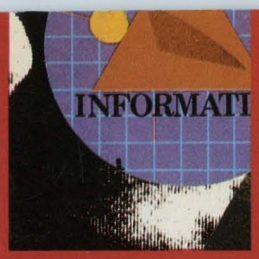

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Quantum PM

- New Twists For Relational Database Management Systems
- Signal Technology's SMARTSTAR For Application Development
- System Security, Part 1: Protecting Against System Break Ins

OCTOBER ■ 1988

DEC Professional

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System & Application Software

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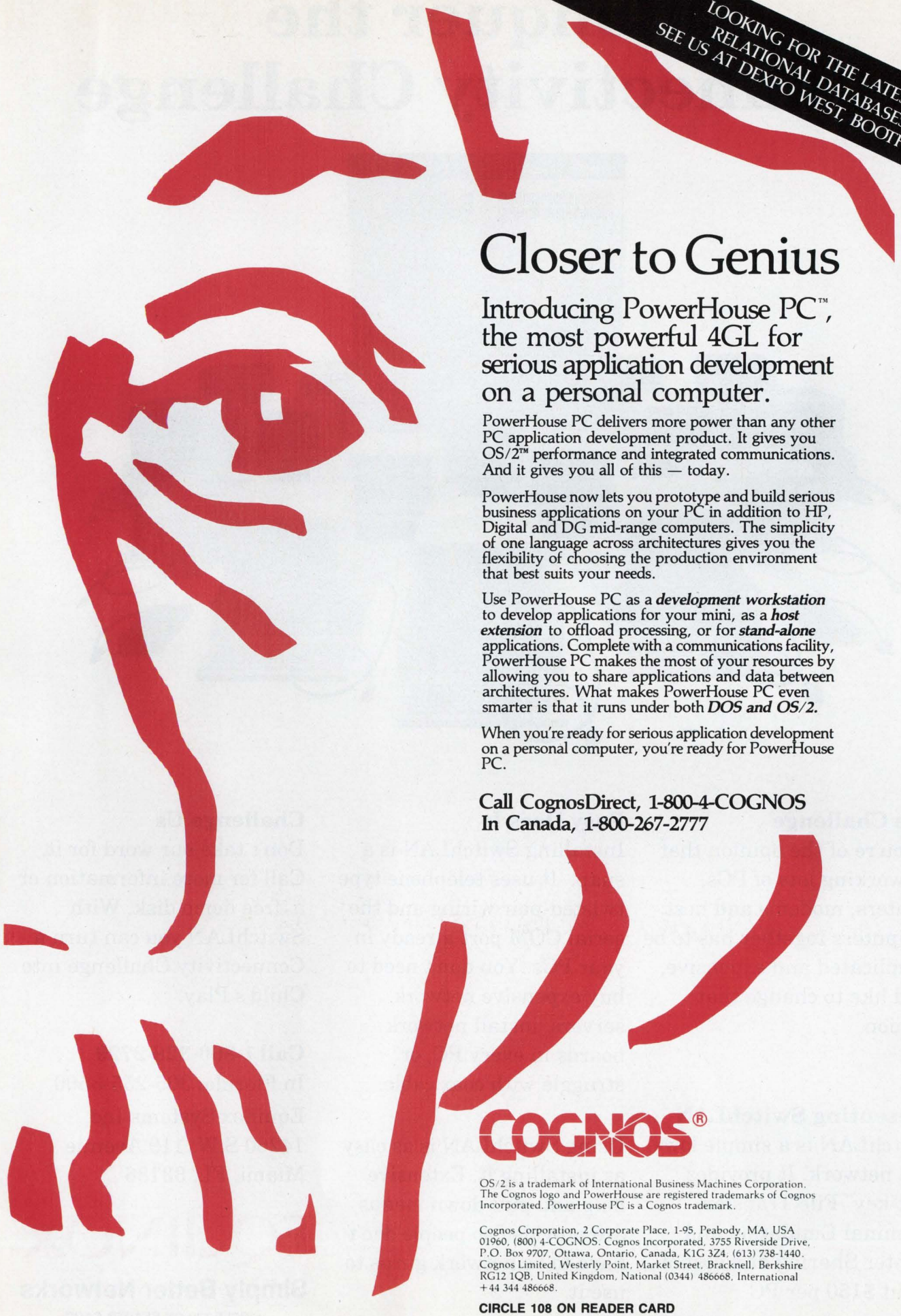

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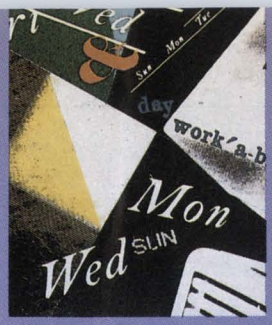

DEC Professional

CONTENTS

OCTOBER 1988 VOL. 7, NO. 10

SOFTWARE

ARTICLES

Continued on page 4.

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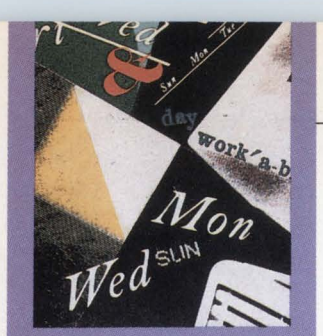

CONTENTS

Continued from page 3.

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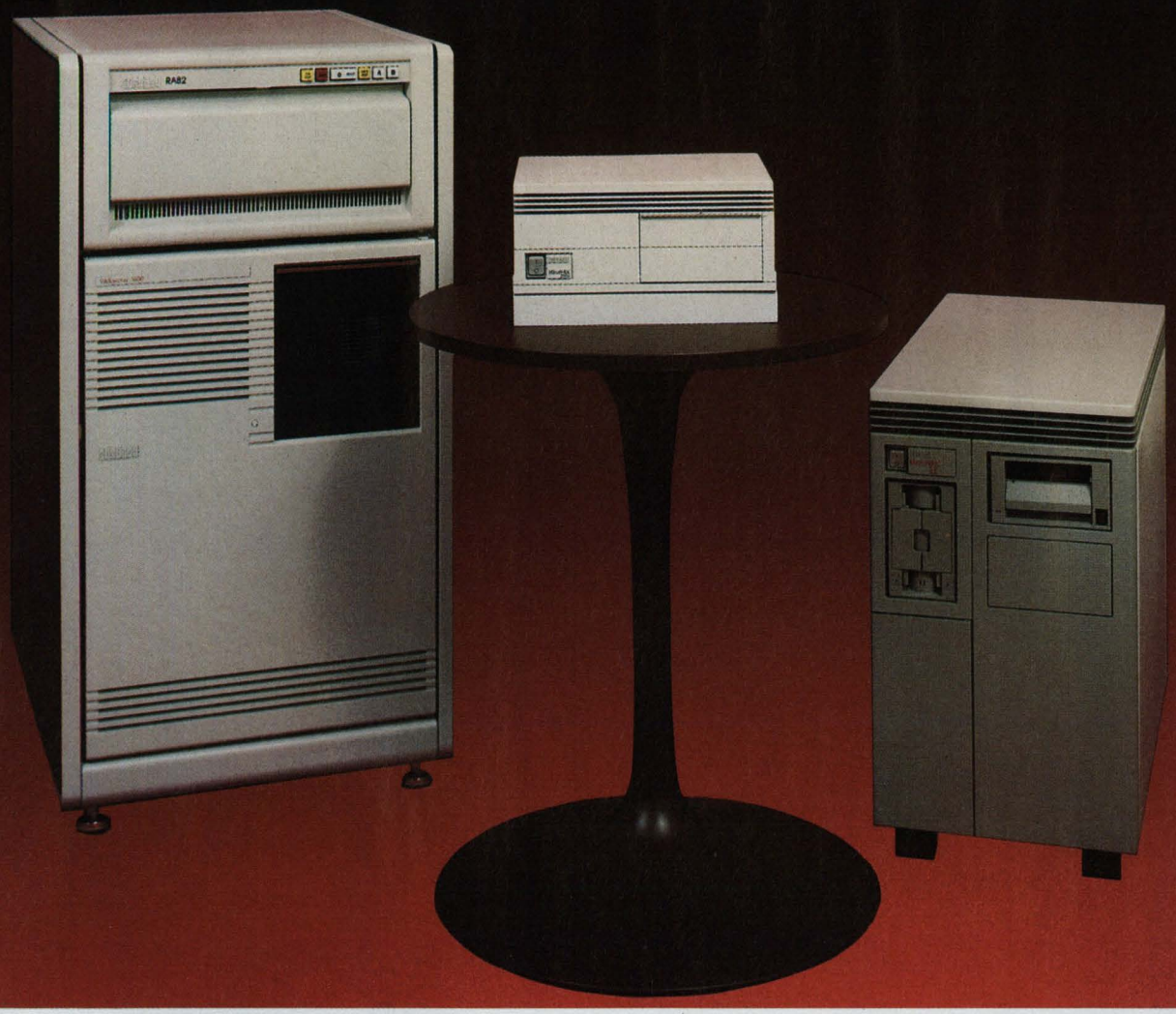

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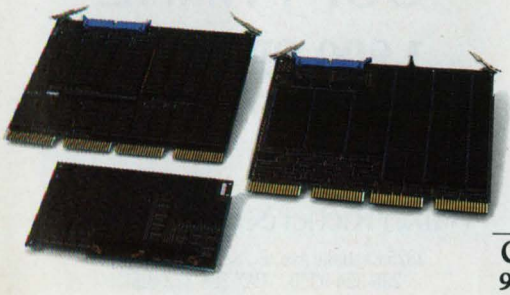

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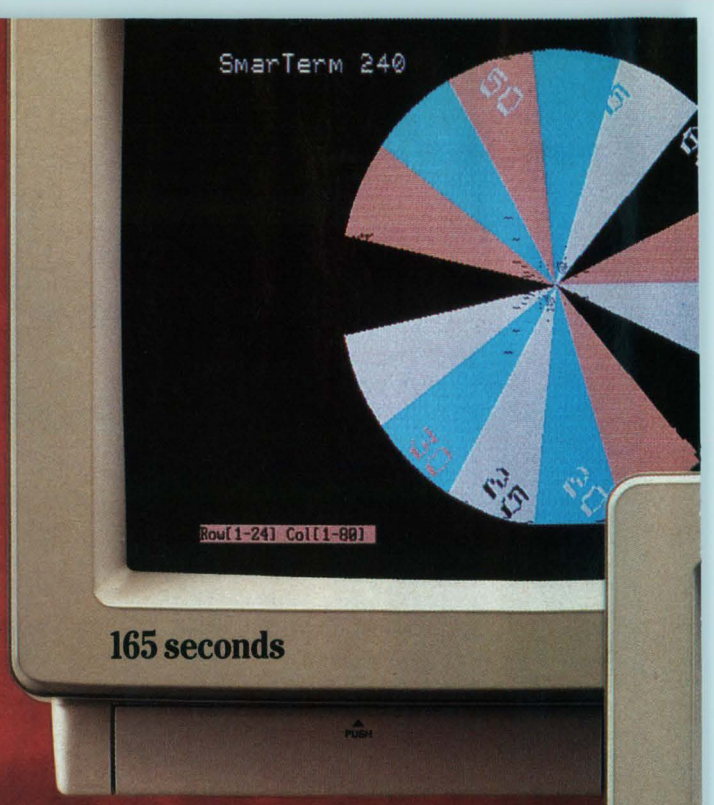

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**Poly-STAR/240 ignores the ReGIS polygon fill command used to color the stopwatch.

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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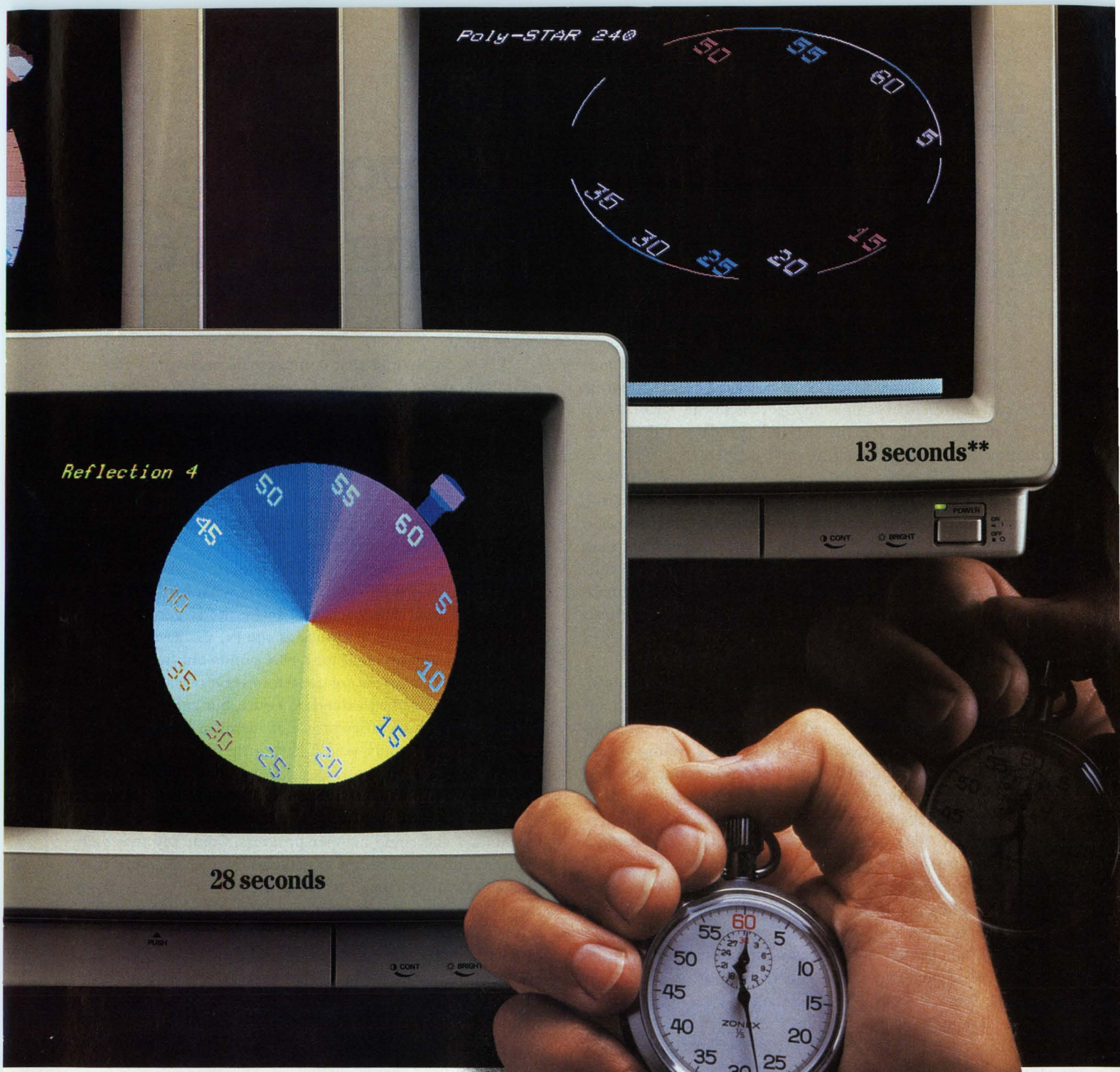

	Reflection® 4 PLUS	SmarTerm® 240	poly-STAR® 240
VT241 Terminal Emulation	Yes	Yes	Yes
VT340 ReGIS Graphics	Yes	no	no
16-Color Display	Yes	no	no
Polygon Fill	Yes	Yes	no
Background Multitasking	Yes	no	no
RAM Used	220K	375K	430K
Complete Keyboard Remapping	Yes	no	Yes
Back up PC Files to VAX	Yes	no	no
Variables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

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PUBLISHER

Carl B. Marbach

Proprietary Operating Systems: Staying Alive

A publication I recently read featured a graph that showed proprietary operating systems declining and non-proprietary (read: UNIX) growing. The two representative lines intersected in the early 1990s.

I don't buy it. On the surface, the data is there, but underneath, digging deeper, it can't happen.

The Big Three of computing, DEC, IBM and Hewlett-Packard, make noises about non-proprietary operating systems. They all talk UNIX out of the sides of their mouths. HP says that it's spending more on UNIX development than on its proprietary system, MPE. In HP's case, that's believable; a major part of its computing machines operate in the technical arenas, where UNIX has been a major factor for some time. Rather than build a technical operating system, it has settled on UNIX as its choice.

But in the commercial arena, MPE is far from dead. MPE/XL is the new version of MPE for the Spectrum 32-bit RISC architecture machines, and it sports many new features to exploit the new architecture. The MPE/XL operating system is optimized for commercial, transaction processing, which it does very well. Even HP expects that its HP-UX version of UNIX won't demonstrate the same performance in commercial situations. HP's position is, simply, that if a customer wants standards he can have HP-UX, and if he wants performance for a commercial system he can have MPE. With thousands of happy, loyal users, MPE won't roll over and die.

At IBM, "standard" means an IBM standard. The world has ASCII, IBM has EBCDIC. We communicate asynchronously, IBM has Bi-Sync. There's X.25 for the rest of us, while IBM has 3780. When 80-column cards became a standard, IBM gave us the System 3 and 96-column cards.

Why should we believe that the largest (by far) computer company is ready to embrace UNIX? Even the newest IBM series, the AS/400 midrange computers, has no provision or plan to run UNIX. AIX, IBM's UNIX variant, will run somewhere, but not on what IBM is betting its future on, the AS/400.

DEC has ULTRIX, which, according to our circulation records, is growing slowly: Although there are UNIX VAXs, they aren't a threat to the dominance of VMS. DEC seems to offer ULTRIX in the same way it offers personal computers: as an accommodation to customers who want a slightly different solution. UNIX seems to have become a workstation standard, adopted by Apollo, Sun and HP. But strangely, DEC's thrust on its VAXSTATION is going to be with DECWINDOWS, not UNIX. UNIX is there if you want it, but you'll have to ask for it.

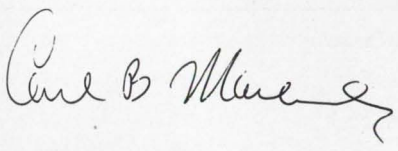
UNIX can save smaller computer manufacturers the expense and time of developing an operating system. Freed from this software albatross, they can concentrate on producing hardware that differentiates itself from the Big Three. Apollo and Sun have distinguished themselves in the workstation market, and other small companies have adopted UNIX. But these independents are tiny compared with the Big Three, which have impressive installed bases that provide plenty of inertia and resistance to change.

It's been said that UNIX is a plot to make hardware transparent: "If it runs UNIX, who cares what hardware it is." This "black box" approach will make the larger computer market as susceptible to clones as the PC market.

The counterargument for UNIX points out that we need standards, that standards are good for everybody. It's true, for example, that if we had a standard house, builders could build it cheaper and more efficiently. But identical houses dotting our landscape certainly would be boring. What would happen to innovation, to solar designs, to Frank Lloyd Wright or others who think beyond today?

To some extent, standards stifle new ideas, stagnate technology and could hamper progress. Some say that each company still would be free to make its own UNIX, but if they did, what would happen to the standard?

UNIX has an important place in today's computer scene, but so does the proprietary operating system. The next year or so will bring some of the most exciting features VMS has ever seen, some of which will change the way we think about DEC computing. While UNIX struggles with standards, VMS will forge ahead onto new ground for a multiuser operating system. If VMS could talk, it might say, "The reports of my death are greatly exaggerated."



20 GIGS FOR YOUR VAX RIG

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The Micro Technology MDI-476 provides a new more efficient level of connectivity for VAX cluster users. The new device offers almost twice the capacity of DEC's largest disk, the RA90. Nine MDI-476's provide a 20 gigabyte storage array in a 60 inch highboy cabinet.

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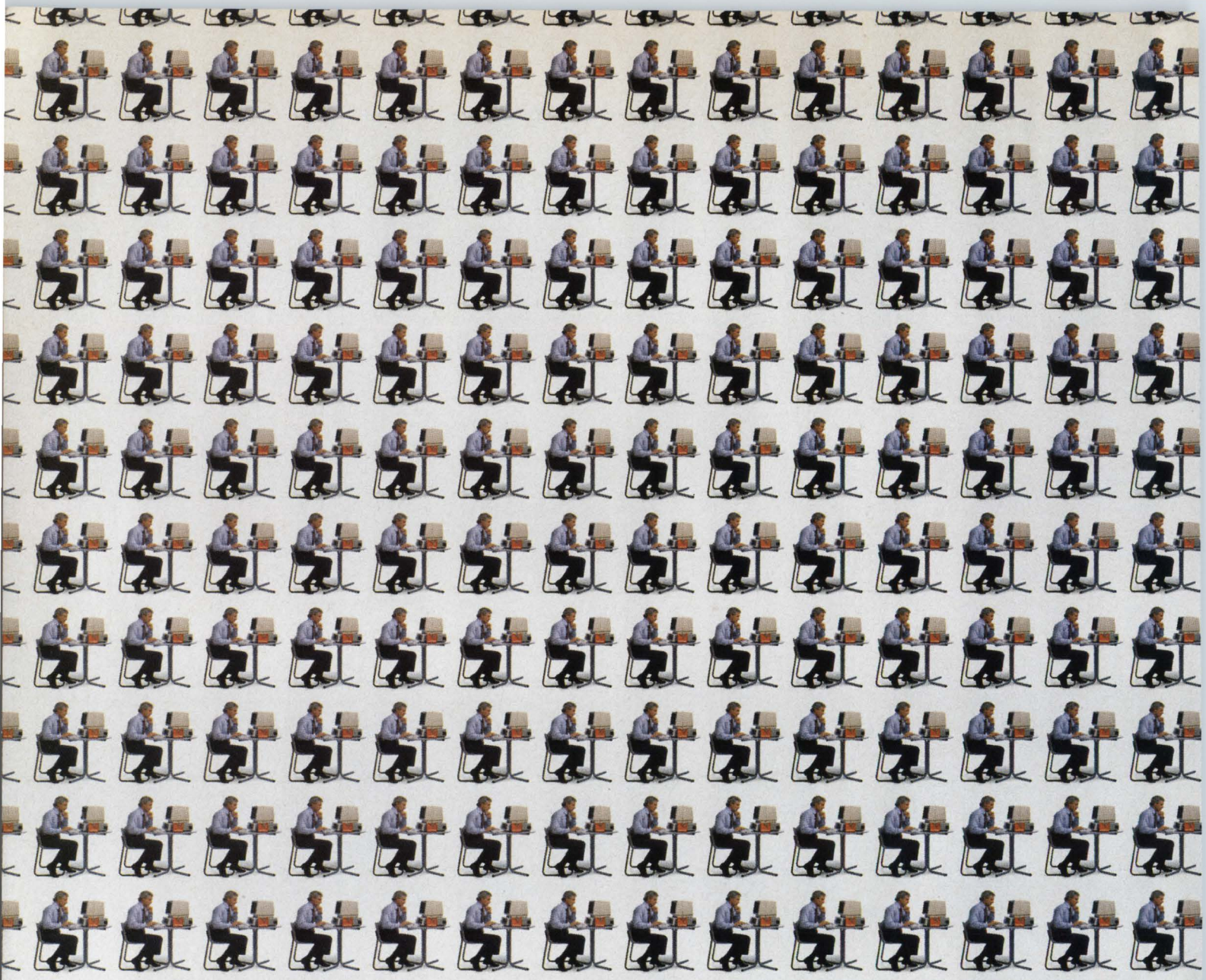

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Total network integration. As more and more users choose different desktop comput-

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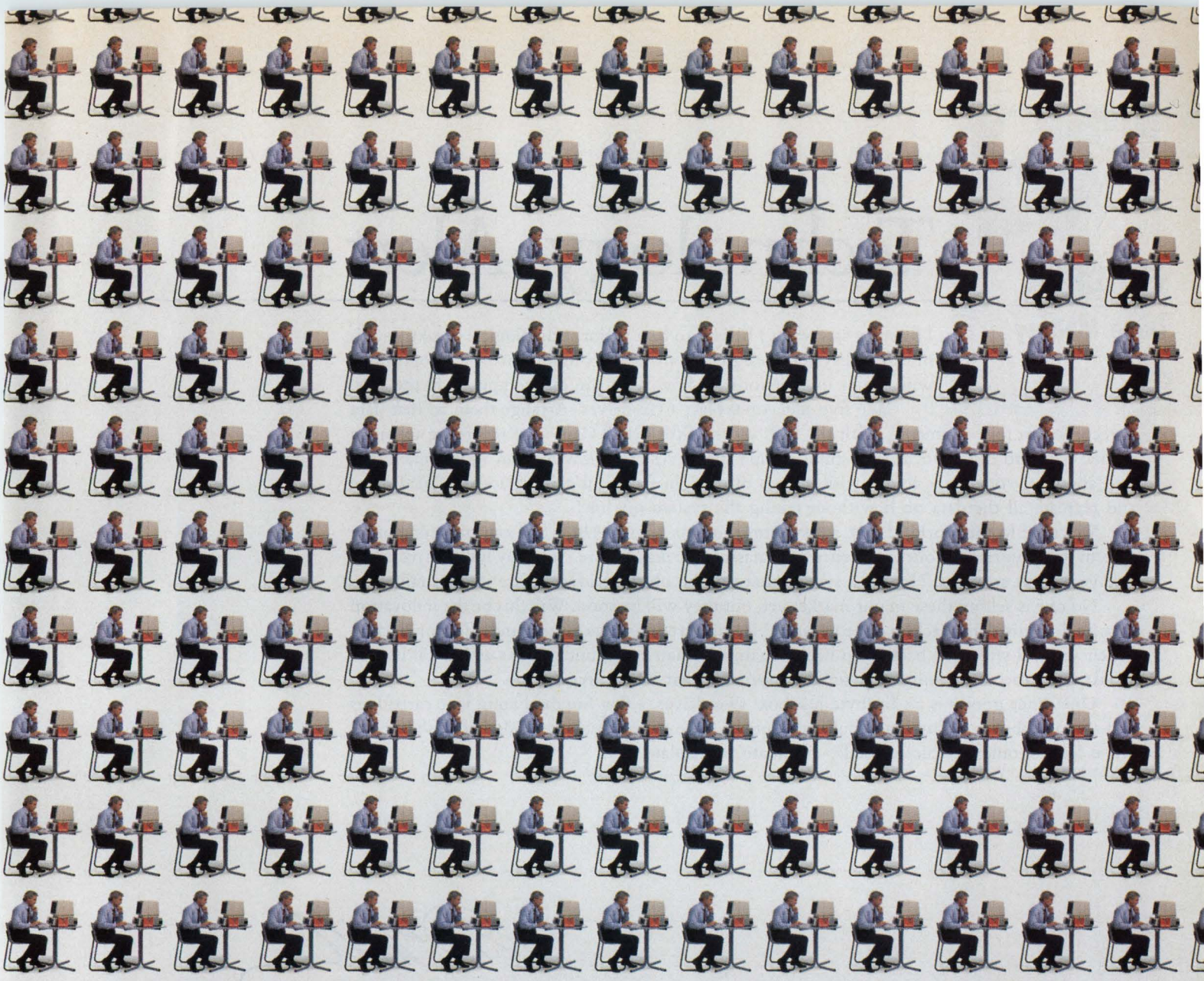

NetWare for VMS to your VAX.

ing environments, system managers face a tricky task: integrate all of these diverse computers into a single workable network.

Choosing NetWare for VMS provides a simple solution. Not only does NetWare let you link PCs to your VAX, but it also gives you the freedom to connect to other important environments. So all of your departmental and corporate computing resources can work together as one seamless system.

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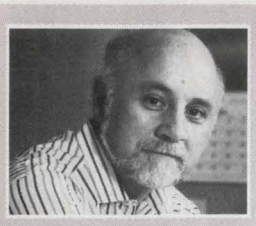


EDITORIAL

Dave Mallery

Technology Alert

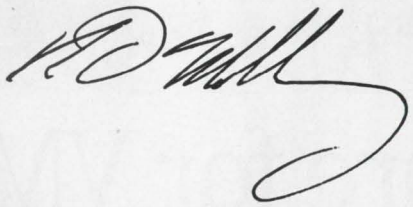
I recently saw what I believe to be a major technological breakthrough in disk subsystem design. It's a breakthrough of massive proportions with major implications for how we'll run our computers in the '90s.

Take five state-of-the-art 1 GB drives. Arrange them so that data is recorded in four segments, with the ECC on the fifth drive. Cause the recording to rotate so that data and ECC information spiral around the drives. You now have an arrangement that will allow any one drive to fail with *no* loss of data. In fact, you can replace the failed drive and recreate all the data on it without taking the system off-line!

Welcome to the world of disk subsystems with six-digit MTBFs. You can run a computer system for 10 years without experiencing a catastrophic disk failure. You may lose a drive every few years, but so what. Here is a system that will be obsolete long before its first failure.

No one is selling these in our market yet, but they will be soon. Will this be the innovation that finally puts daily backup out to pasture? It will certainly have a profound effect on backup urgency; we'll still need backup to hedge against human error, but it looks as if we'll be free at last from the maddening wait for the inevitable that we all live with.

One other goody is an Exabyte jukebox: two drives, a few hundred 8mm tape cartridges and a small robot in a four-hour vault enclosure. If 10-year drive subsystems don't banish backup, we at least should be able to totally automate and isolate it.



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LETTERS

MORE ON PC-NETWORK HOOKUP

Replies to the *ARIS*TALK (July 1988) query on how to connect a PC to a network with a PS/2 model 60 didn't have all the bits. I have a PS/2 model 50 with a 3COM board acting as a boat anchor. DECNET-DOS won't support it because it has a 16-bit bus. TCI plans to support it with CommUnity-DOS, but the software isn't released yet. I use async DECNET-DOS, which works fairly well, but not at the speed of my old PC with an eight-bit bus board.

It should be easy for DEC or TCI to fix the problem, but there aren't enough irate PS/2 users out there. Meanwhile, avoid buying a boat anchor.

Jeffrey V. Sutherland, Ph.D.
Cambridge, Massachusetts

SCO MEETS NCAR

Regarding SCO Inc.'s relationship with the National Center for Atmospheric Research (NCAR), I'd like to provide a clarification.

In the August issue, two readers wrote a letter about NCAR Graphics Software, which is comparable to GRAFkit. NCAR has been a significant source of graphics development for over 20 years. Thus, it's not surprising that SCO would want to incorporate the many years of development at NCAR into a commercial software package.

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.

We're proud to announce that SCO has been selected by the University Corporation for Atmospheric Research (UCAR) Foundation to market NCAR Graphics under a worldwide agreement in association with our GRAFkit product. GRAFkit will maintain the sophisticated algorithms used in 2-D and 3-D graphics computations developed at NCAR. Further, it will include the following commercial benefits:

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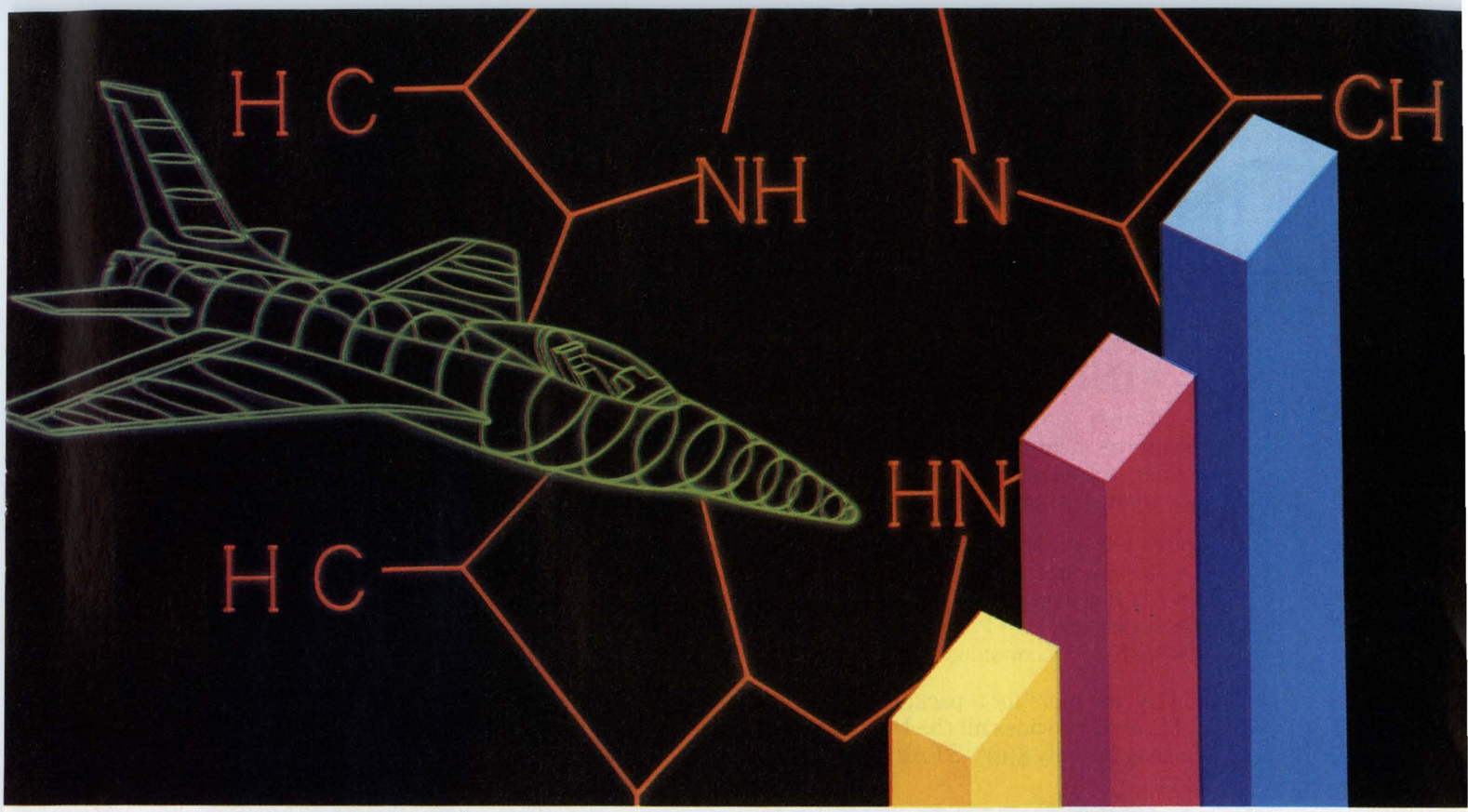
As a commercial company, our job is to enhance products, such as NCAR Graphics, to commercial quality. Academic institutions aren't chartered or funded to support commercial applications, but their work still can be of value to commercial customers through a cooperative relationship like the one between SCO and NCAR.

Rick E. Dakin, Vice President
SCO Inc.
Division of International
Computer Exchange Inc.
Louisville, Colorado

GO OSF

I was interested in Donnalyn Frey's "A Better UNIX For The PDP-11" (July 1988) on the USENIX release of 2.10BSD UNIX for the PDP-11. I thought, "Great! Now I can start exploring the wonder-



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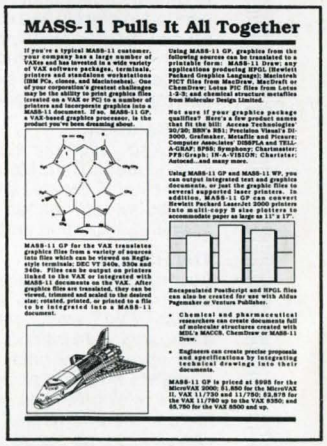

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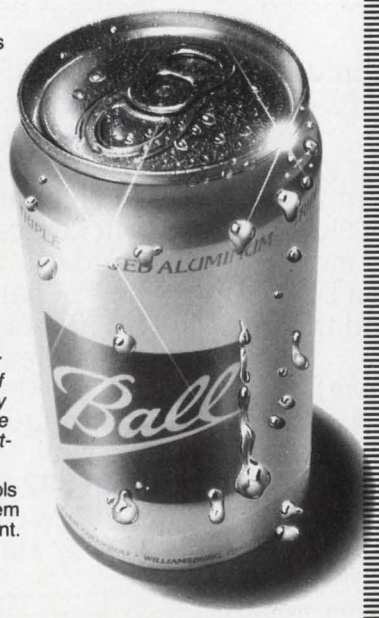

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ful world of UNIX on my home machine (a MICROPDP-11)." Unfortunately, my plans were dashed in short order; I needed a license from AT&T to order 2.10BSD. But my cost would be the standard commercial rate of $65,000.

Having worked with Sun Microsystems platforms, I endorsed the AT&T/Sun partnership for standardizing UNIX. However, this predatory practice by AT&T has opened my eyes. I now fully support the Open Software Foundation's (OSF) effort to introduce some competition into this monopolized market.

Bradley S. Albom
Vallejo, California

TERMINAL RESET

"Hardware Connection Considerations" (Cluster Chronicles, July 1988) lists a DCL command procedure to run 386WARE. The line following END_PROC: is EXECUTE RESET. Because EXECUTE isn't a DCL command, I assume it's a symbol or foreign command. RESET suggests that this line resets terminal characteristics before the command procedure exits. What does EXECUTE RESET do and how does it work? Is the code available?

We use products that change the terminal characteristics. It would be nice to have a general-purpose procedure or program that resets the terminal's characteristics as they were before the product was invoked (not some default state).

Phil Gravel
Naperville, Illinois

John F. McGlinchey, MIS manager: Leaving the EXECUTE RESET line in the command procedure was an oversight. I attempted to make the command procedure generic in content prior to publication. I've replaced the line with the appropriate DCL code on the file in the download section in ARIS. It causes a soft reset on a VT200 series terminal. The code is ESC[!p and can be found in any VT200 series terminal manual. The EXECUTE command was published in the June 1988 issue of VAX PROFESSIONAL. ■

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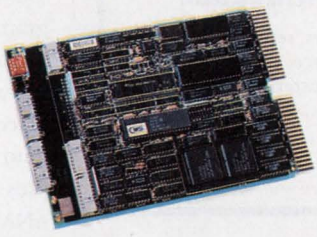

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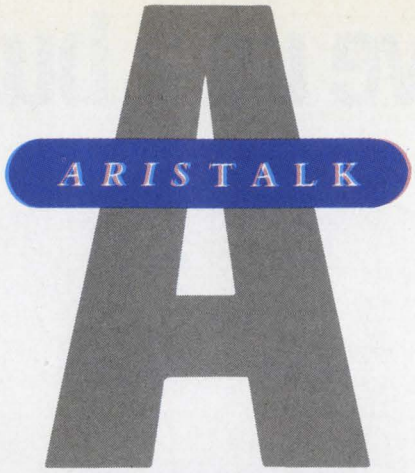

EXPERT SHELL FOR VAX

QUERY:

Peter Hayes *(SIG 45/MESS 284):* Does anyone know of a supplier of a VAX expert shell?

REPLIES:

Joe Disselkamp *(SIG 45/MESS 310):* I've been using a shell called LEVEL5 from Information Builders Inc., New York. We've trained over 60 people on it. It will use DECWINDOWS/workstations by first quarter 1989. It's a good package and support is good.

You might know it better by its old name, Insight 2+ (one of the first PC shells).

Terry C. Shannon *(SIG 45/MESS 326):* Insight 2+ (or whatever they're calling it) is indeed good stuff. It's one of the two PC-based expert system tools used at E.I. DuPont de Nemours Inc., which has several hundred PC-based applications up and running. The DECUS AI SIG is sponsoring a session on this product at the Fall Symposium in Anaheim this month.

RUMOR HAS IT

DR. R *(SIG 23/MESS 133):* Coming soon to a DEC site near you are the new MICROVAX 3300 and 3400 systems. Packaged in a bigger and better version of the much-vaunted BA213 skunk box, these little beauties will make ideal holiday gifts for the resource-constrained system managers on your shopping list.

U.S. TO U.K. COMMUNIQUÉ

QUERY:

Robert Hirsch *(SIG 27/MESS 206):* My New York company wants to communicate with our 11/780 to our MICROVAX in the United Kingdom. We are using a Trailblazer modem from Telebit of Mountain View, California, and the U.K. has a CASE 400/24+ modem. I'm having a problem with noise on the line and some modem settings. I connect approximately one in 20 times, but the noise on the line knocks me off. Our FAX has little trouble communicating with the U.K. FAX. I'm told our modems are compatible. Is there a way to get around the noisy line? Could the modem be the problem? If anyone is communicating with a site in the U.K., I'd love to hear about it.

REPLY:

Phil Anthony *(SIG 27/MESS 207):* Check to see if the modems are compatible. European standards for the same speeds aren't the same as U.S. standards; e.g., Bell 212A vs. CCITT V.22 both run at 1200 bps but use different protocols. Fortunately, most modems sold in the U.S. can use both standards, but check with the manufacturers to see if they switch automatically or whether you have to issue a command.

RECOVERING DELETED FILES

QUERY:

Frank Borelli *(SIG 101/MESS 375):* Is there any way to recover files that have been deleted erroneously? One of our users at a remote site, using a MICROVAX II, has deleted some critical files (no backup, of course). Is there a utility or VAX function that can be used to recover these files? Anxiously awaiting responses.

REPLY:

Robert G. Schaffrath *(SIG 101/MESS 376):* There's a program called RESTORE under the VAX87E saveset on the Fall 1987 DECUS symposium tape. The program is written in CORAL-66, but an executable is provided. To recover the files, no writing activity should have taken place after the delete, because the blocks tend to get reused. After you mark the files for recovery, the program calls ANALYZE/DISK/REPAIR to dump the files into [SYSLOST]. Mark the blocks in BITMAP.SYS as allocated. It's sort of kludgy, but it works.

Continued on page 22.

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.

California Alert: The ARIS lines in Southern California are up. The phone number is (818) 577-9100.

XMODEM is available.
KERMIT is available.

SIG Identification

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

11	Clustering/Networking
23	MICROVAX
27	Communications
45	Programming
101	Miscellaneous

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COMMANDS OVER DECNET

QUERY:

Jay Shah *(SIG 11/MESS 263):* How can I execute a command on another VAX over DECNET without setting host to it? If I'm logged in SYSA and want to queue a file to a printer on SYSB and give qualifiers such as PRINT/HEADER, I have to log in to SYSB. Any ideas?

REPLY:

Richard B. Gilbert *(SIG 11/MESS 267):* TELL.COM should allow you to execute a command over DECNET. It's available on CompuServe's VAX Forum, GO VAXSIG, Library 8.

Be warned that TELL.COM has some characteristics of a virus, although, as far as I know, it's benign. But it will propagate copies of itself to systems that don't have it.

DATATRIEVE DATE PROBLEM

QUERY:

Scott L. Cochran *(SIG 45/MESS 308):* We're using DATATRIEVE to generate several reports on data entered into a file from a FORTRAN program. We use SYS$GETTIM to load the current system time into the record. When finding a collection in DATATRIEVE, we can't use FIND XYZ WITH MYDATE EQ "6/29/88" because the system date is different for each record because of the resolution of the 64-bit word. My solution is FIND XYZ WITH MYDATE BT "6/29/88" AND "6/30/88". This works, but I can't use AT TOP OF MYDATE or AT BOTTOM OF MYDATE because each date is different.

Is there a way to mask the date field in DATATRIEVE so it only looks at the most significant part?

Is there a better way to load the date field so it has fewer significant digits?

REPLIES:

Steven P. Davis *(SIG 45/MESS 309):* The internal date format for VMS and DTR is a 64-bit integer representing the tenths of microseconds (sometimes referred to as KLUNKS) since the base date of November 17, 1858. When you invoke SYS$GETTIM, it returns the current system date/time as this value. Because the time of day is part of this value, it prevents DTR from making an exact date match.

The time of day needs to be stripped from the binary date/time prior to storage in a file. To do this:

1. Invoke SYS$GETTIM to get the current system date/time as a 64-bit integer.
2. Invoke SYS$ASCTIM to convert the binary time to an ASCII string.
3. Strip out the date from the returned ASCII string.
4. Invoke SYS$BINTIM to convert the date to the 64-bit binary value.

This leaves the 64-bit date with the time stripped off.

John Flynn *(SIG 45/MESS 312):* The goal seems to be to store today's date with the time part stripped off. However, what exactly does this mean?

Every VMS 64-bit date must be a completely specified date and time. The time part can't be stripped off. It can, however, be set to a standard constant value, such as midnight (which is 00:00:00.00). If all dates are stored as if they were midnight, DTR can compare and sort as desired.

The SYS$GETTIM for getting the current VMS time isn't needed. If you call SYS$ASCTIM and leave out the input date/time argument, you have the current date/time being used (at least this can be done from BASIC). That saves a step. Then, the time part can be stripped from the ASCII version of the date/time, and SYS$BINTIM can be used to convert back to VMS 64-bit format. However, if you just leave off the time part, I think BINTIM will replace it with the current time, which defeats the purpose. Strip off the current time from the result of the ASCTIM and replace it with 0:0:0.0, which should force BINTIM to use midnight.

With DATATRIEVE, if a date has been stored with a non-midnight time by an external program, you can mask off the time part so that you can compare. Define a COMPUTED BY field, either in the record definition itself or as a variable; i.e., if DATE is a USAGE DATE field, you can define a variable D as DEFINE D COMPUTED BY FORMAT DATE USING NN/DD/YY. That will convert the DATE field to a string using the NN/DD/YY edit string. You can use the D field in reports to say things like AT TOP OF D. This isn't good for sorting because D, as a string, will sort in ASCII, not chronologically. You still can use the DATE field for that.

There's even a way to define a COMPUTED BY field, which is the VMS 64-bit format version, that you then can use for sorting. You have to convert the USAGE DATE field to a string in DD-MMM-YYYY format, with the time part stripped off, append a 0:0:0.0 to it and use FN$DATE to convert the string back into VMS binary format in your COMPUTED BY field.

CANCELLING TT I/O REQUESTS

QUERY:

Bob Grohovsky *(SIG 45/MESS 311):* Here at CTS, we've been trying to develop a procedure that reads a TT serial port or timeout if no response is received after a timeout period of, say, 20 seconds. By using Request and Reply packets, we're able to request Reads directly to the TT driver ($TTADR). By using the RECEIVE_ANY procedure, we're able to timeout, but there seems to be no way of terminating the pending request at the TT driver level. Therefore, the next time a Read is requested, a Reply packet is sent almost immediately with nothing in it. Every Read request thereafter is wrong.

If you've worked with READing and WRITEing directly to the TT driver, please send us any hints on how to terminate pending requests.

REPLY:

Jerry C. Hudgins *(SIG 45/MESS 319):* It seems to me that the newest version of MPP (V2.4) includes a new request to cancel a previous TT I/O request. You might check into this. ■

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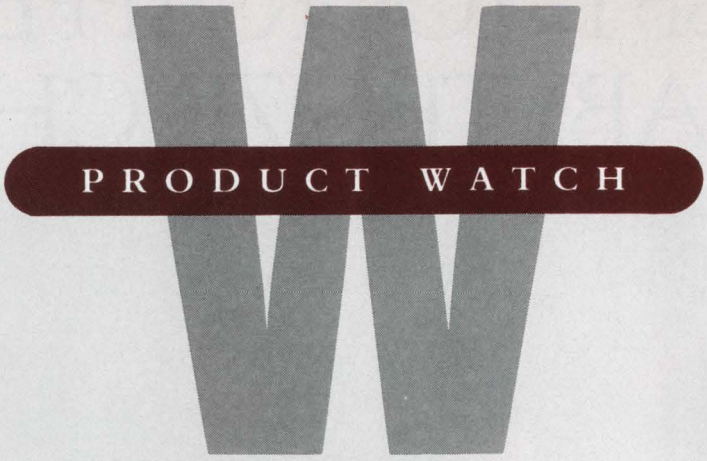

Neuron Data's Nexpert Object Simplifies Complexity Of AI

Nexpert Object Features Inference Engine, Graphical Interface And C Run-Time Library

One product that's helping to reshape the image of artificial intelligence as expensive, high-powered hardware running complex, hard-to-use LISP-based systems is Nexpert Object from Neuron Data of Palo Alto, California. Nexpert Object is a powerful object/rule-based expert system shell available for a number of hardware platforms including the VAX and VAXSTATION.

Nexpert Object features a powerful inference engine, an easy-to-use graphical interface and a robust AI run-time library written in C. "We are going from the short-lived era of knowledge engineering into that of knowledge design. This change is the result of new, cognitive AI primitives associated with most powerful graphic interfaces and a complete embeddability into the existing computing environment," says Alan Rappaport, president of Neuron Data.

"Nexpert Object encompasses these components and allows the actual holders of the knowledge, the experts, along with the existing resources of the firm, to design complex knowledge applications, changing the economics of AI in general."

Objects and rules can be added to the knowledge base as the designer creates the application, making Nexpert Object a flexible system to use.

Each object possesses an arbitrary number of properties and can comprise a number of subobjects. Like objects are grouped into classes. A powerful mechanism allows an object to inherit properties from one or more parents. It also can pass properties up to the classes of which they are members.

Objects can be created in a top-down fashion, starting with the definition of a class and working down through subclasses, objects and properties. A bottom-up technique that starts with the definition of a lower-level structure also is supported. Another design option permits starting by defining the system's rules, using various objects, properties and classes. Nexpert Object automatically compiles object structures with their respective properties.

Nexpert Object rules take the form of IF-THEN-DO and are the basic pieces of knowledge it processes. Rules act on objects and their properties to link facts and observations to actions and conclusions.

Nexpert Object's inference engine allows symmetric forward and backward chaining. Alternative hypotheses can be dynamically generated based on acquired knowledge.

A non-monotonic reasoning ability lets default assumptions be made if knowledge is incomplete. Reasoning can be modified based on sudden contradictions or interruptions or on the adjustment of a hypothesis that merits a change in reasoning. The developer can control the reasoning process to perform WHAT-IF analyses based on modifications made to the objects and rules under development.

A number of features allow the designer to tailor the application's processing strategy. A conflict control technique lets the designer establish processing control and priorities. The influx of new data also can be controlled. Handling uncertainty and incompleteness is left to the system designer; Nexpert Object doesn't force the use of predetermined methodologies.

Extracting knowledge from the experts who are developing the system is a major task of AI-based tools and is often the toughest problem to overcome. A poor interface to the system can slow knowledge acquisition. To resolve this, Nexpert Object gives domain experts direct access to the system, with no middlemen.

The transparent interface allows the developer to create a system based on his preferred method. Objects,

A new dimension in data storage

GIGA 1200: 1.2 to 8.4 Gigabyte (4mm) DAT Data storage tape subsystem

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rules, classes and properties can be modified interactively. As rules are developed, they can create new objects dynamically. Only a few rules and objects are required to form an initial nucleus of knowledge from which the remainder of the knowledge base is built. This allows the reasoning process to be built in the same way the expert thinks.

Nexpert Object's powerful graphical interface simplifies system development. Screen-driven Rule and Object editors use pop-up menus to reduce keystrokes and offer a highly formatted method of providing data to the system. The Rule Network depicts the relationships between concepts, rules and actions. The Object Network shows the relationships between classes, objects and subobjects.

Nexpert Object's open architecture permits integration into the VMS environment. Bruno Jouhier, research engineer at Neuron Data, says, "The point to remember is that Nexpert is shipped as a VMS shareable image library, which reduces link time and optimizes disk and memory use.

"The inference engine can be invoked from user-written programs in any language, using standard VMS calling conventions.

"For example, the reasoning module can be part of a large-scale application such as CAD/CAM. On the other hand, the inference engine can call external modules, for example, to read data from a serial port or to trigger some action when conclusions are drawn."

Nexpert Object can be used in conjunction with database packages. Direct interfaces are available for Rdb, ORACLE, INGRES and Sybase. Custom interfaces can be written for proprietary databases. Nexpert Object can define, query and update the database at run time. Multiple databases can be queried, using information from each to form a singular structure in Nexpert Object's knowledge base. Information can be extracted from one database and used to update another.

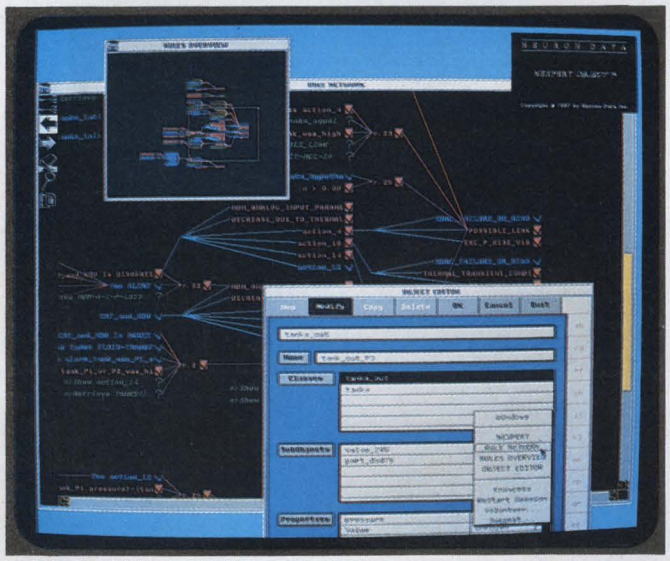
A database application can have Nexpert Object modules embedded in it and can call on them to do analysis or take action based on changes made in the database.

Development versions of Nexpert Object are available for VAX and VAXSTATIONs under VMS and ULTRIX for $8,000. The Runtime Library and Runtime Screen Builder are available for $1,500 each.

For more information, contact Neuron Data, 444 High Street, Palo Alto, CA 94301; (415) 321-4488.

Circle 559 on reader card

—David B. Miller



A knowledge expert can check the development of the expert system by viewing the Rule Network. An overall view of the network is displayed in the small top window. The bottom window illustrates how objects are created with Nexpert Object's Object Editor.

Getting In The Know With Rabbit-2 VMS Know-It-All

RAXCO's Package Keeps VAX System Managers Informed And In Control

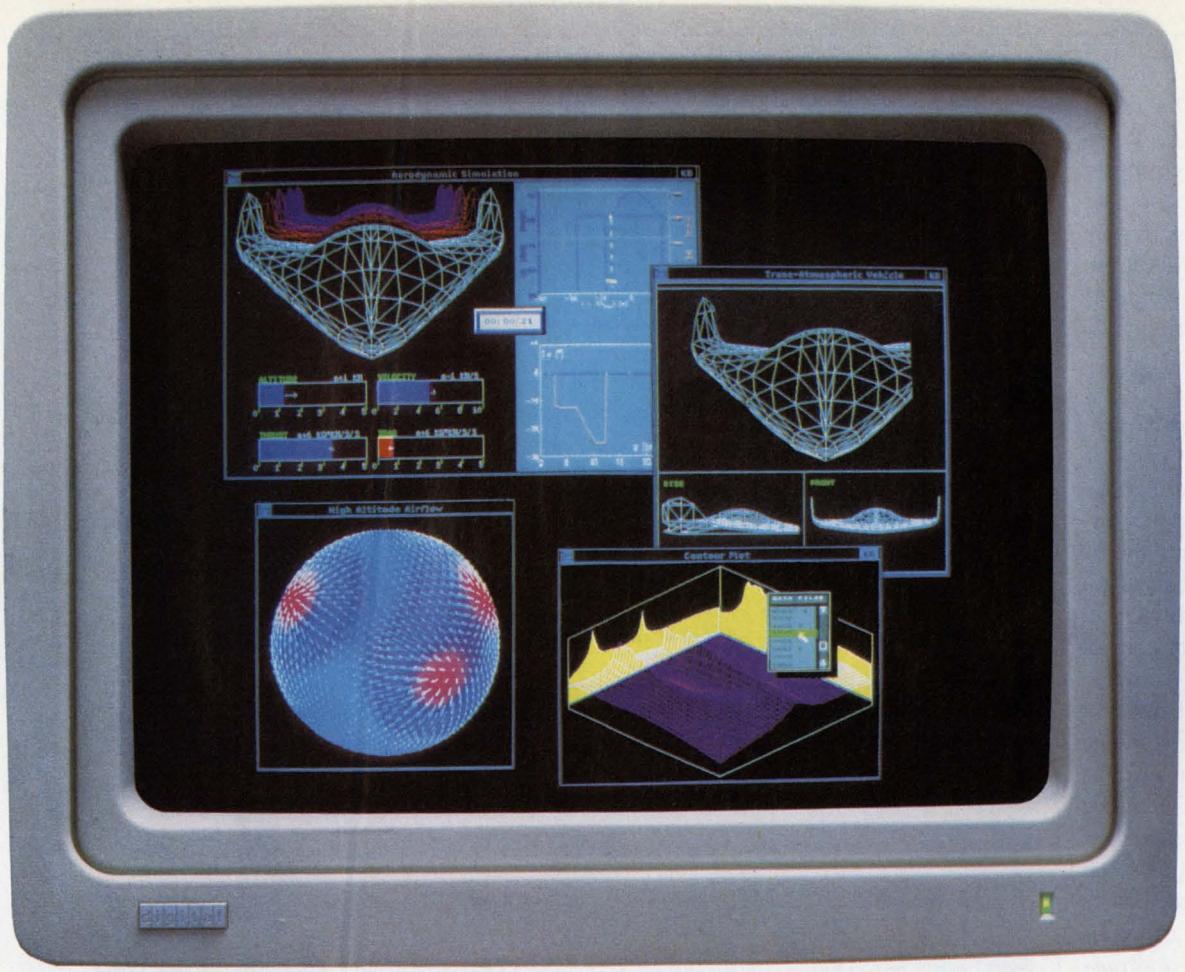
What do you know about your system? Is throughput acceptable? What about response time? Who's using the machine the most? Could any jobs hoarding CPU time be moved elsewhere? Would shifting a queue or two to another processor make any difference? Do you need more memory or CPU power?

When you need answers to these and other system performance questions, can you find them easily? If not, Rabbit-2 VMS Know-It-All from RAXCO Rabbit Software of Rockville, Maryland, can help.

Rabbit-2 keeps you informed about your system's performance because it:

1. Reveals the load on your system and points out bottlenecks.
2. Displays resources being used, what programs are running and for how long.
3. Produces project allocation reports to help you determine if resources should be added or reapportioned.
4. Provides before and after pictures of your system so you can determine the impact of changes you make.
5. Produces graphs to identify growth trends.
6. Allows you to create various system load scenarios to simulate WHAT-IF situations so you can make informed capacity planning and load balancing decisions.
7. Provides security and monitors user productivity by tracking log ins and the activity that takes place at each terminal.

Data for analysis is



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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West Germany
Phone: 49-69/6 66 65 97 Telex: 176 997 150
Fax: 49-69/6 66 67 38

Precision Visuals International Ltd.
United Kingdom
Phone: (0895) 35131 Telex: 51826715
Fax: (0895)72299

*Programmer's Hierarchical Interactive Graphics System

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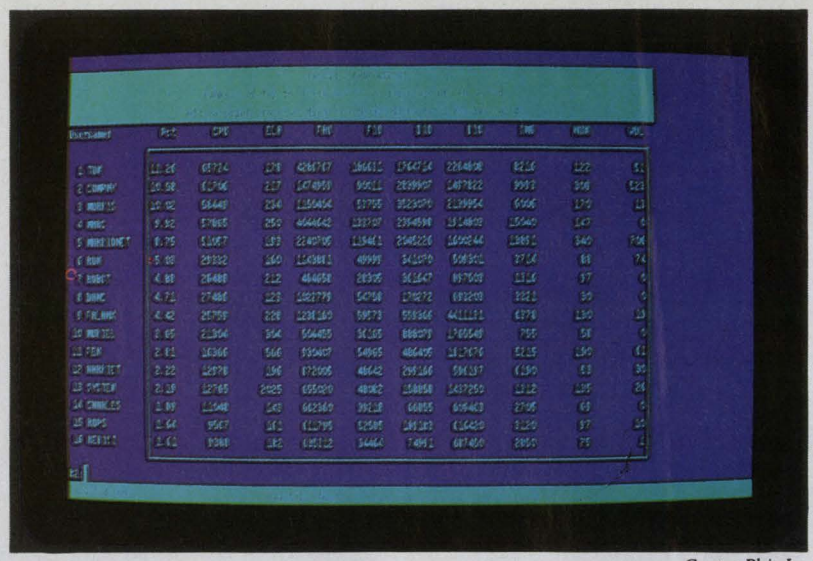
chosen in Rabbit-2's Input Phase. It includes VAX Process and Image Accounting data, VMS Monitor data and Rabbit-1 Chargeback System Accounting data. In addition, you can play back single or merged data files from previous Rabbit-2 runs.

Three foundation types of reports, Rank, Time Interval and Profile, can be generated in Rabbit-2's Report Phase. A comprehensive set of commands allows you to choose the statistics and entities on which you wish to report and to control the report format. You also can manipulate entities and create scenarios to investigate every facet of your system.

A number of features add to Rabbit-2's capabilities. For example, split-screen windows can provide before and after views of your system, as well as a simultaneous view of two different performance statistics.

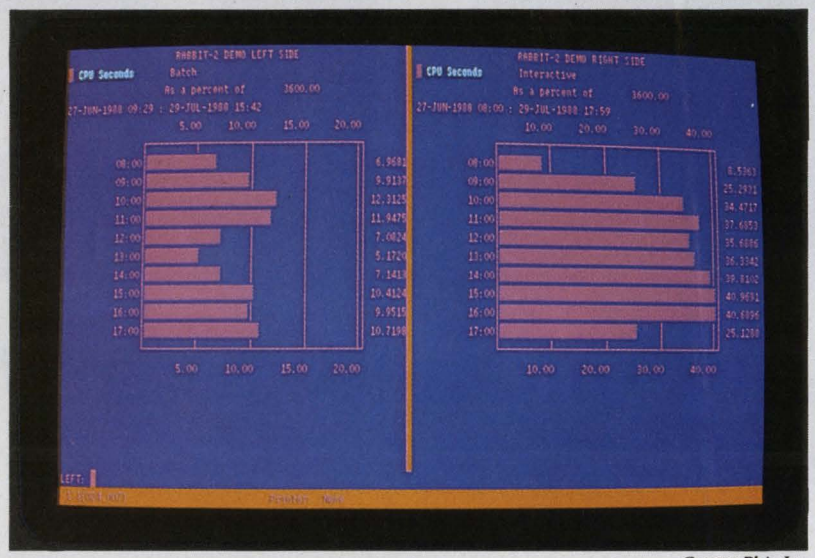
Pseudo or virtual entities can be created with Rabbit-2's Synthetic Entity feature. For example, if you want to investigate the effect on your system of adding a programmer, you can create a pseudo programmer using process information taken from other programmers on the system. Rabbit-2 treats this nonentity as real, creating reports as if the pseudo programmer were on the system. Thus, system managers can determine the impact of changes they plan to make.

Matt Tomsho, RAXCO's technical liaison, states, "Synthetic entities are an excellent capacity planning tool. You can see how adding additional users will affect performance long before they actually start."



Screen 1: In 132-column format, Rabbit-2's reports can provide extensive information on all facets of system performance.

Courtesy Blair, Inc.



Screen 2: Rabbit-2's split-screen feature lets you compare different views of the same statistic or look at different statistics.

Courtesy Blair, Inc.

Rabbit-2's Group feature lets you group and manipulate entities in any arrangement. For example, three users can be grouped together and moved to another system, so that management can gain a clear picture of system performance if such a change was made.

To make Rabbit-2 easier to use, report settings, such as column width, report type and entities to include, can be saved to a disk file with the KEEP command. These settings can be recalled later to generate subsequent reports.

Two entities, UIC and Priority, can be used with any Rabbit-2 option in a similar fashion to User, Account and other Rabbit-2 entities.

Data read in the Input Phase can be SAVEd and used in subsequent reporting runs. SAVEd files from previous runs can be merged into one file before playback.

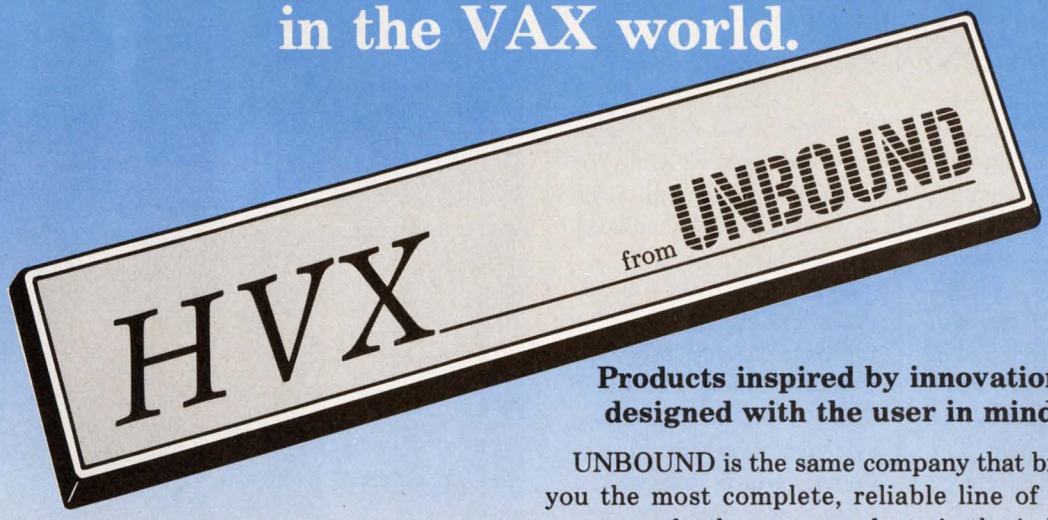
Rabbit-2 is available for all VAX systems. Its reports can be displayed on a variety of terminals; no special graphics capability is needed. Prices range from $499 to $4,995, depending on configuration.

For more information, contact RAXCO Rabbit Software, 2440 Research Blvd., Ste. 200, Rockville, MD 20850; (301) 258-2620.

Circle 551 on reader card

—David B. Miller

On October 18, 1988 Unbound Inc. will premier a revolutionary new product that will change the perception of supercomputing in the VAX world.



Products inspired by innovation, designed with the user in mind.

UNBOUND is the same company that brought you the most complete, reliable line of Q-bus system and subsystem products in the industry.

The desktop QUBE family of MicroVAX and PDP-11 compatible computers have the dual distinction of offering high capacity and performance in a compact, low cost transportable package. Our QUBE systems are sold worldwide, from accountants in West Germany, to medical OEM's in the U.S., to research scientists in Japan.

UNBOUND's Versa-QUBE family of peripheral subsystems give you assured availability with a full range of 5.25 and 8 inch products. These ESDI, SCSI and SMD based disk and tape subsystems feature free installation and extended one year onsite warranty by Control Data Corporation.

Come see UNBOUND's full line of DEC-compatible products and the introduction of our new HVX family of minisupercomputers at DEXPO West 88. If you are unable to attend, please call us toll-free at 1-800-862-6863 (1-714-895-6205 in Ca.), or fill in the attached coupon for a DEXPO preview package.

Introducing the HVX family of VAX compatible minisupercomputers.

Now DEC VAX users can have supercomputer class processing power without migrating to a radically different computing environment. UNBOUND's new HVX family of minisupercomputers integrate directly into the VAX hardware and software architecture, with high speed shared memory and parallel processing that works in unison with DEC's VMS operating systems.

In fact, HVX minisupercomputers are so compatible and transparent, you'll think you're running on the fastest VAX anywhere. And because the HVX expands your VAX's processing capacity, your current investment in software, peripherals and training is protected from obsolescence.

The HVX's unique triple bus architecture and multiple cluster design assures increasing cumulative processing power and a well defined, incremental growth path for the future. In addition innovative share memory system provides optimal interprocessor communications and program transfers to and from the VAX.

With unequalled compatibility and supercomputer class performance, UNBOUND's HVX minisupercomputers set a new standard for ease of use and affordability.

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Software Written In DBL And BASIC PLUS Runs On UNIX Supermicro

Prime Computer Migrates PDP-11 Applications To UNIX Environment

Citing approximately 6,000 potential applications in the PDP-11 operating environment, Prime Computer Inc. of Natick, Massachusetts, has created a migration program that will move software developed in the DBL and BASIC PLUS programming languages into the UNIX environment. The revised software is optimized to run on Prime's EXL series, a 32-bit, 386-based supermicro that can run MS-DOS or Pick under UNIX.

Further, Prime has entered into joint marketing agreements with Digital Information Systems Corporation (DISC) of Rancho Cordova, California, and Datavision (U.K.) Ltd. of Blackpool, England, the creators of DBL and BASIC PLUS respectively.

Under the agreements, Prime will market the migrated software running under UNIX V.3 on the EXL. Prime will be responsible for the hardware and the operating system, while the two software companies will support the software systems. Prime anticipates savings from conversion from PDP-11s to EXLs through maintenance costs.

DBL, a superset of DIBOL, will run all DIBOL software. DBL is a high-level business programming language portable across a wide range of operating systems and hardware.

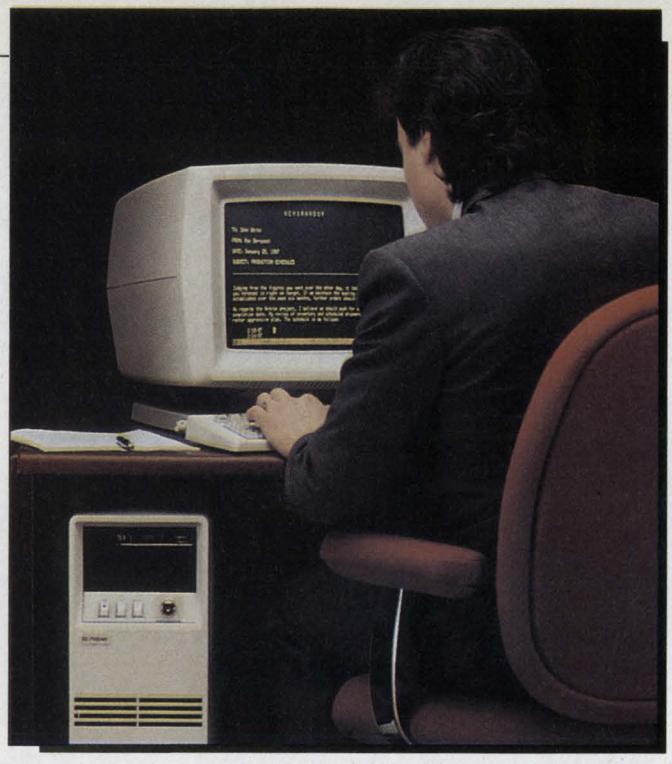
DBL Synergy, also available for the EXL in the agreement, is an application development tool from DISC for DBL developers.

The emulation of BASIC PLUS on the EXL, called Universe BASIC, allows users to translate BASIC PLUS code into C. It consists of two systems: Universe Interpreter, which provides a BASIC user interface; and Universe Compiler, which lets users convert completed software applications into true native code on the EXL.

"Hundreds of companies relying on BASIC PLUS applications have been limited for the past 18 years to outdated hardware technology," says Brian Ritchie, director of Prime's entry-level systems group. "To upgrade, they would have had to scrap their applications and sacrifice the substantial development investments. In addition, they also would have lost the trouble-free aspects of using those applications which have proved to be bug-free."

The end user is responsible for completing the conversions, but Prime and its VARs are available for assistance. Prime can look at a prospect's PDP-11 BASIC PLUS code tape, for example, and determine the amount of code conversion required.

Certain FIP calls, SYS functions and MODE options can't be emulated in the UNIX environment.



EXL supermicro runs DOS and UNIX concurrently.

The migrations are the result of examining the original software code and comparing system calls under PDP-11 operating systems (such as RSTS) to system calls under UNIX.

The software programs will be serviced by DISC and Datavision. For service of the hardware systems, customers can deal with the retail VAR or directly with Prime. Or, they can service it themselves.

Computers in the EXL series, which implements the Multibus II architecture, have been measured from 3.2 to 5 mips. Compared with the 1 mips PDP-11, this is a major transposition. The EXL is particularly strong in commercial markets.

The high-end EXL 325 is a multiuser, multitasking computer with a 387 coprocessor that operates at 25 MHz. Compliant with the System V Interface Definition, the EXL comes with 16 MB RAM, 64 KB of cache memory, and 1 GB of disk storage.

Merge 386 is the proprietary program that allows an EXL (with at least 4 MB of memory) to run UNIX and MS-DOS concurrently. Users can access any DOS or UNIX program from the UNIX dollar prompt.

For more information, contact Prime Computer Inc., Prime Park, Natick, MA 01760; (617) 626-1700.
Circle 498 on reader card

Digital Information Systems Corporation, 11070 White Rock Rd., Ste. 210, Rancho Cordova, CA 95670; (916) 635-7300.
Circle 501 on reader card

Datavision (U.K.) Ltd., 121 Talbot Rd., Blackpool, FY1 3TA England; (0253) 21444.
Circle 574 on reader card

—Evan Birkhead

Fun With WORD-11

Jane said, "See WORD-11. It is new. It has lots of features. It is the most complete word processing package available for VAX/VMS."

"Oh, oh," said Dick. "It is easy. It uses the fewest keystrokes. It has a color coded keyboard. It has optional menus. It is perfect."

"It is better than perfect." said Jane.

WORD-11, from Data Processing Design, makes child's play out of even the most complex documents. For the novice or expert, WORD-11 is the highest level in VAX/VMS word processing.

In addition to the features listed above, WORD-11 includes multiple font support, automatic spelling correction, Thesaurus, automatic hyphenation, multiple wrapped columns, automatic box draw, on-line help, list processing, and a fully integrated graphics option. Plus, WORD-11 offers high performance with low CPU overhead.

Now WORD-11 is available on IBM PC's and compatibles with identical document format as the VAX version.

For more information on WORD-11 or a demonstration kit call or write.

Data Processing Design, Inc.
1400 N. Brasher St., Anaheim, CA 92807

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Inside California call 714-970-1515
Inside Canada call 416-225-7788
FAX: 714-779-7468

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CIRCLE 236 ON READER CARD

Tektronix Offers High-Performance Networked Graphics Terminal

Device Features Direct LAN Access

There was a time when you could distinguish a workstation from a terminal and a mainframe from a supercomputer. As technology advances, however, these distinctions become blurred, and users begin to expect more power and functionality from smaller, more cost-effective electronic devices.

Tektronix Inc. of Wilsonville, Oregon, trampled yet another barrier when it introduced the 4211 Graphics Netstation. The terminal allows users to share information directly with workstations and mainframes on a local area network (LAN).

The 4211 is capable of connecting with an RS-232C, a high-speed TCP/IP-based Ethernet LAN and a multiple-session coax connection that allows up to five IBM 3270 sessions and one ASCII host session simultaneously.

It's five times faster than its predecessor, the 4111, and features a redraw rate of 40,000 transformed and clipped 2-D vectors per second. It's compatible with more than 100,000 software applications written for the 4111 and 4200 series terminals.

As Jack Morehouse, general manager of Tektronix's Graphics Terminals Division, said at a press briefing at SIGGRAPH in Atlanta, "The 4211 provides a natural growth path between the 4200 series and Tek's high-end graphics workstations. It gives the sophisticated graphics user the connectivity and performance of a workstation with the cost-effectiveness and simplicity of a terminal."

A fast redraw capability and high-resolution images come from a new, dedicated graphics engine based on Texas Instruments' 34010 and three Tek-designed custom gate arrays. I/O and data management tasks are powered by the new 32-bit 386SX microprocessor from Intel Corporation.

"With its 32-bit design and 16-bit external data bus, the 386SX microprocessor provides 32-bit processing power at a cost typically associated with 16-bit systems," explained Claude Leglise, marketing manager for Intel's Santa Clara, California, Microcomputer Division. "It's an excellent choice for systems requiring the performance of workstations in a price range closer to that of terminals."

The 4211 is well-suited for the presentation graphics, engineering and mapping markets. It runs software applications from Tek's PLOT 10 family, as well as many third-party software packages.

For hardcopy output, the 4211 supports Tek's high-resolution ink-jet and thermal wax printers, Hewlett-Packard's LaserJet and ThinkJet, Epson printers and other output devices.

The 4211 comes with a 15-inch display with 1024 x 768 resolution, 16 colors from a palette of 4,096, four dedicated dialogue planes, three RS-232C ports, a high-speed Centronics port, VT200-style keyboard and .75 MB of RAM.

As options, you can upgrade to a 19-inch display, 256 of 16.7 million colors, Ethernet LAN with TCP/IP, a coax connection with IBM-compatible keyboard, 2 MB of additional RAM, a mouse and thumbwheels.

Priced at $6,495, the 4211 will be available for volume shipments next month.

According to Morehouse, the company plans to offer windowing capability by next year and fiber optic FDDI by 1990.

For further information, contact Tektronix Inc., Wilsonville Industrial Park, P.O. Box 1000, Wilsonville, OR 97070; (800) 225-5434; (503) 685-3041.

Circle 493 on reader card

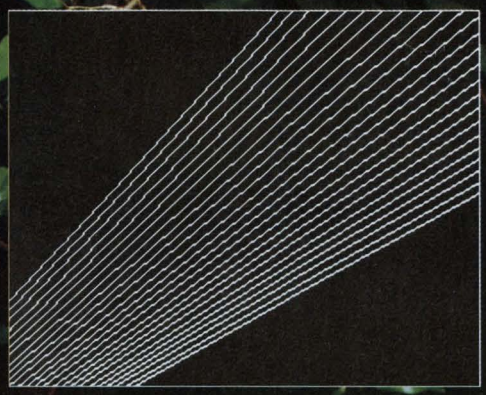
Intel Corporation, 3065 Bowers Ave., Santa Clara, CA 95051; (408) 765-8080.

Circle 495 on reader card

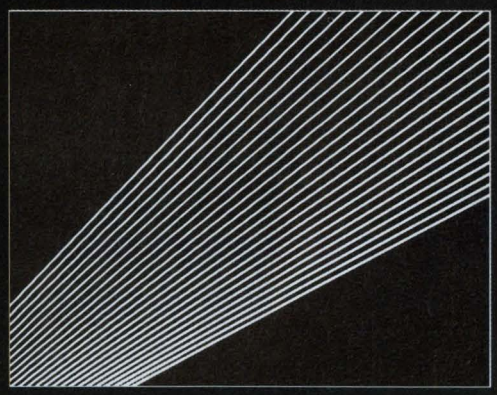
—Karen Detwiler

The 4211 Graphics Netstation offers connection with workstations and mainframes on a LAN.

Codonics brings you the first affordable graphics terminal without the jaggies



The competition's 1024 x 780 pixel display



Codonics' true-line™ display

The Codonics 4096. Finally, a graphics terminal with Tektronix 4010/4014 emulation, DEC VT320/220/100 alphanumerics and no jaggies.

A few features:

- 16,000 x 12,000 effective resolution, utilizing Codonics' true-line™ beam geometry hardware
- True 4096 x 4096 sub-pixel addressability
- DEC VT320/220/100 emulation with high definition fonts
- Flawless Tektronix 4010/4014 emulation
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Chemical Process Simulator Estimates Performance

Aspen Plus Tests Plant Design

The chemical industry is becoming a mainstream applications area for Digital Equipment Corporation. DEC has placed itself firmly in the fray by virtue of its Cooperative Marketing Program (CMP). One of DEC's CMP participants is Aspen Technology of Cambridge, Massachusetts, designer and manufacturer of the Aspen Plus chemical process simulator.

Aspen Plus primarily is used as a tool for the chemical engineer to simulate chemical plants and processes before the plants are built. This way, feasibility of the initial design can be tested, kinks worked out and costs estimated or justified. Process simulation and economic analysis can be generated in the same run.

By setting up a series of case studies, Aspen Plus can determine detailed heat and material balances, design trade-offs and evaluate subprocesses and operations. The program also can be used to improve and remodel plants by simulating such complex tasks as replacing reactors. Existing plants can use Aspen Plus to reduce operating costs, become more energy efficient or increase production.

Each case is understood by the program to be an iteration, part of a greater design whole. Cases eventually interface with other aspects of the design process, and Aspen Plus is structured to accommodate these relationships.

The program is available for the VAX and VAXSTATION line, IBM PCs and compatibles and various UNIX workstations.

Aspen Plus is used in a wide range of applications in the petroleum, cosmetics, pulp and paper, and food industries. It understands the properties of solids and electrolytes in addition to liquids and vapors.

The program also understands the constraints of thermodynamics and the qualities of each chemical, and with this knowledge sets up the simulation. If the model you're developing is within these predefined rules, the system lets you continue. If not, it notifies you of this when the model is entered.

Plant operation models are set up to approximate models stored in the Aspen Plus library. Each model can be configured by adding a wide range of variables, such as operating and equipment specifications or physical property peculiarities.

The system also accepts WHAT-IF statements to help determine the effect of variables, e.g., the effect of summer and winter temperatures on the plant.

Finally, the system generates a report of performance for the hypothetical plant, detailing chemicals used, the process flow, properties of internal streams and performance of individual subprocesses. The final model is actually a mathematical model of a process flowsheet.

ModelManager, which runs interactively on PC compatibles and VAX workstations, is a new software tool for Aspen Plus that allows the user to enter English language commands and models, rather than use the involved Aspen Plus input language.

In general terms, ModelManager makes it easier to generate Aspen Plus models, particularly for the first-time user. ModelManager acts as a front and back end to Aspen Plus, preparing the input language and sending it to Aspen Plus to execute the simulation.

ModelManager also consists of an expert system that guides the engineer step by step through the design phases. In addition to checking and notifying for completeness, ModelManager finds inconsistent specifications.

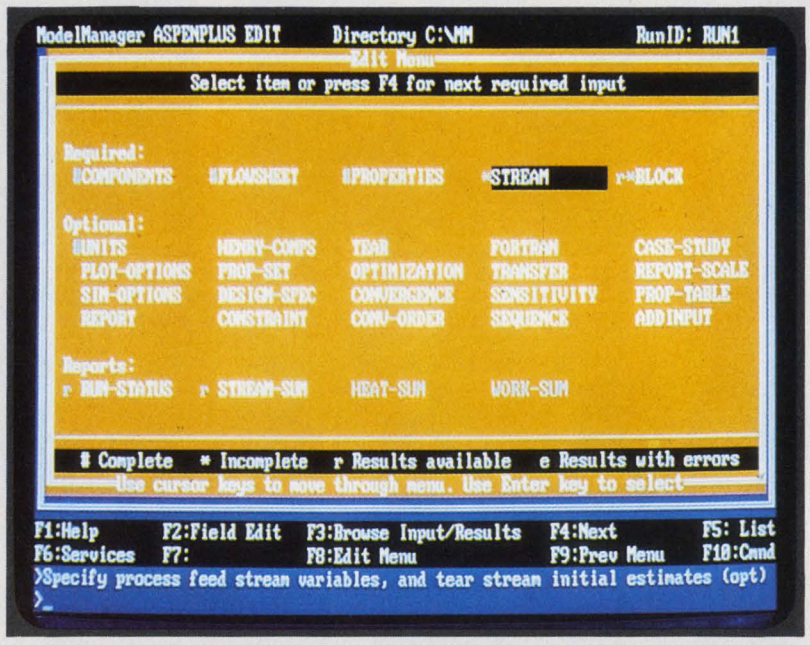
Five pieces of information are required (see Screen). Each requirement is completed with data from the library. When the last form is complete, the engineer can submit a run and generate reports.

Aspen Plus is expected to start shipping on 386-based machines this fall.

For more information, contact Aspen Technology Inc., 251 Vassar St., Cambridge, MA 02139; (617) 497-9010.

Circle 499 on reader card

—Evan Birkhead



Screen: ModelManager's expert system prompts the user to complete five required forms.

SAMTRON

SAMSUNG'S AMERICAN ORIGINALS

After years of building high-quality monitors and terminals for American users, Samsung has taken the next logical step. We've developed an American product line. Samtron.

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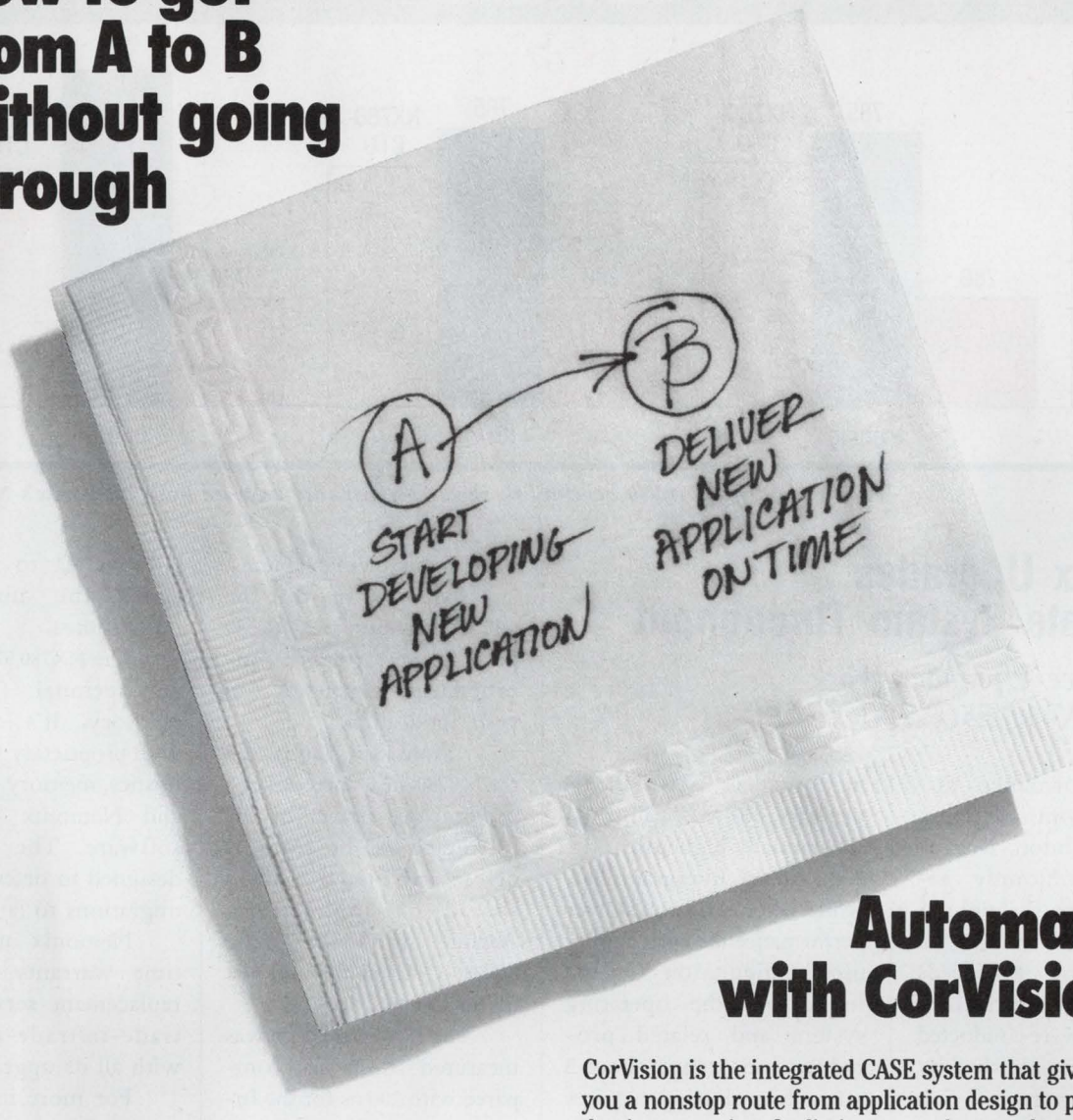

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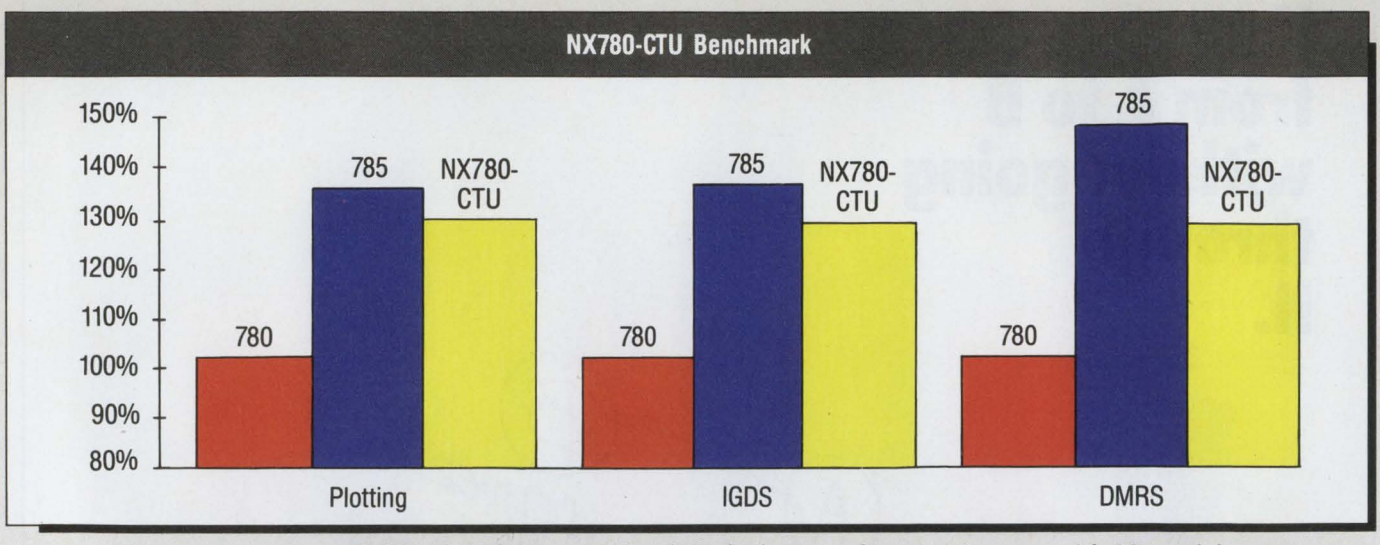

Courtesy of Axiom Software

Axiom data from 11/780 benchmark shows performance increase with Nemonix's NX780-CTU.

Nemonix Upgrades Accelerate System Throughput

Performance Upgrades Work With VAX 11/750, 780

CPU performance upgrades from Nemonix Inc. of Hopkinton, Massachusetts, significantly accelerate system throughput for the VAX 11/750 and 11/780. Tests measuring CPU speeds for CAD/CAM-optimized VAX systems were conducted and the results published by Axiom Software of San Francisco.

Tested were Nemonix's Special Performance Upgrade (SPU-3) for the Intergraph VAX-11/751 and the Cache and Translation Buffer Upgrade plus Acceleration Board (NX780-CTU) for the Intergraph VAX-11/780. Intergraph Corporation of Huntsville, Alabama, is a reseller and OEM for VAX-based CAD systems. Axiom offers software for Intergraph users.

The SPU-3 is a set of four processor boards that increases main system memory to 15 MB. This is substantially higher than the 8 MB on the Intergraph 751, which often results in slower performance for even a four-user configuration. On the Intergraph, the operating system and related procedures can occupy about 2 MB, while plotting requires another 1 MB. Some software packages consume up to 3 MB.

The four boards include an NX0008 Synchronized Clock Accelerator (SCA) to push system throughput performance, 12 MB of memory and a memory controller. Upwardly compatible with existing VAX hardware, the SPU-3 replaces the boards DEC furnishes with the 750. The accelerator board has an on/off switch to help diagnose and isolate the sources of system problems.

Axiom claims that the SPU-3 provides a 20 to 30 percent performance improvement, depending on your application.

Axiom also claims that the NX780-CTU increases the performance power of the Intergraph 780 by 25 to 30 percent (see Figure 1). For a spread of applications, Axiom found that "the NX780-CTU comes in just under the 785."

The CPU cycle time was measured at 170 ns, compared with 200 ns for the Intergraph 780. This indicates an increase in both data throughput and response times.

Like the SPU-3, the NX780-CTU consists of four processor boards that are exchanged with the existing boards. This quadruples the size of the cache memory and translation buffer, increased from 8 to 32 KB. In addition to accelerating throughput, this reduces the system memory demand.

The buffer holds 512 word locations, allowing the NX780-CTU to store four times the number of translations.

The NX780 SPU includes an optional 16 MB of memory. It's configured with proprietary micro diagnostics, memory diagnostics and Nemonix benchmark software. The system is designed to deter expensive migrations to larger VAXs.

Nemonix offers a lifetime warranty, overnight replacement service and a trade-in/trade-up policy with all its upgrade boards.

For more information, contact Nemonix Inc., 106 South St., Hopkinton, MA 01748; (800) 435-8650; in MA, (617) 435-9087.
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Axiom Software, P.O. Box 210655, San Francisco, CA 94118; (415) 751-8304.
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Keeping Everything In CONTEXT

LatiCorp's Text Retrieval System Helps You Find Documents Easily

Anyone who has searched for that one special document, knowing only its general subject or a phrase or two it contained, will appreciate CONTEXT from LatiCorp Inc. of San Francisco, California.

CONTEXT is billed as a "knowledge access system" that allows you to build collections of documents and perform searches and retrievals based on search criteria you establish. Target markets include publishing, software development, word processing management, the legal and medical fields, and scientific research.

The basic pool of information searched is called a collection. Files stored in a collection fall in a variety of formats, including ASCII, C source code and OCR scanner input. The C source code filter lets you search for program text, strings and comments. Files in formats not supported by CONTEXT are used if an ASCII file is created before adding the file to the collection.

A collection holds approximately two billion documents of 16 million characters each, and spans physical devices. Up to three collections can be searched at once, although there's no limit to the number of collections you can create.

Collections are indexed to create index entries for every word. Indexing is done manually or automatically at times you specify. After collections are created and indexed, you're ready to search for documents contained in them.

A search involves choosing a thesaurus, a word proximity factor and the collection to examine. Standard, Legal and Plurals thesauruses are provided. The proximity factor determines how close two search items must be to each other, expressed in number of words, for CONTEXT to include a document in the list of successful search candidates.

Two types of searching, Content Search and Profile Search, can be used separately or in conjunction with each other.

Content Search looks at each collected document's "body." Search items consist of single words, word roots, literal terms and phrases. Wildcard support lets you find patterns such as "a?b", which finds all three-letter words beginning with "a" and ending with "b". The asterisk (*) wildcard takes the place of many characters and is useful for searches such as "inter*", which finds all words containing the prefix "inter".

A proximity search locates documents having two search items placed within a certain number of words apart. Wildcards also are supported here. For example, the search item [comput* software] retrieves documents containing phrases like "computer aided design software" as well as "software for statistical computations".

A Profile Search lets you search for documents containing specified information in their "document profile," which consists of a title, author, subject and date.

All search information is entered into a Search Profile. Each Search Profile can be assigned a number and used for future searches by referencing the search number. This allows you to combine searches.

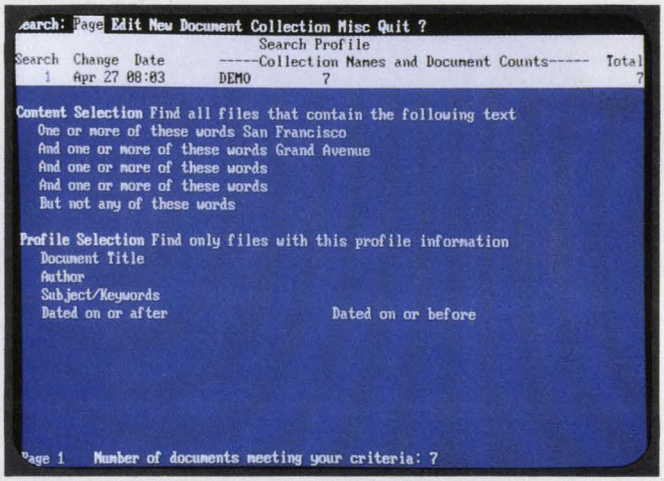
Detailed listings of the documents contained in each search are available. Documents found by a particular search can be retrieved, opened, examined and printed.

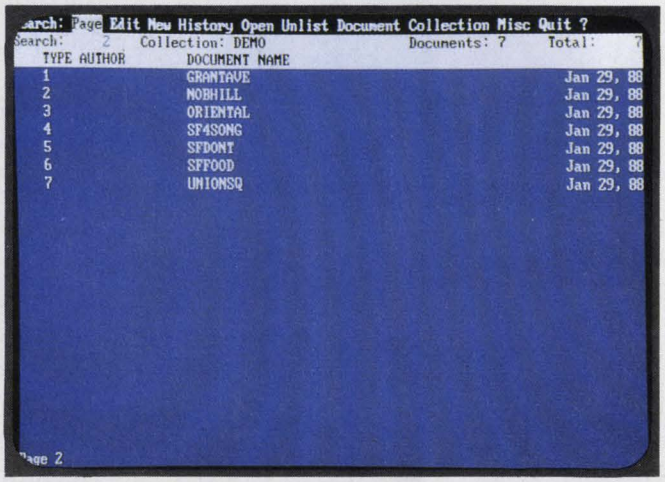
CONTEXT is available for VAX and MICROVAX systems running ULTRIX 2.0 or 4.2BSD. It's also available in PC DOS and XENIX V/286 versions. Prices range from $495 for the PC version to $1,495 for the VAXSTATION 2000 and $71,995 for the VAX 8800.

For more information, contact LatiCorp Inc., 185 Berry St., San Francisco, CA 94107; (415) 543-1199.

Circle 496 on reader card

—David B. Miller





With the CONTEXT knowledge access system, search information is entered into a Search Profile (Top Screen). The program then generates a list of all documents that meet your search criteria (Bottom Screen).

EIGHT QUESTIONS THAT MOST 8MM BACKUP SUPPLIERS HOPE YOU WON'T ASK.

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New Twists *For The RDBMS*

With SQL ACCESS to RDBMSs, 4GLs and other applications are more effective. BY EVAN BIRKHEAD

"IF USERS THOUGHT [DEC's] Rdb was a good VAX database, there'd have been no reason for anyone to make another one."

The person who said that watched me write it down, then asked for anonymity. But several people, experts in relational database management systems (RDBMSs), said fundamentally the same thing. A giant, wildly competitive VAX RDBMS industry has sprouted, and it appears to be growing like a weed.

Meanwhile, the database has evolved into the centerpiece of virtually all large-scale applications and many smaller ones. It has earned a special role as the fulcrum of computer transactions on Wall Street, in government and universities, aerospace and engineering, in fact everywhere. Steadily, vendors of applications software packages are realizing that accessing and manipulating information in databases is essential.

This is evident from the number of systems claiming compatibility or integration or read/write capabilities with the major databases. Contributing to the trend and establishing a new area of technology are vendors of fourth-generation languages (4GLs).

The beginnings of this trend involved standalone applications for Lotus 1-2-3 and others. But the trend is now developing out of necessity in the networked, multivendor world. Databases must exchange data with competing databases, and 4GLs must integrate with popular RDBMSs.

Partnerships

Underscoring the burgeoning 4GL/database relationships are various industry partnerships. Among these is a marketing and development agreement between Cognos Inc., maker of the PowerHouse 4GL, and Interbase Software Corporation, maker of the InterBase RDBMS (see "InterBase," August 1987). Ashton-Tate also is involved. The companies are co-marketing their software products as mutually beneficial solutions in all types of application development houses.

InterBase itself is compatible with several third-party databases because it adheres to DEC's Digital Standard Relational Interface (DSRI) used in DATATRIEVE and VAX SQL. InterBase talks to Rdb and RMS, and has been extended to DATATRIEVE, Powerhouse and SMARTSTAR from Signal Technology (see p. 50). InterBase lets you perform simultaneous updates to databases on multivendor CPUs and operating systems in a network.

A Pivotal Role

At present, the closest thing to an industry-standard language for accessing relational databases is SQL. In most applications, it's the keystone for creating, updating and retrieving data from RDBMS files. But as Don DePalma, director of technical communications at Interbase, points out, "If you say SQL should be a standard, you're missing the point about what standards should be."

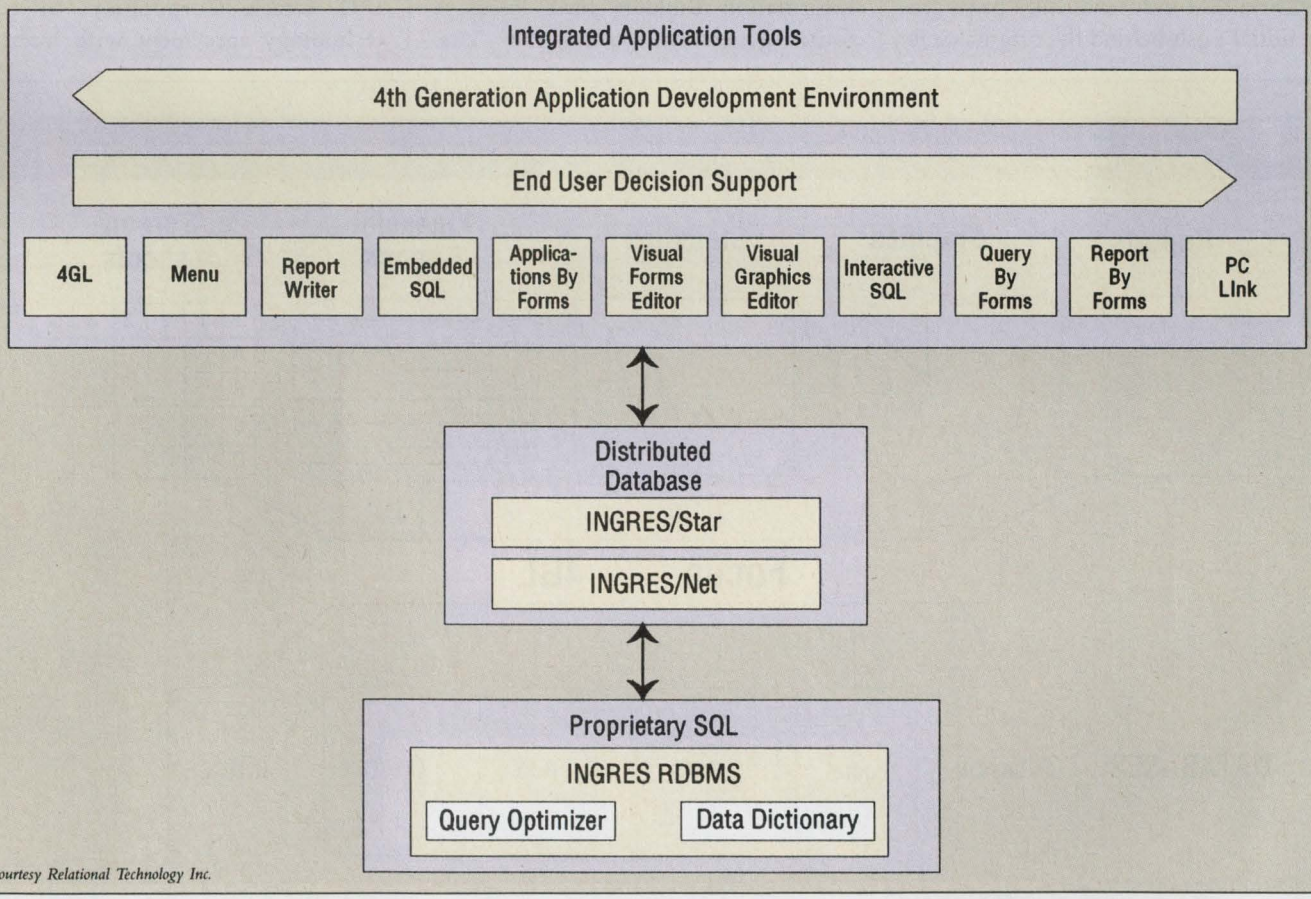
SQL, which has been assigned a standard syntax by ANSI, is emerging on several hardware platforms, and has earned recognition for its portability. Indeed, SQL is central to integrating a wide variety of applications with several leading databases. Databases with SQL can run an application package on one vendor's CPU and simultaneously access data from another.

Besides being independent of the operating system, SQL uses the same protocols to access local and remote databases. Although it provides a standard syntax of language, SQL doesn't provide a standard interface. No two dialects of SQL are the same, so applications are never completely portable between SQL environments. Each vendor adds its own proprietary extension to make SQL run in its environment. Sybase, which is based on SQL, has emerged as a contender almost entirely because of its close association with SQL.

SQL and a forms system are provided with virtually all major relational databases, so I/O formatting shouldn't be a problem. In the application/database relationship, the application is the client and the database is the server. In a network or cluster, a node running an application accesses the database by sending an SQL query to the database node (see Figure 1).

According to Scott Kitayama, UNIX product manager at Relational

Figure 1.



Courtesy Relational Technology Inc.

The INGRES networked RDBMS includes extensions to SQL for access from application development environments.

SQL, WHICH HAS BEEN assigned a standard syntax by ANSI, is emerging on several hardware platforms, and has earned recognition for its portability.

Technology Inc., which produces the INGRES RDBMS, SQL also could be the best solution for the integration of data between ULTRIX and VMS. Kitayama predicts that the SQL of the future will be able to access non-relational databases, indexed files, distributed databases and abstract data types, in addition to relational databases. This suggests that SQL, still an underdeveloped technology, could become the standard way to access data stored anywhere in any manner.

SQL has become pervasive in the DEC and IBM industries. IBM provided the initial push behind the original SQL implementations, and SQL is currently the access protocol for SAA and OS/2. Lotus, INGRES and ORACLE all use SQL in some form. Ashton-Tate and Sybase databases, among others, are SQL servers. SMARTSTAR V5.0 also implements an SQL generator. This 4GL interfaces with Britton Lee's database machine (see "Data Sharing In A VMS/UNIX Environment," July 1988), and plans are under way to integrate with ORACLE.

Mainstream Strategies

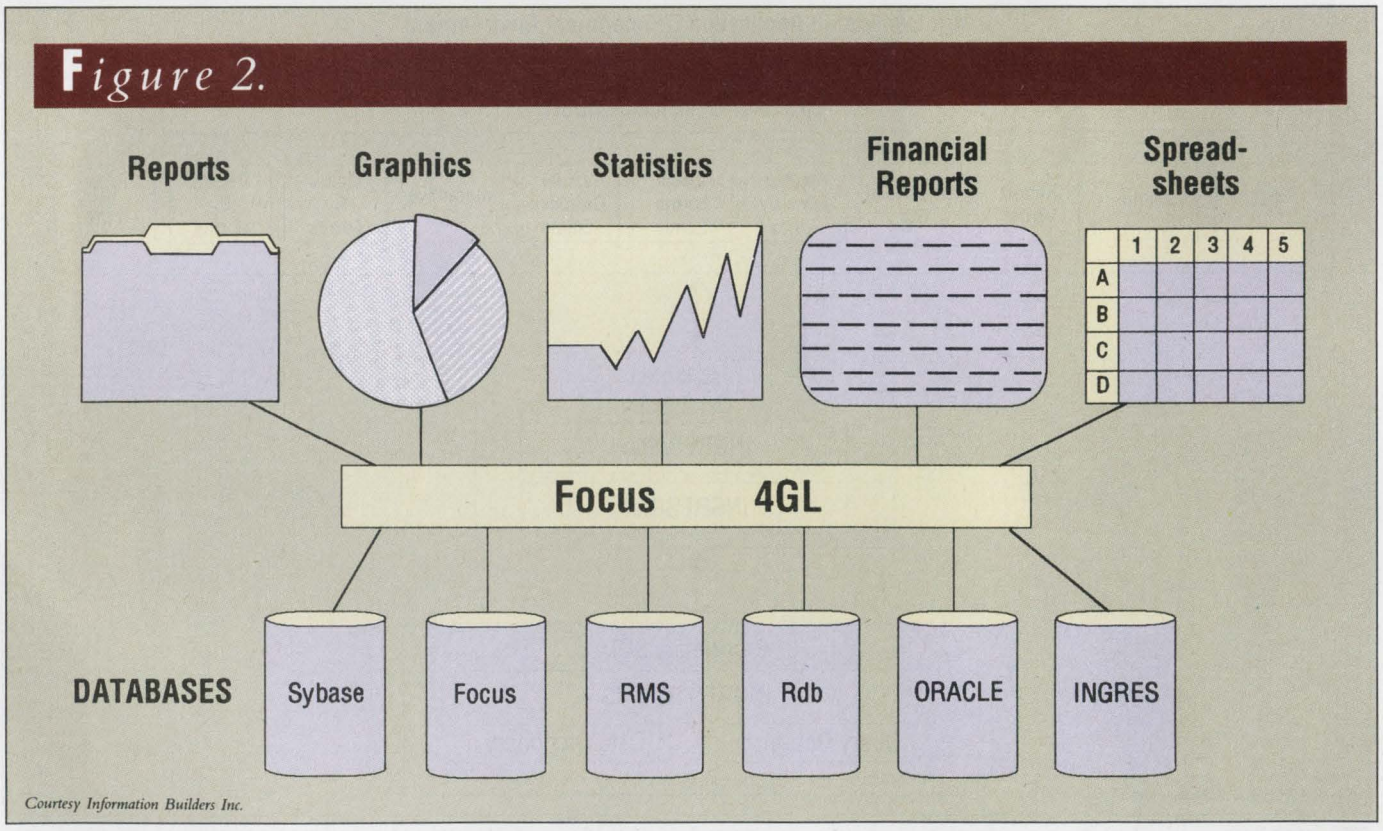
Information Builders Inc.'s Focus, a fourth-generation package for PCs, UNIX and VMS, is perhaps the industry's foremost example of an application development environment that runs with various off-the-shelf relational databases.

Although Focus is furnished with its own DBMS (and a spreadsheet and project management package), Information Builders has established either read or read/write capabilities with dBase III, ORACLE, INGRES, Sybase and DEC's Rdb (see Figure 2). Others are expected to be announced as part of this ongoing strategy.

Focus for SQL accesses IBM's two SQL-based RDBMSs, DB2 and SQL, and has tried to make the differences in SQL dialects transparent to the user. Thus, applications can be written in one environment, such as VM/CMS, and delivered in another (e.g., MVS).

Cincom Systems Inc. is among a handful of 4GL/RDBMS manufacturers that provide links to VAX databases and DB2. Oracle Corporation, in a co-technology agreement with Interlink,

Figure 2.



The Focus 4GL accesses a variety of RDBMSs.

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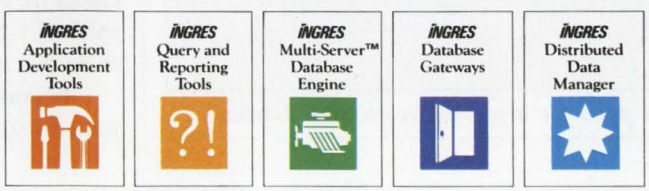

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has developed a seamless way to access data residing in DB2 from VAXs. Interlink's role is to establish a high-speed hardware connection (800 KHz) between the VAX and IBM.

This way, applications users can set up paths to search wherever they need, without concern for which hardware or operating system a database resides on.

Additionally, ORACLE and INGRES support NetWare VMS from Novell Inc., allowing networked PCs to store and access database files on VAXs.

Besides demonstrating overlap between database technology and large multivendor networks, these patches show that DEC and IBM take a similar approach toward SQL as well as access for networked databases. Oracle estimates that more than half its installations are VMS-based, and 15 to 20 percent are IBM. Oracle also runs under Mac A/UX and OS/2.

Recital from Recital Corporation is a new UNIX and VAX/VMS 4GL that includes a complete implementation of dBase III Plus. RDBMS features not found in dBase III Plus also are included. According to Tony Welsh, Recital's president, the 4GL was written first and the dBase was added afterward. "It's a 4GL that just happens to have dBase III built inside," he explains.

This enables users to move a whole application from a PC to a VAX without modifications. The program also has data sharing capabilities, including access to RMS. Recital is developing access to ORACLE and INGRES, as well. Interestingly, the program will feature an import/export facility directly connected to Access Technology's 20/20 files.

CL/1 from Network Innovations Corporation, now part of Apple, is an application development or connectivity language that accesses databases on a Mac workstation front-end and permits manipulation of databases and applications on an executing VAX host. The link can be completed over AppleTalk or DECNET/Ethernet.

On the VAX side, CL/1, which is also SQL-based, supports Rdb, ORACLE, INGRES, Sybase and VAX RMS flat files generated by COBOL or FORTRAN applications. On the Mac side, CL/1 integrates with Apple's HyperCard, dBase III and others.

Following The Trend

Access Technology Inc., proprietor of 20/20, a major VAX/VMS spreadsheet, is evolving its software to let it access and manipulate data in several RDBMSs. The 20/20 Database Connection includes Rdb, DATATRIEVE, Informix and PowerHouse. Release 2.3 of 20/20 includes the ability to read, write and consolidate 1-2-3 and PC Excel model files from the 20/20 command line.

In coming years, Access will continue to stress portability and integra-

Figure 3.

Using this model:

```
Assembly
  parent: Assembly
  tailNoLow: Integer
  tailNoHigh: Integer

relKeyNo: integer
```

Applications can write code such as this:

```
if (anAssembly.parent.tailNoLow > 10
  && anAssembly.parent.tailNoHigh < 50)
then
  printf ("This Part Must Be Recalled \ n");
```

(The application writes standard property access notation, unaware of where the data is stored.)

The object type Assembly actually can get its values from anywhere. Thus, the implementor of the object type Assembly can write:

```
{
 y=anAssembly.relKeyNo;

exec-SQL ("Select TailNoLow into $x
       From Assembly
       Where Assembly__id=
         Select Parent__id
         From Assembly
         Where
Assembly__id=$y");
 return (x);
}
```

Courtesy Ontologic Inc.

Ontologic's C++ based system accesses parts for assembly in an SQL database.

Companies Mentioned In This Article

Access Technology Inc.
6 Pleasant St.
S. Natick, MA 01760
(508) 655-9191
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Ashton-Tate Inc.
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tion, since 20/20 runs on a wide variety of platforms. They include systems from IBM, DEC, Data General, Sun, Prime and Apollo.

Other applications need to access and manipulate information in databases as well. SPSS Inc., designer and manufacturer of SPSS-X, a VMS statistical analysis package, is picking up on the same strategy. Having established SQL interfaces to ORACLE, INGRES, DATATRIEVE, Rdb and DB2, SPSS believes it now has the groundwork to penetrate 90 percent of the VAX database market.

SQL has spread even to the Ada language market. At Grumman Data Systems' Ada laboratory, an Ada/DBMS interface to SQL has been developed. Now being tested in beta sites, the major benefit, again, should be in multivendor networks. The company's short-term goal is to allow Ada systems access to many existing relational databases.

Integrating With Objects

Object-oriented databases, an emerging technology based on a different school of thought, also are designed to accom-

modate fourth-generation or CASE application development. Many maintain that these complex structures are better suited for it.

Object databases combine modeling abstractions of objects with the storage properties of databases. For integrating with applications such as design environments, object experts claim two advantages over relational and other databases. They are an open architecture and separation of the model from the implementation (see Figure 3).

"The best candidate system upon which to base an integrated system is one which supports good modeling, an open architecture and database features," says Timothy Andrews, a systems designer at Ontologic Inc.

"The first problem with individual tools is that they lack the generality of a global perspective," explains Andrews. "Most of the data formats of the individual [DBMS] packages are tailored to the specific application and are thus incompatible, making integration a difficult task."

Supporters of object-oriented databases maintain that DBMSs have many other drawbacks with regard to integration. But there's also a drawback to object systems: few are commercially available.

However, Ontologic's Vbase, written in C++, is available. It's being used in several diverse industries to integrate existing applications and databases into one application with a common model. Already solidly established in UNIX (on Sun Microsystems) and VAX/VMS, Vbase combines object-oriented C with a high-performance database.

Neuron Data Inc., which has established joint marketing agreements with both Relational Technology and Sybase, has developed database integration for its C++-based expert system, Nexpert Object. The program is tied into the RDBMSs by typing an SQL, and can interface directly with ORACLE, INGRES and Sybase.

Partnerships and the increased development of code generators are merging all the technologies. One company is taking this idea a step further. With the release of Natural Architect, Software AG has developed a CASE tool that integrates into Natural, its 4GL for VAX/VMS.

CASE SYSTEMS BEGIN to take on much of the functionality of 4GLs (many say that 4GL/CASE is becoming a single design and development tool), object-oriented databases enter the fray, and all become more integratable with the RDBMS. Perhaps we're creating a megatechnology: a powerful database with unlimited flexibility.

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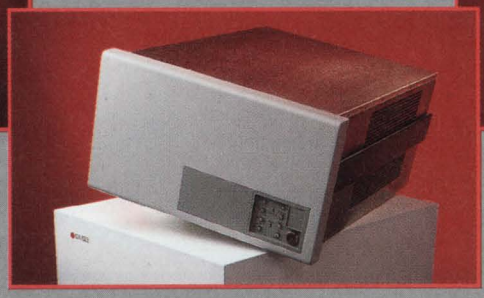

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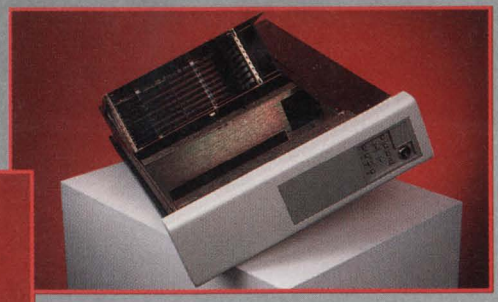

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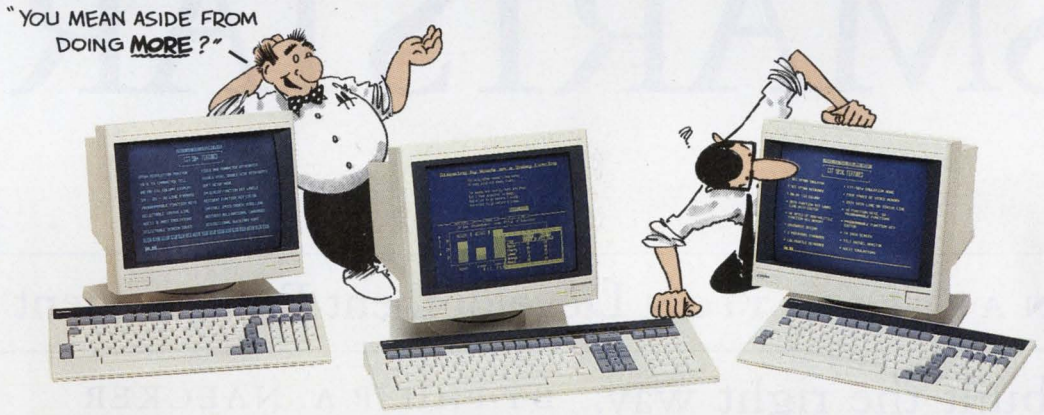

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Signal Technology's SMARTSTAR

An Application Development Environment built the right way.

BY PHILIP A. NAECKER

WHAT'S THE MOST expensive component of your computer system? Disks? CPU? Probably not. If your shop is like most, the most expensive component of your entire computer operation is the computer support staff, especially the software development staff.

Also, in a typical computer shop, the software development backlog is more than one year. That's the time you have to wait until someone starts working on a new application, and it's more like two years in most MIS shops. Add the months required to build a typical medium-sized application using standard languages, and it's easy to see why users become impatient and want a PC so they can do things themselves.

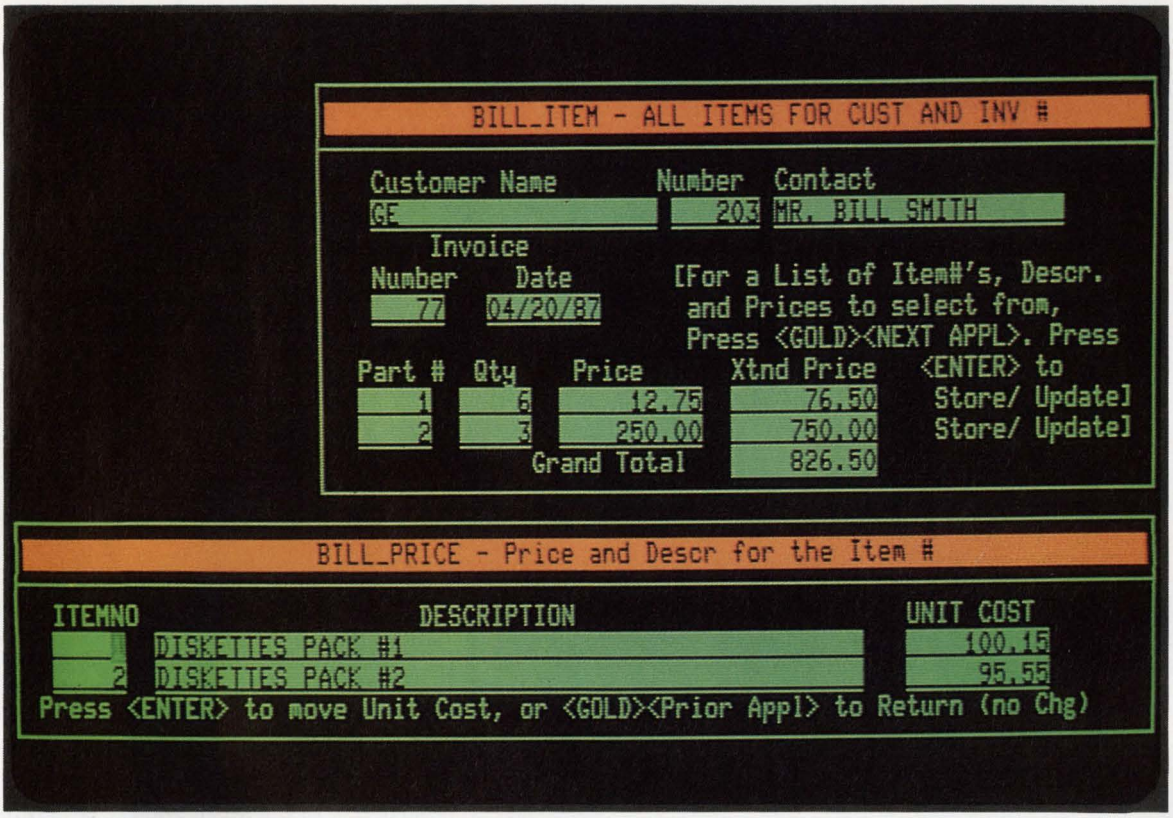
Application Development Environments (ADEs) provide a means to leverage your development resources, reducing both the time required for and the cost of developing a new application. A good ADE also can provide a means for users to build and modify their own applications.

SMARTSTAR from Signal Technology Inc. (STI) of Goleta, California, is an ADE with a full set of tools for building all kinds of data management and user interface applications. Components of SMARTSTAR can be used to design databases, load data into the database or move data between different kinds of databases, produce reports, build menu-based applications and provide user interfaces. It's one of the few VAX products that can match the productivity of some of the PC-based application development tools, and it does so without sacrificing the power or flexibility of the VMS environment.

What SMARTSTAR Isn't

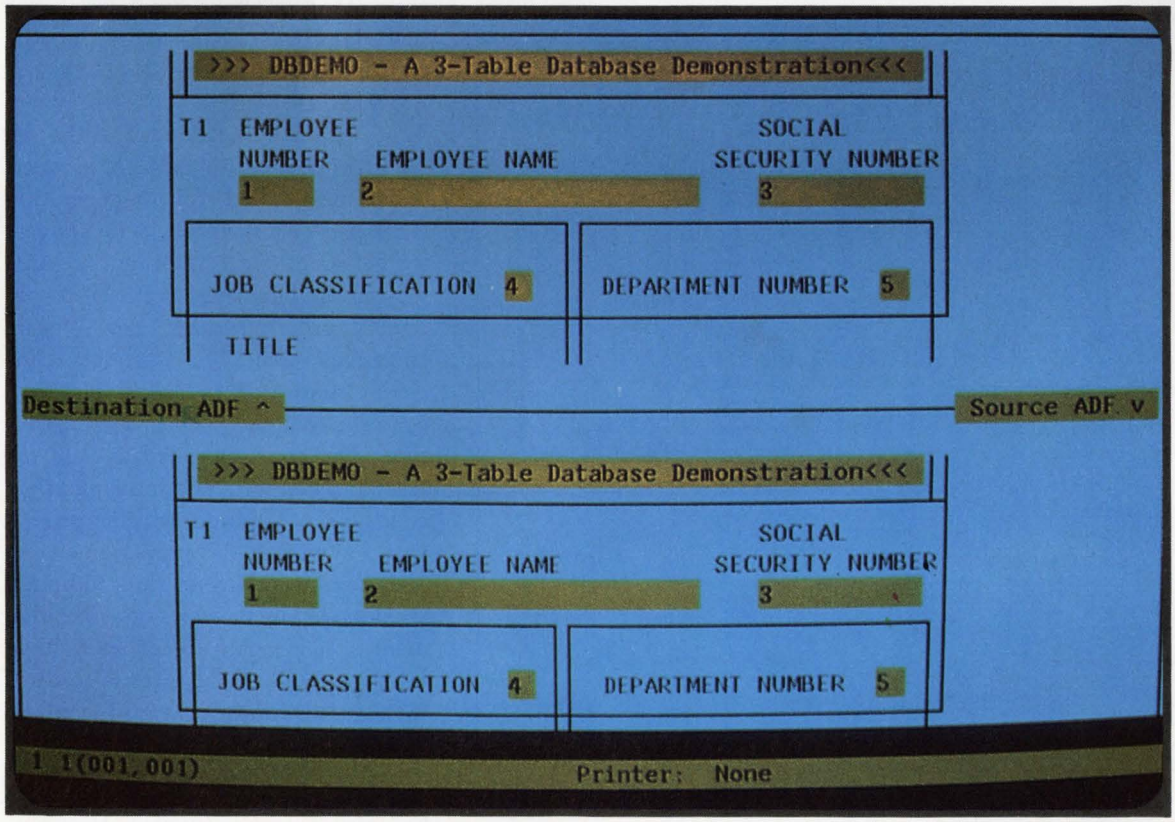
To understand SMARTSTAR, it's useful to know what SMARTSTAR isn't.

1. It's not a query language. Although there is a query component to SMARTSTAR called SMARTQUERY, it doesn't use a language to specify the data to be retrieved or modified but uses a query-by-forms approach. However, if you like query languages, you can ask SMARTSTAR to output the SQL form of



Courtesy of Signal Technology Inc.

Screen 1: SMARTSTAR users can create multirelation forms with scrolling regions and totals just by "painting" the form on the screen.



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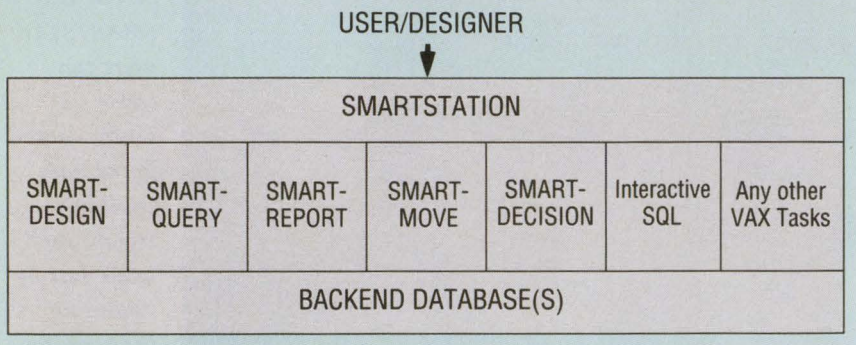
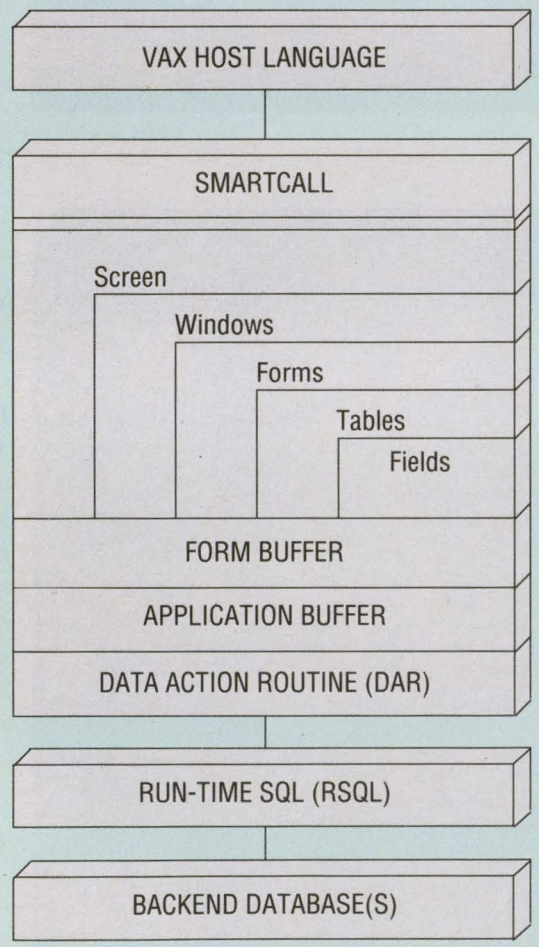
Screen 2: SMARTMOVE converts data from one database to another using a graphical interface to specify the relationships between fields.

Figure 1.



The SMARTSTAR environment.

Figure 2.



The SMARTCALL architecture.

all of its queries, including queries used to generate formatted reports. You then can edit the SQL to your heart's content.

2. It's not a forms management system. Although SMARTSTAR includes excellent facilities for designing screen forms and getting information into and out of those forms, the forms are used as a paradigm for the database, and there's a strong relationship between the structure of the forms and the structure of the database underneath.

SMARTSTAR knows how to use several different relational databases, but SMARTSTAR is not itself a DBMS.

3. It's not a database management system. SMARTSTAR knows how to use several different relational databases (as well as RMS files), but SMARTSTAR is not itself a DBMS.

4. It's not a new language. Although SMARTSTAR is one of a class of products sometimes called fourth-generation languages (4GLs), there's little similarity between SMARTSTAR and a third-generation language like COBOL or BASIC, or even other new "near-languages" like SQL. Although it includes steps that are analogous to a language compilation, the resulting run-time file contains virtually all the semantics that went into the application, so it's a much more reversible process than a typical 3GL compilation.

5. It's not a code generator. Although SMARTSTAR does a good job of creating usable SQL in a non-procedural fashion, using that code alone ignores some of SMARTSTAR's most powerful features.

6. It's not simply a menu system. Although SMARTSTAR includes a component (called SMARTSTATION) to create

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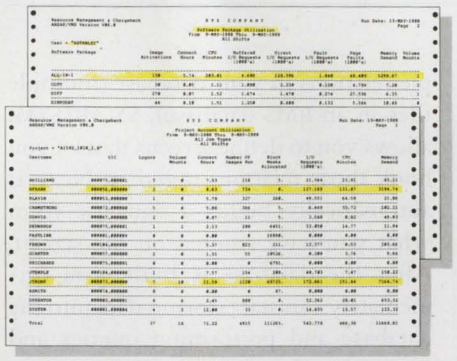

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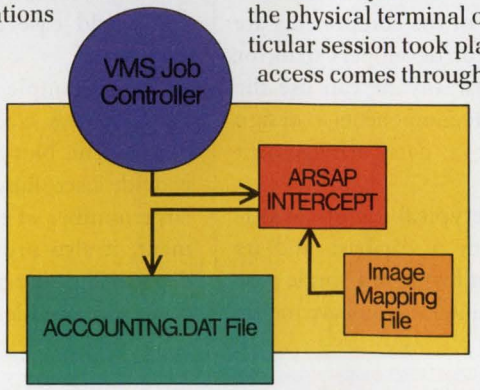

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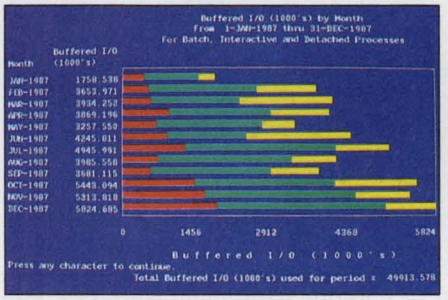

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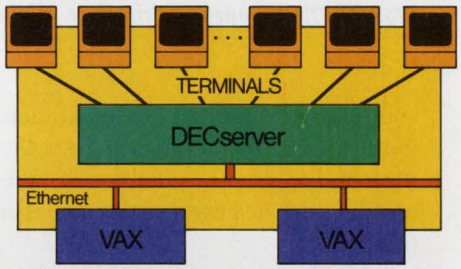

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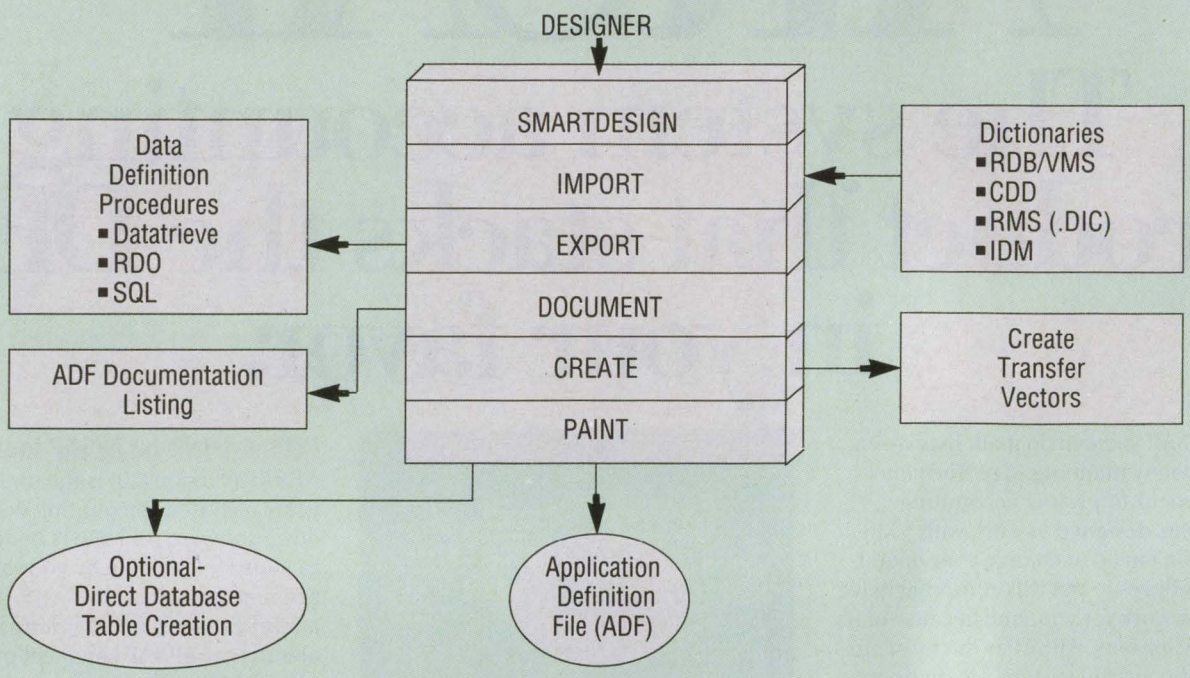
Figure 3.



SMARTSTAR's open architecture allows it to integrate with many other VAX software products.

and manage menu trees of applications (both applications built using SMARTSTAR and applications built using other tools), it has the power to do more than that.

Unlike most other menu systems, SMARTSTATION not only can invoke applications, it can put multiple applications on the screen at once, and the menu system can be called from a 3GL program. Applications built using SMARTSTAR aren't SPAWNED as subprocesses from the menu system; they're run from the parent process with all the performance and resource-sharing advantages that implies.

7. It's not a product to integrate PCs into the VAX environment. Although one component of SMARTSTAR can generate PC-compatible spreadsheet files, and the whole product can be customized to take advantage of the display or keyboard of a PC, SMARTSTAR doesn't connect applications on different kinds of hardware.

STI believes that data should be accessible from different environments, but that's not the same as saying that the same application must run in different environments. STI puts it this way: "Data connectivity is important. Application connectivity is not."

What SMARTSTAR does provide is an integrated environment (tools and run-time components) for building applications, especially data management applications. It supplies this capability via a number of components (see Table 1 and Figure 1), each of which has a forms- and keypad-based user interface. Although some of the components are intended more for developers than for end users, almost anyone can use the basic SMARTSTAR components to design and implement a data management application.

In the archetypical use of SMARTSTAR, you define a database and its associated screen forms in a single pass using a screen painter. If you have multiple relations in your database (multiple files in an RMS database), SMARTSTAR allows you to define screens that let you hook those relations together. Next, it automatically builds a database from what you have painted on the screen. After the database is built, you immediately can start storing data into the database and performing queries and reports on that data (see Screen 1).

Not limited to simple joins between the relations, SMARTSTAR can define various flavors of master-detail joins, including multilevel joins and outer joins. In other words, it handles just about any real-world case that you're likely to encounter.

For example, consider a personnel database that tracks all employees by department. Not only does SMARTSTAR provide a scrolling area for the possibly large number of employees per department, it also provides access to those departments that have no employees (the outer join) and lets you provide search

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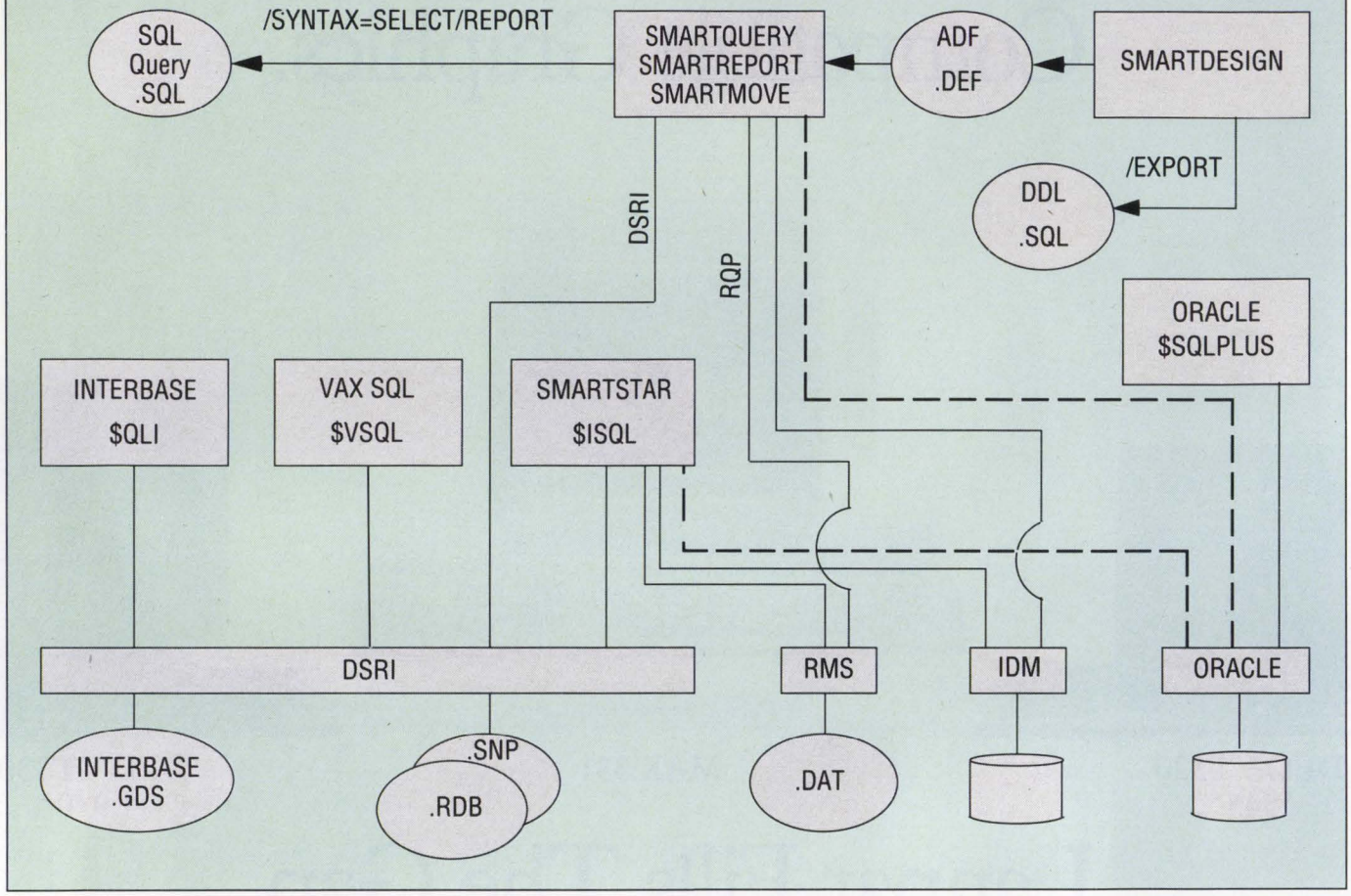
Figure 4.



SMARTSTAR supports a number of backend database types. It also can generate SQL files automatically.

criteria to select records both on the basis of the department and the employees in that department.

After you've found records that match these complex criteria based on employees in the department, you can "zoom out" to see all other employees in the department that you've selected. That's a nifty bit of database access and one that eludes most database application writers.

"With all that power," you say to yourself, "it must be slow, right?" Wrong. Because of its well-thought-out architecture, SMARTSTAR encounters little or no performance penalty when compared to a 3GL. In fact, in many cases, a SMARTSTAR application outperforms those developed using traditional techniques. SMARTSTAR makes it easy to design and use fully normalized databases, and a fully normalized database is one of the secrets of a well-designed and well-performing data management application.

Architecture

Notwithstanding its application development features, what makes SMARTSTAR a very powerful development environment is the open architecture emphasis of the product design. Unlike many products, including some ADE products, SMARTSTAR provides numerous ways to get into and out of the SMARTSTAR environment. It also lets you extend and tailor the environment using either 4GL or 3GL techniques. Let's see how SMARTSTAR provides this capability.

SMARTSTAR is a VMS-only product. It doesn't run on any other operating system. As a result, the SMARTSTAR software engineers take full advantage of the VMS architecture. For example, all the SMARTSTAR messages are generated using the VMS MESSAGE utility. Therefore, they can be customized easily, on both a site- and user-dependent basis. Also, the entire SMARTSTAR system adheres to the VMS calling standard, so you can call SMARTSTAR from any VAX language and write extensions to SMARTSTAR in any VAX language.

Through a callable interface, SMARTSTAR allows you to call each component (such as calling SMART-

QUERY or SMARTMOVE from within an application program) in a highly supportable and maintainable way. SMARTSTAR is implemented as a number of shareable images, and your programs continue to work even when new releases of SMARTSTAR are installed. Furthermore, your application programs automatically take advantage of new SMARTSTAR features as they become available, including new support for new database types.

Even more useful than the ability to call SMARTSTAR is the ability to call programs written in 3GLs from within SMARTSTAR components. If you don't like what SMARTSTAR does, you can make it do it your way. SMARTSTAR provides for a number of user-defined action routines, such as Data Action Routines, Keyboard Action Routines and Field Action Routines (see Figure 2). These routines, written in your favorite 3GL, can perform any arbitrary function, including calls to other SMARTSTAR components.

For example, an engineering application might need to perform some complicated calculation involving user-input data, data from the application database and data from application-specific files. Using the various action routines available in SMARTSTAR, this calculation could be performed based on keystrokes, database reads or updates as a result of the user moving the cursor into or out of a field, or as the result of some external event.

After calling a 3GL routine from SMARTSTAR, the SMARTCALL Run-time Library provides a range of functions you can use for typical operations in the SMARTSTAR environment, including accessing other applications, modifying the user's environment and data conversion. The documentation on SMARTCALL describes each of the SMARTCALL routines in an RTL format and provides complete instructions on linking the shareable images needed to make your action routines available to multiple applications.

In the extreme case, it would be possible to write a complete set of Data

SMARTSTAR

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What To Look For In A Software Product

When I consider a software product to run on my VMS system, I want to know some things about its engineering and architecture:

1. Is it written for VMS? If it's a port from another operating system, I'm going to think twice about buying it. The problems of ports are legion, not the least of which is the "least common denominator" approach that most software houses take to operating system support. If a function doesn't work on all the operating systems, it won't be added to any because of the impact on documentation, maintenance, and portability of applications built using the system.
2. Does it use all the power and tools of VMS, taking full advantage of the linker, shareable image structure, messaging facility, RMS, control-key standards, naming conventions and extended filenames? Can it be installed using standard VMSINSTAL by a busy system manager who doesn't have time to customize the installation?
3. Are the people who wrote it VMS jocks with long-term VMS experience? If they're refugees from another operating system, it's likely that they'll bring to the product the biases and flavor of that operating system. I want VMS products to look, feel and taste like VMS products, not like HP products or IBM products.
4. Does it adhere to any applicable standards or de facto standards, such as ANSI SQL, DSRI and PostScript? The more a product adheres to standards, the easier it will be for me to integrate it with other products and find people who know how to use it.
5. Does it use available DEC or third-party products and tools for common functions, or does it try to be all things to all people? I am very cautious about products that advertise, "We include our own powerful relational database." Software products work better if they're part of the mainline business of a company that's a major player in a relatively narrow technical area. Simply put, the product should be layered on top of other quality software, even from other companies if that's what it takes to get quality software.
6. Is it an open architecture product? If yours is a new VAX shop with limited software development experience, you want a product that meets your needs out of the box (OOTB). But most shops can't or don't want to limit themselves to the capabilities of any product OOTB; they want to be able to customize it, tailor it, improve it. An open architecture product allows tailoring and integration with my applications and third-party products. A well-engineered product makes it easy.

Perhaps the most important observation about SMARTSTAR is that it meets almost all the above architectural criteria, missing on only a few minor points. Based on these criteria, SMARTSTAR is a solidly engineered product with a very attractive open architecture.

Action Routines to access a new type of database transparently to your existing or new applications and to the user. However, the current version of SMARTSTAR doesn't have the SMARTCALL facilities to let SMARTSTAR define an application using your new database access routines.

SMARTSTAR itself takes advantage of the callable nature of the various components. SMARTMOVE, for example, is a sophisticated SMARTCALL application. SMARTSTATION calls the other SMARTSTAR components to avoid creating unnecessary subprocesses. Many action routines are provided as a standard part of the SMARTSTAR environment for such things as table lookup, field validation and data conversion.

SQL Access

Another attribute of the SMARTSTAR open architecture is that most of the SMARTSTAR components provide an output that you can massage.

For example, after years of working with DATATRIEVE and relational databases, I have specific things that I want to do when I establish my field and record definitions. Using SMARTDESIGN, I can build an application definition and use the /EXPORT qualifier to build a DATATRIEVE or RDO definition of the database in a file that I can edit (see Figure 3 and Program 1).

When I've polished the definitions to my own specifications, I then can define the database myself, but SMARTDESIGN has saved me much of the tedium of defining a database and also has built my human interface. Furthermore, because SMARTDESIGN can output the record definitions for DATATRIEVE and because DATATRIEVE can access DSRI databases directly, almost any application I build in SMARTSTAR can have data available from DATATRIEVE as well.

Similarly, SMARTREPORT can be instructed to output the report procedure as an SQL source file. If you need to customize or further refine the procedure, the SQL code then can be edited and changed by a technically knowledgeable SQL user. The same technique can be used with SMARTMOVE. Furthermore, you can extract parts of the SQL code for use elsewhere in your application or even as a learning exercise on how to use SQL.

When I first looked at SMARTSTAR five years ago, there was a choice between DEC's layered product approach (TDMS or FMS, DATATRIEVE, CDD) and a vertically integrated (and open architecture) SMARTSTAR application development environment. At that time, SMARTSTAR had less functionality (only SMARTDESIGN and SMARTQUERY), and there were fewer SMARTCALL entry points. Since then, STI has done a better job of layering software than DEC, and its product is better integrated.

The advantage of the SMARTSTAR open architecture is that you can get there from here. If there's an operation you need to perform in your application and you can't do it directly in SMARTSTAR, you can call a 3GL and use the SMARTCALL interface to perform your special function.

Definition Files

All the information that describes a SMARTSTAR application is contained in an Application Definition File (ADF), and most of the SMARTSTAR com-

Program 1.

```
/*
**-----------------------------------------------------------------
**      DBDEMO.SQL
**      Optional DDL Autogen from SMARTDESIGN
**-----------------------------------------------------------------
*/
CREATE TABLE EMP (
            EMPNO LONGWORD,
            NAME CHAR (24),
            SSNO CHAR (11),
            JOBCLS WORD,
            DEPTNO WORD);

CREATE UNIQUE INDEX EMP_0 ON EMP (
            EMPNO);

CREATE INDEX EMP_1 ON EMP (
            NAME);
            .
            .
            .
CREATE TABLE JOB (
            JOBCLS WORD,
            TITLE CHAR (20),
            SALMIN LONGWORD,
            SALMAX LONGWORD);

CREATE UNIQUE INDEX JOB_0 ON JOB (
            JOBCLS);
```

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ponents use the ADF both during development and at run time. The ADF is created and maintained by SMARTDESIGN and contains a description of all the forms, message files, key definitions and databases used by SMARTSTAR.

SMARTREPORT also has a definition file, called a Report Definition File (RDF). The RDF contains a complete description of a report, including a pointer to the associated ADF and information about selection criteria, control breaks, sort orders and the like.

SMARTSTATION has a workstation definition file that describes the entire menu system and all the applications (both SMARTSTAR applications and others) that are run inside the workstation.

Even SMARTMOVE has a definition file, a Move Definition File (MDF), that allows you to define a move operation, such as the monthly upload of one database from another, and invoke that operation without human intervention.

Database Access

SMARTSTAR supports a number of different databases (see Table 2 and Figure 4). Although you can perform virtually every function that SMARTSTAR provides in an RMS database (a group of normalized files), SMARTSTAR gives you essentially identical access to six different databases. There are a number of reasons why you need this flexibility.

First, many applications need to use existing files or databases. To use existing files, SMARTDESIGN provides facilities for reading data definitions from the VAX Common Data Dictionary or from the database itself. These data definitions become the basis of the Application Definition File, and SMARTDESIGN automatically can generate forms for each of the relations in the database and automatically determine the connections between the relations using the field names.

An example of the use of this capability might involve an existing accounting package running on your VAX. Using SMARTDESIGN to read record definitions from the CDD, you could develop applications to provide relational access to the accounting files for ad hoc query using SMARTQUERY or for ad hoc or regularly scheduled reporting using SMARTREPORT, and upload into a SMARTDESIGN spreadsheet. Thus, the construction of a single SMARTSTAR application might support a large number of functions (queries, reports, spreadsheets) to fill the gaps in the accounting software.

Another valuable advantage of the support of multiple database types comes during the development cycle. It's easy to work with RMS files during development, because the time required to open and define them is short compared to that of a full-blown relational database management system. However, after an application becomes heavily used, there are advantages to a DBMS, including improved locking, rollback and commit, transaction semantics that

Table 1.

Component	Function
SMARTDESIGN	Used interactively by the designer to create the application and its basic components, including the databases (if they don't already exist) and screen forms.
SMARTQUERY	An end user tool for retrieving data from a number of database types. SMARTQUERY can perform retrievals that involve relational joins, qualify or restrict the data so that only the records of interest are displayed, and handle master-detail type of scrolling regions. The user communicates with SMARTQUERY using a query-by-form and keypad-oriented approach.
SMARTREPORT	An end user and technical user tool for generating reports. SMARTREPORT gives the user control over the format of a report page, footers and headers, control breaks, aggregates and many other advanced features. It also can select data using the same form- and keypad-oriented techniques used in SMARTQUERY.
SMARTMOVE	A facility for moving data between databases, including databases of different types (see Table 2). SMARTMOVE also knows how to do mass deletes and modifications to a single database.
SMARTSTATION	A facility for organizing SMARTSTAR and other tasks into a windowing menu structure. SMARTSTATION neatly integrates SMARTSTAR tasks without spawning subprocesses.
SMARTDECISION	A Lotus 1-2-3 look-alike for VMS, SMARTDECISION not only supports graphics on a variety of text and graphics terminals, it has the capability to import data from any database accessible via SMARTQUERY.
SMARTCALL	A Run-time Library that provides the 3GL application programmer with all the tools used to build a callable SMARTSTAR application. SMARTCALL is so powerful that it was used to build SMARTMOVE.
ISQL	Interactive ANSI-standard SQL with many extensions, including a REPORT statement, an interface to the SMARTREPORT component, SQL procedures with parameter passing and support for three VAX editors.
Run-Time SQL	Full Dynamic SQL support. Also included is multidatabase access, including support for different types of database backends.

SMARTSTAR components.

span relations, and excellent journaling capability.

In SMARTSTAR, the process of moving an application from RMS to Rdb is often as simple as changing the database type in the Application Definition File, building the new database (automatically, of course), and then moving any existing data using SMARTMOVE (see Screen 2). The whole process might take only a few minutes on a small application, and except for the run time of SMARTMOVE, it might not take much longer on larger applications.

The support of multiple databases is attractive even if you currently don't use a database management system but are considering one. By using SMARTSTAR with RMS files for your development, you can build applications now and port them into the database (whichever you choose) later. Plus, RMS is free with VMS.

SMARTREPORT and SMARTMOVE generate SQL export files that describe their operation; how can those SQL files be used if the database is in RMS? The solution is the Relational Query Processor (RQP).

RQP understands relational syntax (in the form of SQL) but implements it on RMS files. You can use the SMARTSTAR SQL components (ISQL and RSQL) directly on RMS files if you desire. Because RMS is a file system and not a database management system, you don't have transaction control when you use RMS, and some of the more complex features of SQL aren't supported, including the SQL clause GROUP BY.

The SQL documentation in SMARTSTAR includes a complete and accurate discussion of the trade-offs between Rdb databases and RMS files in use with SMARTSTAR SQL. It even addresses the dreaded reflexive join problem where some databases have problems when a join references the same table twice.

Because SMARTSTAR supports so many different databases, your developers can learn a single development tool and your users can become familiar with a single interface style, and that training investment can be preserved as you develop and acquire applications in other database systems.

Of course, every product has its weaknesses, and SMARTSTAR has a few quirks and inadequacies that we detected in the Lab.

I've been spoiled by the DEC installation procedures. I'm used to installing a product that asks me every question it needs to know and assumes that I'm too lazy to read the installation guide. Because I didn't read the installation guide, I had several minor problems installing SMARTSTAR. Although the CLD definitions for the various SMARTSTAR verbs are provided, they're not applied to the DCLTABLES. This should be done as part of the installation process.

SMARTSTAR logical names don't all have the same facility prefix. For example, the SMARTSTAR examples live in a directory pointed to by the logical SSAPPLEX, the help lives in SSHELP, and the executables live in SMARTSTAR. I'd prefer consistent logical names, such as SS_EXAMPLES, SS_HELP and SS_EXE. Also, because STI hasn't registered its message bases or facilities, there's the potential for conflict with other products that use the MESSAGE utility.

Unfortunately, for all its good intentions in applying good VMS design practices, STI overlooked a few things. For example, my first test of SMARTDESIGN was to import an already defined database. An error occurred (I don't know whether it was in the prerelease database management software or inside SMARTDESIGN), and I was presented with a singularly unhelpful error that appeared to have been generated by BASIC: "ERR52(?Illegal number) @ 10 in RDB_EDITEXP".

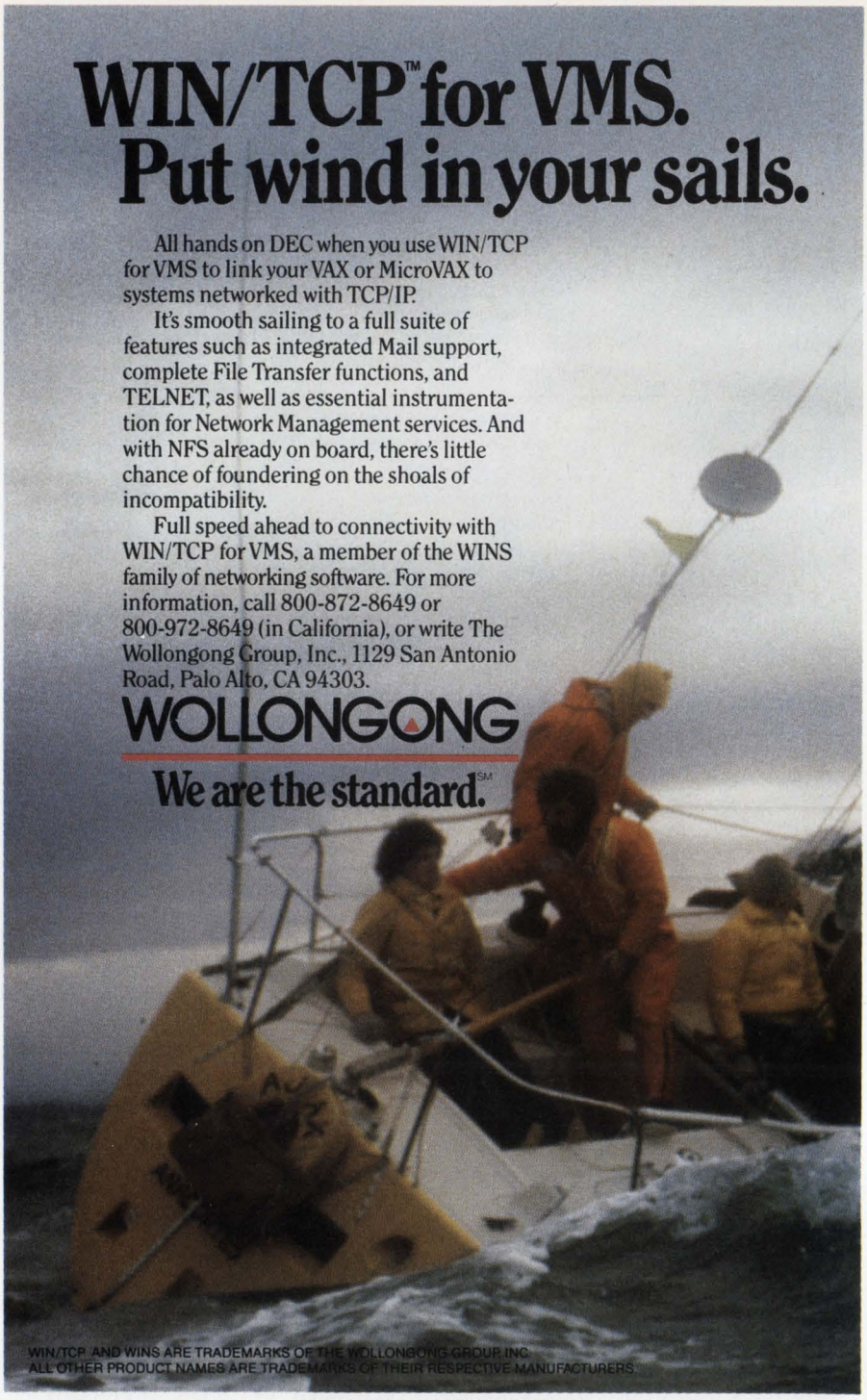
If the problem was inside SMARTDESIGN, it should have generated a proper VMS-format error message, and if the problem was in a lower-level layered product, SMARTDESIGN should have trapped the error and given me some clues as to what was happening when the error occurred.

The STI startup file also does some

Table 2.

Database	Description
RMS	Both sequential and ISAM files are supported. Selection of data is not restricted to indexed fields. SMARTSTAR can do relational joins across multiple RMS files in a way that appears to the user as if the multiple files were in a relational database system. Using SMARTSTAR SQL, you can access RMS files from SQL.
DSRI	Any DSRI-compliant relational database is supported (see "DSRI," April 1987). This includes Rdb/VMS, InterBase and Rdb/ELN.
Britton Lee Database Machines	SMARTSTAR can retrieve and update data in the BLI Intelligent Database Machines (IDM) as if the data were located in a local VAX database or RMS files.
ORACLE	Signal Technology has announced its intent to provide access to ORACLE databases using the identical SMARTSTAR user interface and providing access to all the powerful SMARTSTAR components, such as SMARTREPORT and SMARTDESIGN. *DEC PROFESSIONAL* has seen a working prototype of the ORACLE interface. Using SMARTMOVE or RSQL, data easily can be moved into or out of an ORACLE database.

Database types supported by SMARTSTAR.



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monkey business with LNK$LIBRARY logicals. Shareable images like those in SMARTSTAR would seem to belong in the system image library, IMAGELIB, so I can think of no good reason for not installing the SMARTSTAR images there and avoiding the link library logical name.

Still, these and other similarly minor blemishes pale in the light of the open architecture of the product. The architecture is robust enough that STI can add new products (like the recently announced SMARTDECISION) and new databases (like the upcoming ORACLE access) without any significant change in the underlying product. STI will be able to extend its products to take advantage of DECWINDOWS with little impact on the user, also because of the product design.

If you're building an application that involves databases or human interfaces, or if you appreciate quality software design, you should take a look at SMARTSTAR for your VAX.

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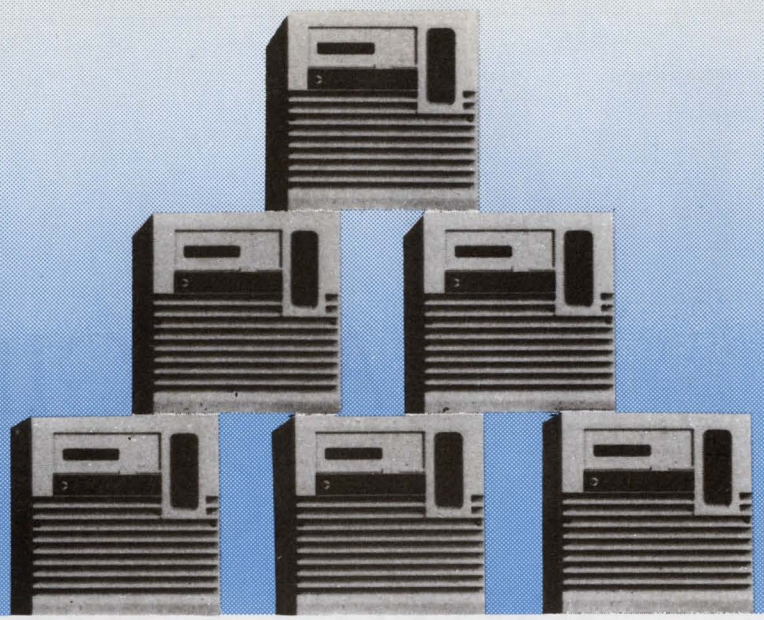

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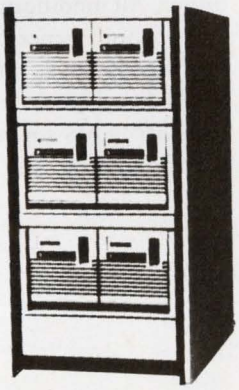

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SOFTWARE DEVELOPMENT

MANAGING SOFTWARE DEVELOPMENT

By Donald P. Golden Jr.

The Code Management System Package And VMS Can Handle The Problem Efficiently.

At Shell Oil Company, we have a single large software system that supports on-line control and optimization in various manufacturing locations. The development and maintenance activities centered on this product can be categorized broadly as:

1. Ongoing maintenance of the current released version of the product.
2. Multiple development activities to produce the next version.
3. Testing activities relating to both the current and next versions.

Because these three programming activities address the same product at the same time, the opportunities for mistakes abound. At one point, the group, during a new development effort, failed to include a patch developed by the field support organization. This allowed a problem to recur in the field.

In another instance, a new feature included late in the development cycle wasn't tested thoroughly before being released to the field. Again, a time-consuming diagnosis and patch procedure ensued. In a third incident, a patch, perfectly appropriate for the current production version, was incorporated in the development version without considering side effects. It conflicted with a change in specs being implemented and caused some strange results.

The cost of such mistakes has prompted us to scrutinize our software development environment. We've progressed through several generations of software version control mechanisms to manage these multiple development paths:

1. A single individual assigned as a project librarian.
2. Experimental use of DEC's Code Management System (CMS).
3. Use of multiple CMS libraries for each facet of development.
4. Advanced use of CMS as the core of a development environment.

Our current development environment is based on a single CMS library for all development and maintenance efforts. CMS features mechanisms for securely maintaining the source modules that comprise a system. It allows a single developer to assert ownership of a module during modification. This can preclude errors that can creep in when modifications collide.

It's the classic "last one in, wins" syndrome. All modifications are tracked by CMS, and previous generations of a given module can be extracted, allowing you to say, "It worked two weeks ago; what did you do to break it?" CMS supports classes that contain specific generations of various modules. A

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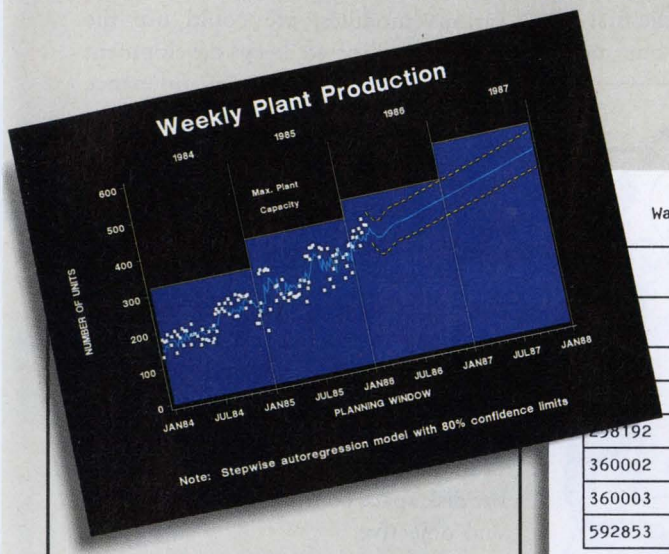

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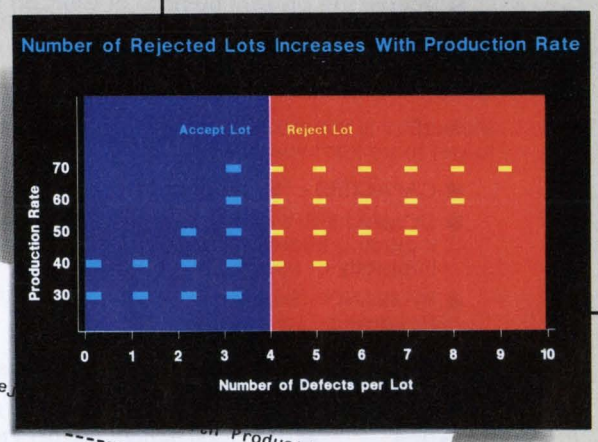

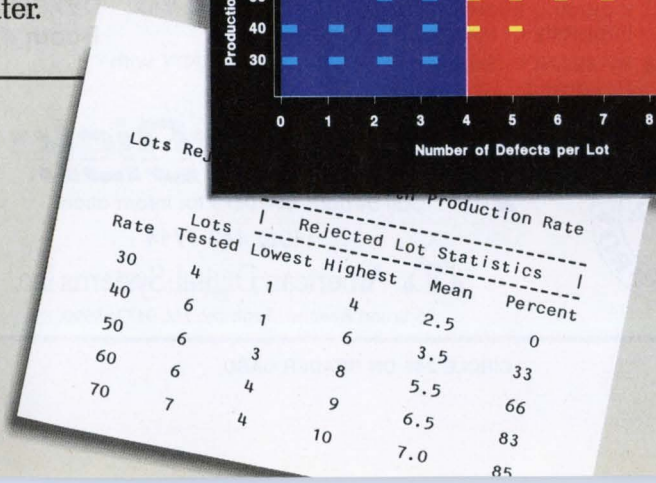
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* Computer Intelligence, January 1986.

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class is the ideal tool for defining a consistent version of a product for testing or release.

CMS must be applied correctly to achieve optimal results. With limited CMS experience, we embarked on a three-pronged development effort. The three prongs were diverse and concentrated on different areas of the product.

We took a snapshot of our sources and created three different CMS libraries, one for each of these efforts. CMS was a fine tool for each individual development project, but merging the three libraries to create a new release was far more work than we anticipated. This experience helped to define the first of our four objectives for our new development environment.

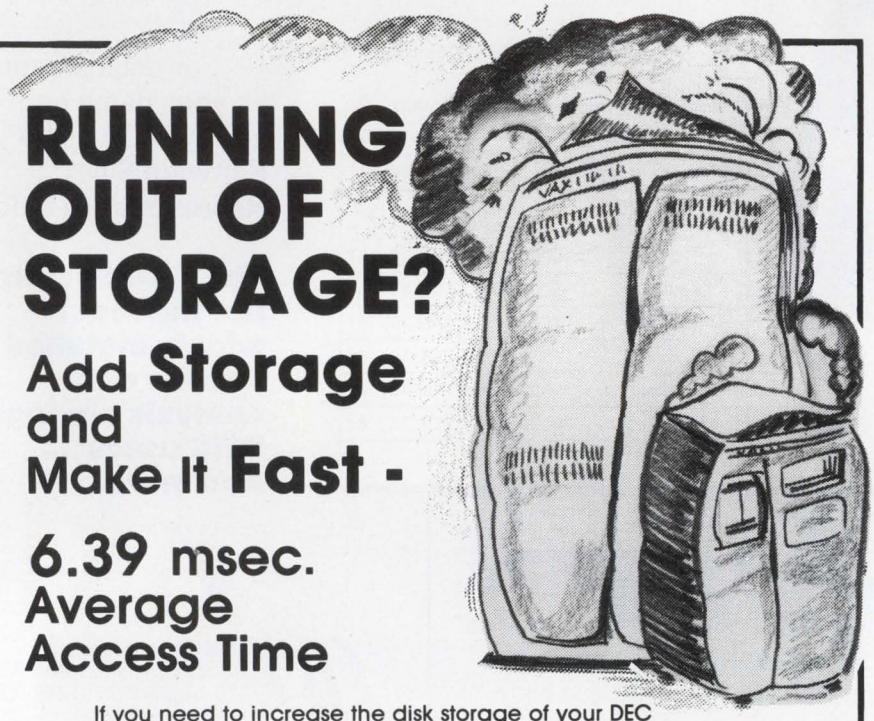
1. One CMS Library — It seemed reasonable that we could exercise fully CMS's functionality and devise a system to have one CMS library maintain all our sources. We had confidence that, by using CMS's ability to support variants of various modules, we could use the MERGE facility to keep development going without losing maintenance updates.

Approximately 1,000 distinct source modules are required to define our software product. Over a development cycle for a single project, as many as 200 of these change. Given this relatively small percentage of changed modules, keeping a complete copy of the master source for each development effort requires a huge amount of disk space, most of it devoted to redundant copies of the same modules. Attempts to limit the disk space consumed led to our second objective.

2. Abbreviated Project-Specific Source Directories — Rather than maintain a plain-text version of the complete sources in directory structures for each of the various development teams, we thought it would be appropriate to have a single master directory structure and maintain only the changes from the master in each of the individual team's structures. A change acceptable to all teams then would result in a change only in the master, whereas each team could maintain its own unique changes and these changes wouldn't affect other groups.

It's the nature of our product that a complete build consumes all of a VAX 11/750 for roughly one day. If there's an error, a day is lost repairing the error and another rebuilding the product. Defining a strategy to limit the lost productivity because of this build problem defined our third objective.

3. Minimize Downtime Due to Failed System Build — We believed we could design a parallel directory structure that would allow us to maintain a "version being built" while retaining the "last working version." This parallel structure would exist for each



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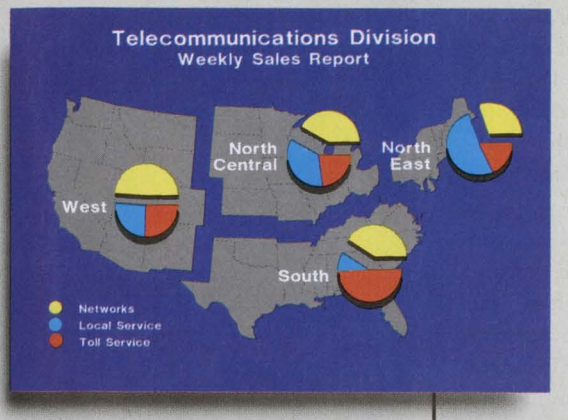

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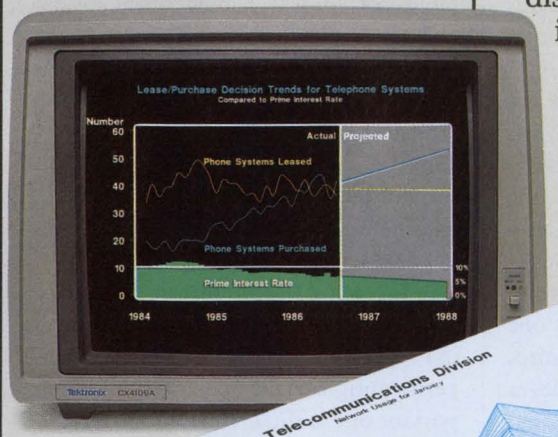

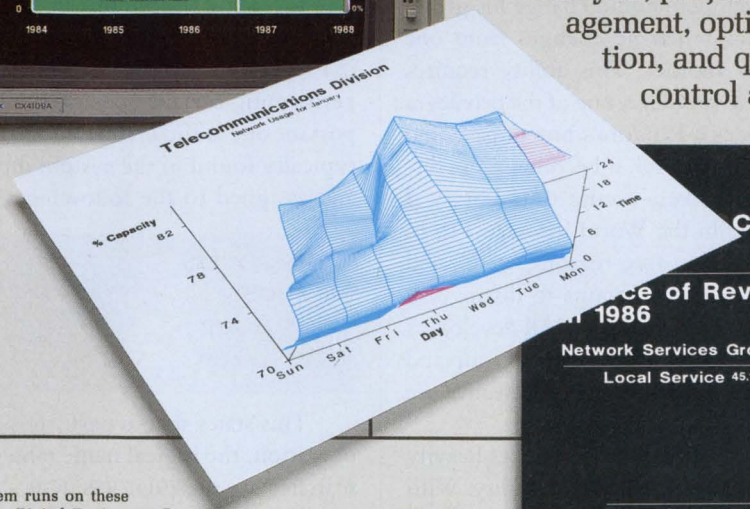

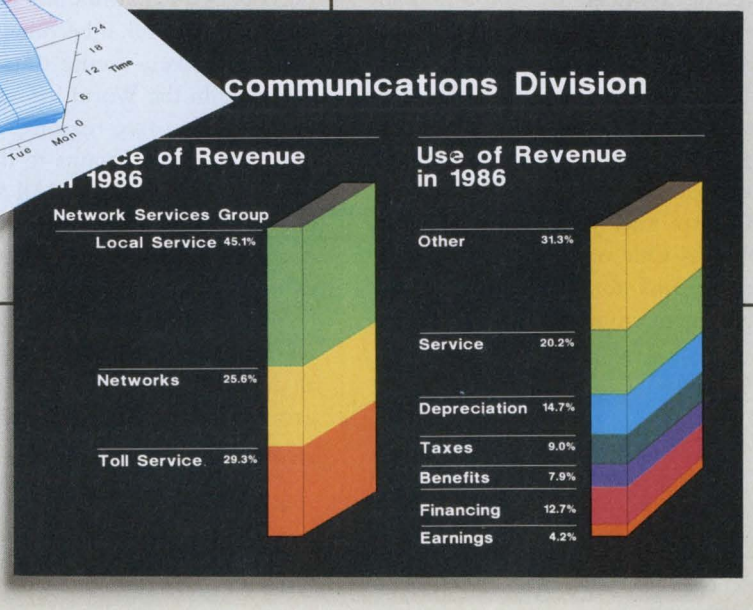

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team. All builds would be done in the "build" portion of the structure.

At the completion of the build, this new version would be tested. If it was stable enough to support continued development and testing, it would be copied to the "working" portion of the structure. On the other hand, if the new version was unsuccessful, the old "working" portion of the structure still could be used while the problem correction team worked to resolve the build problems.

Some of the developers in our organization work on several assignments at the same time. Often, the multiple tasks assigned to one of these developers lie in the domain of different development teams. Accommodating this mode of operation became our fourth objective.

4. Facilitate Individual Effort on More Than One Assignment at a Time — We decided that the primary team membership should be a default established at log in time and that there must be an ability to switch to a different team temporarily. It was important that, in switching teams, work assigned under one group wouldn't become mixed with that of another.

The Development Environment

The solution that meets these objectives employs several VMS and CMS features. Some of the VMS features help meet more than one of the objectives. We use seven principles:

1. When in Doubt, Borrow — One benefit of using VMS is that it's a good source of examples. We've found many good examples of how to do things in VMS itself. Our development environment borrows heavily from the techniques employed by DEC in making VMS meet a variety of needs simultaneously.

2. Group and Job Logical Name Tables — One obvious way to allow several teams to coexist in a single development environment is to use the VMS group concept. That is, we could put all developers under a UIC of the form [DEVELOPER,user], all members of the quality team under a UIC of the form [QTEAM,user] and location managers under [LOCSUPPORT,user]. This would allow each of these teams to be separate and to share logical names in a logical name table.

The problem with doing this for our organization is twofold. First, the requirement that a developer have a primary team assignment as well as the ability to assist other teams becomes a hard one to meet. To do this properly, the developer should change his group identifier when he changes from one team to another. This ability requires CMKRNL privilege, one of the privileges that opens a Pandora's box of potential problems. Second, it becomes more difficult to make a secure CMS library if everyone in the World has access to it.

For these two reasons, we elected not to use VMS groups to distinguish our development teams. All developers are assigned to a single VMS group and teams are distinguished via a creative use of logical name assignments.

Our software system relies heavily on the VMS logical name facility. With all developers assigned to the same VMS group, traditional group-qualified logical names no longer are useful to differentiate between teams. Group logical names are used only if they apply to each of the teams.

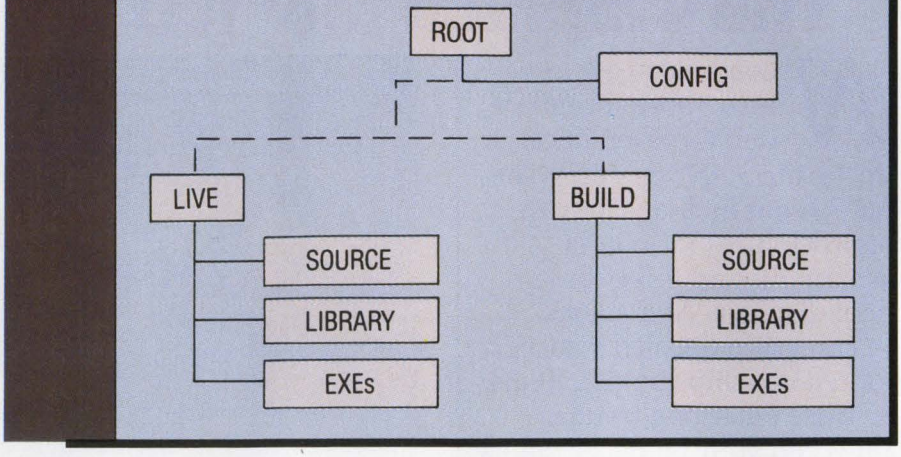
With version 4 of VMS, the logical name facility was expanded to include tables of logical names with special characteristics that allow them to act as logical name directories. (VMS version 5 won't change our operation.) There's a logical name table called the LNM$SYSTEM_DIRECTORY that's common to all of the processes active on a system, and there's a table per process called the LNM$PROCESS_DIRECTORY.

In each of these directories, there are several multivalued logical names that specify the order of search when performing certain operations. An important one is the LNM$FILE_DEVICE, typically found in the system directory and assigned to the following values:

```
LNM$PROCESS
LNM$JOB
LNM$GROUP
LNM$SYSTEM
```

This states that in performing a file operation, the logical name tables to be searched are the PROCESS, JOB, GROUP

FIGURE.



Root structure.

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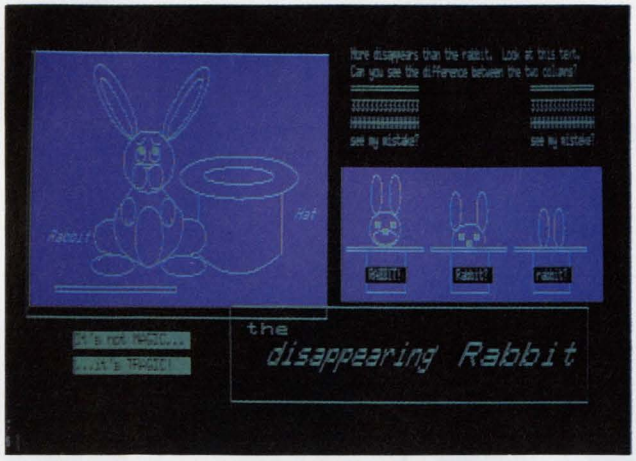

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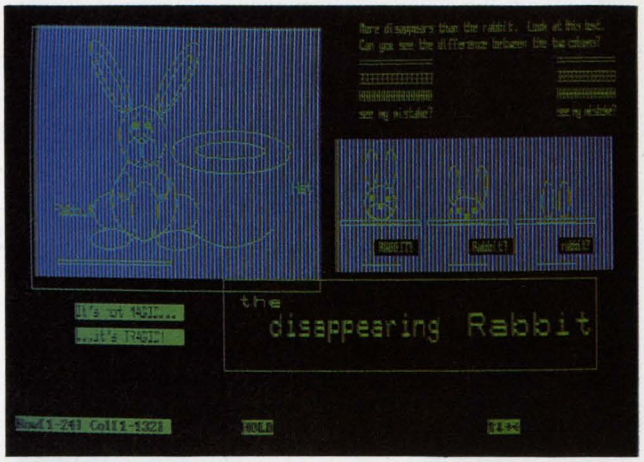

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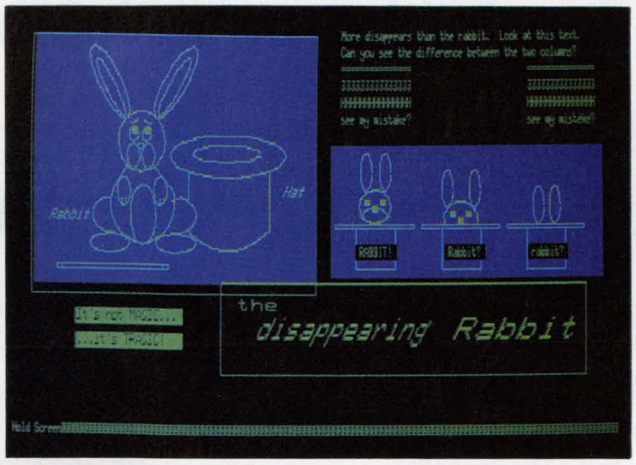

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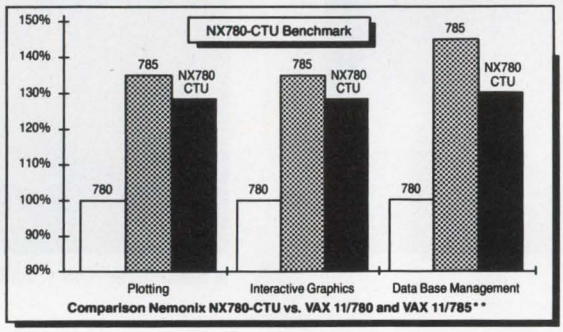

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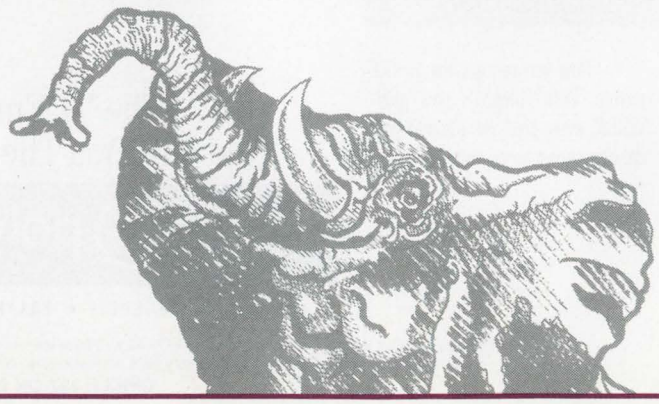

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and SYSTEM tables, in that order.

In the LNM$PROCESS_DIRECTORY, these are defined more specifically on a per process basis as follows:

```
LNM$PROCESS = LNM$PROCESS_TABLE
LNM$JOB = LNM$JOB_nnnnnnnn
LNM$GROUP = LNM$GROUP_gggggg
LNM$SYSTEM = LNM$SYSTEM_TABLE
```

where nnnnnnnn is a unique job table identifier and gggggg is a six-digit unique group identifier.

These are the "standard" assignments. We found that by redefining LNM$GROUP in the process logical name directory, we could use tables other than the standard group logical name table and have members of the same group on the same machine experience different environments.

3. Establishing Multiple Alternative Group Logical Name Tables — At boot time, the SYSTARTUP.COM procedure invokes a series of startup procedures for each unique development effort on the system. These startup procedures construct a pair of logical name tables for each class of developers with a table-naming convention that's unique to that class. Then, during the log in procedure, the LNM$GROUP logical name in the process directory is replaced with a multivalued logical name of the form:

```
LNM$GROUP <special table>,
=
    LNM$GROUP_gggggg
```

4. Complications Associated with Unique Group Tables — Our software system comprises a group of detached processes that cooperate to perform the manufacturing support functions. Detached processes don't by nature share any logical name tables other than the SYSTEM table and appropriate GROUP table. Thus, when a developer wants to define a group logical name to be used by the running system, he must put that logical name into the real group logical name table, not the special one.

5. Roots — One feature of VMS that appeared in version 3 and was used heavily in the cluster support offered in version 4 is a root. Some of you certainly will recognize SYS$SYSROOT as a key logical name. A rooted directory structure allows several parallel structures to lie "side by side" on a disk. Each root looks like a virtual disk, with a top-level definition of the form:

```
SYS$SYSROOT = $1$DUA0:[SYS2.]
```

The key feature of the root definition is that subordinate logical names can be defined based on the root logical name. They automatically will point to other directories if the root logical name is changed. Thus, a whole logical name structure can be established with a single root definition. This structure can be made to point to any one of a series of disk structures just by changing the definition of the root logical name.

DEC uses this root structure to allow more than one copy of the VMS operating system to lie on the same disk. Typically, a system disk will have the primary operating system in the SYS0 root and standalone backup operating system in the SYSE root.

6. Roots Within Roots — In our development environment, we've made extensive use of the rooted structure to meet two main objectives. First, each team has its own rooted structure to hold a version of the system. Second, within each individual team's root is a pair of roots, one for the last working version of the system and one for the version being built. For this reason, two special group logical name tables are built for each developer class, one to hold the logical names for the last working version and the other for the one being developed. The Figure illustrates a root structure for a single team.

The root directory holds only the directory files for the tops of the remaining tree structures. The CONFIG structure contains the information used to configure the software for application to

> . . . two special group logical name tables are built for each developer class . . .

a field installation. It's used mainly to drive a build operation, although it's modified occasionally when major changes are made in the live system. A single copy of this configuration data is sufficient for both the LIVE and BUILD parts of the root.

The LIVE and BUILD limbs (limbs are branches near the root) are roughly identical except that the LIVE side contains the latest working copy of the software, whereas the BUILD side contains the "next" incarnation of the software. The SOURCE directory contains the command files and source files that actually make up the software. The LIBRARY directory contains the object libraries used during the build as well as the installable, shareable images. Finally, the EXE directory contains the executables generated by the build.

Logical names are the key to seeing (and not seeing) parts of the overall tree structure. We define two top-level logical names that provide the entry points to the traversal of the tree. P2_DISK points to either the LIVE or BUILD limbs, while SITE_DISK points to the configuration information. Their actual definition is of the form:

```
P2_DISK = "ddcu:[root.LIVE.]"
          or
    "ddcu:[root.BUILD]"
SITE_DISK = "ddcu:[root.CONFIG]"
```

These names, incidentally, are created with the CONCEALED and TERMINAL attributes in the JOB logical name table. Note that P2_DISK can acquire either of two definitions depend-

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ing on whether the developer wants to work on the current working version or the next version of the software.

This structure also allows a developer to move from root to root (i.e., from team to team) in a straightforward manner. By changing the first part of the root definition, a developer sees the root structure for a different team. For example, the SITE_DISK definition for the enhancement team might take the form:

```
SITE_DISK = "$1$DUA4:
  [DEVELOP.CONFIG]"
```

whereas, for the quality assurance team, it would be:

```
SITE_DISK = "$1$DUA12:
  [QTEAM.CONFIG]"
```

A DCL command included in the common log in file allows you to enter the command CHANGEROOT and the root identifier, and have all appropriate logical names redefined to point to a different structure. Another pair of DCL commands allows developers to switch readily between the LIVE and BUILD sides of the root structure. Each of these DCL commands manipulates the DCL prompt, so that developers are made aware which side of which root is currently their default.

If this were the whole structure, we'd have solved only two of our four objectives, namely that a system build doesn't disrupt the entire team and that a developer can work for more than one team at the same time.

7. Multivalued Logical Names — Another feature introduced with version 4 of VMS is multivalued logical names. As the title implies, a logical name can have more than one assigned value. A common application of multivalued logical names is the creation of a search list. A good example is the definition of SYS$SYSROOT on a cluster disk:

```
SYS$SYSROOT = "$1$DUA0:[SYSn.]
    "SYS$COMMON"
```

where

```
SYS$COMMON = "$1$DUA0:
  [SYSn.SYSCOMMON.]"
```

This allows the bulk of VMS, which is common to all of the systems in a cluster, to reside in the SYSCOMMON root, while the machine-specific information for each member of the cluster resides in its specific root.

We've created a similar set of logical names to allow one master copy of our sources to service all teams simultaneously. We maintain both the CMS library and a plain-text version of the

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A class in CMS is a collection of specific generations of elements. This is an ideal way to define a release of a product.

source modules in two directories accessed by logical names:

```
MASTER_SOURCE =
  "MASTER_DISK:[PLAIN]"
MASTER_SOURCE_CMS =
  "MASTER_DISK:[CMS]"
```

where:

```
MASTER_DISK: = "$1$DUA7:[MASTER.]"
```

MASTER_SOURCE contains the latest release of the software common to all roots. Typically, this is the major release of the software that's installed in field locations. MASTER_SOURCE_CMS is the logical name by which the CMS library for all roots is reached.

There is a logical name by which source modules are accessed in every root:

```
SOURCE = "P2_DISK:[SOURCE]"
   "MASTER_SOURCE"
```

In this way, the only modules in the actual root SOURCE directory are those different from the ones in the master directory. Thus, of the 1,000 modules comprising our software system, all exist in the MASTER_SOURCE directory, while only a small fraction exist in each of the individual root SOURCE directories.

The real strength behind this system is the facilities provided by CMS. CMS allows many serial generations of a source module to exist simultaneously. Each module starts out as generation 1 and proceeds serially with each RESERVE/REPLACE operation in CMS.

CMS supports a class feature. A class in CMS is a collection of specific generations of elements. This is an ideal way to define a release of a product. For example, release 1.0 can comprise generation 7 of A.FOR, generation 3 of B.FOR and generation 2 of C.FOR. Release 2.0 can coexist with release 1.0 in the same CMS library and comprise generations 8, 3 and 4, respectively, of the same elements.

In CMS, a class could be called V1 and hold the information about release 1.0 and a different class could be defined as V2 with the information about release 2.0.

While CMS classes are ideal for supporting various releases of a product, there are other uses also. We use them to differentiate the generations used by the various development teams.

At the beginning of a development cycle, our CMS library is set up in an initial state. A class called MASTER is defined as the current field release of the product. The plain-text versions of the elements in the MASTER class are fetched into the MASTER_SOURCE directory. A class is defined for each of the various development teams and is set equal to the MASTER class. Typically, we use three classes:

1. DEV — The class containing "latest and greatest" software developments and enhancements. This is the class that eventually will comprise the next major release.

2. QTEAM — This class contains the software being tested by the quality assurance team. This is typically "one back" from the DEV class and is a working version of the software that has survived the initial testing by the individual developers.

3. SMT — The location manager's class contains patches to the latest release developed to support problems uncovered in the field installations. These patches are merged into the DEV class also, so that once a problem is solved, it remains solved in the next release.

A set of command procedures encapsulates the CMS library to assure that the plain-text copies of elements in the various roots are correct. When an element is reserved for modification, the command procedure checks in which root the developer currently is working and makes sure that the copy of the program is in a subdirectory of the same name as the current root. This allows a developer to work on the same module in different roots simultaneously without undue confusion. It also reserves the module from the CMS library from the class associated with the developer's team.

Upon replacement, the command procedure not only performs the CMS functions on behalf of the developer, but also puts a plain-text copy in the BUILD sources of the current root. In this way, the "latest and greatest" changes are always available for the next system build. Variants caused by simultaneous modifications in two different teams also are handled by the command procedures. Finally, the reserve procedure assures that a developer receives the generation appropriate to the team he's assigned to.

We've met all four of our objectives with this development environment by applying simple VMS features and the CMS package. Perhaps you'll be inspired to apply VMS features to the solution of your outstanding problems. —*Donald P. Golden Jr. is technical manager for Shell Oil Company, Houston, Texas.*

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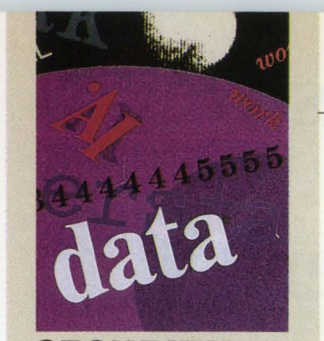

SECURITY

SYSTEM SECURITY, PART 1

By David W. Bynon

Protecting Against System Break Ins.

Editor's note: Because the subject of system security is so vast, David W. Bynon will cover it in two parts. In Part 1, he discusses user identification and access protection.

If there's one topic that affects us all, system security is it. We all have important information about ourselves, our customers, our company or our country stored in a computer system. Some is public knowledge, such as our name and address, but most is not.

It has become easy to access, sort, manipulate or destroy stored information. After all, we have made the computer a powerful tool for performing these types of operations. The easier computers are to access, the more difficult they are to protect.

System security is a multifaceted problem. We're faced with issues such as physical security, log in/password protection, identification, trust, user awareness, object protection and system manager awareness.

Positive User Identification

Positive identification is the greatest problem we face in trying to protect our computer systems. Positive personal identification has been cited in several publications put out by the U.S. National Bureau of Standards (NBS). The NBS states that there are three methods by which an individual may be identified: by something unique which is known by that person, by something unique about that person, and by something unique that is possessed by that person.

An example of the first method, and that used by VAX/VMS, is the user password. The second method is representative of a biometric identification, such as your fingerprint or retinal capillary patterns. The final method is a basic key, the possession of which grants access.

The NBS recommends in several publications that no single one of these methods be considered secure enough for positive identification. However, two of the three methods can be used in tandem to prove positive identification sufficiently; e.g., a password used together with a key.

User And System Passwords

VAX/VMS system security is useless without 100 percent password integrity. Passwords are a VAX/VMS system's first line of defense against unauthorized system access. For this reason, strict attention must be paid to the use and maintenance of all passwords.

A password is associated with each entry (account) in the system user authorization file (SYS$SYSTEM:SYSUAF.DAT) unless explicitly negated. Passwords, which may be one to 31 characters, are stored using a one-way encryp-

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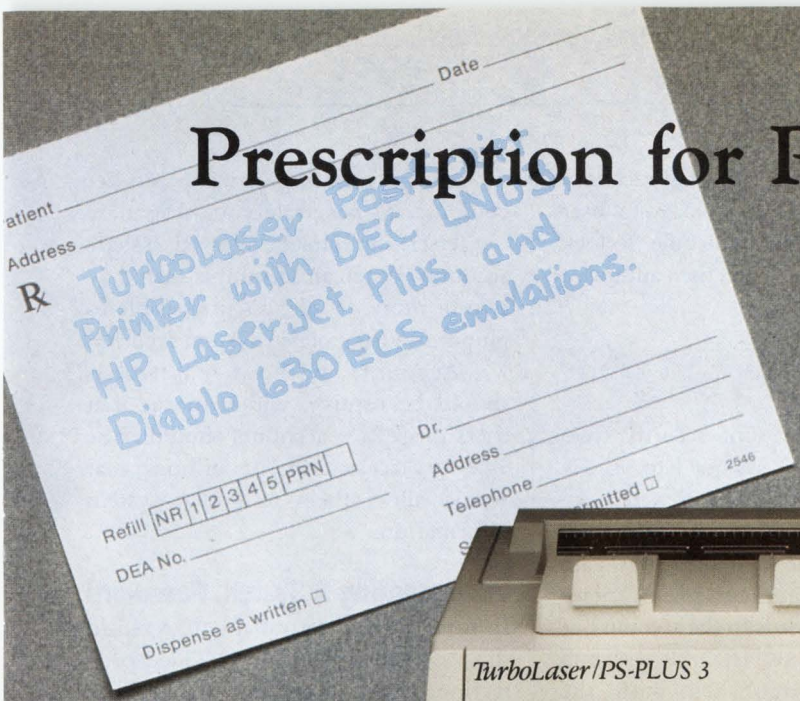

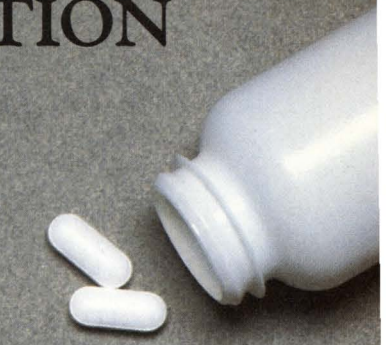

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> For more account security, two passwords can be assigned to an account.

tion algorithm. The encryption transforms each password into a 64-bit hashed value. Once encrypted, passwords can't, with any publicly known method, be returned to their original readable form. For this reason, lost or forgotten passwords must be changed by the system manager.

Password Tailoring

Using AUTHORIZE, password protection can be tailored to your needs. For instance, the authorize qualifier /PWDMINIMUM defines the minimum number of characters to which a password may be set. The default value of six otherwise would apply. If a password is set by the system manager using AUTHORIZE, the password may be less than the minimum value.

The /PWDEXPIRED authorize qualifier pre-expires a user's password. A user whose account password has been pre-expired must set a new password when he logs in. Use pre-expired passwords on all new accounts to force the user to set his password. Set a password's lifetime with another authorize qualifier, /PWDLIFETIME. By default, a password's lifetime is six months. The lifetime established applies to both primary and secondary passwords. The first example below establishes a password lifetime of 45 days, while the latter institutes a password with no expiration date:

```
UAF> MODIFY /PWDEXPIRED=45
UAF> MODIFY /PWDEXPIRED=NONE
```

If you work in a high-security environment, you can prevent users from establishing their own passwords. Most organizations that do this have a security office that assigns passwords to user accounts on a regular schedule. To lock user passwords, use the authorize command:

```
UAF> MODIFY /FLAGS=LOCKPWD
```

For more account security, two passwords can be assigned to an account. In this way, a two-key system can be employed. This two-key system requires two people to be present to gain access to an account. Each person knows one of the passwords to the account but not both. Using AUTHORIZE, a second password is established with the command:

```
UAF> MODIFY /PASSWORD=
  (password1, password2)
```

If you want users to be able to set their own passwords with assurance that password guessing won't compromise the account, the password generator should be used. The authorize qualifier /GENERATE_PASSWORD forces the user to select his password from a generated list. When the user enters the DCL command SET PASSWORD, five passwords and a pronunciation table are displayed. The user must choose a password from the list. This method of password implementation is easier, and in some ways more secure, than assigning passwords.

Password Recommendations

Passwords are sensitive mechanisms. In essence, they're identical to keys or combinations to locks and must be protected in the same way. Obviously, being careless with passwords can be disastrous; leaving any information about VAX/VMS accounts lying around is discouraged.

Passwords should be long, nondescriptive and changed frequently. Passwords such as a spouse's or child's name, phone number, car license number or other information about the user that might be obvious shouldn't be chosen. I recommend a minimum password length of eight characters. The greater the length, the less risk you take of someone guessing or using another computer to penetrate your system.

Users shouldn't be allowed to share accounts. When an account is shared by two or more people, it's impossible to pinpoint who violated system security.

Accounts without passwords should be captive, which means that users of captive accounts shouldn't be able to access DCL or utilities that would allow them to get at system information.

Implementing A System Password

In some cases, a terminal connected to the VAX may need to have added protection. This is often the case with lines accessed by modem, where it is difficult to monitor who's trying to use the system. The system password protects these lines by preventing a log on attempt until the system password is entered. Also, until the system password is entered, no information about the system is provided.

The system password is implemented on a line-by-line basis using the command:

```
$ SET TERMINAL/SYSPWD/
  PERMANENT TTxn:
```

Users who log on remotely (through the SET HOST command) can be forced to use the system password by setting bit 19 (hex value 8000) in the system parameter TTY_DEFCHAR2.

The system password itself is created with the command:

```
$ SET PASSWORD/SYSTEM
```

which prompts for a password and verification. The system password also can be modified using AUTHORIZE:

```
UAF>MODIFY/SYSTEM_PASSWORD=
   "new_password"
```

The SECURITY privilege is required to set or change the system password.

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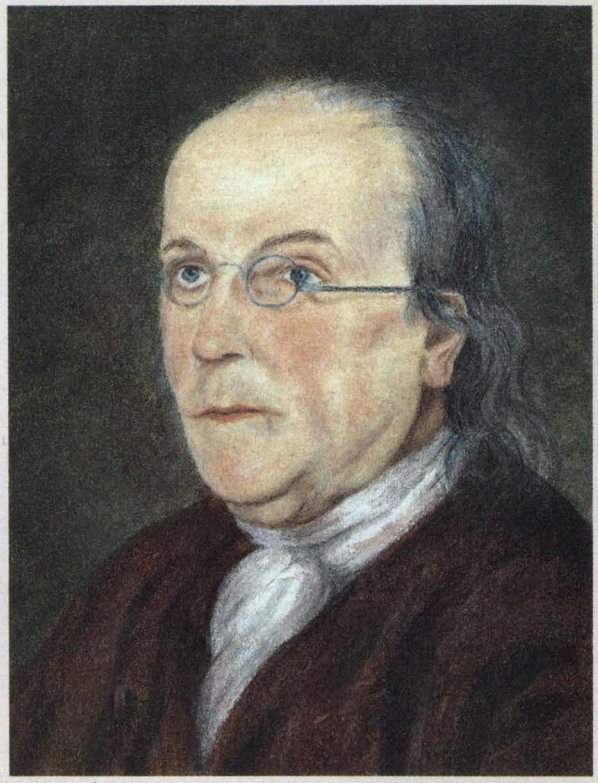

When it comes down to it, your company's records and information are its most valuable assets. If you compromise that information, you could lose millions—or worse.

Benjamin Franklin said it best when he said "an ounce of prevention is worth a pound of cure." The time to protect your data is before a loss occurs. Every year more than a billion dollars are lost to computer crime. Surprisingly, the majority of violations come not from external hackers, but from trusted employees. Recent surveys show that over 85% of computer crime comes from a company's own employees, with an average loss of over $90,000.

ClydeSENTRY computer security software for VAX/VMS systems is a major deterrent to most assailants. With the knowledge that the entire system can be monitored and a detailed audit report produced pinpointing potential security problems, users are not likely to misuse system resources.

Standard VMS access controls are good, but as many companies and government sites are finding out, they are not enough. ClydeSENTRY utilizes all VMS user, password and privilege functions and improves the system with powerful access controls, monitoring and reporting features.

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You'll find that even when you are monitoring the entire system, the CPU burden is less than 3%, and typically, full implementation is transparent to users and requires no additional equipment or personnel.

In the real world, no security system is perfect. ClydeSENTRY computer security software comes as close as practically possible. Call Clyde Digital Systems now to help prevent the attacks on your proprietary information and to keep your private files private.

Computer System Security Features Analysis

	VMS Access Controls	ClydeSENTRY with VMS
ACCESS CONTROLS		
File Protection	✓	✓
Access Control Lists	✓	✓
Password Protection	✓	✓
Alarms	✓	✓
Dial-up Port Protection	☐	✓
Unattended Terminal Protection	☐	✓
Restriction on Privileged Activities	☐	✓
MONITORING CONTROLS		
Privilege Levels	✓	✓
Accounting Logs	✓	✓
Continuous, Tamper-Proof Monitoring	☐	✓
Archival of Security Data	☐	✓
Real-time Terminal Monitoring	☐	✓
ANALYSIS AND REPORTS		
Detailed Analysis of Audit Data	☐	✓
Security Report Generation	☐	✓

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It's stored in a separate record of the system user authorization file, which can't be shown, and the system password has no expiration date.

VAX/VMS Log In Protection

A perpetrator has most of his break in task completed simply by knowing the type of operating system or computer you have. Think about it. When you hear someone say VAX/VMS accounts, you probably think of SYSTEM, FIELD, ALLIN1 and some others. The experienced perpetrator has the same knowledge and immediately tries the most common passwords, such as MANAGER, PASSWORD, SERVICE and A1. Therefore, don't give out information if it's not necessary.

Obviously, we're not worried about our fellow workers trying to break in; they already have accounts and pose a security threat of another kind. Rather, this discussion is directed at what we can't see: the dial-in and remote access users.

Log In Messages

The first system message that reaches a VAX/VMS user logging in is the system announcement message. The translation of the logical name SYS$ANNOUNCE will display when a log in sequence is initiated (before the username and password are accepted). Often this message identifies the VAX, for example:

```
Welcome to VAX/VMS V4.7 at the U.S.
    Savings Bank
```

Three important pieces of information have been given away here: the system type, the operating system version and the name of the organization.

SYS$WELCOME, a second logical name, also can be used to provide information to users logging in. The welcome message is the preferred method of providing a welcome message or information about the system. The SYS$WELCOME message isn't displayed until a successful log in has been completed.

If you have captive users or users who are not to be shown the system welcome message, the authorize qualifier /FLAGS=DISWELCOME can be used to disable this feature. In this way, you have full control of the information you put out.

Log In Break In Protection

An excellent security feature of VAX/VMS is its ability to detect someone trying to hack his way into your system. VAX/VMS log in break in protection is controlled by setting up several system parameters that control the number of log in retries, break in threshold, break in source recognition and the action to be taken when break in detection is triggered.

The system parameters that control retries are LGI_RETRY_TMO (LOGIN RETRY TIMOUT) and LGI_RETRY_LIM (LOGIN RETRY LIMIT). These two parameters are used to control the number of log in attempts allowed in succession. This is particularly appropriate for dial-up lines. The default value allows three retries with a time limit of 20 seconds between tries. Break in threshold, which is the number of log in failures permitted before action is taken, is established with the system parameter LGI_BRK_LIM (LOGIN BREAKIN LIMIT). Log in failures are invalid username and password combinations. The default value for LGI_BRK_LIM is five failed log in attempts.

When break in detection is triggered, VAX/VMS tracks the source of the break in based on the system parameter LGI_BRK_TERM (LOGIN BREAKIN TERMINAL). The value of this parameter will determine if the username and terminal are to be tracked together or independently. The default value of 1 has usernames and terminals tracked together, whereas a value of 0 counts failures against usernames only. Tracking just the username is most appropriate for terminal servers, because the terminal line can be changed easily between attempts.

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The duration of break in recognition is set using the system parameter LGI_BRK_TMO (LOGIN BREAKIN TIMEOUT). The default is five minutes, which is sufficient for most situations. This parameter is used to assign an expiration time to an initial failure on terminal, username or both. The expiration time is the current system time plus the value LGI_BRK_TMO. Each additional failure adds an additional time of LGI_BRK_TMO.

The more failures logged against a username, terminal or both, the greater the period of time during which failures count toward the number defined by LGI_BRK_LIM. After the expiration arrives, without more unsuccessful log ins occurring, the cumulative failure count returns to zero. A successful log in doesn't reset the cumulative failure count.

When a break in attempt is detected, the action taken is controlled by the LGI_BRK_TERM (LOGIN BREAKIN TERMINAL) parameter. If LGI_BRK_TERM is set to one, no log in from the offending terminal, with the same username, is permitted. In other words, only the offending user is locked out from that terminal. If the source is a NETWORK user, the remote user will be disallowed from logging in. Although locking out a terminal line might be seen as desirable, a problem could occur. On a system using terminal servers, if the parameters are set in a certain manner, all terminal lines could be disabled. This would be only a minor inconvenience in return for a more secure system.

To make the lockout time variable, the system parameter LGI_HID_TIM contains a value that is multiplied by a

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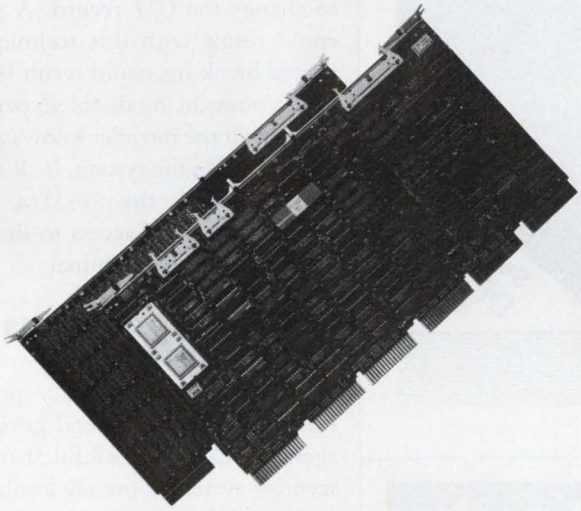

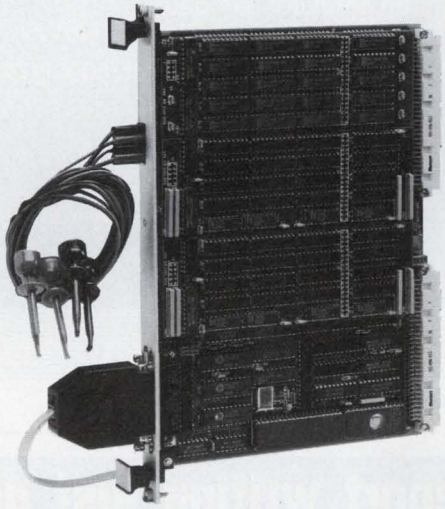

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random number. The random number falls between the values of 1 to 1.5. This feature prevents someone from guessing your lockout interval, making the use of another computer to break in impractical.

Another system parameter LGI_BRK_DISUSER (LOGIN BREAKIN DISABLE USER) can be used to set the DISUSER flag in the system user authorization file. If a user's account is locked out from this mechanism, the system manager must use AUTHORIZE to change the UAF record. A problem could result with this technique. Repeated break ins could result in multiple accounts being disabled, perhaps all accounts if the intruder knows all of the usernames on the system. If all accounts were disabled, the SYSTEM account would be allowed access to the system from the console terminal.

Hard-Core Authentication Of Identification

Sites with special security problems, such as banks and federal government agencies, can be thankful that special security systems now are available. By employing a secure hardware gateway and a hand-held device that generates passwords, two of the three NBS identification methods can be realized. One system that implements this security feature is SecurID by Security Dynamics of Cambridge, Massachusetts.

The SecurID card is a credit card-sized microprocessor that generates a new, unpredictable passcode every 60 seconds. The secure hardware gateway to the system is fulfilled by an Access Control Module, which is synchronized permanently with every SecurID card. To be granted access, enter the number generated by the SecurID card and a personal identification number. Once access is granted, you then must carry out a normal VAX/VMS log in sequence.

In Part 2, I will discuss the features, problems and management of VAX/VMS internal security.

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TUNING

QUANTUM PM

By David B. Miller

A Solid Package For System Performance Monitoring From Computer Information Systems Inc.

Much has been written about VMS performance management and tuning, but managing a system's resources remains a challenge.

VMS utilities such as MONITOR and ACCOUNTING used in conjunction with the DCL SET and SHOW commands help you meet the challenge. However, using them can be difficult, considering all the available qualifiers and options. The databases they create aren't integrated, and it can be difficult to tailor their use to your situation.

Third-party system monitor and reporting programs gather comprehensive system statistics and provide reports. In addition, they attempt to add extra features not provided by VMS's tools, centralize system information in a common database and reduce the confusion of using VMS's utilities. We tested one such package, Quantum PM, from Computer Information Systems Inc. (CIS) of Braintree, Massachusetts.

Quantum PM provides a highly structured user interface, comprehensive system statistics collecting capabilities and powerful reporting functions. It collects and reports on configuration, CPU, I/O and memory statistics in single CPU, clustered and networked environments.

Using It

Quantum PM is installed via VMSINSTALL. During installation, 20,000 free blocks are required on the system disk. Quantum PM also needs 20,000 free blocks on the disk on which it will reside permanently. It establishes a number of logical names, creates a QUANTUM_PM username for running the program, sets up the node on which it's being installed, and, if you're running in a clustered environment, gives you the opportunity to set up additional nodes. You needn't set up all nodes at installation time; Quantum PM's management functions allow you to set up nodes later.

Quantum PM is designed to conform to CIS's Applications Architecture, a clear, logically designed, user-friendly interface common to all CIS software. Quantum PM's interface is menu- and window-driven; screen handling is well done. Up to 10 commands can be recalled from a command buffer. Default values are provided where appropriate.

Another facet of the Applications Architecture is extensive help. Context-sensitive and syntax help is available at all prompts. For prompts involving a choice from a list, data help is provided to inform you of all legal values.

Quantum PM consists of five major subsystems: SYSMGR, SYSOPR, SYSTRN, SYSCOL and SYSRPT.

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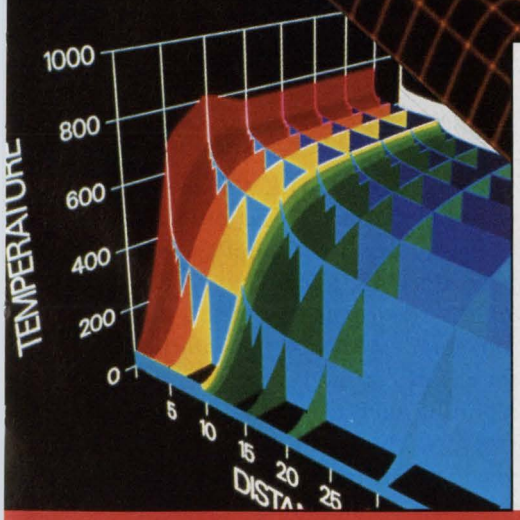

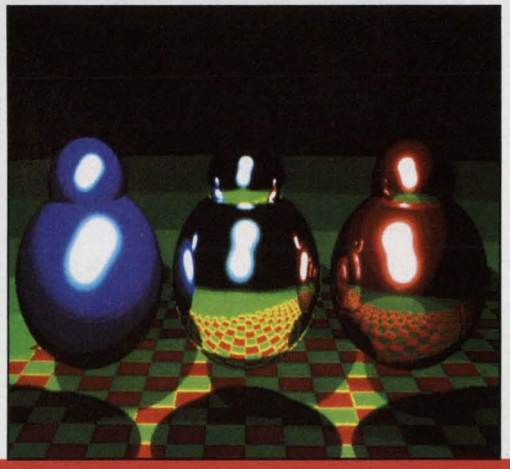

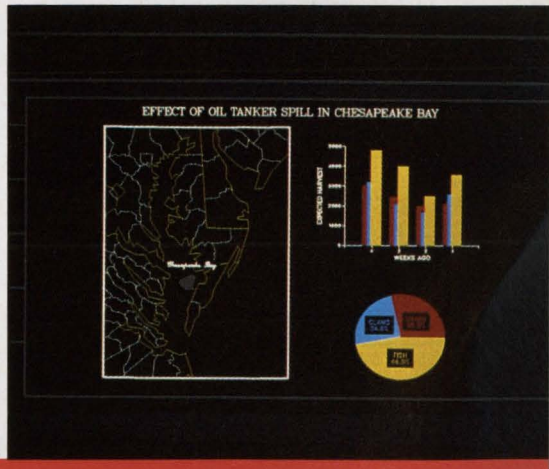

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Quantum PM

PLATFORMS: Any VAX system under VMS

PRICE: First CPU license ranges from $1,000 for the MICROVAX 2000 to $18,000 for the VAX 8800 and $54,000 for the VAX 8978

COMPUTER INFORMATION SYSTEMS INC.

HEADQUARTERS:
165 Bay State Dr.
Braintree, MA 02184
(617) 848-7515

FOUNDED: 1975

PRODUCT LINE: VAX/VMS system, performance, resource and programming software

OWNERSHIP: Private

BRANCHES: One domestic, two international

CIRCLE 529 ON READER CARD

QUANTUM_PM user directory has USER, BATCH and OUTPUT subdirectories to hold script files, report output, screen-snapshot files and data collection files. SYSOPR gives privileged users access to these subdirectories and provides file management capabilities as well as batch and print job control.

Terminal characteristics can be adjusted for the duration of a Quantum PM session. Collection file attributes, such as protection, initial allocation, extent and bucket size, can be adjusted via SYSOPR. Individual data files can be optimized from the SYSOPR module; there's no need to optimize all Quantum PM files in the SYSMGR function.

You can give users privilege to access some or all of SYSOPR's subfunctions; non-privileged users aren't presented with the SYSOPR menu choice after invoking Quantum PM.

3. SYSTRN — Manages raw data files. It gives you the capability to inspect the contents of raw data files, merge two or more, filter out unwanted statistics and combine sample collection intervals into longer ones.

SYSCOL and SYSRPT are used to collect and report on system statistics.

4. SYSCOL — Can collect more than 400 statistics directly from VMS, including SYSGEN parameters and more than 150 dynamic statistics related to nodes, devices, SCS nodes and processes. The raw data contained in a collection file then is passed to Quantum PM's reporting function, which massages the raw data and produces reporting statistics.

After starting SYSCOL, its DATINI subfunction initializes and establishes a collection based on the choices you make.

Select the statistics you need to collect. A complete list of available statistics is in the manual, but you'll probably prefer to type in the names of no more than two or three of them. So, CIS has grouped the statistics.

For example, the group G_PAGING includes individual statistics for total fault rate, page read rate, hard fault I/O rate, modified write rate, modified write I/O rate and swap rate. You can select a number of groups. Some groups overlap, but it's not necessary to generate a report on all statistics; you can receive a report on a subset of the collected statistics.

Choose the "entities" for which statistics are to be collected. Entities are nodes, SCS nodes, devices and processes. Wildcarding is supported, so it's not necessary to list all entities separately.

Date and time options govern starting and ending dates and times, days of week and times of day to collect data, and sample interval length. You can define work shifts and collect data based on them.

Other collection options let you include comments in the collection file, designate the local node to synchronize the collection process if multiple nodes are involved, collect data on outswapped processes and allow read access to the data file while data is being gathered.

After you've chosen the statistics you want to collect, on what entities they are to be collected and for what time period, you also need to supply the collection file name and confirm that everything is ready to go. DATINI initiates the data collection, connects to all necessary entities and returns control to SYSCOL. At this point, you can initiate other data collections, perform other Quantum PM functions, or exit Quantum PM and do other things while the collection process chugs along.

At any time during collection, the collection procedure can be inspected, paused or stopped with the DATCMD subfunction of SYSCOL.

We collected system statistics between 8 a.m. and 5 p.m. Even though the collection included groups of statistics for paging, cache, paged and non-paged pool, SCS statistics, DECNET, memory, lock and system summary information, the data collection files only grew to about 500 blocks each.

5. SYSRPT — Produces reports through a SYSRPT subfunction for hardcopy reports and SYSDSP for a dynamic display.

Quantum PM doesn't report directly on collection statistics. Rather, it uses a set of reporting statistics derived from the raw data. A reporting statistic can be the same as a piece of raw data, or it can be the result of a CIS- or user-written formula involving other statistics, arithmetic and logical operations.

For instance, the formula:

```
C_DEV_OP_COUNT / C_INTERVAL
```

where C_DEV_OP_COUNT and C_INTERVAL are collection statistics names for operation count and sample interval length, respectively, computes an I/O-per-second rate for a device. Quantum PM collects this information for all devices and uses this formula at reporting time to provide meaningful statistics. The SYSMGR function allows you to inspect, add to and change these formulas to suit your needs. Both mathematical and relational operations

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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.

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October 19, 1987

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are supported. Seventeen built-in functions to compute such things as averages, maximums, minimums, absolute value and standard deviation can be included in formulas.

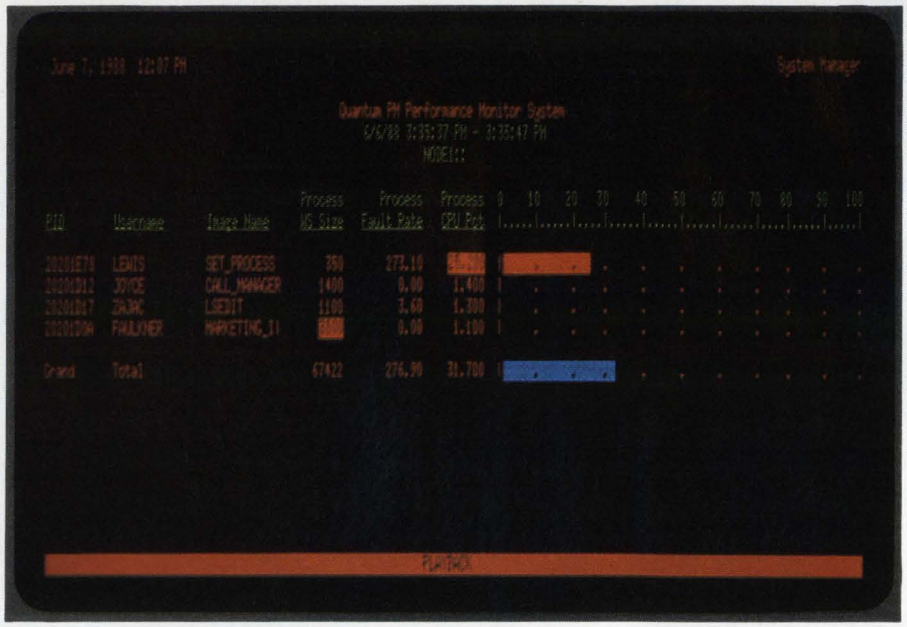
Quantum PM reports have three dimensions termed rows, columns and frames. Frames are individual reports consisting of rows and columns. For example, one report can place time intervals in its rows and statistics in its columns. There is one frame, or complete report with rows and columns, per entity. A full collection report consists of a "stack" of frames.

The 3-D reporting provides for six different report formats. You tell Quantum PM how to arrange the statistics, entities and times with respect to rows, columns and frames.

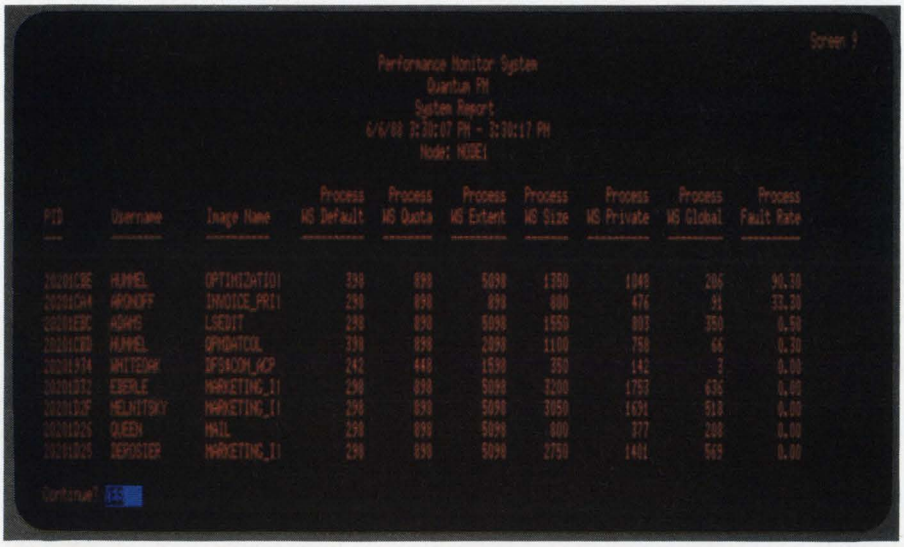
Reporting doesn't have to be generated on all the data in a collection file. You choose the statistics, entities and time intervals you want to see. Thresholding can be specified to report on only those items meeting the threshold criteria. Report items can be sorted in ascending or descending sequence.

Time and entity totals, averages, minimums and maximums can be generated. You specify through the SYSMGR function those statistics for which you want totals; this avoids generating meaningless totals, such as a total for CPU speed.

Quantum PM formats the report according to the criteria you specify in the SYSMGR function. Output can be sent directly to your screen, spooled to a line printer or sent to a file for later printing.



Screen 1: Quantum PM's dynamic display can play back previously recorded collection files or report on real-time system data. The data in the last column can be graphed.



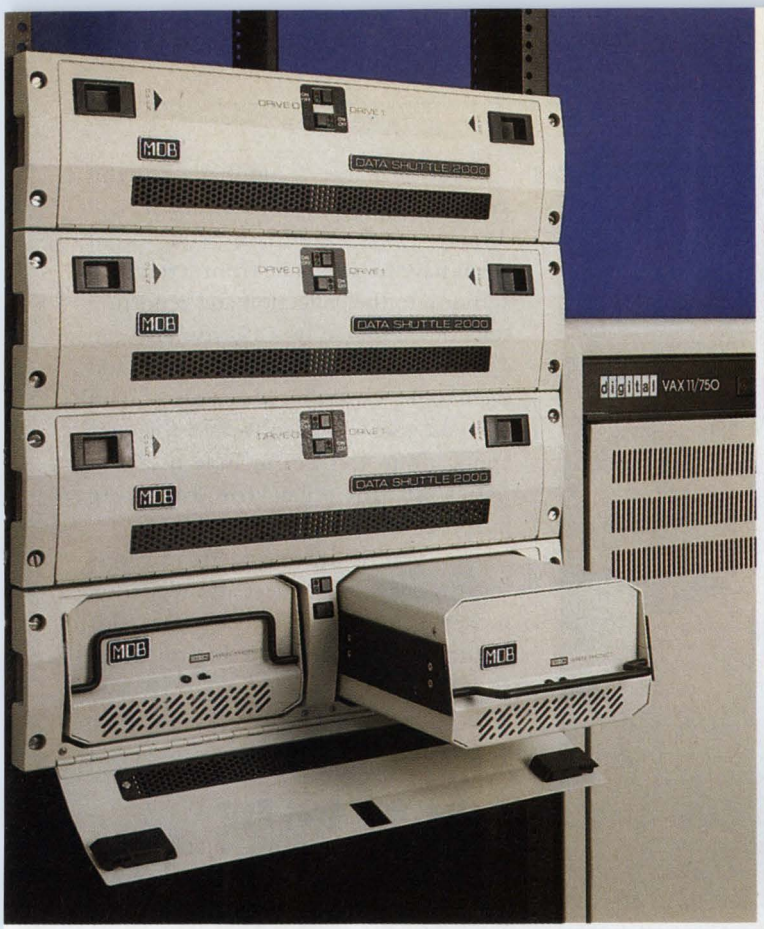
Screen 2: Each screen of a Quantum PM report is a frame (in this case a sampling interval) consisting of rows of processes (a type of entity) and columns of statistics.

Another reporting subfunction, SYSDSP, plays back a collection file on your terminal, one sample at a time. Output can be echoed to another terminal or to a file. A report frame is a time slice for a dynamic display. After selecting the contents of rows and columns, you can elect to produce a graph of the data contained in the last column.

Statistics can be displayed in a number of modes, including current value, total, average, minimum and maximum and delta value. Each is reflected over time according to the restrictions of the SYSDSP function.

While the playback is running, you can scroll backward and forward between screens if reports need more than one screen; invoke help; or interrupt the display and return to the Quantum PM dialogue. The format of the report also can be changed while the collection is being played back.

There are, however, problems trying to perform these functions if you're running over DECNET. We encountered



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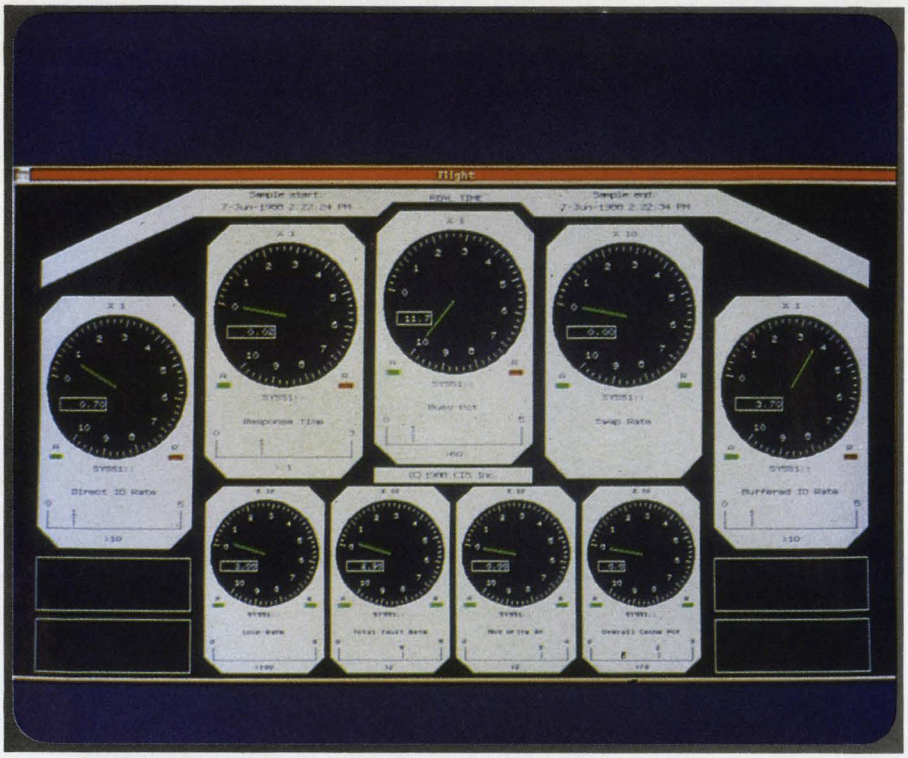


Screen 3: The flight display mode uses dials and indicator lights to report system performance statistics.

similar problems with XNS and our Xyplex Host Interface Unit. There are no such difficulties if your terminal is connected to a terminal server or directly to the CPU.

Live collections can be displayed while they're running; you don't have to collect the data first and play it back later. Simply bypass the SYSCOL and DATINI functions and invoke SYSDSP directly.

A dynamic display and one report frame are shown in Screens 1 and 2.

Convenience Features

Quantum PM provides additional features that make it easier to use.

When Quantum PM is installed and the QUANTUM_PM username is automatically set up, you're immediately directed to the menu system. Quantum PM also can be invoked directly from DCL commands issued by users with privilege or from a batch job, bypassing the menu system altogether.

To minimize the number of choices required to complete a typical data collection and reporting cycle, Quantum PM contains a powerful script file capability. Script file writing can be invoked any time you're in the Quantum PM dialogue or for your entire session. As you work through the menus and enter information, the script file is created automatically. You can tell Quantum PM to include prompts for information that will change from collection to collection. Script files then can be edited. They also can be nested.

Script file execution is invoked by supplying the script's name at the point in the Quantum PM dialogue where the script was created originally. Be sure to start script files at the right place in the Quantum PM dialogue. If you don't, the script will be out of sync with the dialogue, producing interesting results. To check on the script's progress, you can echo each step as it's executed, then abort it if things go awry.

CIS provides a number of useful sample script files to collect, report and display system statistics. You might never have to write one from scratch. In addition to the collection and reporting statistics supplied by CIS, you also can define your own user statistics and add them to the Quantum PM database. This lets you tailor your collection for your application. You can include user statistics in formulas for reporting purposes.

If you're interested in process statistics, you can collect and report on processes based on project name. This feature is not designed to do project accounting; it's intended to help you determine the impact that processes are having on your system.

Fasten Your Seat Belt

Who says performance management can't be fun? Screen 3 shows Quantum PM's flight display mode of operation. Flight display performs like SYSDSP, but in a more interesting way.

Each octagonal mounting plate displays numerically based statistics. Rectangular plates display statistics indicating true/false conditions. The outlines of plates are drawn even if there are no statistics to fill them.

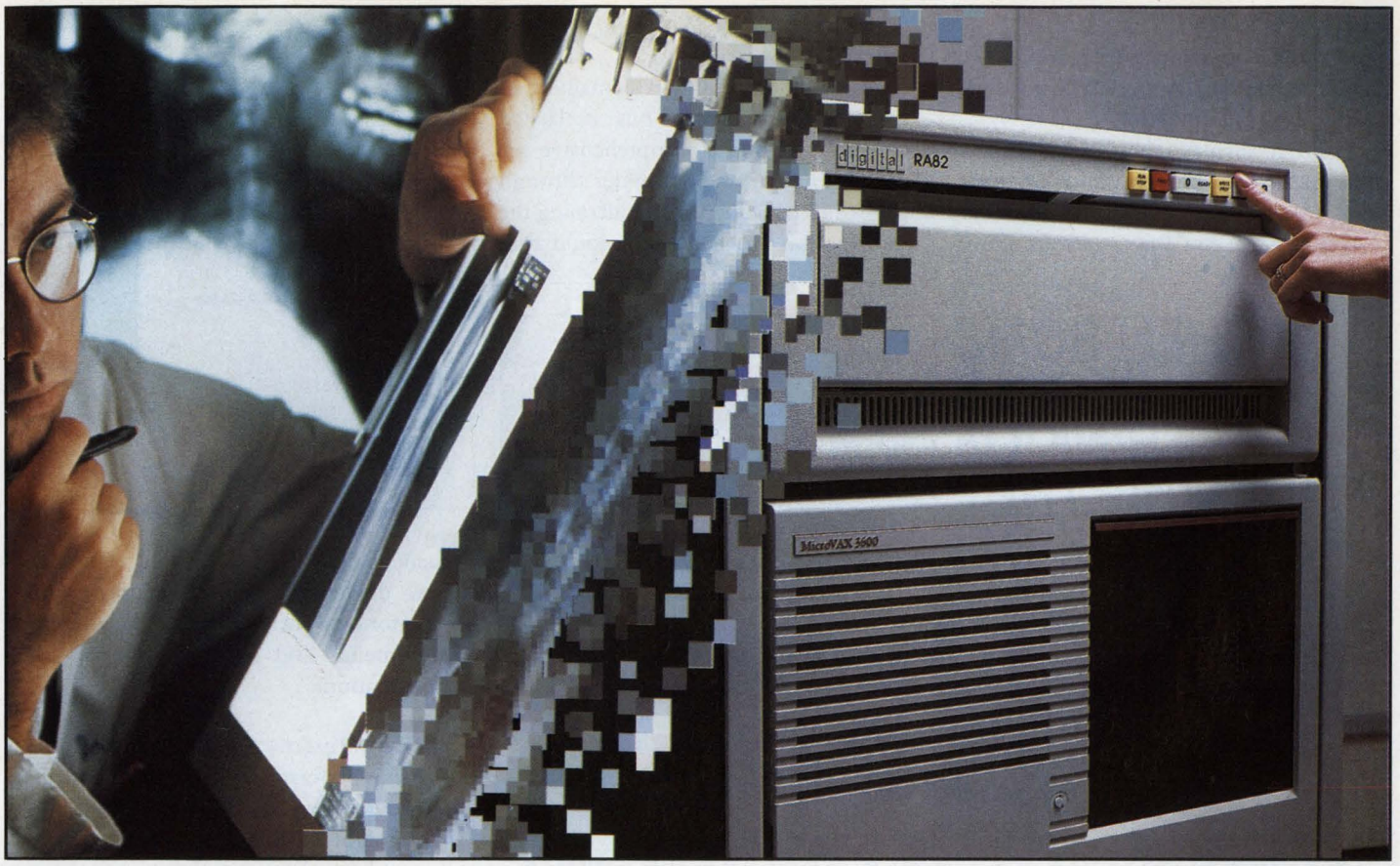
Numeric plates have a circular dial with a needle pointing to a value from 0 to 10. Quantum PM performs automatic rescaling of the incoming values and displays the scale factor above the dial.

Each dial contains a gauge used to track the number of times a condition occurs for a statistic. User-specified maximum occurrence counters can be established, and a user-specified action can be invoked if the gauge goes above the maximum.

Indicator lights above the plates of numeric dials change color when the dial is being rescaled and when the maximum occurrence counter has been exceeded. Plates for true/false indicators have a light to indicate a maximum occurrence condition.

Flight display runs on both color

S O L U T I O N S



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and black-and-white workstations. We also ran the display on a Macintosh II using a VT240 emulator.

Flight display reports statistics just as SYSDSP does, only in a different manner. The display is new and still under development, but CIS is serious about refining it for general use.

The documentation contained all the necessary items, but it lacked organization and a comprehensive index. I found myself flipping through pages and marking those containing the information I needed so I could find them again. CIS currently is developing new documentation to include more help for new users, more sample screens and menus and a better division of information.

QUANTUM PM ISN'T going to solve your system's performance problems, nor will it provide itemized lists of everything that might be wrong, complete with possible solutions. It requires a knowledgeable system manager who knows his computer, his user base and workload to interpret the reports that Quantum PM provides and to make intelligent, intuitive decisions to solve system problems.

Quantum PM is a comprehensive and flexible system statistics monitor and reporting package. It has an excellent user interface that's easy to use and that logically ties all of Quantum PM's modules. The script file feature is a real timesaver. The number of statistics and reports you can generate with Quantum PM will meet any of your data collection and reporting needs. The flight display mode will make even the most mundane performance management tasks interesting.

Quantum PM is an excellent choice for system managers looking for a solid package with which to do performance analysis, system tuning and capacity planning.

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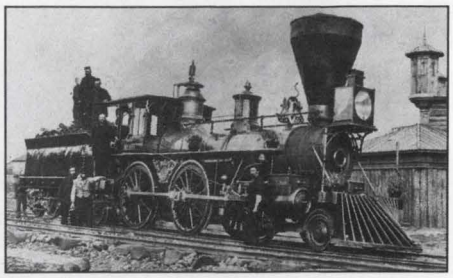

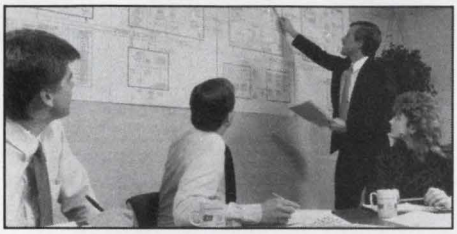

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FILE DESIGN

EFFICIENT INDEXED FILES

By Richard A. Snyder

Reducing The Number Of I/O Operations Required For File Manipulation.

In many instances, VAX RMS indexed files aren't designed and maintained with the care necessary for optimum performance. Frequently this is because the file designer doesn't understand indexed file structure. A basic understanding of indexed files will assist the user in file design and maintenance. The goal is to reduce the number of I/O operations required for file manipulation, thereby increasing perceived CPU speed.

Indexed File Structure

For VAX RMS I/O operations, an indexed file is logically thought to be a number of buckets of data. The bucket size is a number of disk blocks (1-63) specified by the file designer.

Data buckets contain data records sorted by the primary key of the file. An index record is created for each data bucket. The index record contains the key value for the last record in the data bucket plus control bits and a pointer to the data bucket. Index records are stored, sorted by key value, in index buckets. If all the index records for the data buckets can't be contained in a single index bucket, another level of index buckets is created. For successive index levels, each index record contains the last key value for each bucket in the lower level. This process of adding index levels continues until all the index records at a level can be held in one bucket.

Figure 1 is a simplified block diagram of a single keyed indexed file. The file contains nine buckets, consisting of three index buckets and six data buckets. The virtual block number of the file used to locate each bucket is shown in italics. The primary key is a two-position character string, in this instance assuming values from 01 through 24. The contents of the data buckets are sorted by the primary key. You also can see that the largest key value in each data bucket repeats in an index record in index buckets located at block numbers 27 and 28. Because not all index records fit into a single bucket, another level of indexing is required. This causes the highest level in the index, the root, to be contained in a single bucket located at block 13.

If alternate keys are defined for the file, each additional key causes RMS to create an additional index tree. The data level for the alternate index trees isn't the data, though, because the data in the data bucket is sorted by the primary key, not the alternate key. The alternate tree data record is known as a Secondary Index Data Record (SIDR). The SIDRs are sorted by the alternate key and contain pointers to the true data record bucket.

Figure 2 is a simplified diagram of an indexed file with an alternate key. This is the same sample file used in Figure 1, but a

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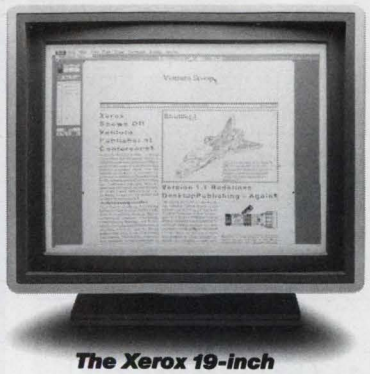

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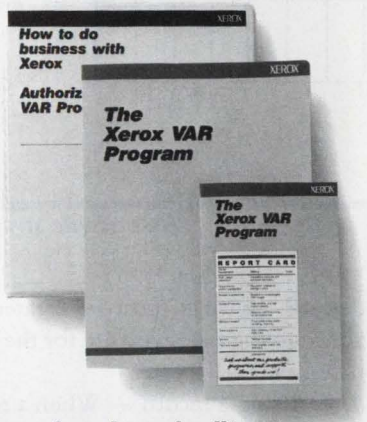

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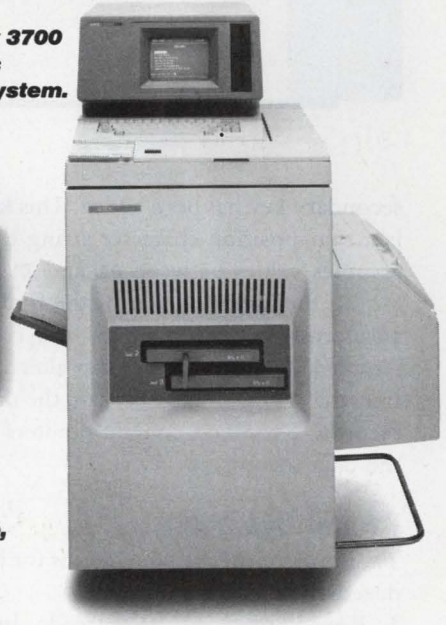

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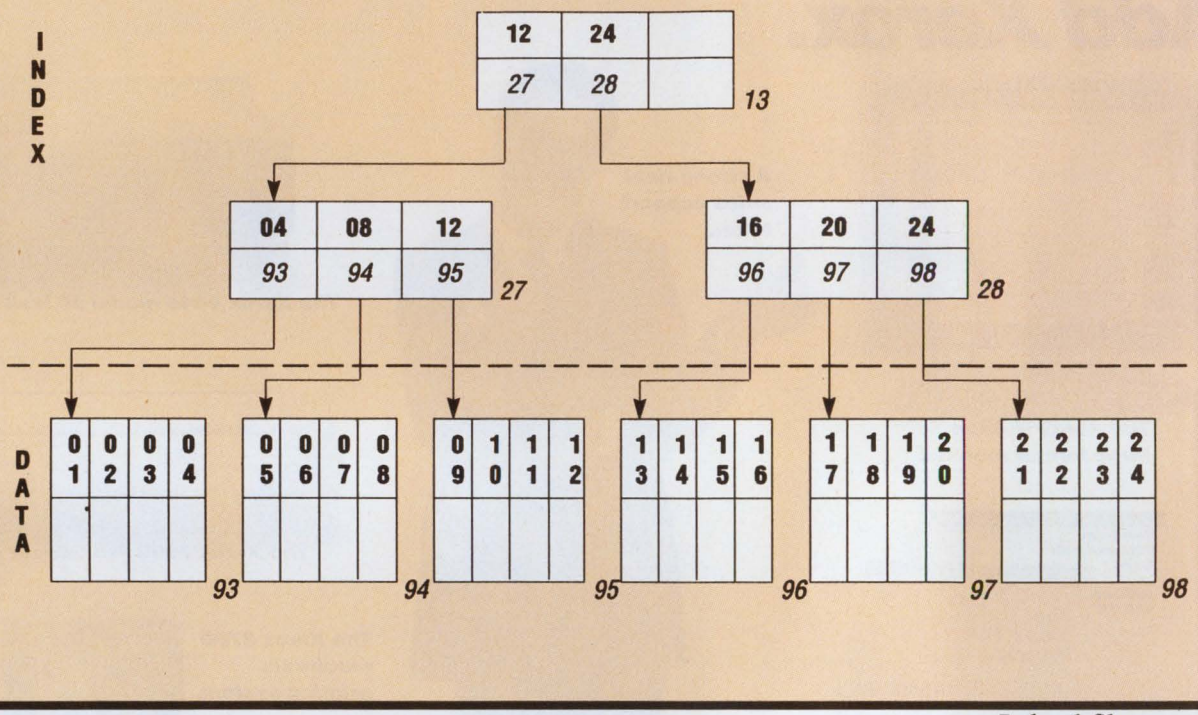
CIRCLE 361 ON READER CARD

FIGURE 1.



Indexed file structure.

secondary key has been added. This key is a two-position character string that assumes values between AL and ZY.

In the lower section of the figure, an alternate key index tree has been constructed. The data level of this alternate tree, the SIDRs, doesn't contain the data records. The SIDRs contain pointers to the data records.

Record Operations

There are four record operations for indexed files:

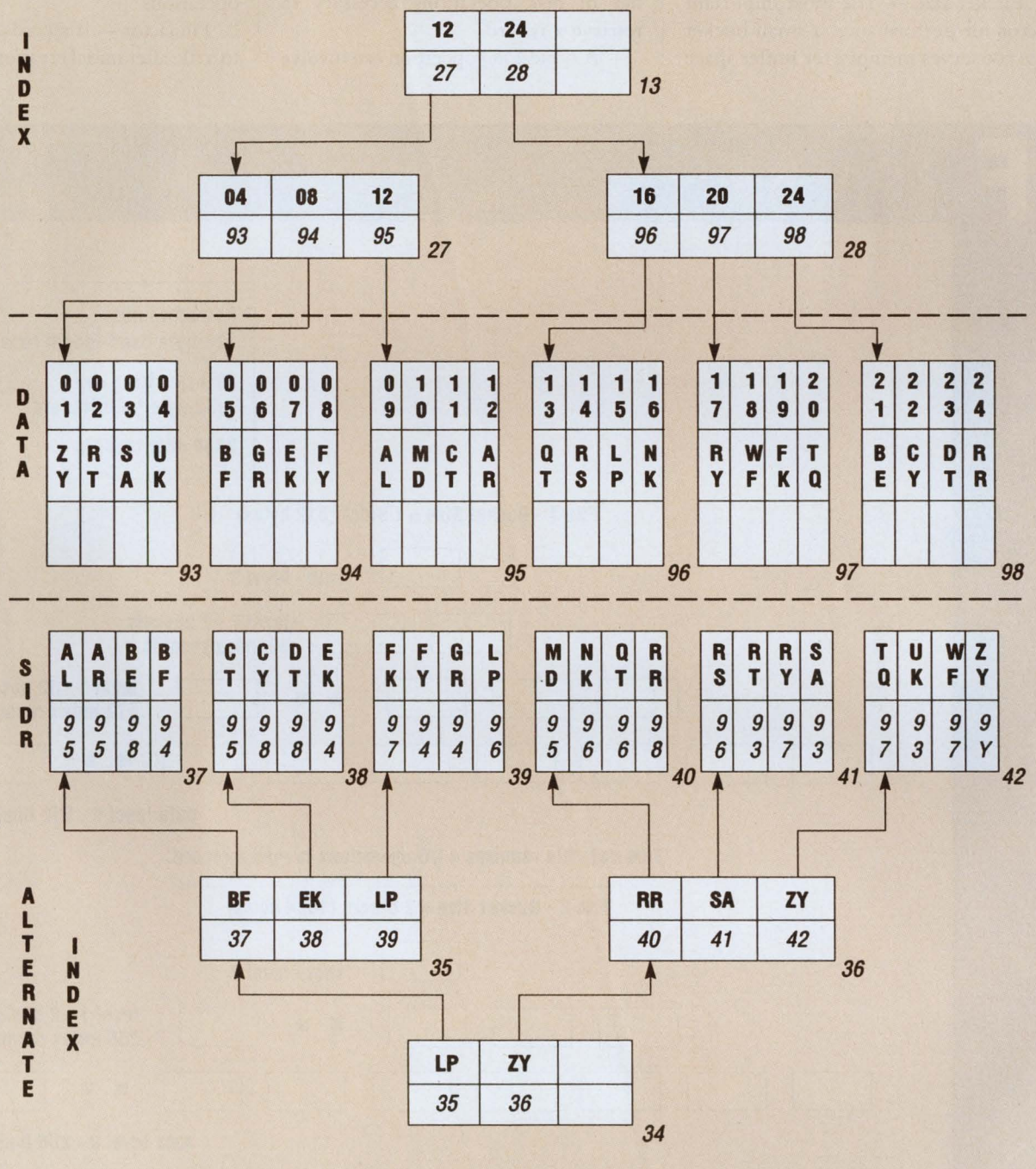
1. Keyed read — RMS reads into memory the root index level of the key of reference. It then searches the index records for the first one containing a key that's greater than the one specified in the read request. This index record contains the pointer to the bucket on the next lower level. RMS then reads the next lower level bucket into memory. If the next lower level bucket is an index bucket, RMS repeats the process until it reaches a data bucket. Then, RMS searches all the data records until a key match is made. It gives you the data record, or, in the instance of reading by an alternate key, performs one additional read to move from the SIDR to the true data record.
2. Sequential read — RMS returns successive data records with each read starting from the current record context. The current record context is established by doing a keyed read that establishes the key of reference and starting record position.
3. Writing to the file — When writing to the file, RMS searches to find the correct data bucket based on the primary key. When found, RMS inserts the data record, in sorted sequence, in the data bucket. If the file has alternate keys defined, an SIDR must be created and added to the tree structure for the alternate key.
4. Deleting a record — When a record is deleted, a control bit is set to indicate a deleted record. Record deletion doesn't regain file space.

Memory Considerations

Whenever a bucket is read into memory from an indexed file, it resides in a special memory area, called a buffer, that was set aside at file open time. A buffer holds one bucket.

By default, RMS allocates two buffers for an indexed file. The limitation of two buffers often can cause RMS to juggle the same buckets into and out of memory during random file access. RMS

FIGURE 2.



Alternate key structure.

attempts to cache the root level of the index structure, because the root bucket is needed for all record operations.

Efficiency Factors

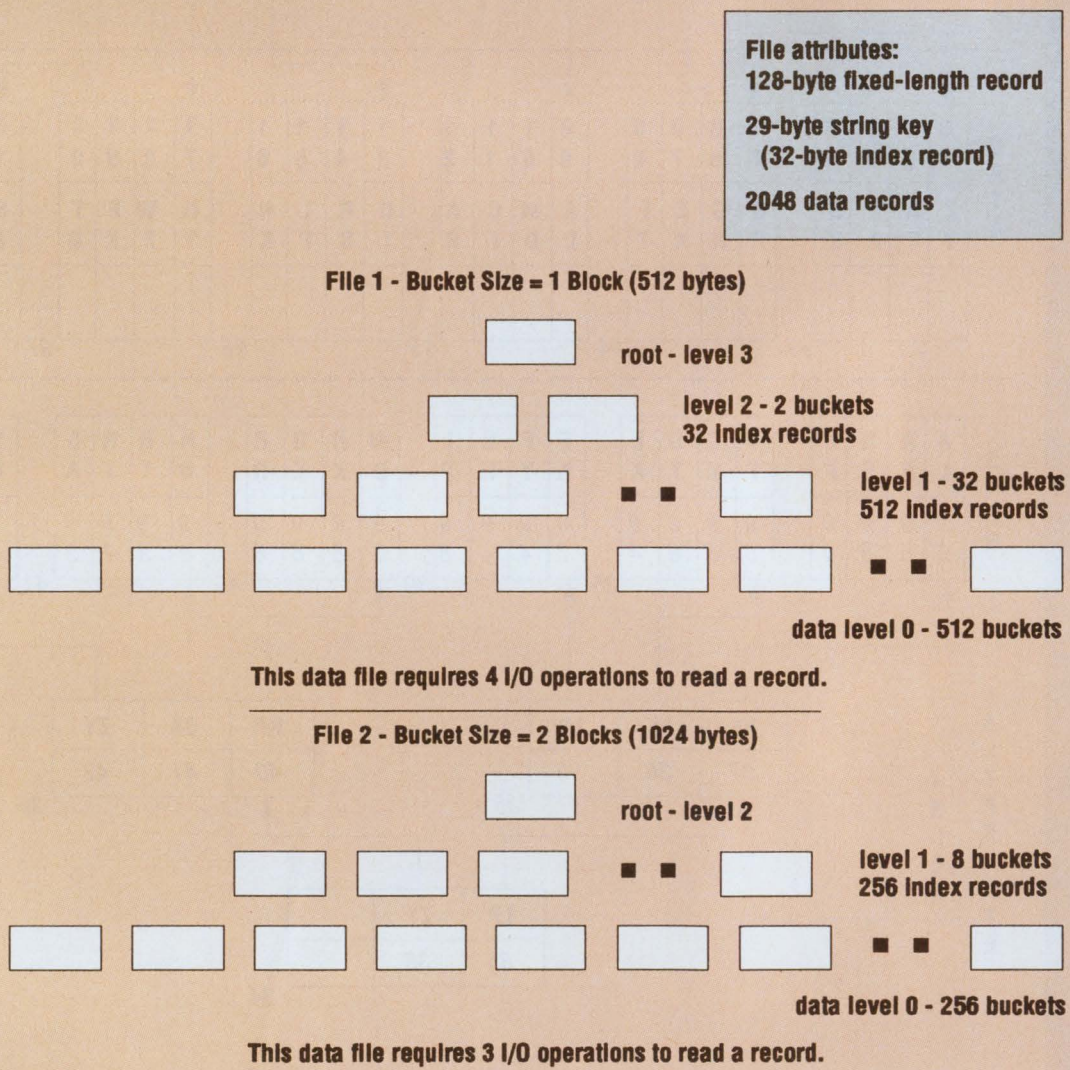
The three factors governing indexed file performance are:

1. Bucket size — The most important factor for performance, a small bucket size conserves memory for buffer space and reduces record search time; a larger bucket size can reduce the number of index levels, thereby saving I/O operations. Figure 3 shows the same data in two files that differ only by bucket size. Note the difference in the number of index levels and the corresponding number of disk operations necessary to retrieve a record.

A typical I/O operation can involve up to 30 milliseconds to complete. In the same amount of time, hundreds of thousands of instructions can be executed by a VAX. To increase perceived CPU speed, eliminate any I/O operation possible. Using the proper bucket size can eliminate unnecessary I/O operations.

2. Fill factor — If records will be added to a file after initial creation and loading,

FIGURE 3.



Bucket size comparison.

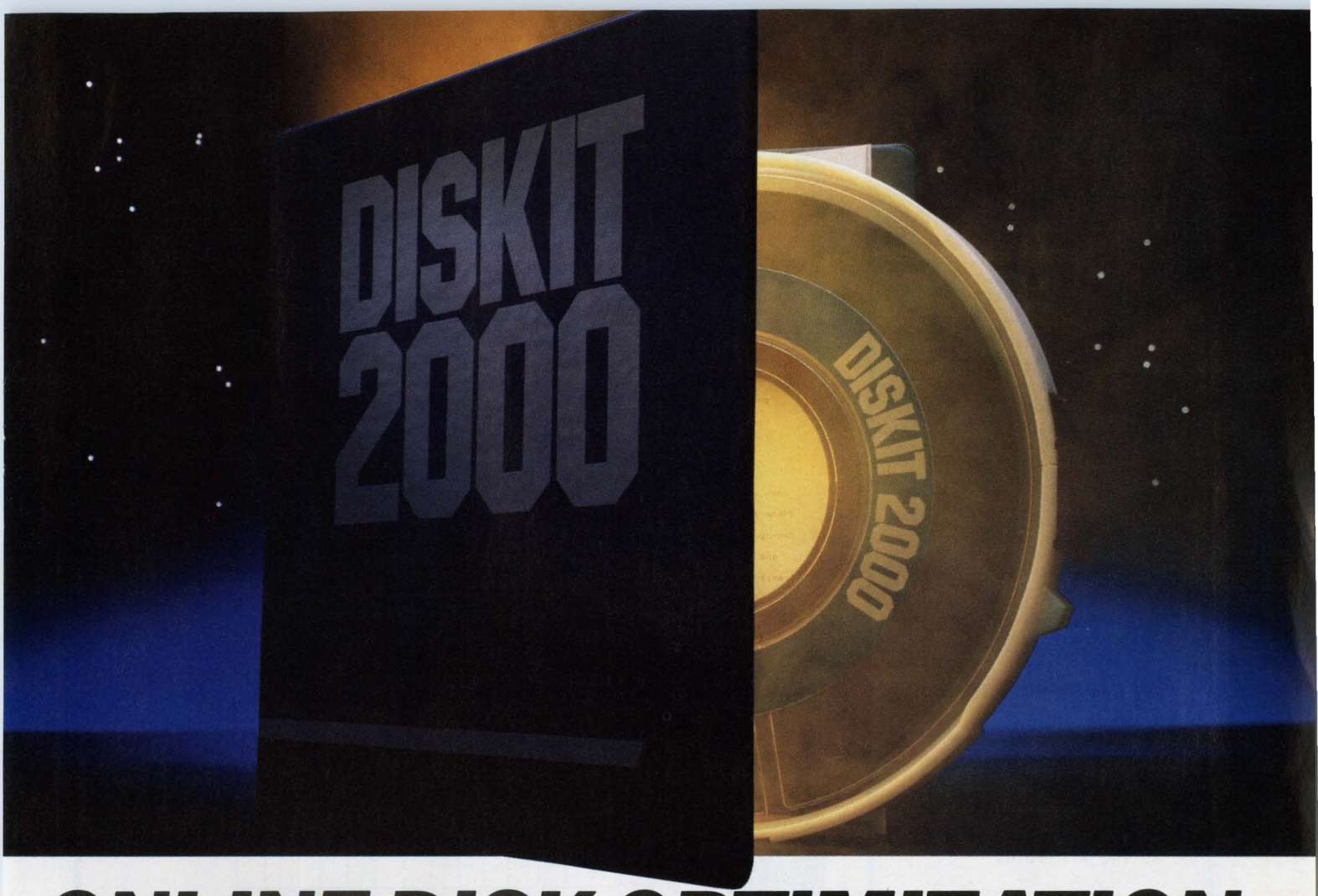


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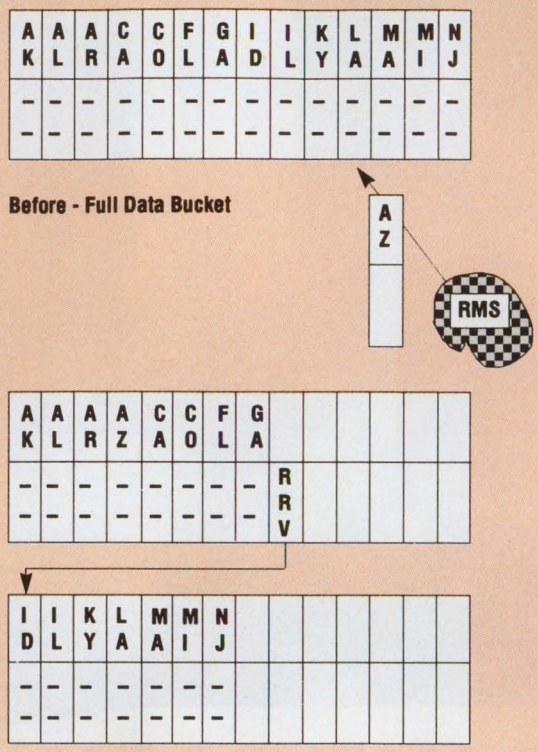
FIGURE 4.



Bucket split.

empty space should remain in each data bucket for the records. Adding a record to a full data bucket causes a bucket split (see Figure 4). When that happens, RMS allocates another data bucket in the file, moves half of the data from the original bucket to the new one, adds the new record and appends a pointer to the original bucket that points to the new bucket. This pointer is called an RRV.

A new data bucket created by a bucket split isn't indexed in the tree structure. To get the data in the bucket, RMS must pass through the original data bucket to obtain the RRV, thereby incurring an extra I/O operation and reducing perceived CPU speed.

Two steps must be taken to reduce or eliminate bucket splits. First, allow for a reduced fill factor at file load time; leave some room for additional records. Eventually, though, as records are added, the empty space will be used and the buckets will be filled. When bucket splits occur, you must restructure the file to remove them.

3. Buffer count — Random access to an indexed file results in fewer I/O operations if more memory buffers are allocated. This allows RMS to cache larger amounts of the index tree structure in memory. Buffers also can be global in nature, thereby improving performance in shared file situations.

Ideally, the entire index tree structure is cached in memory buffers. Although this isn't always feasible, the file should be designed to make the broadest use of memory buffers. Do you want to

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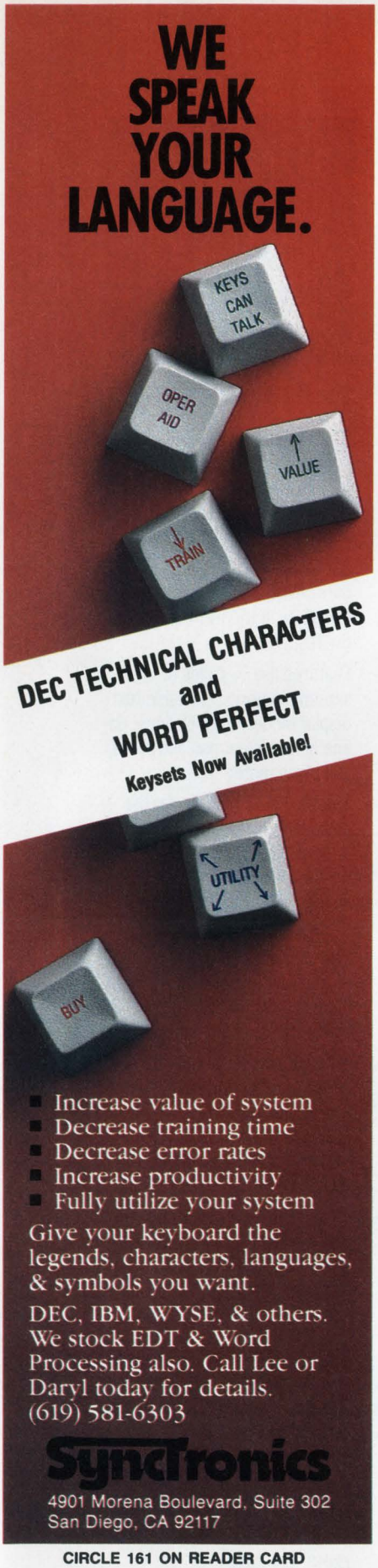

CIRCLE 161 ON READER CARD

PROGRAM 1.

```
$          FILE_NAME  :=         'P1'
$ GET_NAME:
$          IF FILE_NAME .NES. "" THEN GOTO GOT_NAME
$          INQUIRE/NOPUNC FILE_NAME "File spec:  "
$          GOTO GET_NAME
$ GOT_NAME:
$          FILE_NAME_ONLY        :=          'F$PARSE(FILE_NAME,,,"NAME")
$          ANALYZE/RMS/FDL 'FILE_NAME'
$          EDIT/FDL/NOINTERACTIVE/ANALYSIS='FILE_NAME_ONLY' 'FILE_NAME_ONLY'
$          CONVERT/NOSORT/CREATE/STAT/FDL='FILE_NAME_ONLY' 'FILE_NAME' 'FILE_NAME'
$          PURGE 'FILE_NAME'
$          DELETE 'FILE_NAME_ONLY'.FDL;0
$          EXIT
```

buy more memory to support buffering, or would you prefer to buy additional disks to spread the load?

Optimizing A File

When aiming for file efficiency, remember that you never use a high-level language's defaults to create the file. Instead, use a File Definition Language (FDL) file.

The FDL editor, provided with VMS, is a novice's dream for file design. When told to follow a certain script, the editor will ask you questions relating to the file you're trying to design. With the exception of the fill factor, you can do a bang-up job by choosing the default answer to the prompts:

1. Bucket size — The FDL editor suggests a bucket size. However, with each file design, you should weigh various factors before taking the default suggestion. To assist you with the alternatives, the FDL editor suggests three bucket sizes. With each suggestion, the editor also shows the resulting number of levels in the index, the total number of buckets in the index (desirable to cache), the total number of memory pages necessary to cache the index and a relative figure of merit showing CPU processing necessary to search the index.
2. Fill factor — The FDL editor prompts "Key n Load Fill Percent" to set the fill factor for this key and its data area. The editor accepts values between 50 and 100 but inserts 100 percent as the default. Accept this default only with a static file. Files that have records added deserve better treatment than a 100 percent fill factor. Your choice depends on how many records are to be added after initial load and how often you wish to restructure the file.
3. Buffer count — The FDL editor doesn't ask you explicitly to specify the buffer count. If you want to use the editor to make this choice, choose the ADD option at the Main Menu, CONNECT option on the next menu and MULTIBUFFER COUNT on the Connect Attribute Menu. However, you also can set the buffer count at run time with the DCL command "$ SET RMS_DEFAULT/INDEXED/BUFFER=n".
4. Non-static files — If you want an easy method of file restructuring, use the "hands off" DCL commands shown in Program 1 to choose a new bucket size and clean up bucket splits. This command file doesn't repair bad fill factor specifications or provide for additional I/O buffers. These items must be specified correctly during initial file creation. *—Richard A. Snyder is manager of system programming at Texas Gas, Owensboro, Kentucky.*

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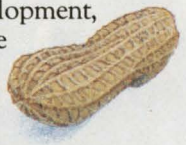

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PROCEDURES FOR RSX

SPNHLP

By Leonard Gerstle

A Procedure For Providing On-Line Help For RSX Systems.

Under VAX/VMS, there are provisions for adding user help to the VMS HELP facility. In addition, the Run-time Library routines allow a software developer to provide this help when a user requests it.

Although RSX provides a method for adding information to the HELP facility, there are no provisions for displaying this information from within a program. Because our environment involves an integrated system of VAXs and PDP-11s networked via DECNET, I wrote a procedure to give RSX this functionality.

The first step is to incorporate the information into RSX Help. Instructions for doing this can be found in the *MCR Operations Manual*, Volume 2A of RSX-11M PLUS, pages 3-67 through 3-72. This involves creating a file called LB:[1,2]xxx.HLP. In this case, I've called it LB:[1,2]USR.HLP. If the file contains help for item "progrm object subobj," you could display the information by typing HELP /USR PROGRM OBJECT SUBOBJ at an MCR prompt. Figure 1 shows sample HELP files.

Most of our facilities that prompt the user use the TPARS facility. Therefore, in SPNHLP (see Program 1), I used the standard TPARS registers as inputs. It works by issuing a spawn of the appropriate MCR help line. It takes as input the address of the task name (or main help parameter), and the address and size of the secondary help string (if it exists). Program 2 shows an example of SPNHLP's use. *—Leonard Gerstle is a senior systems programmer with Trecom Business Systems Inc., New York, New York.*

Continued on pages 108 and 109.

ARTICLE INTEREST QUOTIENT
Circle On Reader Card
High 487 Medium 488 Low 489

FIGURE 1.

USR.HLP

User Defined Help

The current list of documentation in the USR.HLP file is as follows:

prog1 prog2 prog3

For more information, type HELP/USR item.

1 prog1
@ [1,2] prog1

1 prog2
@ [1,2] prog2

1 prog 3
@ [1,2] prog3

PROG1.HLP

Help for PROG1

Additional help is available for:

errors switches

2 errors
Error 1 - Invalid format
Error 2 - Invalid switch
Error 3 - Invalid parameter

2 switches
/Brief - Brief output format
/Full - Full output format
/Output - Spools output to specified file

Sample HELP files.

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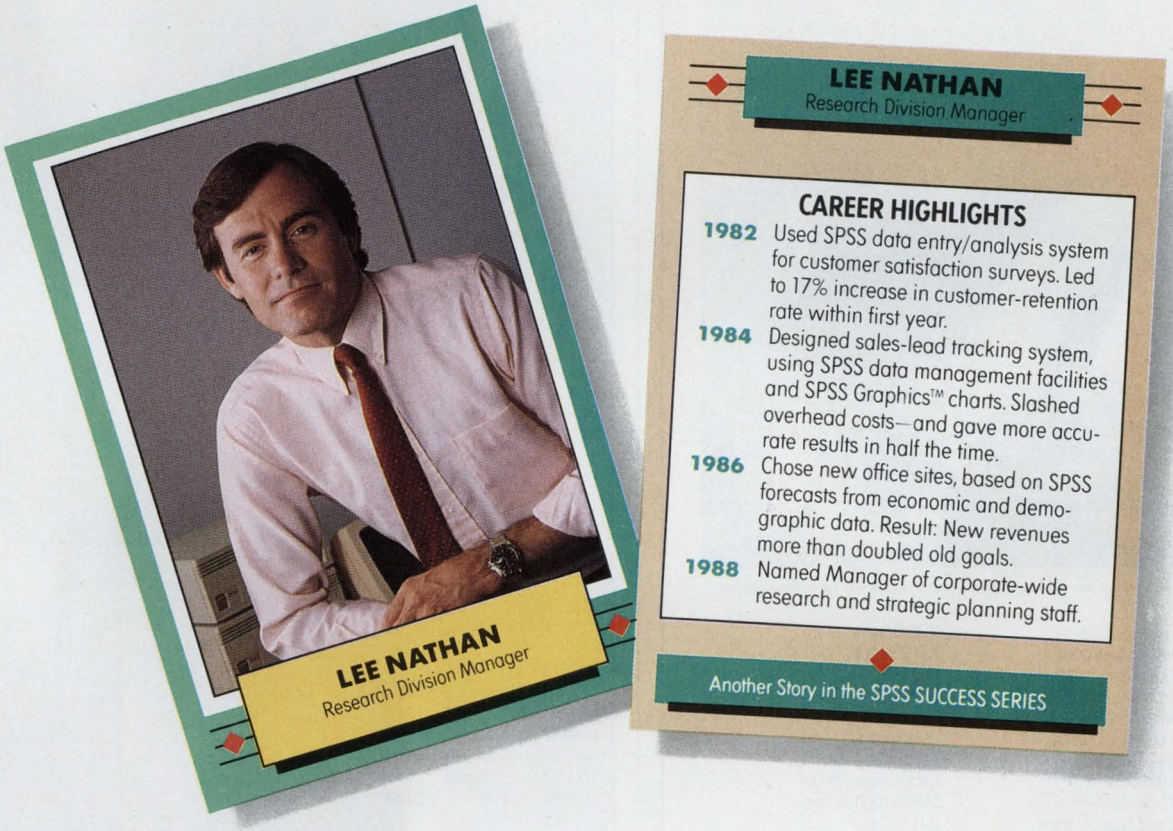

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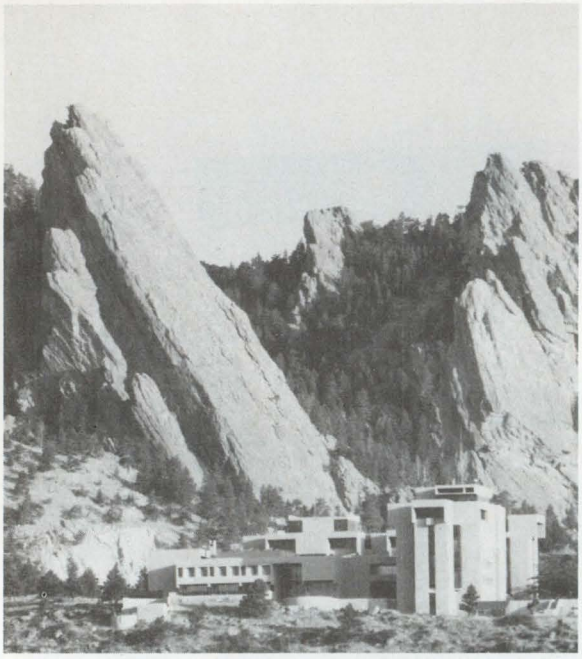
CIRCLE 159 ON READER CARD

GRAPHICS FROM THE TOP



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CIRCLE 253 ON READER CARD

PROGRAM 1.

```
  .Title    SPNHLP
  .Ident    /03.000/
;+
;   *** SPNHLP ***
;
;   Subroutine to spawn help line to MCR.
;
;   Input:
;        R3 = Size of HELP's secondary parameter string (zero if none).
;        R4 = Address of HELP's secondary parameter string (zero if none).
;        R5 = Address of task name (in .Asciz format).
;             (Main parameter to HELP.)
;
;        R3 & R4 are the registers given to you by TPARS after parsing
;   the word "HELP".
;
;   E.G.:
;        TASK:
;             .Asciz    "PROG1"
;
;                 :
;                 :
;                 :
;
;             TRAN$     "HELP", xxx, HELP
;
;                 :
;                 :
;                 :
;
;        HELP:
;             MOV  R5, -(SP)
;             MOV  #TASK, R5
;             CALL SPNHLP
;             MOV  (SP)+, R5
;             RETURN
;
;        When PROG1 parses the command "HELP xxx", (xxx is optional)
;   the following line will be spawned to MCR:
;                                          "HELP /USR PROG1 xxx"
;-
    .NLIST    BEX

HLPEFN   = 1
R50MCR:  .Rad50    "MCR..."

CMDLEN   = 79.
CMDLIN:  .Ascii    "HELP /USR "
PARLEN   = <CMDLEN - <.-CMDLIN> >
CMDPAR:  .Blkb     PARLEN

    .Mcall    SPWN$S, WTSE$S

    .Even
SPNHLP::
    MOV  R0, -(SP)
    MOV  R1, -(SP)
    MOV  R3, -(SP)
    MOV  R4, -(SP)
    MOV  R5, -(SP)
;
;   Blank out parameter section of command line.
;
    MOV  #PARLEN, R0          ; Size
    MOV  #CMDPAR, R1          ; Address
200$:
    MOVB #<' >, (R1)+         ; Blank it out
    SOB  R0, 200$
;
;   Put task name into command line
;
    MOV  #CMDPAR, R0          ; Adr of variable section
```

PROGRAM 1. . . . *continued*

```
300$:
    MOVB (R5)+, (R0)+       ; Move next character
    BNE  300$               ; Not finished: loop
    MOVB #<' >, -1(R0)      ; Finished: change '0' to a blank
    TST  R3                 ; Did we get params ?
    BEQ  500$               ; No: skip
;
;   Put parameters into command line
;
400$:
    MOVB (R4)+, (R0)+       ; Move next character
    SOB  R3, 400$           ; Loop
500$:
    SPWN$S    #R50MCR,,,,,#HLPEFN,,,#CMDLIN,#CMDLEN
                            ; Spawn help line
    BCC  600$               ; No errors: good
;
;   Add your own error handling here
;
600$:
    WTSE$S    #HLPEFN       ; Wait for help to be displayed

    MOV  (SP)+, R5
    MOV  (SP)+, R4
    MOV  (SP)+, R3
    MOV  (SP)+, R1
    MOV  (SP)+, R0
    RETURN
    .End
```

PROGRAM 2.

```
  .Title    PROG1
  .Ident    /01.000/
;+
;   Sample program to use SPNHLP
;-
TSKNAM:
    .Asciz    "PROG1"

       :
       :
       :

    ISTAT$    yyy, zzz

STATE$   INIT
         TRAN$     "HELP", $EXIT, FDHELP    ; User typed "HELP"
         TRAN$     '?,     $EXIT, FDHELP    ; User typed "?"

       :
       :
       :

FDHELP:
    MOV  R5, -(SP)          ; Save R5
    MOV  #TSKNAM, R5        ; Supply our task name
    CALL SPNHLP             ; Spawn help line
    MOV  (SP)+, R5          ; Restore R5
    RETURN

     :
     :
     :

    .End
```

■

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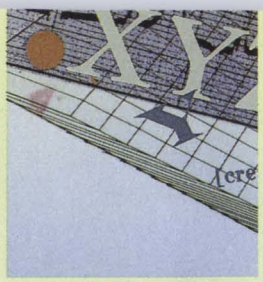


PRESET

By Michael Mayfield

A Program To Preset System Characteristics.

Each time I bring up my RSTS system, I wish the startup procedure didn't take so long. Setting terminal characteristics for all the terminals on the system takes forever.

I have done some work on a special large system configuration with hundreds of terminals. Setting terminal characteristics for this system can take 10 minutes. There had to be a better way.

I began thinking that if the terminal DDBs in the monitor SIL file on disk could be patched so that they already were set up properly, there would be no need to set any terminal characteristics in the system startup file.

Enter PRESET

PRESET was developed to provide this capability. (See Program. The complete Program is available on ARIS.) In fact, it goes one step further and presets values for the default date and time format, as well as the magtape density and label defaults. After using PRESET and removing the startup file commands for setting terminal characteristics, the system startup that once took over 10 minutes now takes about 15 seconds.

PRESET creates a command file that can be used with ONLPAT to patch the currently installed monitor SIL. After the patches are applied, the terminal characteristics, date and time formats, magtape density and labeling format will be preset. These settings will take effect the next time the system is started. Setting these characteristics in the START.COM file is no longer needed.

PRESET can be used under BASIC-PLUS or BASIC-PLUS-II. It supports RSTS V9.0 through V9.5, but not previous versions.

To use PRESET, ensure that the terminal characteristics are set properly for all terminals on the system, that the date and time formats and magtape density and label format defaults have been set properly, and that no terminals other than your own are in use. The easiest and safest way to do this is to take the system down and then back up, executing the startup file but not allowing log ins.

Run PRESET and enter the name of the patch control file to be created. PRESET will create the command file and then exit. This command file should be used with ONLPAT to install the PRESET patches into the current monitor SIL.

Next edit the SY0:[0,1]START.COM command file to remove the commands for setting terminal characteristics and the SET SYSTEM commands for setting /DATE, /TIME, /LABEL and /DENSITY. Run SHUTUP to bring the system down and then bring it back up.

See the Example for the use of PRESET. The terminal and system characteristics will be set properly when the system is restarted.

THE PRESET PROGRAM has saved me much time. It's a simple way to avoid a time-consuming startup procedure.

—Michael Mayfield, vice president of Northwest Digital Software Inc., is an authority on RSTS/E and author of RSTS/E Monitor Internals.

ARTICLE INTEREST QUOTIENT
Circle On Reader Card
High 511 Medium 512 Low 513

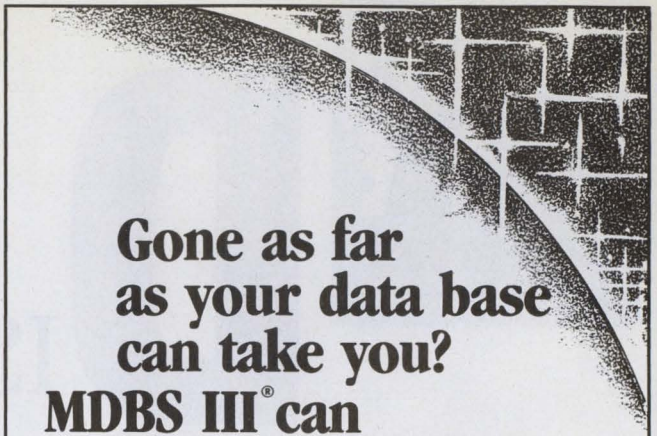
EXAMPLE.

```
$RUN PRESET
PRESET V1.1 == Preset terminal characteristics in SIL

Output command file name <SY:PRESET.CMD>? <LF>
Ensure that the system is idle. Press RETURN to continue? <CR>
Creating patch control file for _SY0:[0,1]RSTS.SIL
Please wait...

Finished. Now run ONLPAT and use the SY:PRESET.CMD
command file to patch the necessary values into the
_SY0:[0,1]RSTS.SIL monitor SIL file.

$RUN $ONLPAT
Command file name? PRESET
File to patch? _SY0:[0,1]RSTS.SIL
File found in account [0,1]
Module name? RSTS
Base address? 047446
Offset address? 1
 Base   Offset  Old     New?
047446  000001    001  ? 000

. . . .

Offset address? ^Z
Base address? 053716
Offset address? 0
 Base   Offset  Old     New?
053716  000000  177777  ? 177777
053716  000002  177777  ? 177777
053716  000004  000000  ? 000000
053716  000006  001440  ? 001440
053716  000010  177746  ? ^C

Patch complete


1 patch installed

Command file name? ^Z

$EDIT [0,1]START.COM
. . . .

$RUN $SHUTUP
. . . .
```

PROGRAM.

```
          .
          .
          .
1020      PRINT "Ensure that the system is idle.  Press RETURN to continue";  &
\         INPUT LINE Z$  &
\         SILNAM$=FNC.FIND.SIL$(12%)  &
\         PRINT "Creating patch control file for "; SILNAM$; CR$;  &
            "Please wait...";  &
\         Z%=FNC.GBLRES%(SILNAM$,12%)  &
\         TTPARM%,TTRING%,TTFCNT%=0%  &
\         TTPARM%=CVT$%(SYMTBL$(1%))  IF RIGHT(SYMTBL$(1%),3%)=M1$  &
\         TTRING%=CVT$%(SYMTBL$(2%))  IF RIGHT(SYMTBL$(2%),3%)=M1$  &
\         TTFCNT%=CVT$%(SYMTBL$(3%))  IF RIGHT(SYMTBL$(3%),3%)=M1$  &
\         DATCNV%=CVT$%(SYMTBL$(4%))  &
\         FOR Z%=4% TO CVT$%(SYMTBL$(0%))  &
\           IF RIGHT(SYMTBL$(Z%),3%)<>M1$ OR  &
                  CVT$%(SYMTBL$(Z%))<>DATCNV%+(Z%-4%)*2% THEN  &
              PRINT CR$; "?Symbol "; RAD$(CVT$%(SYMTBL$(Z%)));  &
                  RAD$(CVT$%(RIGHT(SYMTBL$(Z%),3%)));  &
                  " not resolved properly."; CR$;  &
            "?PRESET will not work with this version of RSTS."  &
            GOTO 32767
          .
          .
          .
```

■



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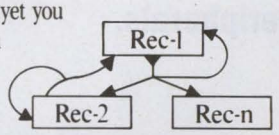

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CIRCLE 138 ON READER CARD

BENCHMARKS

DISK BENCHMARK

By David W. Bynon

Devising Tests To Evaluate Peripherals.

To accurately and consistently implement a performance test for a selection of computers or their peripheral devices, use a benchmark. That's a program that implements the same test for each device or processor it's run against.

To write a benchmark program, you must understand what you're trying to test. A CPU test, for example, is fairly straightforward. You obtain the algorithms for a handful of commonly used math problems, set up a timer and run the problem.

Peripheral device tests, however, aren't quite as easy. The benchmark program presented here (see Program) is for disk devices. To write it, I had to understand what's important in a disk benchmark and comprehend the processor/operating system's role in the program's results.

Three pieces of information are important: average access time, data throughput and the VMS/disk controller overhead. Average access time tells how fast the drive responds to seek requests. The data throughput information indicates the realistic bandwidth capability of the drive/controller/CPU combination. The VMS/controller overhead information is useful when comparing a drive or drive/controller combination on different processors.

It's possible to derive other benchmark information from a disk drive test, such as true seek time, disk latency and command queue. However, this information is available from the manufacturer. The quest isn't to confirm the manufacturer's data but to discover how a particular disk or disk/controller combination performs on the test system.

Average access time is computed by randomly moving the disk heads (seeking) to various locations on the disk and measuring the elapsed time. For example, if the VAX under test can make a drive perform 100 random seeks in 3.35 seconds, the average access time for that CPU, controller and disk combination is 33.50 milliseconds.

Unless you go to the driver level, it's impossible to make the disk perform only a seek operation. To seek using QIO, you actually must execute a READ command. The minimum number of bytes that can be read using QIO is two. This adds extra overhead to the total.

The program accomplishes this test by:

1. Creating an integer array 256 elements in length.
2. Initializing the array with random numbers between 0 and the highest logical block number on the volume.
3. Starting a timer.
4. Reading two bytes from each location in the array.
5. Stopping the timer.

The timer returns the elapsed time, in delta time format, used to run the test. This time then is converted into seconds and divided by the number of READ operations, resulting in the average access time.

The random read test measures the throughput of the CPU, controller and disk combination. As with the random access test, this mark uses an array filled with 256 random disk block locations from which to read. A second array tells the QIO read operation how many bytes of data to read (this is

TOO MUCH.

TOUCHÉ.

The Cipher 3000i™ family. The biggest thing about them is their compact size. Compared to standard technology, they offer space saving benefits that are nothing short of phenomenal.

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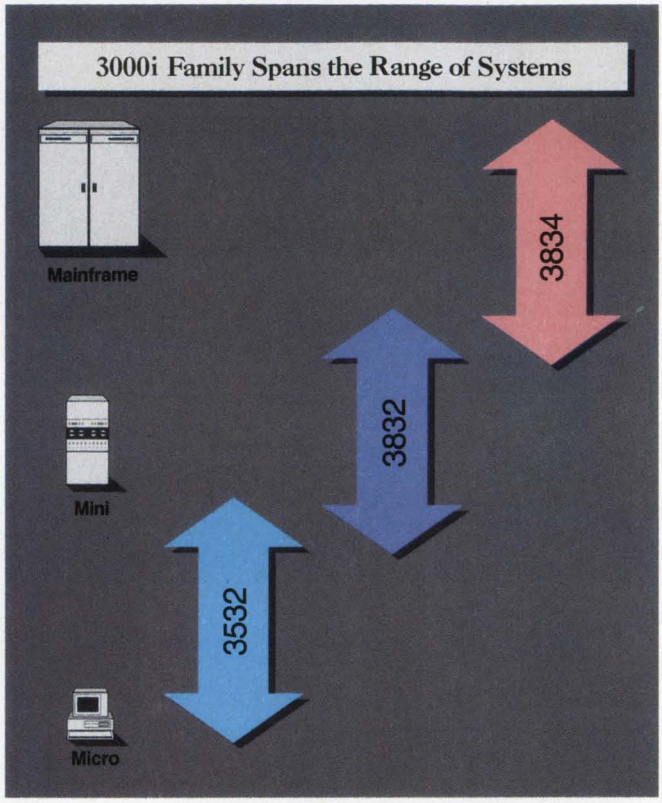
MSR uses a serial serpentine method to record data in groups of two or four tracks. This dual recording capability is the breakthrough that has allowed Cipher to meet the performance needs of the entire range of computer systems. Data integrity has also been greatly improved thanks to an advanced Reed-Solomon Error Correction Code (ECC). The result? An impressive read error rate of 1 in 10^{12} bytes.

Cipher's one and only focus is on removable data storage systems. No one offers Cipher's range of internal and external tape drive systems for backup and interchange with virtually any computer system. And no one is better poised to meet the development and integration needs of computer OEMs, value added resellers and end users alike. Now once again, Cipher sets the standard for tape technology.



INTRODUCING MSR. THE NEW DATA INTERCHANGE STANDARD FOR MICRO TO MAINFRAME.

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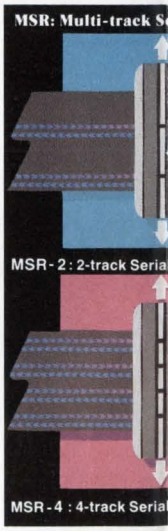
Until now, most new products in the tape drive market have fallen into "too" categories. Too much. And too little.

Big, mainframe-compatible tape drives deliver high performance. But they come with an equally high price tag.

Low-end tape drives are small and inexpensive enough. They just don't pack enough punch to handle the needs of super micros and midrange systems.

What's been needed is a family of tape drives offering the performance, price and form factor required by low-end and midrange systems. Plus an economical means of interchanging data from low to high-end computers.

Cipher says, Touche.



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It begins with a new standard recording format: MSR-Multi-track Serpentine Recording. Now for the first time data can be interchanged from micros to small mainframes with amazing new levels of performance and economy.

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TOO LITTLE.

INTRODUCING THE CIPHER 3000i FAMILY. THE WORLD'S FIRST MSR-COMPATIBLE HALF-INCH CARTRIDGE TAPE DRIVES.

For nearly half a decade Cipher has been committed to filling the void between too much and too little.

The Cipher 3000i family is the first cost-effective, high performance solution for virtually any system size and configuration. There are 2 different series with more than 20 models. The series with an 8-inch form factor is the world's first tape drive system to address the size and high performance needs of workstations, midrange systems and small mainframes. The 5¼-inch form factor series will complement the economy and performance of micros and low-end minis.

What about backup speed?

A high performance, GCR open reel drive takes 22 minutes and 4 reels of tape to backup a 500 megabyte disk. A Cipher 3000i drive, using only 2 cartridges, does the same job in half the time. This increased efficiency can mean substantial savings, potentially thousands of dollars in reduced system and personnel costs alone.

System integration couldn't be easier with a selection of interfaces including Cipher/Pertec, SCSI and IPI-3. A choice of configurations, too. Horizontal or vertical mounting, plus tabletop and 19-inch rack mount versions. And standard 9-track reel-to-reel commands ensure compatibility with existing system software, as well as protection of the enormous investment in software development.

Cipher 3000i drives are also setting new standards in operator convenience. Tape loading is automatic, just like a VCR. Tape path cleaning is quick and easy using a 3480-type cleaning cartridge. And all models feature powerful diagnostics that are automatically executed at "power on" and during normal on-line operations.

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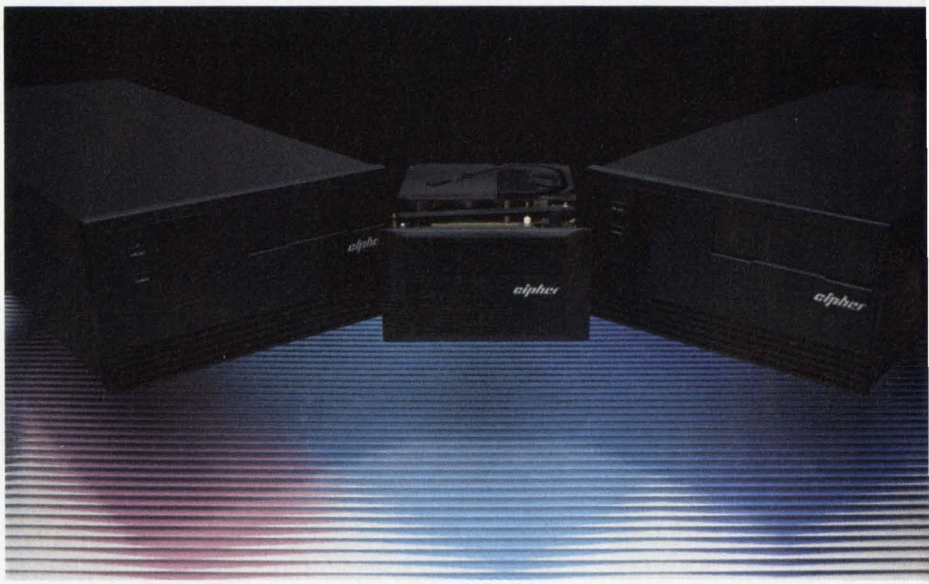
cipher 3000i

Innovation by Design.



Cipher's advanced modular design reduces power and cooling requirements. Brushless reel motors and extensive use of CMOS VLSI circuits dramatically enhance device reliability. With engineering like this it's no wonder the 3000i delivers an impressive MTBF of 15,000 hours.

Never has such an incredible range of power, performance and economy been available from a single line of tape drives. And never has the potential been stronger for the evolution of new, higher performance products for future generation systems.

The 3000i family is the latest in a long series of Cipher innovations. Cipher ½" reel-to-reel tape systems have set the standard by which others are compared. Cipher also leads the way in ¼" streaming cartridge systems and optical disk drives. Plus new innovations in subsystems and interfaces, including SCSI-2 technology. Supported by the full resources of an international service and spares network, the 3000i family is destined to forever change the concept of data interchange. But then, would you expect anything less from the world's leading independent removable data storage systems company.

Touche.

For more information on MSR and the 3000i Family contact Cipher today.

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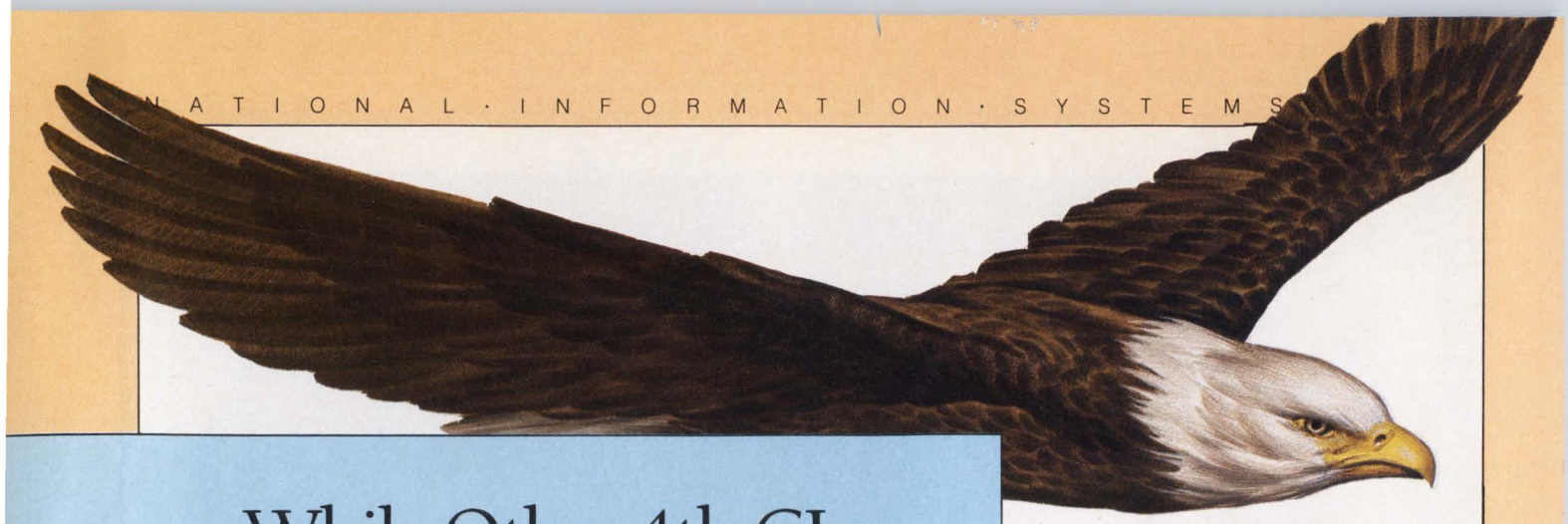
PROGRAM.

```
      PROGRAM VDBM
C
C     ------------------------------------------------------------------
C     VDBM -- VAX DISK BENCHMARK V1.0
C
C     Copyright(C), 1988, Bynon & Associates -- All Rights Reserved
C
C     This program may be freely copied and used for non-profit
C     purposes. David W. Bynon shall not be responsible for damages or
C     loss of data due to the incorrect use of this software.
C     ------------------------------------------------------------------
C
      IMPLICIT              INTEGER(A-Z)
      INCLUDE               '($IODEF)'
      INCLUDE               '($SSDEF)'
      INCLUDE               '($DVIDEF)'
      REAL                  MTH$RANDOM, SECONDS, KILOBYTES, AAT,
     2                      DIFF, SECTORS, REV
      INTEGER*2             IOSB(4), STATUS, CHANNEL, OFFSET, LENC
      INTEGER*4             ELAPSED_TIME(2), SEED(2),
     2                      LOGICAL_BLOCK(256), NUMBER_BYTES(256),
     2                      BUFFER(16384), GETDVI, MAXBLOCK, TOTAL_BYTES
      CHARACTER*40 DEVICE
      PARAMETER    (MAXREAD=16384)
C
C Sign on message
C
      WRITE (*,FMT='(/A/)') 'VAX Disk BenchMark V1.0'
C
C Check command line for device name (parameter)
C
      STATUS = LIB$GET_FOREIGN(DEVICE)
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C If the parameter is absent then prompt for it
C
      IF(DEVICE .EQ. ' ') THEN
        WRITE(UNIT=*, ERR=999, FMT='(1X,A7,$)') 'Disk: '
        READ(UNIT=*, END=999, ERR=999, FMT='(A40)') DEVICE
      END IF
C
C If the colon was left off the device name add it
C
      IF(INDEX(DEVICE, ':') .EQ. 0)
     2  DEVICE(1:40)=DEVICE(1:LENC(DEVICE))//':'
C
C Use GETDVI function to get the number of blocks on this volume
C
      MAXBLOCK = GETDVI(DEVICE, DVI$_MAXBLOCK)
C
C Get the current time to use as a seed for the random number generator
C
      STATUS = SYS$GETTIM(SEED)
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Initialize disk block random read locations
C
      DO I = 1,256
        LOGICAL_BLOCK(I)=(MTH$RANDOM(SEED)*MAXBLOCK)
      END DO
C
C Assign a device channel for use with $QIO
C
      STATUS = SYS$ASSIGN(DEVICE, CHANNEL,,)
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C-----------------------------------------------------------------------
C Start the average access test (256 iterations)
C-----------------------------------------------------------------------
C
C
C Initialize and start a timer
C
      STATUS = LIB$INIT_TIMER()
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
      DO I = 1,256
        STATUS=SYS$QIOW(,%VAL(CHANNEL),              ! Disk I/O channel
     2                  %VAL(IO$_READLBLK),      ! QIO function (read block)
     2                  IOSB,,                   ! I/O Status block
     2                  BUFFER,                  ! Read buffer (p1)
     2                  %VAL(2),                 ! Bytes to be read (p2)
     2                  %VAL(LOGICAL_BLOCK(I)),,) ! Logical block # (p3)
        IF(.NOT. IOSB(1)) CALL LIB$SIGNAL(%VAL(IOSB(1)))
        IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
      END DO
C
C Stop the timer
C
      STATUS = LIB$STAT_TIMER(1,ELAPSED_TIME)
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Calculate the drives average access time (The elapsed time, in system
C delta time format, is expressed in 100-nanosecond units as a
C negative value.)
C
      SECONDS = (ABS(ELAPSED_TIME(1)/10000000))
      AAT = ((SECONDS*1000)/256)
      WRITE(UNIT=*, ERR=999, FMT='(1X,A23,F5.1,A5)')
     2     'AVERAGE ACCESS TIME IS ',AAT,' msec'
C
C-----------------------------------------------------------------------
C Begin the Random Read Test
C-----------------------------------------------------------------------
C
C Initialize array of random read block size
C
      TOTAL_BYTES=0
      DO I = 1,256
        NUMBER_BYTES(I) = (MTH$RANDOM(SEED)*MAXREAD)
        NUMBER_BYTES(I) = (NUMBER_BYTES(I)*4)
        TOTAL_BYTES = TOTAL_BYTES + NUMBER_BYTES(I)
      END DO
      KILOBYTES = (TOTAL_BYTES/1024)
C
C Initialize and start a timer
C
      STATUS = LIB$INIT_TIMER()
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Start the random read test (256 iterations)
C
      DO I = 1,256
        STATUS=SYS$QIOW(,%VAL(CHANNEL),              ! Disk I/O channel
     2                  %VAL(IO$_READLBLK),      ! QIO function (read block)
     2                  IOSB,,                   ! I/O Status block
     2                  BUFFER,                  ! Read buffer (p1)
     2                  %VAL(NUMBER_BYTES(I)),   ! Bytes to be read (p2)
     2                  %VAL(LOGICAL_BLOCK(I)),,) ! Logical block # (p3)
C
        IF(.NOT. IOSB(1)) CALL LIB$SIGNAL(%VAL(IOSB(1)))
        IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
      END DO
C
C Stop the timer
C
      STATUS = LIB$STAT_TIMER(1,ELAPSED_TIME)
      IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Calculate the drives average throughput rate
C
      SECONDS = (ABS(ELAPSED_TIME(1)/10000000))
      WRITE(UNIT=*, ERR=999, FMT='(1X,A24,F7.2,A7)')
     2  'AVERAGE TRANSFER RATE IS',(KILOBYTES/SECONDS),' KB/Sec'
C
C-----------------------------------------------------------------------
C Begin the Controller/VMS overhead test
C-----------------------------------------------------------------------
C
      AAT = 16.67              ! Disk revolution time
      OFFSET = 1
      DO WHILE (AAT .GT. 9)    ! Half revolution access = 8.33 msec
        OFFSET = OFFSET+1
        IF ((OFFSET .GT. 8) .AND. (AAT .GT. 16)) THEN
          TYPE *,'VMS controller overhead cannot be computed.'
          REV = (AAT/16.67)
          TYPE *,'The last access was made in',REV,'disk revolutions.'
          CALL EXIT
        END IF
C
C Initialize and start a timer
C
        STATUS = LIB$INIT_TIMER()
        IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Start the offset read loop
C
        DO I = 1,128
C
C Block zero read
C
          STATUS=SYS$QIOW(,%VAL(CHANNEL),%VAL(IO$_READLBLK),
     2                IOSB,,BUFFER,%VAL(2),%VAL(0),,)
          IF(.NOT. IOSB(1)) CALL LIB$SIGNAL(%VAL(IOSB(1)))
          IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
```

Continued.

Call Me, I'm Interested - CIRCLE 274 ON READER CARD, Mail Literature - CIRCLE 355 ON READER CARD



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CIRCLE 303 ON READER CARD

See us at DEXPO West
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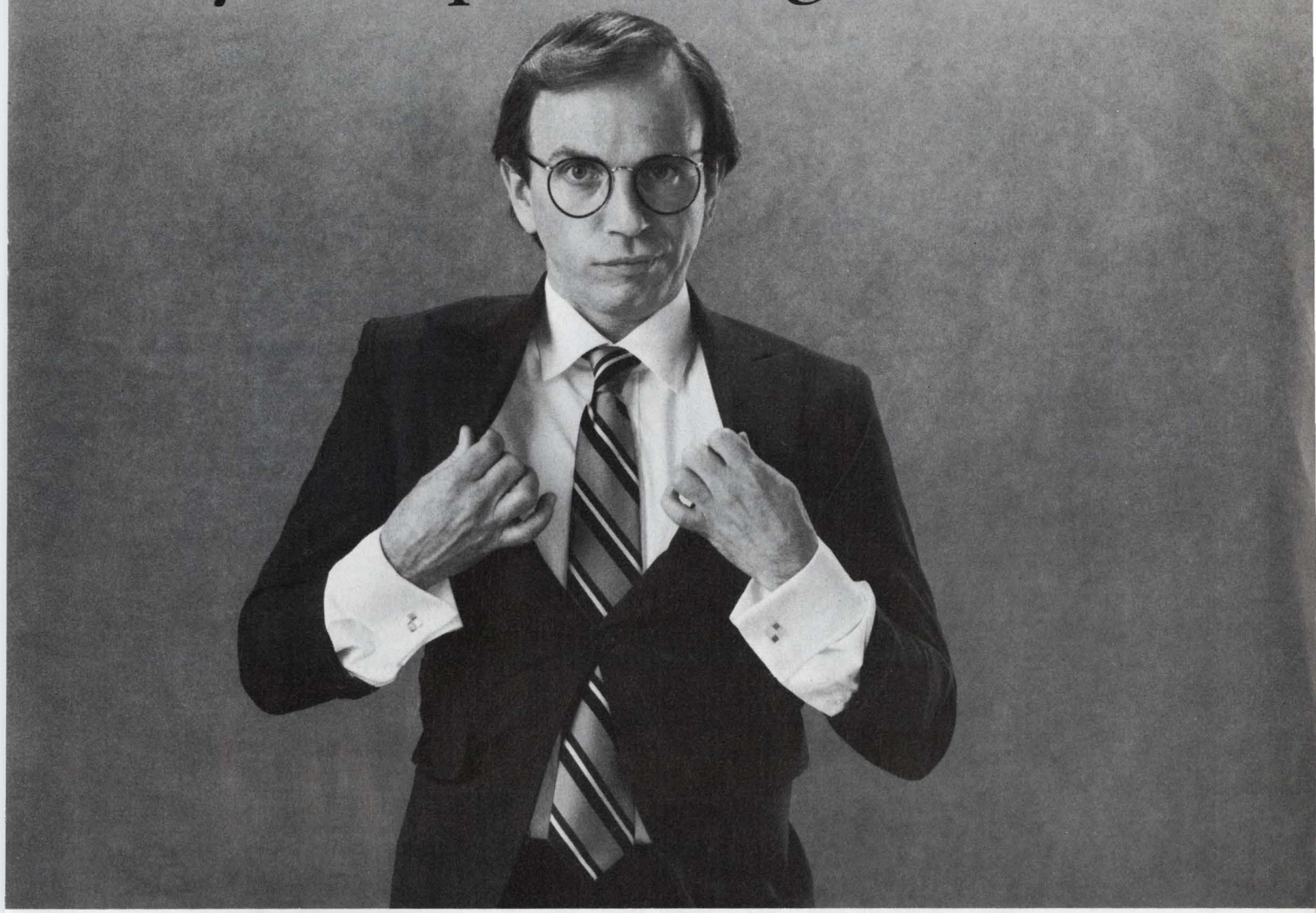
Most sales order management systems promise a great fit.



If you happen to wear their size.

In sales order management, "great fit" means doing the job the way *you* do business — using *your* unique order types and *your* way of processing them. It also means adapting to your changing needs. And it means doing all of this without the time or cost of custom program development.

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INTEGRATED SOFTWARE FOR: **ORDER MANAGEMENT • PURCHASING • INVENTORY • RECEIVABLES • PAYABLES • GENERAL LEDGER**

PROGRAM. . . *continued*

```
C Offset read
C
              STATUS=SYS$QIOW(,%VAL(CHANNEL),%VAL(IO$_READLBLK),
     2                    IOSB,,BUFFER,%VAL(2),%VAL(OFFSET),,,)
              IF(.NOT. IOSB(1)) CALL LIB$SIGNAL(%VAL(IOSB(1)))
              IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
            END DO
C
C Stop the timer
C
            STATUS = LIB$STAT_TIMER(1,ELAPSED_TIME)
            IF(.NOT. STATUS) CALL LIB$SIGNAL(%VAL(STATUS))
C
C Calculate the average access time
C
            SECONDS = (ABS(ELAPSED_TIME(1)/10000000))
            AAT = (SECONDS*1000)/256
          END DO
C
C OFFSET now represents the lowest number of blocks that must be skipped
C to achieve half revolution access time, i.e., controller/VMS overhead.
C
          SECTORS = GETDVI(DEVICE,DVI$_SECTORS)
          DIFF = OFFSET
          WRITE(UNIT=*, ERR=999, FMT='(1X,A35,F5.1,A5)')
          2     'AVERAGE CONTROLLER/VMS OVERHEAD IS ',
          2     ((DIFF/SECTORS) * 16.67), ' msec'
C
999       CALL EXIT
          END

C         ------------------------------------------------------------------
          INTEGER*4 FUNCTION GETDVI(DEVICE, CODE)
C         ------------------------------------------------------------------
C
C This subroutine is used to return information about the device being
C tested. It must be passed the device name (.e.g., DUA1:, DUB3:...) and
C the $GETDVI code (.e.g., DVI$_????). This routine may only be used if
C the CODE requests an integer value.
C
          IMPLICIT              INTEGER(A-Z)
          INCLUDE               '($DCDEF)'
          INCLUDE               '($SSDEF)'
          INCLUDE               '($DVIDEF)'
C
C GETDVI data structures
C
          STRUCTURE /ITMLST/
            INTEGER*2           BUFLEN, CODE
            INTEGER*4           BUFADR, RETLENADR,END_LIST /0/
          END STRUCTURE
          RECORD/ITMLST/ DVI_LIST
          INTEGER*2             STATUS, CODE
          INTEGER*4             INFO, INFO_LEN
          CHARACTER*(*)         DEVICE
C
          DVI_LIST.CODE=CODE
          DVI_LIST.BUFLEN=4
          DVI_LIST.BUFADR=%LOC(INFO)
          DVI_LIST.RETLENADR=%LOC(INFO_LEN)
          STATUS = SYS$GETDVIW(,,DEVICE,DVI_LIST,,,,,)
          IF(.NOT. STATUS) THEN
            CALL LIB$SIGNAL(%VAL(STATUS))
          ELSE
            GETDVI=INFO
            RETURN
          END IF
          END


C         ------------------------------------------------------------------
          INTEGER FUNCTION LENC(STRING) !Return the length of a string
C         ------------------------------------------------------------------
          IMPLICIT INTEGER (A-Z)
          CHARACTER*(*) STRING

          LENC = LEN(STRING)
          DO WHILE (STRING(LENC:LENC) .EQ. ' ' .AND. LENC .GT. 1)
             LENC = LENC - 1
          END DO
          RETURN
          END
```


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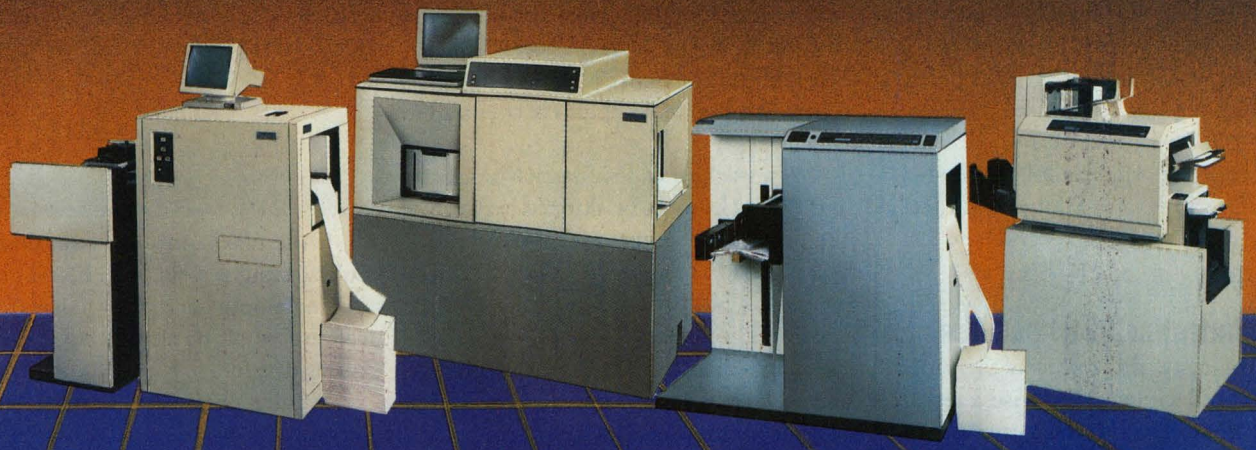

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random as well).

This test could have used a fixed read size, such as 32 or 64 KB. Doing so would have produced the same result each time the test was run. Using a fixed read value, however, wouldn't have offered the gauge I sought. I wanted to know the average performance over a wide range of access situations.

The program achieves this test by repeating, almost identically, the random access test. The result is computed by dividing the total kilobytes of data read by the number of seconds the test took to run.

VMS/Controller Overhead Test

Of all the tests, this one was the most difficult to decipher. To devise a test, I had to determine some constants. I found two that were tangible.

First, most high-performance disk drives can read an entire track of data in a single disk revolution, but the controller, processor and VMS can't. Second, most disks rotate at 3,600 rpm, which is about 16.67 milliseconds per revolution. This information leads to the induced overhead.

The test is simple after you ask the question, "How many disk blocks must be skipped to perform two consecutive read operations on the same disk revolution with half-revolution access time, i.e., 8.33 milliseconds?" These skipped blocks are used to compute the overhead time.

If a track on a disk has 100 blocks, and 25 blocks must be skipped between the first and second read, the overhead is computed as 4.16 milliseconds. In this example, a block passes the heads every 0.1667 milliseconds.

The disk benchmark program should be run when you're the sole user of the system. There's no problem with data corruption, as the program is read only. I've written other versions that both read and write, but after accidentally specifying the wrong disk, I decided reading was sufficient.

To run VDBM, compile and link it, and then set up a symbol to execute it:

```
$ FORTRAN VDBM
$ LINK VDBM /NOTRACE
$ COPY VDBM.EXE SYS$SYSTEM:
$ VDBM == "$VDBM"
```

VDBM requires one parameter only, the name of the disk device:

```
$ VDBM DUA0:

VAX Disk BenchMark V1.0

AVERAGE ACCESS TIME IS 28.3 msec
AVERAGE TRANSFER RATE IS 429.47 KB/Sec
AVERAGE CONTROLLER/VMS OVERHEAD IS 6.9 msec
$
```

If the disk/controller combination you're testing is slow (which will be the case for floppy and LAVC disks), the program won't be able to compute the overhead value.

This benchmark program will help you evaluate disk devices. Understanding what you want will start you on the way to getting the facts you need.

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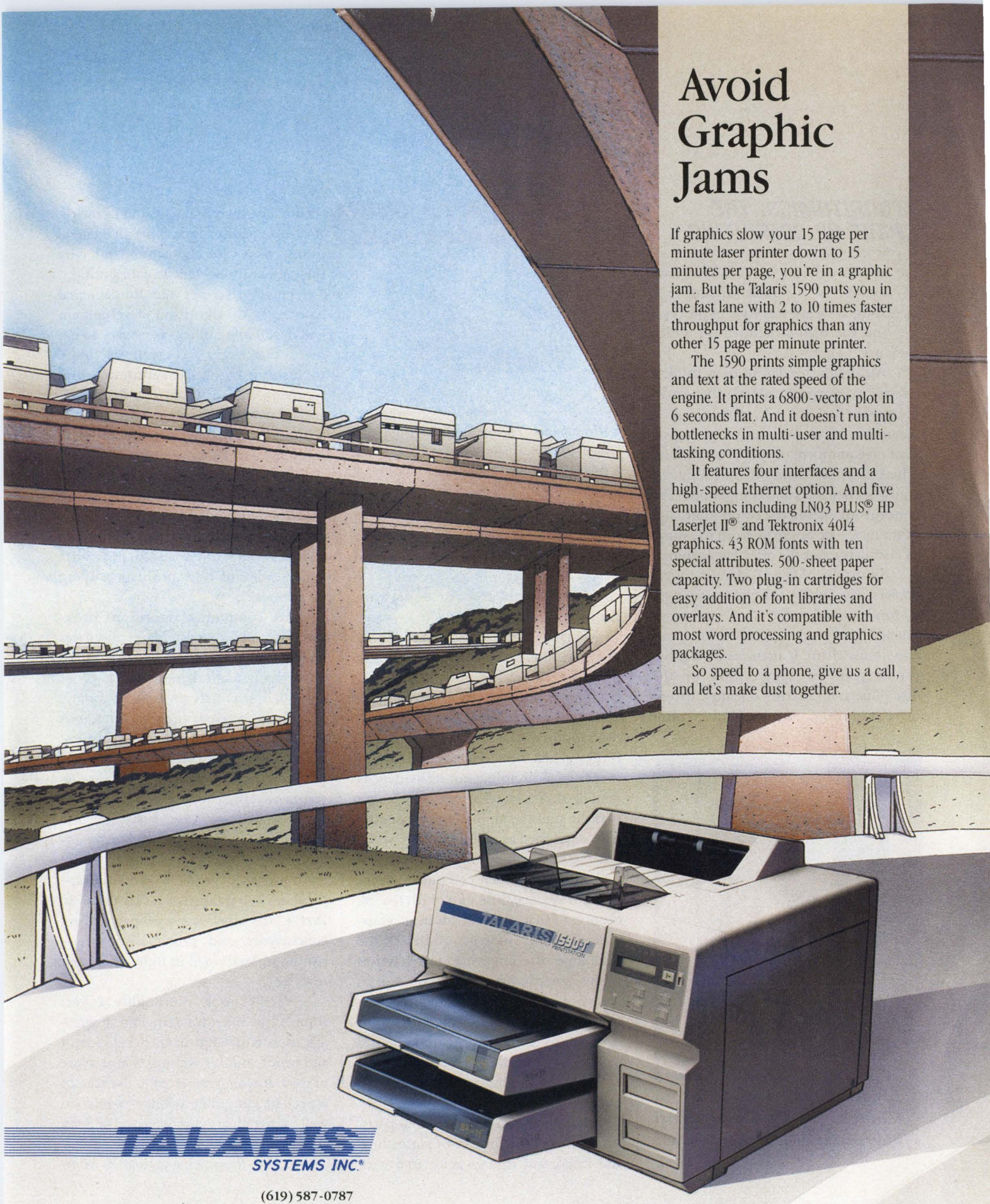

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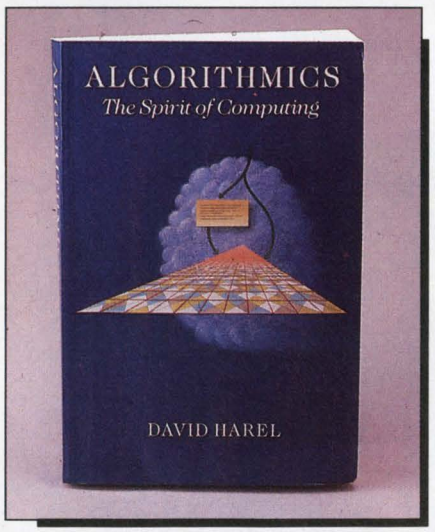
BOOKSHELF

ALGORITHMICS: THE SPIRIT OF COMPUTING

If you ask, "What is computer science?" the response might be, "It's the study of computers — their architecture, operating systems, methods of processing and the data structures on which they act."

Although this definition is valid, it doesn't satisfactorily address the idea of computer *science*. A science is a discipline, an area of study not dependent on equipment or special conditions. Chemistry, for example, isn't only the study of chemicals and compounds. The concepts of chemicals, compounds and other materials originate from the study of chemistry, not the other way around.

Similarly, David Harel's *Algorithmics: The Spirit of Computing* addresses a fundamental aspect of computer science: the study of algorithms and how to use them. It attempts to help the reader gain an appreciation of the discipline and the truly scientific nature of computing, without discussing specific hardware or software components.



Algorithmics: The Spirit of Computing ***by David Harel addresses the study of algorithms and how to use them.***

Algorithmics: The Spirit of Computing
David Harel
Addison-Wesley Publishing Company
Reading, MA, 1987
425 pages
Price: $24.75, softcover
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In fact, Harel asserts that the study of algorithms may be hampered by the physical limitations of computing equipment. He also says that the term computer science may not be the best description of the discipline, because it forges a link between physical equipment and a discipline not really dependent on it. Yet Harel also acknowledges that the study of algorithmics wouldn't have developed as rapidly or fully without modern computing equipment.

Although much computer science literature exists, little of it, with the exception of that aimed at advanced computer science students, addresses the discipline of computing. Harel writes with science in mind and focuses on an audience of technically interested persons. Indeed, his book could provide a sound basis for more specific computer course work as, for example, a general biology text might inspire a student to pursue work in medicine.

The book is divided into four parts. Part 1 covers the history of algorithms and important figures associated with their study, such as Euclid and Jacquard. It also explains algorithms in general terms, who uses algorithms and why they are so important to computing.

Harel describes the fundamental constructs of algorithm development and the building blocks necessary to use them effectively, as well as more sophisticated tools like subroutines and recursion. Fundamental data structures, such as trees and arrays, are discussed in terms of their nature and use in problem solving.

Part 2 discusses the methods, correctness and efficiency of algorithm development. Harel explains algorithmic methods such as "divide and conquer" and traversals to provide a general idea of how problem solving progresses.

Are computing algorithms provable, and if so, how? Harel discusses testing and debugging, as well as the more mathematical methods of proof computer scientists investigate today.

Once proved, general methods aimed at algorithm efficiency are examined. Linear and binary search methods are used as examples to discuss recursion efficiency, upper and lower bounds, average case behavior and tradeoffs between speed and space requirements. In Part 3, discussion focuses on unsolvable problems and the approaches being taken to tackle them. In Part 4, the advantages of parallelism, concurrence and probabalistic algorithms are examined in light of current research.

Harel's book thoroughly covers some of the most fundamental theoretical aspects of algorithm development and proof, and his writing is a pleasure to read. Anyone interested in the science aspect of computer science would do well to investigate *Algorithmics: The Spirit of Computing*.

—Reviewed by David B. Miller

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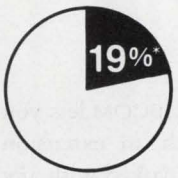

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DCL DIALOGUE

Kevin G. Barkes

Hands Off

When I speak with people at such events as DEXPO and encourage them to share their DCL procedures with others, many fear their efforts won't measure up.

One fellow explained at *DEC PROFESSIONAL*'s booth during the Cincinnati DEXPO, "I'm afraid of getting ripped to shreds by the real DCL hackers. I know there are better ways of doing some of the things I do, but the procedures work and they do the job for me."

Although I've never ripped any submissions to shreds, I've returned some to authors for reworking when the procedures didn't work properly. I'm also guilty of tweaking a few lines here and there to help improve performance or readability.

One reader took me to task for modifying procedures that appear in this column. "I thought the idea was to see what techniques others use in writing DCL," said my critic. "How is that possible when you change things to conform to your concept of proper programming?" It's a good point.

Although most programmers are guilty of improving another's code when the opportunity presents itself, I understand the reader's valid concern. From this point on, reader-submitted procedures will appear in their original form, with comments and suggestions limited to the text of the column. Your comments and suggestions are always welcome.

SUBCOM.COM

The following procedure (see Program) was sent by Sandy Felton, a systems analyst in Houston, Texas.

Although I've never ripped any submissions to shreds, I've returned some to authors for reworking when the procedures didn't work properly.

"The idea," explains Sandy, "came about through two personal needs: the desire to use batch processing to free up my terminal for other things, especially when the task is time-consuming; and the need to monitor events taking place on all the nodes of our cluster.

"I was tired of using EDT or CREATE at DCL to write small files that I'd submit, having to type in the correct queues and then delete the small file.

"SUBCOM prompts you for commands until you press return. DCL commands must be prefaced by $, and answers to program prompts are input without $. Use double quotes if the command has quotes in it. SUBCOM writes these commands to a file called SUBCOM_HHMMSS.JOB. You're then prompted for which queues to submit the job; select one queue or all queues.

"If you have more than three nodes in your cluster, you can modify SUBCOM to suit your needs. I changed the names of our nodes to NODE1, NODE2 and NODE3. To determine on which node the job ran, the nodename is written to the log file as the first command executed. The invoked submit command has NOPRINT, DELETE and NOTIFY.

Sandy explains, "After selecting queues, you're prompted for a time to submit the job. The default is NOW; input the time exactly as you would in DCL if you want to schedule the job.

"Because many installations delete all .LOG files nightly, SUBCOM lets you save the log file, with an extension .SAVLOG, if the file is invoked with any parameter; e.g., @SUBCOM 1."

The Tweaking

Sandy's procedure is useful, and tweakers can have a good time while leaving the procedure intact.

One drawback of using INQUIRE and WRITE in such a procedure is the need to exercise care when using a command line containing quotes:

```
$ REPLY/BELL "This is a test"
```

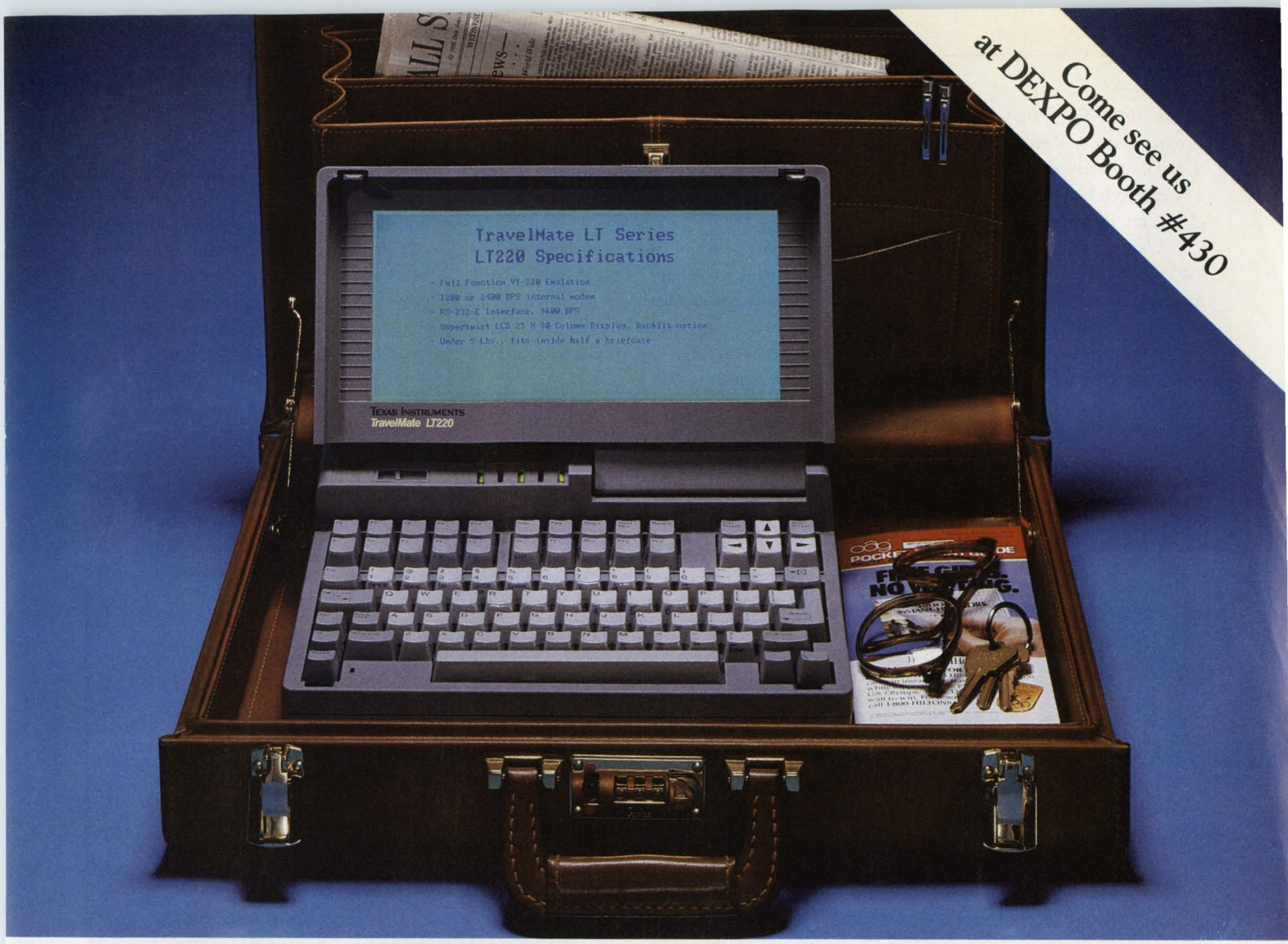
would have to be input as:

```
$ REPLY/BELL " " "This is a test" " "
```

because of the way INQUIRE processes the input line.

You can circumvent this problem by using READ statements instead of INQUIREs, or even using COPY to get the text from SYS$INPUT and direct it to the appropriate SUBCOM file. Similarly, COPY or TYPE could replace the six separate WS commands following the ASK_QUEUE label.

Sandy's method to trap invalid responses to the option question is valid, although it might be more efficient to



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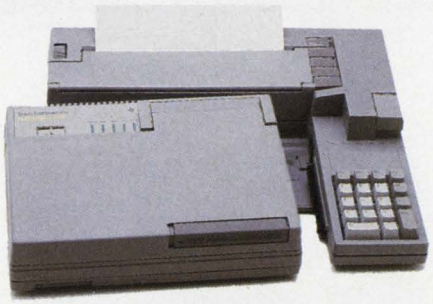

let you create, update and store files. They're also handy for programming the LT220 to your specific application.

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TEXAS INSTRUMENTS

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check OPT for values less than 1 or greater than 4. Responding with a T or Y tricks the procedure into thinking a 1 is entered, but any other non-numeric character is trapped.

Using a one-second delay for /AFTER circumvents having the qualifier generate an error if no value is specified, although 00:00 can be used as well.

Assigning SYS$OUTPUT and SYS$ERROR to the null device is a valid alternative to using the slower SET MESSAGE commands. It's preferable, however, to use ASSIGN/USER rather than explicitly deassigning the logicals.

IF YOU HAVE a useful command file you'd like to share, send it to me at the address below. Include your name and address, and, if possible, send your submission on magnetic media to avoid input errors.

If you're not using the DEC-related bulletin board systems, you're missing a great source of valuable information. The Professional Press ARIS system, in addition to containing the source code of most programs featured in our publications, contains an active message area where callers can exchange hints and tips and have questions answered.

David Blanchard, an ARIS user and regular on my SYS$OUTPUT board,

PROGRAM.

```
$! SUBCOM.COM
$! (See information at bottom of file.)
$           ON CONTROL_Y THEN GOTO DELETE
$           ON ERROR THEN GOTO DELETE
$           ASK := INQUIRE/NOPUNC
$           WS  := WRITE SYS$OUTPUT
$!
$           WS ""
$           COUNT = 0
$!
$ ASK_COMMAND:
$           ASK COM "Command to execute? "
$           IF COM .EQS. "" .AND. COUNT .EQ. 0 THEN EXIT
$           IF COM .EQS. "" THEN GOTO CLOSE
$           IF COUNT .GT. 0 THEN GOTO WRITE_COMMAND
$!
$           X = F$TIME()
$           HOUR   = F$CVTIME(X,,"HOUR")
$           MINUTE = F$CVTIME(X,,"MINUTE")
$           SECOND = F$CVTIME(X,,"SECOND")
$           NAME   = "SUBCOM_" + HOUR + MINUTE + SECOND
$           EXT    = ".JOB"
$           FILE   = NAME + EXT
$!
$           OPEN/WRITE SUB 'FILE'
$           WRITE SUB "$ WRITE SYS$OUTPUT F$GETSYI(""NODENAME"")"
$!
$ WRITE_COMMAND:
$           WRITE SUB COM
$           COUNT = COUNT + 1
$           GOTO ASK_COMMAND
$!
$ CLOSE:
$           CLOSE SUB
$!
$ ASK_QUEUE:
$           WS ""
$           WS "Please select queue: "
$           WS "1. NODE1$BATCH"
$           WS "2. NODE2$BATCH"
$           WS "3. NODE3$BATCH"
$           WS "4. All of the above"
$           ASK OPT "Option? "
$!
$           IF OPT .EQS. "" THEN GOTO DELETE
$           IF OPT .NES. "1" .AND. OPT .NES. "2" .AND. OPT .NES. "3" -
            .AND. OPT .NES. "4" THEN GOTO ASK_QUEUE
$!
$           IF OPT .EQS. "1" THEN QUE = "NODE1$BATCH"
$           IF OPT .EQS. "2" THEN QUE = "NODE2$BATCH"
$           IF OPT .EQS. "3" THEN QUE = "NODE3$BATCH"
$           IF OPT .EQS. "4" THEN QUE = "ALL_NODES"
$!
$           WS ""
$           ASK AFTER "Submit after (NOW) ? "
$           IF AFTER .EQS. "" THEN AFTER = "00:01"
$           IF P1 .EQS. "" THEN LOG_NAME = NAME + ".LOG"
$           IF P1 .NES. "" THEN LOG_NAME = NAME + ".SAVLOG"
$           IF QUE .EQS. "ALL_NODES" THEN GOTO ALL_NODES
$           SUBMIT/NOTIFY/NOPRINT 'FILE'/DELETE/QUE='QUE'/AFTER='AFTER'-
            /LOG='LOG_NAME'
$           GOTO RESET_CONT
$!
$ ALL_NODES:
$           FILE_1 = NAME + ".NODE1"
$           FILE_2 = NAME + ".NODE2"
$           FILE_3 = NAME + ".NODE3"
$           RENAME 'FILE'   'FILE_1'
$           COPY   'FILE_1' 'FILE_2'
$           COPY   'FILE_2' 'FILE_3'
$!
$           IF P1 .NES. "" THEN LOG_NAME = NAME + "_NODE1.SAVLOG"
$           SUBMIT/NOTIFY/NOPRINT 'FILE_1' -
            /QUEUE = NODE1$BATCH/AFTER='AFTER'/LOG='LOG_NAME'
$!
$           IF P1 .NES. "" THEN LOG_NAME = NAME + "_NODE2.SAVLOG"
$           SUBMIT/NOTIFY/NOPRINT 'FILE_2' -
            /QUEUE = NODE2$BATCH/AFTER='AFTER'/LOG='LOG_NAME'
$!
$           IF P1 .NES. "" THEN LOG_NAME = NAME + "_NODE1.SAVLOG"
$           SUBMIT/NOTIFY/NOPRINT 'FILE_1' -
            /QUEUE = NODE3$BATCH/AFTER='AFTER'/LOG='LOG_NAME'
$!
$ RESET_CONT:
$           COUNT = 0
$           WS ""
$           GOTO ASK_COMMAND
$!
$ DELETE:
$           ASSIGN NL: SYS$OUTPUT
$           ASSIGN NL: SYS$ERROR
$           CLOSE SUB
$           DELETE 'FILE'
$           DEASSIGN SYS$OUTPUT
$           DEASSIGN SYS$ERROR
$           EXIT
$! Sandy Felton, Software Consultant
$! The Challenger Group
$! 4800 Sugar Grove Blvd., Ste. 220
$! Stafford, TX 77477
```

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found a few bugs in the MESSAGE.COM utility that appeared in the June issue. "I recently downloaded MESSAGE.COM from ARIS but was unable to get it to work," David reports. "I included some diagnostics in the file and found two problems.

"When the user doesn't include a file, the program prompts the user for a message and creates a file of type .DAT. The batch program, on the other hand, is looking for a file of type .TXT. I solved this by changing:

```
FN = TMPDIR + RAWFN
```

to:

```
FN = TMPDIR + RAWFN + ".TXT"
```

"When the message file was included as P3 and I attempted to close the MFILE, the program died. This file is only opened when the user interactively enters text, and the problem was solved by moving:

```
END_MESSAGE:
  CLOSE MFILE
```

so that it precedes GOT_P3:

"Otherwise," says David, "it works fine. Thanks for a nice routine."

Undocumented CHECKSUM

Brian DeSantis, another ARIS and SYS$OUTPUT regular, found an undocumented DCL command that returns a file's checksum.

"I don't remember where I came across this," Brian reports. "I may have seen it in a DECUS publication or while looking through DCLTABLES.

"The command form is $ CHECKSUM filename. The results are placed in the local symbol CHECKSUM$ CHECKSUM."

If anyone has additional information regarding this command, please pass it on.

Philosophy 101

Several FidoNet VAX echo participants raised a perplexing question. If DECUS is pronounced DEEK-US, why isn't DEC pronounced DEEK?

For a complete list of DEC-related bulletin board systems in the U.S., send a stamped, self-addressed, business-size envelope to: BBS List, Kevin G. Barkes Consulting Services, 4107 Overlook Street, Library, PA 15129. The list is also available on-line at SYS$OUTPUT (FidoNet 1:129/38), (412) 854-0511. SYS$OUTPUT now features VAX, RAINBOW and PDP-11 national echomail conferences.

Kevin G. Barkes is an independent consultant in VAX systems software, management, tuning and training based in Library, Pennsylvania.

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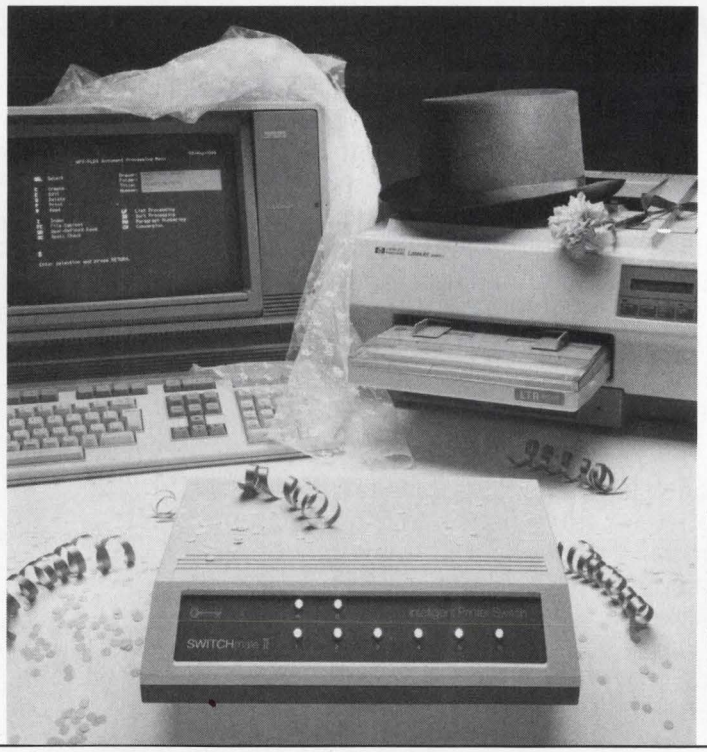

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DIGITAL WATCH

Evan Birkhead

The OLTP Software Funnel

DEC's strong new presence in On-Line Transaction Processing (OLTP) is really a new marketing strategy. Although not a major player in the potent OLTP industry, DEC has been addressing OLTP solutions for years. But the approach was low key, overshadowed by the company's activities in flashier, more visible industries. DEC never had a well-defined plan, leaving OLTP to IBM and Tandem Computers Inc.

With or without DEC's involvement, OLTP is, as DEC President Ken Olsen acknowledges, "the fastest-growing part of business in the computer world." That little statistic must have raised somebody's eyebrows in Maynard. It was clearly a catalyst for July's announcement of DECTP, DEC's package for distributed-style transaction processing. DECTP funnels existing but untargeted software systems into OLTP applications.

> ***"With or without DEC's involvement, OLTP is, as DEC President Ken Olsen acknowledges, "the fastest-growing part of business in the computer world."***

That's not to suggest the announcement contained nothing new. The headliner, DECTP's integral software component, called DECINTACT, appears to be an excellent environment for applications development and TP programming. A CICS-style TP monitor, DECINTACT is offered as an alternative to ACMS, DEC's 4GL TP development environment.

DECINTACT is a re-engineered version of Intact from Advanced Systems Concepts Inc. of Hoboken, New Jersey. Version 1.0 supports RMS files and accesses Rdb and VAX DBMS databases. It also contains a Terminal Forms Editor (TFE) that enables software developers to create screen forms on a terminal.

DECINTACT's architecture is the basis for DEC's claim that it increased its previous TP speeds fivefold.

Quick Transactions

DECTP was developed to give credibility to DEC's definition of transaction processing as the ability to transact business with the consumer quickly and easily, especially at the moment of transaction. Global securities trading and other banking applications, retail and manufacturing are among the industries DEC hopes to address.

One major selling point of DECTP is its versatility, although much credit goes to the VAX architecture itself. DECTP systems run on any size VAX and can be built from the ground up. Endless combinations of compatible software options can coexist, and sites can develop a system dedicated to OLTP or integrate it with other activities such as memos to billing and accounting file

TABLE 1.

PRODUCT	PRICE
DECINTACT version 1.0	$4,457 to $141,135
Rdb/VMS version 3.0 including VAX SQL version 2.0	$2,250 to $71,250
VAX CDD/Plus version 4.0	$340 to $10,810
VAX RALLY version 2.0	$620 to $14,940
VAX DBMS version 4.0	$3,150 to $99,750
VAX Data Distributor version 2.0	$750 to $23,750
VAX ACMS version 3.0	$3,225 to $102,125
VAX TDMS version 1.8	$620 to $14,870
VAXLINK Software	$5,000 to $42,000
VIDA with IDMS/R	$2,760 to $87,280
9.7 GB SA600 Storage Array	$225,000
4.6 GB SA600 Storage Array	$125,000

Pricing for DECTP components. The software license prices listed range from the VAXSTATION 2000 to the VAX 8978 cluster.

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CIRCLE 154 ON READER CARD

Oracle Responds To RDBMS OLTP Challenge

After 2½ years of designing, developing and rewriting nearly 50 percent of version 5 code, Oracle Corporation of Belmont, California, announced in July a new entry in the transaction processing arena.

Traditionally an area for network or hierarchical databases, ORACLE version 6.0 includes a dedicated Transaction Processing Subsystem to add true On- Line Transaction Processing (OLTP) capability to its relational database system. It boasts a 10-fold improvement in transaction processing rates per second over ORACLE version 5.0.

Version 6.0 of the ORACLE RDBMS takes full advantage of multiprocessor environments. Its multiserver architecture allows user processes to share an in-memory copy of data as well as read data from disk. Several background processes caring for specific database functions run independently of user processes, thus improving throughput and response time. On multiprocessor machines, processes can run in parallel, again improving performance.

I/O optimization is achieved through a redo log, a technique whereby the several changes to database rows required by a single transaction are written to disk in one physical I/O operation. Only the row being changed is written back to disk, rather than entire pages of data. Multiple transactions can be piggybacked in the redo log and written out in one operation, substantially reducing disk I/O.

ORACLE's use of a least-recently-used algorithm for writing back pages to the database also ensures that pages in memory get updated as many times as possible before being written to the database.

Rather than locking an entire page or table during a transaction, ORACLE locks at the row and index level. This ensures better concurrency and reduces contention among users.

Database rows can be read and updated simultaneously. Queries and ad hoc reports can be produced without interfering with system performance. Called Multi-Version Read-Consistency, this technique reduces the data contention between those users reading the database and those updating it.

Fault tolerance and data recovery are provided. The redo log is used to recover transactions that weren't written to the database at the time of system failure. Portions of a database can be backed up and recovered on-line while users are entering transactions. If a disk should fail on a multidisk database, users not needing that data still can run unaffected. Full support of disk shadowing techniques as found in VMS is provided. In clustered environments, a failure of one CPU poses no problems; another processor recovers all in-process transactions from the failed CPU and allows work to continue on all healthy CPUs.

Databases can be spread across multiple disks. ORACLE's SQL*DBA helps database administrators control and monitor databases and system performance.

PL/SQL, included with ORACLE, is a powerful procedural OLTP extension that reduces application development time. Throughput is increased by grouping several SQL statements into one database request.

ORACLE used the TP1 OLTP benchmark to conduct tests. Performance tests simulating a bank with five million accounts, 500 branches and 5,000 tellers run on a VAX 6240 using one processor produced 11.0 transactions per second (tps) on a 500 MB database. Mean response time was 1.6 seconds. Performance improved proportionately as processors were added. Using four processors, performance improved to 42.6 tps with a mean response time of .40 seconds.

Tests simulating a bank with 3,600,000 accounts, 360 branches and 3,600 tellers conducted on a VAX 8820 achieved a peak rate of 32.8 tps with a mean response time of .46 seconds. Transaction processing rates of 48.6 tps and 37.0 tps were achieved on a four-processor 6240 and an 8820, respectively, on a smaller-scale database called the Banking Benchmark.

ORACLE version 6.0 will be available starting in mid-October for use on platforms running the benchmark tests, which includes the VAX under VMS, IBM and Amdahl machines under MVS, and Sequent minicomputers running UNIX. Releases for VM/CMS, Sun, Pyramid, Hewlett-Packard, Data General, Macintoshes and PCs will be available shortly thereafter.

—David B. Miller

ORACLE Version 6.0

PLATFORMS: A variety of platforms including VAX/VMS, IBM/MVS and VM/CMS, 30 UNIX platforms, Macintoshes and PCs will be supported

PRICE: $4,000 to $250,000, depending on configuration

ORACLE CORPORATION

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Belmont, CA 94002
(415) 598-8000

FOUNDED: 1977

PRODUCT LINE: Database management, application development, decision support and network communications software

REVENUES: $282.1 million

NET EARNINGS: $42.9 million

OWNERSHIP: Public (NASDAQ: ORCL)

BRANCHES: 21 U.S., 57 international

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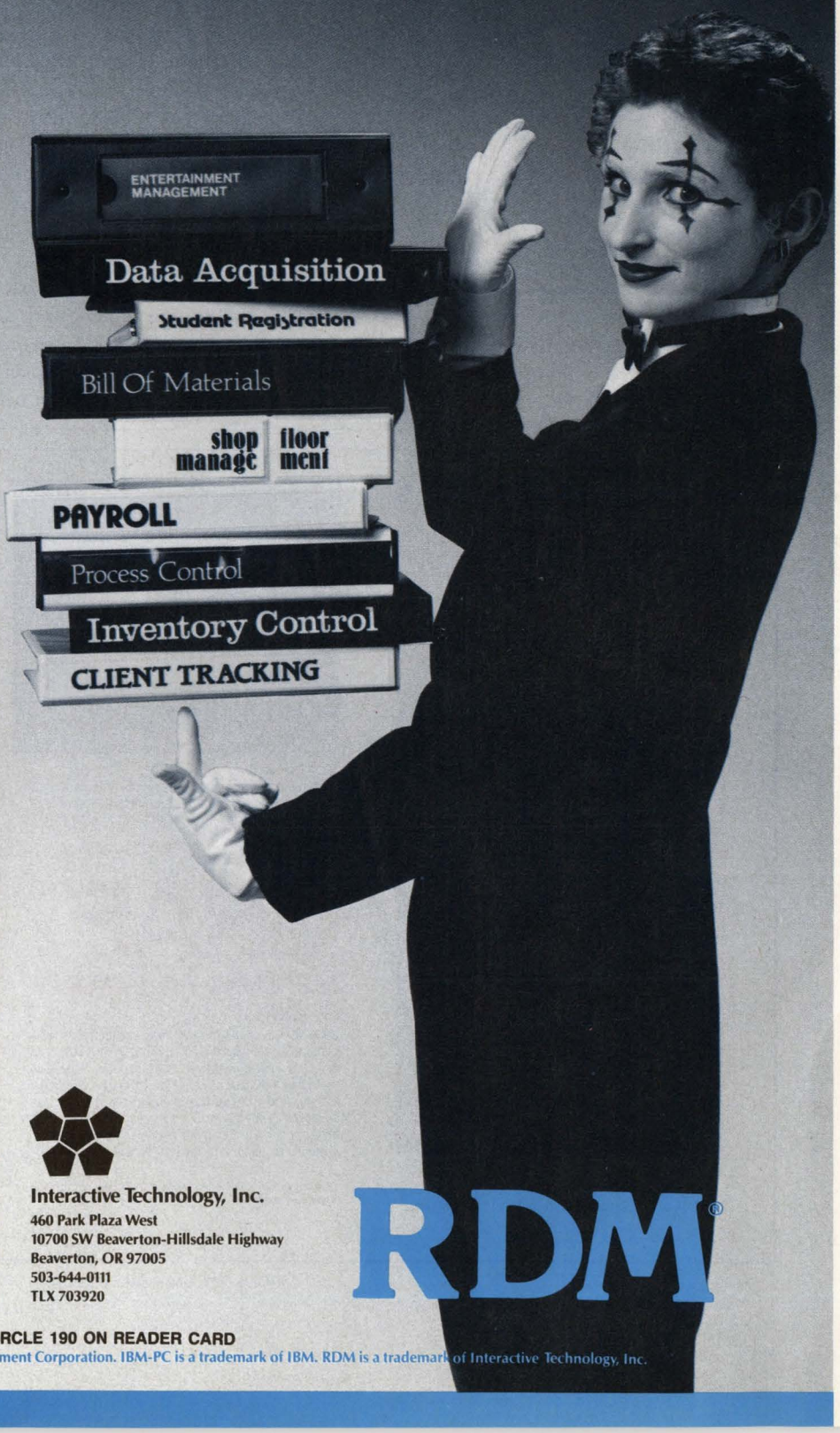

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Hoboken, NJ 07030
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Armonk, NY 10504
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Tandem Computers Inc.
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Cupertino, CA 95014-2599
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users. Suitable DECTP software systems can be added like building blocks.

In addition, DECTP systems can be customized to put the power where you need it: either integrated with a large database or optimized to do many transactions or complex transactions. Virtually all the DECTP systems can be integrated directly with related systems in the group.

Into The Funnel

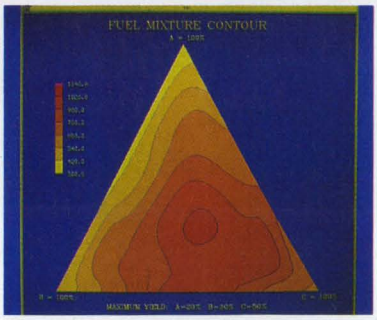
The existing software systems that were funneled into DECTP have undergone major improvements. For example, the improvements made in VAX Common Data Dictionary (CDD)/Plus version 4.0 are significant to customers who have been sitting in the previous version for almost three years.

CDD/Plus is a dictionary that's optimized for performance across a distributed database. The new version contains a single logical dictionary for networkwide reference with an improved way to integrate and roll up data collected by applications across a network. Data definitions can be managed centrally or locally.

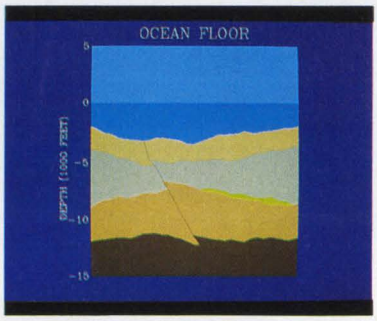
Another hot ticket was the debut of version 3.0 of Rdb/VMS, DEC's maligned relational database management system. According to DEC, the new version demonstrates a 10-fold performance improvement. On its own, Rdb can handle up to 30 transactions per second (tps) on an 8800. Version 3.0 supports multifile databases, enabling database storage areas to be distributed across multiple disks or files.

The performance of ACMS, claims DEC, can be increased from six to 30 tps when used with Rdb.

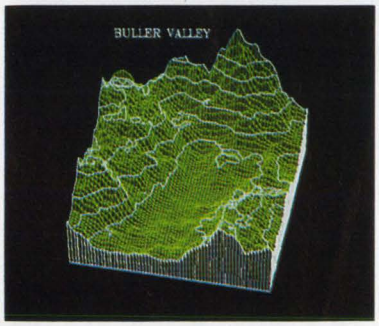
In addition, Rdb now incorporates VAX Structured Query Language (SQL) version 2.0, DEC's implementation of the ANSI-specified SQL. SQL statements can be embedded in Ada source files. In fact, VAX SQL statements can be linked with any VMS-compatible third-generation programming language. Rdb now also



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.



X, Y Graphs
Two-function graphs are easily generated even with large data bases. High quality presentation graphs are available by using GRAFkit's curve fitting and color fill capabilities.



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

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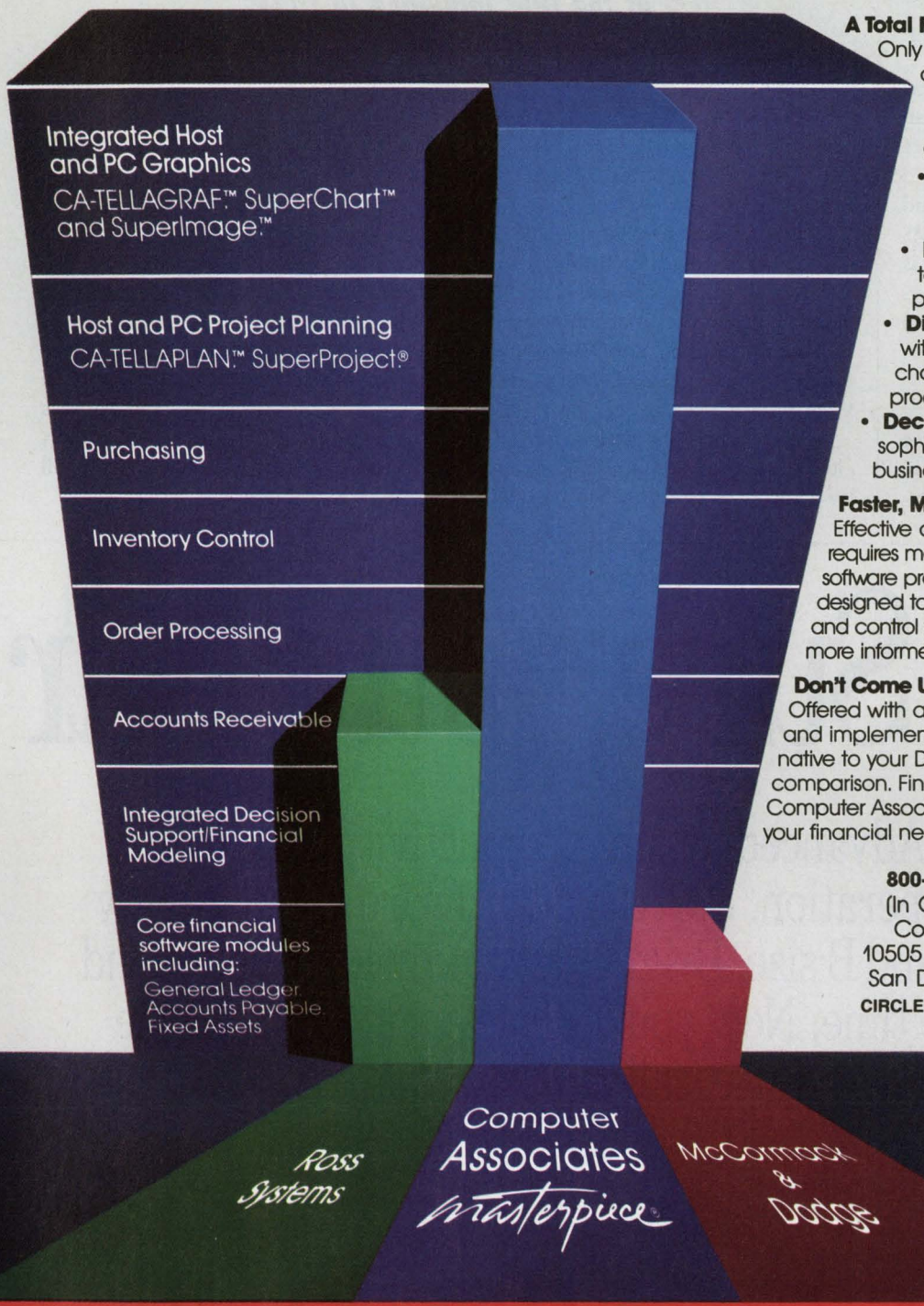

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supports databases as large as 50 GB. It's also an integral component of DECTP.

Less dramatic were the new releases of VAX Rally, a 4GL tool that helps programmers develop database applications, and VAX DBMS, DEC's CODASYL-compliant network database management system with a high-speed backup facility for large databases.

VAX ACMS, a strong option, has been usurped by DECINTACT. Version 3.0 contains some overall performance improvements, including queuing and storing/forwarding of transactions and a new recovery capability. VAX TDMS version 1.8, a sister product of ACMS, is tailored specifically to manage ACMS forms and other data presentation at a local terminal.

The IBM Look

DECTP is of interest to people who have been asking for IBM-style solutions in a DEC environment. Besides DECINTACT, which has a CICS look, VAX SQL is a classic example of the IBM influence in OLTP.

> ***"Besides DECINTACT, which has a CICS look, VAX SQL is a classic example of the IBM influence in OLTP."***

VIDA with IDMS/R is DECTP's package for reading IBM/Cullinet databases, going through an SNA gateway. In addition to defining, retrieving and updating in Rdb, VAX SQL can retrieve data in IBM databases using VIDA with IDMS/R in read-only mode.

Many other IBM database types, including IMS and VSAM, can be accessed by a software system called VAXLINK. It's designed for networked applications that need to draw data from IBM mainframes.

VAX Data Distributor, now in version 2.0, is a companion system to VIDA with IDMS/R and VAXLINK, providing a way to manage relational databases across multiple processors. It can make copies of databases or subsets on the same or remote systems, and create a single target database. It also can collect data from several sources. These are all IBM-style utilities.

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To learn how to install these programs or teach them to your staff, you can attend the TP university that DEC has established for DECTP.

Benchmarks

DEC's media blitz on DECTP was devoted to comparisons with Tandem and IBM. The performance of various VAXs versus IBM mainframes and Tandem VLXs running different database configurations of the Debit-Credit benchmark were highlighted.

The bottom line of the comparisons was that on one transaction system (an 8700), you can have up to 3,000 tellers doing one transaction per minute, 24 hours a day, seven days a week, for half the cost of the comparable IBM system and with more functionality than the comparable Tandem.

DEC also claims to have completed 100 tps on the Debit-Credit benchmark on an 8974. This is a three-to-one price-performance increase over IBM and a two-to-one increase over Tandem.

The performance of the new SA600 Storage Array is a major reason why DECTP systems can attain such fast speeds. The only hardware component of DECTP, the SA600 comprises as many as eight 1.2 GB RA90 disk drives. It stores up to 9.7 GB with seek times up to 117.5 ms, and a peak transfer rate of 2.8 MB/sec. The SA600 accesses clusters through the HSC50 or HSC70.

The bulk of the DECTP announcement was delivered by Bob Hughes, vice president of marketing. Hughes sees DECTP and its IBM look as leading to a new concept, the networked organization.

"You can have the power of a large VAXCLUSTER behind the glass wall, should you choose to do centralized transaction processing," he maintains. "Or, you can scale down that power and transform your business into a decentralized operating environment if you choose. You are no longer limited to one choice from one vendor, and the other choice from another vendor."

DEC's success in OLTP will rest on the company's ability to convince the world of that. ■

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DECNET: Looking To Phase V

NETWORKING EDITOR

Bill Hancock

To date, the only DECNET Phase V implementations announced are for VMS and MS-DOS. This leaves DECNET users on other operating systems wondering if there's a future after Phase IV, or, in some situations, Phase II and Phase III.

Another concern is what Phase V will do to a relatively functional network. Will it destroy a useful network? No, they'll remain useful. Will existing networks cease to function? No, they'll continue to run.

Phase V has been a long time in coming; you could say that it's been planned since Phase II. Let's examine the phases and the path they blazed to Phase V.

Roots

Phase I of DECNET was introduced in 1976, a year after its announcement. Originally implemented on RSX-11M systems and later on IAS, RSX-11D and OS/8 (as DECNET-8), Phase I was built with a set of goals that appeared after the product was released.

The original goal was to help leverage hardware sales by allowing PDP-11 hardware devices to communicate with each other. Phase I allowed a two-machine, point-to-point (direct connection from one system to another) network, and it used a rather bizarre user interface and an even stranger program interface. Later goals included program-to-program capabilities, file transfer and, in future releases, virtual terminal support.

As a customer of Phase I on my PDP-11/70s running IAS, I wasn't happy. Phase I had problems. The first time I fired it up on my 11/70s, DECNET crashed both machines. I rebooted the systems, and it happened again. With many patches and a lot of frustration, I got a file transferred, only to find that the node pools on both systems were fragmented hopelessly after the transfer was complete, forcing a reboot of the system to clean things up.

Then, Phase II came along in 1978, and it worked. Phase II provided the touted features of Phase I as well as a few undocumented capabilities. However, it was a hassle to set up.

A network installation required that preparatory generation of components be completed. It also required that the network installer perform explicit sizing calculations on buffer allocations and other link/line attributes, a re-SYSGEN of the operating system, driver building procedures and other work. A typical Phase II NETGEN took about two working days on an RSX system after the operating system had been regenerated to support the network components being installed. Those who weren't familiar with the procedure needed up to one month to get things configured correctly.

There were, however, some things to cheer about. Although DECNET didn't provide the full palette of network services we're used to today, it worked well when configured properly, and some of its undocumented features were helpful. Program-to-program, although not as trivial as Phase IV transparent programming on a VMS system, was easier than on Phase I. Further, when a link was active, it stayed active in a predictable fashion.

> ***"Phase V has been a long time in coming; you could say that it's been planned since Phase II."***

Using a utility called Network File Transfer (NFT), a user could move files from one system to another over a variety of asynchronous and synchronous communications devices. An unsupported utility, RMT, allowed some virtual terminal support using a specialized protocol. The protocol worked well except when an occasional escape sequence would cause the terminal driver to hang. All in all, Phase II did what Phase I promised. It also provided the vision of the future.

Moving Forward

Phase II was the first implementation to demonstrate the concept of a layered network architecture. Although only a four-layer implementation (physical, data link control, logical link control and user layers), it successfully demonstrated the idea of a layered implementation of a network architecture.

Further, one goal of Phase I was the use of standards in future implementa-

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tions of the DECNET technology, where reasonable. When Phase II was released, the Open Systems Interconnection (OSI) architecture was announced by the International Organization for Standardization (ISO) as a model for network architectures. OSI didn't specify specific technologies at each of its seven layers, but it did prescribe generic functionality at each layer. Because of the way in which Phase II was coded, the natural flow toward a seven-layer OSI network was founded in Phase II.

Phase II could link more than two systems via a network topological technique known as a star. All systems were connected in a star topology through dedicated communications links so that routing of traffic from one system wasn't necessary. I had six systems connected at once in Phase II, and as best I could determine, Phase II supported up to eight systems linked in a star fashion with no routing allowed.

Phase II allowed a technique known as poor man's routing. This let the network user specify which machines to route a connection through. For instance, if a user on node ALPHA wished to send a file to node BETA, it could be done as long as the two were connected directly. But if a user on node ALPHA wished to send the message, to node GAMMA and GAMMA was connected to BETA and not to ALPHA, it was impossible to send the message because technically Phase II didn't support routing.

By using poor man's routing, however, a network user could send a file from ALPHA to GAMMA through BETA as follows:

```
> NFT GAMMA::BETA::[20,10]
  BILL.DAT=BILL.DAT
```

where the destination is on the left of the = and the source is on the right. This command instructs the Network File Transfer utility to send a file, BILL.DAT, from the current default UIC to UIC [20,10] on the remote system GAMMA by routing the message explicitly through node BETA.

The double colons at the end of the node names are a standard DECNET node name termination specification.

Eventually, most of the DEC arsenal of operating systems ran Phase II DECNET. This included the PDP-11 operating systems, DECSYSTEM 10s and 20s and VMS as an add-on kit in the initial versions of the operating system.

Another Step

Phase III, released in 1980, featured:

1. Adaptive routing — Nodes figured out on their own how to get from one system to another. Further, if a link failed and there was another path to the same remote system, Phase III

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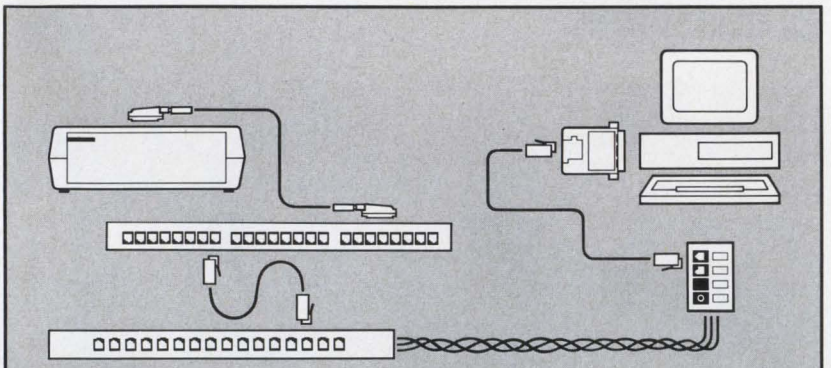

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automatically conformed to the new path without user or network manager intervention.

2. New types of hardware for different types of system bus structures.

3. An increase to 32 nodes and a later increase to 255 nodes on a single network — Actually, 255 nodes were supported from the beginning of Phase III but were restricted to ensure that things were working properly before commitment of support by DEC.

4. An enhanced network management architecture using Network Information and Control Exchange (NICE) protocol.

5. Downline system loading — This allowed host VMS and RSX systems to load RSX-11S diskless operating system kernels into remote PDP-11 systems.

6. Loopback testing and network diagnostics that were usable for network managers.

7. More than six hops on a route for messages — Every time a message traverses a system en route to its final destination, it has taken a hop. By restricting the calculations on routing and the associated buffers, the network manager restricts the number of hops allowed for a network message.

8. Support for X.25 and SNA gateways — Although not a direct part of DECNET, DECNET was required for the downline systems loading that was essential to early versions of the two products.

One problem with Phase III was the way nodes updated changes in the network. When a new system was activated or removed from the network, adjacent nodes (systems that were logically one hop away from each other) would tell other adjacent nodes of the network configuration change. This sounds trivial, but it isn't. Nodes updated each other by sending the entire routing database from one node to the adjacent nodes. If there were more than 50 nodes on the network, the size of the network database could get quite large. This caused overall degradation of the network in situations where nodes were constantly up and down.

> ***"Phase IV appeared about the end of 1982 and provided enhancements directed at local area networks (LANs) or, more specifically, Ethernet."***

Further Enhancements

Phase IV appeared about the end of 1982 and provided enhancements directed at local area networks (LANs) or, more specifically, Ethernet. Further enhancements included routing segment updates. This meant that the routing system no longer sent the entire database on a network update but only the changes to the network. Other features included a generic virtual terminal protocol called CTERM that provided a multisystem virtual terminal capability.

Previous implementations of DECNET allowed like systems to connect in a virtual terminal method, but connections to other unlike operating systems weren't supported by DEC. By providing a generic terminal protocol compatible on all systems, Phase IV allowed dissimilar systems to connect and allowed user virtual terminal access to previously unsupported systems.

Another important feature of Phase IV was the introduction of a concept called an area. Areas refer to a logical

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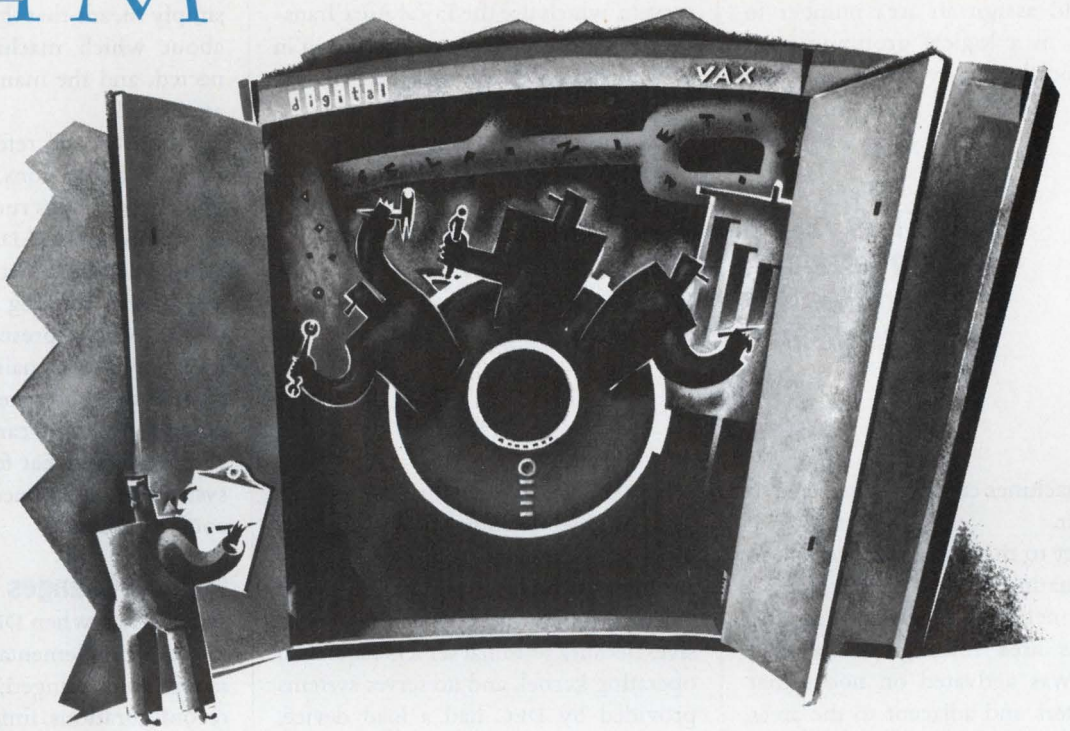

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segmentation of nodes into a virtual collection. This meant the network manager could assign an area number to machines in a logical grouping (e.g., geographically, or by work function) and the machines could be connected to each other.

To get to machines that weren't in the originating node's area, a special type of network routing function known as area routing (or Level II routing) was activated on nodes that were routers and adjacent to the areas being connected. The message then was sent to a remote destination node in another area through the area routers. Area routing allowed connection between large numbers of nodes without the overhead of keeping track of all node status on all nodes in the network. Because Phase IV also introduced 1,023 nodes per area and support for 62 areas, the number of machines on a collective DECNET network could exceed 65,000.

Commensurate with the support of such a large number of systems was the capability of some nodes to avoid the network routing overhead entirely. These nodes, known as end nodes, could connect and send messages to any other node in the local or any connected area, but didn't have a routing database to update or track. In active networks, routing could consume a great deal of CPU and I/O power, sometimes degrading the routing system's overall capabilities. By allowing only certain nodes the ability to route traffic, network overhead could be isolated to the required few machines. Network access capability wasn't degraded for non-full-featured systems (end nodes).

Support for non-DECNET systems also was included in Phase IV. Terminal servers, which use the Local Area Transport (LAT) protocol, were introduced in 1984 to connect large numbers of terminals to systems in a distributed way. The original terminal server project, called CI-Mercury, was conceived to connect terminals to a VAXCLUSTER (CI-based) but was deemed too expensive. Because terminal servers require an operating kernel, and no server systems provided by DEC had a load device, support for downline system loading of the kernels had to be included.

> ***DECNET is referred to in phases rather than versions, because different operating systems run different versions of themselves and DECNET.***

Support for remote connections from DECNET-based nodes for terminal server management also was deemed essential, so DECNET needed some enhancements to support the new products. The original terminal services product, called LAT-11, allowed PDP-11 systems with terminal multiplexers, the proper amount of memory and Ethernet cards of certain configurations to be downloaded from selected RSX and VMS host systems. When the DECSERVER-100 was introduced in 1985, support was extended for loading a non-PDP system (DECSERVERS use the Motorola 68000 processor).

Phase III and IV weren't implemented on all systems supported by DEC. Operating systems such as RT-11, IAS, TOPS 10 and 20 and RSTS/E, although still sold and supported, weren't upgraded to Phase III and/or Phase IV. As a result, many previously supported DECNET systems can run only early phases of DECNET (e.g., RT-11 Phase II). This doesn't mean that such machines can't be on the network; it simply means that there are restrictions about which machines can be connected, and the manner in which they are linked.

DECNET is referred to in phases rather than versions, because different operating systems run different versions of themselves and DECNET. By specifying DECNET functionality in phases, any system running a particular phase of DECNET is presumed to have that level of functionality and support, regardless of software version. Thus, the network manager can determine which systems have what features and which systems can be connected in appropriate configurations.

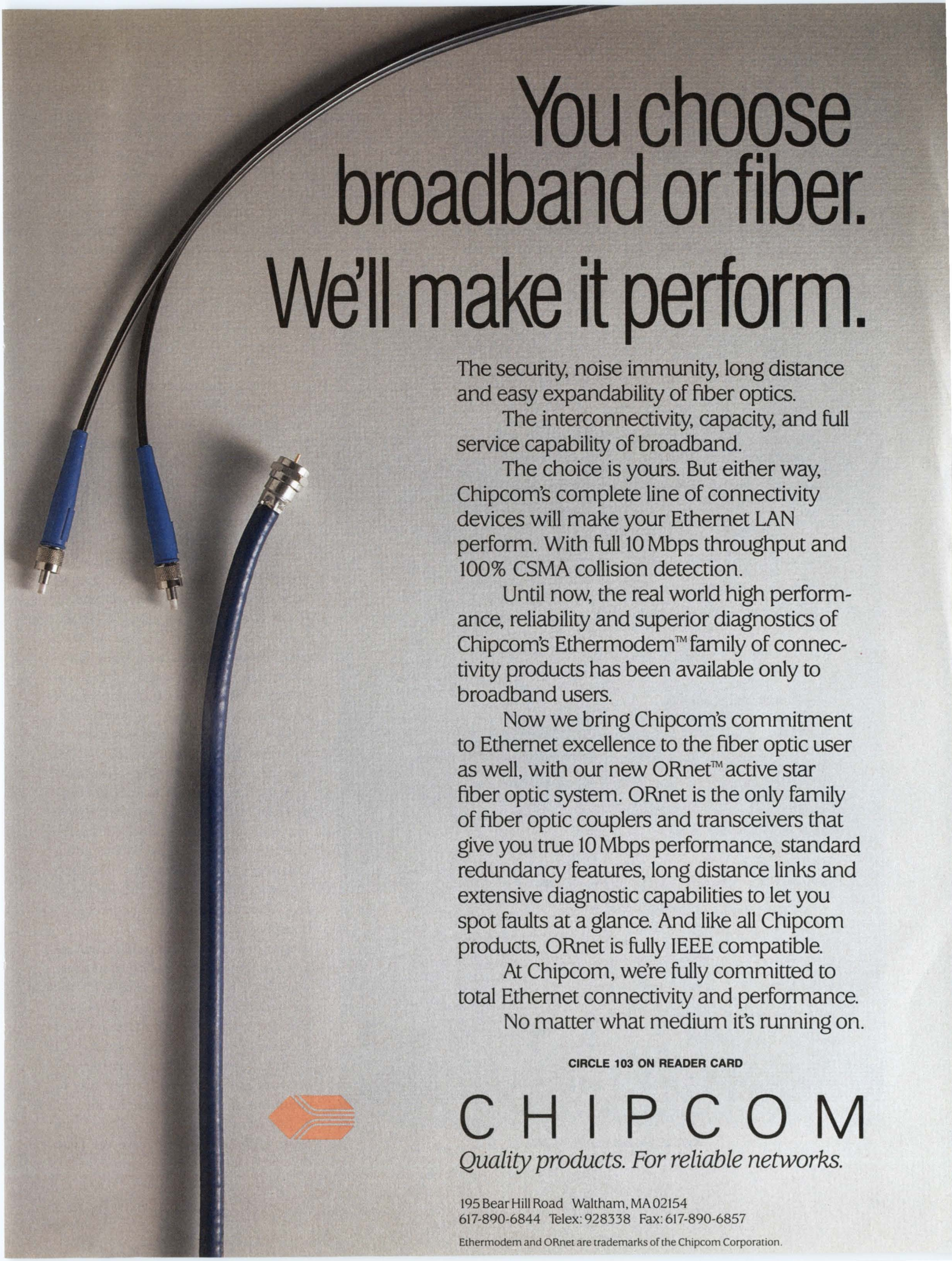
Making Changes

In late 1987, when DEC announced the Phase V implementation of DECNET, many users cringed, fearing network reconfigurations, functionality changes and other horrors. Why? Because in Phase V, DECNET undergoes serious changes that affect how it works and what it does. There's no need to be concerned about the user interface in Phase V. Network managers, however, must relearn the DEC style of networking, as Phase V changes the way DECNET operates.

Phase V introduces the following major changes from 1987 through 1990:

1. Support for large networks — A Phase IV node address consisted of 16 bits (two octets). This combination allowed permutations of more than 65,500 nodes on a single network. In Phase V, node addresses are 20 octets (bytes), allowing extremely large networks. Individual nodes will have a 48-bit local address that allows more than 281,474,976,600,000 combinations. Add OSI multiarea allowances plus multidomain network, and the number of nodes allowed on an interconnected network is extremely large.

The OSI addressing standard (ISO std. IS8348 Addendum 2) provides a global addressing standard to which all future nodes will need to adhere for



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connection to worldwide networks like the Integrated Services Digital Network (ISDN). Networks of one million or more nodes will become common in larger multinational corporate networks as computing gets closer to the user.

2. Support for Digital Network Architecture (DNA) and the OSI architectures simultaneously on the same systems — By supporting DNA, existing DECNET network configurations shouldn't break, and by supporting OSI, connection to larger and more diverse networks is supported.

3. Incorporation of OSI prescribed network management protocols and replacement, where appropriate, of existing DNA management protocols — This allows a DECNET manager to control not only DNA nodes but also other OSI-compliant nodes.

4. Replacement of certain proprietary packet formats, such as DNA routing headers, to ISO-compliant formats: e.g., ISO CLNP, ES-IS — This allows not only support of OSI networks, but support of new network technologies in connection-oriented and connectionless networks.

5. Support of OSI data link architectures — This means farewell to the Ethernet V2.0 packet format and hello to the IEEE 802.2/802.3 LAN packet formats for CSMA/CD networks. Another benefit is that, theoretically, support for standard OSI data link protocols should allow support of other currently non-supported OSI data link protocols, such as 802.5 (token ring) and 802.4 (token bus/MAP networks).

An important issue in this part of Phase V is the necessity of support of High-Level Data Link protocol (HDLC). In this context, support of HDLC precludes the use of the current DEC data link protocol, Digital Data Communications Message Protocol (DDCMP). When the data link protocol is exchanged for a different mechanism and protocol, the change is serious.

6. Access to OSI applications — OSI provides for certain generic mechanisms, such as electronic mail (X.400), virtual terminals (VTP), file transfer (FTAM) and other applications under consideration and standardization. By providing such access, non-DEC systems running OSI-compliant software and hardware are capable of being accessed transparently.

7. A more auto-configurable environment — This feature is a boon to those who don't have time to deal with the network software. By allowing the network to determine the buffers and sizes necessary for certain operations, as well as other types of link negotiation, the network can determine the best way to communicate with a remote node.

8. Modification of routing algorithms from a Phase IV distance-vector (also

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known as Bellman-Ford) to a new routing mechanism known as link-state, also called the Dijkstra algorithm or shortest path first (SPF) — The Phase IV algorithm was attractive, because it was easy to implement. But it could cause network looping under certain topological changes, the network routing converged at the speed of the slowest link speed, it was difficult to diagnose network problems and to secure, and slow nodes slowed the entire network.

With the Phase V algorithm (which is not yet an OSI standard), nodes sense their local and connected environment and then broadcast this information to the entire network, causing each routing node to build a topological map of the entire network. From that information, each node independently constructs access routes to other nodes using the SPF technique.

The Phase V SPF algorithm has disadvantages in that it's difficult to implement, requires specialized management mechanisms, and is non-trivial to migrate to from Phase IV. However, it has many advantages: It allows larger networks and scales well to larger networks. It converges rapidly after the network changes. It's easier to secure than the Phase IV algorithm. It rarely exhibits loops in the network and destroys those that appear. It's easier to diagnose, as each router has a complete topological map of the network. And it allows speedier mapping of the route path for routed traffic.

9. End-node systems that allow more than one network connection, known as an end-node multilink capability — End nodes will allow more than one piece of network hardware to be connected to the system and to connect to the appropriate networks. Although such node configurations don't route traffic between the multiple connections, the multiple connections allow the system to be configured in high-availability and redundant topologies. End-node systems also can work in multiple areas simultaneously.

10. Network congestion management modified to allow network congestion avoidance rather than the Phase IV method of congestion control — The network manages network traffic congestion by adjusting buffering and traffic flow before traffic is discarded because of congestion overflow.

11. Node names that exceed the current six-byte node name — To accommodate transition from Phase IV to V, a node alias database will exist to allow translation from the old format to the new.

12. Required use of the network naming service — The name service provides for address resolution for various items such as nodes, devices, applications and other objects through global names on multiple networks. This service makes life easier for applications and management of the network.

13. Network management changes from a monolithic model to a modular, easily modified model — Through use of an entity model, relationships between differing network objects, nodes, modules, events, attributes and other items are defined.

Network management incorporates emerging network management standards such as Common Management Information Protocol (CMIP) and Common Management Information Services (CMIS). Further, subsystems such as Management Information and Control Exchange (MICE) and Management Event Notification (MEN) will be incorporated in various layers and utilities to allow network control.

Eventually, the Network Control Program (NCP) will be replaced by Network Command Language (NCL). Although similar to NCP, NCL is implemented differently and is incompatible with NCP.

> ***"In Phase V, DECNET undergoes serious changes that affect how it works and what it does."***

Planning Ahead

How can you get ready for Phase V?

1. Check for hard-coded node names in applications — In Phase V, node names may be hundreds of characters long, and this affects such code.
2. Grow the network as needed but don't get carried away with areas — Areas should reflect actual network needs.
3. Consider using more dedicated router systems to speed up network routing, such as the forthcoming DECROUTER-2000 system.
4. Prepare to change network programs that make use of the NICE protocol — NICE doesn't exist in Phase V.
5. Use the naming service, because it's required in Phase V.
6. Modify network databases if you multiarea Ethernets, as Phase V routing doesn't support multiple areas on an Ethernet except for migration issues.

The history of DECNET from Phase I to Phase V shows the path that DECNET has taken to support new features. It also shows that DEC will take precautions to ensure that Phase V, while complex, will migrate smoothly.

—Bill Hancock is an independent systems and network consultant in Arlington, Texas.

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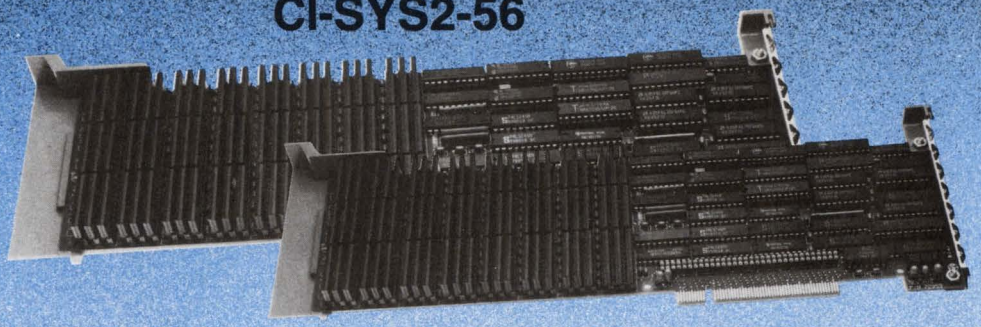

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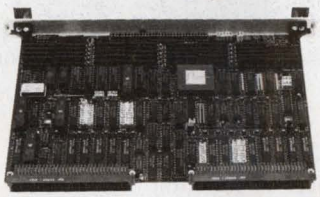

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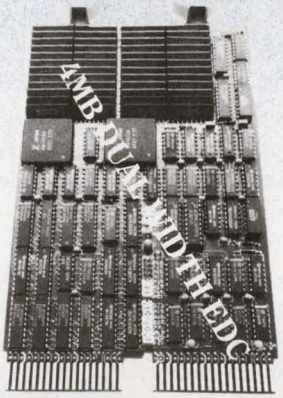

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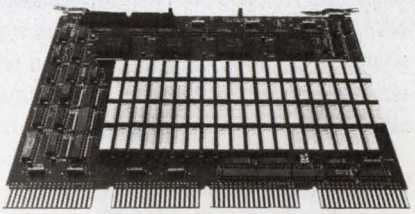

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LET'S C NOW

Reading And Writing Declarations, Part 1

Rex Jaeschke

Editor's note: Most of the declarations you read and write in your C career will be simple, and you will know how to read and write them. In these cases, you don't need to follow any rules, and most C veterans don't even know what the rules are, possibly because they've never been spelled out. However, if you can't read and write arbitrary complex declarations, you never will be able to fully exploit C's type capabilities. This month, Rex Jaeschke opens up the inner sanctum of C and takes us where only the high priests have gone.

After I became reasonably familiar with the basics of the C language, I began to explore the limits of the types of objects you can construct in C. To my delight, I found there was no limit to the set of possible types. However, after you get past the basic- and elementary-derived types, it's no longer obvious by quick inspection what a given declaration means, assuming it compiles without error. On the other hand, if you want to define an object of some type, you must express it so it will compile and do what you want. If it contains a syntax error, you must be able to determine why, without trying all the possibilities and looking at the generated code.

Type information is needed in other areas, too. Specifically, you need to understand declarations so that you can generate casts, declare functions that have a given return type, use the **typedef** capability and use **sizeof**. All four build on the knowledge you use in generating a declaration. In this two-part series, I will address each of them.

The Base Types

The base types in C are: the signed and unsigned versions of the integral types **char**, **short**, **int** and **long**; the floating-point types **float**, **double**, and the ANSI C addition, **long double**; and structures, unions and enumerated types.

To declare an object of one of these base types is simple. You write the type and follow it with an identifier.

For the purposes of this discussion, ignore that a declaration can include multiple declarators (as in **int i, j, k;**) because this has no impact on the topic. For the most part, ignore also the trailing semicolon, because it's not part of the declarator.

Some examples of declarations involving base types are:

```
int i;
double d;
struct tag1 s;
enum color my_color;
```

> ***"Because a derived type is derived from another type, you can derive a type from another derived type, ad infinitum."***

The **void** type isn't quite a base type, because you can't have an object of that type. (However, ANSI C permits a pointer to **void** and functions returning **void**.) By its very nature, an object exists and can't have type **void**. But it can be argued that **void** is a base type.

Derived Types

There are three possible ways to derive a type T1 from another type T:

1. T1 is an array of objects each having type T.
2. T1 is a function having a return type T.
3. T1 is a pointer to an object or function of type T.

Consider the following declarations:

```
int i, a[10], f(), *pi;
void g(), *pv;
```

I've declared **i** as an object having the base type **int**, **a** is an array of **int**, **f** is a function that returns an **int**, and **pi** is a pointer to an **int**. Also, **g** is a **void** function (i.e., it has no return value), and **pv** is a **void** pointer.

This ANSI C invention doesn't mean **pv** is a pointer to a non-existent object, as the declaration might imply. Rather, **pv** points to an object whose type currently isn't known; i.e., a **void** pointer is a generic pointer.

The types of **a**, **f**, **pi**, **g** and **pv** are known as derived types because they're derived from other types, in this case base types.

Note that the following declarations are illegal:

```
void v, b[10];
```

The simple rule to remember here involves the position in the declaration of the derived type punctuation. In the case

of arrays and functions, the **[ ]** and **( )** are postfix punctuators. They follow immediately after the declarator to which they apply. The pointer notation ***** is a prefix punctuator, so it comes immediately before the declarator to which it applies.

Deriving From Derived Types

Because a derived type is derived from another type, you can derive a type from another derived type, ad infinitum. For example:

```
char **ppc, ***pppc;
long table[10][5], counts[5][4][6];
```

Here, **ppc** is a pointer to a pointer to a **char**. It's derived from the type "pointer to **char**" which is derived from the base type **char**. In fact, all derived types come down to a base type, because the base types are the only ones for which there are keywords. Because ***** is a prefix punctuator, add an extra ***** in front of a valid type declarator until you get the desired level of indirection.

With the arrays, the situation is very similar, except that **[ ]** is a postfix punctuator and is added to the end of the type declarator to be modified. Thus, a multidimensional array is an array whose elements are arrays. The final dimension array contains either objects of a base type or pointers (to some level of indirection) to a base type.

In the two declarations above, a type was derived using the same punctuator only and the **( )** punctuator was omitted. This punctuator can't be applied to itself. For example, **int f( )( );** is illegal because a function can't return another function. It can, however, return a pointer to a function.

The three punctuators can be mixed and matched, giving rise to other possibilities. However, not all such declarations are valid. Two valid ones are:

```
char *keywords[10];
double *test();
```

Other combinations are possible, but require extra punctuation to write them. Permissible combinations of these punctuators are:

	pointer	array	function
pointer to	YES	YES	YES
array of	YES	YES	NO
function returning	YES	NO	NO

Precedence Of Punctuators

When a declarator contains more than one of these three punctuators, the order in which they apply to the identifier becomes a concern. For example, does **char *keywords[10];** declare **keywords** to be an array of 10 pointers to **char** or a pointer to an array of 10 **char**? Both are possible, so which is it and how do we write the other?

The three punctuators *****, **[ ]** and **( )** also happen to be operators and as such have precedence. Consider the following program:

```
main()
{
        char *keywords[10];
        char c;

        c = *keywords[0];
}
```

To resolve the right-hand side of the assignment expression, go to the operator precedence table. This indicates that the **[ ]** takes precedence over the unary ***** indirection operator. Therefore, **keywords** is subscripted, giving a pointer to **char** which then is dereferenced to give the **char** to which it points, and that **char** is assigned to **c**.

The order of precedence of operators in the expression *must* be identical to that of the same punctuators in the declaration. I prefer to talk about precedence of evaluation of operators in expressions and precedence of binding of punctuators in declarations. In any event, C's precedence table resolves both.

Let's reconsider the declaration **char *keywords[10];**. Because **[ ]** takes precedence over *****, **keywords** is first an array of 10 elements, each of which is a pointer, and each of which points to a **char**. Returning to our earlier example:

```
char **ppc, ***pppc;
long table[10][5], counts[5][4][6];
```

The same rules can be applied. In the case of **ppc**, there are two punctuators with the same precedence. However, the precedence table indicates that multiple ***** operators (and punctuators) associate right to left. In the case of multiple **[ ]** punctuators, they associate left to right as would a combination of **[ ]** and **( )**.

Forcing Different Punctuator Precedence

Having proved that **char *keywords[10];** declares **keywords** to be an array of 10 pointers to **char**, you'll need the same set of punctuators to declare a pointer to an array of 10 **char**. How is that written? You need some mechanism to change the default binding of the punctuators.

The way you change the precedence of operators in an expression is to use grouping parentheses. Now you've iden-

tified the fourth and final punctuator that's permitted in declarations.

Note that parentheses are used here for two purposes, representing both function call and grouping. However, it's unambiguous to the compiler as to which is meant, and you too should get comfortable with the difference.

```
char (*pa)[10];
```

Here, the parentheses force the * to bind closer to **pa** than does **[ ]**, causing **pa** to be a pointer. It's then a pointer to an array of 10 elements, each of which is a **char**.

Such a type is rarely used, and we won't discuss its merits at this stage. However, such things often exist in multidimensional arrays. For example, if **ary** is declared as **int ary[5][10]**, **ary[i]** has type "pointer to array of 10 **int**", not "pointer to **int**" as many people incorrectly believe.

As you can have redundant grouping parentheses in expressions, so too can they exist in declarations. Therefore, some of the earlier declarations can be rewritten as:

```
char *(*ppc);
long (table[10])[5];
char *(keywords[10]);
double *(test());
```

In all cases, the grouping parentheses simply document the default binding. They serve no other purpose, and after you've mastered the reading of such declarations, you generally wouldn't use the extra parentheses, because they clutter up the declaration.

Other redundant uses of parentheses are:

```
int (i), ((a)[10]), ((f)()), (*(pi));
```

Writing A Declaration

Consider the following declaration requirement where **fp** is to be a pointer to a function that returns a pointer to an **int**. Now the trick in converting these words into the corresponding declaration is to work top down. First and foremost, **fp** is a pointer, so let's write that:

```
(*fp)
```

Because the pointer notation uses a prefix punctuator, write the * before the **fp**.

Note that just like expressions, white space between punctuators and identifiers is ignored, so you could write **(* fp)** instead, although this doesn't add anything. In fact, it might reduce readability.

Instead, surround ***fp** with parentheses to ensure that the * binds tightest, regardless of any other punctuators that may be added.

Next, **fp** is a pointer to a function, so add the postfix function punctuator and the binding parentheses, giving:

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

The function returns a pointer, so add the prefix * and another pair of grouping parentheses to produce:

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

The function returns a pointer to an **int**, so add the base type as a prefix (and the trailing semicolon), giving the syntactically complete declaration:

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

I religiously have added grouping parentheses at every step just in case they were needed. In this case, one or more of the pairs is redundant and therefore can be removed. (Of course, leaving them in causes no harm unless you feel it hurts readability.)

To determine which sets of parentheses are redundant, work from the bottom up or, if you like, from the outside in. Clearly, the outermost pair is redundant, because no other punctuators are outside them. Also, the next outermost pair can be removed because **( )** has higher precedence than *. When these two pairs are erased, you get:

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

Now there's one pair left. Note that the **( )** aren't grouping parentheses; they represent a function call punctuator. The remaining pair is meant to ensure that * has precedence over **( )**. Because this isn't the case by default, the parentheses are needed. 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.

You now have sufficient knowledge to write any declaration you want. Of course, if such a declaration is invalid (for example, a function returning a function), you'll get the corresponding error from your compiler. But if such a declaration would have been valid, you would know how to write it by following these rules outlined above.

To check your understanding, use the rules outlined to prove that the declarations shown below actually match their English descriptions.

Declare **funct** as a function returning a pointer to a function returning a pointer to an array of 10 structures of type **tag**:

```
struct tag (*(*funct())())[10];
```

Declare **ptr** as a pointer to a pointer to an array of five

pointers to **double**:

```
double *(**ptr)[5];
```

Declare **ary** as an array of 10 arrays each of five pointers to functions returning **short**:

```
short int (*ary[10][5])();
```

Reading A Declaration

When you understand the rules and can write any declaration, reading them is easy. You simply apply the rules in reverse. The only difference is that the declaration doesn't contain redundant grouping parentheses, so you'll have to revert to the precedence table to determine the order of binding of the punctuators.

This can be demonstrated by reverse engineering one of the three declarations you've just written. What does the following declaration mean?

```
double *(**ptr)[5];
```

Working inside out, note **(**ptr)**. Because * associates right to left, **ptr** is a pointer to a pointer. Then either apply the * or **[ ]**, and because **[ ]** binds tighter, **ptr** is a pointer to a pointer to an array of five elements. Finally, each of those array elements is a pointer to a **double**. If the declaration contained redundant parentheses as follows, there would be no need to look at the precedence table:

```
double *((*(*ptr))[5]);
```

As a final test, convince yourself that the following declarations mean what the narrative says.

```
long int (*(*point)())[5];
```

declares **point** as a pointer to a function returning a pointer to an array of five **long int**s.

```
enum color *(*(*(*a1[5])[3])())[6];
```

declares **a1** as an array of five pointers to an array of three pointers to functions returning a pointer to an array of six pointers to **enum**s of type **color**.

Function Prototypes

With the addition of function prototypes by ANSI C, declarations involving functions now can contain argument information as well. However, this doesn't change any of the rules for reading and writing declarations. It simply makes the declarations more complex. For example:

```
int f1(double, char *);
```


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declares **f1** to be a function that takes two arguments (of type **double** and **char ***, respectively) and that returns an **int**. In the following more complex case:

```
double (*f2(void))(double);
```

f2 is declared as a function that has no arguments and returns a pointer to a function, taking one **double** argument and returning a **double** value.

Classes and Type Qualifiers

Declarations can contain class and type qualifier keywords such as **register**, **static**, **extern**, **auto**, **const** and **volatile** (and in the case of MS-DOS implementations, **near**, **far** and **huge**). Like prototypes, these keywords have no effect on how you read or write declarations. When you work out how to write the required declaration without these keywords, it's a relatively simple task to insert them in the appropriate places. For example:

```
static volatile char *const p;
```

declares **p** to be a **static const** non-**volatile** pointer to a **volatile** non-**const char**.

> ***"When you understand the rules and can write any declaration, reading them is easy. You simply apply the rules in reverse."***

This column has considered the rules and techniques for reliably reading and writing arbitrary declarations. Part 2 will focus on how to build on them to generate casts, declare functions that have a given return type, use the **typedef** capability and use **sizeof**.

Readers are encouraged to submit any C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, VA 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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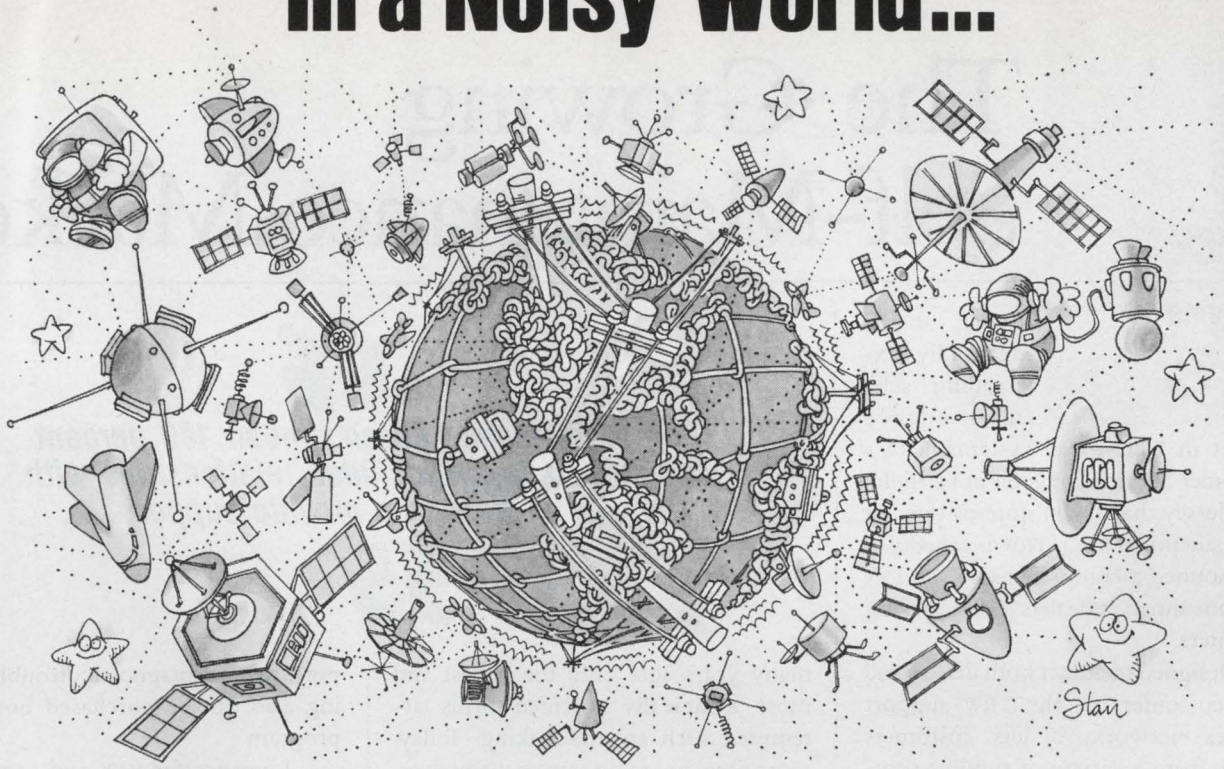

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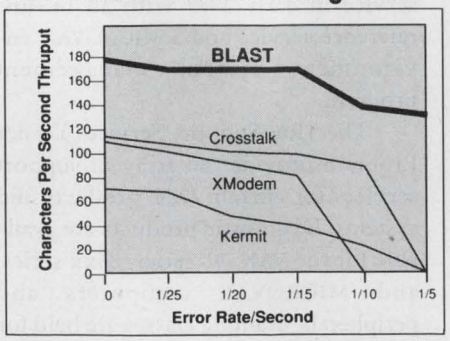

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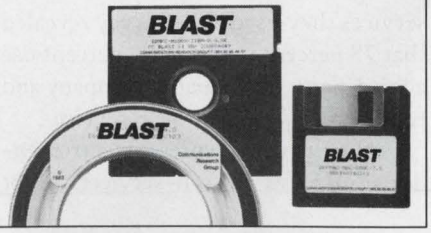

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FIELD SERVICE

The Growing Self-Maintenance Market

Ron Levine

Today, there's a rapidly expanding self-maintenance market in DEC-based systems. TRW's Customer Service Division in Fairfield, New Jersey, has taken note of this. At the Anaheim DEXPO, TRW is scheduled to announce a comprehensive services program aimed at dealers' self-servicing customers.

Designed to attract both dealers and their customers to the TRW support services network, it lets customers choose from a variety of support services and select the level of help they need to maintain their equipment and systems. TRW is working to become a partner with the self-servicer, providing underlying technical support, diagnostics, product repair capabilities, training, reference materials and a host of other services.

Self-maintenance doesn't mean 100 percent self-sufficiency. It includes relationships with outside dealers who provide support to assist in servicing endeavors that either can't be handled or aren't cost-effective in-house. TRW's Support Services Dealer Program is an attempt to capture this self-maintenance market segment.

That the self-maintenance market is growing is evidenced in a survey conducted by *DEC PROFESSIONAL*. We asked subscribers responsible for obtaining service at their companies whose services they used. The survey revealed that 78 percent use DEC, 25 percent use a third-party maintenance company and nine percent use in-house service.

Nine percent represents a tremendous increase in self-servicers. Not many years ago, only the largest and most technically oriented firms attempted such an undertaking. Today, more users opt to do service themselves, calling on outside help only when necessary.

> ***"Self-maintenance doesn't mean 100 percent self-sufficiency. It includes relationships with outside dealers who provide support . . ."***

Considering that the computer systems field service market is expected to be valued at $9.5 billion by 1992, there's substantial business waiting to be captured in the self-maintenance segment. Although depot repair organizations have long targeted self-servicers as a major business source, third-party maintenance companies largely have ignored them, viewing them as competition rather than as an untapped source of revenue. But this attitude may be changing.

Support Services

Offering support services to the self-servicer isn't out of character for TRW. In 1987, 57 percent of its accounts were third-party maintenance, while 42 percent were self-maintenance.

At that time, TRW's Support Services consisted of documentation, diagnostics, depot repair, technical information, supply sales and training classes for hardware maintenance, software and operation. In 1988, a Technical Support Service was added. It's subscription-based and provides the user with telephone assistance or fly-in, on-site support. Remote diagnostics troubleshooting also can be purchased under this program.

Logistics for VAX and some PDPs has been expanded and includes depot repair and spare parts sales for many currently installed DEC systems. Consultant services, including installation management, self-maintenance and system management services, also are among TRW's offerings. TRW plans to expand the technical documentation service in early 1989 with an on-line reference service and a MICROVAX environment system management program.

The TRW Support Services Dealer Program provides an array of support services for current DEC products and systems. Diagnostic products are available for the VAX 700 series, 86xx series, and MICROVAX computers and peripherals. Training classes are held for PDP-11, VAX and associated peripherals in hardware maintenance, software, and operations and management. Customers and TRW in-house trainees attend the same classes. Technical Support Services, including maintenance, consulting and logistics support (depot repairs and spare parts) are available for most VAX systems and some PDP product lines.

Although the Support Services

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CIRCLE 126 ON READER CARD

> ***Considering that the computer systems field service market is expected to be valued at $9.5 billion by 1992, there's substantial business waiting to be captured . . .***

package aims at the self-maintenance market primarily through dealers, TRW sells directly to end users. A TRW spokesman admitted that some channel conflicts exist between TRW direct sales and dealer sales, but was confident that these can be resolved. Dealer sales of support services are bundled with the hardware sale; TRW direct sales contain no hardware component.

TRW offers the complete package of technical assistance, or any part of it, in a turnkey operation; i.e., a self-maintenance package comprising on-site backup, consulting, diagnostic support, technical support, system management and technical reference services. According to Bill Fredell, TRW Customer Service Division manager, "TRW offers a cafe-style menu to choose just how much maintenance support you want and how much you want to pay for. This approach provides enough backup to offer security for your self-service program. Knowing that there's someone to call if you run into something you can't handle is important in an in-house service environment."

Services Rundown

Diagnostics Sales are aimed at small companies buying used equipment and others needing troubleshooting aids and system exercisers. The MICROVAX diagnostics is the lead offering in this category. The dealer sells it with both the TRW name and dealer logo on the diagnostics software. It can be bundled with the dealer's hardware sales.

Training Sales, non-maintenance and maintenance training courses, can be purchased under TRW through a participating dealer and resold to the dealer's customer.

Maintenance is scheduled to begin later this year. Maintenance services under the TRW logo can be sold to the dealer's customer along with the hardware sale.

Support Services can be resold by a participating dealer to his customers. Initially, this offering will focus on hardware and later, move into operational system support. When sold through the dealer, this support package may be included with the hardware sale.

The dealer benefits because TRW's name and services are bundled with the hardware sale. "The customer can buy his support and maintenance along with the system and he never has to write another check," says Carroll Collins, a TRW marketing manager. "The program allows the dealer to deliver an alternative set of services at the time of sale. VMS and maintenance support and the hardware, software and operations training

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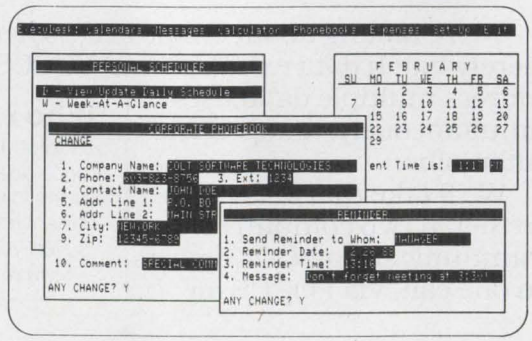

EXECUDESK allows windowing to and from all modules.

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CIRCLE 158 ON READER CARD

courses appeal to a wide variety of customers. And, of course, the dealer can make extra profits on the sale," adds Collins.

The dealer retains complete control of his customer. TRW, after qualifying the dealer organization, doesn't require a customer qualification. TRW supplies the dealer with list prices for its services; the dealer can resell at the listed retail price and receive a volume-based dealer discount, or he can price within his total sale package; i.e., bundled with the hardware sale. In either case, the dealer, not the customer, is invoiced by TRW at the discount rate.

The Support Services Dealer Program makes it easy for the dealer to sell the extra services. The invoicing procedure keeps the dealer's bookkeeping simple and provides the dealer's customer with a total packaged solution in support of all his computing needs. Samuel Work, TRW Technical Training Center director, says, "We're providing a single-source solution to the customer's needs while helping the dealer sell into the self-maintenance market."

Dealers As Sales Agents

TRW recognizes that the most effective and cost-efficient way to reach the self-maintenance market is through the dealer. A four-step procedure brings a dealer into the program.

1. TRW approaches dealers who have been targeted as potential agents.
2. Dealers are provided with a TRW agreement that states terms, conditions and procedures to be used when selling TRW services. Licensing requirements for diagnostics sales are included; a dealer can sublicense diagnostics use to customers. If accepted, the dealer signs the form and returns it to TRW.
3. TRW quotes maintenance service sales pricing to the dealer based on system configuration.
4. All services sold are billed directly to the dealer at his discount rate, not the dealer's customers. The dealer retains all customer contact.

Through this new Support Services Dealer Program, TRW is attempting to form an alliance with system integrators and other resellers. The array of services offered should help dealers sell into the self-maintenance market and give TRW a footing in this potentially strong segment of the service industry. ■

SERVICE PROFILE: DYNSERVICE NETWORK

CORPORATE HEADQUARTERS: 1875 Whipple Road, Hayward, CA 94544

TELEPHONE NUMBER: (415) 732-3080

CONTACT: Julie Criscenti

CLASSIFICATION: Independent repair service

TYPES OF SERVICES OFFERED: Depot repair, spares, parts exchange

KINDS OF SERVICE AVAILABLE: Carry-in, mail-in, pickup/delivery (some locations)

AVERAGE TURNAROUND TIME: Two to five days

STANDARD SERVICE DAY: 8:00 a.m. — 5:00 p.m. (Mon. - Fri.)

EXTENDED SERVICE DAY AVAILABLE: No

EQUIPMENT SERVICED: DEC, IBM, Control Data, Data General, Hewlett-Packard, most peripherals, modems, networks and add-on PCBs

WARRANTY: 90 days

MARKETS SERVED: Customers — OEMs, VARs, dealers, users, system houses; geography — national

IN BUSINESS SINCE: 1984 (Dynalectron Service Network as a unit of Dynalectron Corporation)

PRICING: Fixed

PARTS INVENTORY: More than 2,500 different items (average number on hand)

TECHNICIAN TRAINING: OEM and in-house

REMARKS: Five depots; four West Coast, one East Coast. DynService Network, a unit of DYNCORP, provides depot repairs and spares for all lines of DEC computers, other brands of computers and most major types of peripherals. More than 2,600 different subassemblies are repaired. An express parts exchange program also is available.

DynService Network has more than 180 employees working in the company's corporate office, five depots and sales offices. More than 4,000 customers are serviced nationwide. The company claims that it isn't a competitor of manufacturers and independent service providers, but it's a repair and support organization for these firms.

The company maintains a parts inventory of more than 2,500 different items for products serviced. Parts replacement can be new, used or on an exchange basis. DEC-written diagnostics are used by technicians who are factory and in-house trained.

CIRCLE 369 ON READER CARD

Now the best seller comes in an illustrated edition.

With the WY-85 at left, Wyse authored the best selling alternative to DEC's VT-220. It's fully compatible with the VT-220, but loaded with features that make it even more compatible with the people who use it.

Like a larger 14" screen. Tilt and swivel base. An easier set-up mode.

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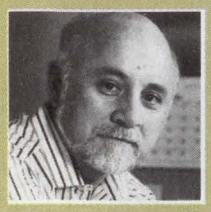
*IDC 1986 U.S. Terminal Census.

CIRCLE 258 ON READER CARD

from the lab



Cluster Chronicles: Trolls!

Dave Mallery

The biggest problem with an LAVC is the locality of the data. Put another way, if FRODO:: has one big disk containing all of Editorial and BILBO:: has another containing all of Circulation, when a node goes down, you lose half your operation.

In an environment like ours, with constant hardware changes that make installation and removal an ongoing nightmare, machines go down. Professional Press now has over 100 employees, and even a few minutes of downtime is very expensive. Just to prove that he could, FRODO:: partially fried a power cable to his backplane, causing two weeks of intermittent crashes. This led us to consider a more survivable disk configuration.

Our new 8250, THORIN::, was just coming on-line. Because he has a KDB50, the logical complement was a UDA50 on BILBO::. That way, we could have dual porting available between the two nodes. If we ensured that all critical material was available by that path, we could lose either BILBO:: or THORIN:: and still have all our data available. In general, if you configure so that any production disk is available from one of two nodes, the likelihood of survival increases.

UDA/KDB combinations are made for dual porting. There are other alternatives for the rest of our disk farm. The 9900s on BILBO:: can be dual ported with Q-bus hardware from System Industries. The new Sabre from Control Data Corporation on FRODO:: can be dual ported, but only to another 3 MB/sec. controller. There's a UNIBUS version from Emulex that could be used on BILBO::.

These aren't active dual ports, but simply connections that lie dormant until they're needed. We should have several of these working.

SAURON::, a VS461 (color, 15 inches, 4 MB), has joined the cluster. No sooner did he appear than he was given four batch queues to run. It seems that any computing resource on our cluster gets consumed within minutes of joining the quorum.

THORIN:: is our BI test bed as well as HSC/KDB-compatible engine. We tried to make it boot over the cluster as a pure diskless satellite, but were foiled. It kept requesting a "tertiary load file" on the boot node that is nowhere to be found. This is probably some 8250-specific microcode file, but it isn't on any release tape we can find. If anyone can solve this riddle, please let us know. We'll soon report on more conventional disk configurations. Many thanks to Beaver College Glenside, Pennsylvania, which willingly allowed us access to their 8250 and provided us with much needed information.

Ethernet Update

The network extension to Pasadena continues to run flawlessly. ARIS lines for Southern California now are in place and will be announced on ARIS as soon as they're operable. We're installing another leased line from our Pasadena office to our office in San Bruno. ARIS

CONTENTS

lines will follow for our readers.

We procured a pair of 16-port MICOMs for the San Bruno line along with a pair of 14.4s. This will produce keyboard response in San Bruno equivalent to that in Pasadena, without the expense or added delay of another Ethernet gateway transition.

Memory is now so expensive that it's cheaper to buy extra 4-MB VS450s than to add a reasonable amount of memory to any one of them. It's so typical. Just when the state of the art demands nearly infinite amounts of a resource, federal bungling and good old American quarter-to-quarter financial planning conspire to allow a true chip cartel to form and prosper. We have only ourselves to thank.

Companies Mentioned In This Article

MICOM-Interlan
155 Swanson Rd.
Boxboro, MA 01719
(617) 263-9929
CIRCLE 547 ON READER CARD

Control Data Corp.
8100 34th Ave. S.
Bloomington, MN 55425-1640
(612) 851-4131
CIRCLE 548 ON READER CARD

System Industries
560 Cottonwood Dr.
Milpitas, CA 95035
(408) 432-1212
CIRCLE 514 ON READER CARD

Emulex Corp.
3545 Harbor Blvd.
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Costa Mesa, CA 92626
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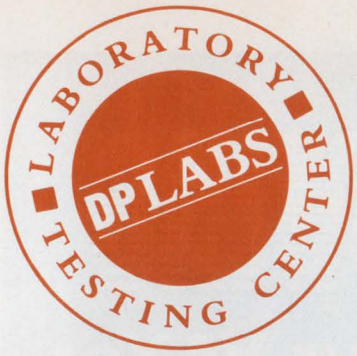

from the lab

Datability's RAF Print Server

David B. Miller Every system manager wants to take advantage of all computing resources. Datability Software Systems Inc. of New York, New York, producer of the popular Remote Access Facility (RAF), helps make this possible.

The RAF Print Server (RPS) allows you to use printers attached to PCs as if they were connected directly to your VAX. At the same time, your PC can be used for normal functions. You won't notice that RPS is active.

We installed RPS on an AST 386 attached to an AST Turbolaser. Our PC is connected over Ethernet to the VAX using a MICOM NI5010 card. RPS supports a number of other Ethernet boards, including those manufactured by DEC, Excelan, 3Com, and Ungermann-Bass.

RPS requires LAT PLUS version 5.1. It occupies 8 KB of PC memory if RAF is installed, and 48 KB if RAF isn't installed. RPS includes a subset of RAF modules to allow it to run; a full copy of RAF isn't required.

If RAF is installed on your system, RPS installation automatically will update the installed copy of RAF and allow you to skip a number of installation steps. Also, you must be connected via Ethernet; asynchronous connections aren't supported.

If RAF isn't on your system, you need to supply some information (see Screen). Different screens will appear depending on the type of Ethernet card installed in your system. Our MICOM NI5010 card required an Ethernet interrupt of five. We accepted all other default settings.

If you wish to access fewer hosts than exist on your network, you must enter the name of each. You must be judicious about this, because RPS allocates 400 to 500 bytes of buffer space for each host.

RPS allows multiple sessioning, and you need to indicate the number of concurrent sessions you want. RPS allocates 400 to 500 bytes of PC memory for each session, so you have to choose this number accurately.

Each PC used as a print server must get a unique server name during installation. This name is used to establish a link between the PC running RPS and your VAX.

After installation, you need to run RPS to create a port name that's associated with a port on your PC. For example, the command:

```
C:>RPS/CREATE TURBOPS LPT1:
```

associates the port name TURBOPS with the PC's first parallel port. Switches are available to set up serial ports. Additional RPS ports can be created at any time. Each definition must indicate a different port name and PC device specification. To ensure that RPS is started if the PC is rebooted, the CREATE command should be placed in the system's AUTOEXEC.BAT file.

A VAX remote print queue then is

```
RPS Installation Program

Install    Exit

        Ethernet Base Address:  300
             Ethernet Interrupt:  5
                 Ethernet DMA:  1
              Number of Hosts:  4
               Names of Hosts:  BILBO,FRODO,GOLLUM,BOMBUR
    Name of Preferred Host:  FRODO
          Number of Sessions:  4
          Print Server Name:  GANDALF

The name you enter here will be used to connect your PC with a VAX system queue
and MUST be unique.

[F1] Abort    [F10] Accept all Values    [↑ ↓] Change Field
```

Screen: The RPS installation screen. Our PC was equipped with a MICOM NI5010 Ethernet card.

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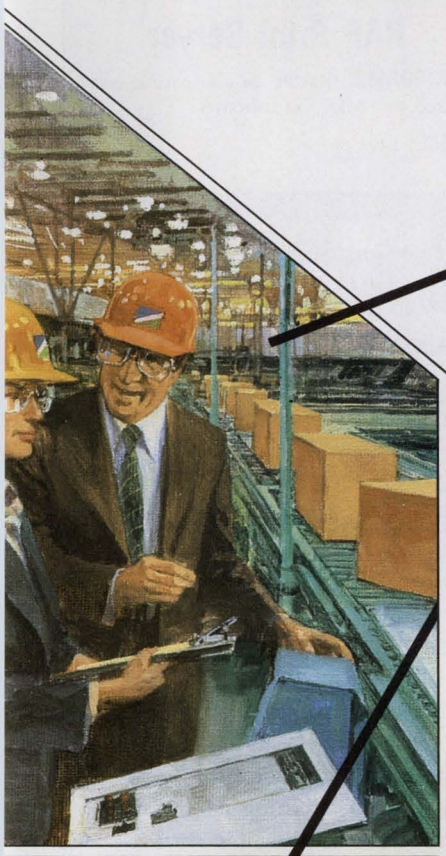

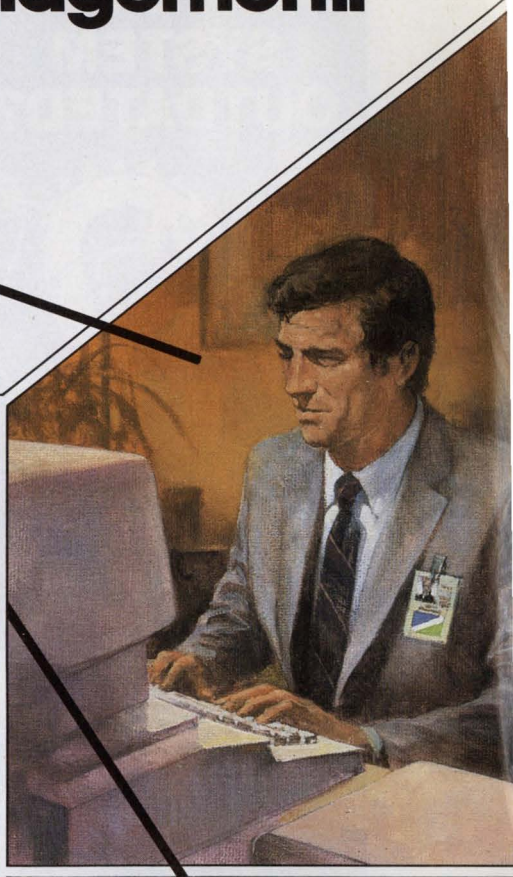

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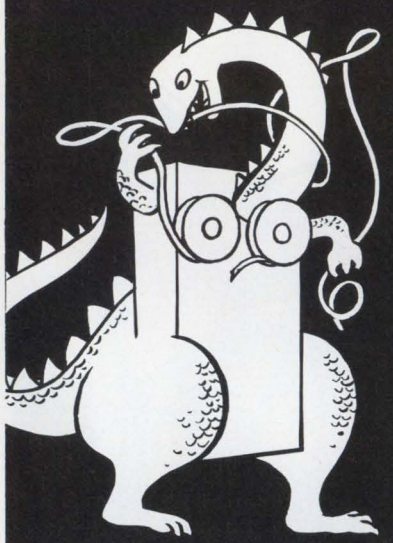

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CIRCLE 166 ON READER CARD

LABORATORY TESTING CENTER
DP LABS

associated with the print server. The queue definition is:

```
$ LATCP:==$LATCP
$ LATCP
CREATE PORT LTA1:
SET PORT
  LTA1:/NODE="GANDALF"/PORT="TURBOPS"
  /QUEUE
$ SET TERMINAL LTA1:/PERM/PASTHRU
  /LOWERCASE/NOBROAD/NOWRAP/PARITY=NONE/
  NOECHO/EIGHTBIT/TAB/FORM/ALTYPE/TTSYNC
  /HOSTSYNC
$ SET PROT=(S:RWLP,O,G,W)/DEVICE LTA1:
$ SET DEVICE LTA1:
  /SPOOLED=(TURBOPS,SYS$SYSDEVICE:)
$ INIT/QUEUE/START/PROCESSOR=LATSYM
  /FORM=DEFAULT/RETAIN=ERROR/DEFAULT=
  (NOBURST,FLAG=ONE,NOTRAILER)
  /RECORD_BLOCKING TURBOPS/ON=LTA1:
$ EXIT
```

Notice that the PC's server and port names are used for the /NODE and /PORT names in the VMS SET PORT command. A print queue specifying the PC's server and port names must be set up on your VAX with commands similar to these.

When the print queue and RPS are both active, the VMS PRINT/QUEUE command is used by any VAX user to print files to the PC's attached printer. Local printing can be done as long as the server is halted with the /PAUSE command. After local printing is complete, the server can be restarted. Printing locally without pausing the server can cause VAX and local documents to be mixed. On the other hand, pausing RPS can stall your VAX print queue. Datability is working on a solution to let you print anything from anywhere without interrupting the server.

RPS doesn't require a dedicated PC to run. Your PC can be used for other applications while RPS runs in the background.

Datability's RAF Print Server is an easy way to help you get the most from your computing equipment.

RAF Print Server

PLATFORMS: IBM PC or compatible connected to a VAX via Ethernet

PRICE: $495 per PC

DATABILITY SOFTWARE SYSTEMS INC.

HEADQUARTERS:
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New York, NY 10001
(800) 342-5377
(212) 807-7800

FOUNDED: 1977

PRODUCT LINE: PC to VAX connectivity and productivity products

OWNERSHIP: Private

CIRCLE 469 ON READER CARD

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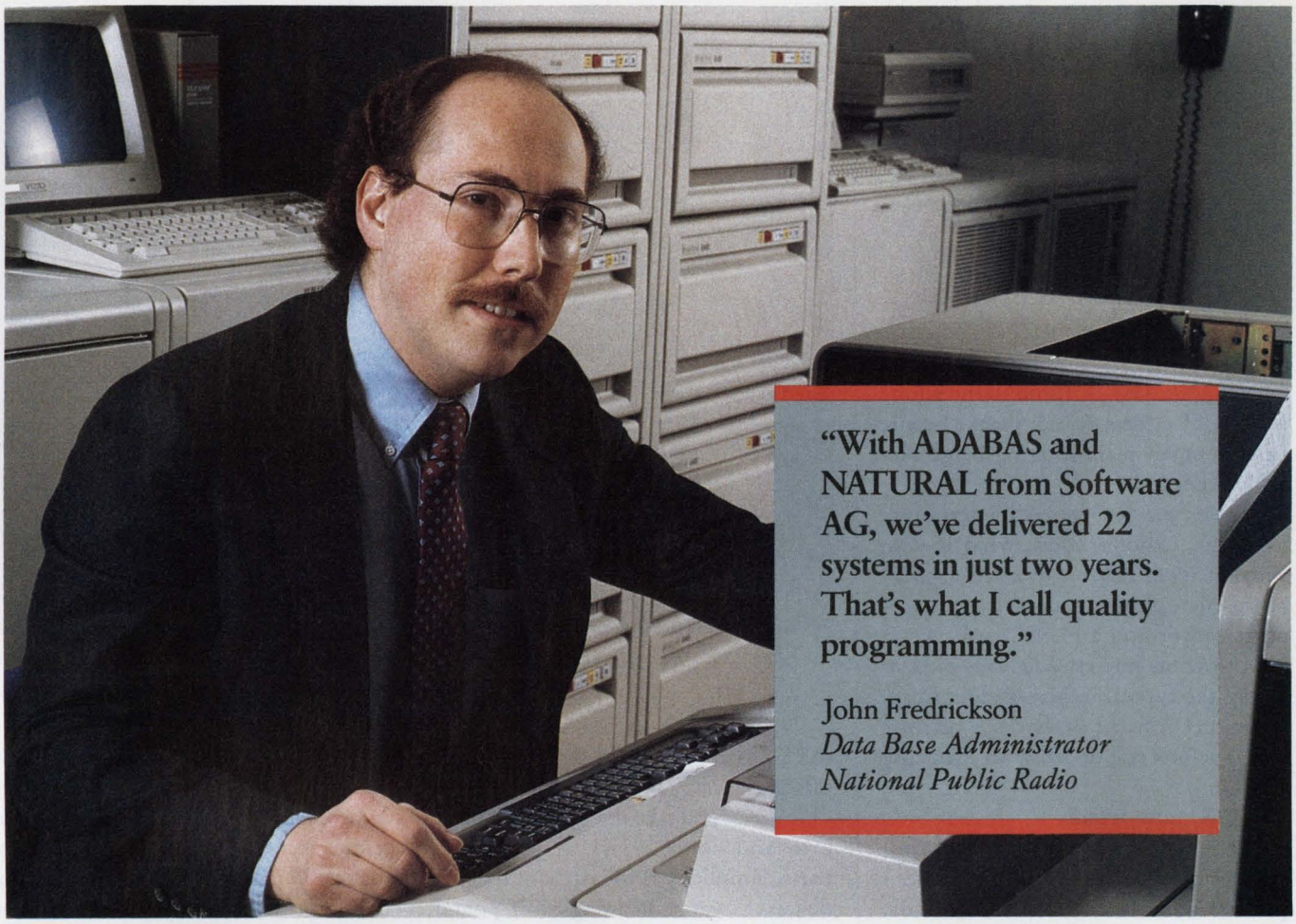

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Radio Shack's DUOFONE Sensor Alert Monitor

David W. Bynon

While browsing through the phone section of a local Radio Shack, I came upon a small plain-looking beige box with a keypad.

The gadget looked interesting, although I didn't know what it was. Further investigation revealed a miniature microphone, a speaker, a temperature sensor and a phone cord.

Now my interest was really piqued. Being the typical techno-gadget freak, I couldn't resist; I pushed the on button. The box responded with a friendly "Hello."

OK, now what?

I looked over the flat keyboard, pondering the interesting labels. I pressed What Is The Status. Again, the gadget responded, "This is telephone number . . . , alert condition OK, the temperature is 72 degrees, the power is off, battery condition OK, sound level OK, no number."

It was a room monitor! I've been needing one for a long time. Do you know how hard it is to find a cheap computer room monitor, especially one that talks to you? I couldn't resist, so I shelled out the $99.95 and took home my new toy.

The Radio Shack DUOFONE Sensor Alert Home/Office Monitor is a small, inexpensive, telephone-based office/computer room monitor. Nothing fancy, just the basics. It has turned out to be a great deal; perfect for my small office.

The Radio Shack DUOFONE Sensor Alert Home/Office Monitor watches over power, noise, temperature and an auxiliary sensor.

When you take the device out of its box, you notice a lack of pieces and parts. Simplicity is the name of this little talker's game. In a single half-pound unit, Radio Shack has packaged a telephone dialer, microprocessor, voice synthesizer, keyboard, microphone, temperature sensor, auxiliary sensor and a battery backup power supply.

The keyboard, a flat-panel type, is used to turn the unit on and off, program its functions and request status information. Output is provided by the voice synthesizer, which is remarkably clear and understandable.

When you compare this monitor to others, it appears limited. There are no fancy attachments, no software and no computer interaction capability (i.e., it can't shut your system down for you). But what it does for the price makes it a deal.

The Radio Shack room monitor will watch over power, noise (such as an alarm or buzzer), temperature and an auxiliary sensor of your choice. When a problem arises, such as a high-temperature reading, the monitor automatically dials up to three phone numbers until someone answers and responds. The monitor informs the person it contacts of its own telephone number and the room's status: for example, that the temperature is high. It asks the person who takes the call to respond by calling back the number provided.

Sensor Alert also knows how to answer the phone. This feature is available so that you may call to receive the current room status. An interesting part of this feature is the ability to listen in on a room. You can program the monitor to leave the microphone on for up to 199 minutes as part of the status check.

The auxiliary sensor is a simple mechanism, triggered when two contacts on the back of the unit are shorted

together. While there are many ways to use this sensor, the easiest way to make it useful is to connect a relay to it. When power is supplied to the relay, the relay contacts close, and the sensor will be triggered.

I made use of the auxiliary sensor by building a special Mod-Tap adapter, normally used to connect terminals to the system. By wiring pins 20 and 7 (DTR and GROUND) to a five-volt micro-relay (which fits inside the Mod-Tap adapter) and wiring the relay contacts to the Mod-Tap adapter's RJ11 jack, it was possible to trigger the sensor by program control. When modified, the adapter and relay simply are connected to the system as if you were installing a terminal. A telephone extension cable, with an RJ11 jack on one end, is used to connect the monitor to the computer. Note that you can use any RS-232 cable you might have lying around. I found the Mod-Tap adapter to be convenient and easy to use.

After you have the relay cable connected to your system, you need a method of turning it on and off. On a VAX or PDP system, the simplest way to turn the sensor on is to set the MODEM characteristic on the serial port, which asserts five volts on pin 20 (sets DTR high). This can be accomplished under program control using a $QIO system service call to the TTDRIVER to modify the port characteristics or inside a DCL command procedure with the command $SET TERMINAL TTxx: /MODEM/PERM.

Uses for the auxiliary sensor are myriad. I used it to monitor system security by writing a watchdog program to monitor the operator log. Another idea was to have the monitor call me when I receive new mail. The applications seem to be endless.

Already, it's saved me from a potential disaster. One weekend, while I was out of town, the air conditioning in the office went down. When the computer room temperature reached 85 degrees, the Radio Shack monitor went on alert and started to call its assigned numbers. My house was the first number on the list, but I wasn't home. So, it called the second number, my friend Dave Rasor. Dave wasn't happy about being awakened at 2 a.m. to a synthesized voice: "This is telephone number. . . . The temperature is high. . . ." Thanks for saving the office, Dave!

If you need a simple office monitor to inform you when there's trouble, this unit is just right. It's easy to use, reasonably priced and saved my equipment from a meltdown. It's a winner in my book.

Mod-Tap System
285 Ayer Rd.
P.O. Box 706
Harvard, MA 01451-0706
(508) 772-5630
CIRCLE 517 ON READER CARD

DUOFONE Sensor Alert Home/Office Monitor

PRICE: $99.95

TANDY CORPORATION

HEADQUARTERS:
1800 One Tandy Center
Fort Worth, TX 76102
(817) 878-4852

FOUNDED: 1921

PRODUCT LINE: Electronic audio, video and computer equipment

REVENUES: $3.45 billion

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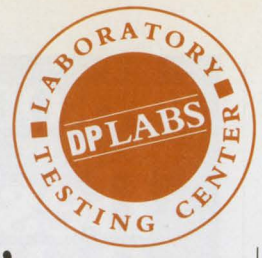


Cipher's M990 GCR CacheTape Tape Drive

David B. Miller

In this era of front-loading VCRs and CD players, you shouldn't have to struggle with hard-to-use tape drives. Further, consider the matter of storing your valuable data. Are backups a little slow? Do you have myriad reels hanging on your tape racks?

The Cipher M990 GCR CacheTape ½-inch tape drive from Cipher Data Products Inc. of San Diego, California, is an easy-to-load, easy-to-use streaming tape drive. It sports a number of features that reduce the time spent on backups, the number of tapes required to do them and the headaches suffered by operators fighting with archaic hardware. We tested the drive on our PDP-11 RSTS System.

To load a tape, you lower the front door and insert the reel right-side up. The drive takes care of the rest.

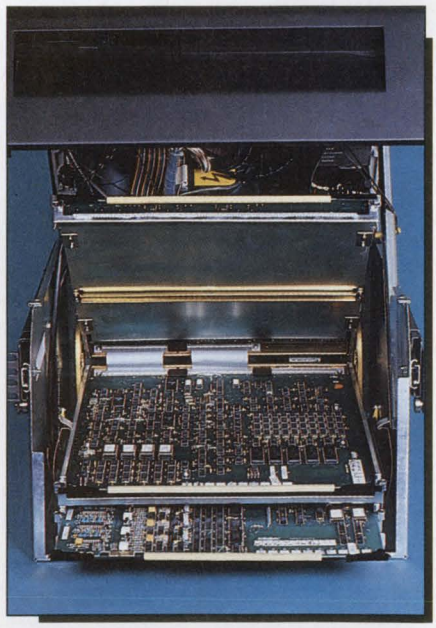
The front panel contains the usual load, rewind and on-line buttons. It also provides intelligible messages, such as "Load Failure," "Tape Stuck" and "Reel Upside Down," on its LED alphanumeric display.

There are 29 configurable options available to determine operational parameters and interface characteristics. Your setups can be saved and safeguarded against power loss so that they can be recalled later.

The M990 can handle tape densities of 1600, 3200 and 6250 bpi. Its Cipher in-

The Cipher M990 is 14 inches high, 17 inches wide and 22 inches deep.

This top view shows the tape path. The drive automatically performs the loading.



An inside view of the Cipher M990.

terface is compatible with most systems. A SCSI-compatible interface is available.

Using dynamic RAM and emulating start/stop interaction between the host and tape drive using look-ahead algorithms, the tape drive's operation can proceed unhindered. This allows burst transfer rates of 70 to 632 KB. Block sizes can range from 1 KB to 64 KB.

An extensive error detection and correction capability removes responsibility for error correction from the host.

Running at 6250 bpi, we reduced our backups on our RSTS system from four tapes to one and thus significantly reduced backup time. The tape drive has a Mean Time Between Failure of 10,000 hours.

With that kind of speed and reliability, we look forward to many quick, error-free backups from our M990 tape drive.

M990 GCR CacheTape Tape Drive

PLATFORMS: A variety of platforms including PDP and VAX systems

PRICE: $9,000

CIPHER DATA PRODUCTS INC.

HEADQUARTERS:
9715 Business Park Ave.
P.O. Box 85170
San Diego, CA 92138
(619) 578-9100

FOUNDED: 1968

PRODUCT LINE: Magnetic tape peripherals, optical disk drives and controllers

OWNERSHIP: Public (NASDAQ: CIFR)

BRANCHES: Seven domestic, four international

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GrayMatter's DSKBLD

David B. Miller

DSKBLD, a disk optimization tool from GrayMatter Software & Consulting of Seattle, Washington, is designed to provide RSTS/E managers optimum disk performance with a small amount of effort. Because disk performance can be as critical to a system as CPU, memory and communications performance, a product that keeps disks running efficiently is of interest to any system manager. We tested version 4.2b.

DSKBLD optimizes a RSTS/E disk by:

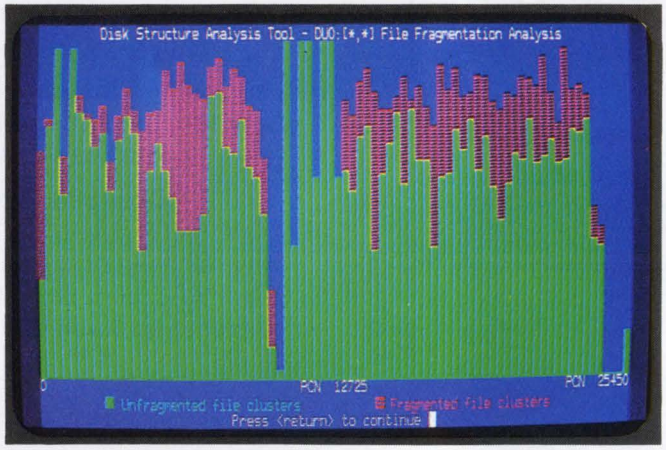
1. Recreating and reorganizing all file directories.
2. Creating contiguous User File Directories (UFDs) and placing them in the center of the occupied part of the disk, not necessarily the physical center.
3. Placing system files at the center of the occupied portion of the disk. Optimizing system files is optional.
4. Fitting files into clusters in such a way as to reduce windowturns.
5. Creating files with special extensions, such as .BAS, .PAS and .FTN, contiguously.
6. Optionally placing a scratch area in the center of the occupied disk where you can place any important, frequently accessed files.

DSKBLD also includes the following features:

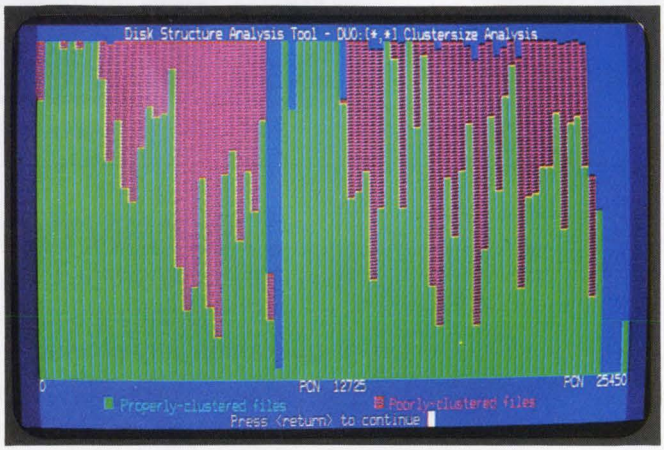
1. DSAT — Starting with DSKBLD version 4.2, the Disk Structure Analysis Tool (DSAT) was included to provide graphical data about the disks on your system. We used DSAT's reports to gain information about our files' cluster sizes, distribution of group and user file directories, file fragmentation, and what clusters on the disks were free. Sample DSAT output is shown in Screens 1, 2 and 3. Before DSAT was included, managers had to either stick to a more rigid optimization schedule or wait for users to complain about disk performance. DSAT allows you to monitor disk performance at any time. You can take corrective measures before disk performance degrades.
2. Retention of accounting and last logged-in data on the output disk.
3. An easy-to-use interface and on-line help.
4. Directories that can be sorted by creation date/time, access date, filename/extension or extension/filename.
5. Support for single disk, fixed disk and multiple disk environments, thus accommodating systems of all configurations.
6. The ability to optimize specific accounts, rather than the entire disk.

Three operating modes are provided. The first, disk-to-disk mode, is the fastest and most efficient method if your system has two disks of equal size and characteristics. Two single disk modes, "in-place" and "disk-to-tape-back-to-disk," also are provided to accommodate smaller configurations.

In-place mode was introduced in version 4.2 and can be performed on a system with only one disk. If a smaller disk is available in addition to the one being optimized, it can be used as a work disk and will make optimization easier.



Screen 1: This DSAT screen reveals fragmented file clusters on the disk to be optimized.



Screen 2: Clustersize Analysis is another report provided by DSKBLD's Disk Structure Analysis Tool.

The second single disk method involves a disk-to-tape-back-to-disk operation. It was replaced with the in-place mode and is no longer supported by GrayMatter.

Minimum system requirements include RSTS/E V9.1 or later, the RSX runtime system, 750 blocks of permanent disk space and 2,500 free blocks during installation. DSKBLD also must be run from a privileged account.

Our test system consisted of a PDP-11/84, one RA81, two RL02s and a TU80 tape drive. We optimized the RA81 and used it for both the system disk and data disk. Data on the disk was contained in a few large files with individual user accounts containing many pointer and index files related to the data. Sorting, searching and updating frequently were performed on these data files, making disk optimization important to us.

Because we had only one large disk, we chose to run the in-place optimization. DSAT showed us what the disk looked like. After running the optimization, we ran DSAT again to see what DSKBLD did. We also kept our ears open to hear whether the system's users noticed any difference. We waited one month and ran the optimization procedure again.

Installation was simple. It required running $BUILD and telling DSKBLD whether we had floating point hardware. After DSKBLD's control files finished executing, DKBUTL, a utility command file, was run to enter three validation codes. DSAT was installed automatically.

After invoking DSKBLD, the program asked for the input and output devices and for any work disk. Our system represented a worst-case scenario in that the input, output and work disks were the same unit.

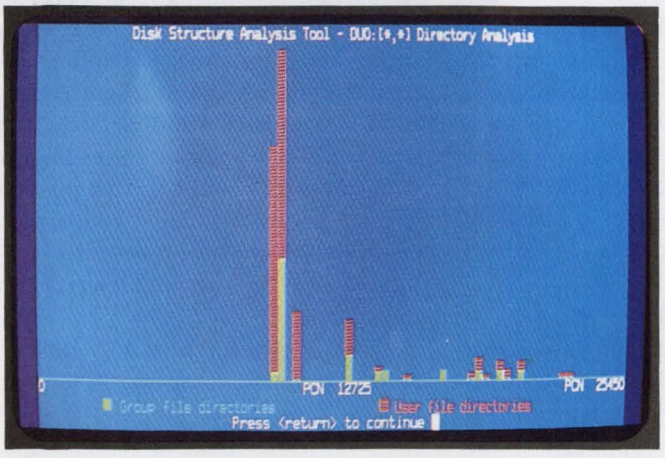
DSKBLD used nearly six hours of wall time and more than an hour of CPU time to process 142 accounts and 6,484 files. Informational messages consisting of the account number, the number of blocks and files processed, and the time needed to optimize the account were printed on an account-by-account basis.

DSKBLD cared for improperly clustered files, leaving none on the disk after optimization. The directory analysis revealed no changes. The file fragmentation report indicated a 15 percent reduction in fragmentation, according to DSAT reports after optimization. The free pack cluster analysis also showed some improvement in the location of free pack clusters, with more free clusters pushed to the end of the disk.

After the second test run a month later, DSAT reported similar results for the cluster size analysis and directory analysis. However, the file fragmentation report showed virtually no improvement, and some free pack clusters actually were redistributed toward the front of the disk rather than being pushed to the back.

ALTHOUGH WE DIDN'T achieve dramatic results, we did see an improvement in file clustering, file fragmentation and distribution of free clusters on our system on the first test. We didn't achieve the same results on the second run. Remember, however, that our system represented a worst case with only one disk that was used for input, for output, and as a work disk. You safely could expect better results if your system has more than one disk, at least for use as a temporary work area.

The software is easy to install and use, and it's safe. Trying it on your system should present no problems. Give DSKBLD a try and determine for yourself the impact it will have on your particular system.



Screen 3: The locations of Group File Directories and User File Directories are displayed by the DSAT Directory Analysis report.

DSKBLD Version 4.2b

PLATFORMS: RSTS-based systems running RSTS version 9.1 or higher

PRICE: $995 for first license, $595 for each subsequent license

GRAYMATTER SOFTWARE & CONSULTING

HEADQUARTERS:
1300 Dexter Ave. N., Ste. 550
Seattle, WA 98109-3542
(206) 281-8800

FOUNDED: 1983

PRODUCT LINE: RSTS and VMS system software utilities

OWNERSHIP: Private

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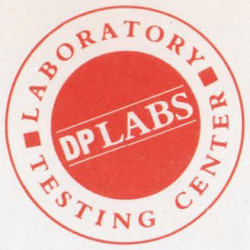

Coda's Integrated Accounting System

Evan Birkhead The Integrated Accounting System (IAS) from Coda Inc. of Manchester, New Hampshire, has a look that's markedly different from that of modular accounting packages. These best-selling packages traditionally use software building blocks, with hooks between modules that allow simultaneous, relational updating across the system. IAS violates this rule in that it combines such things as general ledger, accounts payable and accounts receivable into one mountainous database.

Although multifaceted, the database is neither awkward nor difficult to maintain. It's an efficient means of logging and reporting transactions that's well-suited for mid-sized and large corporations.

New Religion

For many, learning IAS will be like converting to a new religion. The program is sophisticated, yet logically structured. Once the complex patterns of screens and ledgers become familiar, accountants will see that the system, through the integration of ledgers, emulates the way they think. IAS's best feature is its flexibility. Sixteen different document formats, designed for entering transactions, are provided. Accounts payable and accounts receivable, with almost identical layouts, are separate definitions applied to ledger documents.

The Coda database is structured like a three-layer pyramid. The top layer is the nominals, which are high-level general ledgers. The middle layer is for GL subaccounts: for example, departments, contracts and customers. The lower layer is where elements, the details of the top two layers, are located. These can be such things as employee numbers and invoice numbers.

Period balances exist at all three levels. When an element is updated, every related transaction recorded above it on the pyramid also is updated. For example, a credit in a subaccount will be applied to the corresponding nominal GL.

Ledgers (or books) can be set up for every type of transaction. Transactions are kept in intrays before they are input into the books. Here they can be modified or deleted. Once they're added to the books, however, they can't be modified or deleted.

The package is tied together by a Ledger Reporting System (LRS) that acts as a bookkeeping tool to monitor a company's big picture; i.e., how small transactions affect its overall financial outlook.

For reports, the user simply tells the LRS which tables are to be reported, and defines the layout. IAS can read, for example, just books or just intray, or books and intray. It also accepts Only/Not statements. Reports can be enhanced with personal comments; you're provided with almost unlimited space (up to 65,000 lines) for comments.

The Financial Reporting System (FRS) reads only period balances and is used for more general reports. A 2-D report writer, it's used for operating statements and balance sheets.

Ledger Integration

Each of the three layers is tightly woven with the next, and likewise each customized ledger sheet can be reached or created by a succession of menus. The top menu (Screen 1) and all descending menus are icons for the keypad on the right side of your keyboard. You can use these keys to call up the desired table, but you also have the option to use mnemonics, listed on the left side of the menu.

The latter method becomes much easier once you're familiar with the menu hierarchy. Instead of descending through menu after menu, you can type, for example, MM NA at the top menu to bypass the Masters Menu and go directly to the Names and Addresses form. The Me key lets each user customize the path usually taken after log in.

Help is available by pressing the PF2 key; a one-line explanation of what the system expects you to do is provided. Pressing Help a second time gives you an in-depth explanation of your function, sometimes several pages long. A few Gold keys are offered, such as Gold-M, which lets you review or modify an account before completing your invoice. Gold-T takes you to the top menu.

Browsers, another facility, is IAS's method of inquiry and retrieval. It searches all three levels and lets the user scroll through screens and toggle between different informational fields for each document.

For the new company Evan1, I was able to set up a fully workable set of transaction documents in a couple of hours. First, by selecting descending menu choices for manage, general maintenance, company and add, I got a document that requested address, date, and so forth. Then I set up a user for my company (so I could get back in), and granted Level 9, or full system access, reserved for consultants. I also configured a second user, with fewer access capabilities.

I set a base currency, U.S. dollars, (Screen 2) for the company. To set up a

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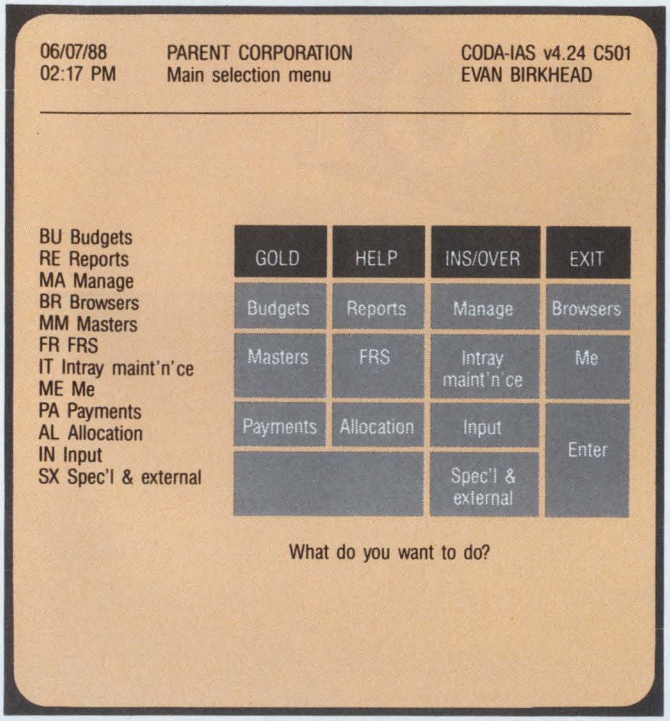
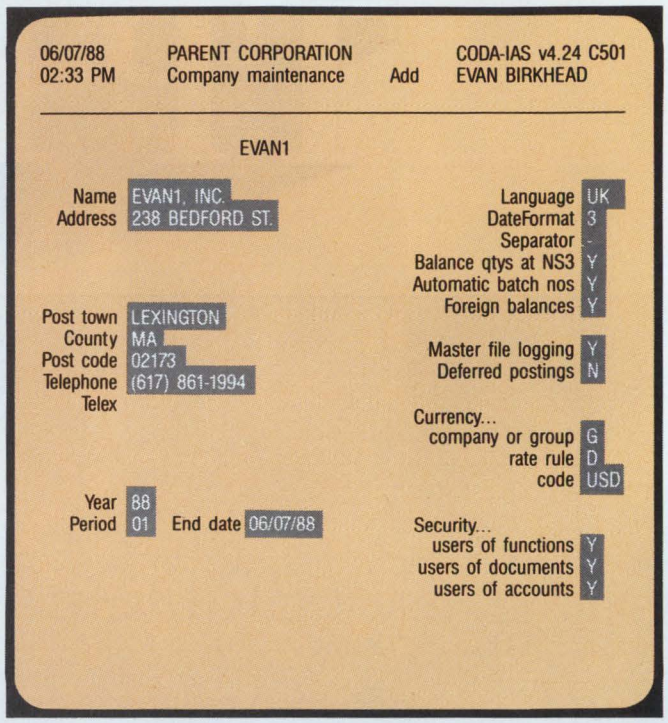
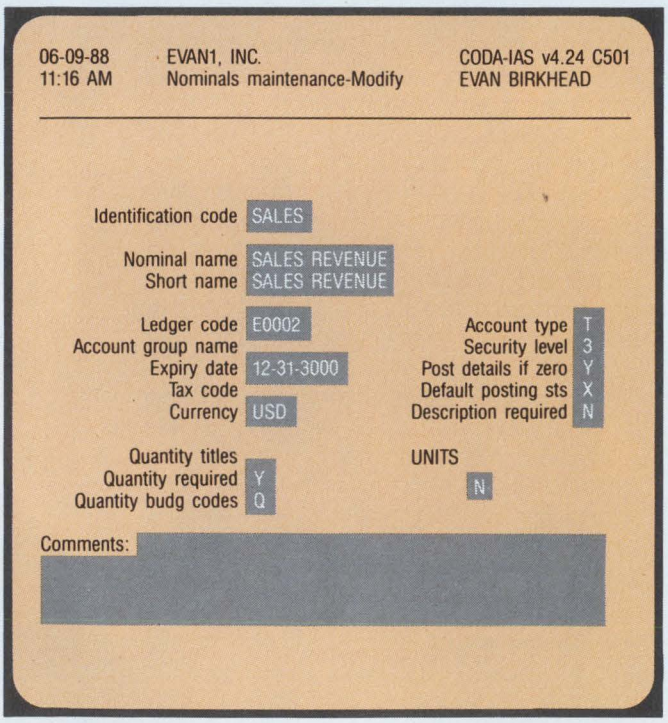


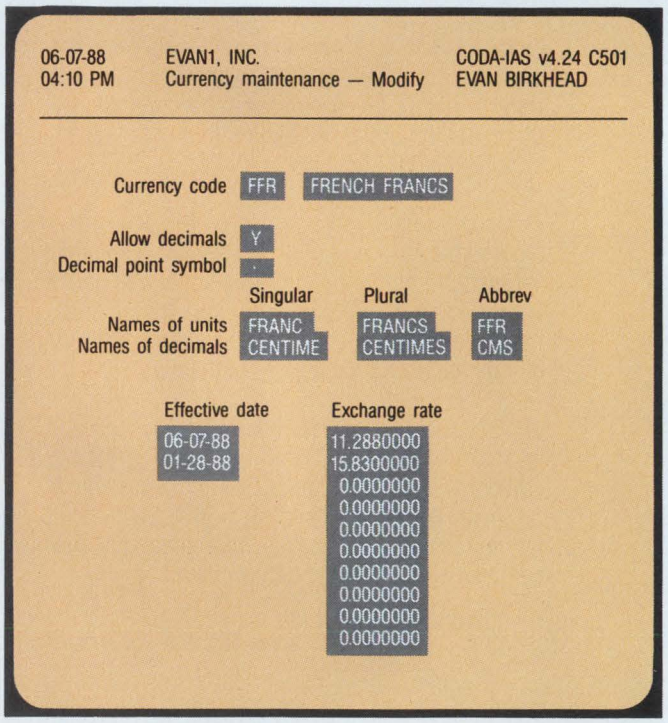
Screen 1: The main menu and lower-level menus offer keypad labels or mnemonics.



Screen 2: Setting up a system and base currency requires responding to these queries.



Screen 3: Nominals maintenance modification screen.



Screen 4: Currency exchange rates can be adjusted daily.

Charge of Accounts, I selected masters, ledger and add, and added a vendor name and address. Customer documents were similarly set up. Each subsequent general ledger required its own nominals and subaccount maintenance (Screen 3).

The Features

There are many configuration options that make IAS fully customizable. Additionally, the software provides some unusual features:

1. An intercompany transaction courier that links balances from two companies over DECNET.
2. A multicurrency facility that calculates exchange rate differences and accepts foreign transactions.
3. An expansive security system that restricts users' access to defined ledgers or elements.

Intercompany Communications — The system is suited perfectly for use over DECNET. IAS self-balances all ledgers when two related companies are located on the same network. At one end, the user simply enters a code for the other company involved. This is set up easily with three utilities:

1. Troll — carries transactions and handles the DECNET communications protocols.
2. Mercury — the messenger that collects transactions from the intray and delivers them to Charon (pronounced Karen).
3. Charon — does the input work for Mercury, making changes to the books of the receiving company.

The IASLink interface is a library of callable routines that can be used to access another program. On DECNET, it's a standard way that companies transact, and many use it to define things such as divisions and branches.

This communication also supports transactions among companies that keep books in different currencies.

Multicurrency — IAS's multicurrency capability should impress *Fortune* 500 companies that deal internationally. There's one rate table that can be set to show adjustments according to a company's base currency. It also can be used for intercompany transactions.

Each IAS document can be specified with a different currency, and any currency can be used because they're all user-defined. Inside Currency Maintenance (Screen 4), I established an exchange rate for francs versus U.S. dollars by telling the system the names of the currencies and their units, and then setting an exchange rate. If necessary, the rate can be reset at the beginning of each workday.

This is ideal for banks, multinational companies with overseas divisions, or any company that frequently deals with foreign accounts. Each currency and its corresponding exchange rate can occur in reports with exact figures tabulated.

Security — Nine levels of password security are set by the system manager, preventing users from accessing ledgers for other departments. A chart specifying user level on the y axis and start- and end-dates on the x axis is provided.

Choices for menus that users have no access to are removed from the keypad icon. The security setting can be modified.

Documentation

Four manuals accompany the program:

1. A user manual for the average user.
2. A reports manual for tailoring reports, also useful for planning and budgeting.
3. A management manual that details accounting procedures and system security.
4. A technical manual for the system manager, concerned with installing the system and the IASLink.

The user documentation is unusually concise; rarely is more than one page devoted to a particular function. The manual is set up with sections explaining each keypad function, key by key. You will need the manuals to set up, but after that, only on-line help should be necessary. Coda also offers a three-day user training course and a one-day manager's course.

Written in VAX COBOL, IAS links to ALL-IN-1, and through simple interrupts, accesses VAX mail, calculators, or scratch pads.

Perhaps an explanation for IAS's different approach is its British roots. Unknown in the United States, IAS is well-recognized in Europe, with more than 350 customers. Last year, Coda Ltd. announced its American subsidiary, Coda Inc., which has already acquired several large accounts.

Integrated Accounting System

PLATFORMS: VAX, HP 3000

PRICE: $21,600 to $324,000, depending on VAX size and number of users

CODA INC.

HEADQUARTERS:
1155 Elm St.
Numerica Bldg., 6th Fl.
Manchester, NH 03101
(603) 647-9600

FOUNDED: 1979

PRODUCT LINE: Integrated accounting software package

REVENUES: $6 million

OWNERSHIP: Private

BRANCHES: Leeds, London, Hong Kong

CIRCLE 556 ON READER CARD

Data Center's QUEMAN Queue Control Program

David B. Miller Managing your system's queues can be a real challenge. Print queue control also can be difficult. VMS queue commands aren't always easy to use; the amount of typing necessary and the number of qualifiers to remember can become a bit overwhelming, especially if you need to act quickly.

Enter QUEMAN from Data Center Software of Beverly, Massachusetts. QUEMAN gives you a high level of control over your system's queues. Only a few keystrokes are required to carry out QUEMAN's functions, eliminating the need to type out complex DCL commands. We tested version 2.0.

With QUEMAN, you can:

1. Monitor and manage queues.
2. Merge, pause, reset, start and stop queues.
3. Assign and deassign output queues.
4. Delete, change destination, change forms, hold, release or restart individual jobs.
5. Create, modify and delete forms.
6. Change forms for print jobs.

QUEMAN works in clustered environments as well as on single CPUs. Full-screen displays provide pictures of what's happening. Individual queues can be examined in detail, or all your queues can be observed at the same time.

You don't use VMSINSTALL for the installation. Instead, you restore the distribution and execute a BUILD.COM command file.

There are numerous screens of information. Let's look at a few related to batch queue control.

Three Functions

Three main functions, the Batch Queue Manager, Output Queue Manager and Forms Manager, are accessible from the opening menu. Screen 1 shows The Batch Queue Manager.

Brief information concerning all batch queues is displayed. QUEMAN first displays this screen in Monitor mode. As queue information changes, the screen is updated to reflect the change.

To use the commands that appear at the bottom of the screen, you must invoke Command mode by pressing Return or an arrow key. An arrow appears to the left of the first queue, and the first command on the command line is highlighted.

When you choose a queue and press PF1, a detail screen is displayed providing information on priority, memory use, protections, execution status and flag settings. If you select a Queue Command, an additional window is displayed for the selected operation. Screen 2 is the result of selecting the MERGE command.

QUEMAN's menu-driven interface reduces the number of keystrokes required to carry out queue functions. Windows are clear, understandable and unobtrusive. When a window is no longer needed, it disappears from the screen.

Queue commands MERGE, PAUSE, RESET, START and STOP are easy to use. The ZOOM command lets you look at individual job entries in the selected queue. Going a step further, a detailed display of a single job can be generated. Entries can be DELETEd, moved from one queue to another (DESTINATION), put on HOLD, RELEASEd and RESTARTEd (stopped and restarted from scratch).

The Output Queue Manager, accessed from the main menu, performs functions similar to the Batch Queue Manager. Information about output queues also includes form and device names for each entry.

Additional commands for output queues include ASSIGN and DEASSIGN, which respectively enable and prevent output from being sent to queues. The FORM command allows you to specify the output form for the selected queue. Output queues can be MERGEd, PAUSEd, RESET, STARTed and STOPped. You can also ZOOM in on individual output queue entries to get detailed information as well as to DELETE, HOLD, RELEASE, RESTART, change DESTINATION or change the FORM for selected jobs.

The Forms Manager allows you to create, delete and modify the forms on your system. Forms characteristics and descriptive information can be changed on the Forms Manager screen. The forms you set up then are available to any output queue.

Documentation is clear and under-

QUEMAN

PLATFORMS: All VAXs. VMS version 5.0 is supported

PRICE: Ranges from $245 for the VAXSTATION to $2,995 for the VAX 87XX and 88XX series

DATA CENTER SOFTWARE

HEADQUARTERS:
70 Herrick St.
Beverly, MA 01915
(508) 922-5500

FOUNDED: 1986

PRODUCT LINE: Development and marketing of VAX-based utilities

OWNERSHIP: Private

CIRCLE 483 ON READER CARD

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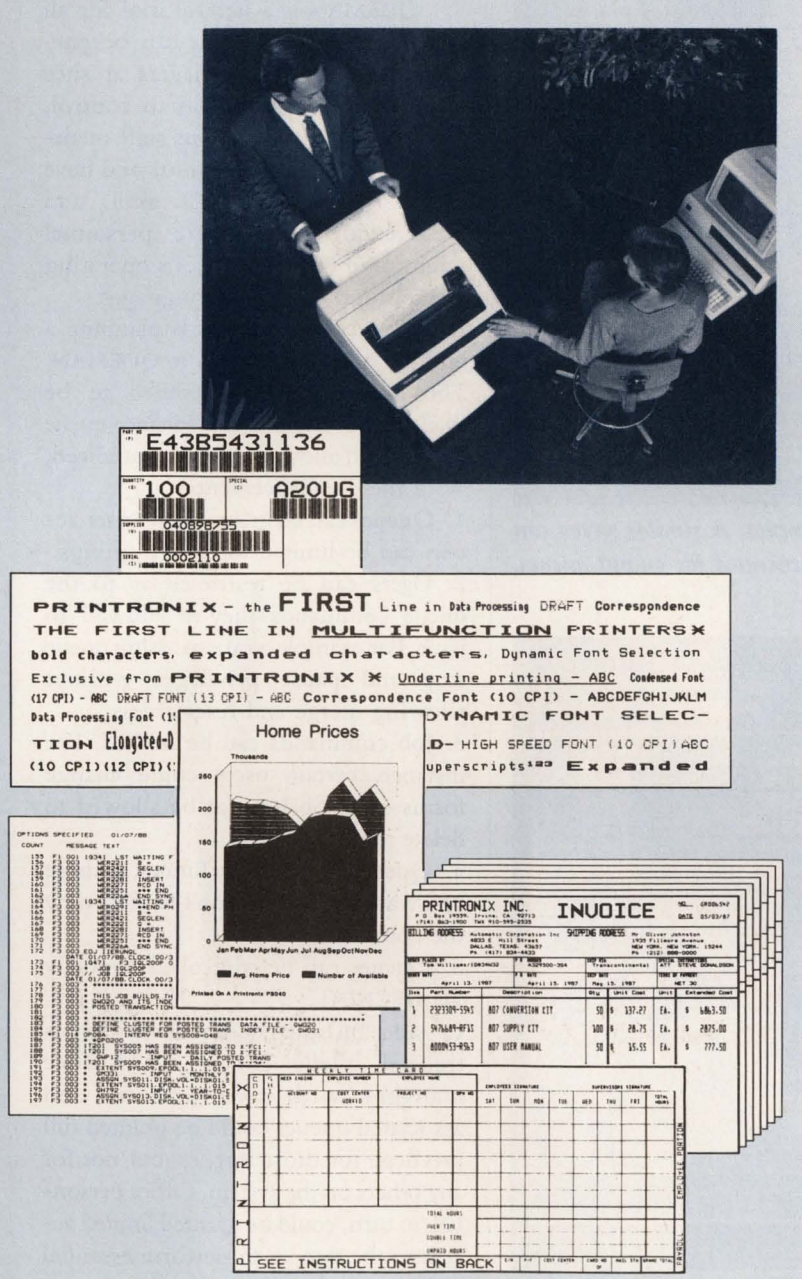

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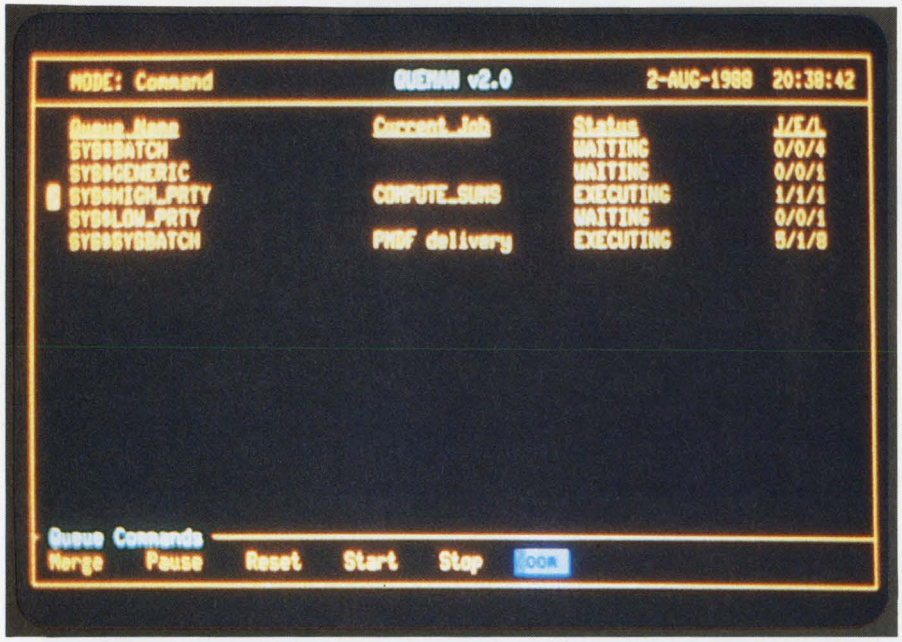
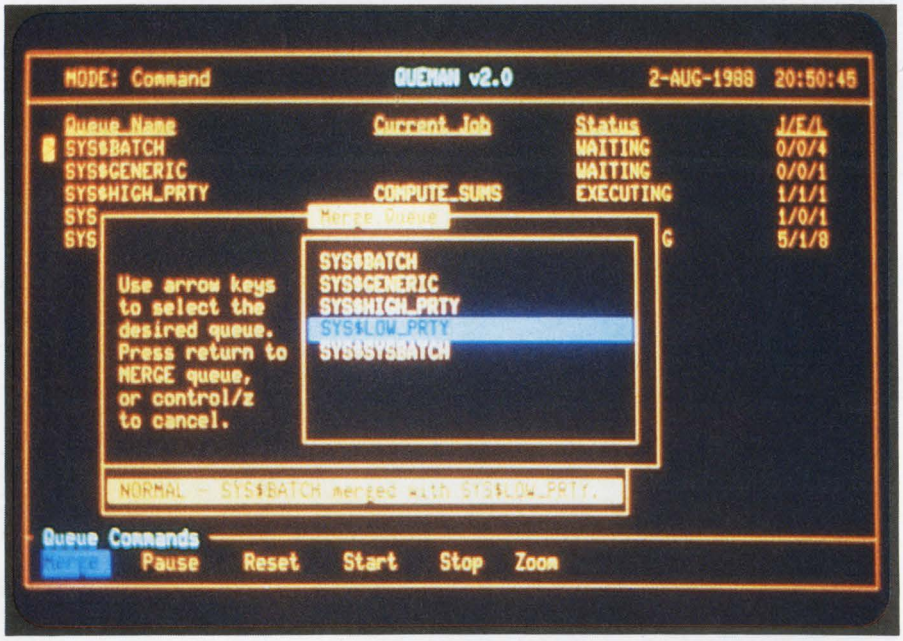


Screen 1: This screen displays a summary list of batch queues. A similar screen can be generated for output queues.



Screen 2: Window handling makes QUEMAN easy to use, as can be seen on this multiwindow display of a queue merge operation.

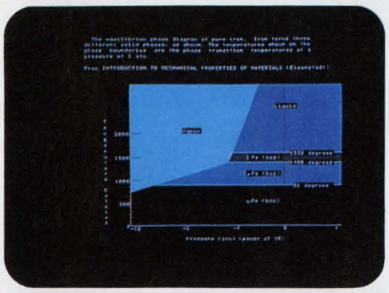
standable, and it includes example screens. The manual I received has no index, but the detailed table of contents is an adequate alternative.

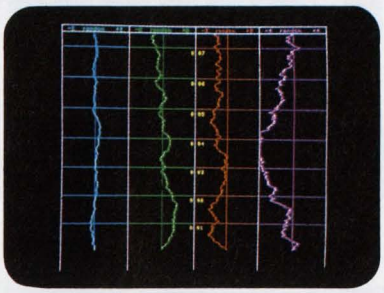
QUEMAN is a helpful tool for all system managers. But it can be particularly useful for managers at sites with a number of queues to control, sites employing operations staff members who work various shifts and have varying degrees of DCL skill, and multivendor sites where personnel might need to know various operating systems and command languages.

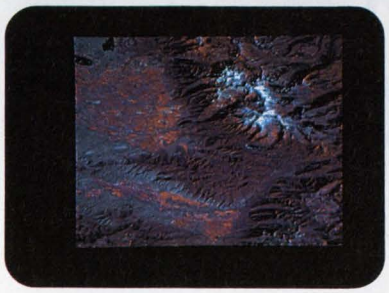
Editor's note: Data Center is planning a number of enhancements to QUEMAN. The new features, scheduled to be available this month, will enhance queue control and allow it to be decentralized. With these enhancements:

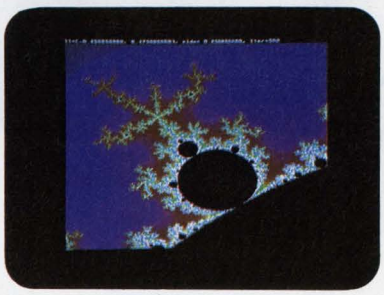
1. Queues can be grouped and user access can be limited to certain groups.
2. Users can be restricted as to the queue commands they're allowed to issue. For example, you can assign queue stop and pause privileges without allowing merge and reset access.
3. Job commands can be limited. For instance, certain users could change forms on a job but not be allowed to delete jobs.
4. Queue choice can be limited to those you want to see; you don't have to view the entire list.
5. Queues can be controlled remotely via DECNET.
6. ACLs on queues can allow decentralized queue control. An office manager with two printers and associated queues could be granted full privilege for those queues, but not for any others on the system. Office personnel, in turn, could be granted limited access to the queues to perform essential tasks such as changing forms but wouldn't have full privileges.
7. Queues can be created and deleted.
8. Priorities for both print and batch queue jobs can be changed directly from the QUEMAN screen. ■

Put exactly what you want on screen.



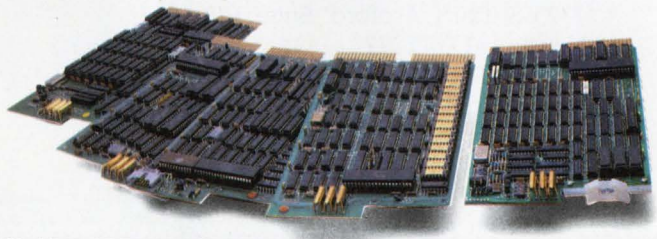






	MODEL	Q-BUS/ UNIBUS*	PIXEL GRAPHICS	ALPHA-NUMERICS	COLORS
COLOR	VCK8	Q & U	1024 × 1024	64 × 85	256
	VCK24	Q & U	1024 × 1024	64 × 85	16 million
	VCX8	Q & U	512 × 512	48 × 80	256
	VCX24	Q & U	512 × 512	48 × 80	16 million
	VCH	Q	512 × 512		256
	VCG512	Q	512 × 512		16
	VCG640	Q	512 × 640		8
	VRC	Q & U		24 × 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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CIRCLE 316 ON READER CARD

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CIRCLE 362 ON READER CARD

What Can You Say About A VAX Utility That Recovers $50,000 Worth Of Disk Space For Under $5,000?

Here's what users are saying.

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Steve Simek
Talaris

"...With PAKMANAGER I recovered almost 15% of my disk space by being able to easily find expired files and multiple versions of files left by uncaring users."

John Smetona
Topsville

"...PAKMANAGER really helped...This product very quickly puts on our screen all of the information we need about a particular disk, within a few seconds."

Tom Stewart
Security Pacific Automation Co.
Digital News, June 13, 1988

This is what the press is saying.

"...PAKMANAGER provides a flexible, easy-to-use and powerful system to help you manage VAX disks effectively...teamed with a disk compression and defragmenting utility such as DEMAC's SQUEEZPAK, the two tools will provide a solid one-two combination to fight against disk clutter."

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

THE MAC CONNECTION

Joseph P. Dallatore

CommUnity-Mac

Two fundamental questions you must answer when establishing a hybrid Mac/VAX network are which networking hardware and which networking protocols to use.

For the physical/electrical connectivity question, there are many possibilities. If you need the throughput of Ethernet's 10 Mbps, you can install a combination of ThickWire, ThinWire, twisted-pair or fiber optic physical links to each Mac, depending on your site requirements and hardware budget. You also can connect the Macs using Apple's low-cost, medium-speed physical networking hardware, LocalTalk, and connect these work group networks to a backbone Ethernet with an internetwork bridge. If you're on a tight budget and can sit still for a 9600-baud line, you can use standard RS-232 connections.

On the question of protocols, the primary contenders are Appletalk and DECNET, followed by a myriad of third-party network systems such as TCP/IP, TOPS, 3Com and Novell. Many of these also work with Ethernet or LocalTalk hardware and cabling.

CommUnity-Mac, from Technology Concepts Inc. (TCI) of Sudbury, Massachusetts, is a software product that enables a Mac to function as a DECNET Phase IV end node. The latest version, 1.2, which is now in beta test, has important new features.

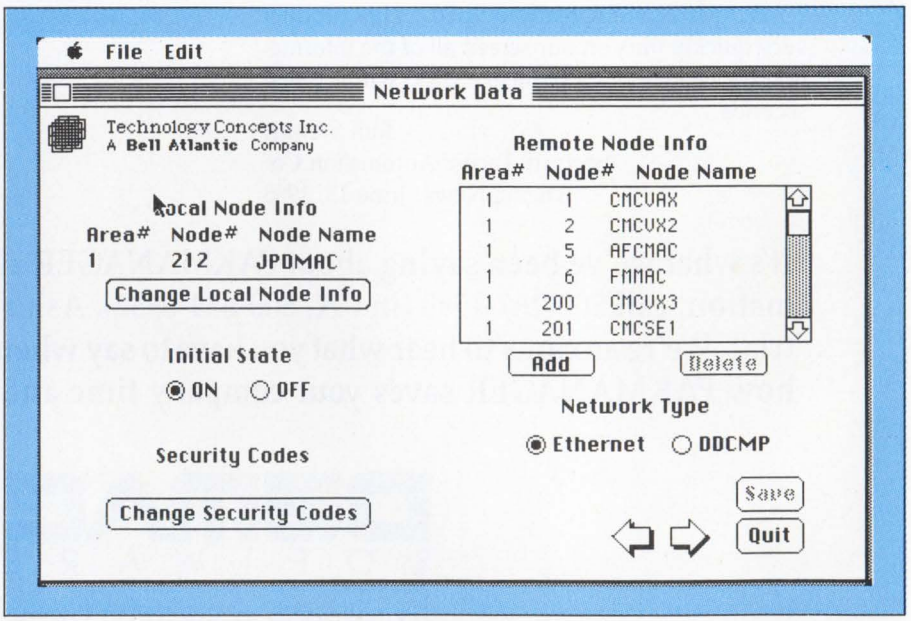
Latest Developments

Previously, use of CommUnity-Mac on a Mac Plus or Mac SE required a Dove FastNet SCSI-to-Ethernet adapter. For the Mac II, an Apple EtherTalk card or a 3Com EtherLink/NB card could be used. Version 1.2 includes drivers for the Kinetics family of Ethernet adapters, the EtherPort II card for the Mac II, the EtherPort SE card for the Mac SE and the Kinetics "Ether SC" SCSI-to-Ethernet adapter, which can be used with any Mac equipped with a SCSI port.

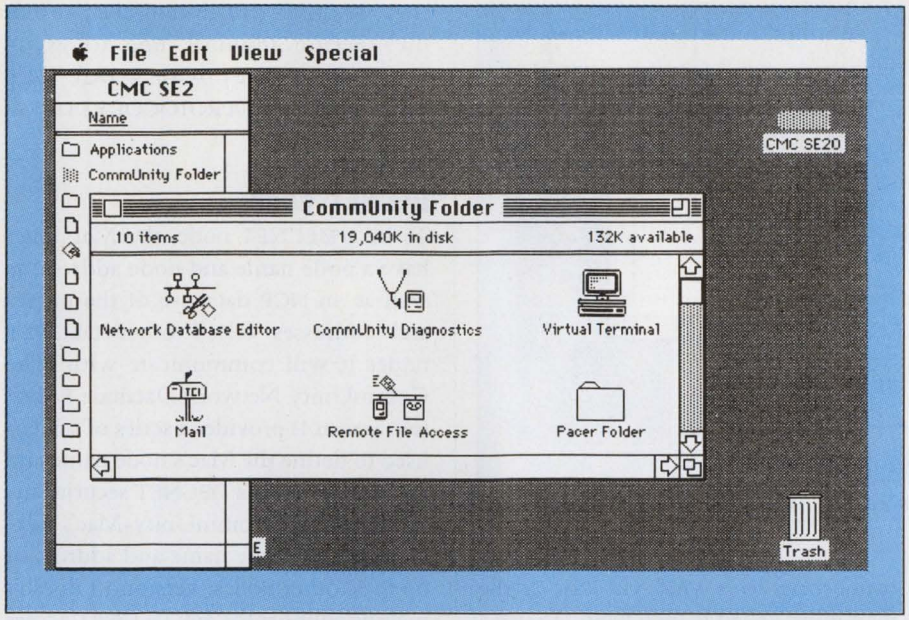
The SCSI-to-Ethernet bridges suffer from lower throughput than the internal cards, but provide upgraded Mac 512s and Mac Pluses with a way to connect directly to Ethernet. Until now, Mac owners who bought Kinetics hardware were unable to consider CommUnity's DECNET software without the prospect of also buying another SCSI-to-Ethernet box.

Connectivity to the VAX/VMS environment often means terminal emulation. CommUnity includes a Virtual Terminal application that uses DECNET's CTERM protocol to connect a terminal session running on the Mac to a VMS system. Virtual Terminal is a modified version of the PacerLink (formerly PCLINK) terminal emulator for the Mac that's popular among Mac/VAX users because of its "more than just terminal emulation" features. These include script programming language and the ability to provide a pushbutton shell for VMS through the use of on-screen soft keys.

Every Mac/VAX connectivity package worthy of the title provides the means to use your VAX/VMS system as a file server. CommUnity's package provides a VMS File Server facility that allows the Mac user, through a Mac Desk Accessory, to mount a VMS volume. When the user logs in to a VAX account through the File Server, the account's log in default directory appears on the Mac desktop as a virtual disk drive, and the VMS files within the directory appear as Mac documents within the volume.



Screen 1: The CommUnity Network Database Editor.



Screen 2: The CommUnity folder showing the Pacer Folder, Network Database Editor, Mail, Remote File Access, Virtual Terminal, and Diagnostics Applications.

We installed a beta test V1.2 of CommUnity-Mac on a Mac SE and a Mac II, both equipped with a Kinetics EtherPort card connected to our network. Our network includes several VAXs running VMS 4.7 and other Mac IIs running TSSNET, distributed by Alisa Systems.

The CommUnity-Mac package consists of three Mac 800-KB disks, an installation disk, an applications disk and disk of device controllers. A bound user manual is included, instead of the traditional stapled LaserWriter pages. We installed the current V1.1 on a Mac SE using a Dove FastNet connected to the SCSI port. The installation directions are succinct, and assume previous knowledge of the Mac and the Mac Installer application.

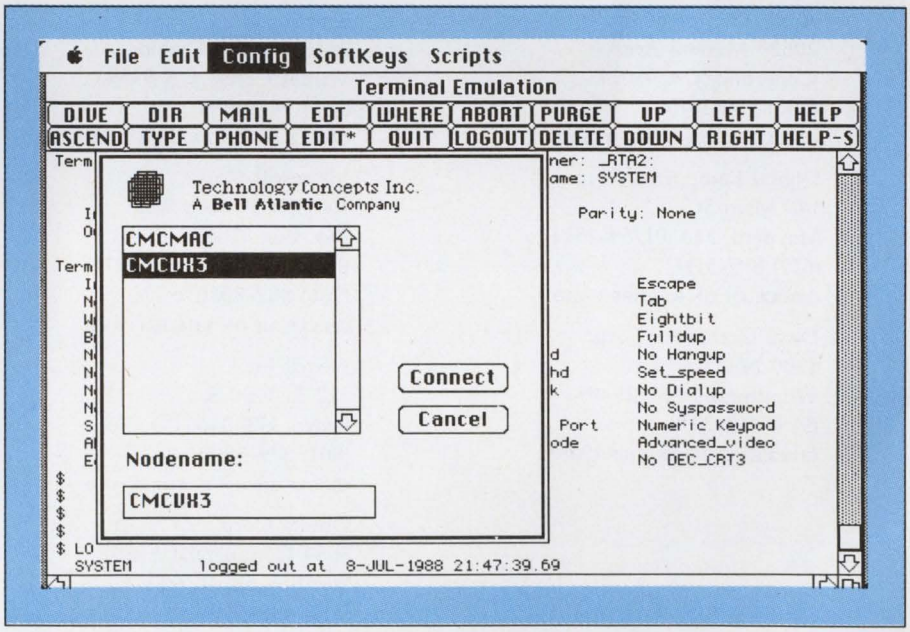
One quirk of CommUnity-Mac is a requirement that the Community folder, which contains all the necessary run-time files, reside in the top level of the system's boot disk. If your habit is to hide application-specific folders beneath the system folder, or anywhere else, CommUnity-Mac will force you to keep this folder in a place you might not prefer.

After installing the software, a Desk Accessory (DA) labeled CommUnity is supposed to appear. Invoking the DA then gives you access to most of the product features. The first time I installed the software, the CommUnity DA didn't appear; because I already had the maximum number (15) of DAs allowed on a Mac, the installation failed.

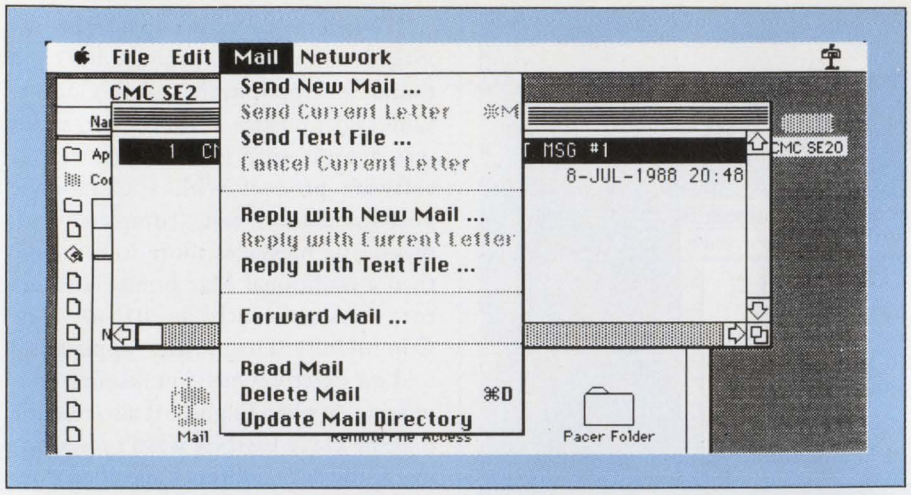
When the DA didn't appear, I rummaged around on the product disks and found an application called CommUnity Diagnostics. I launched it, and it was a great surprise. Imagine a Mac software product with a UETP-style post-installation test, complete with diagnostic messages more informative than a traditional Mac bomb with error messages such as ID=07. The CommUnity Diagnostics application told me exactly which init resource was missing, in plain English. It also told me that the Dove FastNet wasn't responding at the SCSI address I specified during the installation of the CommUnity-Mac kit.

After a few checks and a reinstallation, I dialed TCI's support number. I was sorry to hear that the diagnostics program was correct: My FastNet was dead. After a few futile tries to restart the FastNet, I moved on to the field test kit of CommUnity V1.2a because it works with Kinetics hardware, of which I still had some working samples.

Version 1.2 installs in the same fashion, except that you must copy the appropriate controller image for your hardware configuration into the CommUnity folder to complete the in-



Screen 3: The Virtual Terminal with the Config box used to select a VMS node to Connect to. Note the programmable soft keys at the upper edge of the screen.



Screen 4: TCI Mail editor, showing the Mail pull-down menu options.

stallation. If your network link is an RS-232 line, CommUnity-Mac includes a DDCMP controller for the Mac's modem port. This driver supports line speeds up to 56 KB. However, when connecting to a VAX via RS-232, the maximum speed is 9600 baud. To use a direct terminal connection (not a terminal server port) to a VAX, you first must run SYSGEN and connect the DDCMP driver (NIDRIVER), then switch the specific terminal line to asynchronous DECNET with a DCL $SET TERMINAL TTxx: /PROTOCOL = DDCMP command.

DECNET Node

To be a DECNET node, the Mac must have a node name and node address, as well as an NCP database of the names and addresses of all other DECNET nodes it will communicate with. The CommUnity Network Database Editor (see Screen 1) provides a series of screens used to define the Mac's node name and address, the Mac's DECNET security information (the CommUnity-Mac's software key) and the name and address of up to 50 other nodes. Version 1.1 doesn't include support for any DECNET access control information, such as proxy log ins or default DECNET account passwords. Account names and pass-

Companies Mentioned In This Article

Alisa Systems Inc.
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CIRCLE 503 ON READER CARD

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(617) 897-5111
CIRCLE 471 ON READER CARD

Dove Computer Corp.
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Wilmington, NC 28405
(919) 763-7918
CIRCLE 505 ON READER CARD

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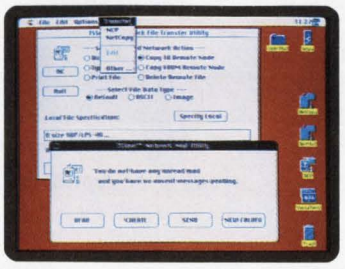

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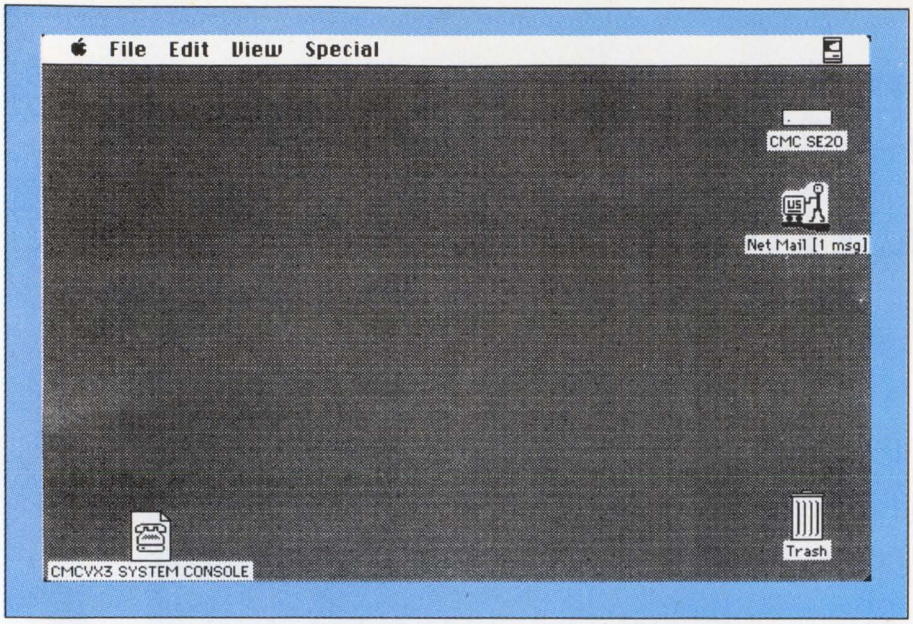


Screen 5: A Net Mail Folder, which appears whenever a VMS mail message is received by the Mac SE from any other DECNET node.

words must be provided at the time a network operation is initiated.

This brings us to one of the big problems with DECNET on the Mac. If I have a dozen VAXs in my network, I can compose a DCL command file that runs NCP and updates the database with node names and address for all nodes. If I add 30 Macs as DECNET nodes, I have to revise that command file, send it to each node and execute it to update the database.

Now I have 42 nodes in my network. Every Mac must have 41 of those node names and addresses entered by hand. There's no batch queue to do this for you. And you can't copy the Network.dat file from one Mac to another, because the file also defines the Host name and address and carries the software key for the node's CommUnity license. So plan extra typing time if you're adding a new Mac to a big DECNET network.

Once the local node and the network database are defined, the Mac is compatible with other DECNET Phase IV nodes for remote file access, exchanging VMS mail and, for those nodes that support CTERM, Remote Terminal Emulation. As you can see in Screen 2, CommUnity-Mac includes an application for each of these operations.

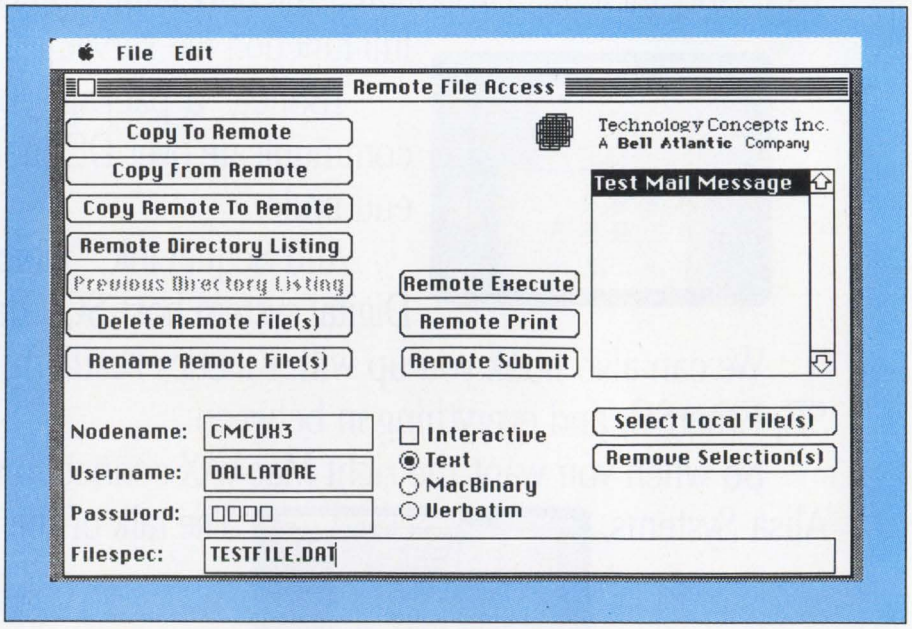
Emulation

Virtual Terminal is the modified PacerLink emulator, and provides a choice of VT100 or VT220 emulation (see "PCLINK: Another Great Communicator," September 1987, p. 31A, for a description of the terminal emulator's features). The primary difference from the standard PacerLink emulator lies in the data link protocol used to transport information to the VAX.

With standard Pacer, Pacer Network Protocol is used. With CommUnity-Mac, DECNET's CTERM protocol is used instead. By using CTERM, the emulator can connect directly to any DECNET node that supports the DCL $SET HOST command, not only those VAX/VMS systems that have PacerLink installed.

Even better, it supports command line recall using the keyboard arrow keys. The script feature of the emulator records user actions to be played back later with the click of a soft key. Script programs can be created to enable soft keys to perform a variety of complex or repetitious tasks. The CommUnity-Mac user manual includes a chapter describing each script command and what it does.

The current emulator settings can be saved in a configuration file that includes the node name of the particular



Screen 6: The Remote File Access, showing a Mac document called Test Mail Message, about to be copied to the VAX as TESTFILE.DAT.

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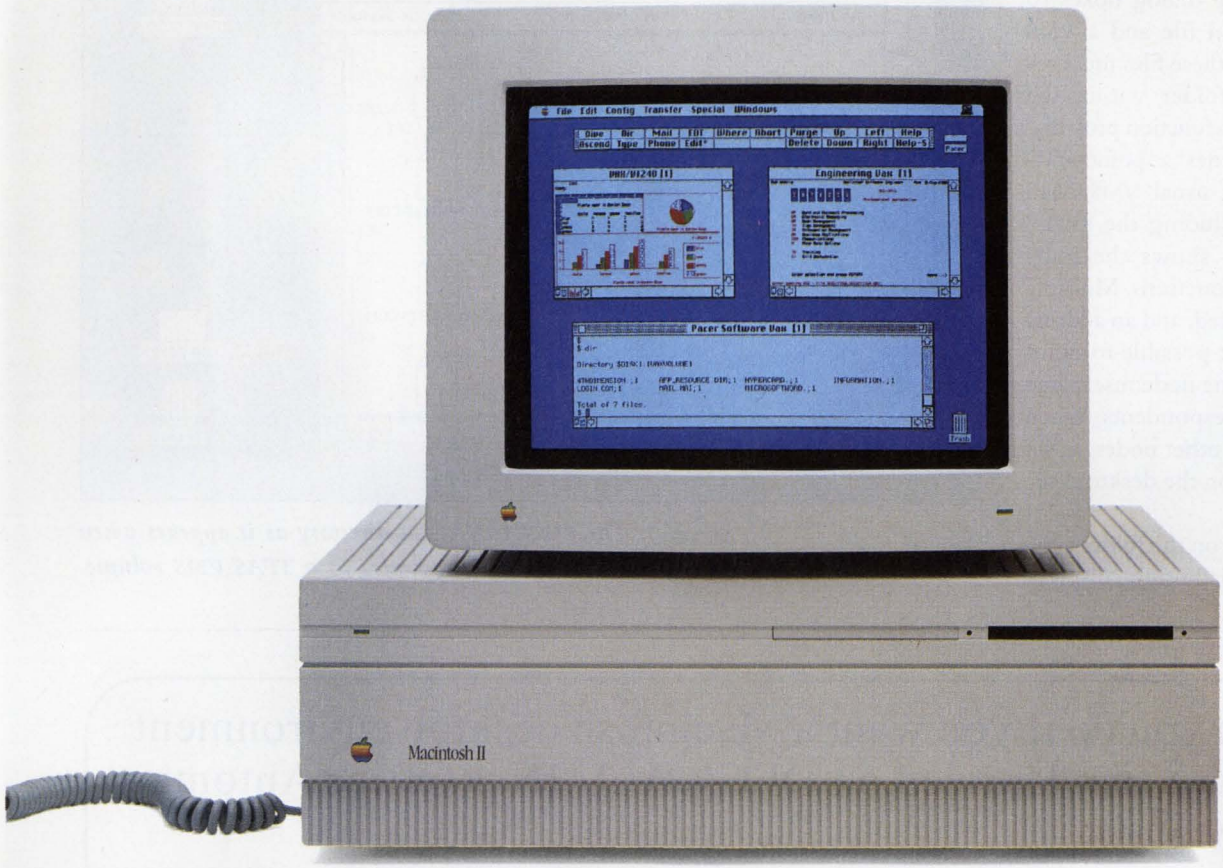
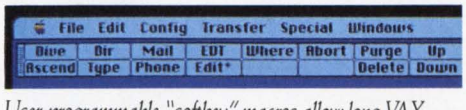


Multi-windows, actually.

With PacerLink connectivity software, Mac users can manage multiple VAX jobs by viewing multiple concurrent terminal emulation sessions. Enter data in one window and your VAX host updates all others continuously, even under MultiFinder.

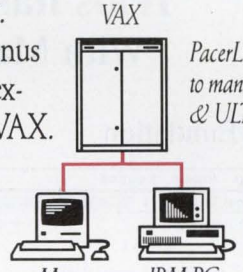
Using Mac techniques, you can adjust PacerLink windows as you please. Enlarge, miniaturize, stack or just stick them in a convenient corner to keep an eye on!



User-programmable "softkey" macros allow long VAX command streams to be executed with a single click.

To make the VT100 and VT220 terminal emulator even more useful, we've built in programmable "softkeys" that allow complicated interactions to be executed with a single click. Along with the pull-down menus and windows, these softkeys extend the Mac interface to the VAX.

Equally important, PacerLink integrates its terminal emulation with file transfer, virtual disk and print services to give you full functionality with one product. It connects IBM PCs (and compatibles) as well as Macs to VAX (VMS and ULTRIX) and several UNIX systems.*



PacerLink connects Macs and IBM PCs to many hosts, including DEC VAX (VMS & ULTRIX) and several UNIX systems.

PacerLink is the core of a powerful family of integrated micro to mini solutions. Add PacerShare, and you gain a VAX/VMS AppleShare-compatible file server that's completely transparent. Add PacerPrint, and users on either side of the network can access PostScript printers. With PacerGraph, you extend graphic emulation capabilities to the VT240/VT241 standards.

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**Physical connection between the Mac/IBM PC and host can be RS-232, Ethernet (EtherTalk or TCP/IP) or Apple LocalTalk bridged to Ethernet using Kinetics FastPath or Cayman Gatorbox. All product names subject to trademark claims.*

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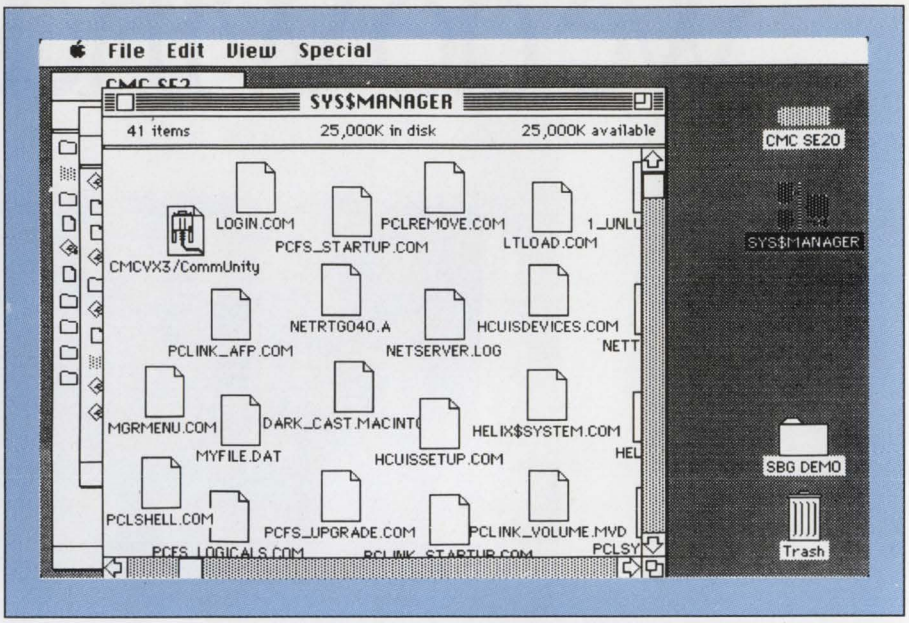
VAX to connect to (see Screen 3). By double clicking on a configuration file instead of the Virtual Terminal icon, you can avoid the startup dialog boxes to select a configuration file and a VMS node. Unfortunately, these files must remain in the Pacer folder within the CommUnity folder to function properly.

TCI Mail provides a point-and-click version of the usual VMS Mail utility functions, including the REPLY command. Screen 4 shows the pull-down menu of mail functions. Multiple recipients are supported, and an address book utility makes it possible to point and click to specify the node::username for your regular correspondents. When mail is received from other nodes, a Net Mail folder appears on the desktop (see Screen 5).

Double clicking on the folder activates the same TCI Mail utility, display-



Screen 7: The SYS$MANAGER directory as it appears when mounted as a TFAS VMS volume.

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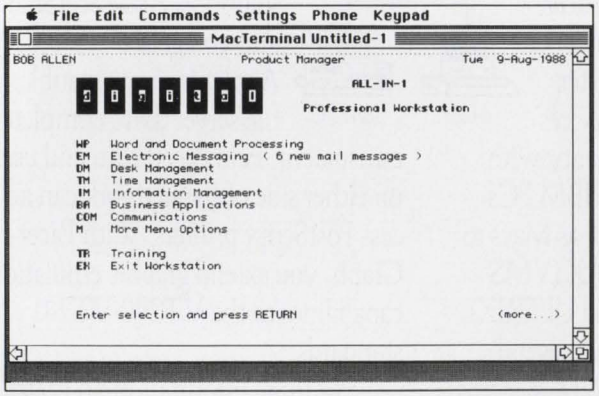

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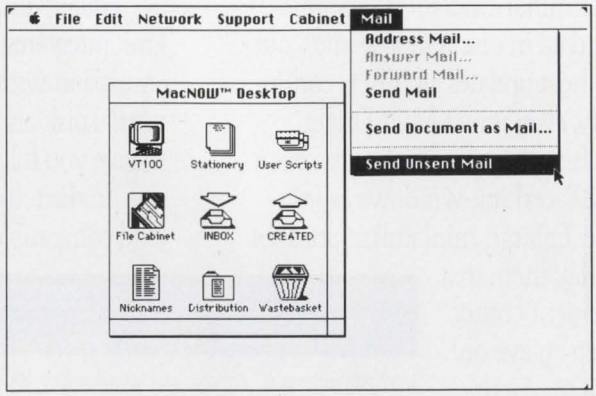

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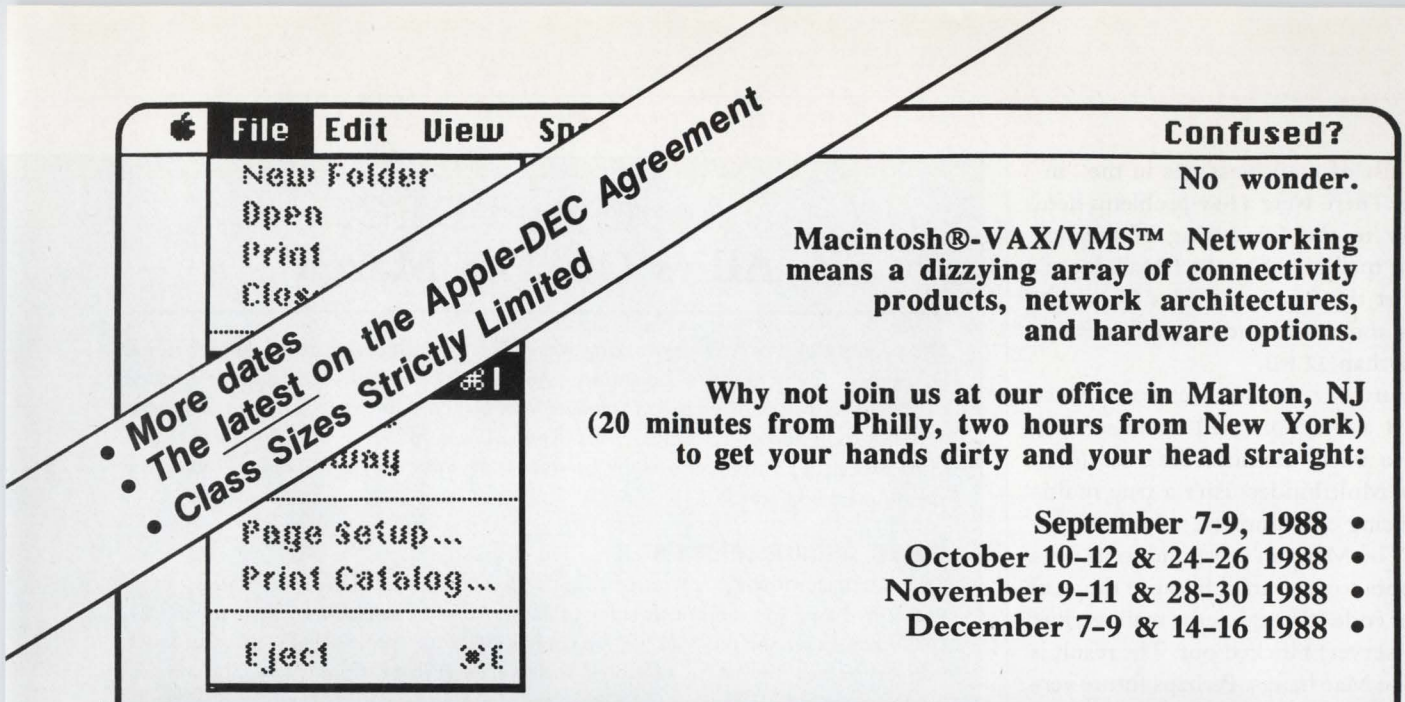

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ing a list of mail messages in the "in" folder. There were a few problems here, mostly in the formatting of the text within mail messages. TCI Mail doesn't support the Stream LF files from VAX nodes and can't handle a mail message larger than 32 KB.

Further, the release notes warn against a Mac DECNET node sending mail to itself. Because the Mac (even under MultiFinder) isn't a true multiprocessing environment, a deadlock occurs. The Mac can't respond to its own attempts to send mail because the mail sender code (client) has the mail receiver code (server) blocked out. The result is that the Mac hangs. Perhaps future versions of CommUnity-Mac will feature a way to prevent this situation.

Front End

The Remote File Access (RFA) application provides a Mac-like front end to the DECNET copy operation. One of the disadvantages of making the Mac a DECNET node is that the Mac user must understand how to form fully qualified VMS file specifications of the style:

```
Nodename"username password"::disk:
[dir.subdir1]filename.dat;1]
```

But things can be very complicated when one of these DECNET nodes is actually a Mac node. What does the "DECNET" file spec for the Mac file in a Mac folder look like? The Mac allows spaces in document and folder names, and Mac files don't have version numbers. VAX file specifications can be over 200 characters long; the Mac is limited to about 35.

Remote File Access provides a series of buttons to perform most forms of node-to-node file copying, including a copy from one remote node directly to another, and copying files from the Mac to a VAX and vice versa. Files can be moved as TEXT (data converted to ASCII), MacBinary (all Mac file structures are preserved) or Verbatim (every byte, as is, sent to the VAX in 512-byte fixed-length records). VMS wildcard copies are supported. Unfortunately,

Apple And DEC: Allies On The March

The promise of Mac/VAX networking stirred lots of enthusiasm at the Apple/Digital Developers' Conference, held in Boston, August 7-9. The conference, open to selected customers as well as Independent Software Vendors (ISVs), focused on various Mac/VAX network tools and opportunities and offered a few surprises as well. In our world of often vague cooperative partnerships between companies, the Apple/Digital Conference was refreshingly specific.

Ironic Announcements

One surprise of the conference came when DEC revealed the specifications of its VAX/VMS-based file and printer services. Expected to be available by September 1989, DEC's file server for the Mac will be compatible with Apple's AppleShare network file server and similar to offerings such as PacerShare from Pacer Software of Westborough, Massachusetts, and AlisaShare from Alisa Systems of Pasadena, California.

The unnamed (DECShare?) Macintosh File Server will, like its counterparts from Alisa and Pacer, allow Mac users to access VAX/VMS files from their electronic desktops, viewing the VMS file system through the Mac's unique icon-oriented user interface. The product will take its place alongside DEC's currently available VMS Services for MS-DOS file server software, rounding out DEC's Personal Computer Systems Architecture (PCSA) family.

Likewise, DEC's planned Macintosh printer services will offer Mac and VAX/VMS users access to laser printers from both Apple and DEC, similar to functions performed today by Alisa's Alisa Print Services and Pacer's PacerPrint.

DEC's product announcements took on ironic significance, however, as representatives from Alisa and Pacer were in attendance. How can DEC encourage developers to build Mac/VAX networking products while it announces competitive products?

At the concluding press conference, Apple and DEC were quick to point out that DEC's file and print services products won't be available for at least a year, and that customers who need such services now should buy now. And, because Alisa's, DEC's and Pacer's file servers will all be based on Apple's AppleShare file server architecture, cooperation between and file migration across these products will be simple.

Real Tools

The real business of the Apple-DEC Technical Alliance is standards, and the brightest news at the Developers' Conference was the emergence of "real" developers' tools with consistent interfaces.

Apple announced version 2 of its AppleTalk for VMS developers' tool, which is a full implementation of AppleTalk networking protocols under the VMS operating system. AppleTalk for VMS V2 will include all the features of the current V1.6, adapted for use under VMS version 5.

Currently in use under products such as the Helix VMX database product from Odesta of Northbrook, Illinois, the V2 announcements represent a strong endorsement by both DEC and Apple of AppleTalk for VMS, and will boost its acceptance by software developers. AppleTalk for VMS V2 should be available this fall.

Apple also stated that further AppleTalk for VMS development will focus on performance improvements by rewriting some of its packet-routing "overhead" functions as a VMS I/O driver, and in some cases by completely eliminating the need for routing. No timetable was presented for these developments, presumably scheduled for version 3 of the software.

For use with AppleTalk, DEC announced plans to implement VAX/VMS-based Ap-

pleTalk/DECNET Transport Gateway software. This tool would provide end-to-end connections for software using Apple's AppleTalk Data Stream Protocol on Apple's products and DEC's Network Services Protocol in DECNET. With this facility in place, a Mac-based software package will be able to establish a network dialog with a program running on a VAX using task-to-task DECNET facilities.

By building such bridges between their networks, DEC and Apple are encouraging the involvement of both families of developers. Apple- and DEC-oriented software engineers, following Apple's and DEC's respective networking guidelines, will be able to interconnect their products into distributed applications without having to immerse themselves for months in the other's foreign technologies.

Distributed Applications

Apple demonstrated a prototype of its X11 X Windows server software for the Macintosh Operating System, promising delivery of X11 DECWINDOWS from host VAX computers as soon as DECWINDOWS becomes available. For developers seeking more intimate host control of the Mac's user interface, Apple showed its MacWorkStation developers' tool. MacWorkStation offers control of almost every aspect of the Mac user interface to a host VAX application over a simple asynchronous line as well as over a network.

Programmers looking to write Mac front ends for host-based database products got a look at Apple's CL/1 and DEC's SQL Services. Both products provide a transaction interface between software such as HyperCard on the Mac and ORACLE on the VAX. CL/1 supports database products such as INGRES and Informix as well as ORACLE, while DEC's SQL Services is written specifically for DEC's Rdb/VMS relational database product.

LONG A PROBLEM in our industry, Apple and DEC announced their joint intention to simplify the interchange of compound (text and graphics) documents by adhering to DEC's Digital Document Interchange Format (DDIF). To be found in the "Save as . . ." options of future word processors and document converters from both companies, DDIF is rich enough to faithfully handle complex presentation formats.

Worries that DEC and Apple might build everything themselves and leave developers out in the cold dissipated quickly as the two companies discussed their plans for business communications applications, such as electronic mail and conferencing. In these application areas, it was obvious that the major players would be content to provide the rails and ties and leave the real railroading to the ISVs.

In addition to document interchange tools like DDIF, Apple and DEC announced their joint support for X.400 electronic mail standards. DEC's present and future X.400 mailbus architecture products provide promising development platforms, and companies like Microsoft and Alisa already have announced plans to jump on.

Many Apple/DEC developers' tools discussed at the conference, including AppleTalk for VMS and MacWorkStation, are available today. Also, developers looking to write cooperative database applications shouldn't overlook the possibilities presented by currently available tools from third-party vendors, such as Helix VMX.

Programmers looking to write Macintosh front-end software for VAX host database systems must wait for Apple's CL/1, due later this year. DEC's SQL Services will require AppleTalk-DECNET Gateway, which probably won't be released until mid-1989.

Customers can expect to see a Microsoft-Mail-to-VAXMAIL gateway from Alisa/Microsoft by the end of 1988, new AppleShare-compatible file servers from companies like Novell by early 1989, and a host of network product introductions throughout the next 12 months. Mac/VAX/VMS networking has been with us for more than two years, and with the commitment Apple and DEC showed at the Developers' Conference, you can bet it's here to stay. — *Al Cini*

CommUnity-Mac V1.2

PLATFORMS: Ethernet and systems that support DDCMP

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due to differences between the two systems' file naming conventions, indiscriminate wildcard copies can fail or produce unexpected results.

Screen 6 shows a copy command to move a TCI Mail file on the Mac to my log in directory on CMCVX3. The Remote Submit, Execute and Print buttons allow a Mac user to transfer command files and print files prepared on the Mac to the VAX for processing in a single step.

The Remote File Access utility's Verbatim mode is put to excellent use in installing the VAX-hosted CommUnity File Server. The CommUnity-Mac disks contain a VMS executable image and a command procedure that you copy to any VMS node with RFA. TFAS.EXE implements a VAX-based network file server for CommUnity nodes. The TFAS server is a DECNET object and is accessed using DECNET task-to-task communications. It provides a view of a user's VMS log in directory as if it were an external Mac disk drive. The Mac user first mounts the disk drive us-

ing the CommUnity DA, and can choose to see all VMS files, or only those VMS files that were created by the Mac during previous sessions.

Files created by VMS applications appear as generic documents (see Screen 7). Whether the document can be used from the Mac depends on whether you have a Mac application that understands the file organization and contents. For example, Microsoft Word can load ASCII text files, so a user can edit command files, mail messages and EDT-based files using MS-Word and the TFAS server. While this isn't interoperability, it's better than KERMIT or even the best terminal emulator's transfer file facility.

The CommUnity DA also can connect the Mac to a VAX running DEC's PCFS file servers (although PCFS V2.0 isn't yet supported), so sites using PCSA can share files among Macs, VAXMATEs and the VAX. If you don't have PCSA, but have MS-DOS machines, CommUnity-DOS allows PCs equipped with an appropriate Ethernet board to connect to any TFAS server. Either way, you get Mac, DOS and VMS users sharing access to the exact same files, and not copies, as long as the files are stored in a format supported by an application in all three environments. Right now, this usually means ASCII text files, but eventually someone will market a word processor/spreadsheet/database/what-have-you that runs well with all three operating systems; then things will start to get really interoper-esting!

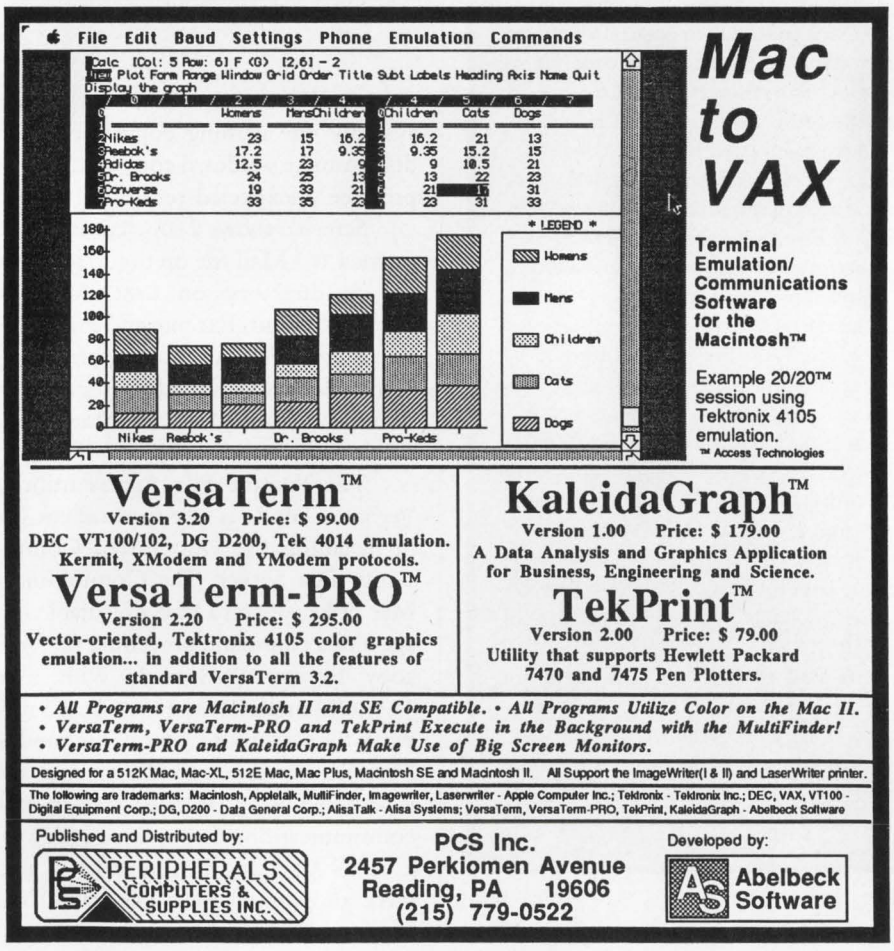
The Manual

The strongest point of CommUnity-Mac is the more than 130 pages of the product manual dedicated to the tools and techniques the product provides for task-to-task communication over DECNET. The documentation, intended for the Mac programmer/application developer, is well-written and extensive, and includes an appendix of source code and example programs. The CommUnity applications disk includes a folder, appropriately titled "For Developers Only," which also contains the source code of a program module written in C, showing CommUnity-Mac's task-to-task interface in use.

At the lower levels, the task-to-task communications is patterned after the UNIX file I/O services, and provides five calls to open, read, write, close, or pass I/O control information to the program. Two methods of access are provided. A series of callable subroutines, called the DLIB, can be used by any programmer for direct access to the data structures and services necessary for task-to-task communications.

Programmers who prefer to program at a higher level can code calls to the Mac's Device Manager (which in turn calls device driver routines) and gain access to the same data structures and functions. Up to five simultaneous links to remote systems can be managed by CommUnity-Mac using Kinetics hardware, and eight links when using the FastNet controller.

COMMUNITY-MAC IS a well-designed, well-packaged implementation of DECNET for the Mac. Many of the restrictions involved in implementing a Mac-based DECNET end node are inherent Mac or DECNET restrictions, and not a matter of design lapses. I'm not convinced, however, that I want or need my Mac to be a DECNET node. If you're trying to support a fairly non-technical user base, DECNET is complicated compared to Appletalk's "plug it in and turn it on" approach to networking. But if your users must have it, and are at least amateur DECNET node managers, CommUnity-Mac definitely deserves a place on your short list of products to consider. *—Joseph P. Dallatore is a senior software engineer with Computer Methods Corporation, Marlton, New Jersey.*



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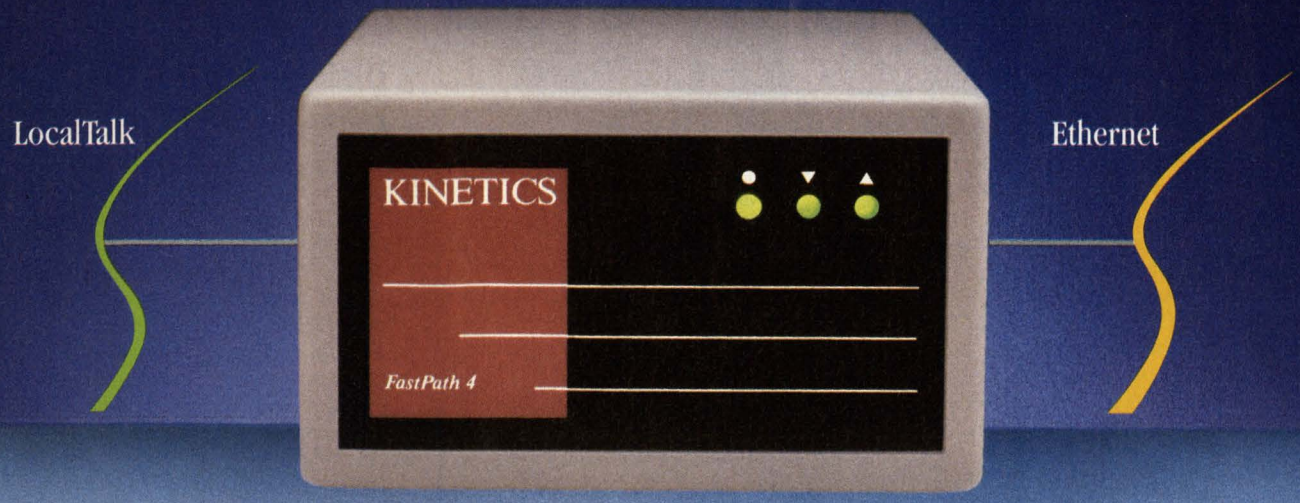
FastPath 4 from Kinetics



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Connect LocalTalk to Ethernet

FastPath connects a network of Macintoshes, LaserWriters, and other LocalTalk devices to Ethernet at the lowest cost per connection.

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PRODUCTS

QTEXT II Supports POSTSCRIPT Printers

ECAP Systems Inc. has announced that it has been granted development and marketing rights to the Q'Text word processing system. Q'Text covers a full range of DEC computers and operating systems.

The first release of Q'Text, called QTEXT II, will contain a number of improvements to older versions of the system. QTEXT II will support POSTSCRIPT printers; it also allows multiple simultaneous work files with the ability to move and copy blocks from one to another.

ECAP will provide QTEXT II free of charge to any current user of Q'Text who wishes to enter into a service contract.

For further information, contact Eric Covington, ECAP Systems Inc., 69 Ste-Euphemie St., Casselman, ON K0A 1M0; (613) 764-3889. Stop by Booth No. 421.

Circle 554 on reader card

LP-6 Suited For CAD/CAM Environment

Codonics Inc. has introduced the LP-6 laser printer, a personal-size laser printer suited for graphic applications in the engineering and CAD/CAM environments.

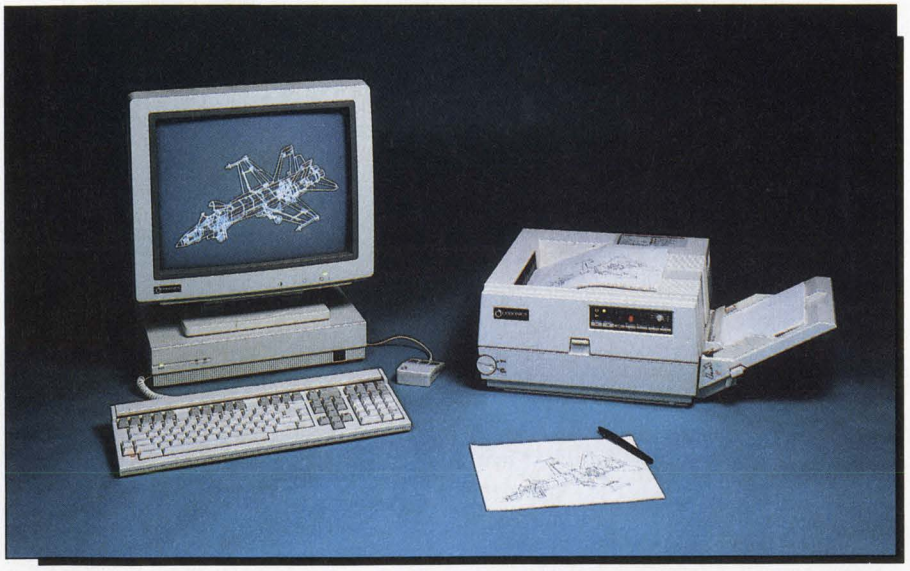
By combining a high-speed parallel communications link and Codonics' vector mode, the LP-6 can produce fast laser graphics. With the standard HP Laserjet Series II emulation and a full MB of memory, the LP-6 is supported by all major software packages. In addition, the LP-6 is equipped with a complete HPCL 7475A plotter emulation that facilitates high-resolution, full-page, 300-dpi graphics hardcopy from any graphics software.

The LP-6 delivers full-page, high-resolution graphics and text at 6 pages per minute. With 31 standard type fonts and optional cartridge fonts, the printer is flexible in document design.

Obtain additional information by contacting Codonics Inc., 18001 Englewood Dr., Middleburg Hts., OH 44130; (216) 243-1198. Stop by Booth No. 416.

Circle 433 on reader card

Many companies appearing in Products this month are DEXPO exhibitors. Their booth numbers are indicated, so stop by and visit.



Codonics Inc.'s LP-6 laser printer.

Diskeeper V2.1 Includes Graphic Display

Executive Software Inc. has announced V2.1 of its on-line disk defragmenter for VAX/VMS. The product offers various new features including graphic display designed to give VAX managers a clear picture of the state of file and space fragmentation on their disk; V5.0 VMS support, including SMP support, making it compatible with Digital's Calypso line of computers and the 8800 series of VAX computers; and a software-driven data-checking feature.

Diskeeper V2.1 allows VAX managers to stagger the start-up of Diskeeper on multiple drives. Split I/O and window turn counts have been added to the Disk Analysis Utility. With this feature, VAX managers can calculate the specific effect of fragmentation on system performance.

Diskeeper V2.1 prices range from $249 for VAXSTATIONS to $4,500 for the VAX 8840.

For more complete information, contact Leland Thoburn, Executive Software Inc., 3131 Foothill Blvd., Ste. F, La Crescenta, CA 91214-2699; (800) 346-4707; in CA, (818) 249-4707. Stop by Booth No. 220.

Circle 553 on reader card

MS-DOS V3.10 Features Improved Capabilities

Suitable Solutions Inc. announces the availability of MS-DOS V3.10 for the Rainbow. The product features support for hard disk partitions up to 32 MB, improved BACKUP and RESTORE capabilities and several new commands, including APPEND, ASSIGN, ATTRIB and FDISK.

MS-DOS software, a user guide and 30 days of telephone support are available for $99.

For additional information, contact Suitable Solutions Inc., 1700 Wyatt Dr., Ste. 12, Santa Clara, CA 95054; (408) 727-9090. Stop by Booth No. 516.

Circle 465 on reader card

IMSL Libraries For VAX Under BSD UNIX 4.2

IMSL Inc. has released the IMSL Libraries for VAX 86xx/87xx/88xx computer systems under the BSD UNIX 4.2 running the FORTRAN 77 compiler. The IMSL Libraries consist of three problem-solving products:

MATH/LIBRARY, STAT/LIBRARY and SFUN/LIBRARY.

The IMSL Libraries feature standard calling sequences, sophisticated error handling, consistent documentation and extensive use of BLAS to assure uniformity and stability in vector/matrix operations.

The annual fee for the Libraries ranges from $2,200 to $3,500 for the first year, and from $1,200 to $2,500 for renewal support, depending on library product.

For more information, contact IMSL Inc., 2500 ParkWest Tower One, 2500 CityWest Blvd., Houston, TX 77042-3020; (800) 222-IMSL; in TX, (713) 782-6060. Stop by Booth No. 1460.

Circle 462 on reader card

BEAGLE Tests And Proposes Hypotheses

VRS Consulting Inc. has introduced BEAGLE, a rule-finder system that tests hypotheses like a conventional statistics package and proposes hypotheses to be tested. It uses an evolutionary induction strategy to devise new discrimination rules for testing, and then generates code for the logic rules discovered.

Uses of BEAGLE include weather prediction, medical diagnosis, forensic identification, risk management and market analysis.

The MicroVAX 2000 version starts at $25,000 for purchase and $125 for monthly rental. The 780 VAX version starts at $7,750 for purchase and $400 for monthly rental. To learn more, contact VRS Consulting Inc., 4676 Admiralty Way, Ste. 206, Marina Del Ray, CA 90290; (213) 827-7890. Visit Booth No. 325.

Circle 464 on reader card

V1.3 Adds Interface To Multiware RENDER

Multiware Inc. announced a new, interactive version of a presentation graphics software package. Version 1.3 adds an interactive human interface to RENDER, a Multiware product that runs on DEC computers.

Version 1.3 makes presentation graphics affordable and accessible to non-technical users of DEC computers. The interface with RENDER provides an on-line question-and-answer interface, the ability to extract data automatically from files written by other programs, and the ability to incorporate automatic graphic reporting as part of an office or plant automation project.

Learn more by contacting Michael Brown, Multiware Inc., 2121 Second St., Bldg. B, Ste. 107, Davis, CA 95616; (916) 756-3291. Visit Booth No. 2025.

Circle 456 on reader card

DEXPO West 88

This month, California has DEXPO and DEXPO has the real world of DEC computing. DEC users can expect a three-day buying spree, with more than 15,000 products from 350 exhibitors. Exhibitors can expect to benefit from an estimated 15,000 attendees. The aisles will be streaming with DEC-specific solutions and hands-on demonstrations.

New this year is DEXPO's West Coast Apple-DEC Connection exhibit. This special display area will feature more than 50 Mac-to-VAX exhibits demonstrating communications and applications. If you're an IBM PC user, you'll find a diversity of MS-DOS connectivity and software products.

At DEXPO, you'll be able to compare VAX, MICROVAX and PDP-11 enhancements. You also can see DEC's MICROVAX 3000 and the VAX 8850 mainframe.

The 14th National DEC-Compatible Exposition will be held at the Disneyland Hotel in Anaheim, October 18-20. Show times are Tuesday and Wednesday from 9 a.m. to 5 p.m., and Thursday from 9 a.m. to 4 p.m. The focus is Integration.

DECUS Symposium attendees can attend DEXPO free of charge. DECUS will be held at the Anaheim Convention Center. Shuttle buses will run continuously each day from 8:00 a.m. to 5:30 p.m. between the Convention Center and the Disneyland Hotel. A complete schedule, including pickup and drop-off locations, will be posted at both convention sites.

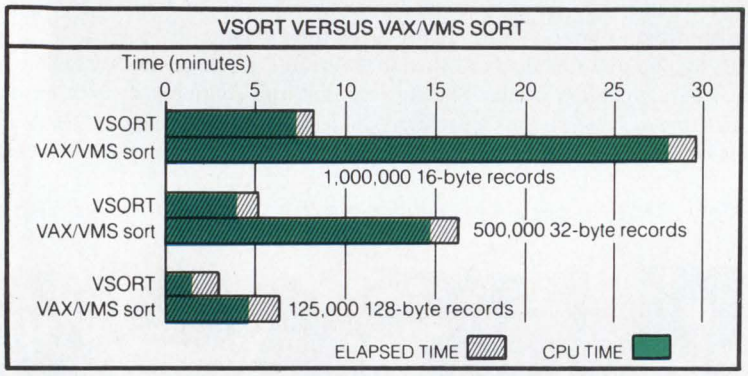
The Professional Press exhibition booth number is 1260. Plan to see us there.

DEXPO West 88, to be held in Anaheim, California, is the multivendor show that covers every aspect of DEC users' computing needs.

VSORT AND VSELECT

The fastest way to sort and extract records on a VAX.

If you spend too much time sorting with the VAX/VMS sort utility, spend less — up to 75% less — with VSORT from Evans Griffiths & Hart, Inc. Compare the following elapsed and CPU times for VSORT (V03.07) and the VAX/VMS (V4.2) sort utility running on a VAX 11/780.



VSELECT, the fast sequential record extractor.
VSELECT is also fast and efficient. Running stand-alone on a VAX 11/780, VSELECT often exceeds scan rates of 1,000 blocks per second. It can select and reformat records from an indexed file much faster than the VAX/VMS CONVERT utility can unload the same file — often three or four times faster.

For RSTS/E, use FSORT3 and SELECT.
If you run RSTS/E on the PDP-11, we invite you to join the hundreds of users and OEMs who, for the past ten years, have relied on FSORT3 and SELECT for the fastest possible record processing.

Other software products for VAX/VMS and RSTS/E

- *ROSS/V* a RSTS/E operating system simulator under VAX/VMS.
- *KDSS* a multi-terminal key-to-disk data entry system.
- *TAM* an efficient screen formatter for transaction processing applications.
- *DIALUP* a data communications package that links VAX/VMS and RSTS/E systems to remote computers.
- *BSC/DV* a device driver for DEC's DV11.

CIRCLE 282 ON READER CARD
For more information, call (617)861-0670 or write:
Evans Griffiths & Hart, Inc.
55 Waltham Street
Lexington, MA 02173
TWX: 710-326-0103

Evans Griffiths & Hart, Inc.

EG&H

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20/20 Release 2.3 Is Portable To VAXs

Release 2.3 of 20/20 from Access Technology Inc. is being shipped. Initial 20/20 release 2.3 shipments are portable to VAX computers. Enhancements include a fully integrated spreadsheet auditor and the ability to read, write and consolidate Lotus 1-2-3 and PC Excel model files directly from the 20/20 command line.

Other enhancements included with 20/20 are 21 string, data and special functions, a macro debugging capability, faster and improved screen handling, graphic enhancements including scatter plots, support for DIF format data and calculation options.

20/20 supports optional interfaces to database management and packages, as well as ALL-IN-1 OA system.

Prices range from $3,400 for the MicroVAX II to $35,000 for the VAX 8978. For more information, contact Geoff Spillane, Access Technology Inc., 6 Pleasant St., S. Natick, MA 01760; (617) 655-9191. Stop by Booth No. 227.

Circle 455 on reader card

Quantum PT Is Definable System Tuner

Computer Information Systems Inc. has introduced Quantum PT, a flexible, resource efficient VAX/VMS system tuner with entry-level performance monitoring capabilities. Quantum PT is a user-controllable and definable system tuner that allows optional changes to the VMS scheduling algorithm, makes dynamic VMS SYSGEN parameter adjustments and performs dynamic process memory reallocation.

The Quantum PT performance monitoring subsystem provides a real-time display of system and process statistics, as well as an hourly statistical reporting capability.
For further information, contact Steve Lilly, Computer Information Systems Inc., 165 Bay State Dr., Braintree, MA 02184; (800) 232-5215; in MA, (617) 848-7515. Stop by Booth No. 1813.

Circle 463 on reader card

Oracle Announces OLTP Version Of RDBMS

Oracle Corporation announced the new on-line transaction processing (OLTP) version of its Oracle relational DBMS. The new Oracle software also offers low cost per transaction on each environment ranging from small minicomputers to the largest IBM mainframes.

Oracle's performance is notable on multiprocessor OLTP platforms because of

Oracle's multiserver process architecture that takes advantage of all CPU processors. Oracle automatically locks exclusively at the row level and uses fast-commits, deferred writes and multiblock I/O, and an efficient read-consistency model for maximum throughput. It provides complete system fault tolerance for continuous availability including automatic recovery from CPU failure, on-line backup and recovery for disk failure recovery and on-line reconfigurability. To learn more, contact Catherine Monaco, Oracle Corp., 20 Davis Dr., Belmont, CA 94002; (415) 598-8219. Visit Booth No. 2530.

Circle 568 on reader card

TURBO DISK Enhances Processor Performance

EEC Systems has announced TD V.30, which is compatible with VAX/VMS V5.0. TURBO DISK enhances performance in dual and parallel processors. Added features are multiple TURBO DISKs — up to 99 separate RAM disks; automatic setup of correct parameters for the number and physical size of TURBO DISK; and simplified system management from a central, integrated menu. After TURBO DISK is installed, file I/O recording can be run without modification of the system AUTOGEN/SYSGEN options or rebooting the system.

No-charge demos are available for qualified prospects.

To find out more, contact EEC Systems, 327/E Boston Post Rd., Sudbury, MA 01776; (508) 443-5106. Stop by Booth No. 1516.

Circle 453 on reader card

Wollongong Offers Enhanced Environment

The Wollongong Group Inc. introduced EUNICE BSD 4.3, an enhanced operating system environment that provides a UNIX BSD 4.3 environment on VMS systems. With EUNICE BSD, VAX users can access any of three operational environments: VMS, UNIX or integrated VMS/UNIX. Both local and networked UNIX users can operate efficiently in a VMS environment with no change to VMS.

EUNICE BSD automatically translates VMS files into the UNIX format for UNIX users and software. VMS capabilities, such as DECnet, VAXcluster and symmetrical multiprocessors, are usable by EUNICE BSD. Special device drivers and configuration changes aren't required.

EUNICE BSD 4.3 is $5,000 for four-user MicroVAX and $17,200 for 16-user VAX 8800.

For additional information, contact Norman Lombino, The Wollongong Group Inc., 1129 San Antonio Rd., Palo Alto, CA 94303; (415) 962-7100. Stop by Booth 2031.

Circle 458 on reader card

ERI Training Offers Three Programs

ERI Training presents DEC hardware and software training in three flavors: 1. Videos — New for 1988 are "Ethernet Concepts and Planning" and "Using ALL-IN-1" video training tapes. Also available are "Using VAX/VMS" and "VAX/VMS for Programmers" courses. 2. On-site, custom-tailored courses — Software Education from Operating System through Networks and Clusters, plus hardware training on site. 3. Seminars at its New York training facilities — Attend DECUS presentations by Bob Branchek and *DEC PROFESSIONAL*'s networking editor, Bill Hancock.

For more information, contact ERI Training, 462 Broadway, New York, New York 10013; (212) 334-1240. Visit Booth No. 1638.

Circle 459 on reader card

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.

- 30 pgs. per min./Up to 150,000 per month
- Less than 55 DBA
- Vector and Raster Graphics
- High resolution: 300x300 DPI
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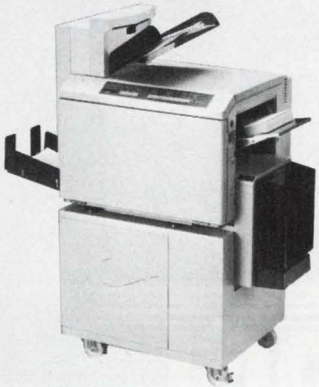
- Dual input feeders/High capacity (2500 sheet)
- Remote or local attachment
- Compatible with IBM (including channel attach) DEC, H-P, Prime, UNISYS and most other popular computers
- Forms overlay—up to six forms
- Versatile output: up to 32 character sets



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.

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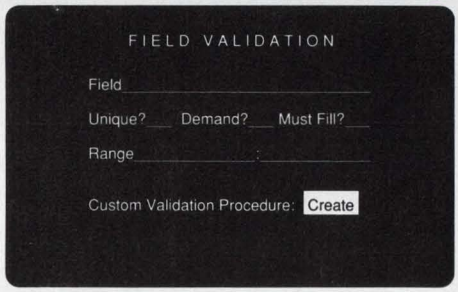

With System 1032 Application Facility

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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The ESCORT™ System is the VMS menu, security and access control manager that works. And makes everything you do look good. Because it replaces clumsy DCL menus with a professional presentation that offers "moving bar" or "choose the name" selections. There's even an on-screen clock and selectable timeout available. Makes your life easier.

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ESCORT™ is powerful. Each menu is arranged in a tree structure of subordinate menus — with up to 1500 choices available.

ESCORT™ is versatile. Invoke images. Command procedures. Batch jobs or even other menu systems. Organize anything that runs under VMS.

ESCORT™ is friendly. All maintenance functions are grouped into simple data entry forms.

ESCORT™ is secure. Each user account has its own list of functions and menus it can access. For convenience, functions can be assigned to generic classes of users or each user may be authorized separately.

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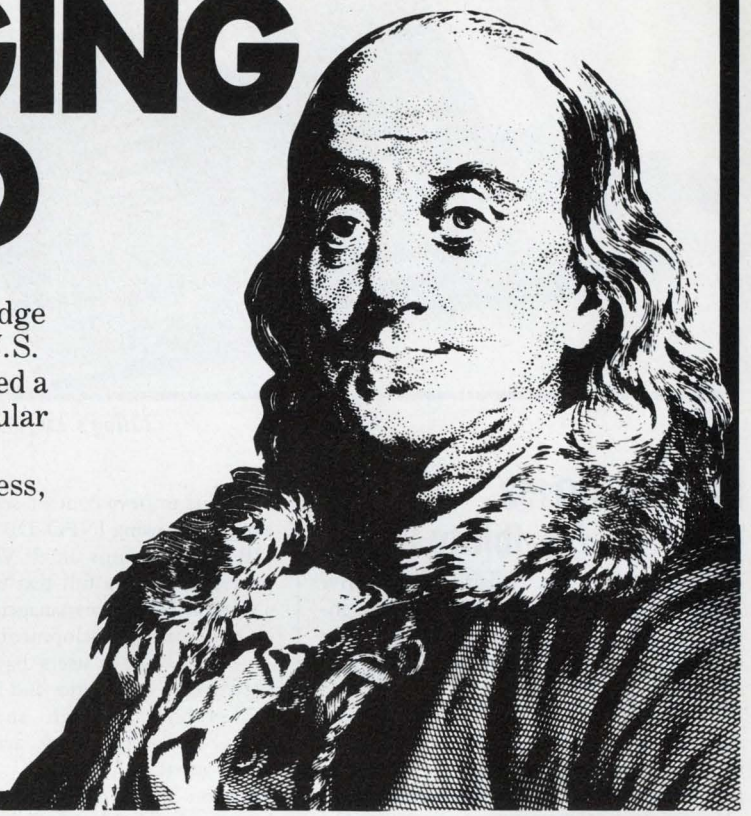

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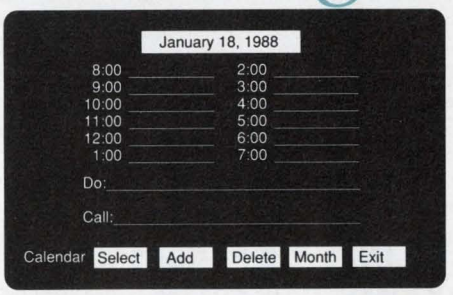

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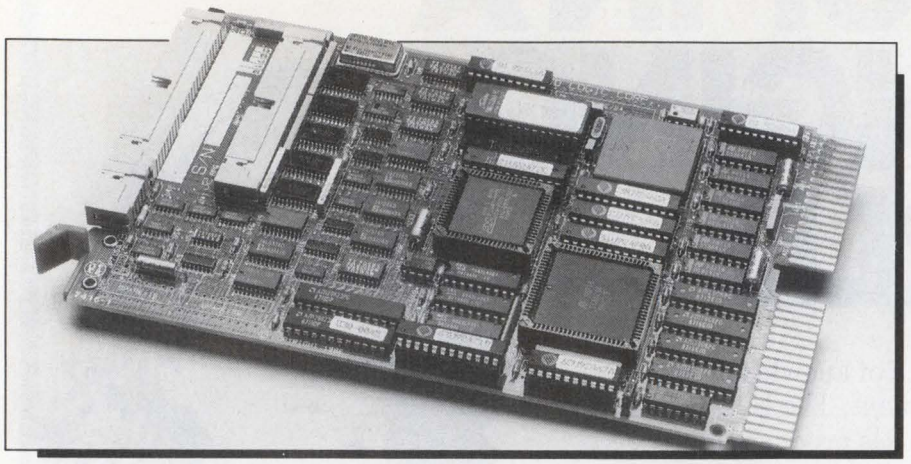

Dilog's DQ153 tape coupler.

DILOG's DQ153 Provides Flexibility

DILOG has introduced a half-inch tape drive coupler that provides DEC systems integrators with performance and flexibility for configuring archival and data backup subsystems in MicroVAX, MicroPDP-11 and LSI-11 systems. The DQ153 tape coupler can interface up to four industry-standard half-inch start/stop, streamer or cached streamer tape drives per board. It can handle multiple recording densities, including 800 bpi NRZ, 1600 bpi PE and 6250 bpi GCR formats, and multiple tape speeds, from 12.5 to 200 inches per second.

The DQ153 supports standard 22-bit Q-bus addressing and is block mode memory compatible. It's transparent to the TU software driver contained in RT11, RSX11M+, RSTS, MicroVMS, ULTRIX and DSM operating software. All functionality is contained on a single dual-height module that plugs into one dual slot in the Q-bus backplane.

The DQ153 coupler is priced at $1,200. For further information, contact Judie Dutton, DILOG, 1555 S. Sinclair St., Anaheim, CA 92806; (714) 937-5700. Stop by Booth No. 1400.

Circle 403 on reader card

V3.40 Of INFO-DB+ Runs On VAX/VMS Computers

Henco Software Inc. has released an international version 3.40 of INFO-DB+. The integration of INFO-DB+ with MASS-11 lets users work with this package without leaving INFO-DB+ or performing document conversions. The new HELP command lets users retrieve on-line explanations about INFO-DB+ commands as part of the command session. The new HELP function key lets users retrieve context-sensitive explanations while using INFO-DB+ tools. INFO-DB+, which runs on all VAX/VMS computers, includes a full-text retrieval system, a relational database management system and an application development 4GL.

INFO-DB+ users have use of VAX networking capabilities and integration with ALL-IN-1. Through shared memory, INFO-DB+ can work across clusters in every situation.

For more information, contact Gail Spencer, Henco Software Inc., 100 Fifth Ave., Waltham, MA 02154-7527; (617) 890-8670. Visit Booth No. 1536.

Circle 454 on reader card

Quad Pac Design Minimizes Footprint

System Industries Inc. announced the Quad Pac family of fixed 5¼-inch drives that provide formatted data storage capacities ranging from 2.2 GB to 8.9 GB. They can be interfaced to any DSA controller. Quad Pac products feature a modular design that minimizes footprint and optimizes ease of use and maintenance.

Prices range from approximately $50,000 to $250,000, depending on capacity, host connections and quantity.

To learn more, contact Anne Gitlow, System Industries Inc., 560 Cottonwood Dr., Milpitas, CA 95035; (408) 432-1212. Stop by Booth No. 1312.

Circle 514 on reader card

RLAT LAT Driver For Reflection Users

Walker Richer & Quinn Inc.'s new software product, RLAT, is to be used with the company's Reflection series of terminal emulation software. RLAT is a LAT protocol driver for PCs. Reflection users can connect their PCs to a VAX over Ethernet using RLAT on their PCs and the LAT support provided with VMS.

RLAT works with all PC versions of Reflection that support LAT. RLAT requires an Ethernet cable to the VAX, VMS V4.4 or later on the VAX, and a supported Ethernet card on the PC.

Single copies of RLAT are $99.

Contact Wendy Sue Williams, Walker Richer & Quinn Inc., 2825 Eastlake Ave. E., Seattle, WA 98102; (206) 324-0350. Stop by Booth No. 301.

Circle 400 on reader card

Software AG Offerings Compatible With VMS 5.0

Software AG of North America Inc.'s entire VAX software product line, including ADABAS NATURAL, can run under VMS V5.0.

Software AG's products also will take advantage of DEC's symmetric multiprocessing (SMP) capability, which is offered with VMS 5.0. Existing applications can run unaltered, and users will see enhanced performance throughput and balanced performance across applications.

Software AG is committed to working in tandem with DEC on current and future VMS versions.

For more information, contact Lois Paul, Software AG of North America Inc., 11800 Sunrise Valley Dr., Reston, VA 22091; (703) 860-5050. Visit Booth No. 2810.

Circle 401 on reader card

PROGRESS 4GL DBMS Will Support SQL

Progress Software Corporation has announced that its PROGRESS 4GL and DBMS will include SQL support.

Progress Software has structured its 4GL to accept both SQL statements and PROGRESS statements in the same procedure. Developers can use pure SQL syntax, regular PROGRESS syntax, or mix and match both types of syntax in a single procedure. Users also can edit and change SQL statements using the built-in PROGRESS 4GL editor.

The PROGRESS 4GL DBMS runs on over 140 hardware platforms and is transparently portable across MS-DOS, UNIX, XENIX, ULTRIX, VAX/VMS and CTOS/BTOS operating systems, as well as LANs.

For more information, contact John H. Ricciardone, Progress Software Corp., 5 Oak Park, Bedford, MA 01730; (617) 275-4500. Stop by Booth No. 517.

Circle 404 on reader card

Handy Holder For Light Pens From PERCON

Bar code readers and light pen or digitizing wand users now have a safe place to keep wands between uses with PERCON's new universal wand holder.

The holder is molded from high-quality engineering-grade ABS plastic. The interior is tapered with an O-ring at the bottom to cushion the tip and another O-ring at the top to prevent the rattling that wands undergo when slid into wand holders.

The wand holder costs $4 and is included with each PERCON E-Z-READER bar code reader and wand.

For more information, contact Palmer Parker, PERCON, 2190 West 11th Ave., Eugene, OR 97402; (503) 344-1189. Visit Booth No. 637.

Circle 407 on reader card

DDA Demands High Professional Standards

Dealers in used DEC products should visit Digital Dealers Association's (DDA) booth. DDA is beginning its sixth year as a trade association and is a force in the establishment of an orderly growth in the secondary market for DEC products.

High professional standards are a prerequisite for membership, and the association monitors complaints against all resellers of DEC equipment.

Meetings are held twice each year with programs geared to advance members' professional skills and business practices. A newsletter, *DDA NEWS*, is published quarterly.

Information regarding the association and applications for membership can be obtained by contacting Digital Dealers Association headquarters, 107 S. Main St., Ste. 202, Chelsea, MI 48118; (313) 475-8333. Visit Booth No. 413.

Circle 402 on reader card

Emulex Modems Reduce Space Needs

Emulex Corporation has introduced 14.4 Kbps V.33 and 9.6 Kbps V.29 full duplex rack mount modems and a modern card cage capable of holding up to 16 modems. The new Performance 1000 Rackmount modems and Performance 1000 Modem Rack provide a space-efficient method for concentrating large numbers of leased-line modems. The Performance 1000 Modem Rack is 5¼ inches high plus power supply and holds 16 modems.

Each Performance 1000 Rackmount modem has a row of eight front-panel LED indicators and four configuration switches for diagnostics and monitoring. The 14.4 Kbps Performance 1000 modem is compatible with the CCITT V.33 and V.29 standards and uses Trellis coding for improved performance over conditioned and unconditioned voice grade leased lines.

The Performance 1000/14.4 Rackmount modem is priced at $1,695; the Performance 1000/9.6 lists for $1,095. The Performance 1000 Modem Rack is priced at $795.

For more information, contact Brian Edwards, Emulex Corp., 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626; (714) 662-5600. Stop by Booth No. 1300.

Circle 406 on reader card

Buffered Interface Provides High I/O Rates

Numerix Corporation has an upgrade/modification for the NMX-432 series of Attached Vector Processors (AVP). This upgrade/modification of the NMX-432 series and

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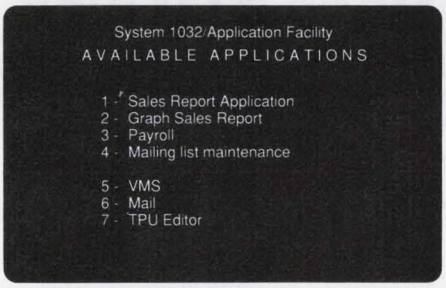

With System 1032 Application Facility

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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CIRCLE 113 ON READER CARD

HAPI-3 host interface to HAPI-5 host interface consists of new internal/external cables, ECOs on all boards to current revisions, a complete system test and a new software driver.

The higher-performance host interface upgrade/modification provides a migration path for existing systems, higher I/O speeds for existing systems and compatibility with VAXBI systems. The higher performance gives a 190 percent increase for the Q-bus, 30 percent increase for the UNIBUS, and 185 percent for UNIBUS/APTEC system, without changes to existing application programs.

For additional information, contact Larry Zagorsky, Numerix Corp., 20 Ossipee Rd., Newton, MA 02164; (617) 964-2500. Stop by Booth No. 2026.

Circle 408 on reader card

Summus Releases GigaTape JBL 125

The GigaTape JBL 125 from Summus Computer Systems is a mass storage subsystem combining 8mm helical scan recording technology with an auto-load feature that allows random access to 125 GB of digital data in a standard NEMA 19-inch rack.

The GigaTape JBL 125 can be configured in many capacities ranging from 125 GB occupying a seven-inch panel of a 19-inch rack mount to multiple terabytes. It's available with host adapters that are compatible with Q-bus, UNIBUS and BI architectures, VME and Multibus.

List price for the GigaTape JBL 125 subsystem, including the GigaTape Librarian, is $38,000.

For further information, contact Dave Meitzen, Summus Computer Systems, P.O. Box 820549, Houston, TX 77282-0549; (713) 589-9772. Stop by Booth No. 705.

Circle 410 on reader card

HDS Terminals Feature Graphics And Windows

Human Designed Systems will display its new HDS3200 Image Leader terminal series at DEXPO West. The terminals include full DEC compatibility, integrated text and graphics with SIXEL and Tektronix 4014 graphics memory, a 15-inch monitor, multiple pages of scrollable text memory, 38.4K baud communication speed, HDS windows, a pop-up calculator and more.

The entry-level Model 10 is $699. The Model 20, which has a 50-line text display mode, is priced at $999. The flagship Model 30 costs $1,299.

To learn more, contact Michael Kantrowitz, Human Designed Systems, 3440 Market St., Philadelphia, PA 19104; (215) 382-5000. Stop by Booth No. 507.

Circle 409 on reader card

ZSTEM 340 Performs VT340 Emulation

KEA Systems Ltd. announces ZSTEM 340, a software package that performs VT340 graphics terminal emulation on IBM PC XT/AT and PS/2 computers. Highlights include VT340 resolution and 16-color capability, block transmission, programmable UDKs, mouse support and multiple sessions. ZSTEM 340 and the PowerStation 340 allow XTs, ATs, PS/2s and compatibles to connect to PDP-11s and VAXs. The PowerStation 340 bundle contains a VT300 layout keyboard for connection to IBM PCs, XTs, ATs and PS/2s in addition to ZSTEM 340 emulation software.

ZSTEM 340 has integrated network support available at no extra cost to the end

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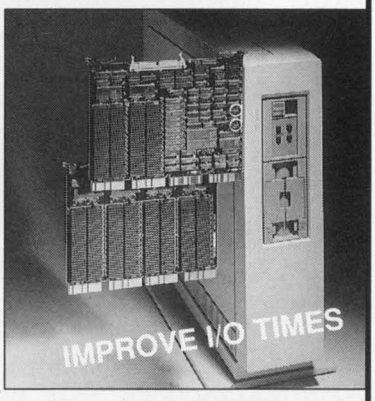

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CIRCLE 329 ON READER CARD

user. This includes all networks that use INT14 redirection: Bridge PCS/1, Sytek and others. ZSTEM 340 also supports Ungermann-Bass Net/One, ZLAN and DEC's multisession LAT.

ZSTEM 340 emulation software is priced at $350.

To find out more, contact Danielle Galbraith, KEA Systems Ltd., 2150 W. Broadway, Ste. 412, Vancouver, BC V6K 4L9; (604) 732-7411. Stop by Booth No. 437.

Circle 423 on reader card

TARGET->HOTLINE Is A VMS User Support System

Target Systems Corporation has shipped version 1.0 of TARGET->HOTLINE, user support software for VAX/VMS systems. This easy-to-install and use application provides time-saving results for small, medium and large MIS groups by automating the logging, tracking and reporting of on-line user problems or questions.

TARGET->HOTLINE provides full DECnet support for fast, efficient and secure DECnet use. Complete VAXcluster and LAVC support is included. TARGET->HOTLINE has a variety of applications such as MIS user support, plant engineering, facilities management, hotline help desks or DECnet management for one to 10,000 nodes.

TARGET->HOTLINE sells for $395 to $795 per CPU.

To find out more, contact James Murphy, Target Systems Corp., 33 Boston Post Road West, Marlboro, MA 01752; (617) 460-9206. Visit Booth No. 321.

Circle 411 on reader card

EDITool Increases Editing Productivity

Software Partners/32 Inc. has released a new editor for VAX/VMS. EDITool, The VAX/VMS Editor's Productivity Workbench, is a full-featured editor that increases editing productivity.

Built on the EDT Keypad Emulator, EDITool can by used by EDT users without any retraining. EDITool features split-screen editing, wildcard editing, cut-and-paste capabilities and intelligent command line.

License prices range from $395 for a MicroVAX to $6,495 for a site license.

For further information, contact Software Partners/32 Inc., 447 Old Boston Rd., Suite 8, Topsfield, MA 01983; (508) 887-6409. Stop by Booth No. 711.

Circle 418 on reader card

Codar Develops Three New Products

Codar Technology Inc. has introduced three new products: a removable disk subsystem, a tape drive subsystem and a dual MicroVAX computer.

The Model 925 RD Removable Disk Subsystem has up to 2.5 GB of removable disk storage and is packaged in a 19-inch rack-mountable subsystem.

The Model 809 MT is a ruggedized, TEMPEST-compliant 9-track magnetic tape transport that can read and write data in 9-track, NRZI and phase-encoded IBM-compatible formats.

The 600MD Dual MicroVAX Computer System provides two fully independent MicroVAX CPUs inside a single rack-mountable chassis.

For further information, contact Barbara Evans, Codar Technology Inc., 1500 Kansas Ave., Longmont, CO 80501; (303) 776-0472. Stop by Booth No. 316.

Circle 422 on reader card

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CIRCLE 248 ON READER CARD

Application Development Seminars

Sept. 7	Raleigh, NC
Sept. 9	Washington, DC
Sept. 13	Buffalo, NY
Oct. 4	Rochester, NY
Oct. 6	Syracuse, NY
Nov. 16	San Francisco, CA
Nov. 18	San Jose, CA
Nov. 29	Boston, MA

9 a.m. to Noon

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CIRCLE 286 ON READER CARD

Best FERRUPS Offers Compatibility

Complete hardware and software plug compatibility is provided for virtually all computers by Best Power Technology Inc. across its line of FERRUPS UPSs. The new additions include versions for the IBM System /34, /36 and the Data General Eclipse machines. PowerWatch software from Best is also available for IBM PC XT/AT and compatibles, other computers using UNIX/XENIX operating systems, AT&T 3B series and VAX/VMS.

FERRUPS units provide two key functions for electronic and electrical devices:

1. Instant continuous computer-grade power in case of blackouts or deep, protracted brownouts.

2. Complete line conditioning and filtering, protecting against virtually all other line power problems including minor brownouts, sags, spikes, surges, noise and frequency variation.

For more information, contact Best Power Technology Inc., P.O. Box 280, Necedah, WI 54646; (800) 356-5794; in WI, (608) 565-7200. Visit Booth No. 311.

Circle 430 on reader card

Timeline V4.1 For VMS

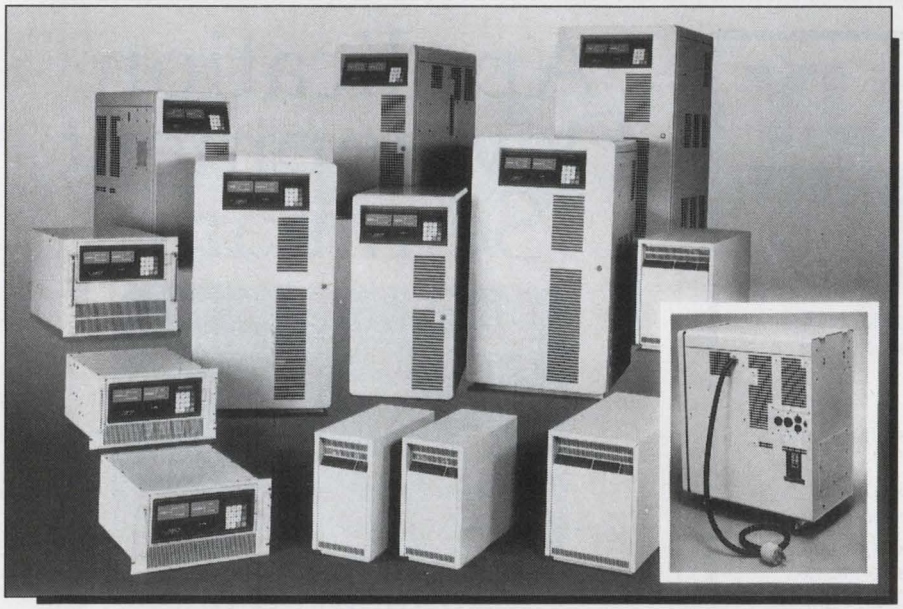
Timeline Inc. has announced version 4.1 of the Timeline Purchase Order and Accounts Payable Systems. They're fully integrated components of the Timeline Financial Accounting System designed exclusively for VMS.

New Purchase Order can be integrated with accounts payable for vouchering and control, so purchase orders aren't overpaid; with the Timeline Inventory System for purchase receipts; and with the Timeline Fund Accounting System for commitment checking and reporting. New Accounts Payable features include automatic generation of discounts at check-writing time and immediate check printing directly from the journal entry file.

Timeline subsidiary packages, including the Purchase Order and Accounts Payable Systems, are priced from $10,000 to $32,500 depending on CPU size.

To find out more, contact Lawson Abinanti, Timeline Inc., 3055 112th Ave. N.E., Ste. 106, Bellevue, WA 98004; (206) 822-3140. Visit Booth No. 1566.

Circle 427 on reader card



Best Power Technology Inc.'s UPSs from 250VA to 15KVA.

CI-MIV3-EDC Compatible With MicroVAX III

Chrislin Industries Caribe Inc. has announced the new CI-MIV3-EDC board with up to 64 MB of memory on a single card for the MicroVAX 3xxx. The CI-MIV3-EDC offers added reliability with error detection and correction.

The CI-MIV3-EDC module uses either 1-MB dynamic RAMs or 4-MB dynamic RAMs. The power requirement at +5V is 2.5 amps. Configurations of 8, 16, 32 and 64 MB are available.

The CI-MIV3-EDC is hardware and software compatible with the MicroVAX 3000 series computers. Word size is 32 bits. For more information, contact Christine L. Seese, Chrislin Industries Caribe Inc., RD 188, KM 08, Industrial San Isidro, P.O. Box 1657, Canovanas, Puerto Rico 00629-1657; (800) 468-0736. Visit Booth No. 1210.

Circle 426 on reader card

AIS To Display BURCOM And EasyEntry

Applied Information Systems Inc. (AIS) will display the BURCOM Digital/Burroughs communications system and the EasyEntry data entry applications generator.

BURCOM allows any VAX, PDP-11 or Professional series computer to communicate with most Burroughs machines using standard Burroughs protocols. BURCOM supports file transfer, task-task communications, and emulation of Burroughs MT983, TD830 and ET1100 terminals using standard DEC terminals.

EasyEntry is a data entry applications generator for the VAX, PDP-11, Professional, Rainbow and IBM PC. It supports heavy data validation, rekey verification, file searches, math computations, windowing and color. It can be used as a standalone applications generator or can be integrated with other software packages.

For more information, contact Applied Information Systems Inc., 500 Eastowne Dr., Ste. 207, Chapel Hill, NC 27514; (800) 334-5510. Stop by Booth No. 1451.

Circle 424 on reader card

INTOUCH Produces Fast Code

Touch Technologies Inc. has announced the latest release of INTOUCH, a software development environment that runs under VAX/VMS. The product provides an environment in which the software professional can design, run and test software under direct control through the use of a CRT/KB. INTOUCH produces fast code and allows easy testing of applications.

INTOUCH provides a sophisticated development environment and debugging system, quick response, extensive database management facilities and the advantage of a powerful, logical language. Enhancements include Guided Screen Builder (GSB), Guided Query Language (GQL), Interactive Screen Builder (ISB) and an easy-to-use End User Statistics (EUS) application.

For additional information, contact Touch Technologies Inc., 9990 Mesa Rim Rd., Ste. 220, San Diego, CA 92121; (800) 325-2527; in CA, (619) 455-7404. Stop by Booth No. 700.

Circle 366 on reader card

FastPath 4 Extends Functionality

Kinetics Inc. introduced the newest generation of its Ethernet-LocalTalk gateway. FastPath 4 automatically can start and configure itself on AppleTalk LANs, and includes software that automates communication between Macintoshes and the TCP/IP hosts commonly found in UNIX environments. The new FastPath Manager, configuration software included with the FastPath, can be operated from any Macintosh connected to LocalTalk or Ethernet.

FastPath 4 supports multiple network protocols, enabling Macintoshes to share printers, electronic mail services, file servers and other peripheral devices.

The price of the FastPath 4 is $2,495. For additional information, contact Tom Cromelin, Kinetics Inc., 2540 Camino Diablo, Walnut Creek, CA 94596; (415) 947-0998. Stop by Booth No. 2526.

Circle 506 on reader card

SWITCHmate II Makes LaserJet DEC Compatible

Gold Key Electronics Inc. announced the SWITCHmate II Intelligent Printer Switch that makes HP LaserJet printers compatible with DEC systems. DEC printer emulation is activated automatically whenever required by any attached system. DEC systems can be integrated freely to share the LaserJet with other computers, like IBM PCs, that drive the LaserJet directly.

The SWITCHmate II also includes a LaserJet control interface that gives all sharing systems access to LaserJet features such as font selection, paper tray selection, paper size selection and manual feed mode selection.

DEC printer emulation supports all DEC text applications including DECmate Word Processing, ALL-IN-1 and WPS-Plus VMS. The SWITCHmate II, model SW6-HP2, costs $1,295.

To learn more, contact Deirdre Branch, Gold Key Electronics Inc., 11 Cote Ave., P.O. Box 186, Goffstown, NH 03045; (603) 625-8518. Stop by Booth No. 2650.

Circle 428 on reader card

DEMAC System Software Offers Complete Control

DEMAC Software will exhibit its entire Disk Management Software Series for VAX/VMS. Included are SQUEEZPAK, a defragmentation and optimization system; PAKMANAGER, a disk analysis and space management system; and DEMAC's newest enhancement, System Security software for VMS.

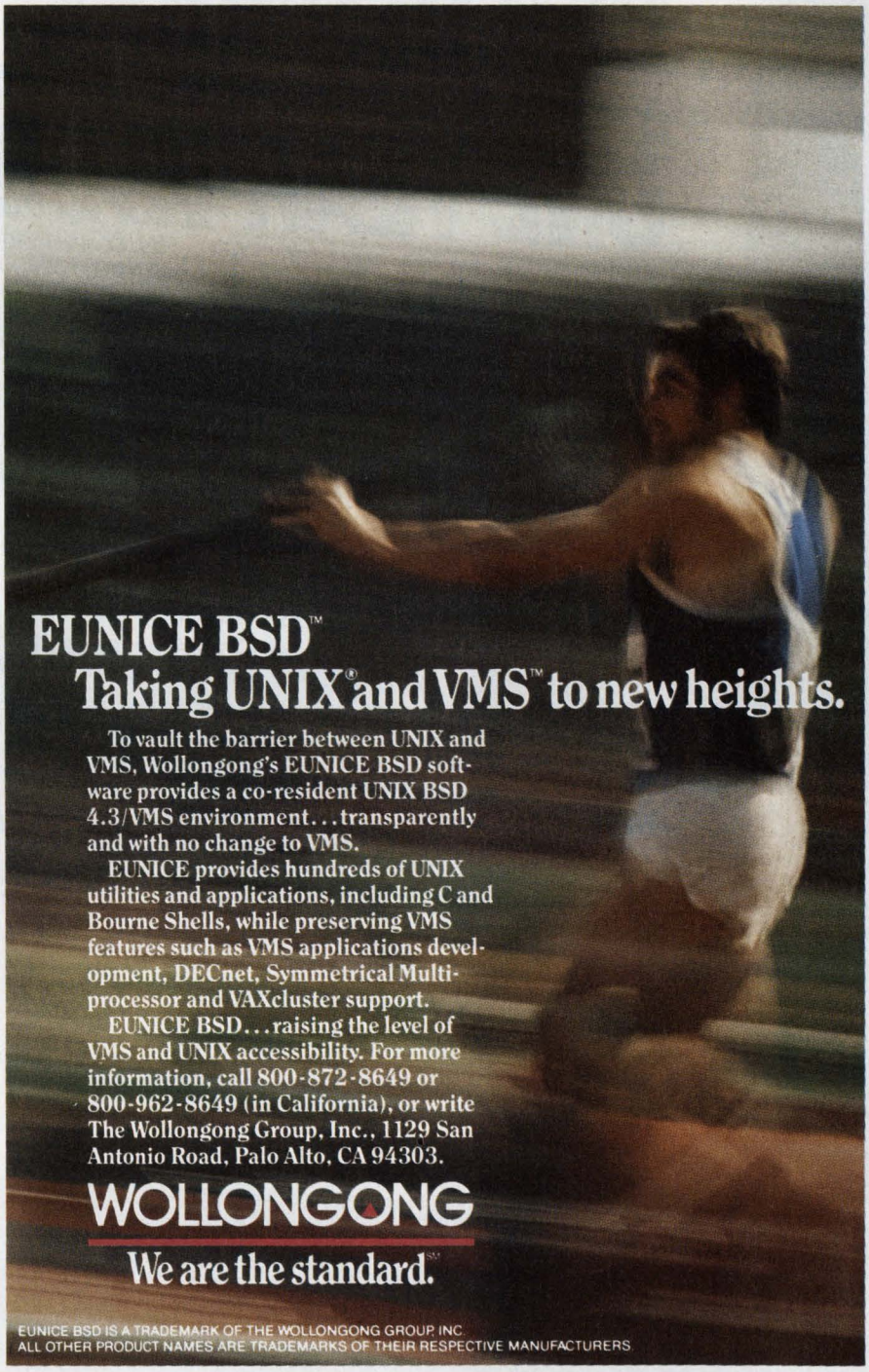
SQUEEZPAK is an on-line software system that enhances overall system performance by making fragmented files contiguous and consolidating free space, thereby reducing physical disk access involved in file reading and writing in the system.

PAKMANAGER, a system software product, allows VAX managers to obtain valuable disk information to properly manage disk resources.

SECUREPAK, a security control and audit utility for VAX/VMS systems will be announced formally at DEXPO.

For more information, contact DEMAC Software, 1260 Old Innes Rd., Ottawa, ON K1B 3V3; (800) 267-3862 in the U.S.; (613) 748-0209 worldwide. Visit Booth No. 427.

Circle 365 on reader card



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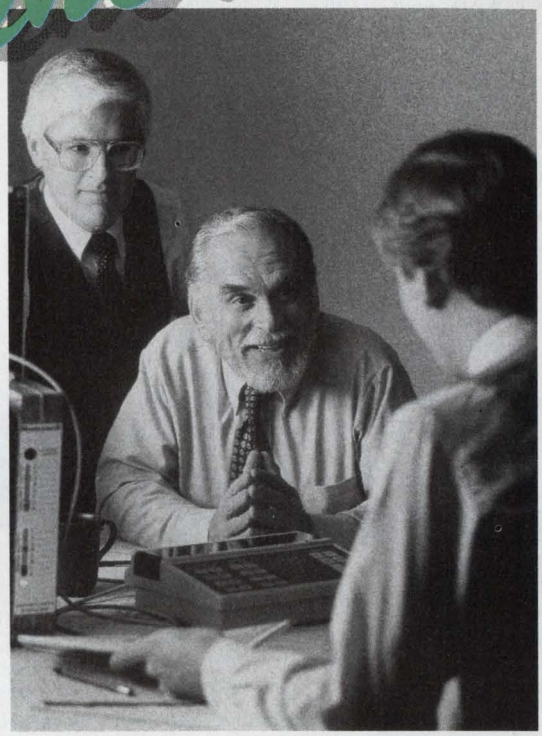
Meet the technology leaders in OEM Peripherals



—at the Invitational Computer Conference near where you live and work.

Every group has its meeting place. In your area, the meeting place for the major manufacturers of OEM peripherals—and the decision-makers that specify and select these products—is the Invitational Computer Conference (ICC). This year there are 12 ICCs dedicated exclusively to the OEM peripheral market in the United States and Canada, and six in Europe. One will be convenient for you.

These one-day, seminar/displays are so popular because they give you just what you need to know without wasting your time or money. You don't travel, there's no admission fee, the seminars and table-top displays from major manufacturers are all targeted to your interests (no searching through aisles), and the atmosphere is informative and hands-on, but congenial, with refreshments served. In a few hours you'll have the latest story on the newest and best in disk and tape drives, controllers, terminals, printers, test equipment, etc.

Invitations to the ICC in your area are available from one of the many exhibitors or the ICC management. Request yours today.

1988/89
OEM Peripheral Series
U.S./Canada Locations

Newton, MA	Sept. 8, 1988
Herndon (Tysons Corner), VA	Sept. 20, 1988
Minneapolis, MN	Oct. 20, 1988
Westlake Village, CA	Oct. 25, 1988
Dallas, TX	Dec. 8, 1988
Irvine, CA	Jan. 5, 1989
Ft. Lauderdale, FL	Jan. 24, 1989
Seattle, WA	Feb. 21, 1989
San Jose, CA	Mar. 16, 1989
Raleigh, NC	Mar. 28, 1989
Toronto, Canada	Apr. 18, 1989
Nashua, NH	Apr. 24, 1989

European Locations

Frankfurt, W. Germany	Sept. 15, 1988
Stockholm, Sweden	Sept. 20, 1988
London, England	Sept. 27, 1988
Munich, W. Germany	Jan. 19, 1989
Milan, Italy	Jan. 26, 1989
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CIRCLE 301 ON READER CARD

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GP-220Z Features True Zoom

Northwest Digital Systems Inc. announced the new GP-220Z terminal, which features true zoom capability in addition to emulation of the VT220 and Tektronix 4014 terminals. Using the True Zoom feature, the GP-220Z's display becomes a 1024 x 780 window into a virtual 8192 x 8192 resolution image. With 290 KB of display list memory, images can be zoomed to show complete detail using smooth lines. The GP-220Z also outputs alphanumeric and vector commands to hardcopy devices, such as HP plotters and LN03 Plus or QMS Lasergrafix laser printers.

The GP-220Z is priced at $1,795.

For further information, contact Northwest Digital Systems Inc., P.O. Box 15288, Seattle, WA 98115; (800) 537-1201. Visit Booth No. 215.

Circle 432 on reader card

PDI Signs CMP With DEC

Phoenix Data Inc. (PDI) has signed a CMP with DEC to provide a wide range of solutions for the high-speed real-time data acquisition and control market.

Phoenix Data also has announced a variety of hardware and software products. The IDAS subsystems now can be connected to BI-bus systems through the DBR32E parallel interface using RTCS-compliant software drivers. RTCS drivers are now available for Q-bus systems using the DRV11-WA parallel interface.

Phoenix Data has purchased the Test Management System product line from Honeywell. PDI has an interface to VAX.

For more information, contact Phoenix Data Inc., 3384 W. Osborn Rd., Phoenix, AR 85017; (602) 278-8528. Stop by Booth No. 1644.

Circle 434 on reader card

LINK V2.1 Offers PDPclustering

The LINK V2.1 from Northwest Digital Software Inc. offers PDPclustering with full bidirectional disk access. The LINK requires no application program changes. PDPclustering provides full file protection and privilege enforcement, record locking, RMS support and data caching as well as all other RSTS/E functions. The LINK allows totally transparent access to all shared disks. Up to 63 users can be added with each new node of the PDPcluster.

The LINK software package price begins at $10,000.

Northwest Digital Systems Inc.'s GP-220Z terminal.

For further information, contact Joel Jacobsen, Northwest Digital Software Inc., P.O. Box 1797, W. 405 Walnut, Newport, WA 99156-1797; (509) 447-5631. Stop by Booth No. 620.

Circle 429 on reader card

DDS Showcases PDP-11/70 Enhancements

Digital Data Systems Inc. (DDS) and SETASI Research and Development will be showcasing their latest enhancement products for the PDP-11/70. The combination of the PEP-70 and the new HC-70 allows the PDP-11/70 to run with 4 MB of cache memory at a 100 percent hit rate.

A free videotape describing PDP-11/70, UNIBUS and MASSBUS architecture will be available to qualified requesters. The tape presents a tutorial on why many years of productive life are left in the PDP-11 family of computers.

To obtain additional information, contact Digital Data Systems Inc., 1551 N.W. 65th Ave., Fort Lauderdale, FL 33313; (305) 792-3290. Visit Booth No. 2030.

Circle 431 on reader card

TPC 115-C/MTD -120v Helps Power Systems

By sequencing the input ac on in four-second intervals, the new Pulizzi model TPC 115-C/MTD -120v ac power distribution and control system provides filtering, transient protection and helps UPSs by limiting the peak current required when equipment is turned on.

The TPC 115-10C/MTD -120v has 10 outlets, a 15-foot power cord and fits a standard 19-inch-wide IEC STD rack that's 1¾ inches high, 8 inches deep and 14 pounds in weight.

The single quantity price is $526.

For complete information, contact Mike Pulizzi, Pulizzi Engineering Inc., 3260 S. Susan St., Santa Ana, CA 92704-6865; (714) 540-4229. Stop by Booth No. 1562.

Circle 435 on reader card

Microterm 5510 Emulates VT320

Microterm Inc. has introduced the 5510, a fully VT320-compatible text terminal with many additional features not found on the VT320. The Microterm 5510 text terminal features a VT320 emulation on a fully overscanned reverse video, soft white monitor.

This product offers a 14-inch display, with 24 lines of either 80 or 132 characters and a 25th status line. The 5510 uses a 15 x 12-character cell in 80-column mode and a 9 x 12-character cell in 132-column mode. Two pages of memory in 80- or 132-column mode are standard on the 5510, as well as DEC downloadable character set support.

The 5510 costs $499.

For additional information, contact Pam Kamal, Microterm Inc., 3630 S. Geyer, Ste. 300, St. Louis, MO 63127; (314) 822-4111. Stop by Booth No. 1470.

Circle 437 on reader card

Menu-Driven Turnkey Provides Information

Softool Corporation has expanded its application platforms by adapting user turnkeys to its Change and Configuration Control (CCC). A CCC/DM (development and maintenance) turnkey for VAX will be demonstrated at DEXPO West.

The menu-driven turnkey provides a centralized source of information and reports, including configuration and project management, development, testing, quality assurance, release control and emergency maintenance.

CCC/DM is available for the VAX, MicroVAX and VAXstation systems and ranges from $4,500 to $57,000.

For more information, contact Softool Corp., 340 S. Kellogg Ave., Goleta, CA 93117; (805) 683-5777. Stop by Booth No. 1455.

Circle 438 on reader card

Compugraphic Offers Proportional Typefaces

Compugraphic Corporation has 78 new proportional typefaces for the LNO1 and LNO3 laser printers, bringing its total number of proportional typefaces for the LNO3 printer to 117. Compugraphic offers the Courier, Elite and Modern typefaces at larger point sizes to accommodate headline and display applications.

Most of the Compugraphic library is available in sizes ranging from six to 36 point, in a choice of character sets to suit specific applications. In addition to proportional typefaces, Compugraphic offers 26 monospaced designs, including OCR-A and OCR-B.

Learn more by contacting Font Technologies, Compugraphic Corp., 90 Industrial Way, Wilmington, MA 01887; (508) 658-0200. Stop by Booth No. 2016.

Circle 440 on reader card

Cortex Enhances CorVision CASE Product

Cortex Corporation will exhibit an enhanced version of CorVision, an integrated CASE product that improves software development productivity. The new product automatically generates an application's code directly from design diagrams using a process called Picture Programming. It links application design tools on an IBM PC/AT or VT series terminal with an application generator on a VAX.

Developers can build production applications that share data with other VAX/VMS-based applications. Applications developed with CorVision use RMS and Rdb relational database. They also support VAXclusters and standard VMS data types.

For further information, contact Tom Woods, Cortex Corp., 138 Technology Dr., Waltham, MA 02154; (617) 894-7000. Visit Booth No. 2635.

Circle 443 on reader card

WORD-11 V4.2 Standardizes Font Style

Data Processing Design Inc.'s V4.2 of its word processing program WORD-11 allows a site to print a document in an identical proportional font, regardless of the laser printer used. If a printer goes down, the WORD-11 document can be switched to another laser printer, yet retain identical font style. Companies wishing to standardize font styles can do so regardless of the laser printer.

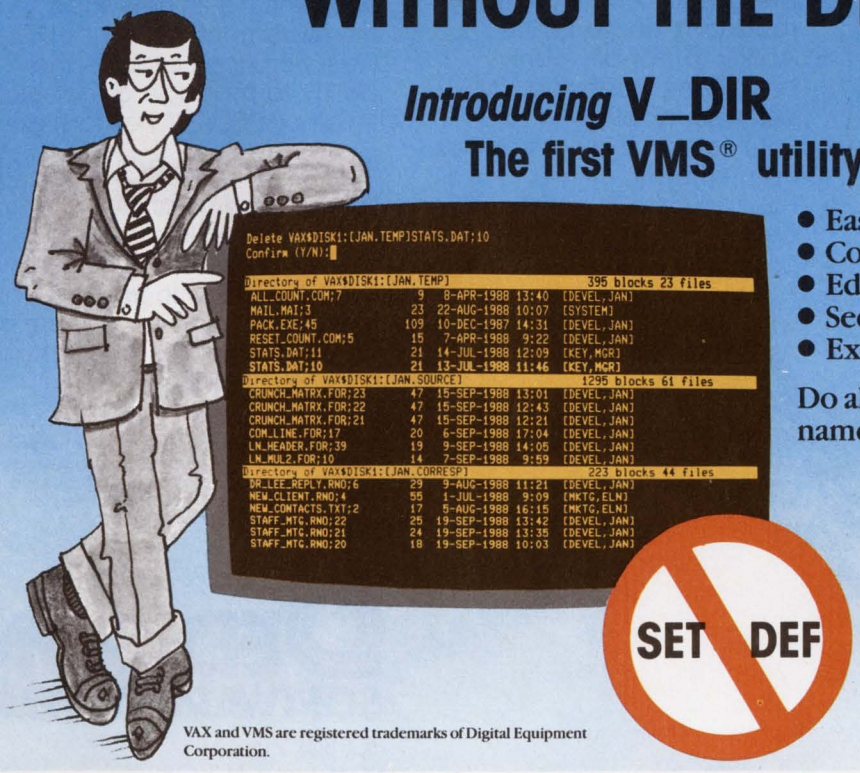
To learn more, contact Data Processing Design Inc., 1400 N. Brasher St., Anaheim, CA 92807; (714) 970-1515. Visit Booth No. 2141.

Circle 436 on reader card

PC Add-In Card Ability Extends Functionality

Virtual Microsystems Inc. has a DECnet-based, MS-DOS application server that lets

FINALLY! VAX™ FILE MANAGEMENT WITHOUT THE DRUDGERY



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The first VMS® utility that lets you

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Do all of this ***WITHOUT TYPING*** a file name or directory name.

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The Tape Tool Kit

Edison Software Offers Two Comprehensive, Powerful, Easy-to-use Tools

Now you can save time and money in your magnetic tape area with our Tape Tool Kit featuring our CONVERT and IMAGE utilities. Processing of foreign tapes is not only time consuming, but very costly if you have to send them out to be processed or copied.

CONVERT™ offers you:

- Process or create IBM standard labeled OS/DOS tapes
- Translate data from ASCII to EBCDIC or EBCDIC to ASCII
- Handles packed and binary data
- Multi-reel support
- process data with a single command
- Ability for operator free processing
- Complete documentation and support provided.

IMAGE™ offers you:

- Copy any tape from one reel to another
- Merge data from multiple reels to a single tape
- Ability to handle parity errors when copying VMS backup tapes
- Print selected blocks or files from a tape
- Position tape for print or copy using a FIND command
- Perform all of the above with only ONE tape drive
- Ability for operator free processing
- Complete documentation and support provided.

Coming Soon: Tape Management

Edison Software Systems will be announcing its new tape management system at DEXPO West 88. Plans include the ability to manage all tapes, whether DEC, IBM or foreign.

See us at DEXPO West 88

You will find us at booth 435 ready and willing to answer all your tape handling questions. Bring this ad with you and be eligible for a 10% discount on any of our products purchased prior to January 1989.

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multiple VAX terminals and VAXstation users run PC applications that support IBM PC/AT-compatible add-in cards. Called V-Server/Plus, this new PC application server for the VAX is a standalone hardware and software system using an IBM PC/AT-compatible backplane, proprietary to Virtual, which can be configured for several standard implementations.

The V-Server/Plus backplane is divided into two sections, one static and one configurable. The configurable section offers eight PC/AT standard add-in slots.

The option price is $500 for the single add-in slot configuration and $2,000 for the four add-in slot configuration. A baseline V-Server starts at $12,000 for a four-user system.

To find out more, contact Bill Thomasmeyer, Virtual Microsystems Inc., 1825 S. Grant St., Ste. 700, San Mateo, CA 94402; (415) 573-9596. Stop by Booth No. 1270.

Circle 439 on reader card

MTC Supports VT220 Terminal Emulation

StarSoft Technologies Inc. has introduced the Multi Term Card (MTC), a terminal emulation board for the IBM PC or compatible that supports full VT220 terminal emulation. The MTC and its accompanying software provide the flexibility of using DOS applications and terminal applications in one PC at one desk.

MTC is compatible with IBM PC/XT or AT clones, allows both DOS applications and full terminal emulation in the PC, and transfers files between PCs and mainframes.

The board unit is priced at $495. Additional software terminal emulation packages are priced at $200.

To find out more, contact Dave Marsh, StarSoft Technologies Inc., 14884 Berry Way, San Jose, CA 95124; (408) 727-7074. Visit Booth No. 2647.

Circle 441 on reader card

Qwiknet Professional Runs On VAX

Project Software & Development Inc. will demonstrate its new VAX-based Qwiknet Professional project management software at DEXPO West. The mouse-driven Qwiknet Professional, VAX version, is VAX-based project management software with a multi-layered, user-adjustable window system.

Qwiknet Professional schedules up to 250 projects, 16,000 activities and 16,000 resources. It runs on the full range of VAX computers and supports VT220/320/330 terminals and takes full advantage of color graphics of VT340 terminals.

For more information, contact Lois Tilles, Project Software & Development Inc., 20 University Rd., Cambridge, MA 02138; (617) 661-1444. Visit Booth No. 3125.

Circle 442 on reader card

BA40A-AA Clone Offers Multiple Configurations

Trimarchi Inc. has a BA40A-AA clone, an expansion adaptor that incorporates the functions of DEC's expansion adaptor and offers multiple configurations. Also included in the design are two special function connectors.

The BA40A-AA clone offers more than a dozen combinations of internal or external peripheral configurations for the MicroVAX 2000 and the VAXstation 2000. Internal configurations include support of an RX33, or an RD54, RD53 or RD32 disk

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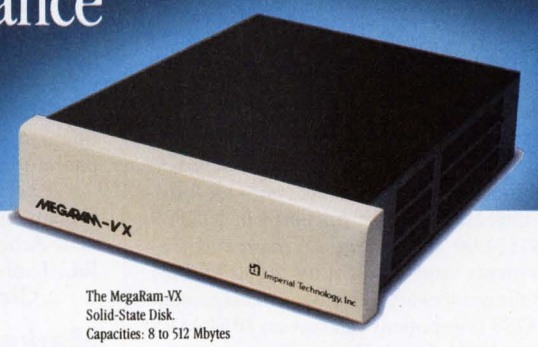

The MegaRam-VX
Solid-State Disk.
Capacities: 8 to 512 Mbytes

The MegaRam-VX is an MSCP compatible, solid-state disk for VAX and MicroVAX Systems.

With access times in the microseconds, the MegaRam-VX lets you add more users and applications while simultaneously improving performance. Increased performance results in better system utilization and productivity.

The MegaRam-VX is particularly well-suited for frequently accessed data, such as index/database files, scratch files and CAD/CAM, as well as for disk based operating systems. Or, use it as a high speed swapping and paging disk.

- Fully software compatible
- Easy to install; low maintenance
- Multi-ported
- Capacities from 8 to 512 Mbytes
- Both battery and magnetic backup
- Field expandable

When attached to a system containing a Unibus or Q-bus interface, the MegaRam-VX appears to the processor as a UDA50 or KDA50 controller, with an RA80 series disk drive... and, the MegaRam-VX is available ***now!***

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CIRCLE 125 ON READER CARD

drive. External configurations support an RX33, up to two RD54, RD53 or RD32 disk drives, and a TK50, all in one chassis.

The BA40A-AA clone costs $600.
For more details, contact Thomas J. Trimarchi, Ph.D., Trimarchi Inc., P.O. Box 560, State College, PA 16804; (814) 234-5659. Stop by Booth No. 2610.

Circle 444 on reader card

HASP + Exchanges Files Between VAX And AS/400

Datanex Inc.'s new version of HASP + software running on VAX, MicroVAX and PDP-11 systems offers an efficient exchange of files and jobs with IBM AS/400. The DEC system requires Datanex HASP + software and a standard DEC communications board, i.e., DMB32, DMF32, DPV11. The AS/400 requires standard communications subsystem hardware and the RJEF software to complete the link.

Datanex offers czSNA/RJE SNA and HASP + Bisync RJE file transfer solutions for DEC to minis (IBM Sys/36, /38, HP, Prime and more) and mainframes (IBM SNA, IBM Bisync, CDC and Unisys).

Prices for HASP + on the MicroVAX start at $3,500, on the VAX at $5,500.
For further information, contact Datanex Inc., P.O. Box 1728, Eugene, OR 97440; (503) 687-2520. Stop by Booth No. 233.

Circle 448 on reader card

Executive Edge Provides Timely Information

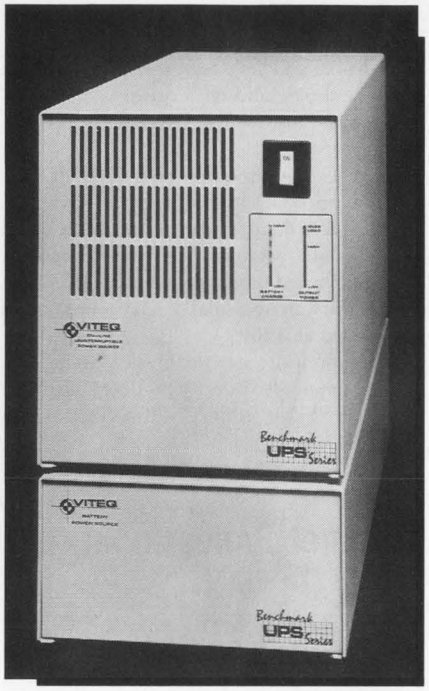
Execucom Systems Corporation has a new Executive Support System (ESS) product, Executive Edge. The product provides senior executives with timely and relevant information, graphics and powerful analytical capabilities in a flexible and easy-to-use form.

Executive Edge is priced from $35,000 to $150,000 depending on hardware requirements and availability of IFPS/Plus modeling software. The data management and DSS component can run on IBM MVS or VM, VAX, Prime Primos, Sun or Apollo.
To find out more, contact Rich Tuttle, Execucom Systems Corp., 9442 Capital of Texas Highway N., Arboretum Plaza One, Austin, TX 78759; (512) 346-4980.

Circle 451 on reader card

Benchmark Maximizes Wall Outlet Capacity

VITEQ Corporation has announced the Benchmark UPS Model 15A, an uninterruptible power supply rated for 12 amp service. It doesn't require the installation of a dedicated line supplying increased utility service capacity of 20 amps or more in order to serve a load of 12 amps, the maximum continuous current output available from the standard wall outlet.



VITEQ Corporation's Benchmark UPS Model 15A.

The on-line UPS can be used on any DEC computer and will protect any minicomputer or other type of equipment load rated 12 amps or lower from all types of line disturbances. Using circuitry incorporating a static bypass switch, the Benchmark UPS series provides a virtually unlimited inrush surge capacity. Input voltage fluctuating from 90 to 140 volts is accommodated.

Prices range from $1,795 to $3,395.
Obtain more information by contacting Annette Arbel, VITEQ Corp., 10000 Aerospace Rd., Lanham, MD 20706; (301) 731-0400.

Circle 449 on reader card

MarketPlus Meets Information Needs

Interactive Data has a turnkey service for managing global securities data, MarketPlus. MarketPlus meets the information needs of institutions that demand in-house access to global markets information for investment analysis and decision making.

On the IBM or DEC mainframe computer, Interactive installs historical securities databases, along with software for data management and analysis. As new data becomes available from international exchanges and third-party data suppliers, Interactive transmits data updates automatically to the customer site. End users access the data and perform analyses from their terminals and PCs.

MarketPlus is available on both the IBM VM/CMS and VAX/VMS computer systems.

Prices range from $75,000 per year to over $400,000 per year, depending on product configuration.
For further information, contact Interactive Data, 95 Hayden Ave., Lexington, MA 02173-9144; (617) 863-8100.

Circle 450 on reader card

GIGA 1200 Uses Helical Scan Technology

GigaTrend Inc. has introduced the GIGA 1200 tape system. The GIGA 1200 is a data storage system that uses helical scan technology to digitally record data onto 4mm DAT cassettes.

The GIGA 1200 can store 1.2 GB of data on a cassette the size of a credit card, with a high reliability factor. Primary applications are for disk backup, data distribution, archiving and image storage and retrieval.
For additional information, contact Roxanne Hoffert, GigaTrend Inc., 5650 El Camino Real, Carlsbad, CA 92008; (619) 931-9122.

Circle 461 on reader card

MCBA Will Demonstrate MRP II System

MCBA Inc. will demonstrate its comprehensive Manufacturing Resource Planning (MRP) II system for the VAX (the final package in the 18-module system, Capacity Requirements Planning).

Capacity Requirements Planning is a shop-floor management tool, allowing comparison of each work center's projected load to its available capacity. By having advance knowledge of potential bottlenecks, the manufacturer can make adjustments to the production plan. What-if analyses permit the manufacturer to test alternative schedules.
For additional information, contact Dennis Freeman at MCBA Inc., 425 W. Broadway, Glendale, CA 91204-1269; (818) 242-9600. Visit Booth No. 1247.

Circle 447 on reader card

WIZ KITS Perform Complex Functions

Six utility and OA software packages for VMS have been released by Scherers Wizard Software, a division of Scherers. The utility software features a standard format, single screen windowing and cursor selection. WIZ KITS perform complex functions, bypassing DCL syntax.

Terminal Server Wiz allows new ter-

minal server users to set up ports quickly and easily. Calendar WIZ is a complete time management system for VMS. Menu WIZ is a comprehensive OA utility for implementing applications menus on VMS. Copy WIZ lets users make image copies of tapes. Process WIZ and Queue WIZ allow users to manage processes and queues.

Single-copy prices range from $295 for Terminal Server WIZ, Copy WIZ, Queue WIZ and Process WIZ; $395 for Calendar WIZ; and $495 for Menu WIZ.

For additional information, contact Scherers Wizard Software, 1308 Bardstown Rd., Louisville, KY 40204; (502) 456-4898.

Circle 452 on reader card

PVCS Bridges PC, Mac, VAX Gap

POLYTRON Corporation, developers of the POLYTRON Version Control System (PVCS) for MS-DOS and VAX/VMS systems, has announced a Macintosh Programmers Workbench (MPW).

PVCS for MPW is a source code and revision management system. PVCS stores the revision history of source files and maintains chronological, historical records of changes. It reconstructs any revision of a module and defines a version as a specific set of revisions of various modules. It supports multiple lines of development from a common ancestor. PVCS revision archive files (Logfiles) are directly transportable between MS-DOS, VAX/VMS and the Macintosh.

Personal PVCS for MPW is priced at $149, corporate PVCS for MPW is $395. A five-user license for Corporate PVCS for MPW is $995.

For more information, contact Lisa Colling, POLYTRON Corp., 1700 N.W. 167th Place, Beaverton, OR 97006; (503) 645-1150.

Circle 445 on reader card

Datamedia Enhances COLORSCAN/2 Workstation

Datamedia Corporation has increased the networking capabilities of and added several new features to its multifunction COLORSCAN/2 graphics workstation.

The COLORSCAN/2 now provides a full 640 KB MS-DOS session while simultaneously running a ROM-based VT220 terminal session. Users simply hot key between sessions and transfer information between VAX/VMS and MS-DOS applications. Unlike third-party packages, the COLORSCAN/2 VT220 terminal emulator is ROM-based and doesn't use any of the MS-DOS 640-KB memory.

For additional information, contact M. Clare Moulton, Datamedia Corp., 11 Trafalgar Sq., Nashua, NH 03063; (603) 886-1570.

Circle 446 on reader card

FX/80T Meets Demands Of Classified Environment

Alliant Computer Systems Corporation has introduced the Alliant FX/80T TEMPEST system for classified defense, intelligence and commercial environments. The FX/80T meets the National Communications Security Information Memorandum (NACSIM) 5100A specifications. It's field-upgradeable from two to eight high-performance vector processors. The FX/80T provides 188.8 peak MFLOPs and 118 Whetstone of computational throughput.

The base configuration includes two vector processors, two VME-based interactive functions, 32 MB of memory (expandable to 256 MB), a 16-line multiplexer, 1.1 GB of disk storage (fixed or removable) and a tridensity magnetic tape drive. The system

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includes Ethernet support, TEMPEST console terminal and printer, a 16-user Concentrix operating system license and FX/FORTRAN.

The FX/80T is priced at $449,000.

To learn more, contact Paul Rubin, Alliant Computer Systems Corp., One Monarch Dr., Littleton, MA 01460; (617) 486-4950.

Circle 405 on reader card

Extra Security From TRW For MicroVAX II

TRW Information Systems Group has developed a security program for MicroVAX II users who work with highly sensitive data. TRW DECLASS is included as an enhancement to TRW's M.T.P. on-line system exerciser currently available to MicroVAX II system managers and maintainers. The program will be offered as a separate module.

The TRW DECLASS program gives system managers increased data security by providing them with the ability to repeatedly overwrite the system's main memory on command.

For more information, contact Larry Feld, TRW Information Systems Group, 15 Law Dr., Fairfield, NJ 07006; (201) 575-7110.

Circle 412 on reader card

TERM Provides Emulation Of Many Systems

Century Software announced its TERM Communications Software Package. TERM provides exact VT100/102/52, Televideo 925/912, Wyse50, ANSI 3.64 and TTY emulation on every terminal attached to a computer.

The proprietary TERM Cyclical Redundancy Check (TERMCRC) protocol allows file transfers up to 38.4 KB and supports XMODEM, KERMIT, MODEM7, ASCII, Binary, Xon/Xoff, Etx/Ack and line-by-line send protocols.

Prices for TERM begin at $195 for a single-user version and $350 for a multiuser version.

Find out more from Greg Haerr, Century Software, 5284 S. 320 W., Ste. C294, Salt Lake City, UT 84107; (801) 268-3088.

Circle 413 on reader card

Chipcom Expands Ethermodem Series

Chipcom Corporation has expanded its Ethermodem III/18 series with products compatible with DECOM Broadband Ethernet Transceiver and DEFTR Broadband Ethernet Frequency Translator for single-cable networks.

The DECOM-compatible additions, which use the 54-to-72-MHz frequency channel, will interoperate with DECOM. The products use DEFTER frequency translator at the headend of the network to convert broadband Ethernet signals from its transmit to receive frequencies.

The units are priced at $3,650 for one-port models, $3,950 for two-port models, $5,150 for eight-port models and $1,975 for replacement modules for installed Ethermodem III/18 units.

To learn more, contact Debra Costa, Chipcom Corp., 195 Bear Hill Rd., Waltham, MA 02154; (617) 890-6844.

Circle 414 on reader card

Telcor Announces 38.4K bps Accelerator Modem

Telcor Systems Corporation's 38.4K bps 2938 Accelerator modem provides error-free file transfer rates up to 9600 bps in interactive mode.

Telcor's patented 4 to 1 data compression delivers savings in phone line costs and gains in worker productivity because on-line time is reduced dramatically. The Accelerator

Back-up you can turn your back on.

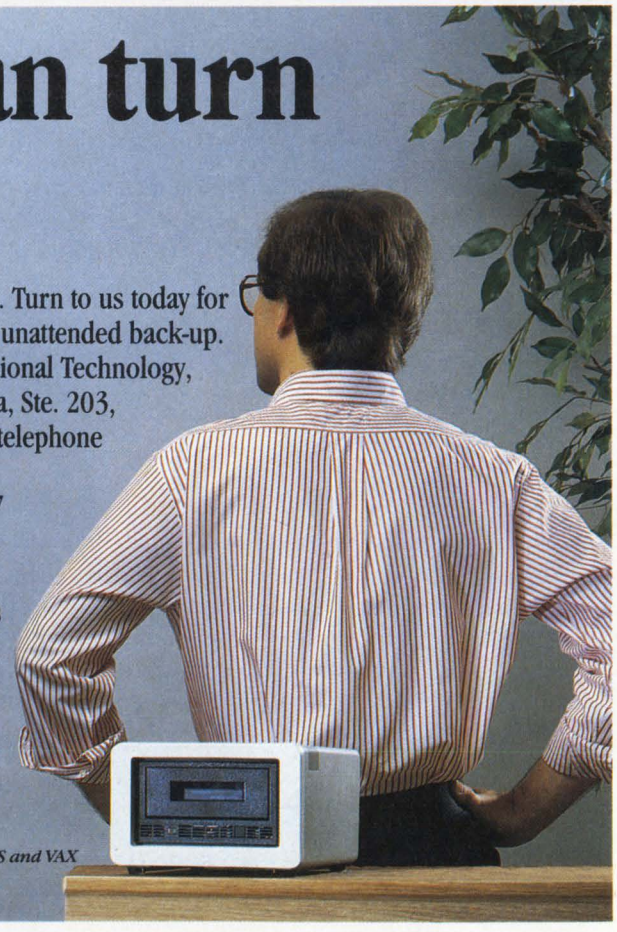
Reliable, unattended back-up is here! With TTI's high-capacity, hands-off tape subsystem you can walk away from tape swapping forever. The reason? Our remarkable CTS-8 uses advanced helical scan recording to store up to 2.3 gigabytes on a standard 8mm cassette. And this inexpensive, reusable media is so compact that it fits in a shirt pocket.

TTI's complete turnkey subsystems for DEC UNIBUS and Q-BUS VAX systems assure full VMS compatibility for a perfect solution with your present software.

It's no mystery why TTI is the international leader in high capacity tape subsystems for DEC. Turn to us today for the best answers in unattended back-up. Call or write Transitional Technology, Inc., 1411 N. Batavia, Ste. 203, Orange, CA 92667; telephone (714) 744-1030. Fax (714) 744-2497

See us at DEXPO West Booth #3008

TTI Transitional Technology, Inc.



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CIRCLE 262 ON READER CARD

2938 provides password/callback security, DES encryption, centralized control of rack-mount and remote modems, and a complete audit trail of network events.
To learn more, contact Bo Sullivan at Telcor Systems Corp., 12 Michigan Dr., Natick, MA 01760; (617) 653-3995.

Circle 415 on reader card

RMC Featured With CONTROL:Manufacturing

Cincom Systems Inc. announced the availability of Repetitive Manufacturing Control (RMC) with the 6.2 release of CONTROL:Manufacturing. The products are available on the full line of VAX computers, including the new 6200 and 8800 product families, and VMS V5.0.

RMC is an optional advanced module of CONTROL:Manufacturing, Cincom's manufacturing management information system. RMC supports repetitive manufacturing management techniques throughout CONTROL:Manufacturing. The major facilities of RMC are products/process definition, production schedule management, material pull support and simplified production reporting.

CONTROL:Manufacturing release 6.2 is priced from $100,000 to $600,000 depending on hardware platform and configuration. To obtain further information, contact Ronald R. Hank, Cincom Systems Inc., 2300 Montana Ave., Cincinnati, OH 45211-3899; (513) 662-2300.

Circle 417 on reader card

LN03 Laser Printer Repairs Offered By ESS

Electronic Service Specialists Ltd. (ESS) has added depot repair to its spare parts services for DEC's LN03 laser printer, with an average repair turnaround rate of three to five days. A one-year warranty is offered on all new and refurbished parts.

ESS services include a 24-hour emergency repair on standard items, complete systems testing and burn in, module swap program and sale, and rent or lease of repair parts kits.
To obtain more information, contact Keith Patterson at Electronic Service Specialists Ltd., N92 W14612 Anthony Ave., Menomonee Falls, WI 53051; (414) 255-4634.

Circle 481 on reader card

CHARM/ULink Improves Performance At Run Time

WorldWide Data Corporation announced CHARM/ULink, a front-end application development tool for the leading DBMSs.

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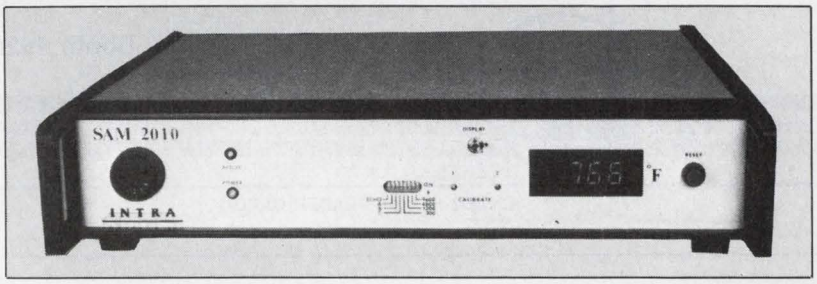

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- Smoke / Fire / Water / Assault
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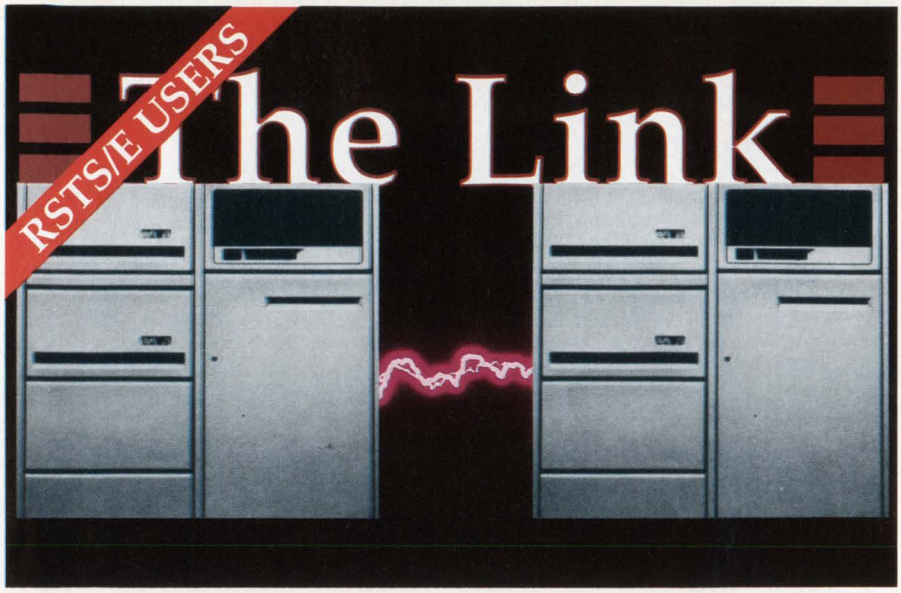

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Since its introduction, the **PDP-11** has been one of the most reliable systems for data processing departments world-wide. Until now, the CPU power of even the largest PDP-11 couldn't handle the growing needs of today's organizations. Now there's **The Link**, the solution to CPU bound PDP-11's running **RSTS/E**.

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DDCMP	DECUS	LA100	Rainbow	VAXELN
DEC	DELNI	LQP02	RALLY	VAXFMS
DECalc	DIBOL	LSI-11	Rdb/VMS	VAXlab
DECconnect	DNA	MASSBUS	RSTS/E	VAX LISP
DECgraph	Eve	MicroPDP-11	RSX	VAX SCAN
DECmail	FMS	MicroPower/Pascal	RT-11	VAXstation
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Macintosh is a trademark of Apple Computer, Inc.

CHARM/ULink offers application designers the ability to create complete applications in C source code for UNIFY's DBMS. CHARM/ULink offers the designer maximum flexibility, improved performance at run time and true machine portability.

CHARM V1.60 can convert UNIFY DBMS files to CHARM's native rf database files. CHARM's rf high-performance database requires no run time or user fees.

CHARM/ULink is priced at $2,500 for entry-level UNIX platforms like 80286 through high-end UNIX environments like VAX. Prices for CHARM V1.60 vary from $1,495 to $70,000, depending on the machine.

For more information, contact Bill Hirst, WorldWide Data Corp., 17 Battery Pl., New York, NY 10004; (212) 422-4100.

Circle 421 on reader card

BYERS PC/XNS Connects PC To VAX

BYERS Engineering Company has a communications software package that allows the PC to connect directly to the VAX. If you have Intergraph's Ethernet (Communications Processor), the only hardware needed for the PC and the VAX is an Ethernet card on the PC. Standard ThinWire or ThickWire Ethernet cabling is used, allowing the PC to connect to the VAX like an Interpro 32C.

BYERS PC/XNS File Transfer Program provides high-speed transfer of IGDS files with minimum system overhead. Because it can execute VAX commands from a command line, it can be run within MicroStation to transfer files and submit plots.

The license fee for BYERS PC/XNS File Transfer Program is $350 per PC. One-time license for each VAX is $600.

To learn more, contact Barbara L. Stafford, BYERS Engineering Co., 6285 Barfield Rd., Atlanta, GA 30328; (404) 843-1000.

Circle 419 on reader card

AUTOBAX Uses Simple Prompting

CRT has released an automated DCL command procedure, AUTOBAX, that runs on any VAX/VMS system. AUTOBAX submits either full or incremental disk-to-tape backups in batch through the use of simple, interactive prompting.

Little or no knowledge of the backup utility is required. Backup listings are created for easy verification. Operator intervention is minimal.

AUTOBAX costs $25.

Obtain additional information by contacting CRT, P.O. Box 271, Belmont, CA 94002; (415) 595-5595.

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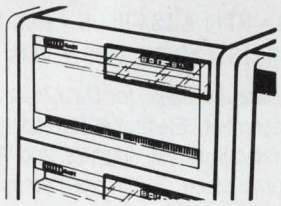

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CIRCLE 189 ON READER CARD

ADVERTISERS INDEX

Reader Service Number		Page
346	Able Computers	39
196	Access Technology	85
333	Accudata	140
327	Aldon Computer Group	169
247	Alisa Systems	185
178	American Digital Systems	74
246	American Digital Systems	66
354	AST/Camintonn	79
254	AT&T Unix Training	145
301	B.J. Johnson & Assoc.	207
345	Beck Computer	102
180	BLAST/Communications Research Group	153
344	C Enterprises	63
310	C. Itoh Electronics	49
102	C.P. International	77
311	CalComp	134-135
329	Cappcomm Software Inc.	202
195	Cardinal Data Corp.	115
103	Chipcom Corp.	143
104	Chrislin Industries, Inc.	147
	Cipher Data Products	supplement
105	Clearpoint, Inc.	7
106	Clyde Digital Systems	81
343	CMS Enhancements	19
312	Codonics	33
108	Cognos Corporation	1
241	Compu-Share	116
111	CompuServe/Data Technologies	197
112	CompuServe/Data Technologies	199
113	CompuServe/Data Technologies	201
286	CompuServe/Data Technologies	203
193	Computer Associates	87
218	Computer Associates	59
352	Computer Associates	133
353	Computer Associates	163
198	Computer Information Systems	141
179	Computer Methods Corp.	189
268	Computer Museum	206
173	Cortex Corporation	37
236	Data Processing Design	31
114	Datability Software Systems	I.F. Cover
189	Datamedia Corp.	221
348	Datasat	118
234	Datasouth Computer Corp.	I.B.Cover
117	De Rex, Inc.	197
	DECUS	supplement
115	Demac Software	181
328	Digi-Com Group Inc.	209
299	Digital Business Systems	156
341	Ecap Systems	151
119	Edison Software	210
121	EMC Corporation	B.Cover
338	Emerging Technology	199
264	Emulex Corp.	23
122	Equinox Systems, Inc.	2
256	Esprit Systems	139
351	ESS	94
282	Evans Griffiths & Hart	196
325	Excelan	137
245	Executive Software	95
336	Exsys	127
123	FEL Computing	6
273	Gejac, Inc.	53
349	GigaTrend Incorporated	25
194	Gold Key Electronics	126
124	Grafpoint	75
265	Graph-On Corporation	71
278	GrayMatter Software	173
332	Hamilton/Avnet	93
125	Imperial Technology	211
126	Information Builders	155
	Interactive Software Systems	18
190	Interactive Technology	131
314	Interstate Electronics Corp.	105
129	Intra Computer	215
132	Kea Systems Ltd.	84
266	Kinetics, Inc.	193
323	Lanpar Technologies	55
134	Logicraft, Inc.	15
237	MCBA	121
304	MDB Systems	91
137	MDBS, Inc.	109
138	MDBS, Inc.	111
139	MegaTape Corp.	41
302	Micro Technology, Inc.	11
231	Microsystems Engineering Corp.	17
357	Miltope Business Products	117
185	MOD-TAP System	138
303	National Information Systems	114
287	Nemonix, Inc.	70
188	Nissho Electronics	83
143	Northwest Digital Software	216
305	Northwest Digital Systems	103
347	Novell, Inc.	12-13
288	Oregon Software	201
244	Pacer Software	187
145	Park Software	84
242	PCS, Inc.	192
313	Perceptics Corp.	125
175	Persoft, Inc.	5
337	Polygon, Inc.	69
240	Polytron Corp.	144
148	Precision Visuals	27
150	Printronix, Inc.	177
152	Printronix, Inc.	177
153	Process Software	215
154	Progress Software	129
356	Promod	152
176	Random Corp.	36
249	Raxco	21
326	Raxco Communications	161
362	Recital	180
155	Relational Technology	45
359	Samsung Electron Devices	35
	SAS Institute	65
	SAS Institute	67
253	SCO, Inc.	108
350	SCO, Inc.	132
157	See First Technology, Inc.	202
275	Signal Technology	supplement
309	Software AG	165
269	Software Techniques	101
158	Sorbus	157
159	SPSS	107
248	Stone Mountain Computing	203
160	Summus Computer Systems	73
161	Synctronics	104
162	Talaris Systems	119
340	Telos Corp.	188
	Texas Instruments	123
186	Touch Technologies, Inc.	89
331	Touchstone Software Corp.	18
262	Transitional Technology	214
177	TriLogic Corp.	167
252	Trimm Industries	48
342	Unbound	29
166	Viking Software	164
167	Walker Richer & Quinn, Inc.	8-9
358	Warson Management Group Ltd.	198
226	White Pine Software	152
169	Wollongong Group	205
239	Wollongong Group	62
258	Wyse Technology	159
361	Xerox Corp.	97
171	Xyplex	223
172	Zoltech Corp. (VME)	213
174	Zoltech Corp. (Q-Bus)	213

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CIRCLE 171 ON READER CARD

BACK END

John C. Dvorak

Japanese Technology Marches On

I was in Canada when I saw the latest in gasoline pumps. With a touch-sensitive full-color display, the Delta 5000 used by Petro-Canada was fabulous. By pushing on the large screen, you tell it how much gasoline you want to buy. Then you insert cash or a card; change is handled by a nearby kiosk.

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When you reach the end, a voice says "Thank you," and you see a video of how to replace the hose in the holder. A new screen appears, asking if you want a receipt. If you do, the machine dutifully grinds one out with its built-in dot-matrix printer.

Finally, the president of Petro-Canada comes on the screen and thanks you for using his gasoline and "the latest in Japanese pump technology." I shoved the receipt in my pocket and drove away, shaking my head.

You know what's going to happen, of course. American gasoline pump manufacturers, who must have seen this thing by now, will downplay it as a hokey gimmick. "People want to buy some gas and get out. They don't want to watch TV while at the pump." Within a few years, we'll be using Japanese gasoline pumps, and the Japanese will have taken over another market segment for one simple reason: they give the customer something nifty.

> ***"The arrogance of American businessmen is killing us."***

The arrogance of American businessmen is killing us. These guys go from one extreme to the other; they make major decisions either off the top of their head ("Nobody wants to watch TV when they pump gas") or by relying on expensive market surveys without watchdogging their direction. Such was the case when Coca-Cola changed its formula. Thank goodness the Japanese don't make a Coke clone.

The pump industry soon will be taken over by the Japanese, just as they took over the consumer electronics market. The Japanese make products, such as VCRs, that American firms can't make because of lack of commitment. So, too, with machine tools and, soon, lawn mowers, kitchen appliances and who knows what else.

The irony is that the Japanese still know nothing about marketing. Oh, they understand some dirty tricks on how to lowball the competition and effectively distribute in ways to burn gray marketers. It amounts to price fixing, which seems to be an unspoken goal. But they still can't market.

For example, Sony couldn't market its Beta recorders, even with a head start, superior quality and an incredible U.S. presence. Now, it can't move its 8mm technology.

A few years ago, Sony was the first to introduce the super high-fidelity stereo recording signal that all high-end VCRs now employ. But it was unwilling to explain it to the public. Sony also made a mistake in naming the new technology hi-fi. As one consumer electronics maven told me, "The American public thinks of hi-fi as something from the late 1950s. It has the wrong connotations."

Soon JVC and the horde of VHS makers followed suit with VHS hi-fi. The Japanese didn't listen, and now only a few connoisseurs know anything about the stereo tracks on movies or Dolby Surround Sound encoding. Who's to blame? Japanese marketers.

So, the Japanese have a weakness that easily could be exploited by American firms. That's assuming we have a good product with which to counterattack. One firm that avoided a massacre at the hands of the Japanese was Tektronix. It laid in wait with high-tech oscilloscopes as the Japanese entered that arena. Tektronix blew the Japanese out of the water with lower prices, super equipment and better marketing.

Although weak in marketing, Japanese strengths include an innate ability to continuously improve a product beyond recognition, and a rapid acceptance of what's new. They're suckers for change. They love gimmicks and nifty technological gimcracks.

Americans have a fascination with new things, to a point. As we get older, we lose this fascination with the new and different. So what happens? The big businesses become peopled by codgers who resist change and develop a cynicism peculiar to American businesses. Result: look for the Delta 5000 soon.

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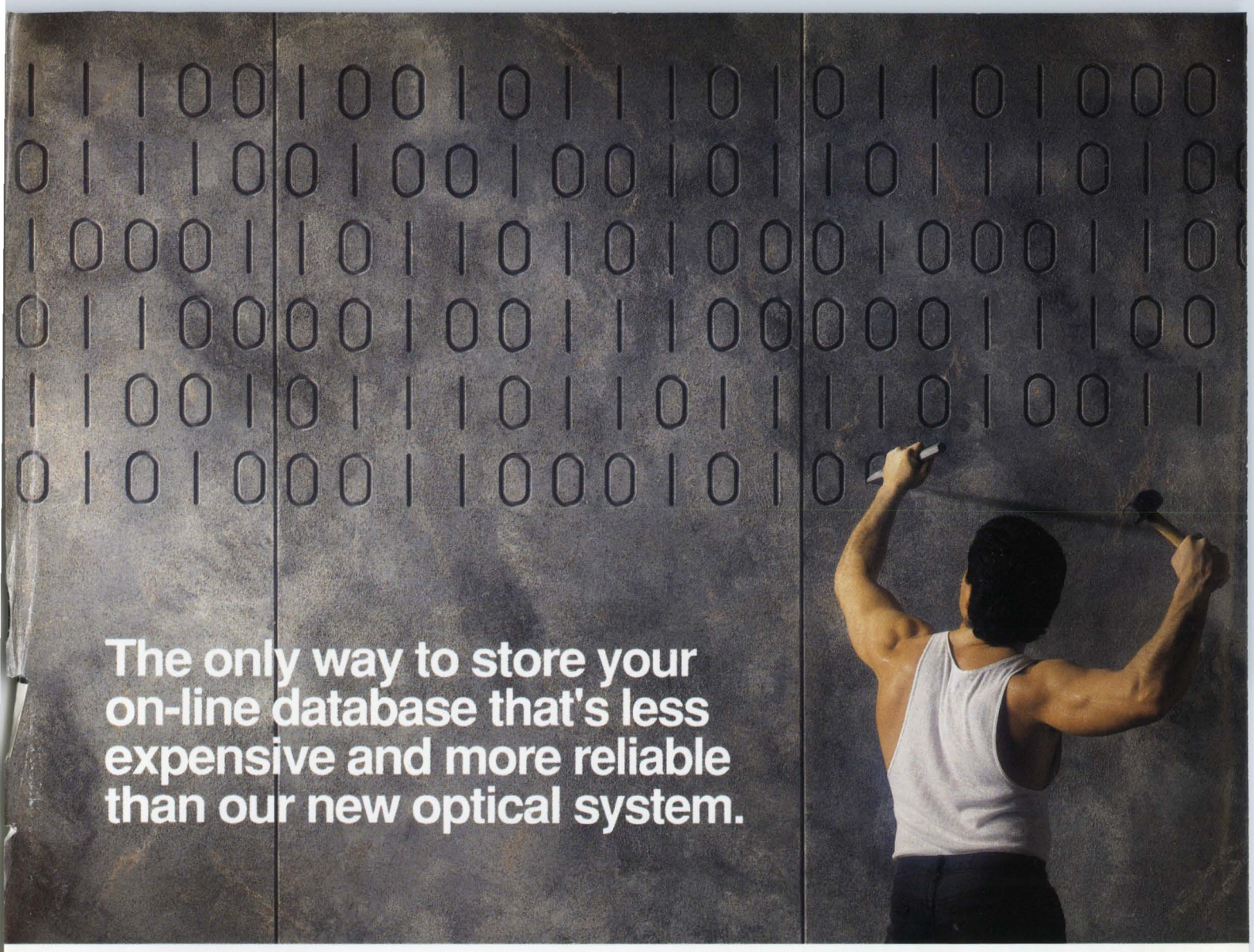

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