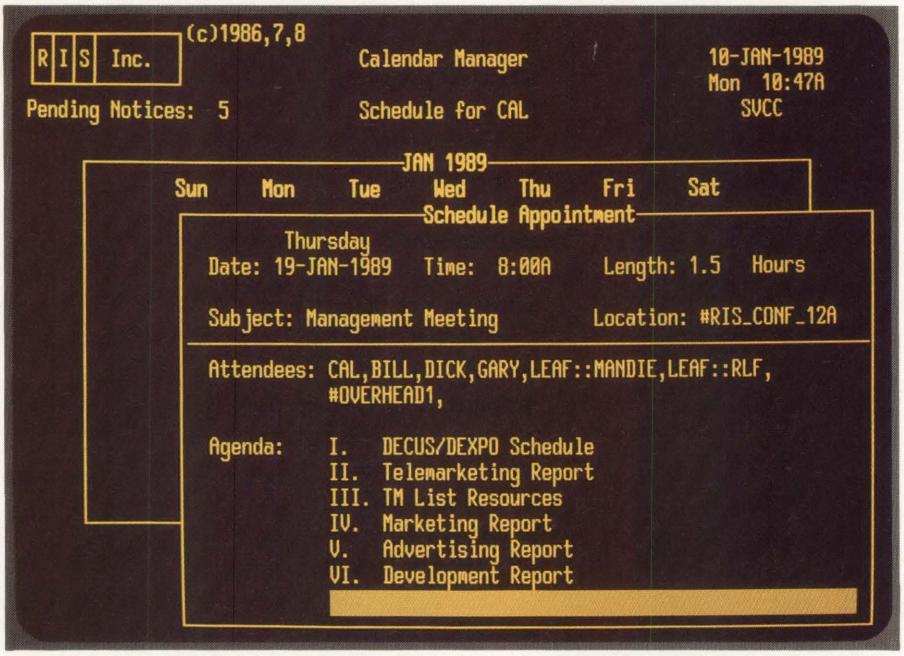
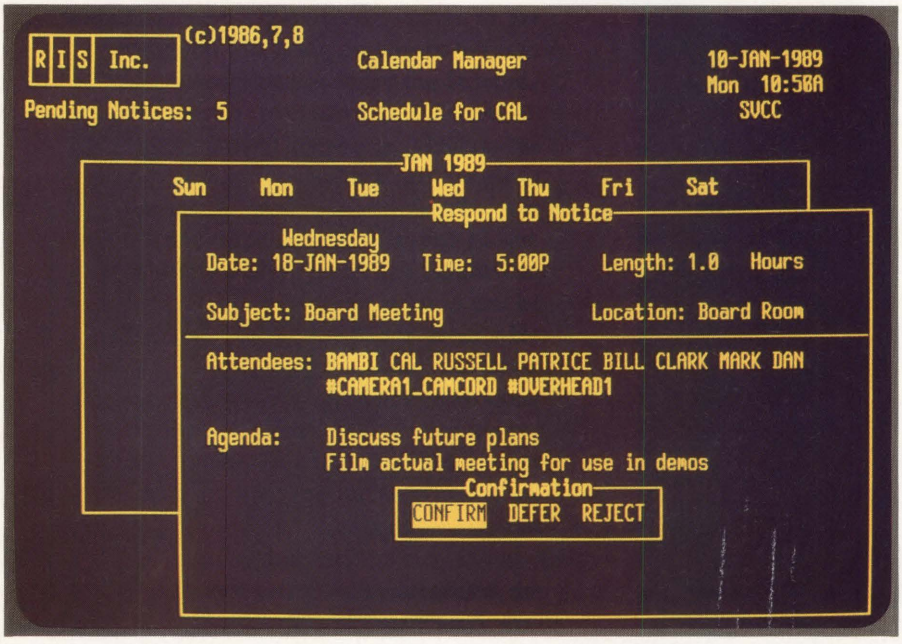


Screen 2: The Schedule Appointment window lets you send a meeting agenda to all the anticipated attendees.



Screen 3: There's no need to call to confirm an appointment. Just use the Respond to Notice window. Names appearing in bold indicate people who have accepted.

of manual input. There are two major windows. The Month window is displayed upon invoking Calendar Manager. It's a calendar of the current month. The cursor is placed on the current date. You can scroll this window to view other months. The Day window displays the current day's schedule (see Screen 1).

To access a particular day, move the cursor to that date in the Month window and press the Return key. The Day window overlays the Month window. Windows necessary to enter appointment data and other information temporarily overlay the Day window as required. Functions requiring typed commands are invoked by pressing the PF1 key, followed by the first letter of the command. For instance, in the Day window, scheduling appointments is done with the PF1-S keystroke sequence. Many of the PF1 key sequences also can be invoked from a pop-up menu.

Scheduling appointments is easy. Access the Day window, move to the time you want the appointment to begin and press PF1-S to display the Schedule Appointment window (see Screen 2). The Date and Time entries default to the date and time on which the cursor is located. Appointment Length defaults to 1.0 hours and can be changed to any multiple of a half hour. The Subject can be any text you want. Location can be free-form or can be chosen from a list of facilities set up via the RCMMGR utility. Resources can be scheduled along with people. You can choose resources from a pop-up window if their names aren't known. Agenda items can be up to 50 lines long. External text files can be substituted as well.

After the information is entered, the appointment can be scheduled immediately by pressing the Do key. The Find key initiates a search for time blocks large enough to hold the appointment or meeting. Calendar Manager uses the length of day and

number of days in the workweek set up with the manager utility as bounds for the search. You can continue to search until a desired time block is found.

Calendar Manager next verifies the availability and validity of the entries for resources, facilities and attendees and notifies you if there's a problem. Any schedule conflict is indicated and an unavailable item blinks. You can elect to change the date or time, delete the problem item or start over.

If scheduling is successful, attendees are notified and their personal calendars updated. Users on the same node as the scheduler are notified immediately; users on other nodes are notified upon next log in. All users will receive a list of appointments at log in time.

You can schedule appointments for yourself and block out days to keep others from scheduling you as an attendee. Ongoing meetings can be scheduled automatically on a daily, weekly or monthly basis.

It's possible to maintain a to-do list with Calendar Manager. These are referred to as action items and are entered at the bottom of the Day window. As many as 15 action items per day are allowed. Action items for the current day are displayed on your screen with your appointment schedule every time you log in.

Changing Plans

Responding to meeting requests is also a simple process. Move to the day and time of the meeting in the Day window and press PF1-R. This displays the Respond to Notice window (see Screen 3). From this window you can accept, reject or defer your decision. Attendees' names appear in bold if they accept and blink if they reject.

You can continue to view appointments in chronological order. A view option is provided to allow searching for appointments with specific phrases in the Subject, Location, Attendees and Agenda fields.

Moving to a meeting day and time and canceling it with PF1-C causes Calendar Manager to remove it immediately from your schedule and from the schedules of any attendees who aren't yet confirmed. A message is sent to confirmed attendees. After they read the message, the appointment is cleared from their schedules.

Regularly scheduled meetings also can be canceled for specific time intervals. For example, if you plan to go on vacation for three weeks, you can cancel regularly scheduled weekly meetings without having to cancel each one individually.

When meetings are rescheduled or modified, Calendar Manager sends notices to all confirmed attendees. Unconfirmed attendees automatically have their schedule updated. If a conflict occurs after attempting to reschedule, you can restore the original meeting or remove those attendees who can't come.

A number of print options are available to obtain hard copy of daily schedules, appointments and action items. Ranges of dates are permitted and output can be directed to a printer or a disk file. Weekly summaries and specific appointment information can be printed.

When meetings are rescheduled or modified, Calendar Manager sends notices to all confirmed attendees.

The Personal Touch

Utilities allow you to customize your personal environment. These are accessed via the PF1-U keystroke sequence.

1. Proxy Scheduling and Proxy Designation — You can grant other users full access or read-only access to your calendar. Full-access proxies can use your calendar just as you can but can't gain access to the calendars of persons for whom you are proxy. Distribution lists can be used to designate proxies. Proxies can be deleted at any time. At least one proxy must be designated for each resource or facility established by the system manager.
2. Clean Schedule Area — A situation may arise when a record for an appointment exists in your calendar but not in the group calendar. Calendar Manager's

Calendar Manager

PLATFORMS: All VAX systems, VT100/200 series terminals, LA, LQ and LN series printers and compatibles

PRICE: License fees range from $1,295 for the MICROVAX 2000 to $6,395 for the VAX 8600/8800 series. A 40 percent discount is available for cluster versions. Media and documentation cost $300 for RX50, $400 for TK50 and $450 for 9-track tape

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PRODUCT LINE: Software development

OWNERSHIP: Private

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REPORT CARD

Dynamic Load Balancer

9.7

	Unacceptable	Poor	Satisfactory	Very Good	Excellent
Ease of Learning/ Documentation					■
Performance					■
Ease of Use					■
Error Handling					■
Support				■	
Value					■

SUMMARY: The Load Balancer's performance significantly improves the performance of a heavily loaded system. Documentation is clear, brief and to the point. Use of the product is effortless once it is installed. The product functions without apparent errors and has no adverse side effects on other system functions. Telephone support for 90 days is included in the price of the product. Installation uses the BACKUP program rather than VMSINSTAL, but is very simple nonetheless. The product is an excellent value, given the cost of alternatives.

DETAILS: The Dynamic Load Balancer is available for a 30-day demonstration period, including documentation and telephone support, for $69.95. Single first copy distributions are priced at $1,995, while subsequent copies cost $1,595. The product runs on any VAX under VMS.

Digital News
October 19, 1987

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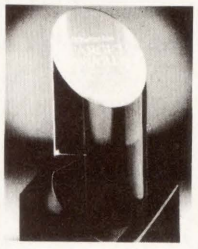

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utility, Clean Schedule Area, corrects this.

3. Purge Area — Similar to the system manager purge function, you can purge your appointment files of unwanted records.

4. Set Tickler — You can disable the tickler notification for meetings.

5. Set Status Notification — This utility enables or disables on-line notification of changes in appointment status. These changes include attendees that confirm or reject a meeting request, a meeting change and a meeting scheduled by a proxy. Regardless of whether the on-line notification is enabled, you receive meeting status change notices upon log in.

6. Alias Management — Personal aliases can be established in addition to any systemwide alias names. Whenever you use an alias in the attendee list, Calendar Manager searches your personal alias list first, then the system alias list and finally the system UAF. Attempting to assign the same alias to two people causes the second alias to supersede the first.

> ***"Utilities allow you to customize your personal environment. These are accessed via the PF1-U keystroke sequence."***

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THE MAC CONNECTION

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A Glance Back, A Look Ahead

As Apple and DEC customers look back on 1988, they might ask themselves, "Am I better off today than I was last year?" Although a lot happened between Apple, DEC and third-party developers during 1988, no new breakthrough products materialized.

What Happened?

Mac-VAX enthusiasts celebrated wholeheartedly on New Year's Eve, 1987. Two announced AppleShare-compatible file servers for VAX systems, one from Alisa and one from Pacer, were on the scene. They were joined by two implementations of DECNET for the Mac, TSSNET from Alisa and CommUnity Mac from Technology Concepts.

An innovative Mac database, Double Helix II from Odesta Corporation was ported to and running on a VAX host for more than a year. Network Innovations announced a connectivity product called CL/1 that allows Mac clients running software like HyperCard to access host VAX database products like ORACLE and INGRES.

As 1987 drew to a close, terminal emulators evolved beyond terminal emulation. Macs were replacing the look and feel of VTxxx terminals with products like MACNOW (ALL-IN-1 made Mac-friendly) from Telos Software and Makeasy (DCL made Mac-friendly) from Alisa Systems.

Would this fast train keep speeding in 1988?

The year started with a bang, as DEC and Apple announced their technical alliance in January. The companies will work together, said the press releases, with product announcements and detailed plans to follow in August at the first Joint Developers' Conference.

February brought DEXPO East in New York. For the first time, all the Mac-VAX connectivity products were displayed in a single exhibit hall.

In March, Apple purchased Network Innovations. It planned to make CL/1 an integral part of Mac product architecture.

August saw the first Apple-DEC Joint Developers' Conference, where Apple and DEC repeated their January statement and committed to networking and document representation standards that would ease future integration of their product families. DEC also announced its own AppleShare-compatible file and printer services for VAX/VMS.

October's calendar contained DEXPO West in Anaheim, featuring the second Apple-DEC connectivity center. It was basically the same show as DEXPO East.

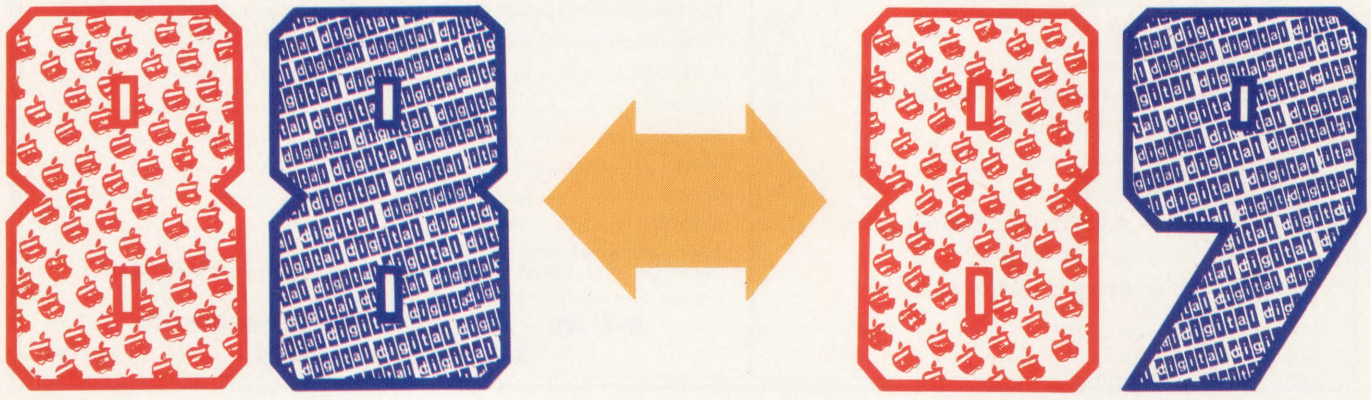
So, as this year of promise comes to a close, Mac-VAX enthusiasts have what they had a year ago, that is, two AppleShare file servers, two Mac implementations of DECNET, Helix and MACNOW.

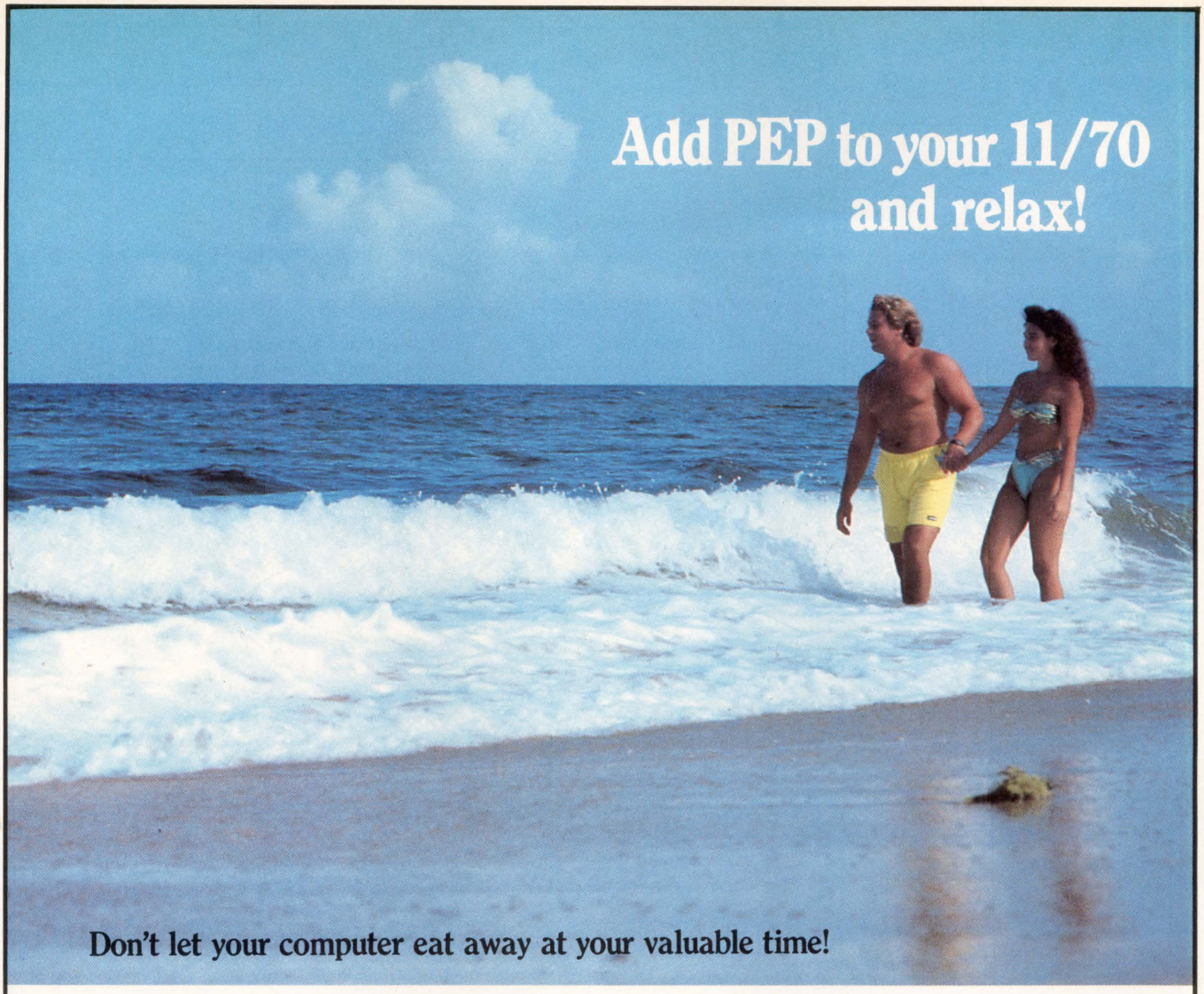
What Really Happened?

It turns out that 1987 was a dress rehearsal. Most of the good stuff offered in 1987 didn't hit the usable stage until well into 1988. Remember the ubiquitous bong of the rebooting Mac at DEXPO East? Most products at the show were in a field-test state, and a few of these products still aren't shipping.

If 1987 was a dress rehearsal, 1988 was the Broadway smash. AlisaShare and PacerShare, demonstrated in 1987 and early 1988, can be bought, installed and supported. The smoke-and-mirrors CL/1 and SequeLink demos of 1987 have evolved into usable applications in real customer settings. After what seemed like the longest field-test cycle since the Space Shuttle, MACNOW is shipping.

So, in 1988, Mac-VAX networking came of age. Shaky but promising concepts implemented by some pioneer





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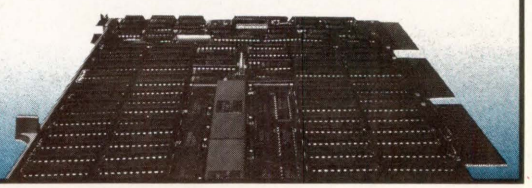

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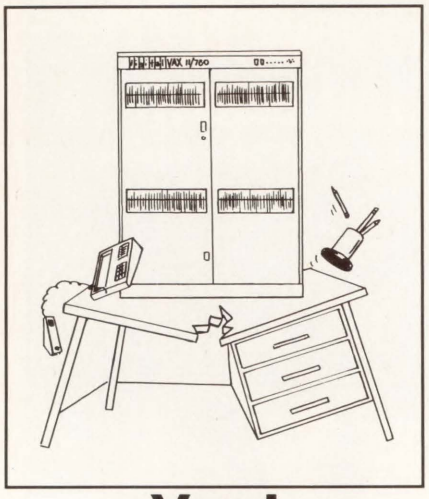

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"early adopter" customers last year have become real products.

What Next?

Some product directions for 1989 look promising.

Odesta has developed a large-scale application of its Helix VMX database technology in its Odesta Document Management System (ODMS) product family. Built using Helix VMX, ODMS Docushare and ODMS Matrix both create an environment in which Mac-created files from any Mac application can be controlled and assembled on demand.

ODMS leads a succession of specialized value-added file servers that will enhance the AppleShare approach found in Alisa's, Pacer's and now DEC's VAX-based Mac file servers with special file search, multiuser interlock, accounting and security features. Look for file servers with enhanced cataloging and keyword search capabilities to be announced during 1989.

The 1987 burst of Mac front ends to VAX/VMS relational databases became an explosion in 1988. By year-end, HyperCard on a Mac could be programmed to access ORACLE on a VAX using products from Alisa (SequeLink), Network Innovations (CL/1), DEC (SQL

Services) and even Oracle.

In 1989, look for announcements of several vertical applications of this technology in accounting, legal, research/scientific and other areas from the third-party developers who have joined this technology.

> **"In 1989, real client-server E-Mail must go through!"**

Also expect the introduction of sophisticated program development tools, like HyperTalk and SQL code generators, from the principal vendors. Such tools will make this technology more accessible to semitechnical, nonprogramming customers.

As 1988 draws to a close, Electronic Mail remains the big product void in Mac-VAX networking. A lot of E-Mail talk from companies such as Alisa, Pacer and Microsoft appeared in the 1988 trade press. But no products have entered field testing.

Somebody should force the issue by using AppleTalk for VMS to write a Microsoft Mail or InBox mail server for the VAX. It doesn't matter if version 1.0 supports text-only into ALL-IN-1 and DECMAIL. Mac users want to exchange mail messages through a VAX "post office server" without having to log onto the host VAX in a terminal emulator. In 1989, real client-server E-Mail must go through!

THE RELATIVELY PLACID Mac-VAX networking marketplace in 1988 will set the pace through 1989, as the existing crop of products evolves. Although this stage in the Mac-VAX life cycle might prove less exciting than the heady, pioneering days of '86 and '87, it will produce a stable generation of products. ■

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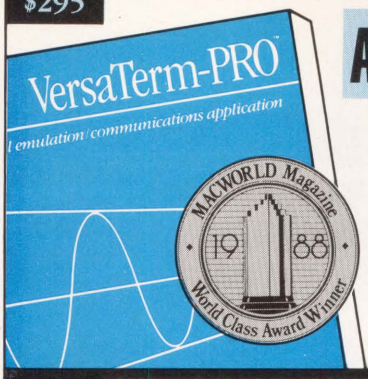

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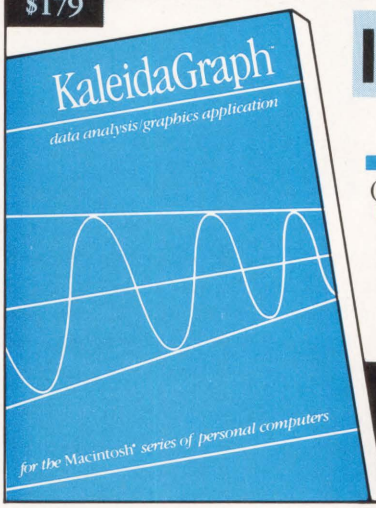

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CIRCLE 242 ON READER CARD

PowerStation

If you have PCs and VAXes, you NEED these products!

For connecting your PC to a VAX, the PowerStation provides the ultimate solution: a VT200 layout keyboard bundled with sophisticated ZSTEM terminal emulation software.

ZSTEM software includes DEC VT240, VT220, VT100, IBM 3101, TEK 4014 and DG D400 terminal emulation.

"Its performance is as perfect as an emulator can get . . ."
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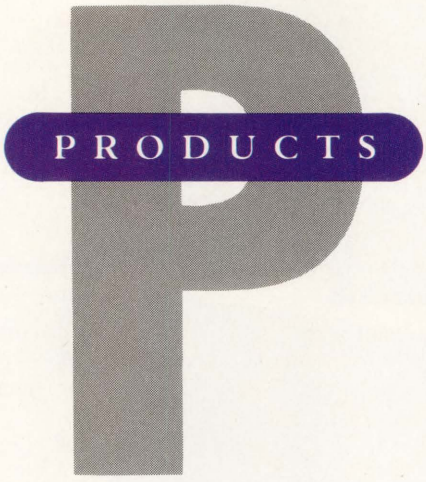


Datalease XLNO3 Enables LNO3 Emulation

Datalease Systems has developed the XLNO3 Personality Cartridge for the Xerox Model 4045 laser printer that enables complete emulation of DEC LNO3. The XLNO3 Personality Cartridge has the same physical characteristics as a Xerox font cartridge. The software stored in the proms consists of an emulation of the LNO3 printer as opposed to font data.

The Datalease XLNO3 Personality Cartridge doesn't modify the Xerox 4045 equipment or software in any way. It functions independent of DEC's operating system and therefore supports the entire DEC product line, including the VAX, MicroVAX, VAXstation and PDP line of computers.

Single units are available at $495, with quantity discounts available.

To obtain further information, Contact Datalease Systems, 1061 S. Melrose Ave., Placentia, CA 92670; (714) 632-6986.

Circle 545 on reader card

RS-232 Port Allows Remote System Status

Computer Power Inc. has announced an optional microprocessor-based RS-232 port for most of its backup power systems. The port allows remote UPS system diagnostics/status via direct connect to a local computer or remote connect via modem. The modem connect method allows factory field service personnel to perform preventive maintenance operations.

A single-line status report gives the user vital system information. Full system discharge can be performed remotely for any reasonable time duration with status reports sent regularly to the user. UPS system fault alarm conditions also are supplied via RS-232 port.

For complete details, contact Computer Power Inc., 124 W. Main St., High Bridge, NJ 08829; (800) 526-5088; in NJ, (201) 638-8000.

Circle 478 on reader card

DOCMAN Runs On VAX CPUs Using Terminals

OMNICOMPUTER Inc. has unveiled DOCMAN, an integrated menu-driven environment that interfaces with WordPerfect and other existing software packages. Maximizing compatibility, DOCMAN uses any of the three major VAX-PC communications packages: DEC's PCSA, Novell's NetWare/VMS and Datability's RAF.

While DOCMAN runs on VAX CPUs using terminals, it was designed especially to use PCs as smart workstations. DOCMAN increases system performance by using the PC for I/O-intensive word processing.

DOCMAN's features include menus, integrated electronic mail, context searching, audit trails, multiple versions of each document and four security levels including document encryption and printing from any point in a system.

To learn more, contact John Gorka, OMNICOMPUTER Inc., 1440 Broadway, New York, NY 10018; (212) 944-9230.

Circle 530 on reader card

BLAST II Links UNIX Or XENIX

Communications Research Group announced new BLAST II products for linking UNIX and SCO XENIX with other operating systems. Any computer with UNIX or XENIX BLAST II can talk to any other computer with BLAST or BLAST II. The product is available for the VAX and PDP, among others. Add-on boards or other hardware is required for file transfer and terminal emulation.

New features for UNIX and XENIX include advanced data compression for file transfers that is fast, rugged and 100 percent error free, with up to 70 percent greater throughput than UUCP or Xmodem.

The product is priced from $395 depending on system size.

Learn more by contacting Communications Research Group, 5615 Corporate Blvd., Baton Rouge, LA 70808; (504) 923-0888.

Circle 541 on reader card

VigiLANt Achieves Optimum LAN Tuning

Symmetric Computer Systems has introduced the first in its series of LAN SmartTAP transceivers, the VigiLANt. The VigiLANt integrates hands-off networking management and diagnostics with standard Ethernet transceiver functions in one unit.

The VigiLANt couples an independent and direct NETWORK MONITOR window on LAN real-time performance with the functionality of a transceiver. Network and host traffic information and NETWORK DEBUG features notify you of serious problems. Conforming to ISO and IEEE 802.3 standards, the VigiLANt is a transceiver, tap, network monitor and alarm.

For additional information, contact Lynne G. Messner, Symmetric Computer Systems, 40485 Encyclopedia Circle, Fremont, CA 94538; (415) 651-6090.

Circle 481 on reader card

Solid State Disk Allows Increased I/O Rate

System Industries Inc.'s Solid State Disk products are compatible with its Clustor Controller, a performance-optimized intelligent disk server for shared stored environments. The availability of a large-capacity Solid State Disk for the clustered environment means VAXCluster users can realize a 10-fold increase in I/O rate.

The Clustor Controller-compatible Solid State Disk is targeted at I/O-intensive applications, including paging and swapping, CAD, graphics, imaging, on-line transaction processing and process control, in which significant I/O bottlenecks occur in clustered environments.

The Clustor Controller-compatible Solid State Disk is available in 8-MB to 256-MB versions at prices beginning at $4,800.

Obtain more information by contacting Anne Gitlow, System Industries Inc., 560 Cottonwood Dr., Milpitas, CA 95035; (408) 432-1212.

Circle 501 on reader card

Megatek 1K-Plus Offers Increased Resolution

Megatek Corporation has announced a new 1K-Plus optional two-board set (frame buffer and video interface) for its 911 and 928 graphics display systems. The 1K-Plus offers sophisticated graphics users higher resolution, independent heads-up-display capability and video functionality.

The heart of the 1K-Plus is the TI TMS34010 Graphics Systems Processor (GSP), which resides on the frame buffer board. The GSP is a fully programmable, 4-mips microprocessor that has an instruction set that includes special graphics primitives, such as PIXBLTS, XY addressing and window definition. The GSP is designed for high-performance 2-D graphics-image generation using vectors, polygons and sophisticated raster fonts.

The cost of the 1K-Plus option is $10,000.

To learn more, contact John Stampfli, Megatek Corp., 9645 Scranton Rd., San Diego, CA 92121; (619) 455-5590.

Circle 502 on reader card

Simpact Introduces An Interface For VMEbus

Simpact Associates Inc. has introduced the VCI 8000, a high-performance DDCMP communications interface for VME-based systems. With this product, system designers can have multiline DDCMP connectivity between VME systems and local or remote DEC computers.

The product includes a UNIX-compatible host-resident driver and test routines, the PT-VME330, board-resident firmware and protocol software, and cabling. The firmware includes self-test routines, an on-line debugger and the protocol downloader and boot routine. The controller contains the 68020, 1 MB of RAM, VMEbus interfaces and a 32-channel DMA controller.

The VCI 8000 is priced at $7,000.

Learn more by contacting Jack Buell, Simpact Associates Inc., 9210 Sky Park Ct., San Diego, CA 92123; (619) 565-1865.

Circle 504 on reader card

Control Data Adds Dynamic System Tuning

Control Data Corporation announced the addition of dynamic system tuning capabilities to its software-based ProAct Service Enhancements. ProAct 4000 provides a software package that dynamically tunes users' VAX/VMS-based systems and increases system performance up to 25 percent on CPU-intensive systems. The software tunes the system by extending the memory management scheme and the CPU scheduling algorithm to increase overall system performance.

The software adjusts system parameters to yield more efficient uses of memory and the CPU every 30 seconds, or, at critical times, every six seconds. It also reallocates system resources to accommodate work load fluctuations, and maintains an internal database of system memory requirements.

Prices for the ProAct 4000 Service, which depend on system configuration, begin at $95 a month.

For more information, contact Pat Williams, Control Data Corp., 1101 E. 78th St., Bloomington, MN 55420-1478; (612) 851-4188.

Circle 415 on reader card

System 1032 V7 Shows Improved Performance

CompuServe Data Technologies has announced version 7 of its System 1032, a 4GL/DBMS for the VAX/VMS environment. This version enhances the software's 4GL, DBMS and screen capabilities, and improves performance.

Version 7 includes new 4GL and screen forms capabilities for developing applications that respond to and control end-user actions. It also includes a time-saving interactive forms editor and efficiently stores records of varying length, according to their actual size.

System 1032 V7 opens datasets 70 percent faster. Bulk updates execute up to 60 percent faster. Language instructions perform up to 50 percent faster.

First-copy licenses for basic System 1032 cost from $3,000 for a VAXstation to $120,000 for a VAX 8800.

For more information, contact Leslie Scott, CompuServe Data Technologies, 1000 Massachusetts Ave., Cambridge, MA 02138; (617) 661-9440.

Circle 419 on reader card

Precision Visuals Adds Configuration Files

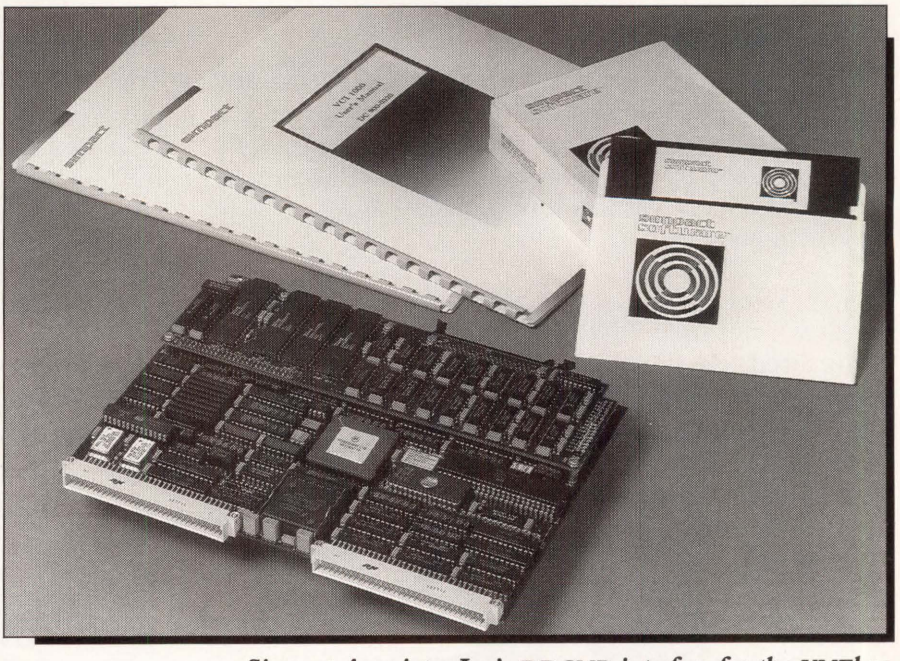
Precision Visuals Inc. has added configuration files to its hardcopy device drivers. The configuration files allow users to tailor the device drivers for their specific environment without having to recompile or reinstall the drivers. All device driver options (e.g., output resolution or landscape vs. portrait orientation) are selected using keywords. The keywords can be issued in any sequence, and sensible defaults will apply if any keywords are omitted.

Device drivers with the configuration files are available for VAX/VMS installations and the LNO1S and LNO3 Plus laser printers and LVP16 plotters.

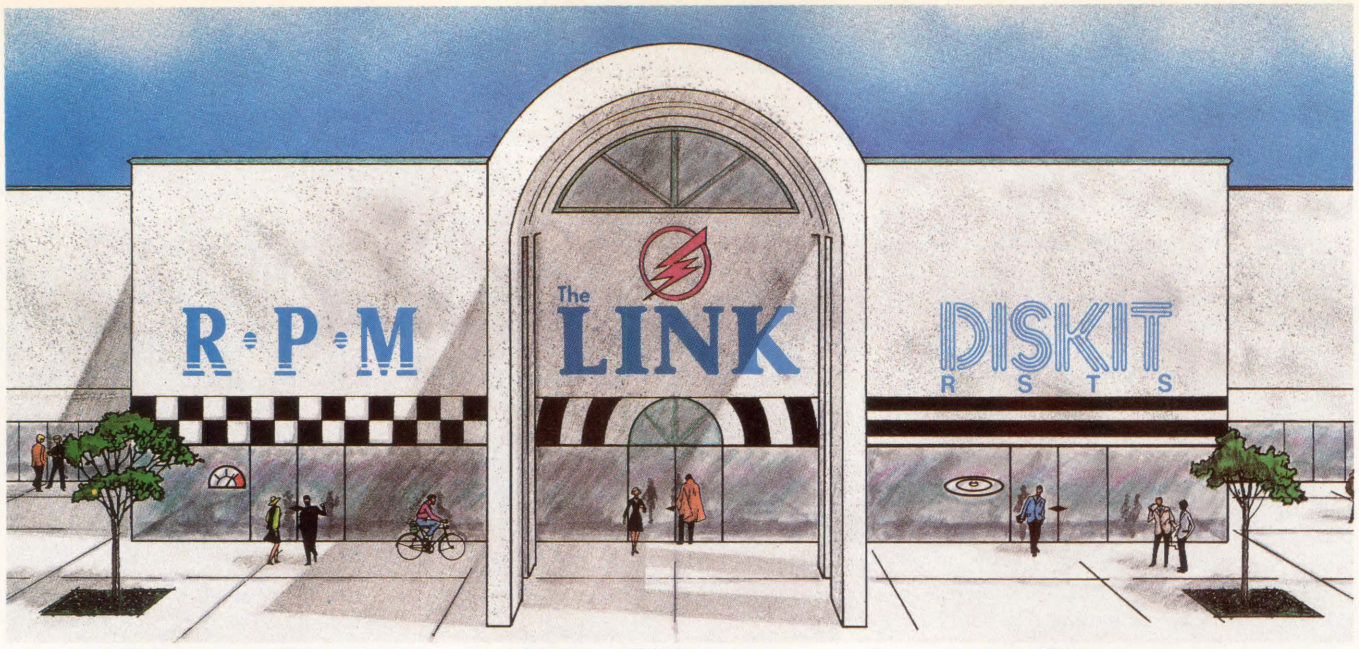
The device drivers range in price from $750 to $1,250, including documentation.

For complete information, contact Chris Logan, Precision Visuals Inc., 6260 Lookout Rd., Boulder, CO 80301; (303) 530-9000.

Circle 503 on reader card

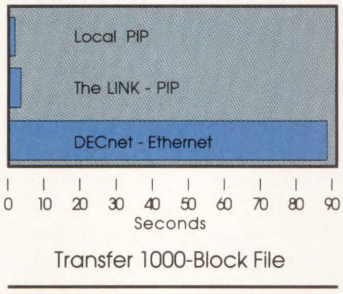


Simpact Associates Inc.'s DDCMP interface for the VMEbus.



The RSTS/E Shopping Center

Northwest Digital Software is dedicated to the PDP-11, and when it comes to RSTS/E expertise we wrote the book. We have everything you need to get the most from your RSTS/E system, from the most popular disk performance toolkit - DISKIT/RSTS to the world-renowned performance tuning package - RPM. And, now we offer the unlimited growth potential of PDPclustering with The LINK. And to back it all up, we provide the best in-depth RSTS/E technical support available anywhere. We've been the undisputed leader in RSTS/E performance products and services since 1979, and we're still going strong!



RPM

Identifies your system performance bottlenecks and their cause, and tells you in plain English how to fix them. It's guaranteed to increase your system's performance by 100% or more! With RPM anyone can keep their system tuned and running at peak performance.

The LINK

Allows multiple PDP-11s running RSTS/E to be clustered together to provide unlimited CPU performance. With The LINK, all disk data is transparently accessible to all users. All types of file operations are supported, including update mode record locking and RMS access. All without any application program modifications and on standard DEC hardware. When you need more performance, just add another CPU to create a powerhouse PDPcluster. The LINK offers a clear and cost-effective growth path while retaining your current hardware and software investment.

DISKIT/RSTS

The RSTS/E disk defragmenter and "toolkit" provides you with everything you need to keep your disks running at peak performance. DISKIT/RSTS includes DSU- the disk defragmenter, DIR - high speed directory listing utility, RDR - high speed directory reordering utility, and OPEN - a display of open file statistics and other job related information not available anywhere else.

Find out how to get the most from your PDP-11s and RSTS/E. For more information, or for a free 30 day trial, call Northwest Digital Software today.

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CIRCLE 143 ON READER CARD

U.S. Design Expands 760-MB Products

U.S. Design Corporation, a Maxtor Company, has announced the Q-STOR family of 760-MB products. These products are low-cost and high-capacity add-in storage products for MicroVAX II or MicroVAX III systems

The products are the QT 760 (tabletop version of the 760-MB storage unit), and Q 760 (complete kit including U.S. Design Q-bus Host Adapter, cables and 760-MB drive).

The products are priced from $5,500 to $6,000.

To find out more, contact U.S. Design Corp., 4311 Forbes Blvd., Lanham, MD 20706; (301) 577-2880.

Circle 505 on reader card

ONSPEC VMS Uses VMS Operating System

Heuristics Inc. has announced ONSPEC Control Software running in the VMS environment. ONSPEC VMS allows easy transfer of data between the PC and the VAX environments. ONSPEC VMS takes advantage of the VMS operating systems for easy access to all points via global sections or mailboxes from any VMS language and easily communicates in real-time with ONSPEC Control Software running on any other computer.

ONSPEC Viewpoint technology allows four full windows to be displayed simultaneously. Each quadrant can become full screen with a keystroke. The product combines an operating system, a spreadsheet, an editor and process control programs for design: preparation of diagrams, lists, specifications and reports; for analysis: modeling and simulation; for process control: displays, alarms, trends, and historical reporting.

For more information, contact Donna L. Terp, Heuristics Inc., 9845 Horn Rd., Ste. 170, Sacramento, CA 95827; (916) 369-6606.

Circle 506 on reader card

WPS-PLUS Makes Full Use Of Your PDP-11 Resources

DEC has announced that WPS-PLUS, its document processing package, runs on the latest versions of RSX-11M-PLUS, Micro/RSX and RSTS/E operating systems. Users can run commercial and technical applications as well as gain benefits of office automation on their existing PDP-11 systems.

WPS-PLUS features include full-screen editing, cut and paste, automatic uppercasing, bolding, underlining, centering and word wrapping. Capabilities instantly are expanded for document creation, communication, printing and storage.

WPS-PLUS allows easy exchange of documents for editing and review throughout the entire organization.

For pricing and more complete information, contact George P. Pappas, DEC, 129 Parker St., Maynard, MA 01754-2198; (800) 343-4040.

Circle 472 on reader card

KERMIT V2.31 Emulates VT102 And VT52

Columbia University Center for Computing Activities announced a release of the MS-DOS KERMIT program, version 2.31. The program runs on the entire IBM PC family, and on IBM compatibles and near com-

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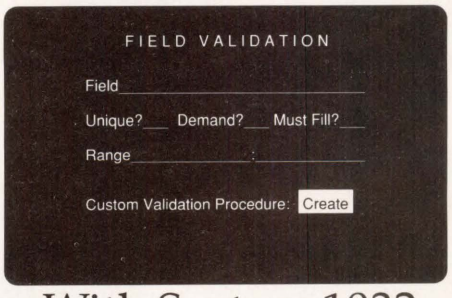
CIRCLE 356 ON READER CARD

Unlock Programmer Productivity



With System 1032 Application Facility

System 1032/AF automatically generates most of your application code from menu selections. Yet you can add custom procedures wherever you need something special.

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CIRCLE 111 ON READER CARD

patibles, such as the AT&T 6300 and VAX-mate. There also are versions for non-IBM-compatibles, such as the Rainbow and the HP 150.

On the IBM PC family and compatibles and the Rainbow, KERMIT emulates the VT102 and VT52 terminals, adding colors, printer control, screen rollback and dump, key redefinition and session logging to the terminal's repertoire.

Major features of V2.31 are exchange of file attribute information with cooperating KERMIT programs and a powerful script language, which includes variables, substitutable parameters, labels and loops.
For additional information, contact KERMIT Distribution, Columbia University Center for Computing Activities, 612 W. 115th St., New York, NY 10025; (212) 280-3703.

Circle 507 on reader card

QUBE 11/83 Expands UNBOUND's Product Line

UNBOUND Inc. announced a full line of MicroPDP-11/83-compatible systems, available in either desktop, rackmount, pedestal or BA123-compatible enclosures.

The QUBE 11/83 systems expand UNBOUND's 11/73 and MicroVAX II system offerings that feature 170 MB to 2.6 GB of formatted disk storage using ESDI or SCSI disk storage technology. Peripheral options include integral TK50 tape, Exabyte 2.3-GB helical-scan tape and TMSCP- or MSCP-based optical disk drives.

UNBOUND 11/83 systems feature memory expansion to 4 MB and communication ports to support 64 users.
For more information, contact J. Rudy, UNBOUND Inc., 15235 Springdale St., Huntington Beach, CA 92649; (800) 862-6863; in CA, (714) 895-6205.

Circle 508 on reader card

Pacer Enhances IBM PC-To-VAX Connectivity

Pacer Software Inc. has announced a major upgrade to its IBM PC-to-VAX connectivity software. PacerLink version 5.2 for the IBM PC XT/AT, PS/2 and compatibles lets users on Apple LocalTalk networks communicate with a VAX/VMS host. This release provides multiwindow terminal emulation for PC users on all supported media.

LocalTalk is Apple's twisted-pair cable that connects Macs, IBM PCs and LaserWriters on an AppleTalk network. By adding support for LocalTalk bridged to Ethernet to the previously offered RS-232C and direct Ethernet connections, the release gives additional PacerLink connectivity options for sites with mixed systems, such as VAX, IBM PC and Mac.

Pricing is based on the number of concurrent sessions and starts at $2,000 per VAX.
To learn more, contact Pacer Software Inc., 7911 Herschel Ave., Ste. 402, La Jolla, CA 92037; (619) 454-0565.

Circle 407 on reader card

MA-200 Features A .5 MB Cache Buffer

Micro Technology Inc. introduced its first HSC70-, HSC50-compatible DSA tape storage system, the MA-200. It's based on the Micro Technology MA90 control interface, which represents a new DSA architecture that will evolve to incorporate other high-performance backup devices, such as 8mm tape cartridge systems, read/write optical disks and other industry-standard devices.

The MA-200 is a 1600, 6250 bpi at 200 ips start/stop tape subsystem, which supports

Q-BUS SYSTEM PACKAGES

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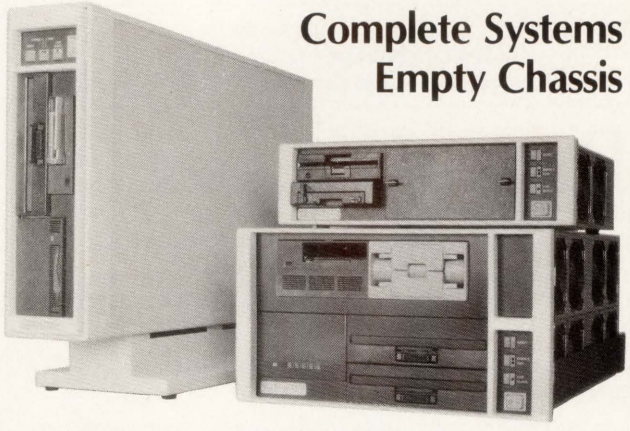

Zoltech's modular design allows literally thousands of configurations to be built with its V-series family of system chassis. Zoltech will deliver anything from empty metal shells to completely tested turnkey systems: You decide what you want to do and Zoltech will do the rest. Q-Bus and VME systems are our specialty, but we also do custom designs.

VME TOO . . .

CIRCLE 172 ON READER CARD FOR VME

ZOLTECH CORPORATION

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(818) 780-1800 Telex 755451

CIRCLE 174 ON READER CARD FOR Q-BUS

one master and three slaves. The MA-200 has a data transfer rate of 1.25 MB per second and a .5 MB cache buffer.

Pricing for one unit is $66,000, which includes dual-porting installation and a one-year on-site warranty.

For more complete information, contact Tom Raimondi, Micro Technology Inc., 1620 Miraloma Ave., Placentia, CA 92670; (714) 632-7580.

Circle 509 on reader card

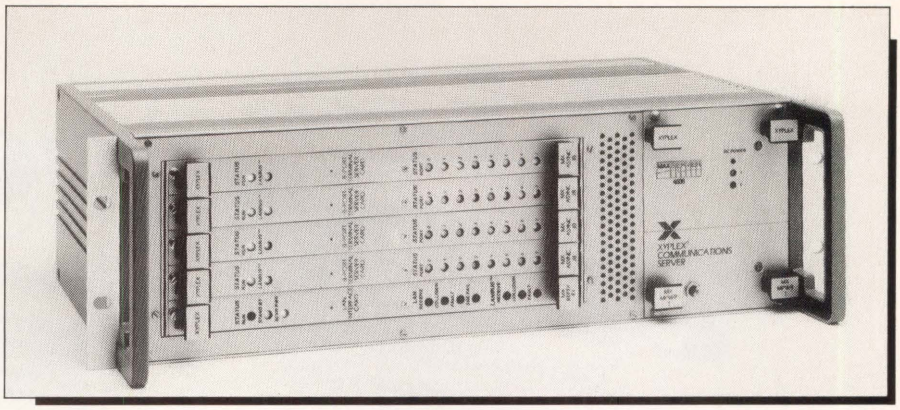
XYPLEX Expands MAXserver Family

XYPLEX Inc. announced an entry-level addition to its MAXserver terminal server family. The MAXserver 4500 connects to 32 users from its rack-mountable, 5 1/2-inch-high cabinet. It combines uninterrupted service with local and wide area network connectivity for VAX/VMS systems, as well as any systems that support TCP/IP software. The MAXserver 4500 expands from eight to 32 connections in eight-port increments, providing RS-232C or RS-423C connections for terminals, IBM PCs, printers, modems and host computer ports.

The cost of the basic MAXserver with an Ethernet connection is $3,995. Eight-port terminal server cards cost $1,395.

For further information, contact Paul Viau, XYPLEX Inc., 100 Domino Dr., Concord, MA 01742; (508) 371-1400.

Circle 511 on reader card



XYPLEX Inc.'s MAXserver 4500 terminal server.

Solid-State RAM Disk Costs Less

See First Technology Inc. is shipping the RDC-16, an MSCP controller board, plus 16 MB of memory, for less than straight memory boards. Users of MicroVAX IIs and IIIs can increase throughput performance up to bus speed with this solid-state disk. The RDC-16 comes with an MSCP controller and 16 MB of memory. It looks like a DU device to the DEC operating system. See First Technology offers a subsystem in 16-, 48- and 80-MB configurations.

The RAM disk will perform in excess of 300 I/O transfers per second and move data at a transfer rate of 1.7 MB per second

WORKHORSE.

The DeRex S-3000 II: A heavy duty page printer without peers.

Fast, quiet, reliable and cost effective, the S-3000 has been designed specifically as a high-volume printer. And it is thoroughly backed by the expertise, technical support and nationwide service of DeRex.

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- Less than 55 DBA
- Vector and Raster Graphics
- High resolution: 300x300 DPI
- Bar codes
- Dual input feeders/High capacity (2500 sheet)
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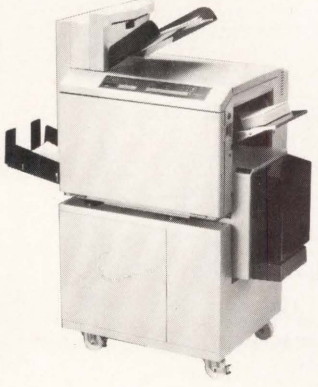
- Forms overlay—up to six forms
- Versatile output: up to 32 character sets



For heavier output, the S-6000-II is another DeRex field-proven, high speed, reliable printer. At 75 pages per minute, with both portrait and landscape orientations, it provides great versatility of output at higher speeds.

DE REX INC.

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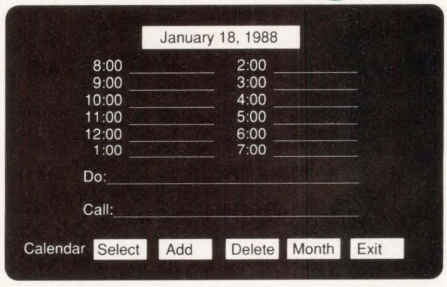
CIRCLE 117 ON READER CARD

Unlock M.I.S. Backlogs



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One keystroke builds a standard application from any System 1032 database you indicate. You then extend this prototype into a full-fledged system by filling in specification menus.

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DB/EXPO'89

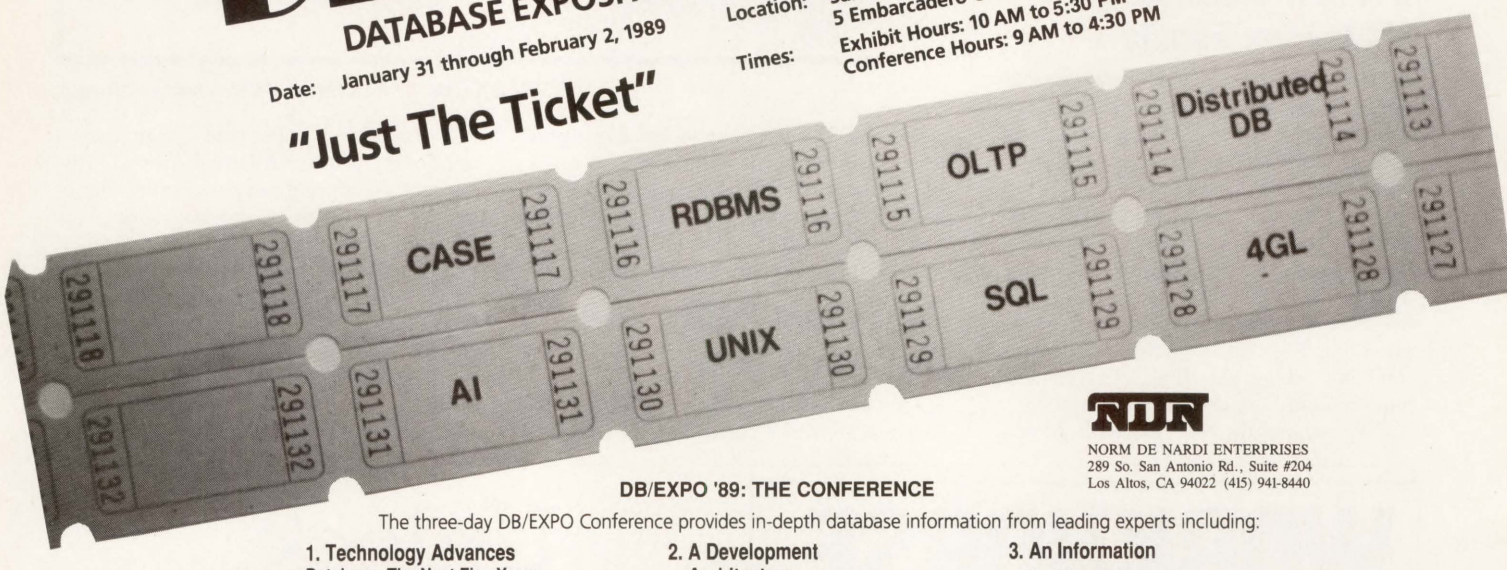
DATABASE EXPOSITION AND CONFERENCE

Date: January 31 through February 2, 1989

Location: San Francisco Hyatt Regency Hotel
5 Embarcadero Center, San Francisco, CA 94111

Times: Exhibit Hours: 10 AM to 5:30 PM
Conference Hours: 9 AM to 4:30 PM

"Just The Ticket"



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Database Architecture and Performance, Colin J. White (Editor /publisher *InfoDB*)

The Role of Distributed Database, C.J. Date (Codd & Date)

Database Directions, Panel discussion chaired by Sharon Weinberg (Codd & Date)

2. A Development Architecture

Understanding the CASE Marketplace, Vaughan P. Merlyn (CASE Research)

Using CASE: Customer Experiences, Linda Nadeau (Knowledgeware)

New Development Technologies, panel discussion chaired by Paul Winsberg

AI and Database Dr. Larry Harris (AI Corp)

3. An Information Architecture

Micro DBMS's: Host Compatibility and Connectivity, Richard Finkelstein (Performance Computing)

Developing an Information Architecture, Jeff Tash (Database Decisions, Inc.)

Putting it all Together, panel discussion, including, Umang Gupta (Gupta Technologies) and Jnan Dash (IBM)

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on a MicroVAX II and 3 MB per second on a MicroVAX III.

Pricing starts at less than $750 per megabyte for a 16-MB subsystem with MSCP controller and 16 MB of CMOS DRAM memory.

For further information, contact Karen Martin, See First Technology Inc., 3255-7 Scott Blvd., Ste. 103, Santa Clara, CA 95054; (408) 748-7717.

Circle 510 on reader card

INGRES Integrates With Teamwork

Relational Technology Inc.'s family of database products, including its 4GL and an RDBMS, will be integrated with Cadre Technologies' Teamwork family of industry-standard CASE tools. The products will be targeted at applications developers in government, manufacturing, engineering and DP/MIS. This will provide workstation-based solutions for the high-end, multiuser marketplace.

Cadre's CASE tools are available on all leading workstation platforms, including DEC. The INGRES family of products is available for all strategic micro, mini and mainframe operating environments.

The first phase, to be available in the first quarter of 1989, will integrate Teamwork's information modeling tool with the INGRES data dictionary.

For more information on INGRES, contact Kevin Gallagher, Relational Technology Inc., 1080 Marina Village Pkwy., Alameda, CA 94501-9891; (415) 748-3400.

Circle 408 on reader card

SNS/SNA Gateway Connects IBM And DEC

Interlink Computer Sciences Inc. announced the SNS/SNA Gateway family of connectivity software for IBM's 8232 LAN Channel Station. The SNS/SNA Gateway product family and the IBM 8232 will serve as a gateway between SNA networks and DECnet through selected SNA functions. Interlink's products connect IBM and DEC systems through their respective System Network Architecture (SNA) and Digital Network Architecture (DNA) networks.

The SNS/SNA Gateway, coupled with IBM's 8232, affords the user volume throughput capabilities and supports 256 simultaneous sessions. The product generally will be available for VM, MVS and MVS/ESA environments throughout 1989 and will cost less than $100,000 for the basic software.

For additional information, contact Kathryn McKeller, Interlink Computer Sciences Inc., 47370 Fremont Blvd., Fremont, CA 94538; (800) 422-3711; in CA (415) 657-9800.

Circle 512 on reader card

LaserSystem 525 Allows 300 MB On-Line Storage

Perceptics Corporation announced LaserSystem 525, an optical disk storage subsystem for VAX and MicroVAX computers running the VMS operating system. LaserSystem 525 provides over 300 MB of on-line storage per optical disk drive and is totally transparent to VMS. Optical storage technology is available for the archiving of data for CAD/CAM operations, publishing, medical imaging, scientific and financial applications, and is well-suited for workstation environments.

DISKIT 2000 is available for all VAX/VMS systems, including the newer MicroVAX 3000 series, 6200 and 8800 machines. Upgrades to support VMS V5.0

The laser printer engineered to be shared.

Dataproducts LZR 1230, shown here with optional envelope feeder and face-up output tray, document jogger, and multi-cassette, sheet-feeder base.

- BROAD COMPATIBILITY—LZR 1230 is compatible with Diablo 630, Epson FX-80 and HP Laserjet Plus. Supports the IBM PC graphics character set.
- THREE CONCURRENT INTERFACES—With Centronics parallel and two serial ports, the LZR 1230 can be shared simultaneously by three different systems.
- VERSATILE—Prints letter size, legal size, statement size paper. Envelopes. Overhead transparencies. Even labels.

The LZR 1230 can support up to 10 workstations. It's perfect for multi-user, personal computer systems. Output is 12 pages per minute—fast enough to replace several impact printers. This is simply the best shared-resource value on the laser market. Call us today.

Dataproducts, laser printers

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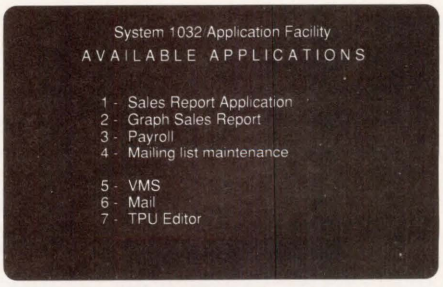

With System 1032 Application Facility

System 1032/AF integrates everything on your VAX: VMS services, 4GL, existing 3GL modules. Integrate at the menu level or invisibly weave everything together inside an application.

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Data Technologies
Tel: (617) 661-9440

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are provided free to DISKIT 2000 users currently under maintenance.

To obtain additional information, contact Shannon Donnelly, Software Techniques Inc., 6600 Katella Ave., Cypress, CA 90630; (800) 332-8650; in CA (714) 895-1633.

Circle 517 on reader card

ITM Allows Sharing Of Tape Drives

Iverson Inc. is shipping its new tape management system, the IVERSON TAPE MANAGER (ITM). The ITM is designed for demanding and complex multiCPU or multivendor CPU environments. It's an electronic digital switch that allows the configuration of multiple tape drives between multivendor CPUs, and is completely transparent to system software.

The IVERSON TAPE MANAGER allows the sharing of up to four separate tape drives among two to four micro-, mini- or superminicomputer CPUs. Using the standard PERTEC interface, the ITM allows different CPU manufacturers, such as DEC, Data General, IBM and others, to share tape drives.

The ITM comes in 16 configurations from the ITM 2100, which handles two CPUs and one tape drive, to the 8400, which handles eight CPUs and four tape drives. Pricing begins at $1,950.

For further information, contact Jon C. Iverson, Iverson Inc., One Saunders Ave., San Anselmo, CA 94960; (415) 459-5665.

Circle 520 on reader card

Objective-C V4.0 Supports ANSI C

The Stepstone Corporation announced Objective-C Language Version 4.0. The V4.0 release of this object-oriented superset of C delivers major enhancements to its users, including ANSI C support, full-function and method prototyping, extensive type checking and enhanced error handling.

The Objective-C Language V4.0 product suite includes Objective-C Compiler V4.0, Objective-C Interpreter V2.0, ICpak 101 Foundation Class Set V4.0 and ICpak 201 Graphical User Interface Class Set V2.0. Product suite deliveries have begun for VAX and IBM PC AT and compatibles.

Find out more by contacting Jeffrey Burnett, The Stepstone Corp., 75 Glen Rd., Sandy Hook, CT 06482; (203) 426-1875.

Circle 518 on reader card

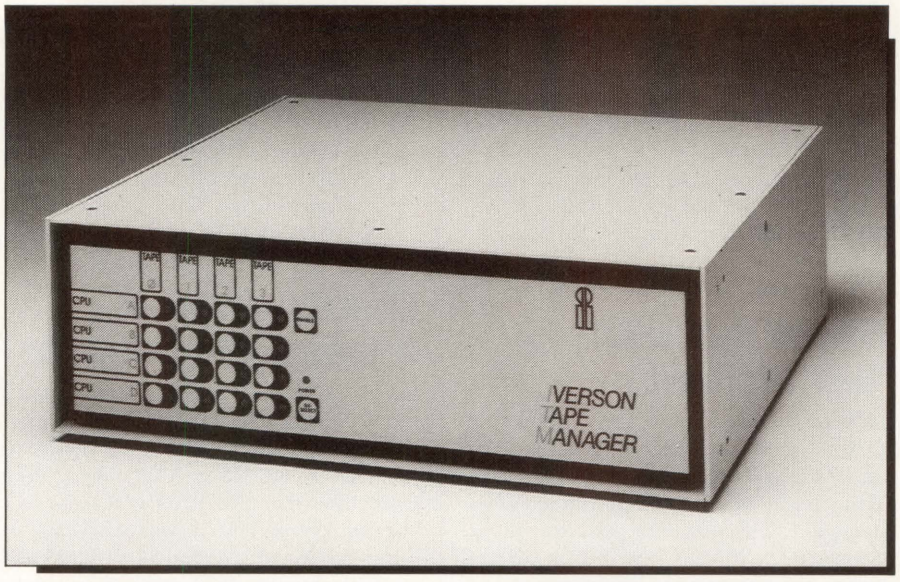
Powerware System 80 Protects VAX

Exide Electronics introduced a new member of its Powerware family of UPSs, the Powerware System 80. The system supports critical electronic loads of 40- to 80-kVA to protect computers ranging from VAX 8530s to 8830 VAXclusters. The System 80 is an on-line UPS that provides continuous power conditioning and automatic backup.

A range of options, including remote monitoring, user changeable operating parameters and a choice of battery capacities, allow the system to be tailored for individual situations. The product is easy to install, maintain and use. Factory pretesting and casters speed installation. Operation is simplified with one-button control, status display and remote monitoring. The critical bus MTBF is 100,000 hours. It's built to IEEE 587 recommendations, and is UL listed as well as FCC, NEMA and CSA compliant.

To learn more, contact Karin Cram, Exide Electronics, P.O. Box 58189, Raleigh, NC 27658; (919) 872-3020.

Circle 519 on reader card



Iverson Inc.'s tape management system, the ITM.

Trajectory Supports DEC Version Of LEX

Trajectory Software is authorized to sell and support all DEC versions of the LEX word processor. Services include hotline support, training classes, program customization and porting.

LEX is a powerful WYSIWYG word processor/office applications system with an integrated database, calculator and math functions, 130,000-word spelling dictionary, sophisticated mass mailing system and advanced macro capabilities.

DEC versions of LEX are available for the Rainbow, the PRO series, PDP-11s and VAXs, with a wide variety of operating systems supported. Prices range from $495 to $11,500.

To find out more, contact Trajectory Software, 555 Goffle Rd., Ridgewood, NJ 07450; (201) 447-5200.

Circle 521 on reader card

BMDP Enhances Statistical Software

BMDP Statistical Software Inc. is shipping its newest release of statistical software for VAX/VMS and IBM/OS systems. This release includes two new statistical programs as well as enhancements in the 40 other programs that comprise the BMDP Statistical Software package. Key highlights of the release are programs CA and 5V.

CA is an exploratory technique that converts data from a 2-D table into a graphical display. The graphs help the user identify similarities and differences in the data.

5V provides methods for analyzing repeated measures data. The essential feature of a repeated measures design is that each subject is observed more than once, at several points in time or under several different conditions. 5V can analyze incomplete data.

For more information, contact BMDP Statistical Software Inc., 1440 Sepulveda Blvd., Los Angeles, CA 90025; (213) 479-7799.

Circle 523 on reader card

IDE Upgrades Software Development Product

Interactive Development Environments (IDE) is shipping release 4.0 of its Software through Pictures CASE product. The product is an integrated multiuser environment

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that supports the entire software development process. Release 4.0 includes user-extensible applications addressing productivity, control and communication issues.

A range of new applications has been created using Software through Pictures' Visible Connections templates, which drive the tools to provide such solutions as automatic documentation, requirements traceability, DOD-STD-2167 support, and data dictionary analysis. Release 4.0 is available for all major workstations, including DEC, and is integrated fully with the windowing system and tools of each host workstation.

Prices range from $5,000 to $21,000, depending on the selected configuration. For more information, contact Michael P. Thoma, Interactive Development Environments, 595 Market St., 12th Fl., San Francisco, CA 94105; (415) 543-0900.

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2.5 Gigabytes Unattended Backup

Digi-Data's GIGASTORE™ provides 2.5 Gigabytes of data storage on a single T-120 VHS video cartridge. That permits backup of your largest disk drive on off-hours without an operator.

Utilizing true read-after-write coupled with very powerful error correction, GIGASTORE gives you an unsurpassed error rate of 1 in 10^{23} bits. In addition, you get a high speed search capability not available in most 9-track drives.

GIGASTORE can be provided with an interface for DEC computers, such as VAX and Micro Vax, for operation under VMS. It is also available with an IBM PC interface, operating under MS/DOS.

Call Digi-Data, an organization with a 25 year history of manufacturing quality tape drives, at (301) 498-0200.

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ExpressNet Features PC-Based Management

DAVID Systems Inc. has announced its DAVID ExpressNet advanced technology Ethernet unshielded twisted-pair wire LAN system. DAVID ExpressNet is compatible with the draft IEEE 802.3 10BASE-T 10-megabit-per-second twisted-pair wire transmission standard. Advances include integrated PC or terminal-based management and control functions, competitive price-per-port connection and compact size.

The product's interactive control features help network administrators monitor packet and collision counts, identify links with traffic and collisions and provide management statistics. It interfaces with Ethernet-compatible hardware and software products from Apple, DEC and others.

Pricing for DAVID ExpressNet is $2,495 for each hub and $149 for each TP-MAU, bringing the per-station cost of a 12-node LAN to $357.

Learn more by contacting Phil McDermott, DAVID Systems Inc., 701 E. Evelyn St., Sunnyvale, CA 94086; (408) 720-8000.

Circle 524 on reader card

LINK Supports Sharing Of Peripheral Devices

Northwest Digital Software Inc. has announced that its LINK software package, which allows the sharing of disk data among clustered PDPs running RSTS/E, supports the sharing of peripheral devices, such as the LN-27 high-speed printer and all other serial printers.

Any node in the PDP cluster can have access to all of the peripherals on any other node in the cluster. The LINK software package allows the PDP site to add needed CPU power without changes to existing software applications.

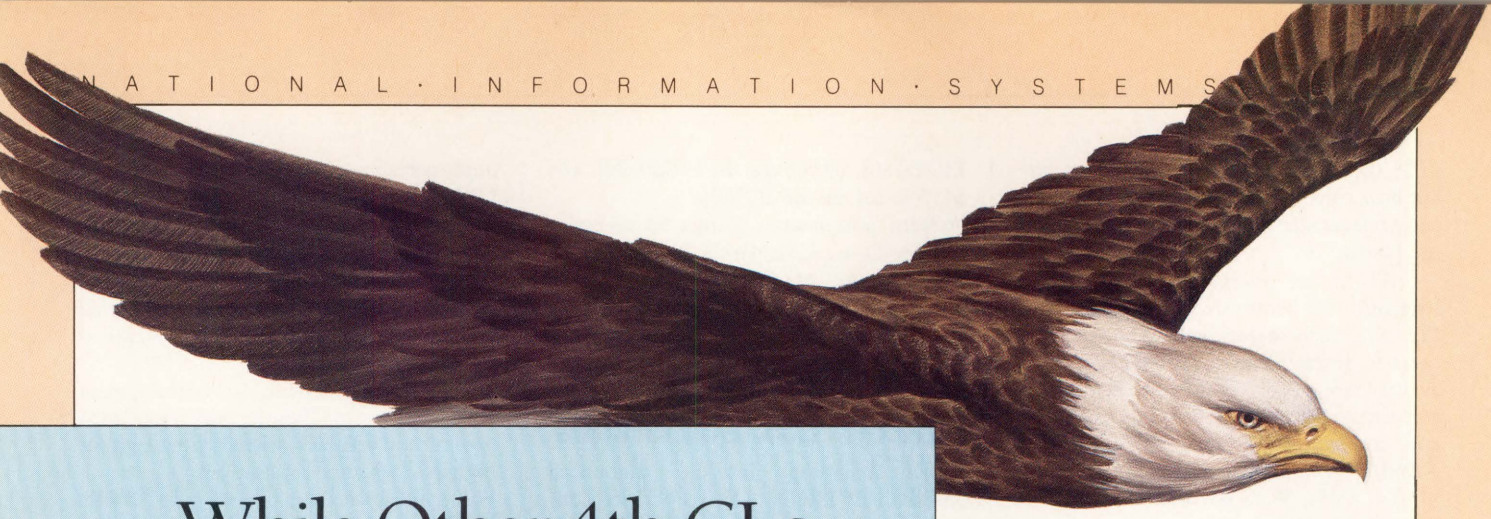
Northwest Digital Software customers currently under support will receive this latest release update automatically.

For more information, contact Mike Mayfield, Northwest Digital Software, P.O. Box 1797, Newport, WA 99156; (509) 447-5631.

Circle 525 on reader card

JAM Release 4.0 Integrates JPL

JYACC Inc. introduced release 4.0 of JYACC Application Manager (JAM), a user-interface management system. Release 4.0 includes the integration of JYACC Procedural Language



While Other 4th GLs Make You Crawl Through Programming, ACCENT R® Lets You Fly.

ACCENT R gets your VAX/VMS multi-user production applications off the ground fast.

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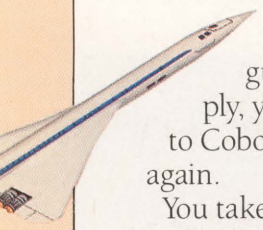

You take advantage of ACCENT R's powerful and efficient programming language. One that features "Application Models"—a unique framework for dramatically reducing programming time; a full complement of debugging tools; error and syntax checking; and intuitive commands for prototyping and developing sophisticated applications.

ACCENT R even delivers custom reports, data entry and display forms, and menus; all without coding.

Still, that's not the only reason why applications developed in ACCENT R take wing. ACCENT R generates compiled code and is optimized for VAX/VMS environments. So your resulting multi-user applications can run as much as forty times faster than interpretive systems.

Better yet, ACCENT R even provides upward mobility for existing applications. That's because ACCENT R can use VAX RMS files. Which means you can easily expand without redesigning your application or re-loading your data.

Fact is, ACCENT R will keep your applications flying for years. It's no surprise that FORTUNE 1000 companies, government agencies, and universities have chosen ACCENT R for developing their full-blown applications.

That's why you should call National Information Systems at (408) 985-7100 for more information. After all, why crawl through programming when you can now fly?

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CIRCLE 303 ON READER CARD

(JPL), the addition of pull-down menus, online help, enhancements to the data dictionary and performance improvements throughout the system.

JPL is an interpreted programming language that works in conjunction with JYACC's database interface product to allow users to access databases via SQL. JAM is available for a broad range of hardware and software environments, ranging from PCs and compatibles running MS-DOS and XENIX, to minis and superminis running UNIX, VMS, VOS and RMX.

For more information, contact Susan Aumack, JYACC Inc., 116 John St., New York, NY 10038; (212) 267-7722.

Circle 526 on reader card

RMSEDT Maintains System RMS Files

Beck Computer Systems announced RMSEDT, an RMS file editor for VAX/VMS that allows easy and instantaneous maintenance of application or system RMS files. RMSEDT, a programming productivity tool, enables programmers to efficiently access, modify, display and print the files of all applications that run on VAX/VMS.

By using RMSEDT, a programmer can modify, display or print any data within any RMS file organization. Features supported include a totally interactive interface, full-command file language, interactive help, dynamic and static strings, and a display and inquiry window for variables.

Pricing starts at $995 per license and varies depending on CPU type.

For further information, contact Beck Computer Systems, 5372 Long Beach Blvd., Long Beach, CA 90805; (213) 428-2894.

Circle 527 on reader card

ER2E/J Subsystem Offers Up To 1.3 GB Capacity

Emulex Corporation has introduced a new version of its ER2E 5 1/4-inch removable disk subsystem for UNIBUS-based VAX and PDP-11 minicomputers. The new ER2E/J is Emulex's first ESDI-interfaced removable subsystem for UNIBUS-based systems and offers formatted capacities up to 1.3 GB.

The new ER2E/J subsystem configurations consist of Emulex's recently introduced UD23 Mass Storage Control Protocol (MSCP) emulating ESDI disk controller, Emulex's 19-inch rackmount ER2E removable chassis and one or two Portable Drive Modules (PDM) that house full-height 5¼-inch ESDI disk drives. Available capacities range from 180 MB to 760 MB per PDM.

The ER2E/J is priced at $7,130 for the ER2E/180J, $9,060 for the ER2E/380J, and $11,390 for the ER2E/760J.

To learn more, contact Katrina Adney-Leslie, Emulex Corp., 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626; (800) EMULEX-3; in CA, (714) 662-5600.

Circle 403 on reader card

SMARTDECISION Employs SQL Capabilities

Signal Technology Inc. has announced SMARTDECISION, a Lotus-like decision-support component for the SMARTSTAR 4GL application development environment. SMARTDECISION features Lotus-compatible interfaces for graphics and spreadsheet applications, and employs ANSI-compliant SQL capabilities. The SQL-based system is fully integrated with SMARTSTAR.

SMARTDECISION provides links to SMARTSTAR facilities, such as SMARTREPORT, for organizing spreadsheet data and graphs for presentation. It also provides for bidirectional operations with Lotus 1-2-3, Symphony, DATATRIEVE, VAX host 3GLs and DCL.

Prices for the optional package range from $1,050 to $8,000, depending on machine size and configuration. Users must be running SMARTSTAR version 5.2 or higher to use SMARTDECISION.

To learn more, contact Paul Elswick, Signal Technology Inc., 5951 Encina Rd., Goleta, CA 93117; (805) 683-3771.

Circle 529 on reader card

DEC Licenses DECwindows User Interface

DEC announced plans to license its DECwindows user interface software to Independent Software Vendors (ISVs) and to other computer system vendors. The software product, called XUI, was developed as part of DEC's DECwindows Program, which will provide implementation of the X Window System for ULTRIX and VMS.

The XUI software has the necessary components for an ISV or user developer to build a DECwindows-style application on any processor. The XUI software and license are available at no charge with purchase of the software media.

The XUI user-interface development environment simplifies the building of windowing and graphics-oriented front ends for high-performance applications.

For more information, contact Judy Finman, DEC, 146 Main St., Maynard, MA 01754; (603) 881-2934.

Circle 400 on reader card

CAP Tool Automates Code Development

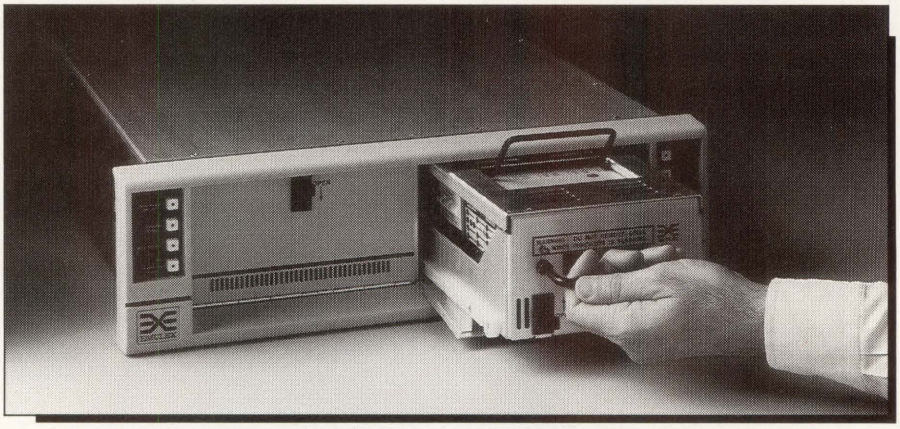
Promod Inc. has released updated versions of its Computer-Aided Programming (CAP) products that feature support for the C programming language. Promod's CAP tools automate the code development and code maintenance functions of software development while allowing reverse engineering of existing code into a CASE environment.

Promod's CAP tools include Pro/Source, ProCap and Re/Source. Pro/Source automatically generates source code based on data collected in the design phase of a project. ProCap integrates design data with code refinements at the compilable unit level. Re/Source reverse engineers compiled source code units into design constructs that easily can be integrated into Promod's design tool, ProMod/MD. The products are offered for all VAX and MicroVAX systems running the VMS operating system.

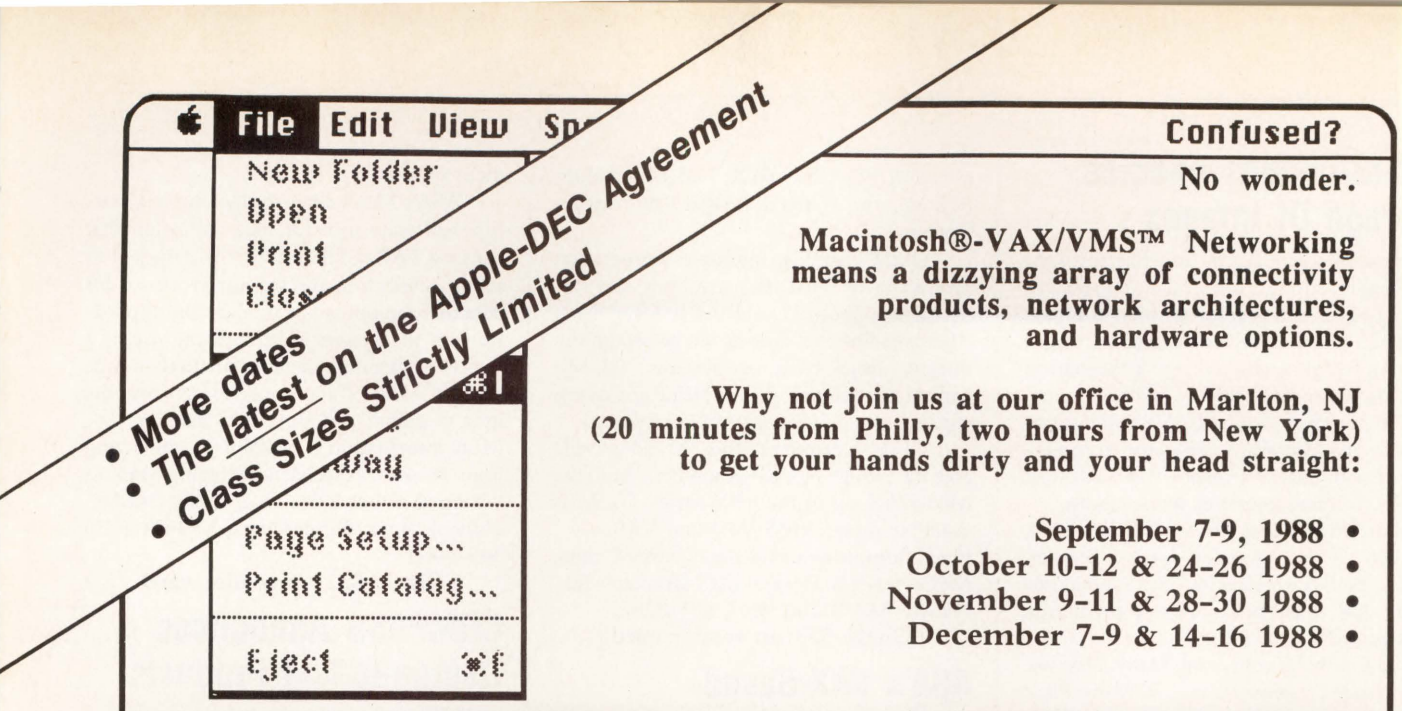
Prices start at $995 for ProCap on a PC base.

To learn more, contact Promod Inc., 23685 Birtcher Dr., Lake Forest, CA 92630; (714) 855-3046.

Circle 540 on reader card



Emulex Corporation's ER2E/J removable disk subsystem.



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VAX/VMS File Servers •
AlisaTalk, PacerShare

Networked Databases •

Apple - DEC Development Efforts •

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BASIS/Images Enables Storage Of Images

Information Dimensions Inc. has software that enables storage, retrieval and display of photographic and graphic art images linked to BASIS full-text databases. BASIS/Images combines high-quality image presentation with low-cost image capture and processing.

The product enables BASIS applications on VAX and MicroVAX computers to be augmented with images accessible via networked MS-DOS microcomputer workstations.

First-copy license cost for GTerm is $300, and for UFF Conversion Utility licenses, $2,500. BASIS operates on DEC minicomputers and mainframes. First-copy license costs begin at $15,200.

Find out more by contacting Dawn Haskins, Information Dimensions Inc., 55 Metro Place S., Dublin, OH 43017-1396; (614) 761-7301.

Circle 532 on reader card

GL:M Handles Multiple Processing

McCormack & Dodge introduced its Millennium software operating environment for computers and its first Millennium application for the VAX, GL:Millennium (GL:M), the General Ledger Information System.

GL:M handles multiple corporation processing of financial, accounting and statistical data. Journal entries can be entered and edited on-line real-time or can be brought in directly from other subsystems. GL:M's Millennium features, such as HELP and query, enhance the functionality of the system.

GL:M is priced at $100,000 and is available for a range of VAX computers, from the MicroVAX up to the 8900 series. GL:M is available under VMS V4.7 and V5.0.

Find out more by contacting George Cohen, McCormack & Dodge, 1225 Worcester Rd., Natick, MA 01760; (617) 655-8200.

Circle 533 on reader card

ASA's VAX-Based Software Stores Data

The ASA Manufacturing Systems Group has announced the availability of a real-time data collection and verification system, MAX Data Collection. The VAX-based software product, which was developed in conjunction with DEC, is an application-independent, real-time data collection/data management product.

ASA's MAX Data Collection is a real-time software tool for data collection that runs on VAXs. The product is designed to act as a collection and storage processor for data that can in turn be used by any application on the system. Through the use of a variety of data input devices, such as bar-code readers, MAX Data Collection enables the user to gather and store data quickly.

More information is available by contacting Elan Winkler, ASA Manufacturing Systems Group, Century Plaza One, 1st Fl., 1065 E. Hillsdale Blvd., Foster City, CA 94404; (415) 345-6000.

Circle 531 on reader card

COMPASS Announces Design-To-Test Products

COMPASS Development Inc. announced two integrated circuit design-to-test products: Stimulus Analysis and Verification (SAV); and Automatic Test Optimization Program (ATOP).

SAV is a design tool that eliminates error-prone, manual tasks from the design cycle, minimizing development time. ATOP is a test engineering tool that intelligently

This is two of the best computers on the market.

It's a Macintosh, of course. But it's also a VAX. Thanks to a family of products from White Pine Software, Macintosh and VAX computers can communicate. These include emulators that allow the Macintosh to appear to a VAX exactly like a DEC terminal. And Reggie, which converts Macintosh graphics into DEC formats (ReGIS and SIXEL) for use by VAX applications or output devices.

And VMacS, which allows users to store and manage Macintosh files on the VAX's hard disks and tape drives.

WHITE PINE SOFTWARE

For more information call or write: White Pine Software, 94 Route 101A, PO Box 1108, Amherst, NH 03031, **(603) 886-9050.**

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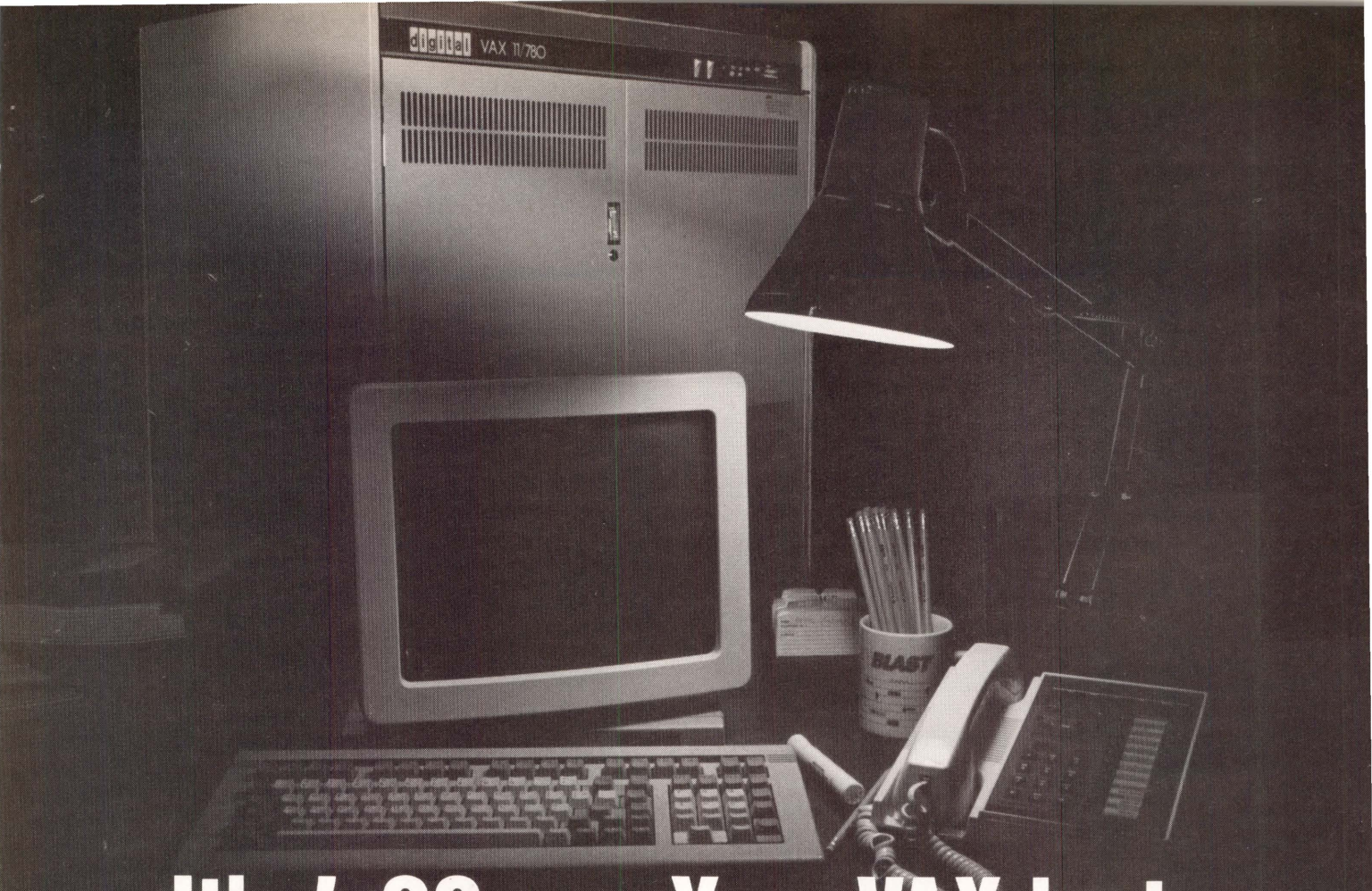

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converts simulation data into functional test programs, ready to be compiled.

SAV costs $16,000 for a VAX installation. ATOP starts at $62,000 for a VAX. For more information, contact Chuck Troiani, COMPASS Development Inc., 2890 Zanker Rd., Ste. 209, San Jose, CA 95134; (408) 432-0715.

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Visual Introduces X Display Station

Visual Technology Inc. has announced the introduction of its Visual 640 X Display Station (XDS), which offers full on-board implementation of the emerging X Window System standard.

Implementing X Version 11, Release 2, the product will connect to other network clients that incorporate the X protocol. As an X server, it allows users to run multiple applications simultaneously, displaying them in overlapping windows. Transparent access and display of remote applications running on any size system is facilitated by Ethernet IEEE 802.4 connectivity (with the TCP/IP protocol).

The Visual 640 XDS costs $1,995. VAR and OEM discounts are available.

To learn more, contact Brian Croxon, Visual Technology Inc., 1703 Middlesex St., Lowell, MA 01851; (617) 459-4903.

Circle 528 on reader card

DataTalker Accesses Mac And VAX

Natural Language Inc. (NLI) announced that NLI DataTalker and NLI Connector, its conversational English information access and analysis products, are available on the Mac II under the A/UX operating system. NLI DataTalker is a conversational English interface to RDBMSs. NLI Connector is a knowledge-based tool used to familiarize DataTalker with specific database applications.

The products require A/UX version 1.1, 6 MB of RAM and a 60-MB hard drive. DataTalker on a Mac can access RDBMSs on VAX Computers (VMS or ULTRIX) via the TCP/IP Ethernet communication protocol.

DataTalker for the Mac costs $5,000 and the Connector is $10,000.

For additional information, contact David Coleman, Natural Language Inc., 1802 5th St., Berkeley, CA 94710; (415) 841-3500.

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Metron Launches VMS Version Of ATHENE

Metron Technology Ltd. has developed software products under the proprietary name ATHENE, which exploit queuing network theory and analytical modeling techniques to provide semiautomated modeling tools for the capacity planner. Metron now has launched a VMS version.

Formal capacity planning lets you analyze the impact of changes in workload and thus avoid performance crises and their associated costs. The ability to vary workload levels and predict the effect that these will have on service levels and use, together with the ability to map a given workload on to a range of alternative configurations, means that organizations can plan upgrades accurately.

For further information, contact Adam Grummitt, Metron Technology Ltd., 50 North St., Taunton, TA1 1LX, England; phone, 0823-259231.

Circle 537 on reader card

SoftCost-Ada Designed For VAX/VMS

Reifer Consultants Inc. has a VAX/VMS release of its Ada software cost-estimation package, SoftCost-Ada. VAX SoftCost-Ada is designed specifically for estimating the costs of Ada applications. It's based on a detailed analysis of more than 80 completed Ada projects that used Ada, MAPSEs and APSEs and object-oriented design techniques to generate more than 25 million Ada source lines of code.

VAX SoftCost-Ada employs new power laws, productivity parameters and cost driver relationships to accurately estimate the time and effort needed to develop Ada applications. It takes into account learning curves, the effects of reuse and MAPSE and APSE environments.

The product is available for the MicroVAX II and VAX 11/780 at an annual lease price of $8,000 for one to four users. For more information, contact Patrick T. Kane, Reifer Consultants Inc., 25550 Hawthorne Blvd., Ste. 208, Torrance, CA 90505; (213) 373-8728.

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Video Profiles Advanced Netware

All levels of MIS management can gain a strategic overview of Advanced Netware, Novell's LAN operating system, with a video from Applied Learning. "Using Novell's Advanced Netware — What Can It Do For Your LAN?" discusses the Advanced Netware architecture.

The video details main facilities and components of Advanced Netware, including the file server, network shell, utilities and security features. It examines Advanced Netware's ability to support a variety of key application software. Connectivity with SNA and VAX is focused on.

The video can be rented for $50 to $150 per month, depending on rental volume. For more information, contact Gary Poplawski, Applied Learning, 1751 W. Diehl Rd., Naperville, IL 60540; (312) 369-3000.

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Ful/Text Offers Fast Performance

Fulcrum Technologies Inc. announced the availability of its Ful/Text software for VAX/VMS and ULTRIX environments. Ful/Text is a full text retrieval product that's suited for large document management applications. It's also suited for use in networked and distributed processing environments.

A capability of interest to large corporate accounts and systems integrators is the Ful/Text Application Program Interface (API). The API allows developers access to the underlying indexing and retrieval routines. This allows Ful/Text to be integrated into other applications, such as office automation packages.

To find out more, contact Barbara Johnson, Fulcrum Technologies Inc., 560 Rochester St., Ottawa, ON K1S 5K2; (613) 238-1761.

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UniVAX-Linker Connects VAX To Unisys-Sperry

Bekeen Computer Corporation has announced that UniVAX-Linker, a communications/terminal emulation package that links VAX users to Unisys-Sperry host computers, is available for MicroVAX systems.

UniVAX-Linker is a VAX-based software product that allows a user on a VAX/VMS computer system full access to a Unisys-Sperry computer system. Any terminal on the VAX (VT100/200/300 or compatibles) instantly can become a full-function Sperry UTS20/30/40 or SVT1120 terminal and interactively access the Sperry system as if they were connected directly.

The license for the MicroVAX version costs $11,000.

For more information, contact Bekeen Computer Corp., Ste. 15, 12 Falconer Dr., Mississauga, ON L5N 3L9; (416) 826-7780.

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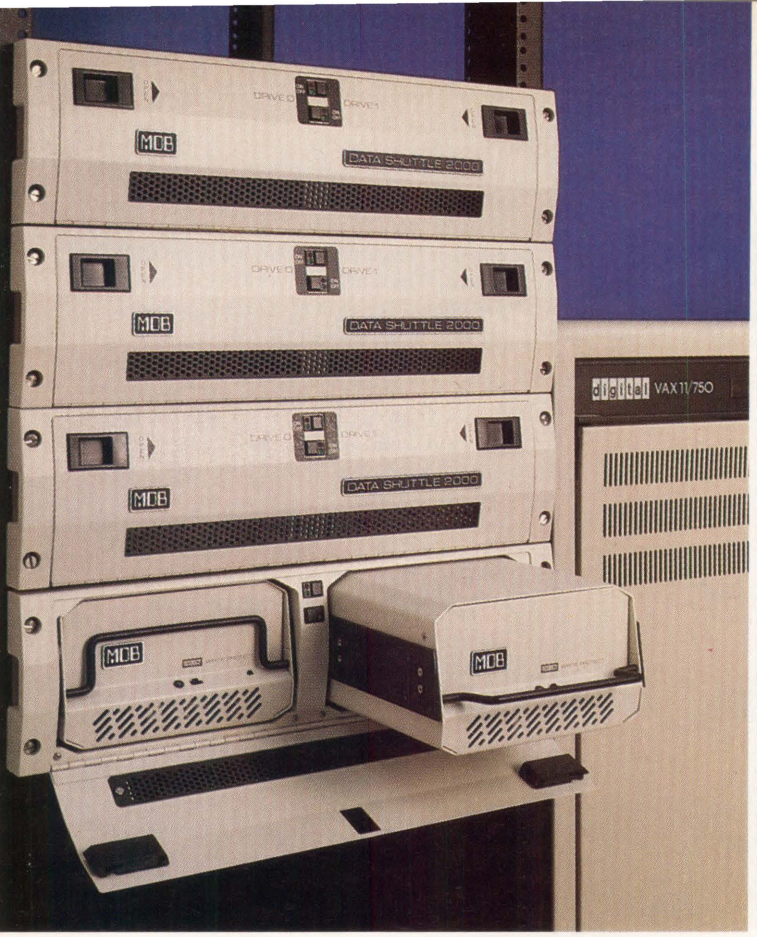
OMNI DGL Links VAX With PC, PS/2

Omnicomp Graphics Corporation Inc. introduced the OMNI Distributive Graphics Link (DGL) high-speed graphics system for connection of IBM PC- and PS/2-compatible workstations with VAXs.

The OMNI DGL enables users of IBM



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Find out more by contacting Omnicomp Graphics Corporation Inc., 1734 W. Belt N., Houston, TX 77043; (713) 464-2990.

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Team*work*/ADA Increases Productivity

Cadre Technologies Inc. announced the release of Team*work*/ADA. Fully integrated with the Team*work* product family, it provides facilities to design, document and manage large-scale Ada software development projects.

Team*work*/ADA increases Ada development productivity by enabling designers to take a high-level view of complex Ada systems, break them down to manageable components and allow a development team to refine the design components concurrently. Further, the product provides a special graphics editor used to build and manipulate Ada Structure Graphs (ASGs).

Prices range from $3,500 to $8,500, and volume discounts are available.

For complete information, contact Karen Chiacu, Cadre Technologies Inc., 222 Richmond St., Providence, RI 02903; (401) 351-5950.

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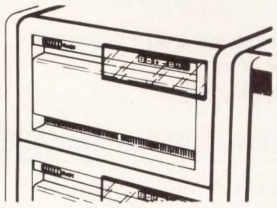

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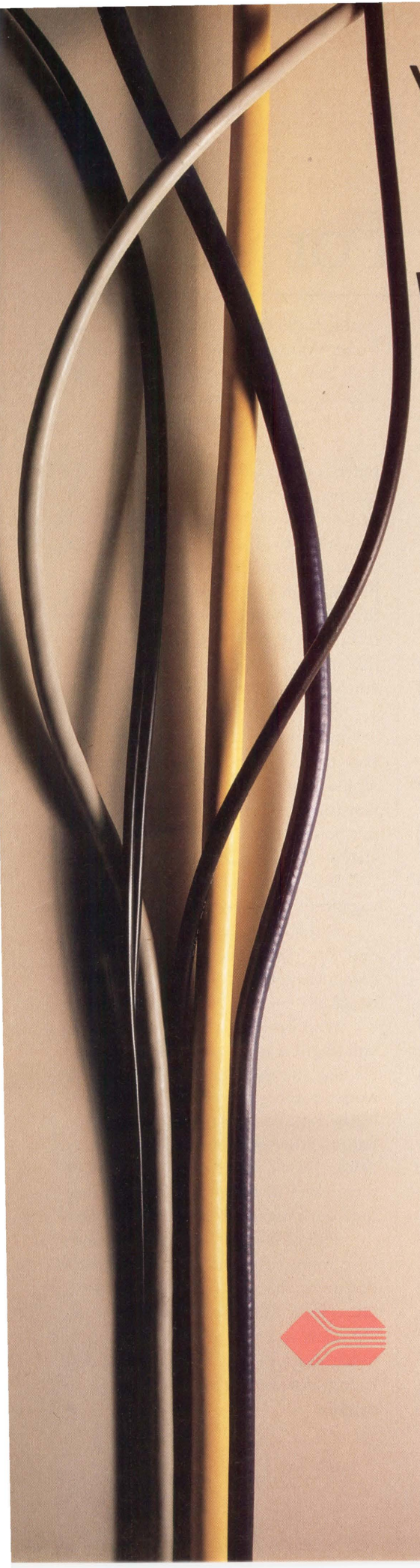

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BACK END

John C. Dvorak

Big Problems For IBM

As we look to a new year of faster and cheaper desktop computers, we find an Age of Confusion is upon us. This confusion is the direct result of IBM's confused direction. It started with the Micro Channel Architecture (MCA) and the PS/2 machines and worsened. IBM has lost its leadership role in the desktop computing business, either by design or incompetence.

I don't know who within this large corporation is behind the mess, but I assume it's the IBM division responsible for the minicomputer. It started with an attack on the PC, symbolized by renaming it the PS/2. It's obvious that if someone put high-speed data channels on an 80386-based system, the performance easily would bury the System/3X machines. The 80386, because it's a single-chip microprocessor, connotes inexpensive. Thus, it would be difficult for Big Blue to price an 80386 system as high as its mini line.

Away From The Mainstream

The MCA was the beginning of a move further away from the mainstream of microcomputing. The next move was the latest version of PC-DOS, dubbed DOS 4.0. Nobody likes this operating system. It has bugs too numerous to outline and the user interface shell is designed poorly.

The grand scheme of IBM is the infamous Systems Application Architecture (SAA). The idea is that every machine from the PS/2 model 50 to the hottest 309X mainframe will have similar interface characteristics. What all this means to most observers is that the F1 function key means Help. That seems to be all there is to it.

The problems with integrating SAA into IBM's entire line are both technical and political. If all applications have the same interface, what happens to the mouse? There's no question that the mouse will play a role in the computer of the future. Coordinating its activity on the terminal of a mainframe, for example, seems more work than its worth.

It gets more interesting. How, for example, do IBM mini makers rationalize a change to SAA, when they just introduced a round of sluggish machines sold to users only because they're software compatible? With a slug of old programs in both the mini and mainframe arena, how will IBM promote SAA? The F1 key doesn't mean Help on *any* of these old programs.

IBM made an interesting political move when the Next computer was announced in October by Next's president Steve Jobs. There was a joint announcement by IBM that certain RISC-based minis and micros would use the Mach operating system used by the Next machine. Essentially, this is a UNIX shell that uses windows, icons, mice and pull-down menus (WIMP). It's very much like the Mac. I was shocked when I saw the IBM announcement, because it flew right in the face of the grand SAA scheme.

Rumor has it that H. Ross Perot, who has sunk $20 million into Next Inc., introduced IBM CEO John Akers to Jobs, who then sold him on the interface. The validity of the rumor is unimportant. What's important is that someone in a decision-making role liked Jobs' sales pitch and threw IBM support behind it. Perhaps this someone never was told about SAA.

Mixed Up

That this could happen proves that IBM is mixed up. Now's the time for DEC (among others) to attack IBM on all fronts. Although IBM might be able to fight back later, in the meantime it will lose important market share.

Let me relate one more story.

A member of the Boston Computer Society had lunch with the product manager for the clunky 5¼-inch add-on drive for the PS/2 line.

When the PS/2 was first announced, observers wondered why there was no provision for the dominant 5¼-inch drive. IBM decided to switch willy-nilly to the 3½-inch drive. I was amused by this, because IBM was one of the last companies to give up on its 8-inch disk.

Asked why IBM abandoned the 5¼-inch drive, the product manager said that nobody at IBM thought it would be a problem to change to the new format. They honestly believed that this new standard would be adopted instantly and overnight by all!

But there's more to it than arrogance: there's lack of understanding.

Recently, an IBM employee told me that few IBM decision-makers read computer publications. "Why bother?" he asked.

Why bother? It seems to me that you might want to see what people are reading and writing. Aren't you, dear reader, reading this because you're trying to get a competitive edge and hoping to garner new ideas? So why don't IBMers do the same? Are they so full of themselves that they think everything they do is right? Apparently they are.

The problem is that they seem to have more than one god ruling their decisions: the schizophrenic SAA, PS/2, MCA, OS/2, AIX, VM, MVS, RISC, et al. Conflicts and strategies are starting to bump into each other in ways IBM hadn't expected. This company is in trouble. ■

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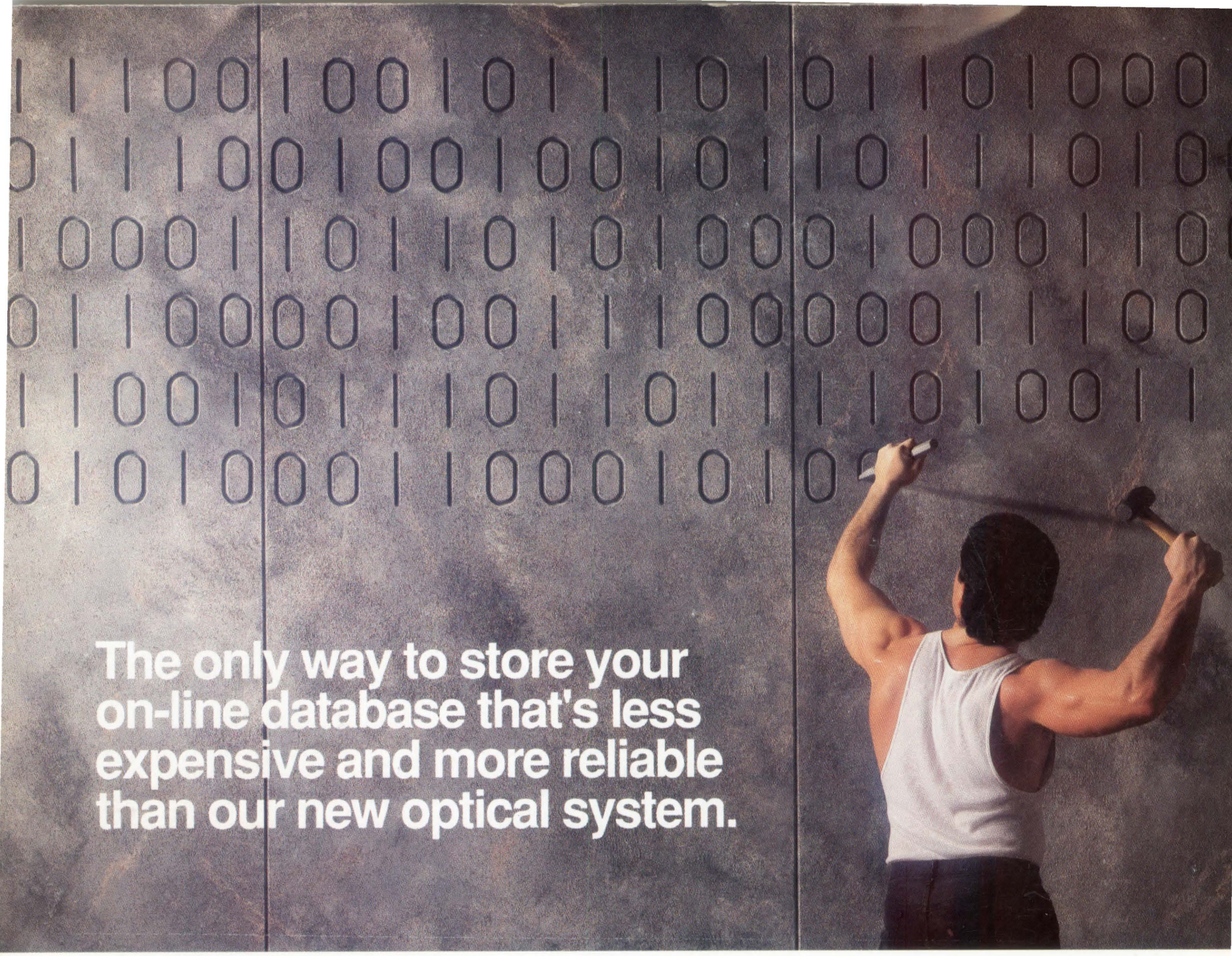

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