



ENVIRONMENT

SAM2010

JULY ■ 1990

DEC

\$4.00 ■ VOL. 9, NO. 7

■ PostScript:
It's Still The
Standard

■ Harvesting
Processor Power
With NCS

■ EDI Gets Ready
For Takeoff

Professional

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*Philip A. Naeker
DEC Professional Magazine
Vol.7, No. 10, October 1988*

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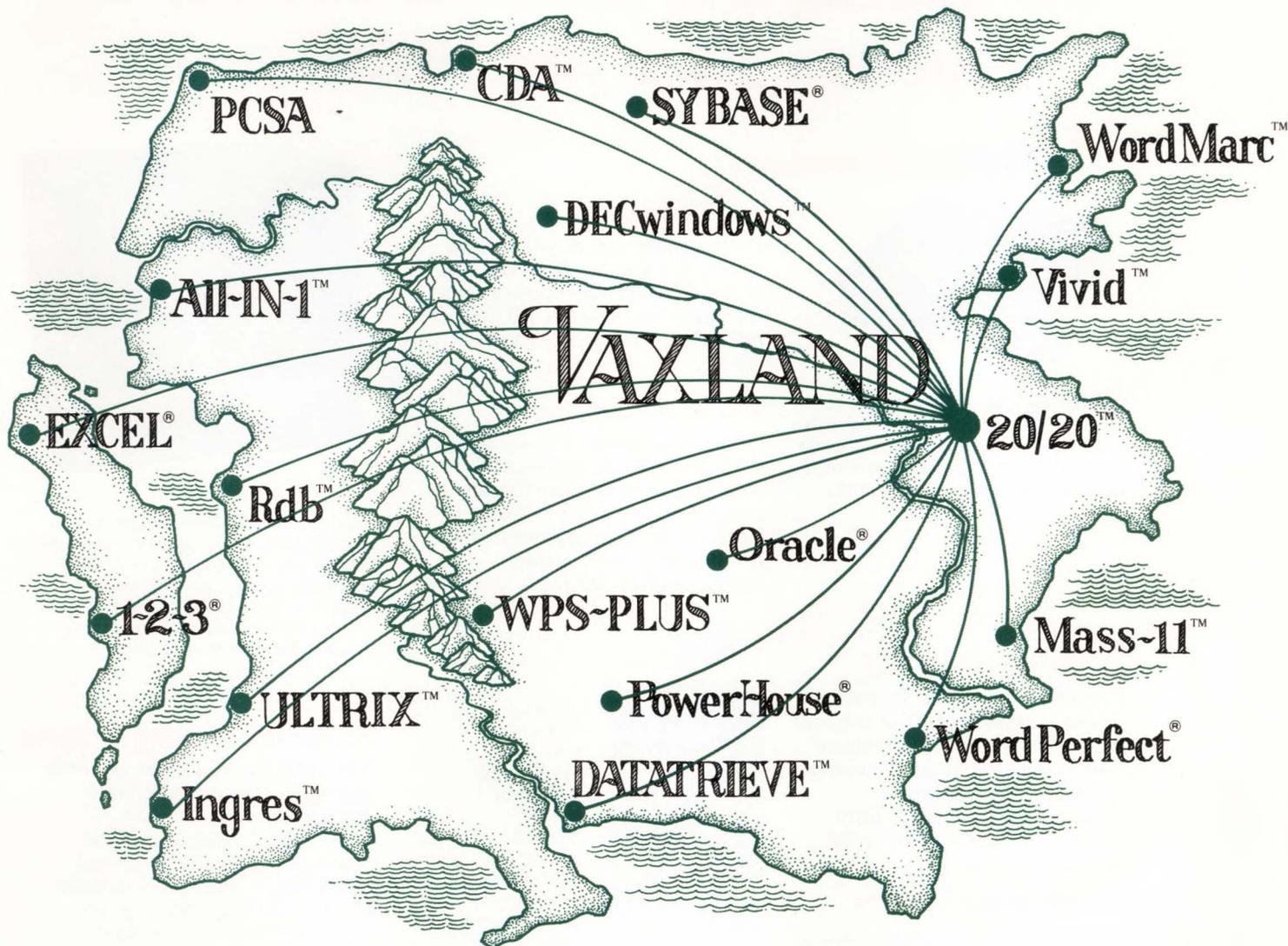
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From our entry level ELS-48 terminal server priced less than DECserver 300, to our DS-15 with more than four times the capacity of a DECserver 550, Equinox has a LAT-compatible server that's right for you.

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Thanks to our unique VLSI technology, the ELS-48 supports 48 users at 38.4 Kbps simultaneously, more than any other server, so it's ideal for graphics terminals. For larger applications, the DS-15 supports over 600 users simultaneously at 19.2 Kbps.



Ideal for sites with large user populations or applications where uptime is critical, the DS-15 features fully redundant Ethernet interfaces, central logic, and power supplies for auto-backup. Up to 1320 connections are supported in a package smaller than the DECserver 550.

MORE than just LAT

If you're in a multi-vendor environment, it's easy to network your VAX terminals and PCs with non-Ethernet hosts, or share modems and printers. Connections to non-LAT devices are made transparently without packet delays, providing fast response even during peak traffic periods.

MORE dependability

Maximum network availability is assured with our DS-15. Single point failures are eliminated with backup of all key components. In the event a failure is detected, switch-over to standby components is automatic, and hot plug-in board replacement avoids costly downtime.

MORE wiring choices

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The DS-5 connects from 48 to 192 terminals to Ethernet and non-Ethernet hosts in the most compact package available today.

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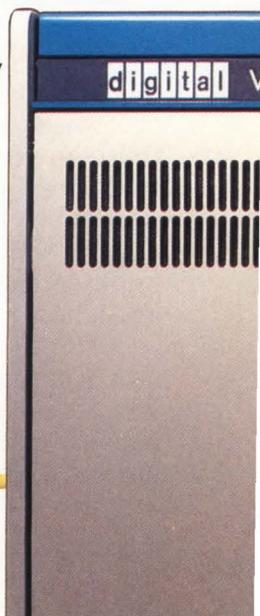
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JULY 1990

VOL. 9, NO. 7

OUTPUT DEVICES

38 COMPUTER DEMOCRACY

Evan Birkhead

VAX-based client/server networks are efficient managers of peripherals. Easy access to distributed printing and communications devices is at the core of the DECnet™ and VAX/VMS philosophies. Now that distributed, departmental computing is becoming the norm, the next step is to link dissimilar networks to improve resource-sharing. The technologies needed to do this efficiently, which include client/server and third-party solutions, are multiplying quickly.

46 FOREVER POSTSCRIPT

Kevin G. Barkes

With the introduction of competing technologies from Apple and Microsoft, it appeared that PostScript and its parent, Adobe Systems, were in serious trouble. But PostScript is firmly entrenched, and nothing short of a revolutionary breakthrough in imaging technology will wrench it from its dominant position. When the 21st century arrives, the smart money may still be riding on PostScript and its direct descendants.

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54 STANDARDS: EDI: READY FOR TAKEOFF

Brian O'Connell

Electronic Data Interchange (EDI) is a set of automated business communications standards that enable companies to send and receive documents electronically. As EDI aims for the sky, the days of exchanging business records by mail are numbered. Is this a ride you can afford to miss?

Continued on page 4.

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Tool For The I/O Trade

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The lab seal indicates that the product reviewed has been tested by one of our experts in our Laboratory and Testing Center.



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Our licensed LAT is included free as part of every copy of SmarTerm 340. Without strings. Loopholes. Fine print. Or disclaimers. Which, considering its value, could save you quite a lot.

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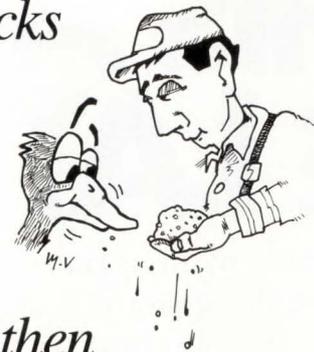
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CIRCLE 290 ON READER CARD

DEC Professional

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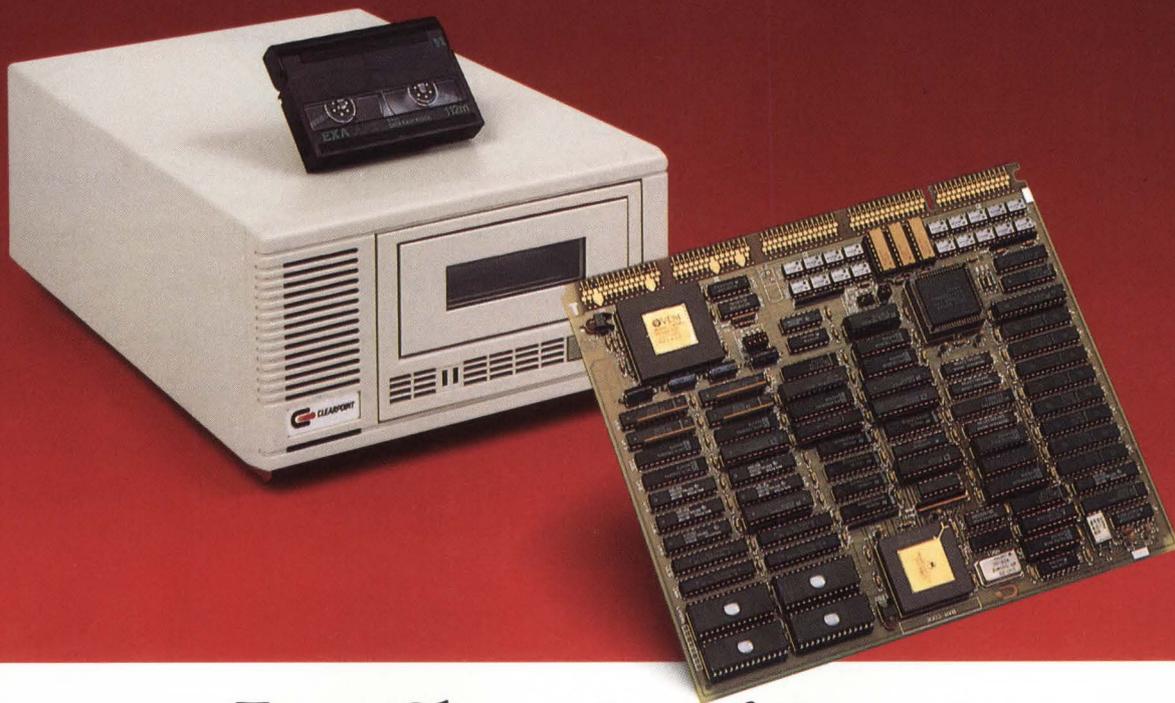
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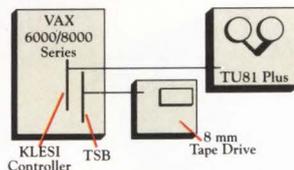
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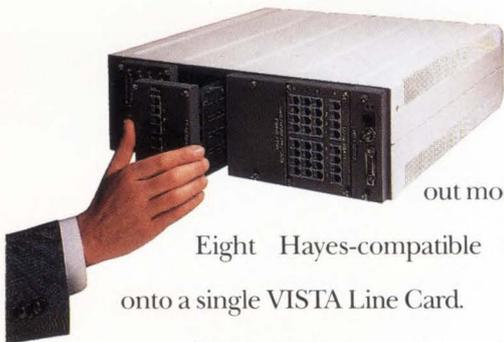
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CIRCLE 181 ON READER CARD

What, no

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With the revolutionary, new VISTA Modem Line Card, Datability premieres network-based dial-in/dial-out modems.



Eight Hayes-compatible modems are packed onto a single VISTA Line Card.

Eliminated are the cables and equipment that used to connect modems to Local Area Networks - because our state-of-the-art modems are internal to our VISTA Terminal Server.

Configure four VISTA Modem Line Cards in a single VISTA Server and you harness the full power and functionality of 32 network-based modems. Witness a single VISTA Server taking the place of an entire rack of network equipment. Configurations are kept absolutely clean and simple throughout.

Each VISTA Modem Line Card provides eight fully Hayes-compatible auto-baud-detect modems, operating at speeds from 300 to 2400 baud.

Each modem can automatically switch between dial-in and dial-out service on an as-needed basis.

A sophisticated dial-back option has been implemented to provide maximum security when required.



spaghetti?

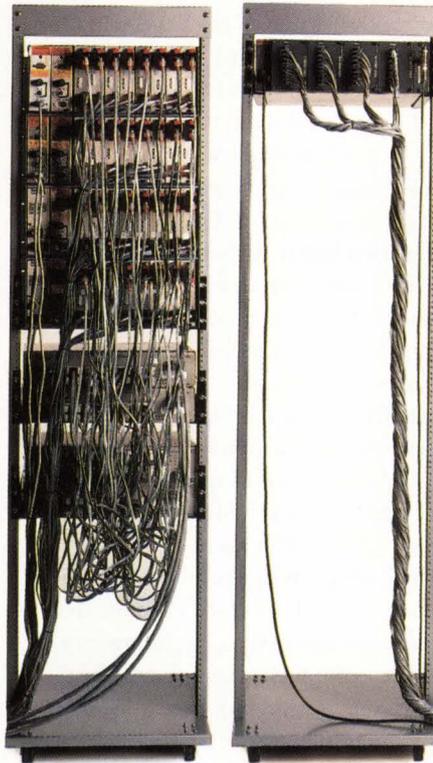
Additionally, system administrators can even create LAN services with predefined telephone numbers that correspond to remote computer systems.

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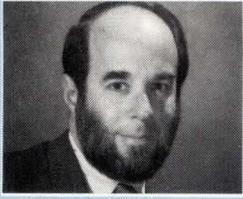
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Carl B. Marbach

The People Problem

While it's true that the price/performance of computer systems continues to improve, new productivity tools are announced with regularity and computers are common in primary schools, there's still dissatisfaction with these devices — with what they do and how much it costs for them to do it.

When people find out that I'm from a computer publication, I feel like the computer doctor. They tell me all their ills. The stories are almost all the same: "I have this computer system — it costs too much and does too little; projects come in late and over budget; and I've become dependent on a resource I can't control or understand."

How many of us have participated in a project that came in late — that may have taken even twice as long as estimated? Did you ever work on a system that, when it was finished, wasn't quite right — that just didn't do the job the users thought it would do? Have any of you implemented a complicated system that required a systematic conversion from something else — and the users just couldn't understand how to get from here to there?

At Professional Press, we recently converted to a new accounting system. The conversion took a highly talented, experienced and hard-working person about one year to complete and required the cooperation of the entire accounting department and the understanding of almost everyone else. I'm convinced that a lesser person would have failed or required a huge amount of consulting time from the vendor, most of which would have been unbudgeted. The accounting software is solid. So why was

it so hard to get this done?

When we print *DEC PROFESSIONAL*, our printer requires exact specifications, down to the last detail. He needs these because he programs the printing process. He leaves nothing out. Can you spell out everything that needs to be done to accomplish a task?

For example, can you tell me how to brush my teeth exactly? Let's see — pick up the toothbrush (which end should I pick up?); open the toothpaste (where's the toothpaste?); put toothpaste on the brush (how much should I put on?); put the brush in your mouth (did I open my mouth first?); and brush (should the bristles point down or up?). You get the idea. We aren't used to specifying things in the detail necessary for any automatic process. The possible number of paths in any small program can be huge — in the millions — and a large, complicated program has astronomical permutations.

While computers have gotten faster, cheaper and (some say) better, people, sadly, haven't kept up. In "Educating The Next Generation" (January 1990), I complained that our schools aren't properly training the next generation of computer programmers. But it goes beyond the programmers. The implementers and users have to take responsibility to "get the job done." If it doesn't work one way, then they have to find a way to make it work: Control the numbers in a conversion, work extra hard when changing from one system to another and, finally, understand what they're doing. The final job in any system is installation, training and support. This is usually accomplished by nonprogrammers.

In "Keep It Simple" (June 1990), I told you about a friend who'd rather return to a roomful of people with green eye shades and quill pens than continue to feed money into a computer operation

that doesn't seem to accomplish anything. At least he could understand and control the cadre of pencil pushers. Does he sound like a candidate for a fancy new network?

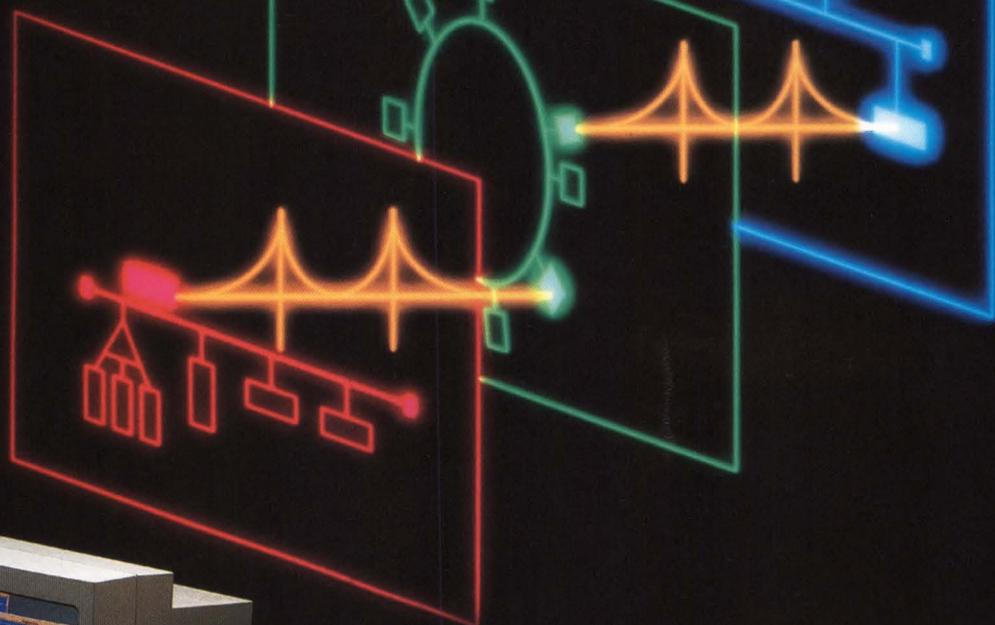
Unless we fix our trade, we could face a revolution that could change our workplace. We simply *have* to fix these problems.

There are, of course, projects that come in on time, cost less than planned and do what was envisioned. There are professionals in our business who know how to plan, manage and implement systems. We need to increase the portion of the professional population that can do these things. Strive to be professional, work hard, concentrate, and keep learning. Take courses or attend professional trade shows where you can learn from the seminars. Insist on periodic training. Learn how to manage yourself, your projects and others.

While there are applications for which a computer always will be the obvious choice, there are others in which a group of accountants with green eye shades and quill pens *could* do the job. I recently saw a chart in which the cost of computer power between 1960 and 1990 was compared to the cost of an automobile during the same time period. If cars had improved as much as computers have in those 30 years, a Rolls Royce today would cost \$500 and get 300 miles per gallon. Unfortunately, we have the same drivers we had in 1960.

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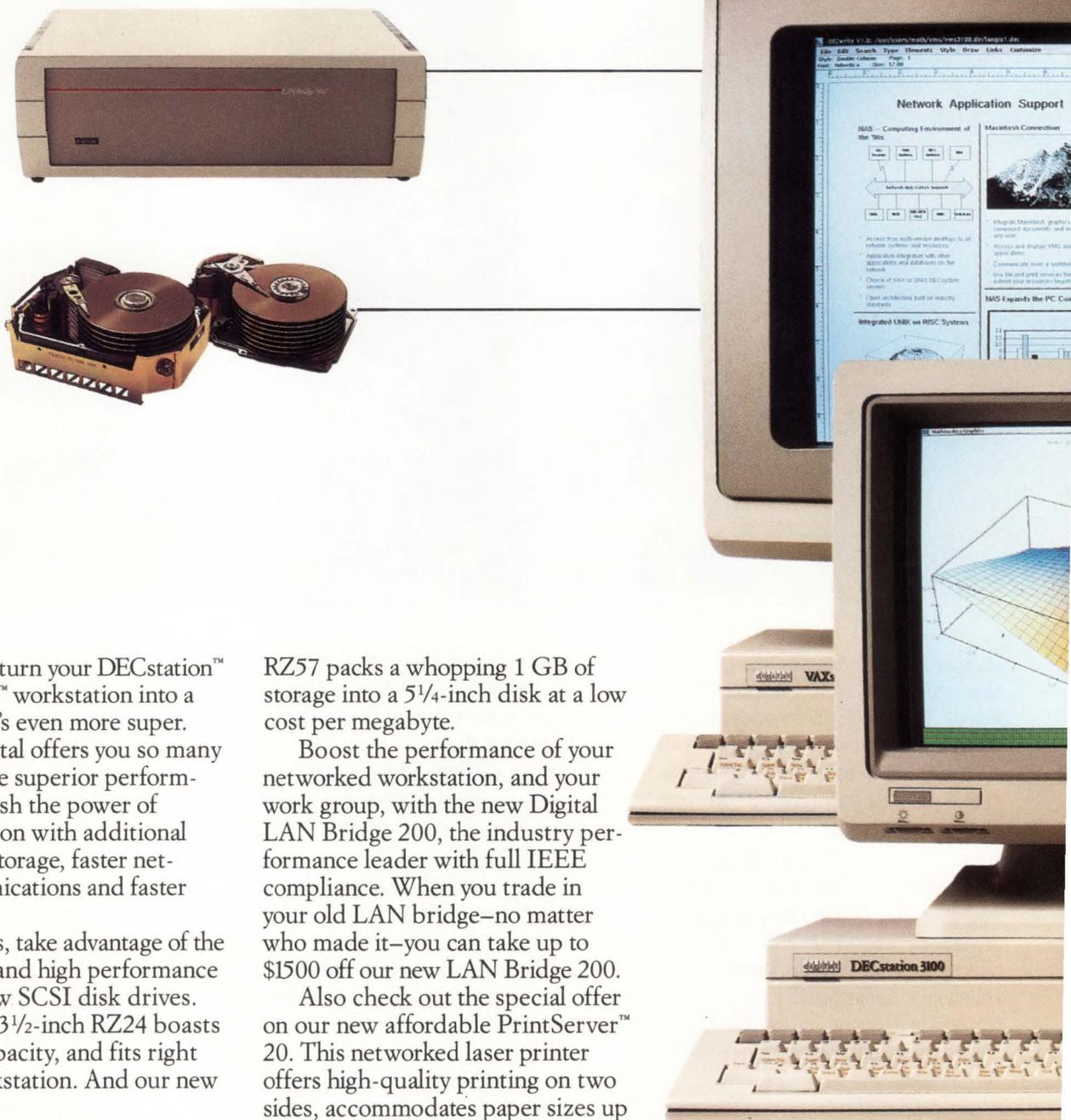
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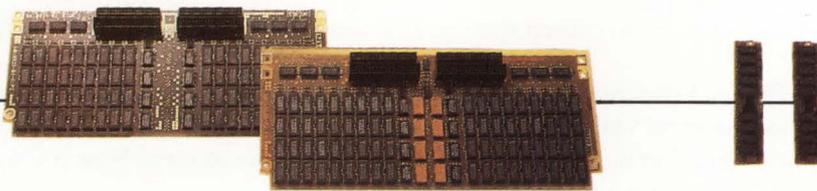
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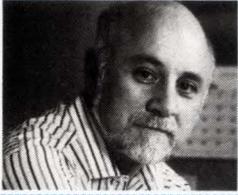
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EDITORIAL

Dave Mallery

VUPs For Sale

As I've been saying for the past several months, the crash of the VAX 8000 line has created amazing bargains. The new VAX 4000 line may squeak in under the \$10,000-per-VUP mark, but the newly devalued 8000s shatter it! If you've been underpowered, you can cure your problem now and still stay ahead of the cost-per-VUP of the 4000.

We turned on our "million-dollar" VAX 8800 (which we acquired for \$85,000, or \$6,500 per VUP) in May, and amazing events took place.

First, it took only about six hours to convert from an 8350-based LAVc to an HSC/CI-based 8800/8350 cluster.

Second, we have millisecond response time. I haven't experienced that since the first few months of my 11/70 in 1975 — and never on VMS, until now.

Third, closet users came out. Our normal pre-8800 peak load was about 65 users. Now it's 78, and it stays there. An available computer is a utilized computer.

Fourth, we've seen real productivity gains. Our circulation department reports *double* the transactions per hour.

One of the hidden gems in this transition is the HSC. At \$11,000, it's one of the greatest bargains I've ever found. It has astounding capacity and has liberated us from the four-drive tyranny of the KDB50. We're adding spindles as fast as we can by converting our newer vintage SMD interface drives to HSC via either Lago Systems or System Industries interface cards.

We're currently using 64 MB but are working on another 64. To utilize the 64 MB fully, we only had to open the working sets a bit. Most of our hard faults went away. The next 64 MB will allow us to do some serious caching and handle the 15 or so new users expected in the next few months. This second 64 MB also will interleave neatly with the first.

These million-dollar machines are truly rock-solid. My field service engineers tell me that their installed base of large 8000s is almost flawless in performance. Just looking at the machines builds confidence.

In addition, we've upgraded our tape drives to HSC-compatible units — 8mm with a Micro Technology MA-24 and nine-track with an SI2100. HSC tape drives deliver a huge improvement in performance. We also installed a Seagate Sabre-6 (2 GB), as modified by Emulex, along with an Emulex DA card in the HSC.

Moving to VMS V5.3-1 also has allowed us to upgrade our DEBNAs to DEBNIs with a corresponding boost in Ethernet bandwidth use. Now if I can just get my hands on a solid-state disk. ...

In summary, the crash of the 8000 line has produced an opportunity to buy VUPs at unheard-of prices. Go thou and do likewise.

PS: Look for The Cuckoo's Egg by Clifford Stoll. If you're concerned about computer security, this book is a must-read.

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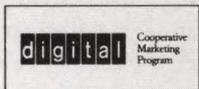
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CIRCLE 141 ON READER CARD

LETTERS

Editor's note: In his March editorial, "Time For Change," Publisher Carl B. Marbach asked for your opinions on two possible system upgrades for Professional Press: a VAX 6000 Model 400 or a VAX 6000 Model 200/300 plus MicroVAX IIIs. Here are the replies we received.

VAX GAMBLE

My heart says a VAX 6000 Model 400, but my mind says invest in client/server topologies. It's a difficult question, and it makes us all gamblers or romantics.

Steve Sloan
Findlay, Ohio

BIG-VAX SOLUTION

My company, GEC Avionics, first entered the DEC world with a PDP-11. In 1984, we purchased our first VAX, an 11/750. Within a year we had outgrown the 11/750. With word processing, spreadsheets and database programs, we managed to suck up every CPU second the 11/750 could give us. We then acquired two MicroVAX IIs to distribute our users across multiple processors.

Then DEC introduced the MicroVAX 2000 and LAVc, which seemed like a good idea. You could just add another VAX every time you added users. Within a year, we had purchased six MicroVAX 2000s, another MicroVAX II, a VAXstation 2000 and a MicroVAX 3600. There was much debate over many small VAXs versus one hefty VAX capable of supporting all our users. The LAVc appeared to offer a better financial solution, but many of us thought it was only a short-term one. We recently added a couple of VAXstation 3100s for a total of 14 nodes in our cluster.

We're a pure VAX/VMS shop and have no plans to consider RISC or UNIX

systems. For our new fiscal year we've budgeted a VAX 6000 Model 410 with 96 MB of memory and a couple of disk controllers. We're trading in as many of our small VAXs as we can to reduce our cluster to a more manageable size. We've concluded that one large VAX is better than several smaller VAXs. We have several reasons for not wanting many smaller VAXes:

1. System management overhead.
2. Higher I/O bandwidth by avoiding LAVc file accesses (needed for database applications).
3. Redundant copies of VMS resident in memory.
4. Increased hardware maintenance costs.
5. Computer resources (CPU, memory and I/O) from one system aren't available to another. If one system is idle and another saturated, you lose performance.
6. The distributed lock manager has problems when a system crashes. To get locks back where they belong, you have to reboot the entire cluster to make sure the system serving the disk owns the locks for that disk.
7. Cluster reboot time is terrible.
8. Large LAVcs usually require multiple system disks.

On the bright side, DEC has made many enhancements to VMS since V5.0 that have significantly improved our ability to keep our cluster operational.

We're looking forward to the arrival of our VAX 6000 Model 410 and hope it provides the performance gains we anticipate. My vote strongly favors that alternative.

Mark Stephenson
Atlanta, Georgia

UPGRADE BY ENVIRONMENT

I'm a system engineer/manager for a network of DEC and non-DEC computer systems at the Air Force Institute of Technology in Dayton, Ohio. I have the same concerns and questions as far as the best method of upgrading.

Both positions have merit. The VAX 6000 Model 400 approach will provide a faster machine but only to a fixed number of users. You may not be able to add users as your conditions change. Even if you can, the users are still using the same fixed resources. Response (and everything else) will decrease.

The file server approach has the advantage of relatively unlimited users. If your workload changes, just add another

DEC PROFESSIONAL WINS AWARDS

DEC PROFESSIONAL has been named a runner-up in the fifth annual Computer Press Awards. Cosponsored by Citizen America Corporation and the Computer Press Association, the prestigious Computer Press Awards contest recognizes excellence in computer journalism.

DEC PROFESSIONAL won two awards from among more than 800 entries competing in 19 categories. "Computer Slump Or Temporary Confusion" by Publisher Carl B. Marbach (June 1989) won runner-up in the category Best Opinion or Editorial in A Computer Publication. "Dispelling Disaster" by Field Service Editor Ron Levine (December 1989) won runner-up in the category Best Feature in A Computer Publication.

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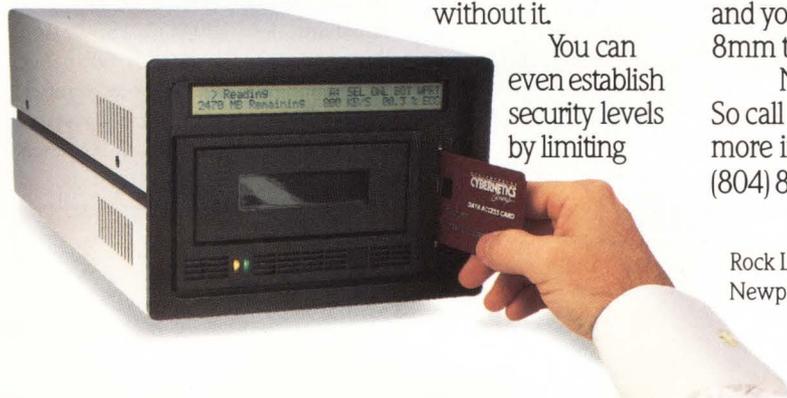
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Convergent	HP	PC MS-DOS	Unisys
Data General	IBM RT	PC Xenix/Unix	Wang

and more...



Correction

In "New Light On Windows" (April 1990, page 28), a portion of Interactive Technology Inc.'s mailing address was inadvertently omitted. The complete address is:

Interactive Technology Inc.
460 Park Plaza W.
10700 S.W. Beaverton-Hillsdale
Hwy.
Beaverton, OR 97005
(503) 644-0111

node and you can have 25 more users.

Throw in the fact that there are virtually unlimited choices of what you can buy for your environment. It seems that every two weeks, announcements come from DEC or its competitors of faster, bigger and better machines. It's difficult to make the best decision.

We believe that the upgrade method you follow depends greatly on your environment. We decided recently that,

instead of replacing our aging VAX 11/780, we would update our existing MicroVAX network and disperse the load. It seems to work fine. As we need more power and capabilities, we add another node. We don't see any decrease in response, and our users are happy.

It would be very advantageous if the Digital performance laboratory mentioned in "Time For Change" could give us data about the response of certain configurations. I'll mention this to my sales representative and get his thoughts.

Dan Zambon
Wright Patterson AFB, Ohio

DISTRIBUTED ADVICE

I recommend the distributed system approach to upgrading your system. This will prove to be the most common and prudent choice through the end of this century, not because of performance advantage, but because of lower risk. The ability to increase computer power

gradually without the major transition of replacing one big box with another undoubtedly will be the preferred choice.

If feasible, consider a switch to a version of UNIX that supports distributed processing. This makes the choice of CPU a minor concern. If you can stick with an open systems standard for the operating system and with applications that conform with the operating system, you'll gain great freedom in implementing future hardware additions or changes.

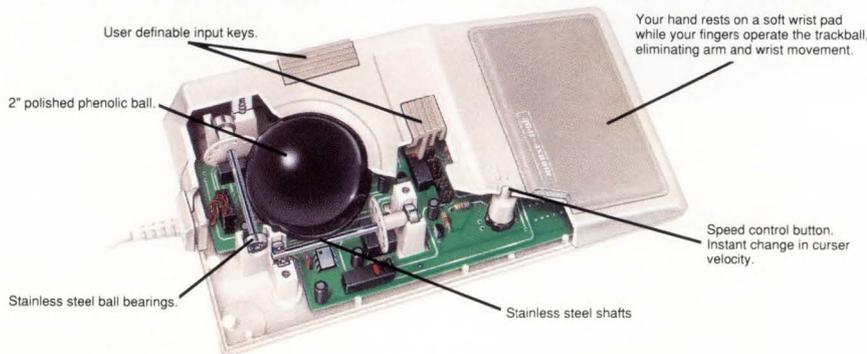
The choice between a RISC or VAX CPU architecture depends on the operating system. VMS gets more performance from a VAX than ULTRIX. Assuming you're using a UNIX-based operating system, the RISC CPUs probably will get the best performance at each server node. The reason for this is the efficiency of optimizing C compilers for RISC CPUs.

As commercial computer systems consumers, we claim to want open systems and portable software. Yet we continue to purchase closed proprietary systems. Major vendors have relatively open products targeted at the government and research communities. Commercial consumers are preoccupied with the immediate price/performance of their purchases. Vendors use our preoccupation to lure us into their proprietary product lines.

When commercial consumers demand open systems with their purchasing dollars instead of empty words, vendors will respond. When it's clear that open systems are an expanding market, vendors will race to produce open systems products at competitive prices. Until then, we must pay more to get the open systems we claim we want.

Richard W. Schroeder
Aurora, Illinois

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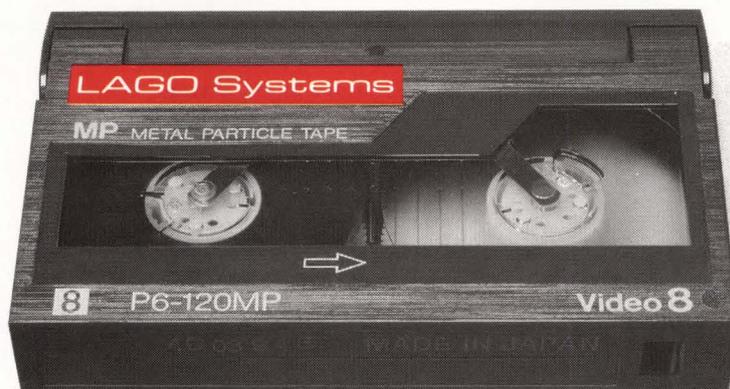
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CIRCLE 274 ON READER CARD

DEC FREIGHT CHARGES

QUERY:

Ray Stone (SIG 91/MESS 92): Do you ever check your DEC freight bills? We received an invoice for our VAX 3100 a few days before the hardware arrived. The invoice listed freight charges for six pieces totaling 3,429 pounds. We awaited the shipment with trepidation, because we're on the second floor of a building with no elevator.

When it arrived, the six boxes were easily handled, making us wonder what the total weight really was. We weighed them and they totalled about 400 pounds. We called DEC and received a credit.

A few years ago I had a similar experience with shipping charges and DECdirect over the method used and the cost for shipping us one manual. I wonder if I've stumbled on a DEC revenue-enhancement policy.

What bothers me is that the original invoice looks like the output from a billing program that has the weight built in for this standard package. What must be the weights for much larger standard packages? Are we an isolated case?

REPLY:

Robert G. Schaffrath (SIG 91/MESS 93): I received an LN03R, which according to the invoice weighed 120 pounds. When I got the printer, the shipping label stated that it weighed about 60 pounds. I'd say it's definitely a revenue enhancer, because DEC seems to create the bill before it determines the actual shipping charges.

SET DEFAULT FOR PRIV ONLY?

QUERY:

Kim Lee (SIG 37/MESS 1311): We use a special connect command for our users

to connect to client directories so that computer use can be recorded. Some people are using SET DEFAULT to bypass this. Is there a better way?

REPLIES:

Michael A. Baydoun (SIG 37/MESS 1312): You could play with the protection of the SET.EXE file in SYSS\$SYSTEM to prevent certain users from setting anything. Or, you could remove the SET command from the violating users' command table. In either case, they wouldn't be able to set anything. Could you make them captive users? If not, write a command file that accepts a variable number of parameters. Set up a symbol for the users such as:

```
$ se*t :== @set.com
```

In the command file, check to see if the first parameter (p1) is equal to some form of the word *default*. If it is, take appropriate action. If not, issue the SET command from the command file and send along the parameters received in the SET.COM command file. If you issue the SET command from the command file with the word *set*, you'll end up calling your own command file, resulting in an infinite loop. A quick workaround is to have another symbol in SET.COM:

```
$ command = set
```

and issue the COMMAND command from SET.COM.

Robert G. Schaffrath (SIG 37/MESS 1315): SET DEFAULT is an internal DCL command, i.e., SET.EXE and SETP0.EXE aren't called. The only way to eliminate it is to get a copy of SET.CLD (either from your VMS05x.A saveset or via

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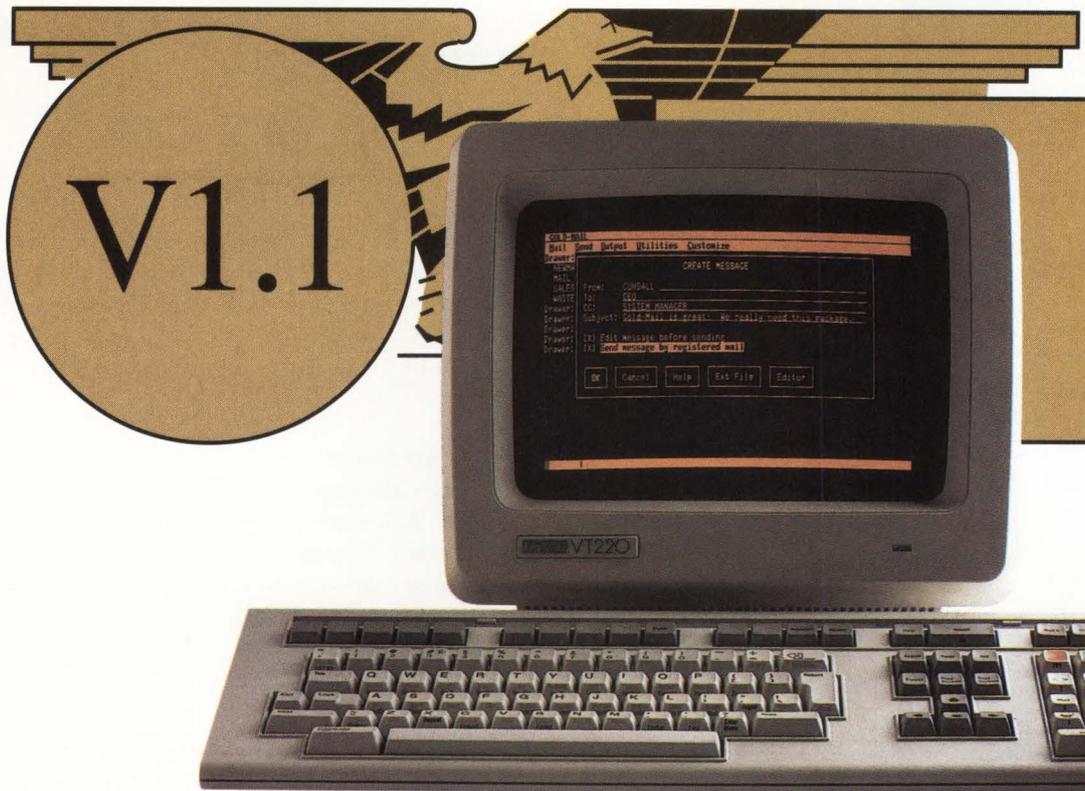
XMODEM and Kermit are available.

SIG Identification

The SIG categories referenced in this month's ARISTALK are:

- 11 Clustering/Networking
- 37 VMS
- 91 Open forum re DEC

VERB.EXE) and delete the default command directly. This means that you have to keep two sets of DCL tables, one for privileged users and one for nonpriv-



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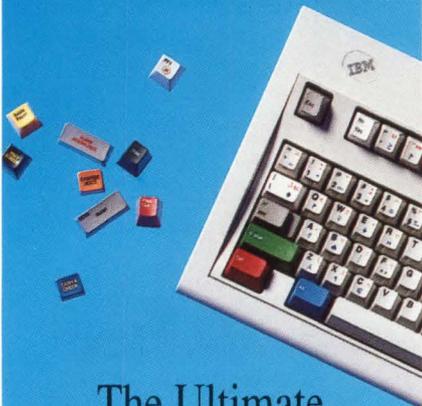
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CIRCLE 162 ON READER CARD

[Report From Dr. R.]

Rigel-Powered VAX 4000

Editor's note: Dr. R. contributes timely information about upcoming DEC products and strategies. Look for his insights on ARIS/BB and in ARISTALK.

■ The MicroVAX 3800 and 3900 teeter on the verge of obsolescence, said sorry state to be precipitated by the arrival of the Rigel-powered VAX 4000 series. Expect the VAX 4000 and a host of other goodies to debut at DECworld Phase I in Boston. The other goodies could include:

1. A VAXstation 3100 successor (PVAX II).
2. A DECsystem 5400 successor.
3. A DECsystem 3100 successor.
4. The much-vaunted R6000-powered MAXserver (uniprocessor Merlin).
5. The VAX 6000 Model 500, now with eight heads, XMI II backplane and XMI I/O.

What about a VME VAX? Sorry, not until next year.

■ Details on PILLAR are few and far between. According to one loquacious ex-DECWest compadre, PILLAR was to have been System Implementation Language (SIL) for VMS and for both PRISM operating systems. Alas, information about PILLAR is hidden within the QUARTZ that once graced Bellevue's glaciers and moraines.

ileged users. Be sure to eliminate the SET COMMAND command from the tables, as well. However, this won't guarantee that the users can't change their defaults. You can change your default drive easily by redefining SYS\$DISK to point to the new drive. But a clever user can write a simple program to call SYS\$SETDDIR and change the default. Your best bet is to set protections on various directories to prevent access.

PRINTING THROUGH DECNET

QUERY:

John Flynn (SIG 11/MESS 542): As I understand it, printing through DECnet can be done only if the file and queue exist on the same node. Are there any other options? For example, if the printer hangs off a DECserver and everything is on a single Ethernet, is there a way for multiple VAXs to share the printer transparently? How are other sites sharing printing resources among multiple nodes in a network?

REPLIES:

Richard B. Gilbert (SIG 11/MESS 543): Issue a PRINT/REMOTE command, but as you noted, both the file and the print queue must be on the remote node. For

occasional use, you can COPY the file to the remote node and then print it.

A printer attached to a DECserver can be used by any node in the network with LAT capability. You need to specify the special LAT print symbiont, which will deallocate the port when it isn't busy. The DECserver does some sort of queuing on its own and will serve various nodes in turn.

If you don't have a DECserver, there's a remote-print facility available on at least one recent DECUS VAX SIG symposium tape. See your LUG librarian.

Comet (SIG 11/MESS 544): Something like the following will help you automate printing across DECnet. Make sure the printer is a spooled device. Then, you can just copy files:

```
$ RPRINT := @REMOTE_PRINT
REMOTE_PRINT.COM
$ IF P2 .EQS. "" THEN P2 :=
  NETVAX::LTA100: ! Remote printer on
                  ! remote node
$ COPY/LOG 'P1' 'P2'
$ EXIT
```

ARTICLE INTEREST QUOTIENT
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Money Matters Made Easy

Dun & Bradstreet Software Services Tailors Online, Real-Time Financial System To VAX Market

The ability of network managers to run identical software packages on mixed platforms was pioneered in part by McCormack & Dodge, now Dun & Bradstreet Software Services. The company's Millenium software operating environment, released in 1983, was the first to provide identical software capabilities on four hardware platforms: Fujitsu, ICL, IBM and the VAX.

Current advancements in Millenium cater to VAX users. As nearly half of its financial applications are in VAX installations, Dun & Bradstreet's latest releases possess a distinct VAX flavor.

A recent modular addition to the Millenium series is FA:Millenium, a VAX-based real-time fixed-asset information system. Preceding the FA announcement, Dun & Bradstreet debuted AP:Millenium, a VAX-based accounts payable information system, and Millenium:SDT, a fourth-generation system development tool.

GL:Millenium, a general ledger information system for the VAX that functions identically to and includes the same capabilities, features and user interface as the IBM mainframe version, was introduced to the DEC market

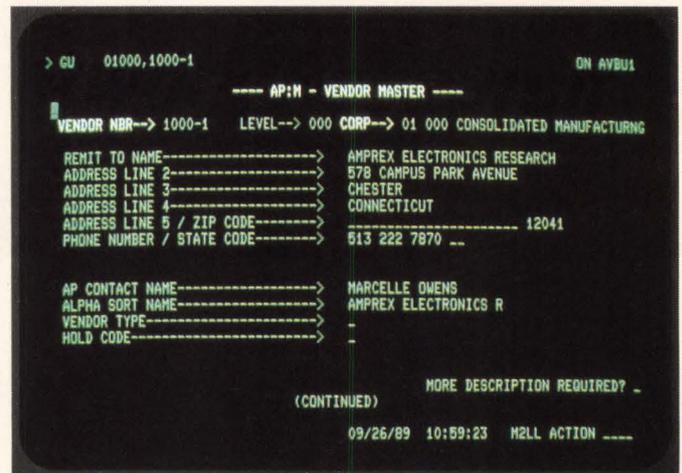
in August 1988.

According to Dun & Bradstreet Vice President John V. Coles, Millenium is "integrated in terms of functionality. The IBM/VAX consolidated functionality is the result of our vision of a multiplatform environment years before it happened."

FA:Millenium automates asset tracking, depreciation and reporting. It also provides automatic tax updates, aiding users in monitoring tax legislation changes and system upgrades.

FA:Millenium on the VAX comes equipped with standard Millenium features such as HELP and QUERY, which provide field-level assistance and up-to-the-minute information from any application.

AP:Millenium features high-volume invoice entry and online edit capabilities. Invoice entry speeds invoice processing, while online editing reduces the need to detect and correct errors. The product calculates favorable payment dates by reviewing options for early-payment discounts and terms of payment on the invoice. It then automatically cuts a check for the predetermined pay date in accordance with the user's banking requirements. It also reconciles cancelled checks against outstanding checks automati-



AP:Millenium provides comprehensive cash management and reconciliation with multicorporate, multibank capabilities.

cally and updates appropriate general ledger accounts once checks are issued.

Millenium:SDT allows VAX users to speed application customization, build applications and related subsystems, and create interfaces between applications. Users may customize applications by changing screens or application logic to accommodate their business needs.

GL:Millenium provides the means for processing financial, accounting and statistical data. Journal entries can be entered and edited online in real-time or can be brought in directly from other subsystems. GL:Millenium can access information quickly, going

from summary information to the transaction level in real-time.

The Millenium software family is available immediately. FA:Millenium, which runs on a range of VAXs, is priced from \$30,000 for the VAX 3600. AP:Millenium and Millenium:SDT are priced from \$39,000 and \$38,000, respectively, for the VAX 3600. GL:Millenium is priced at \$100,000 and is available for systems from the MicroVAX to the VAX 8900 series.

FOR MORE INFORMATION

**Dun & Bradstreet
Software Services
1225 Worcester Rd.
Natick, MA 01760
(508) 655-8200
Circle 431 on reader card**

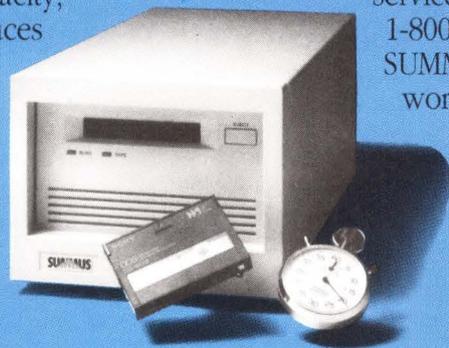
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Grading Your Software

Performance Software Inc.'s V-Test Provides VAX/VMS Software-Testing Solutions

VAX system managers often are hard pressed to gauge new software accurately while meeting strict deadlines. Although few care to admit it, new or revamped software applications too often are installed with minimal testing and regard for capacity planning. Performance Software's V-Test, however, offers VAX managers software-testing solutions that might prevent sleepless nights.

V-Test is a software package that provides VAX/VMS managers with a practical method of testing load conditions and measuring computer performance. Complete testing results are achieved by supplying terminal application inputs automatically and by providing facilities to record terminal response times. V-Test also aids in establishing capacity planning capabilities and system or application tuning. It runs in any VMS environment, including SMP and clusters, and embraces any target software.

"In today's computing environment, project overruns cause testing to be squeezed, which makes the application testing suffer, potentially undermining the product," notes Performance Software's President Tom Hankinson.

The three integral components of V-Test are test-building, a run-time

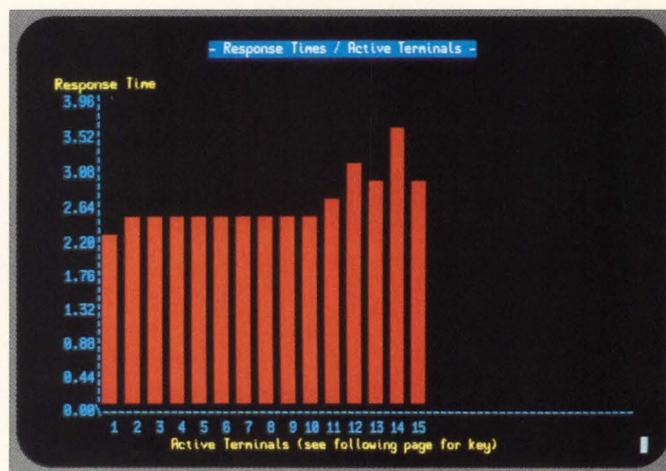
system and results analysis capabilities.

Test-building combines the recording of terminal activity on existing applications with V-Test's script language. Using the terminal session recorder, the script converter and the script compiler, V-Test creates "script preparation." The script provides random data input, multiple test repetition and interrogation of application responses.

The terminal session recorder allows terminal sessions to be recorded into data files. According to

scripts can be replicated at specified rates or at the original recording session speed. The script compiler converts script source files (files that contain script language statements) to script object files. The language statements are receptacles that control the flow of script execution, incorporate random data into the terminal input stream, and examine the terminal application to determine supplied input stream effects.

Before a script is implemented, it's organized by the



This V-Test statistics analysis result screen shows how response times grew, depending on the number of terminals.

Hankinson, terminal input is directed to one file for use in V-Test script development. After the output is sent to another file, the data is used as a baseline for regression testing.

The script converter changes a terminal input session recording file into a V-Test script file. Speed

script compiler and ultimately loaded into a script library, V-Test's housekeeping function.

A run-time system manages the run-time component as a detached process. The run-time process specifies the V-Test terminal

FOR MORE INFORMATION

Performance Software Inc.
28 Green St.
Newbury, MA 01951
(508) 462-0737
Circle 404 on reader card

profiles, passes operational requests to itself, retrieves and displays operational information and allows for audit file inspection. The run-time control system has two operational modes: interactive and standard VMS command line interface. The run-time component is created by the run-time system to create and delete pseudo-terminals and execute scripts. It can also log messages to the audit file and log statistical data to a common statistics file.

V-Test relies on its load statistics analyzer utility to analyze load session testing results. Graphics, tables and listings can be displayed showing minimum or maximum terminal response times over all or part of the load period. The load statistics analyzer utility can run interactively or be driven from the command line and sent to a print file. The format of the statistical file is documented, providing customized recording and analysis of the accumulated data. Data also can be accessed via DATATRIEVE or ported to a PC for additional analysis.

V-Test costs from \$10,000, depending on system processor.



MA92, 3480 on the HSC

Unattended Backup

Nobody Backs Up Your Cluster Like Micro Technology

When it comes to selecting the most efficient, cost-effective form of HSC tape backup, there are just a few serious alternatives. Fortunately, Micro Technology has considered them all for you: the MA-40, 4mm DAT for fast searches and connectivity from workstations to mainframes. The MA-24, 8mm helical scan for high-capacity unattended backup on a daily basis. And the MA-92, 18-track 3480 IBM compatible subsystem, for those times when IBM and DEC exist in the same environment.

They're all 100% HSC 40/50/70 compatible with pure DEC TA emulation. Each includes all the interface capabilities to connect to the HSC5X CA/DA card via the MTI proprietary SCSI-to-STI adaptor, the MA90.

And coming from Micro Technology, you know you can rely on them. Each subsystem is designed with the fewest possible components. That means you get the high-

est reliability and the lowest cost of ownership, every time around. With ratings of 22,000 hours MTBF for the MA-92 and 20,000 hours for the MA-24/40; you can backup a lot of data in the mean time.

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To find out which tape cartridge backup subsystem meets your application needs, write or call Micro Technology today at 800-999-9MTI.



MA24, 8mm on the HSC



MA40, 4mm DAT on the HSC



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Reach For The Sky

*Sky Computers' Skybolt Offers
DECstation Users Accelerated Performance*

DECstation 5000 users looking for increased power would do well to examine Sky Computers' Skybolt application accelerator. By combining Intel's 64-bit i860 and i960 processors, Sky has boosted DEC's most potent RISC-based workstation to levels approaching 40 mips and 80 Mflops, according to Sky marketing manager Cimarron Boozer. Skybolt was first released in November 1989 on VMEbus, Sun and IBM PC-based platforms.

"We have increased the DECstation performance capabilities, accelerating five to 20 times, depending on code vectorization," says Boozer. "These figures border on supercomputing performance."

Skybolt is geared toward such applications as simulation, modeling, finite element analysis, seismic analysis, fluid dynamics, chemistry and financial applications.

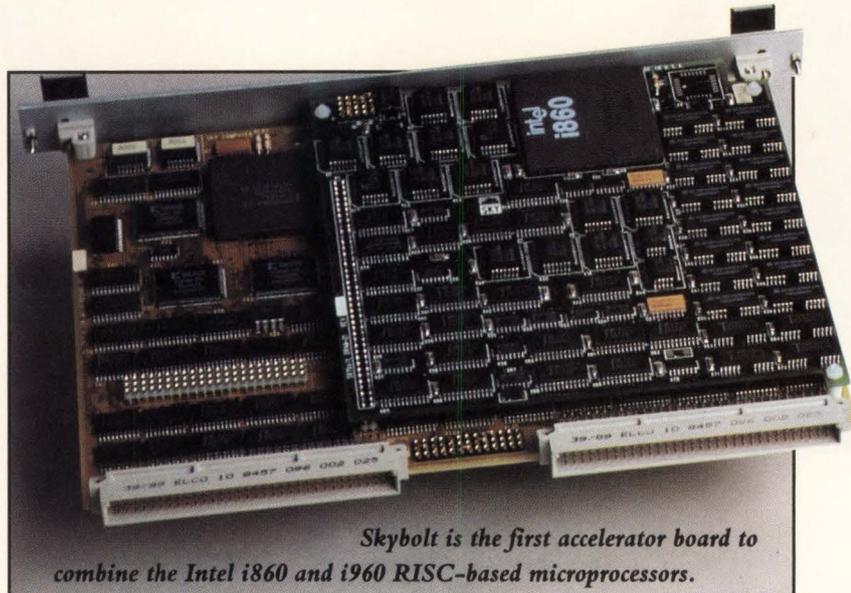
Sky's use of the Intel i860 and i960 processors coupled with enhanced Metaware compilers provides the microprocessing boost. The i860 and i960 processors

combine with the compilers to create Skybolt's embedded processor based on supercomputing design blueprints. The resulting scalar processing, pipelined vector processing, high-bandwidth memory architectures and vectorizing compiler make up Skybolt.

The Skybolt board provides up to 16 MB of memory shared with the main processor. It also boasts a direct memory access engine and a separate onboard channel for external devices. A 32-bit, 54-Mbps interface connects Skybolt to the DECstation 5000 and other devices.

The i860 is a 64-bit processor with a 40-MHz RISC chip that incorporates integer, floating-point and graphic computations. The i960 is a speedy scalar processor that complements the i860 by relieving it of housekeeping duties, handling interrupts, I/O processing and memory management.

Sky relies on its suite of compilers and software tools to help users customize



Skybolt is the first accelerator board to combine the Intel i860 and i960 RISC-based microprocessors.

applications for Skybolt's architecture and to provide an application support library.

The Skyvec C and F77 C and FORTRAN compilers are based on Metaware's High C and Lahey Computer Systems' FORTRAN f77 software. Sky has added a second-generation vectorizing module that automatically produces code during compilation, the same method supercomputing compilers use, according to Boozer. Comparably, compilers normally use preprocessors before compilation, dramatically reducing code performance.

An expansion interface allows connection of custom I/O devices independent of the bus interfaces. Skybolt's internal protocol lets you design an interface to mirror

another device's I/O port.

Notes Boozer, "We offered users Intel i860 and i960 on the same board because we knew the i860 wasn't effective as a general-purpose computer. While it's good at throughput or floating-point, it doesn't handle interrupts very well.

"It is simply not designed to act as a general machine, and this is where the i960 comes into the picture. The i960 acts as another I/O processor, handling polling and VME activity in a parallel processing environment."

Pricing for the DECstation 5000-compatible Skybolt starts at \$12,450, with OEM and system integrator discounts available. Skybolt is expected to ship during the third quarter of this year.

FOR MORE INFORMATION

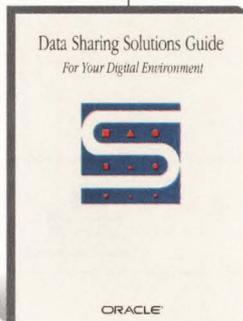
Sky Computers Inc.
27 Industrial Ave.
Chelmsford, MA 01824
(508) 250-1920
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Putting DEC On The Fast Track

ORACLE lets Digital users integrate their VAX and non-VAX computers to create a company-wide data management system.

Digital is the acknowledged leader in providing hardware that networks entire organizations. But everyone still needs the software that will let those systems actually share data.

Which is why so many DEC customers are buying Oracle's family of integrated software products. According to a 1989 Computer Intelligence study, 40% of those planning to purchase a VMS database are choosing ORACLE. That's over twice as many as any other database.



Even DEC's own Rdb.

ORACLE lets MIS departments increase the performance and capability of their existing VAX systems. While also giving them an unlimited choice of hardware, operating systems, networks, gateways to other data and products from independent software vendors.

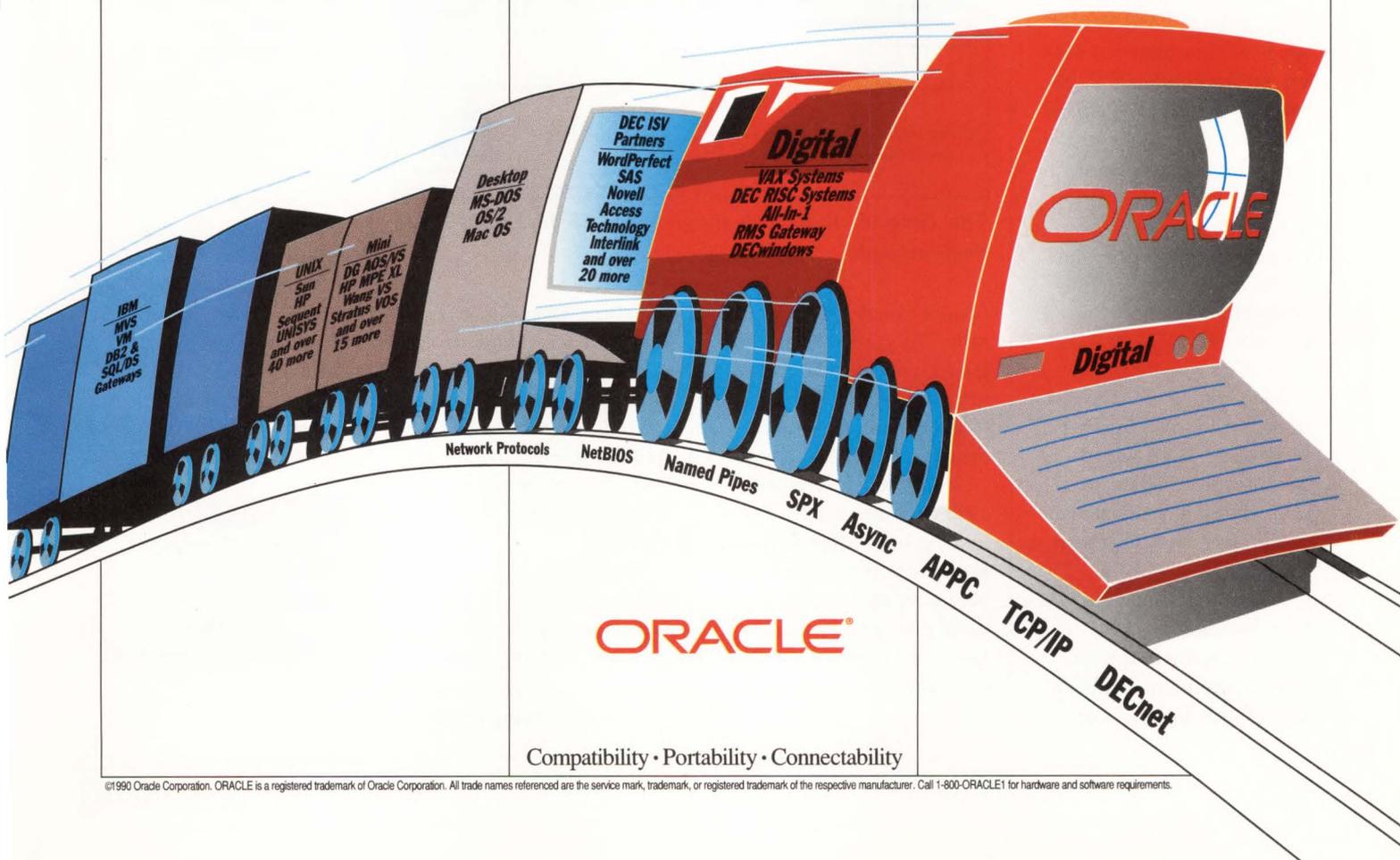
The Oracle family of integrated software includes everything from databases and integrated CASE tools to applications and networking

products. All of it backed by the largest database service, support and consulting group in the world.

To help get you on board, Oracle offers a Data Sharing Solutions Guide. A 150-page step-by-step handbook filled with real-world solutions for connecting VAX systems to DEC's other computers and just about everything else.

Call 1-800-ORACLE1 ext. 1699 to sign up for an Oracle Database conference today. You'll get a free copy of the Data Sharing Solutions Guide. And an open track to the future.

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ORACLE®

Compatibility • Portability • Connectability

Bridging The Gaps

Develcon's internetworking products help solve LAN problems

Have you dreamed of transforming your organization's data processing and data communications facilities into one cost-effective network? Develcon Electronics Ltd. defines this phenomenon as "internetworking" and can help you achieve it with its LAN internetworking products.

Previously, you'd have to integrate multiple products from different vendors to internetwork LANs. You could end up with incompatible local bridges from one vendor, fiber optic interfaces from another and routers from another.

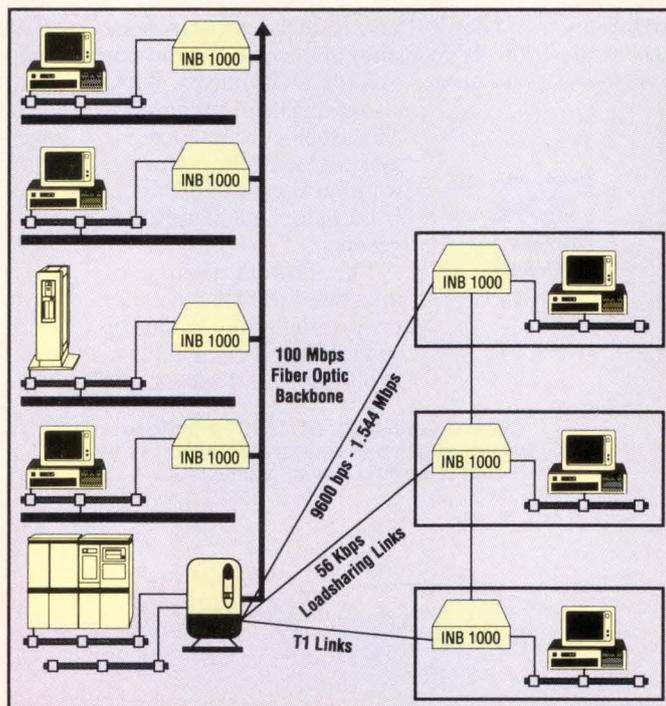
Develcon's products integrate multiple LANs into a single communications network. The combined LANs function as a single seamless LAN, whether the destination is local or remote, without reconfiguration of network resources or changes in user procedures.

Develcon has two fully compatible internetworking product lines: INB 1000 and DevelNet. The INB 1000 is a full-featured, flexible routing bridge. It lets you internetwork up to 32 LANs in local, campus and wide area environments and is independent of all upper-layer protocols including OSI, TCP/IP, DECnet, NetWare and OS/2 LAN Manager.

Each internetworking node permits any combination of LAN interfaces or

network links. Multiple LAN interfaces are available for local applications. Distributed networking applications can use a variety of link

application. Data destined for a remote LAN is routed to the required LAN only, using the best available path. This relieves the backbone



The Develcon INB 1000 integrates up to 32 LANs into a single network.

options from 9.6 Kbps to 100 Mbps. As your network grows, you can add bridge interfaces or links to remote INB-1000 bridges without disruption.

You can link each INB 1000 with integral 100 Mbps fiber or 1.544 Mbps facilities, allowing you to build a corporate internetworking backbone. This backbone can be implemented in the topology best suited for your

or other LANs of unnecessary internet traffic, minimizing congestion.

LAN interface options for the INB-1000 are up to three AUI transceiver (DB15F) or BNC connectors for ThinWire (10Base2) Ethernet.

Also bridging the gap of LAN interconnectivity is Develcon's Model 7183 Ethernet Bridging System. Part of the DevelNet series of internetworking products,

Model 7183 is the card used by DevelNet to provide integral bridge functionality.

Distributed or remote applications of the Model 7183 can use a wide variety of facilities from 9.6 Kbps to 100 Mbps including 1.544 Mbps. Each 7183 bridge card supports a single Ethernet LAN interface with AUI transceiver or ThinWire (10Base2).

DevelNet's functionality is similar to that of the INB 1000's, but it increases the number of LAN and network interfaces available within a single chassis. The INB is limited to four LAN or link interfaces, while DevelNet can support up to 32.

In addition to internetworking LANs with integral bridges, DevelNet also supports many integral gateways including TCP/IP, X.25, 3270 protocol conversion and asynchronous interfaces.

Develcon's interworking product costs vary depending on the application. Ready-to-run INB bridge products start at \$6,000. A DevelNet Node configured for bridging starts at \$10,000.

FOR MORE INFORMATION

Develcon Electronics Ltd.
515 Consumers Road/Ste. 500
Willowdale, Ontario M2J 4Z2
(416) 495-8666
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**EM320 is a versatile VT320 emulator and communications program.
EM320 eliminates the need for a dedicated VT320 terminal.**



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EM320

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- Extensive Online Help Library
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EM320 includes more productivity features than the competition and runs on most popular PC networks. EM320 is easy to install, is backed by a 30-day no-risk purchase policy, and a Toll Free support number.

Diversified Computer Systems has been providing terminal emulation productivity tools to PC users for seven years.

For more information, contact:



Diversified Computer Systems, Inc.

3775 Iris Ave. Suite 1B, Boulder, Colorado 80301
(303) 447-9251 FAX: (303) 447-1406

Other DCS emulators: EM4105 — Tektronix 4105
EM4010 — Tektronix 4010

Fast COBOL

Acucobol's Enhancements Add Speed And Portability To A Tried-And-True Language

Reports of the demise of COBOL are premature. Recent enhancements to the widely used programming language by Acucobol Inc., including upgrades in speed and portability, have signaled a new era for COBOL users.

Acucobol-85 was developed as an in-house response to user concerns regarding long delays in running applications, according to company president Dr. Pamela Coker. "Over the last 10 years, COBOL programmers have written more than 10 million lines of code," says

Coker, "so we were fairly certain the language was being used. But problems in file systems, run times and COBOL compiling forced us to develop solutions on our own."

These solutions include a speedier compiler, extensions for boxed, reverse-video and pop-up windows, color, scrolling, machine-independent file and directory name handling, file locking, and index file compression and encryption. Perhaps the most intriguing feature of Acucobol-85 is its portability

to most major platforms, including VAX/ULTRIX and VAX/VMS, without changing code.

Acucobol-85 runs on 150 platforms under AIX, MS-DOS, OS/2, Netbios, ULTRIX, UNIX, VAX/VMS and XENIX. It also transports applications to new models, supporting Mips, SPARCstation and VAX.

A COBOL application needs to be recompiled only once in Acucobol-85, using its own run times to allow the object code to run on any supported platform. It requires the maintenance of only one version of source code while supporting multiple operating environments. Acucobol-85's object code is compact, five to 10 times smaller than comparable code compilers. Written in C, it ports to new RISC architectures, such as the 88000, 68040, SPARC and IBM RISC, as well as the Japanese G-Micro Chip.

Acucobol-85 compiles four to 10 times faster than other compilers, according to Coker. One Acucobol-85 user recently recompiled a 400,000-line system in less than 45 minutes, an eye-opening improvement over the average recompile time of 4 1/2 hours. Clock times

FOR MORE INFORMATION

Acucobol Inc.
7950 Silverton Ave., Ste. 201
San Diego, CA 92126
(619) 271-7097
Circle 507 on reader card

range from 7,000 to 12,000 lpm on a PC-AT to more than 50,000 lpm on RISC-based platforms.

Acucobol-85 manages configuration control internally within COBOL, eliminating the need for extensive coding within large database files. Its SET FILE-PREFIX verb lets you identify which directory contains a data file. Only one SET FILE-PREFIX statement is needed to access a different directory set, allowing you to control configuration within the Acucobol-85 environment.

Acucobol-85 is fully compatible with RM/COBOL and has a VAX/COBOL compatibility mode. Applications written in VAX/COBOL can run in Acucobol-85 and vice versa. Acucobol-85 applications can talk to other VAX/VMS applications through the RMS file system.

Acucobol-85 costs from \$3,000 on MicroVAX platforms and from \$6,000 on VAX platforms. It costs \$2,000 on a standalone and \$3,000 on a network DECstation 5000 workstation.

```

display "performance of RM/COBOL-85.".
display "by switching to " "ACUCOBOL-85", bold, "you".
display "gain faster compile times and".
display "the power of a source-level".
display "debugger.", no advancing.

perform return-to-continue thru return-to-continue-end.
portability end.

Windowing.
display window line 2, lines 21, erase.
if has-color = "Y"
    add blue, backgrnd-white giving border-color;
else
    add black, backgrnd-white giving border-color.
display window line 4, column 16, size 47, lines 14,
    boxed, color border-color,
    title "ACUCOBOL-85 Screen Manager".
-----ACUCOBOL-85 Debugger-----
DEMO 0105D: d item-part-no
00153
DEMO 0105D: b dis-terminal-attributes
DEMO 0105D: d machine-operating-system
MS-DOS
DEMO 0105D: gp dis-terminal-attributes_
    
```

Acucobol Inc.'s Acucobol-85 provides its own interactive source code debugger.

UNATTENDED BACKUP WITHOUT TAPESYS® IS LIKE CAKE...

...WITHOUT THE FROSTING.

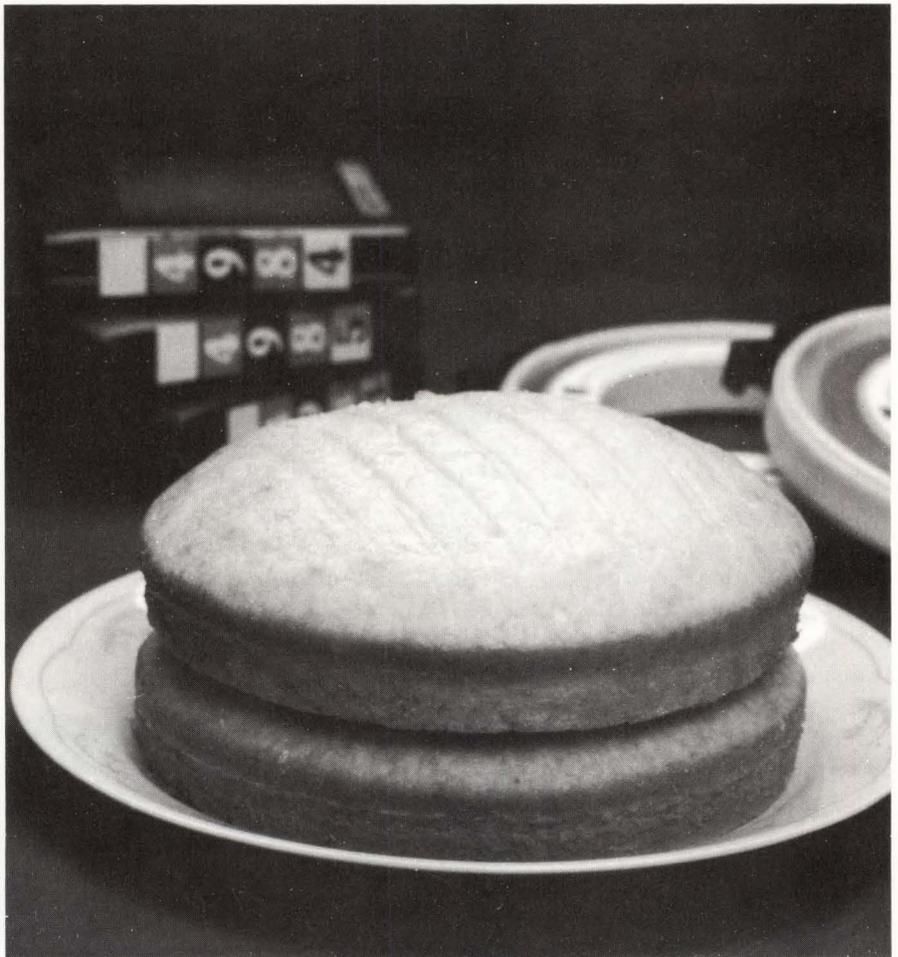
Who wants cake without frosting? It's just not complete! Just like running unattended backup is incomplete without TAPESYS®, The VAX/VMS Tape Management System.

Unattended backup by itself gives you the ability to start your backups and let them run unattended. But, you still need to be able to find those backed up files and you need to be sure that the wrong tapes aren't erased in the process. When it comes time to restore files, TAPESYS® gives you a quick and easy way to find them and bring them back!

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TAPESYS® is also available throughout Canada, the United Kingdom, Europe, and Australia.



SOFTWARE PARTNERS/32, INC.

Integrated Control

Integrated Systems' Interactive Animation Module Aids In The Development Of Real-Time Embedded Control Systems

Integrated Systems Inc., software tools supplier for control systems design and development, announced the Interactive Animation Module, a simulation/animation tool integrated into a comprehensive CAE/CASE tool environment for the development of real-time embedded control systems.

Interactive Animation is useful for demonstrating and modeling system design behavior to management or customers and for understanding the operation of the design. It also permits designers to debug systems in real-time, thus reducing development time. This addition to the company's product line is in response to demand by electronic control system designers working for aerospace, automotive, computer peripheral and industrial automation OEMs.

Interactive Animation lets designers visualize and demonstrate the performance of a complex simulated control system before the design is committed to a hardware prototype. The engineer can interact with the animated simulation by making online changes to the model during the animation.

A graphical interface allows the engineer to create control display panels from a palette of dynamic icons

representing such things as onscreen strip charts, meters, dials, LEDs, switches and knobs. With a system mouse, the designer can click on input icons to change the model's parameters during simulation to evaluate system performance interactively. The user can create his own icons.

"A major problem with system design is the delay between model building and the evaluation of simulated results," explains Don Rich, vice president of marketing. "Engineers can spend weeks repeating this cycle. Interactive Animation accelerates this process by letting users interact with a real-time visual execution of the system model."

Interactive Animation is linked to the company's Matrixx engineering analysis, design, modeling and simulation software environment. It requires Matrixx and SystemBuild V2.0 or later.

Matrixx is an interactive engineering analysis and design package. It's used by the engineering team to conceptualize and organize the design and perform a variety of analyses. It incorporates hundreds of engineering functions and graphic routines. SystemBuild is a graphical programming environment that models the control system and the physical world. It lets the user perform linear and nonlinear system modeling and simulation and

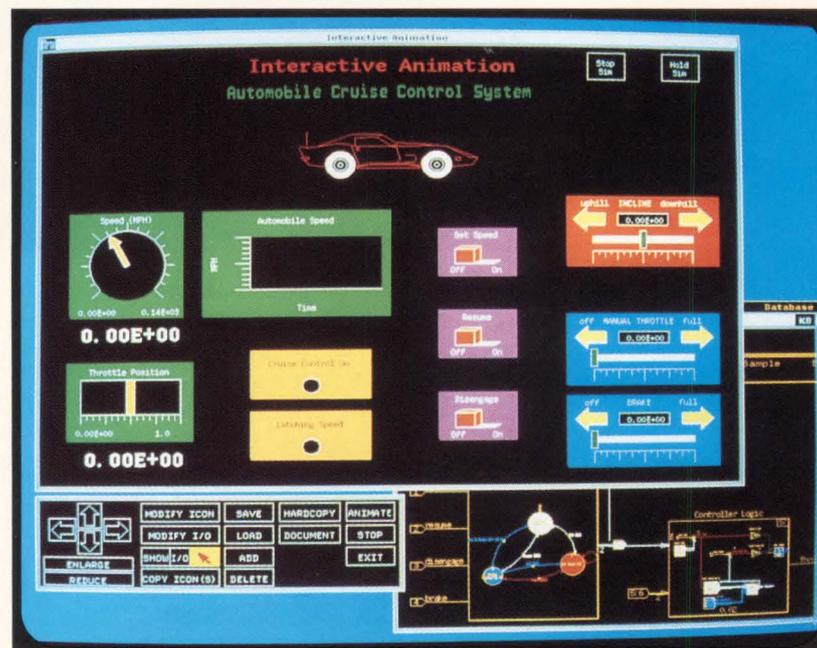
FOR MORE INFORMATION

Integrated Systems Inc.
 2500 Mission College Blvd.
 Santa Clara, CA 95054
 (408) 980-1500
 Circle 400 on reader card

creates WYSIWYG models with engineering diagrams. Each diagram can be decomposed into smaller functional blocks.

The products run on DEC, HP-Apollo and Sun engineering workstations, VAX minicomputers and mainframes, and IBM PC/XT, PC/AT and PS/2 microcomputers and compatibles.

Interactive Animation is priced at \$5,000 in single-unit quantities. It initially is available on the VAXstation running VMS.



The Interactive Animation Module provides an interactive, graphical simulation environment.

Which terminal emulation keyboard would you rather use?



We thought so too. The *PowerStation* is an exact VT200/VT300 layout keyboard that plugs into your PC. The *PowerStation* brings VAX applications to your PC without having to rely on messy labels.

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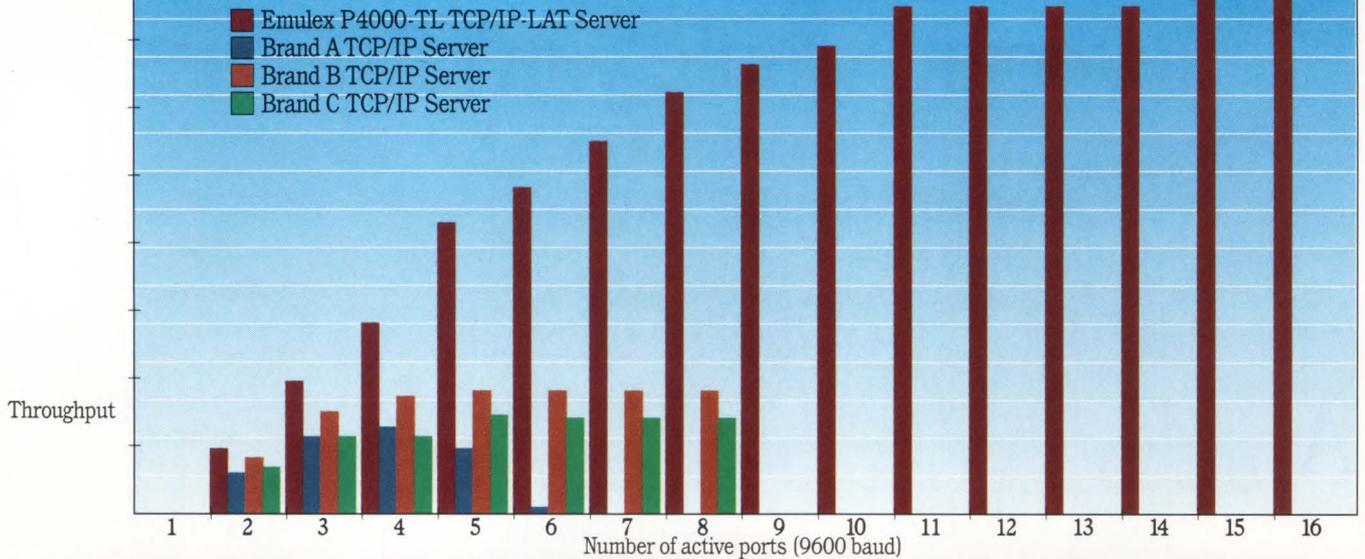
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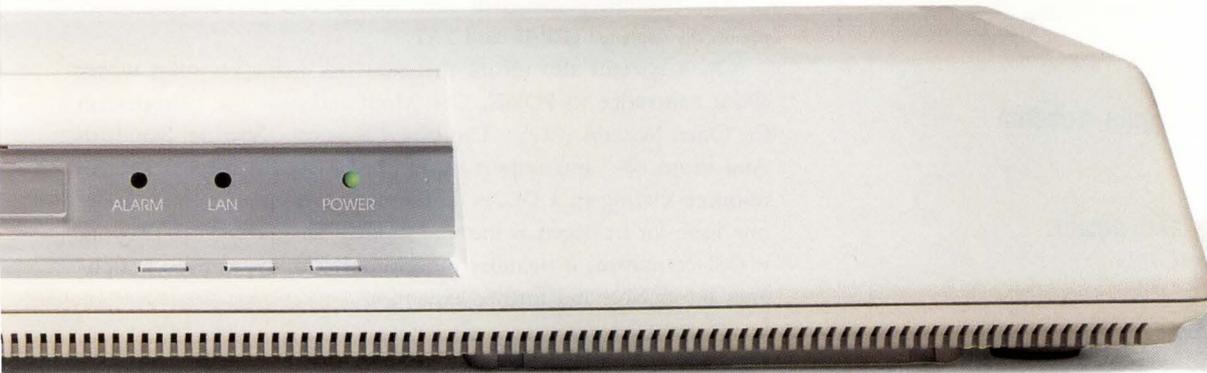
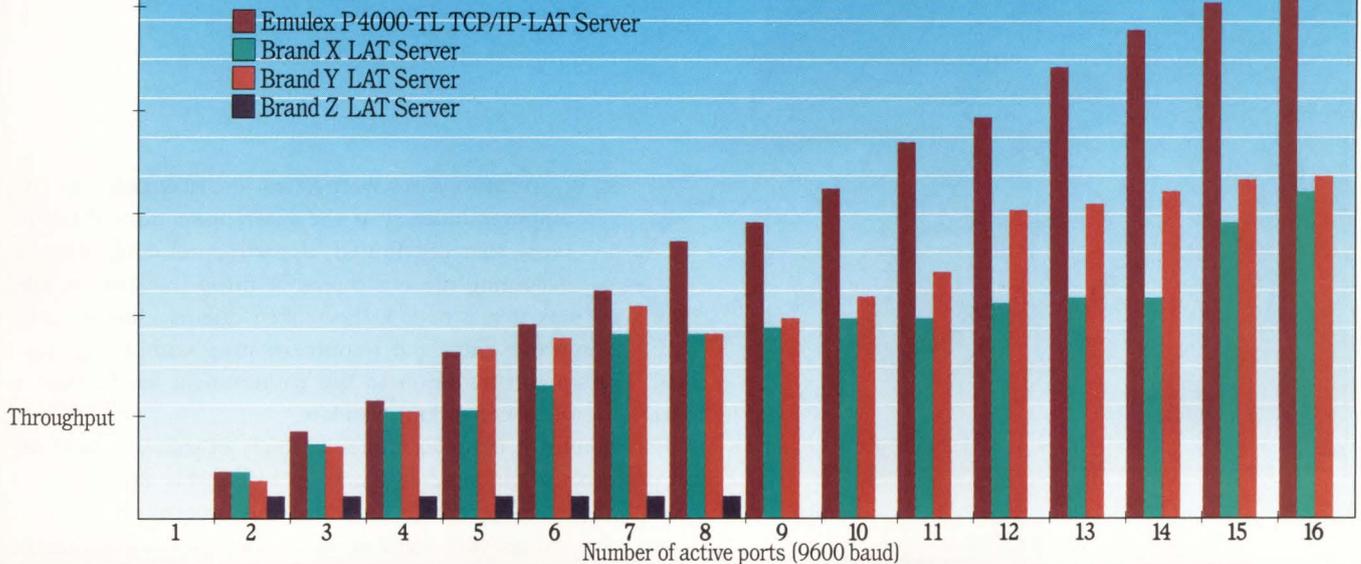
Emulex also tested the P4000-T TCP/IP and P4000-LAT single-protocol terminal



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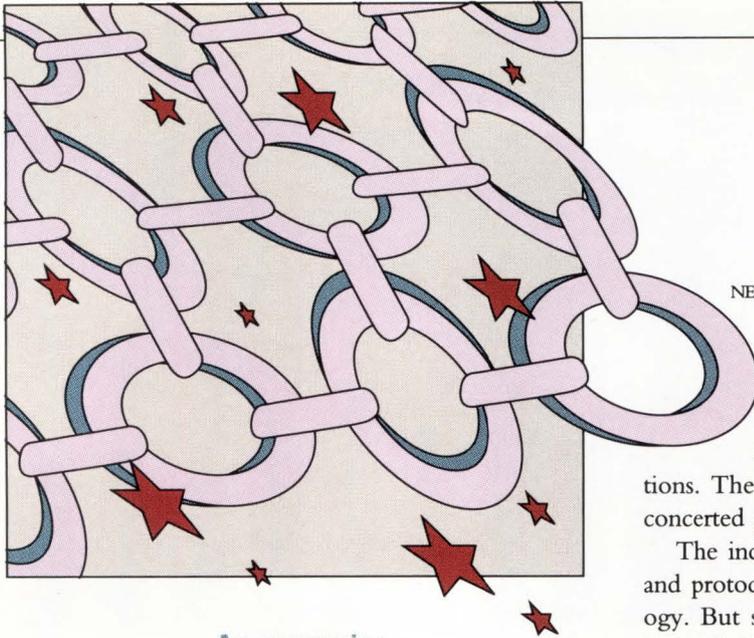


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As companies
link their LANs,
users gain freedom
and power.
But sharing
resources such as
printers presents

network managers
with complex
problems.

■
EVAN BIRKHEAD

ONE OF THE MOST IMPORTANT AREAS FOR PIONEERING IN THE computer industry is the interconnection of LANs. Now that distributed, departmental computing is becoming more accepted at many installations, the next step is to link these often dissimilar networks to improve data- and resource-sharing within organizations. The smooth transition to this environment has become a concerted goal of networking vendors.

The industry is using an impressive body of software standards and protocols as the building blocks to realize this new technology. But so many standards exist that the issue often becomes clouded. For the network manager, sifting through them is a nightmare. Particularly at VAX sites, which are heavily network-oriented, managers must concern themselves with compliance to major industry standards such as OSI and EDI and transport protocols such as TCP/IP and LAT.

Open systems also means that network managers must worry about adherence to POSIX, OSF/Motif and now the Corporation for Open Systems (COS). The box, "Resource-Sharing: Standards And Protocols," lists important standards. But for the purposes of resource-sharing in a DECnet/Ethernet environment, the number one issue for managers is the OSI model. These days, if a network is OSI-compliant, it includes the groundwork for smooth peripherals integration and further expansion.

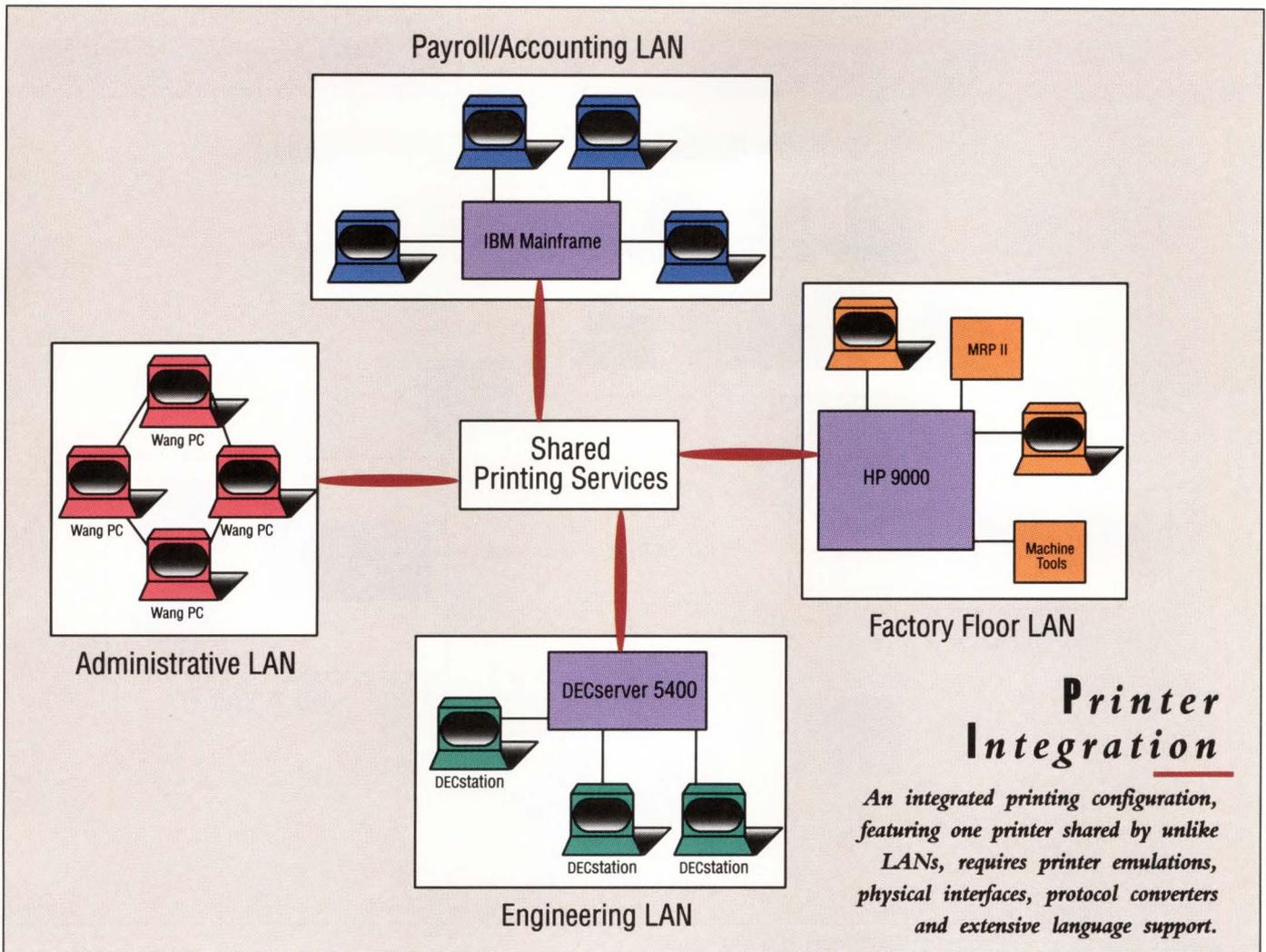
DECnet And Ethernet

The Ethernet networking market, which encompasses virtually every major networking architecture and open systems standard, is at the core of most network product development. Your ability to interact with Ethernet varies depending on whose computer and whose networking software you're using. The race

to create hardware and software solutions that make connections among LANs cheaper, faster and seamless is heated.

Luckily, today's VAX-based client/server networks are efficient managers of resources and peripherals, so linking Digital networks is less of a hassle than with many other networks. Additionally, Digital offers proprietary software and gateways that tie VMS-based networks with ULTRIX, UNIX or IBM/SNA networks.

The ability to make an integrated set of printing resources available to a variety of users in an open heterogeneous network has been called "printegration" by one printer vendor, Kyocera



Printer Integration

An integrated printing configuration, featuring one printer shared by unlike LANs, requires printer emulations, physical interfaces, protocol converters and extensive language support.

Unison. Realizing this concept in the multivendor world involves multiple physical interfaces and networking cards, protocol converters, support for graphics languages such as Adobe's PostScript, and printer emulations. Put simply, printegration can't occur in the real world without a solution that involves a jumble of software and hardware components to ensure the support of a variety of platforms.

For example, tying IBM mainframes to desktop printers in an MIS department requires that the printers play in IBM's PROFS and DISOSS environments. To support VAXs, UNIX workstations, PCs or Macintoshes, the same printers require additional components.

When linking purely Digital networks based on the client/server architecture, however, accessing remote printers isn't

a problem. The problems arise when the networks use dissimilar operating systems and protocols.

Easy access to distributed printing and communications devices is at the core of the DECnet/OSI and VAX/VMS philosophies. The resource-sharing capabilities of VAXclustering is the best example of this. Nevertheless, system managers have felt badly burned by the fact that Digital's DECnet Phase V and NAS network blueprints aren't yet fully defined or available as tangible products.

The Near Future

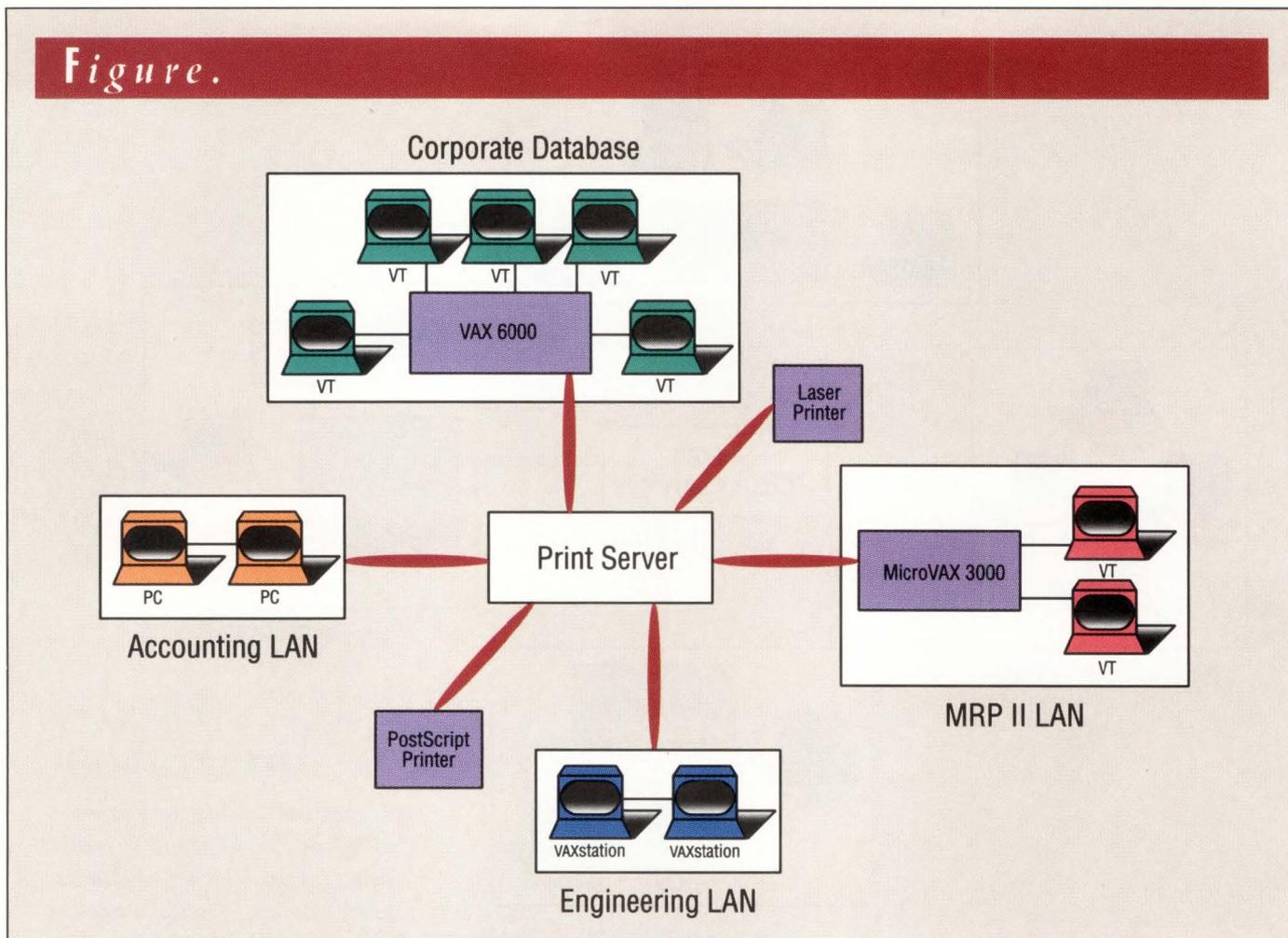
Many of these challenges are ironed out nicely by John McQuillan, a Digital networking consultant and a developer of the Arpanet. McQuillan maintains that the implications of the continued growth in PCs, LANs and distributed processing

(i.e., distributed databases and resources) include a growth in both client/server and peer-to-peer computing, which Digital calls desktop computing.

This networking model will coexist with other models, according to McQuillan, and no model will dominate, at least in the near future. Other models include interactive terminals (in which the storage and user interface are remote) and PCs with terminal emulation or micro-to-mainframe communications (in which there's a measure of local processing).

Significantly, most of the new applications available are for client/server computing. This style of computing, in which Digital has invested heavily, is distinguished from the others in that the entire user interface is located on the workstation.

Figure.



A distributed print server application at the fulcrum of a VAX network.

McQuillan predicts that “more user devices will be on networks,” noting that “different parts of applications already reside on different machines.” The “islands of automation” buzzword heard so much in the early 1980s will fade.

Mainframes and other large computers will act as servers, and the desktop steadily will become the center of creativity in the computing universe. The general trend is an increase in power and flexibility for desktop users through freer access to networked applications and resources. This power grows exponentially as LANs are connected to LANs. McQuillan calls this trend “the democratization of computing.”

McQuillan says that this network will involve a balance of freedom and discipline. The freedom on the desktop can exist only if there’s discipline along

the network. That means solid protocols and standards that act as good traffic cops and network managers who know how to use them.

Client/Server Printing

In Digital’s enterprise blueprint, printers fit into the networking scheme as a fundamental component of the client/server product set and philosophy. Printer functionality generally can be shared by several desktop users through print servers (see Figure). Like other servers, print servers are computers accessible to other devices on a network that allow users to share resources.

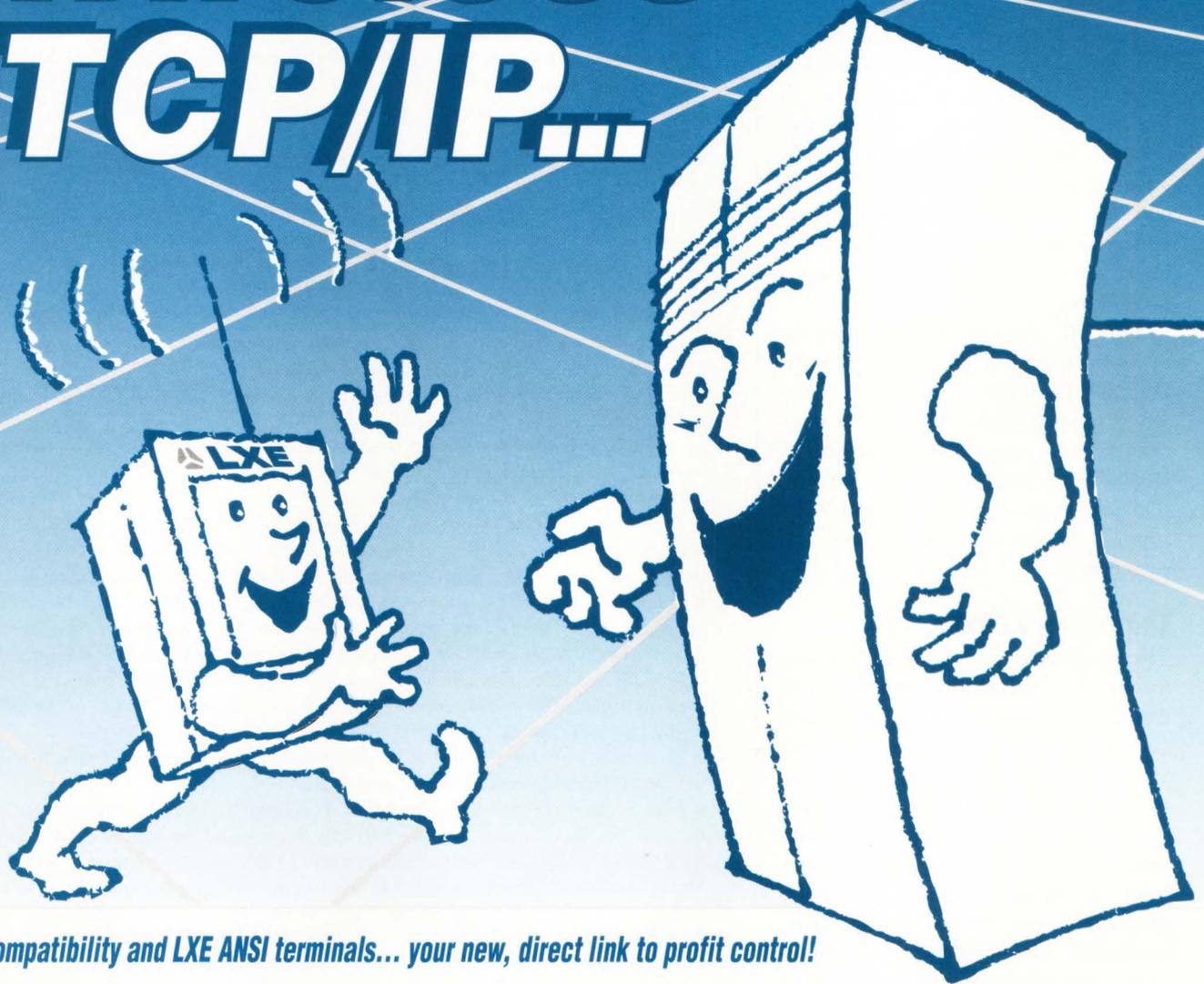
The print server in this configuration also could be designated as a file server, application server or compute server that can be accessed from across the network. In the Digital OSI environment, addi-

tional servers — for example, servers that connect LANs to WANs — are part of the seamless network. Digital’s PrintServer 40, which comes with client and support host software, is often used in such a configuration. Additionally, terminal and communications servers from vendors such as Datability Software Systems and Xyplex can easily support printers (using LAT or TCP/IP) with the same configuration.

Print servers allow several users to share printers, which is a capability that only recently has been perfected. This is a big plus, especially when you consider the cost of laser printers and today’s extravagant color printers.

By using distributed printers, an organization can respond to change quickly, adding resources where the demand is greatest. Many users can share

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a printer while using different applications, often printing multiple formats on various sizes and types of media.

Resource Distribution

In true network computing, in which different computers and workstations communicate as peers, users can tap the applications and other resources of any computer along the network, regardless of the type of terminal or workstation on the desktop. Moreover, users needn't concern themselves with where these resources and applications reside. With its comprehensive set of network peripherals servers and software, Digital is probably closer to achieving this goal than its competitors are.

ULTRIX V4.0, for example, features a media kit with client support for Digital's PrintServer series of printer servers, which means that these peripherals are now interoperable with each of Digital's operating systems. In addition, the new version of ULTRIX includes support for many new systems and peripherals.

Third-Party Activity

The long-term purveyors of printing machines in the Digital world — CIE America (formerly C.Itoh), Datasouth Computer, Facit, Printronix, Talaris Systems and Taneum, among others — are well-versed in the problems facing today's network manager regarding peripherals sharing. Many of these solutions are geared toward eventually providing enterprisewide printing integration. Industry-standard communications and print controllers and servers are available from most Digital-industry printer vendors, and most offer ways to optimize performance and functionality in network settings.

Companies concentrating on this area of technology have developed a variety of approaches to the same general issues involved in printer integration:

- Bay Technical Associates, which designs and manufactures peripheral-sharing devices, has developed LaserShare, an internal buffer and spooler that lets any Hewlett-Packard LaserJet-com-

RESOURCE-SHARING: STANDARDS AND PROTOCOLS

Distributed resource-sharing is perhaps the fundamental advantage of Digital's enterprise networking architecture. In the context of sharing printers and other peripheral devices on VAX networks, let's look at the major standards and protocols from the top down:

- Digital's Enterprise Management Architecture (EMA) is an open-ended, all-encompassing networking strategy. It specifies connectivity among network nodes (X.25, ISDN) and data interoperability with the outside (PCSA, DECnet/SNA).
- Open Systems Interconnect (OSI) is the International Standards Organization's (ISO) networking model. DECnet/OSI, which is compliant with the model, is the fundamental component of EMA.
- Network Application Support (NAS) is Digital's unfinished applications integration environment. One of the four components of NAS is Information and Resource Sharing Services, which allows users and applications to share networkwide information and resources. The other components are Applications Access Services, Communications Services and Operating System Services. These services are available to VTs (ULTRIX or VMS) and workstations running DECwindows.
- Portable Operating System Interface (POSIX) is an industry-standard operating system extension that defines the Operating System Services portion of NAS. It provides an operating system interface for applications portability.
- Sun Microsystems' Network File System (NFS) has become a LAN file management standard and is supported by Digital.
- MIT's X Window System is a connectivity standard that specifies a graphical user interface (GUI) look and feel. DECwindows is based on X, and both OSF/Motif and AT&T's Open Look contain X components.
- Digital's Compound Document Architecture (CDA) contains the Digital Document Interchange Format (DDIF), a Digital-standard protocol for networked compound documents. It was designed to let users share text, graphics, tables and other data.
- Computer-Aided Acquisition and Logistics Support (CAL) is the Department of Defense's (DoD) standard for information and document management. It defines a suite of standards that's an architecture for creating and transmitting technical information.
- The ISO's Office Document Architecture (ODA) is another complex document standard that specifies document processing styles and structures through to the generation of the document image.
- Electronic Data Interchange (EDI) is a standard for the computerized exchange of standard business documents or forms transactions.
- Adobe Systems' PostScript is the standard language that graphics printers read.
- Initial Graphics Exchange Standard (IGES) is a standard for graphical data transfers.
- DECprint is Digital's Print Services portion of NAS, part of Information and Resource Sharing Services. It provides a way for users to print from a variety of systems to a variety of output devices without specifying exact formats or print characteristics.
- Digital's Local Area Transport (LAT) is the proprietary VMS transport protocol for terminals and printers, and TCP/IP is the corresponding UNIX-standard protocol. On a typical Digital network, the two often coexist. They'll soon coexist with OSI. —E.B.

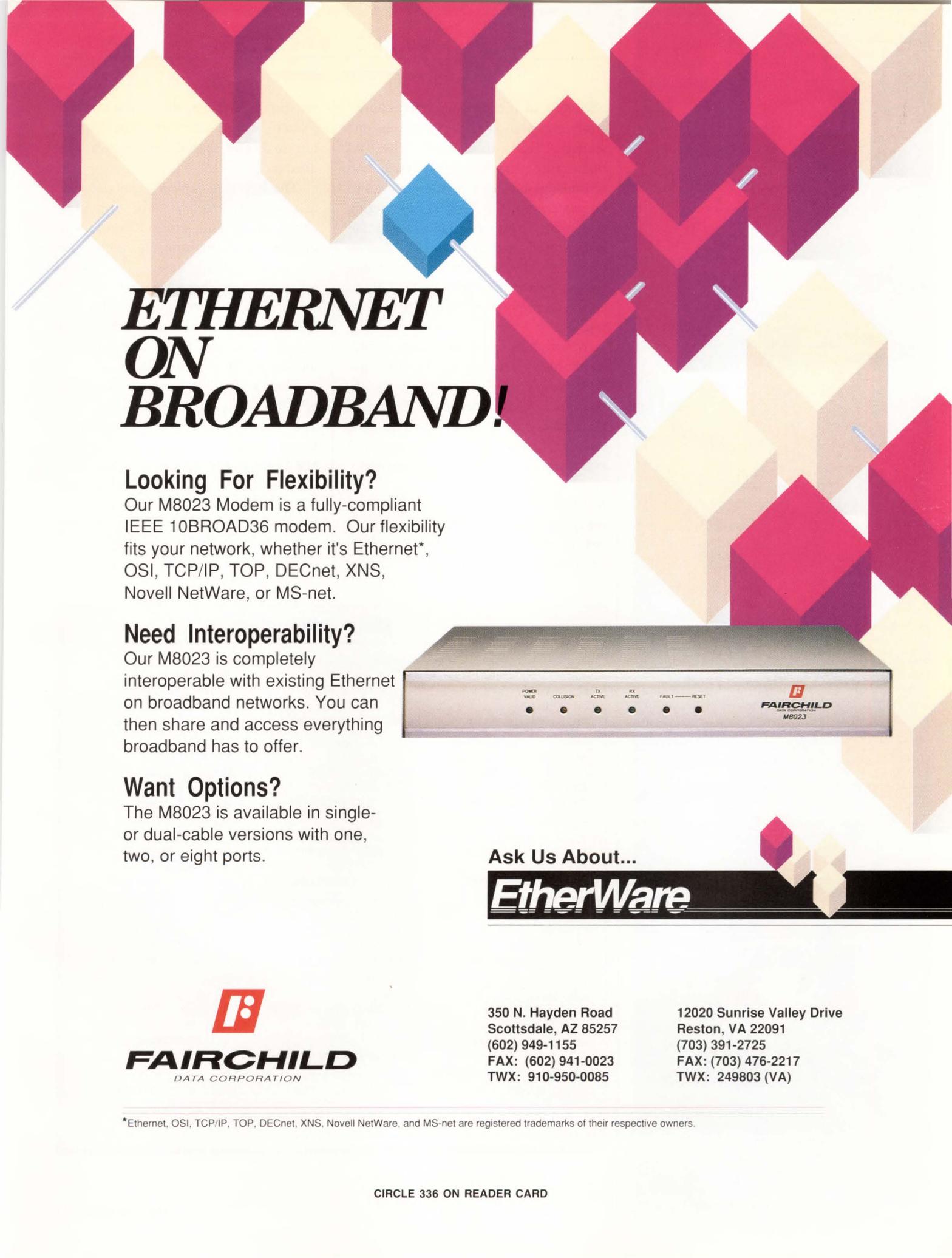
patible printer be shared by up to four computers.

- Crystal Point has designed a software gateway product called LineLock that lets modems be shared. Laden with security functions, this program provides control over network modem access by permitting multiple modem servers to share a network database and to monitor the network's modem pool remotely.
- Gold Key Electronics makes an elec-

tronic switch box that allows multiple users to share and select from multiple printers in a LAN environment. It comes with an LN03 emulator for HP LaserJet printers.

- GrayMatter Software & Consulting offers ScriptServer Software for VMS, which lets PostScript printers (including color printers) tie into VAX networks via LAT and PCSA.

An integrated printing strategy is



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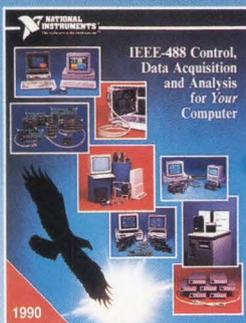
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OUTPUT DEVICES

necessary in the democratized client/server organization of the future. In one scenario, that could involve the IBM mainframe that handles payroll and accounting and shares printing services to output checks; the VAX in engineering that prints complex graphics; the HP system used for MRP II on the factory floor; and the Wang word processing systems used in an administrative LAN to create correspondence (see diagram on page 39).

Meanwhile, companies such as BGL Technology, Advanced Technology, QMS and Tektronix continue to improve the state of the art and the price/performance ratios of laser printers. The sharing of these advanced products will eventually lead to even greater savings.

SHARING IS THE KEY, AND IT'S AVAILABLE inexpensively on OSI platforms. Inherent in DECnet and the rest of Digital's networking product set is support

for shared databases, shared printers and plotters, shared array processors, shared terminals and shared communications devices.

The best rule of thumb for network managers to follow when making configuration and location decisions is that the most cost-justifying printers are the ones constantly in use. That means printers should be interfaced with as many different systems as possible. The technologies to do this efficiently, which include client/server and third-party solutions, are quickly multiplying.

Editor's note: For a comprehensive listing of output devices that work on Digital systems, including vendors and equipment specifications, consult the DEC PROFESSIONAL Hardware Buyers Guide. For information about the Guide, contact Lea Smith at (215) 957-1500.

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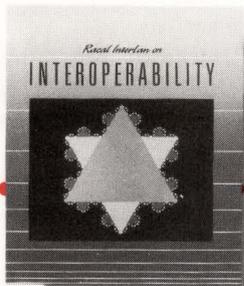
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FOREVER

PostScript

Despite competing technologies, Adobe Systems' page description language will remain a standard. KEVIN G. BARKES

WHAT A DIFFERENCE SIX MONTHS MAKES.

At the fall 1989 Seybold professional publishing conference, it appeared that PostScript and its parent, Adobe Systems, were in serious trouble. Apple Computer announced it was selling its Adobe stock and developing Royal (also known as TrueType), its own "open" font technology. It was replacing PostScript fonts in new versions of its Macintosh system software, stanching Adobe's impressive royalty income and terminating a relationship that had single-handedly created a new industry — desktop publishing.

Even worse, Apple and Microsoft revealed an arrangement in which Microsoft licensed TrueImage, its clone PostScript interpreter, to Apple in exchange for the TrueType fonts. Microsoft also said it would use TrueType in future releases of its graphical user

interface (GUI), Windows. It was a stunning announcement in light of the continuing litigation between the two firms over Microsoft's alleged infringement of Mac copyrights with its Windows interface.

Adobe stock prices dropped. Great gnashing of teeth occurred in the publishing industry, as NATS (not another type standard!) jitters besieged those with huge investments in PostScript and Adobe fonts.

Then came the March Seybold conference and IBM's announcement that it had selected Adobe's Type 1 fonts and Adobe Type Manager font-rendering technology for its System Application Architecture-compliant (SAA) operating systems, including OS/2, OS/400, VM and MVS. IBM had already chosen Display PostScript for its new UNIX desktop

systems, and the SAA scheme would be compatible with the AIX Windows and Next Step implementations.

Big Blue did say it would offer the TrueType font scheme, but only on OS/2 systems. Since fewer than 220,000 copies of OS/2 have been sold since its introduction, that wasn't much of an endorsement.

IBM's decision was more practical than technical. Adobe's type library boasts 600 typefaces. PostScript can drive about 70 output devices and is supported by more than 4,000 application software packages. More than 30 major computer, printer and typesetting manufacturers, including Digital, have PostScript interpreter or Display PostScript agreements with Adobe.

TrueType, despite its promotion by Apple and Microsoft, is still vaporware,



and its alleged compatibility with Adobe Type 1 fonts is untried. Perhaps most important, surveys strongly indicated that IBM would experience a revolt within its user base if it forced customers to dump the \$4 billion they had invested in Adobe fonts and font-rendering technologies.

And as for the argument that TrueType would be an open font standard as opposed to PostScript's proprietary approach, Adobe was selling copies of its Type 1 font specifications at its booth at the Seybold show.

After a winter of discontent, PostScript was back on top of the heap.

The King Of PDLs

What exactly is PostScript? And why is its acceptance as a standard important?

PostScript is the name of Adobe's computer programming language, which is used primarily to communicate high-level graphic information to laser printers and other output devices in a device-independent manner.

While a PostScript program can be created by a programmer using a text editor, the general method is machine generation. That is, a software driver produces a PostScript program that's transferred to an output device containing a PostScript interpreter, such as a laser printer, that executes the program and produces the required images. Display PostScript is conceptually similar, except that the interpreter is a component of the system software and the output device is a bitmapped screen.

PostScript isn't the only page description language (PDL), nor is it technically superior to the others. Its success is the result of two critical strategic agreements: the inclusion of PostScript in the

original Apple LaserWriter and the licensing by Adobe of Linotype's type library of professional, high-resolution fonts. With the 300-dpi LaserWriter at the low end and Linotype's 2,450-dpi Allied Linotronic L300 at the high end, Adobe established PostScript's device-independence and won the hearts and minds of desktop publishers and professional typographers in one fell swoop.

Since PostScript was the only easily accessible, nonhardware-specific PDL around, it was quickly embraced by software vendors. They flooded the market with PostScript-compatible programs, making the language a de facto standard.

PostScript isn't without its faults. It

can be unbearably slow when processing complex graphic images, although early performance problems could be blamed on driver software that produced inefficient PostScript code. When speed is important, users frequently resort to driving output devices in their native

What's A Type?

PostScript Type 1 fonts get their name from the FontType language variable in the PostScript PDL. Type 1 fonts are, logically enough, FontType=1 in PostScript programs. There are several advantages to Type 1 fonts. For example, they use a restricted set of PostScript language operators, making them quite compact and able to be quickly interpreted and rasterized.

Type 3 fonts are user-designable fonts generated using the full set of PostScript language operators. PostScript-compatible fonts sold by nonlicensed third-party vendors are Type 3 fonts.

Until the release of its specifications, only Adobe and its licensed type foundries could produce Type 1 fonts. Adobe opened its Type 1 font specifications at the March Seybold conference, selling the 102-page, \$14.95 manual at its show booth.

While the publication of the formerly secret specifications exposes Adobe to increased competition from other vendors, the company claims it isn't worried. As one

Adobe representative said, "If you laid out all the parts of a Ferrari, could you build your own Ferrari?" The published Type 1 specs, while describing the fonts, don't explain how they're generated, pointing out the major difference between PostScript and the TrueType font-



POSTSCRIPT NOTES

Display PostScript Debuts — Digital is reinforcing its support of the Adobe standard with the support of Display PostScript in DECwindows under VMS V5.4 and the release of a product that permits the output of PostScript files to any Digital desktop graphic Sixel printer.

Digital announced its licensing arrangement with Adobe for Display PostScript in 1988 before the release of DECwindows and VMS V5.0. With every subsequent point release of VMS, software houses have anxiously awaited the integration of the screen imaging technology with Digital's GUI. Even more galling to those loyal to VMS was that Digital included Display PostScript support in its ULTRIX workstations before VMS DECwindows.

Still, programmers aren't complaining. "We're converting everything as fast as we can," says one developer. "This will make cross-platform support a heck of a lot easier."

"DECprint Utility for PostScript to Sixel Printing for VMS" may not be a snappy product name, but it says it all. DECprint is a software-implemented PostScript interpreter running on VMS V5.1 or later. It costs \$450 per user, roughly comparable to the full retail price of PC-based PostScript clones such as LaserGo's GoScript or QMS' UltraScript. DECprint isn't a clone, however. It's licensed from Adobe, and a separate PostScript agreement is included with the customary Digital licensing material. The product is installed using the VMSINSTAL procedure. Access to the DECprint software is accomplished with a DCL "PSPRINT" command.

DECprint reads PostScript source files and converts them to a format that can be sent to Digital's LJ250, LA75, LA324, LA210 or LN03 Plus printers. The printers can be attached to either a shared printer queue or a video terminal printer port; DECprint uses the VMS job controller for queued devices and the terminal driver for attached printers. Color PostScript output is supported on the LJ250 Companion Color Printer or, with color ribbons installed, on the LA324 Multiprinter. LN03 users also need Digital's Image Support and ScriptPrinter software packages.

The Fax Connection — PostScript compatibility may extend to fax machines if Adobe's preliminary foray into the fax market is successful. The company is testing a low-cost fax modem daughterboard add-on to its PostScript printer controllers. In addition to generating 300-dpi laser printer output, the printer's PostScript interpreters could produce compressed 200-dpi images for industry-standard Group III fax transmission.

Even more enticing is the ability to transmit raw PostScript data files, although such transmissions could only occur among PostScript-capable fax machines or add-on computer fax cards. Adobe is working on a proprietary data transmission scheme to compensate for the limited error correction available in the Group III standard.

Raw PostScript transmission offers several advantages. Since PostScript files are an order of magnitude smaller than compressed bitmapped fax images, the time required to send a document would be significantly reduced. And the receiving machine wouldn't have to be a 300-dpi PostScript laser printer. It could be any PostScript-compatible device, including high-resolution typesetters. This would permit the virtually instantaneous transmission of typeset-quality documents to any site with a dial-up telephone line and fax-capable PostScript device.

When Type Isn't Type — While you still can't get a patent for the perpetual motion machine you've been tinkering with in the garage, you now can be awarded a copyright for programs that generate typefaces. The Library of Congress recently awarded a copyright to Adobe for its ITC Garamond typeface program. It's believed to be the first time a type font has been protected.

Copyright laws state that digital typeface designs can't be registered, and it wasn't the Garamond letter forms that received protection. Rather, the copyright was awarded to Adobe for the PostScript program that generates the typeface.

Industry analysts call the Copyright Office's actions a milestone in electronic publishing, since it will encourage fair competition among vendors. The legal protection of a copyright makes it easier to justify the significant investment required to develop digital typefaces. — K.G.B.

rendering schemes.

In PostScript, the "intelligence" is built into the rasterizer, the font-rendering software that generates the images produced by the output device. PostScript Type 1 fonts consist of two components: a file containing the font outline data, and an auxiliary structure containing hints or data describing important typographical aspects of the typeface. The hint data is processed by the rasterizer to improve the quality of the type, especially at lower resolutions.

The isolation of font data from the hints permits Adobe to maintain its font-rendering software without making its existing fonts obsolete. PostScript fonts can improve with age as Adobe enhances its rasterizer and hinting algorithms. PostScript rasterization technology is currently in its sixth generation. This design, coupled with the BuildFont software Adobe licenses to a half-dozen major commercial typeface foundries, permits the generation of Type 1 fonts in a matter of minutes.

The TrueType approach is the opposite of PostScript's. Preliminary reports indicate that the rasterizer is fairly simple and about half the size of the Adobe Type Manager renderer. That's because the intelligence, or font control, is built into the fonts. This makes TrueType potentially faster than PostScript but makes font generation an onerous chore, since the programmer, not the rasterizer, must do most of the work. Further, the quality of the font depends on the skill of the programmer.

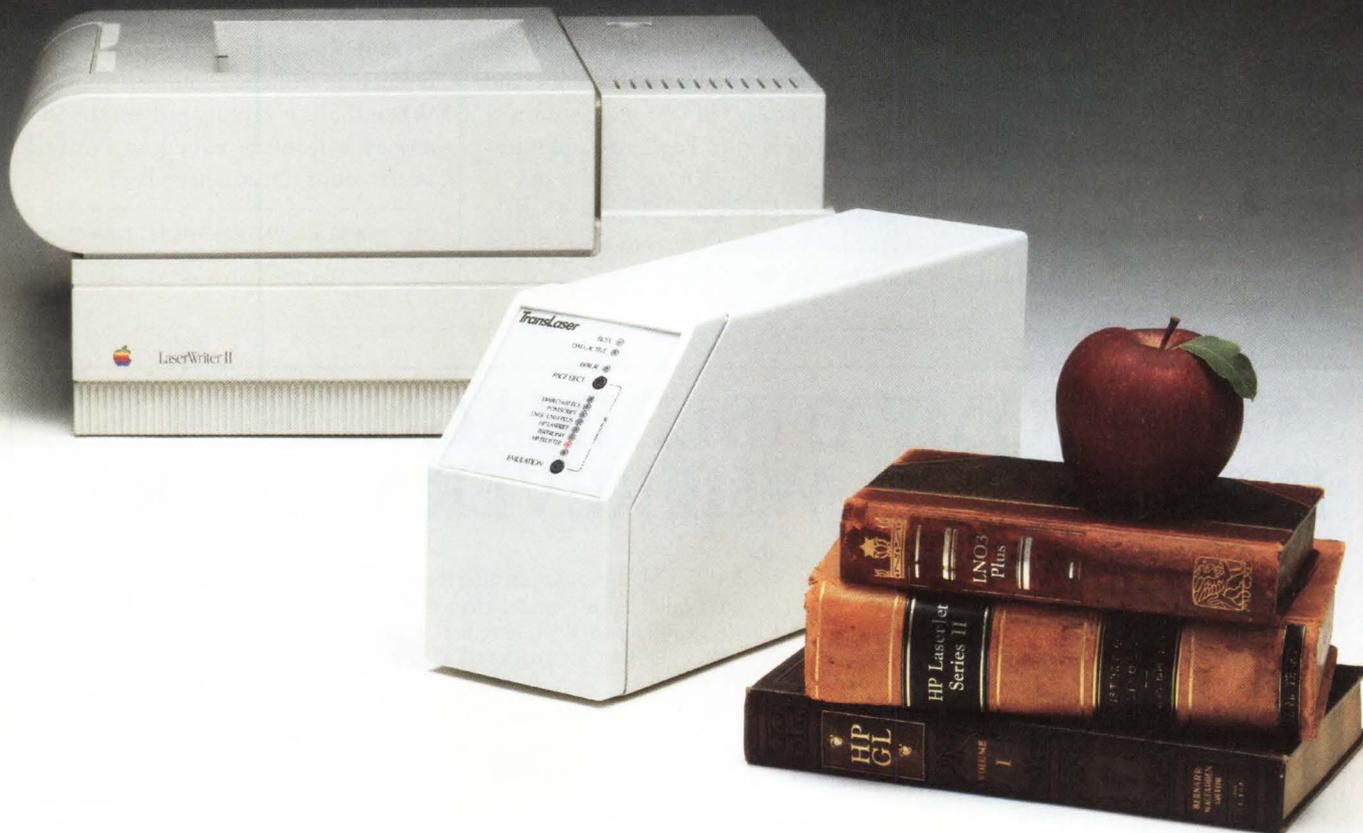
A Matter Of Perception

PostScript's dominance as the de facto PDL standard has never been in question. The Apple/Microsoft development of TrueImage and TrueType wasn't motivated by a desire to broaden the frontiers of publishing. It was a way for the companies to avoid paying Adobe fees for PostScript technology and generate their own license fee revenue.

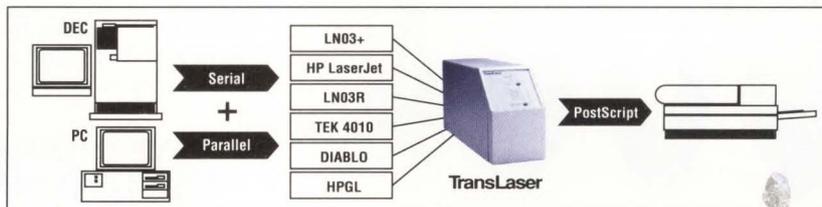
Adobe and PostScript are usually viewed as a single entity, but they are, for all practical purposes (and to the potential dismay of Adobe), two different animals. While the fortunes of Adobe

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are at the mercy of the marketplace, PostScript has transcended such mundane considerations. Clone PostScript interpreters are available from many sources, and the language is on the threshold of becoming an official institution.

The International Standards Organi-

zation (ISO) soon will adopt font and PDL standards. The remaining major complaint against adopting PostScript font technology as a standard — Adobe's proprietary rights controlling third-party access to its font technology — is moot after the publication of its Type 1 font specifications. PostScript, or something virtually indistinguishable from it, seems likely to be adopted by the ISO as the world's Standard Page Description Language (SPDL).

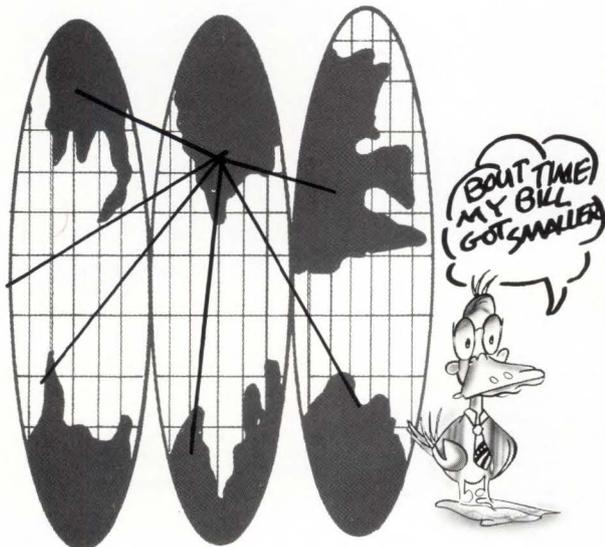
Work on the standard has been under way since 1986 under the cooperative management of Adobe and Xerox. Initially, SPDL was to consist of a combination of PostScript and Interpress, the Xerox PDL originally developed by John Warnock and Charles Geschke (who left Xerox to form Adobe and develop PostScript).

However, Digital, IBM, Unisys and others strongly urged the U.S. committee to adopt the PostScript model, and Xerox eventually dropped its objections. During the ISO sessions, the Adobe Red Book (officially, the *PostScript Language Reference Manual*) was ubiquitous, and it's a safe assumption that SPDL and PostScript will be almost one and the same, with small conversion programs handling the few components that aren't directly translatable.

Whither PostScript? The PDL is firmly entrenched, and nothing short of an inconceivable, revolutionary breakthrough in imaging technology will wrench it from its dominant position. When the 21st century arrives, the smart money will still be riding on PostScript or one of its direct descendants.

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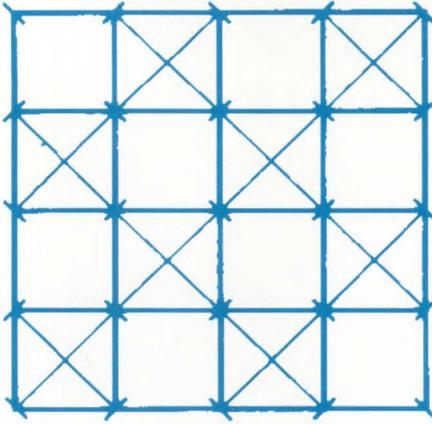
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DEC Professional wishes to thank the DEC computing industry leaders listed above who joined us in co-sponsoring the June 27 reception at the Computer Museum. Five hundred guests attended this successful and enjoyable event, touring the museum and learning more about the history of computing.

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STANDARDS

EDI: Ready For Takeoff

Brian O'Connell

Electronic Data Interchange Starts Its Countdown Toward Industry Acceptance.

The days of corporations exchanging invoices, payments and other business records by mail are numbered. The wheels of commerce in the U.S. and abroad are turning toward electronic correspondence as the primary means of conducting business.

Electronic Data Interchange (EDI) is a set of automated business communications standards that enables companies to send and receive documents electronically. Companies such as Digital, which continues to champion the Open Systems Interconnect (OSI) as the global computing unifier, have developed OSI-influenced application tools geared toward EDI solutions. Proprietary standards that threatened EDI's early growth have crumbled in recent years, leading to the emergence of a handful of dominant EDI standards.

An independent study of *Fortune* 100 and 500 companies reveals that EDI is big business. More than 75 percent of the *Fortune* 100 use EDI, as do 39 percent of the *Fortune* 500. A \$130 million industry in 1987, EDI skyrocketed to more than \$300 million in 1989 and is expected to reach \$2 billion by 1995.

Before EDI, companies generated purchase orders and invoices, then funneled them to their destinations through the postal service. Upon receipt, the cycle renewed itself in the accounting offices and purchasing and sales departments of the corresponding vendors. Aside from the 10- to 14-day delay in finalizing the deal, companies had to contend with

processing errors and accounting discrepancies.

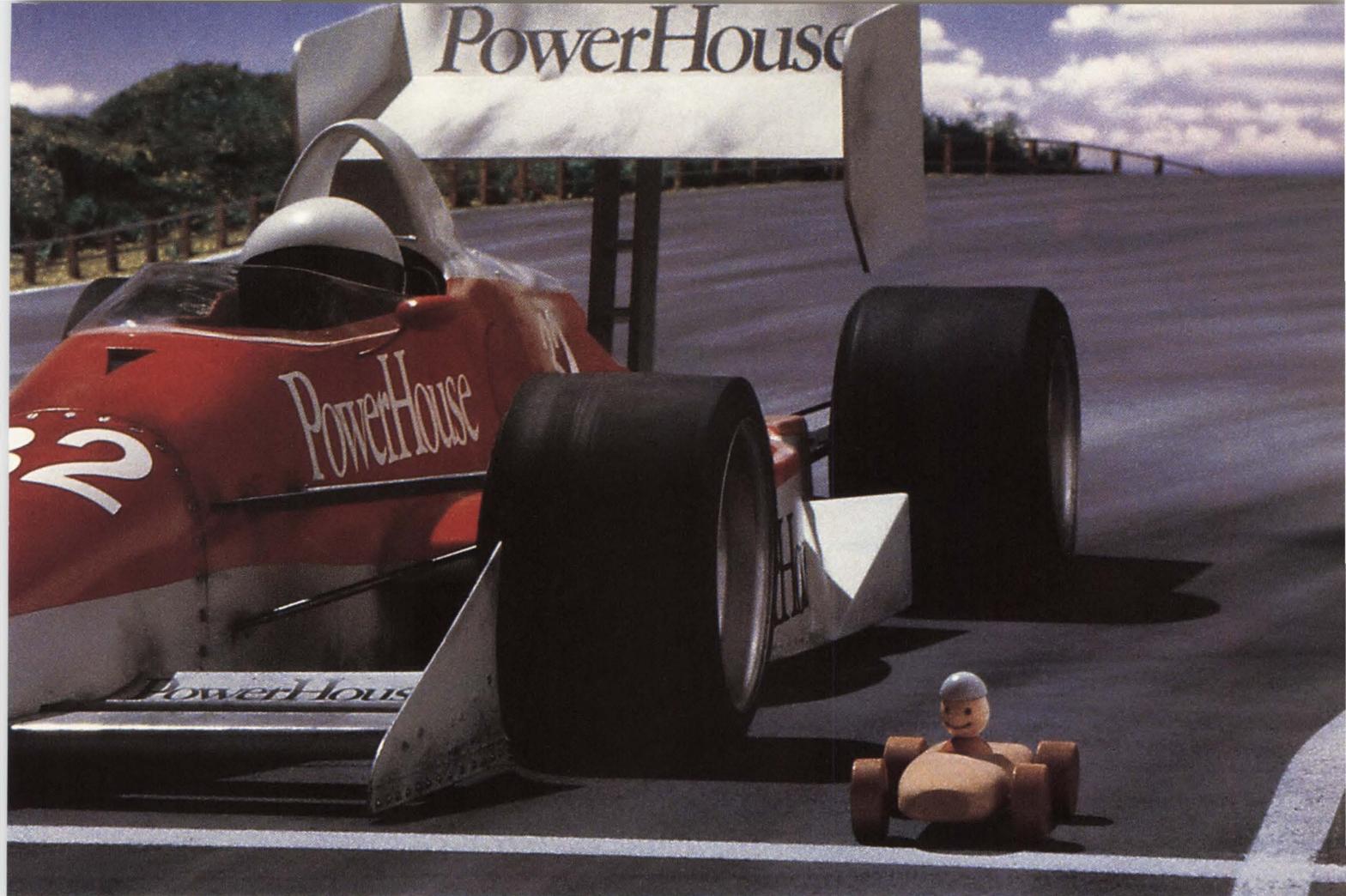
EDI heralds a better way of doing business. EDI orders can be structured into a computer-readable format and either transferred to a Value-Added Network (VAN) or transmitted over direct lines established by the trading partners. The purchase or sales order can then be routed to the vendor's EDI application, converting the information into an accurate business document. EDI enthusiasts claim cycle times can be reduced to two or three days.

Digital's New Role

Digital's involvement with EDI dates to 1984, according to Digital EDI project director Bill Carlisle. Early activity focused on product and services implementation in the transportation sector, an early EDI user. EDI on the VAX was introduced two years ago in Europe, providing software that supported international EDIFACT EDI standards as well as the dominant ANSI X.12 standard in the U.S. Then Digital announced its Compound Document Architecture (CDA), an integrated architecture for creating and managing distributed compound documents through an enterprisewide DECnet/OSI network.

Marty Schultz, president of ASA/Omtool, says that Digital considers EDI "a major revenue stream." Schultz notes the emerging influence Digital's consulting services has on firms that are considering EDI but are unsure of implementation costs and procedures.

Digital's current strategy is to forge an alliance between EDI and its Network Application Support (NAS) unified software environment



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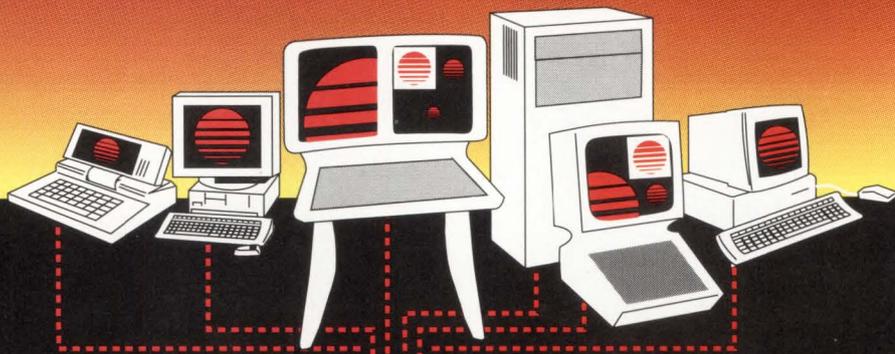
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(see Figure). NAS includes standards-based application services that provide integration among software applications across a distributed environment of multivendor systems. Digital has incorporated its original VAX/EDI release with NAS to install EDI at Digital and to build customized EDI systems for customers.

Digital announced a significant EDI release in Boston on May 30. According to EDI Marketing Manager Curt Anderson, DEC EDI is a client/server distributed computing product that's NAS-oriented in scope and implementation. DEC EDI is a combination communications server, translation server and application server that integrates EDI with CDA.

The communications server handles all inbound and outbound electronic messaging while supporting most export/import protocols, including the X.400 standard messaging protocol. The translation server supports industrywide EDI standards such as EDIFACT, ANSI X.12 and the Transportation Data Coordinating Committee (TDCC) while supporting smaller, more customized industry protocols. The application server interfaces "hook customer applications into an EDI environment," says Anderson.

"Our distributed server environment offers customers three capabilities," he adds. "Flexibility in implementation, upgradability without changing software, and a wide choice of trading partner connections." These connections include four of the largest VANs in the U.S.: GE Information Services, British Telecom Tymnet, (formerly McDonnell Douglas), AT&T EDI and MCI Mail.

Digital also will provide a series of enterprise integration strategies for EDI users, involving programs to educate companies in the planning, design, implementation and management of EDI. "We feel that 80 percent of the problems companies are having with EDI today are management-related," notes Anderson. "The other 20 percent are technological in nature."

Digital also announced the formulation of consulting relationships with two

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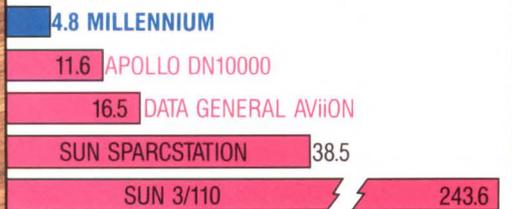
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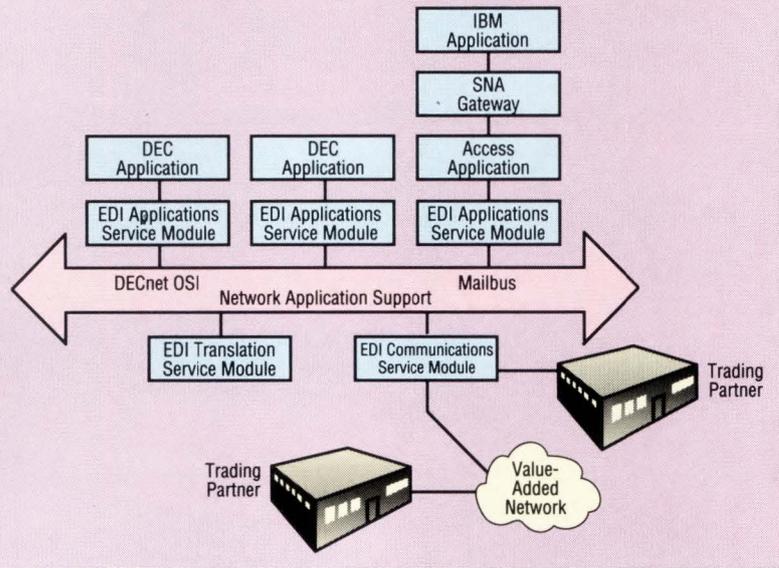
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FIGURE .



The EDI architecture plays a critical role in Network Application Support (NAS), Digital's unified software environment solution.

leading EDI advisors — Coopers & Lybrand and Price-Waterhouse — and a software partnership program to help integrate users with EDI, Anderson says.

Early EDI

Retired Air Force Colonel Edward A. Guilbert is widely credited with developing EDI in 1969 as a way to alleviate congested paperwork in the transportation industry. Guilbert organized the industry by convincing airline, train and bus bigwigs to commit to the development of a unified standards architecture. After a bitter struggle, that architecture, an early version of today's ANSI X.12 standard, was finalized in 1975. It proved to be the cornerstone of today's EDI message subset standards.

Now president of Guilbert Associates, a Washington-based corporate think tank, Guilbert recalls the early days of EDI. "Although today EDI is recognized as the hottest thing on campus, there were a great many skeptics in the '60s and '70s who thought EDI would never fly. It took a great deal of prodding to

convince corporations that EDI was something they needed and wanted. No consideration was given to electronic message standardization among companies back then. In fact, larger companies were prepared to exclude competitors by installing proprietary software in client computers."

This attitude came back to haunt EDI, as the lack of unified standards inhibited its early development. EDI standards primarily are a structure for the message envelope that surrounds the transmitted data, a structure for the message field and contents segment, and a means of communications among external computers.

EDI requires that all correspondence transmitted among trading partners be sent in an envelope. Regardless of standards, message envelopes must begin with a header segment that indicates the location of the sender and must end with a trailer segment that indicates the location of the receiver. Message envelopes also contain codes to identify the nature of the data contained in the message.

The content data normally includes purchase order numbers, terms of the

transaction, and billing and shipping information. The contents contained in the message envelope are normally structured to adhere to the EDI standard agreed on by the corresponding firms. It's left to the trading partners to agree on EDI standards that define the contents and structure of the message envelope.

Trading partners can customize their EDI applications to verify trading partner ID during transmission and in the group headers, specify transaction status or categorize data separators. Data can be transmitted among computers through such standard methods as NJRE, RJE, 3780/2780 protocol, SNA or X.25 packet-switched networks.

EDI Standards

Guilbert eventually helped engineer the acceptance of two early EDI standards that dominate the culture today: ANSI X.12 and the (TDCC) standard. These standards provide guidelines on how EDI data should be configured and how electronic communications among trading partners should be implemented.

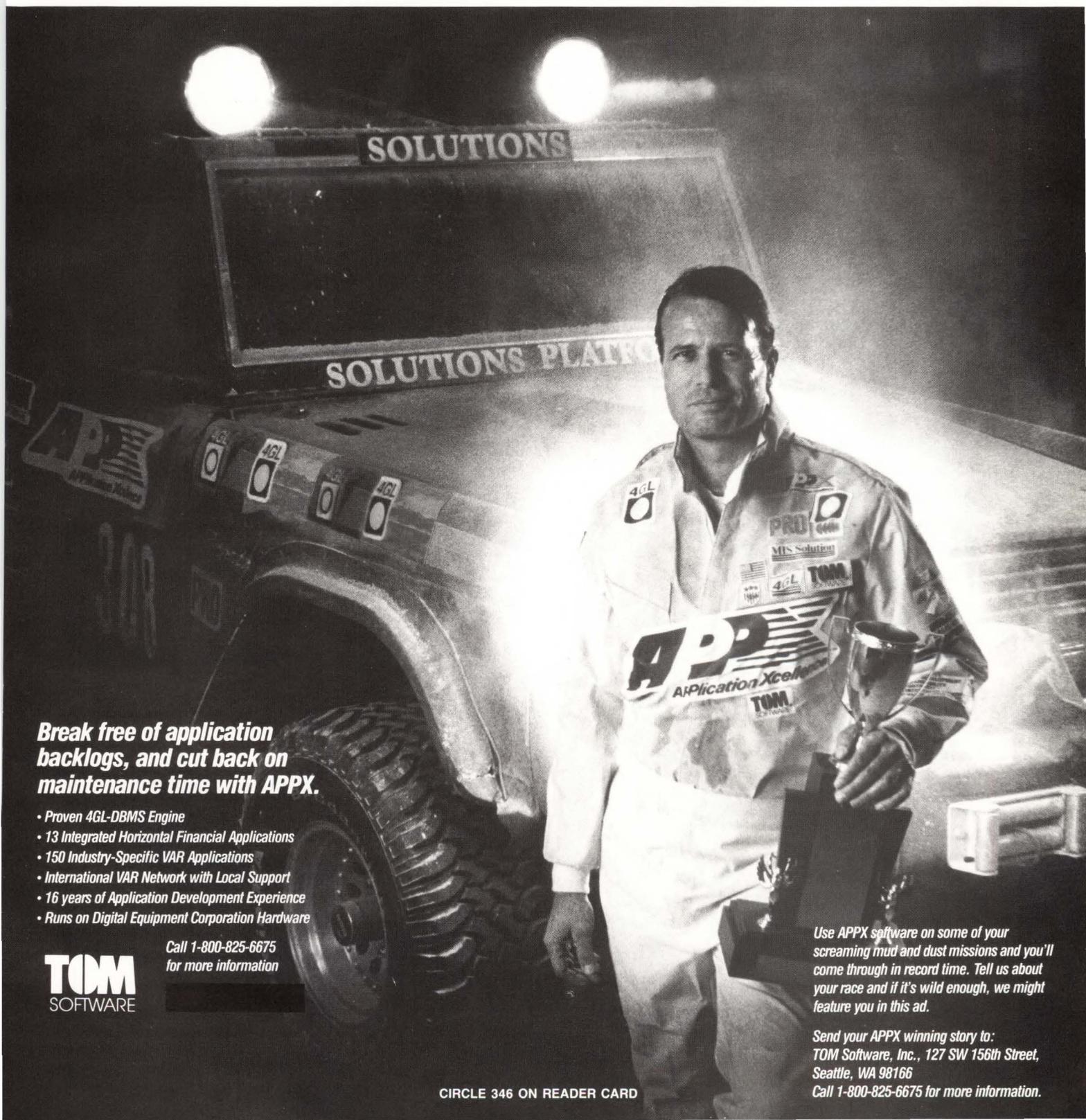
Ruth Anderson, vice president of *The EDI Forum*, an Oak Brook, Illinois-based publication, explains that while the ANSI X.12 and TDCC standards are dominant domestically, two international standards, EDIFACT and X.400, are emerging as companies seek to conduct business globally. In addition, industries have established and enforced their own standards to meet the needs of their markets. These standards include CIDX for the chemical industry and VICS for the grocery industry.

Companies such as American Business Computer and LDJ have designed their software packages to comply with standards used by the auto industry. On the other hand, firms such as Electronic Data Systems and GE Information Services have designed EDI packages for wider, more commercial use.

According to Ruth Anderson, domestic, international and industry EDI standards are converging on ANSI X.12

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as the de facto EDI standard. ANSI X.12 is a flexible, generic standard that can be used by many industries. Once implemented, industries can determine their own guidelines in tune with their own business but subject to the rules and in-

dealing with currency exchanges on EDI, but few, if any, have solved language problems," he says.

Any integration of EDI standards involving EDIFACT is subject to the concerns of the leading members of the

the accepted language of EDIFACT in Europe."

While the DEC EDI release has merged EDI effectively with X.400, some industry analysts contend the EDI-X.400 link can be taken to an even higher plateau. X.400 is the ISO's response to application-to-application data transferral. According to EDI Solutions' Kessler, the X.400 standards take EDI capabilities one step further by enabling firms to exchange e-mail, graphics and facsimile documents.

The ISO's upper layer harbors X.400, where it's used by manufacturers and retailers to send business correspondence among different computers. Currently, companies must establish gateways to transmit e-mail properly.

X.400 developers at Digital have created a single gateway for companies to communicate with one another, regardless of computer models. As EDI relies solely on the Binary Synchronous protocol to send messages, some users

While the DEC EDI release has merged EDI effectively with X.400, some industry analysts contend the EDI-X.400 link can be taken to an even higher plateau.

terpretation of ANSI X.12.

Jeffrey Kessler, national accounts manager at EDI Solutions, believes that EDIFACT and ANSI X.12 are destined to merge into a uniform international trading standard. "Some technology already exists that combines the two standards. Domestically, companies are already

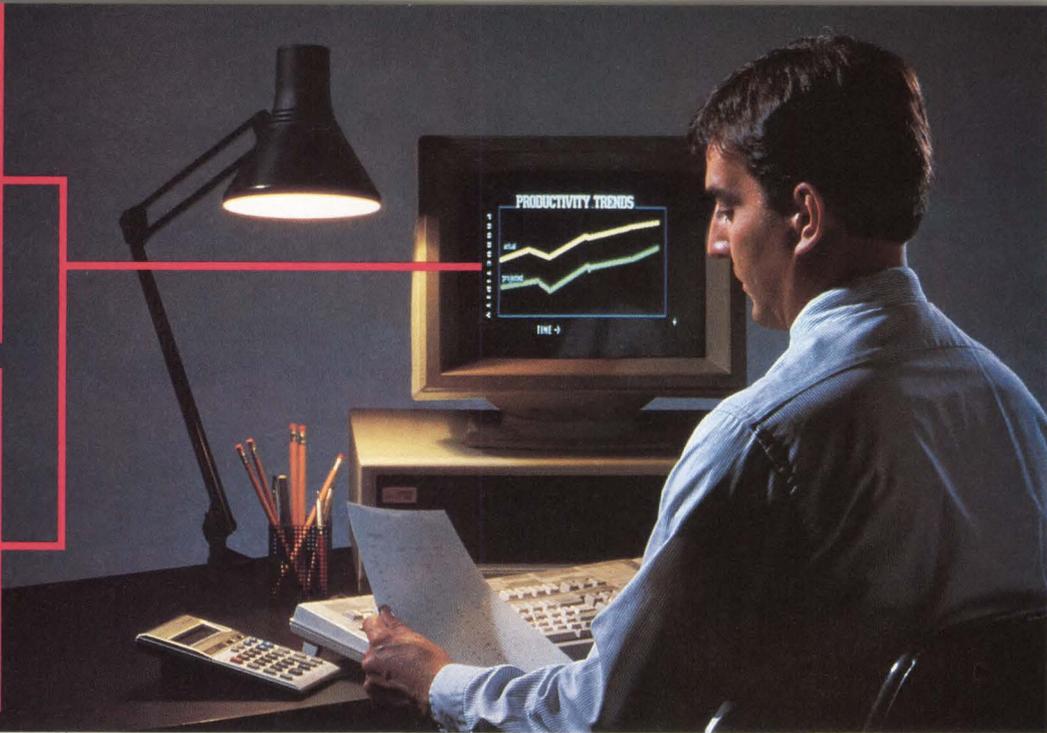
European Economic Community. Warns John Witten, director of marketing for DNS Associates, "With EDIFACT in Europe, nobody can agree on standardization, everyone is going his own way. The French want to do it one way, and the Germans want to do it another way. And nobody is happy about English as

To realize the complete potential of EDI, you need software that's completely functional. EDI/EDGE for VMS™ is just that software. It has a user interface, for example, that makes it fast and easy to type a document, transmit the

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may prefer to integrate X.400, which offers more capabilities and operates on a greater number of protocols.

WHILE EDI ADVANCES toward a unified standard that incorporates parts of ANSI X.12, TDCC, EDIFACT and X.400, its

future lies in corporate implementation. EDI was bankrolled primarily by industrial giants such as Ford Motor and General Electric, which are now positioned to pass the costs of EDI to smaller firms that may not be able to afford it.

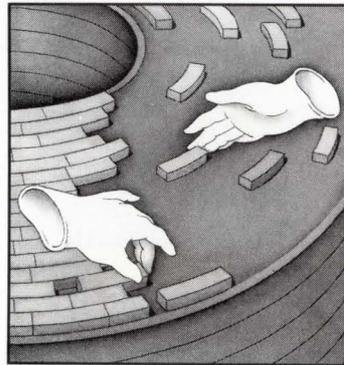
After all, notes Schultz, larger com-

panies that have already implemented EDI can afford to be selective about whom they conduct business with. "How well can businesses absorb EDI's costliness?" he asks. "EDI's implementation is inevitable. The longer companies wait, the more it's going to cost them in the long run."

EDI is already a fixture in the global marketplace. While some maintain that EDI hasn't taken off yet, it certainly is taxiing down the runway. Non-EDI users should ask whether this is a ride they can afford to miss.

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Datability Software Systems' Vista Network Protocol Translator Card And LAT-TCP/IP Network Interface Card Expand Terminal Server Range.



A Server To Suit

In the computer industry, good ideas spread like wildfire. DEC's Local Area Transport (LAT) protocol terminal server is one of those ideas. In the seven years since the LAT terminal server's inception, many functions have been added, and the number of OEMs building terminal servers has expanded. Some of the terminal server OEMs mirror the original, while others add value.

As with most mature products, the terminal server's evolution has been driven by customer demand. Customers demanded more ports per server and got it. They demanded smaller servers with a lower cost per port and got that, too. The most recent demand was for greater compatibility with systems that don't support LAT, primarily TCP/IP. Databil-

ity Software Systems is one OEM that has granted this wish.

The Datability Vista is a high-end terminal server designed around a modular chassis. You can pick and choose from the available options to build a server configuration that suits your requirements. Datability's approach to building communication servers lends itself to long-term solutions that can expand and change. We reviewed Datability's Vista Network Protocol Translator (NPT) card and the LAT-TCP/IP Network Interface Card (NIC) options.

An NPT card translates between any two supported communication protocols on a Vista NIC. The NIC provided for this review was the dual-protocol LAT-TCP/IP unit. The board is plug-ready

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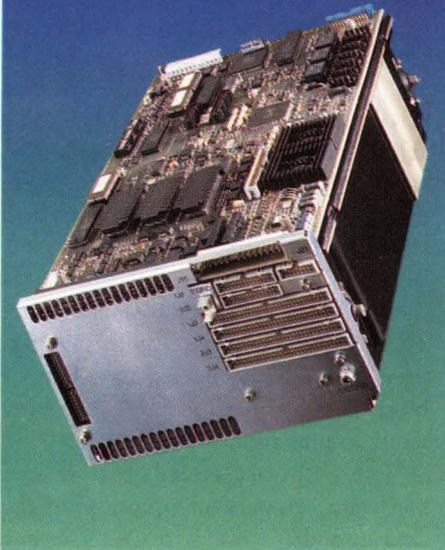
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for ThickWire or ThinWire Ethernet connections. In this configuration, the NPT's job is to convert between LAT and TCP/IP TELNET.

TELNET Tie

TELNET is an industry-standard terminal-to-host protocol. It's part of TCP/IP (the Internet Protocol Suite) and is available for most UNIX systems. TELNET is completely separate from LAT network services, but it provides many of the same features. The idea behind TELNET is that a user with access to the network can start a terminal session with a network host. Unlike LAT, which supports LANs only, TELNET works with WANs. Because TELNET was designed primarily for the WAN environment, it isn't aware of hosts or services until the user requests a connection. It wouldn't be practical for TELNET hosts to broadcast their services as LAT hosts do with multicasts.

TELNET is an application-layer network protocol commonly called the Network Terminal Protocol. When you use TELNET to connect to a host system, TELNET is completely ignorant of your

terminal type and the host. TELNET begins the connection assuming both ends of the connection are dumb terminals. The two ends then negotiate options and features for the session.

TELNET is supported by the Transmission Control Protocol (TCP), a connection-oriented protocol that supports multinet applications. TCP is

a 32-port line card, and the LC-8-RS232, an eight-port line card — are additional plug-and-play options. At least one line card is required.

Server Operation

The Vista is very much a standalone system. It doesn't require a host download, although it can accept a load file if

**“
The Vista is essentially a computer chassis and bus
with option cards installed to meet a
communication requirement.
”**

responsible for end-to-end reliable data transmission. It interfaces to a lower level protocol, such as the Internet Protocol (IP). IP provides the necessary mechanism for TCP to send and receive variable-length information packets. IP defines the fundamental unit of data transfer in the Internet.

Installing The Boards

The Vista is essentially a computer chassis and bus (called the Vista Bus) with option cards installed to meet a communication requirement. The NIC is the main component. It provides the network connection and the system's processing intelligence. NICs come in several flavors, including LAT-only, TCP/IP-only and the dual-protocol LAT-TCP/IP unit.

The NIC directly supports any of three network interface connections: a standard DIX/AUI transceiver connection, BNC ThinWire connection and RJ45 connection for unshielded twisted-pair wire. The network connection style is configured through the use of two jumper blocks at the front of the NIC. No other setup options are necessary.

The NPT card doesn't require user hardware setup. You simply plug the card in and it's ready to use. The line card options — such as the LC-32-RS423,

necessary. The Vista is ready to connect to LAT services from the moment it's switched on. Connecting to TELNET services requires a minor amount of configuration work.

Because TELNET services aren't broadcast to the network, network name servers are required. A TCP/IP network name server is any node set up to relate TCP/IP names and addresses to other nodes. Although functionally part of the TCP/IP network, name servers communicate with a special protocol of their own. An IP user (client) who knows a name server's IP address can send it a name and receive an IP address, if the name server knows it.

Much like an IP name server, the Vista can store IP names and addresses. In the Lab, two VAX systems were used to test the Vista, the first a VAX running VMS V5.3 and the second a VAX running ULTRIX-32 V3.1. When the Vista is switched on, it immediately knows the LAT service names, which include the VAX/VMS system. The ULTRIX-32 system is unknown because it isn't running LAT and its IP address hasn't been defined to the server. Prior to using the Vista in the TCP/IP network environment, the network manager must assign an IP address and define name server names

Vista

PLATFORMS: VAX or UNIX-based systems

PRICE: The Vista NPT card costs \$2,399. The LAT-only NIC costs \$1,200. The TCP/IP-only NIC costs \$1,200. The dual-protocol LAT-TCP/IP NIC costs \$1,600. The Vista chassis costs \$1,000

DATABILITY

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322 8th Ave., 11th Fl.
New York, NY 10001
(212) 807-7800

PRODUCT LINE: Multivendor connectivity products

FOUNDED: 1977

OWNERSHIP: Private

BRANCHES: Atlanta, Boston, Chicago, San Francisco and London

CIRCLE 495 ON READER CARD

and addresses to the Vista. The features are easily established from the server's console port:

```
Vista> SET PRIVILEGED
Password> system
Vista> CHANGE ADDRESS 192.41.217.20
Vista> CHANGE NAMESERVER CHAZ IP
192.41.217.4
```

The Vista's command interface is modeled after the DECserver. Anyone with DECserver experience will feel at home with Datability's software.

Network Protocol Translator

Each NPT card supports one to 16 translation sessions. A translation session is an incoming connection that's translated to another protocol and sent back out as an outgoing session. The feature is used to connect LAT services to TELNET services and vice versa.

The NPT is essentially a line card, similar to the LC-32-RS423, without physical line connections. The NPT's connections are logical, provided within the unit. You can picture the card

as having two sets of ports, source and destination, which are logically connected. Port 1 maps to port 17, port 2 maps to port 18, and so on.

To create a LAT service on the Vista that can be used to connect to a TELNET TCP/IP host, a command such as the following would be entered:

```
Vista> CHANGE SERVICE CHAZ PORT 1-8 ID
"Chaz"
VIRTUAL ENABLE VIRTUAL "192.41.217.4"
Vista> CHANGE PORT 1-8 ACCESS REMOTE
Vista> CHANGE PORT 17-24 VIRTUAL ENABLE
```

This allows up to eight users to connect to TELNET TCP/IP address 192.41.217.4. The VIRTUAL ENABLE command on the remote ports (17-24) makes it possible to disconnect the connection with the source port when the destination port disconnects. To allow multiple sessions through one port, the local switch option must be set. It's also possible to configure a TELNET TCP/IP host address to translate to a LAT service. This would permit users on a TELNET TCP/IP host to connect to a

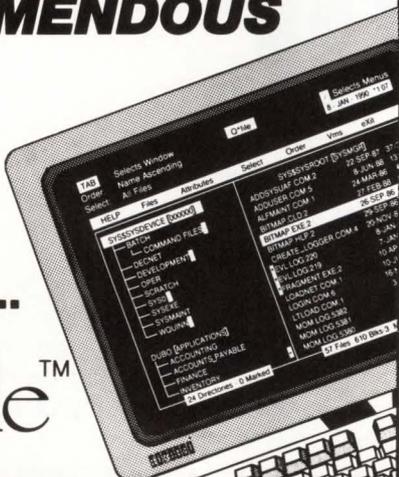
LAT service, such as a VAX/VMS host, anywhere on the LAN.

THE WEEKS I SPENT with the Vista were productive. I not only learned a few things about TELNET and LAT, I also learned how easy it would be to integrate UNIX systems and users into the DECnet/LAT environment.

One characteristic I didn't like about the Vista was its noise level: Its fans are loud. My second gripe is directed at the documentation. Even though I have many years of network and terminal server experience, I could have used more examples. This was especially true when trying to configure a TELNET TCP/IP host address to a LAT service, such as a printer.

I give Datability's Vista praise on two counts: flexibility and ingenuity. I like being able to configure a system with, say, 32 ports now and 64 or more later. The protocol converter is another great idea. These features expand the possibilities of Datability's terminal server. ■

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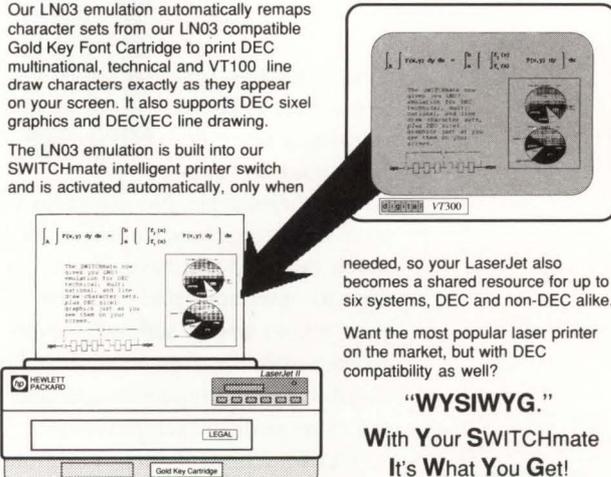
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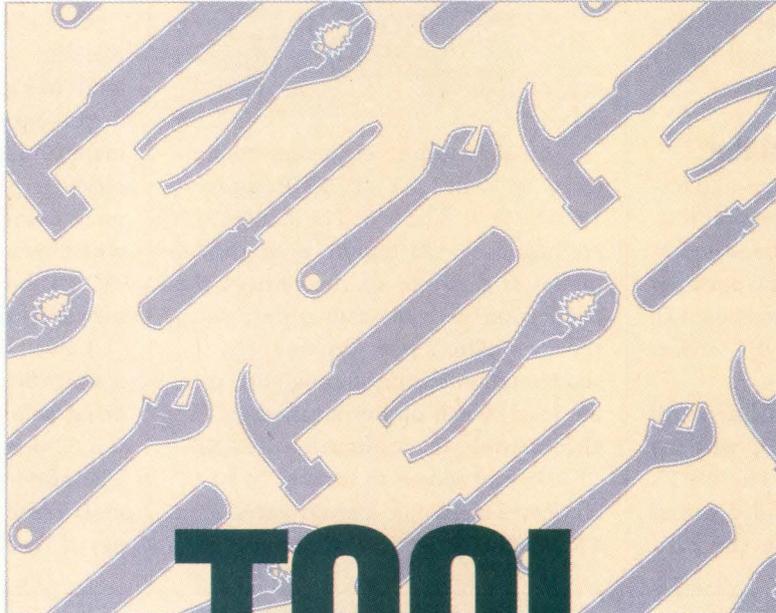
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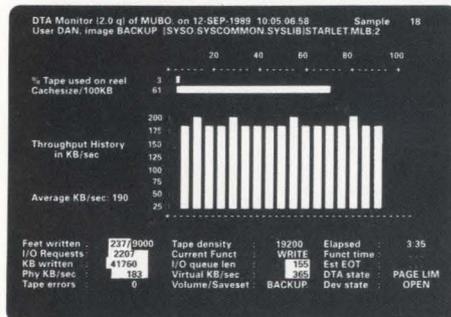


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I/O Knowledge

I/O Plus' main menu is shown in Figure 1. As you can see, I/O Plus can be run

interactively or in batch mode. Under Miscellaneous Procedures, you can get to DCL to perform VMS functions, then return to I/O Plus.

You start your first I/O Plus session by taking a snapshot of the images currently running on your system with the Sample

menu option. The time required to sample your system will vary widely as your system load varies. For example, it took five minutes to sample our 8350 at 11:30 a.m. on a weekday. You'll want to take samples during times of peak use to get the most accurate picture of your I/O performance.

Samples can be appended to one another and analyzed as one large sample. And samples on various nodes in a VAXcluster can be consolidated and analyzed as a single sample, providing cross-cluster analysis. However, you must log into each node to create a data sample. You can't initiate a sample across cluster nodes.

I/O Plus provides enlightening reports and graphs. A sample is shown in Figure 2. Reports and graphs can be displayed on your terminal, sent to a system printer or to a slave printer attached to your terminal.

Figure 2 is a lock master analysis. Remotely mastered locks can slow cluster performance if there's a need for a lot of cross-node I/O. This report shows the locks that are mastered on various nodes in your cluster and the I/O activity taking place between the node on which the sample was taken and other cluster members.



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DECstation 2100/3100	SPARC 330 SPARC 370	9000/350 DN4000	IBM
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CIRCLE 245 ON READER CARD

Another report that focuses on files and locks suggests candidates for data caching or buffering. A file fragmentation report can point out potential problems by displaying the activity on fragmented files. A hot file report identifies files with high I/O activity. You can also generate reports on a file-by-file basis. You'll be able to see which files are open, which users are accessing these files and which images are being run that use the files in question.

User-, device- and process-based reports can be generated. A user report displays the images users are running and the files they're accessing. A device report can help you balance the load placed on your disk drives by showing you the activity on a drive-by-drive basis. A process report breaks down I/O subsystem activity by PID rather than by user. Two related reports can tell you how processes are behaving in relation to each other. These reports can show you processes blocking access to a resource and processes waiting for a resource locked by other processes.

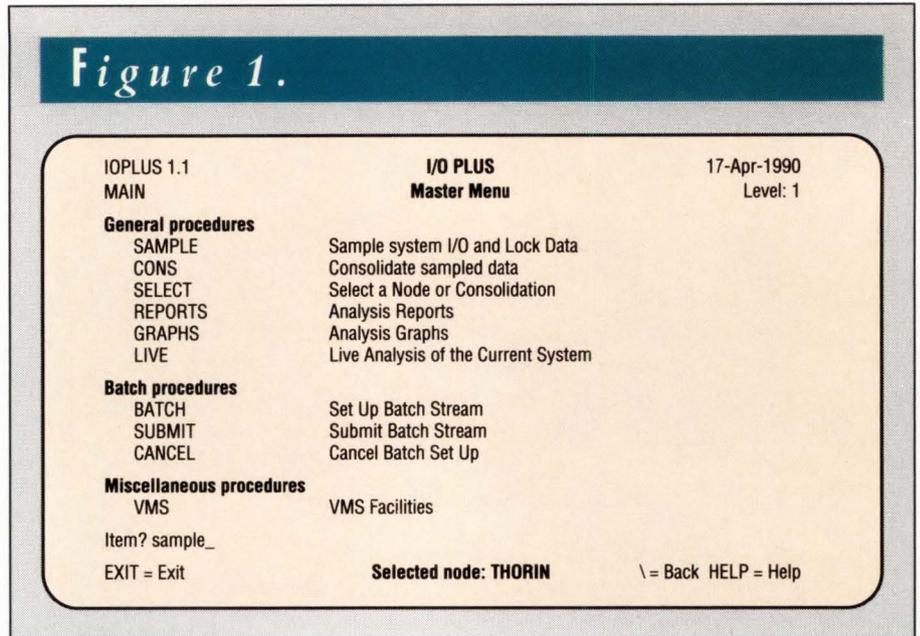
I's And O's

In V1.1, graphs are available for the lock master, user and image analysis. Any terminal will be able to display graphs. Also, graphs can be printed out on any hardcopy device.

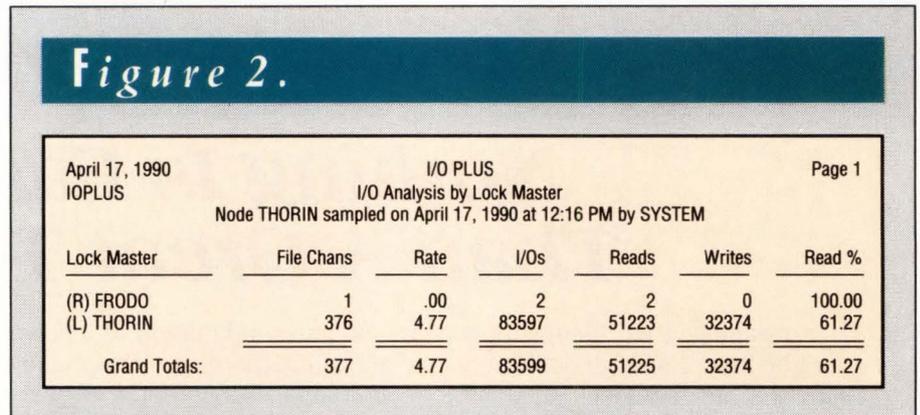
It's easy to run I/O Plus in batch. The Batch Procedures choices on the main menu automate the process of setting up and submitting I/O Plus commands as a batch stream. The batch job can be set up for submission at any time of the day. It would be useful to be able to set up a batch procedure that resubmits itself, but this isn't part of the current implementation.

Help is readily available by typing HELP at any prompt. A list of related topics is displayed, when necessary, so you can get additional information.

The I/O Plus documentation follows the Touch Technologies "thin brown book" standard. Instructions are easy to follow and the manual is brief. There are sections in the back of the documenta-



I/O Plus main menu.



The lock master analysis shows outstanding locks on resources your node is trying to access.

tion that discuss I/O bottlenecks and how to avoid them, as well as the concept of lock mastering.

Identifying performance bottlenecks is part and parcel of the system manager's job. The amount of information and advice regarding VMS performance can be overwhelming. That's why tools like I/O Plus can be so useful in pinpointing performance problems. Try adding I/O Plus to your manager's toolbox.

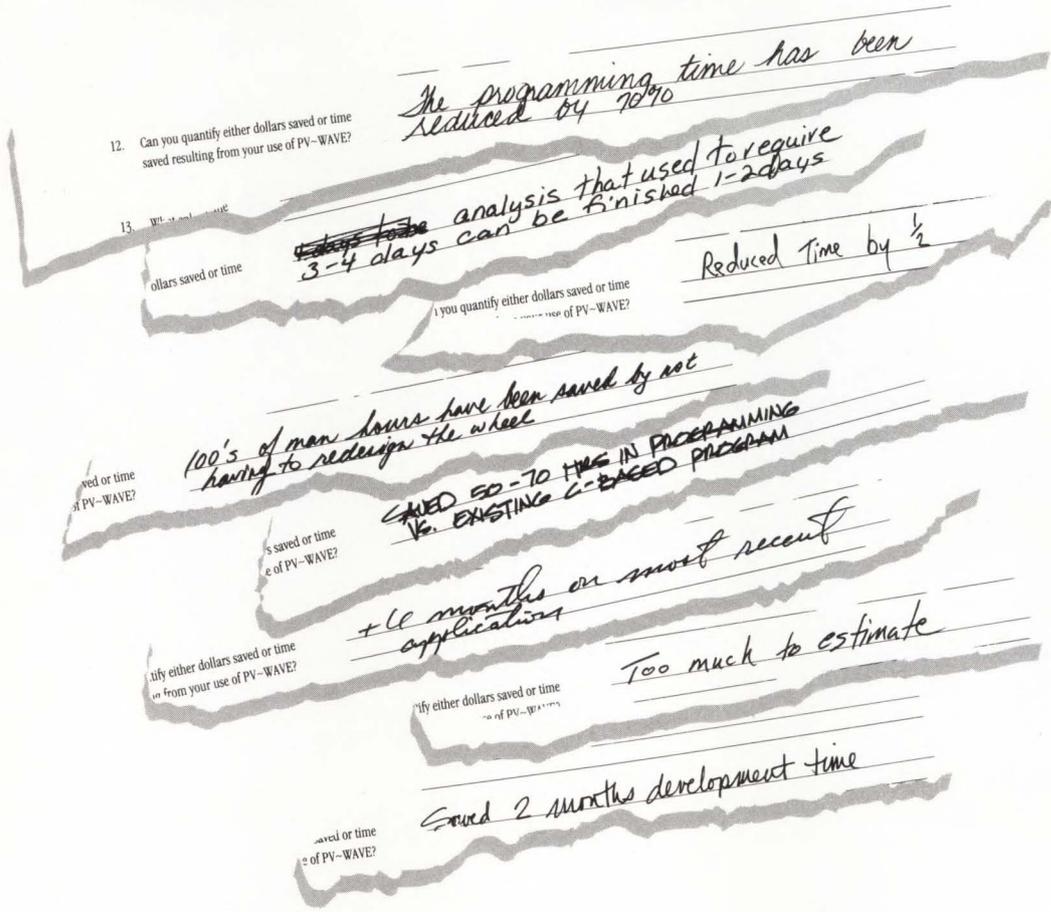
Editor's note: Since our review of I/O Plus, new features have been added. LHOLDER is a report showing holders of locks for which other processes are

waiting. RSREMOTE displays remotely mastered files with high I/O activity. These are candidates for remastering. A procedure is provided to force files to be kept open and mastered on the appropriate node.

Touch Technologies now provides I/O performance help. The Technical Performance Group will accept I/O Plus reports that you generate and will help you pinpoint your I/O bottlenecks. A command procedure is provided to take samples once each hour until 6 p.m. Then, you can simply send or fax the output to Touch Technologies. ■

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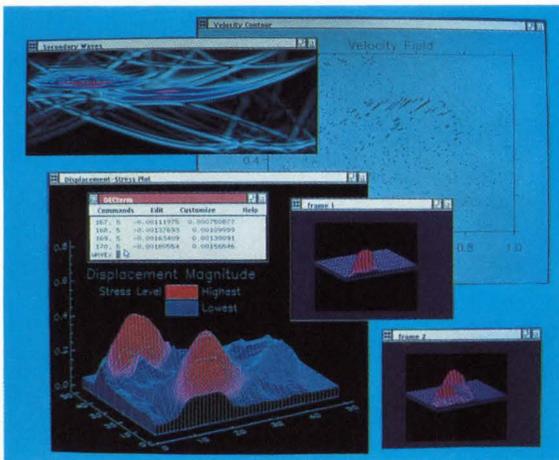


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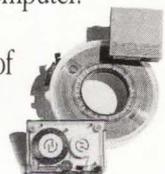
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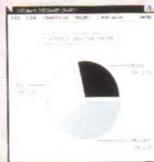


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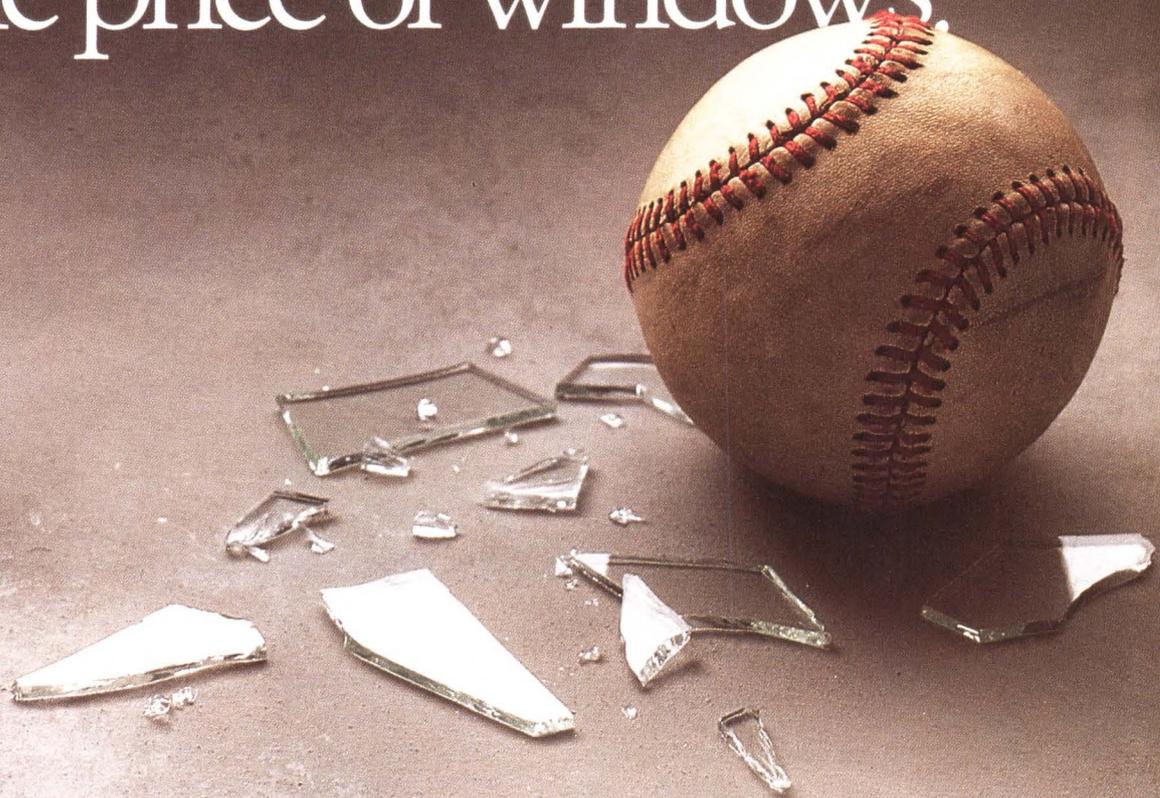


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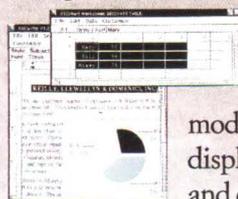
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In today's computer-dependent business environment, protecting the company's data processing assets is a major concern. Many hours of effort go into creating and testing a viable disaster recovery plan. However, it's better to avert a disaster than to attempt a recovery from one.

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in from outside locations at all hours.

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Standing Watch

We tested the VAXcluster version of the SAM2010 on our MicroVAX II in our

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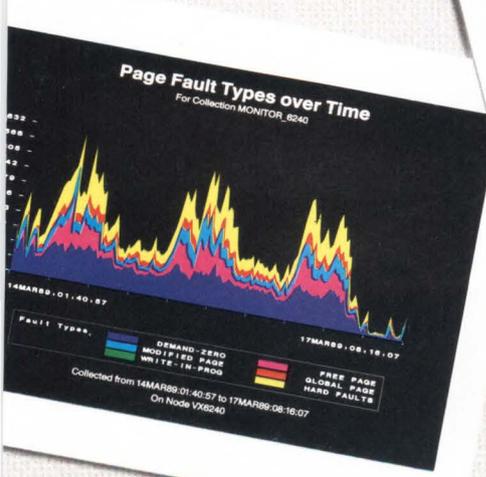
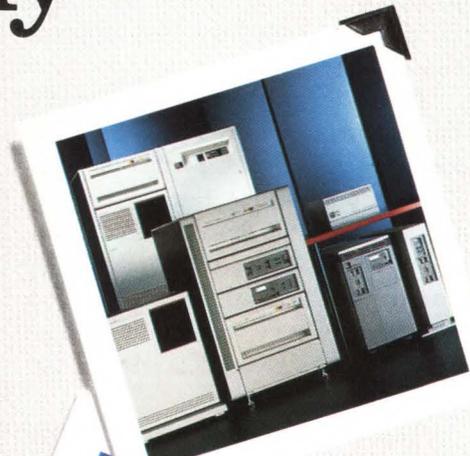
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Pasadena office and found it extremely easy to install, test and operate. It took two people only one day to install and test SAM and its associated devices and software. Everything required for the installation was provided by Intra, including a screwdriver for terminal connections.

The equipment came individually boxed within one large box. Only the supplied screwdriver is needed for standard installation. I removed SAM, plugged it into the RS-232 terminal port on the MicroVAX, and plugged the power cord into an outlet. The red Power On light on the front panel illuminated, and a green LED, also on the front panel, began flashing.

As I continued to hook up the associated units, Technology Editor Philip A. Naecker, who assisted with the review, attempted to establish communication with SAM via the MicroVAX. SAM was connected to a video terminal using the supplied cable, and the baud rate was set for our system via a switch panel on the

front of SAM. Using the SET HOST/DTE command, Phil was able to "talk" to the unit.

Following the SAM installation procedures, we first entered a command to clear the temperature indicators on the front panel, then connected the relay output cable to the computer's power controller. We then installed each of SAM's auxiliary components, including the Humidity Probe, Power Quality Monitor, Temperature Probes, Auto Dialer, Air-Flow Sensor, Water Sensor, Smoke Sensor, and Intrusion Detector.

As each hardware device was installed, we made certain that the terminal could communicate with it by issuing the

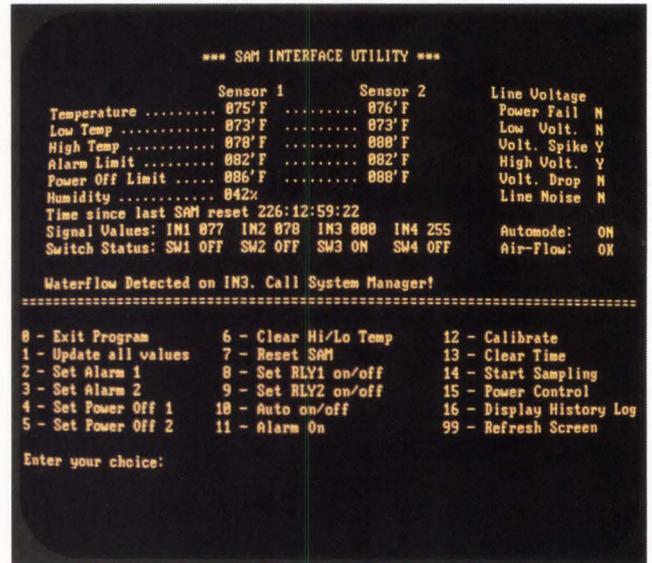


Figure: Sample Menu screen for SAM utility software.

commands depicted in the manual. They all worked on the first try. After the hardware was in place, we installed the SAM software. Phil loaded the TK50 cartridge (cluster version). Standard file-loading procedures are employed.

The software consists of two routines:



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monitor and utility. The monitor is responsible for data sampling, logging, issuing user warnings and initiating the host system software and hardware shutdown when alarm conditions and power-off limits are exceeded. It runs in batch mode and samples such conditions as temperature, humidity, smoke, water, and air flow every 10 minutes. When a threshold, set either by default or by the user, is exceeded, a warning is sent to system users. When the condition becomes critical, sampling frequency is increased from every 10 to every two minutes. If the problem isn't resolved after five samplings, the host sends a timed-out power-down command to SAM. A system software shutdown then is initiated. At completion, the system is powered down. Sampling frequency, thresholds and alarm warnings can be modified for your requirements.

The utility is a menu-driven, interactive program that allows viewing of SAM's capabilities and gives the system manager access to SAM's internal param-

eters for interrogation or modification (see Figure).

Check Out

With the hardware and software installed, we were ready to check out SAM in a normal operating environment. To do this, Phil and I used a combination of things to "force" error conditions.

Software parameters were changed to lower threshold settings, while smoke, water, heat and humidity were brought into our computer room to test each sensor/detector. The air-flow sensor was moved to various locations within the room, some with air-flow obstructions, some without, to observe its operation.

The devices detected their respective conditions, sounded the SAM audible alarm, which is extremely loud, and caused a system warning message to go out to all users.

The Auto Dialer also was activated. It automatically dialed the first number (of the four previously programmed) to report the alert condition in the computer

room. It does this with a synthesized voice message. The unit also requests a reply from the receiving party. It asks to be called back at the computer room to acknowledge receipt of the alert message. It then repeats the message and hangs up.

If an acknowledgement isn't received within a specified time, the Auto Dialer repeats the procedure with the next number in its memory. This continues in a round-robin style until the call is acknowledged.

The Intrusion Detector was installed but not fully tested; it requires programming and setup that aren't covered in the SAM manual. It has its own installation documentation. We connected it, however, and it recognized movement that occurred across its path.

When we corrected the environmental condition that caused the alarm, SAM cancelled the alarm mode. All was quiet again. When the over-threshold condition was allowed to continue, after five repeated intervals of sampling and sending system warning messages with

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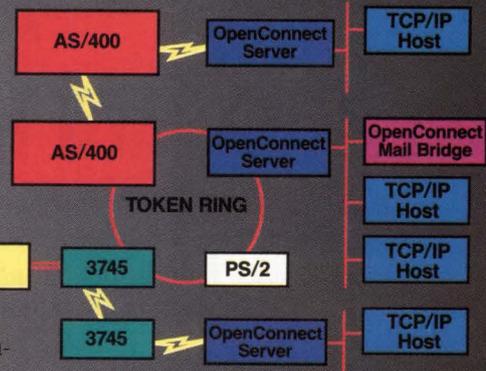
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nonstop sounding of the audible alarm, SAM automatically initiated the power-down procedure.

Glitches

In our tests, the smoke, water, temperature, humidity, air flow probes and power quality monitor all worked. The Auto Dialer also performed as it should have. The Intrusion Detector worked to the limited extent that it was tested. The SAM module successfully recognized each environmental hazard we created and took appropriate action according to the parameters we set. However, we ran into two minor problems.

First, although the supplied SAM manual was easy to follow and clearly depicted which cables/wires to hook where, the labeling on the boxes didn't always match the names used in the manual. This caused minor confusion as to which box to open next, and I wasn't always sure I was handling the right device. I also found the manual amateur-

ish and the instructions for using the software incomplete.

Second, the water, smoke and intrusion detector cables had spade-lug connectors at both ends. The SAM back panel, however, requires BNC-type connectors. To get around this, Intra supplies spade-to-BNC adapters. I found this to be a strange approach. The cables should have the right connectors at each end without this kludge.

Even with these few minor annoyances, the installation went smoothly. I'm sure that any experienced VAX/VMS user could install and activate SAM. If you have a question, Intra provides telephone support.

The SAM2010 Disaster Prevention System is an asset where computer operations and installations must be protected in unattended environments. It senses environmental changes within the computer room, checks the environmental conditions against preset thresholds, and alerts users when a safe parame-

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CIRCLE 504 ON READER CARD

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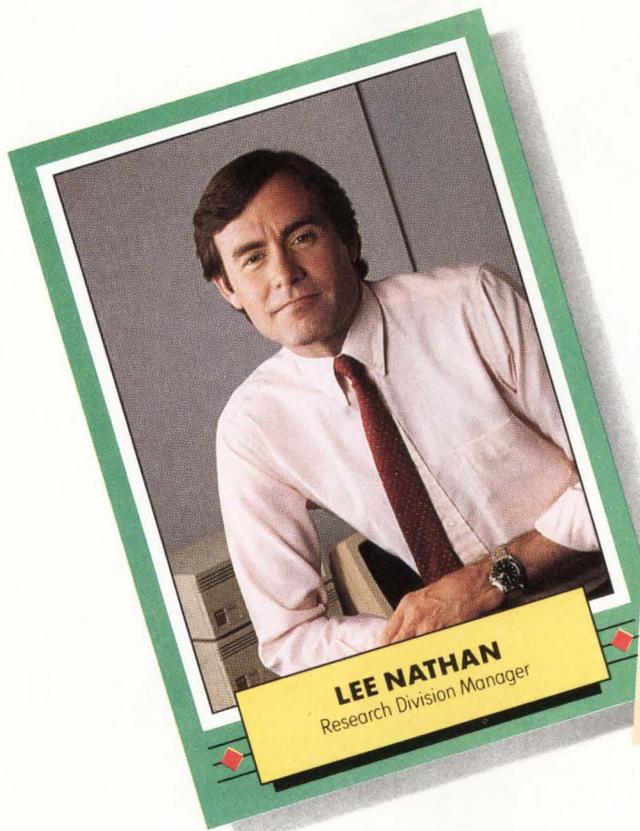
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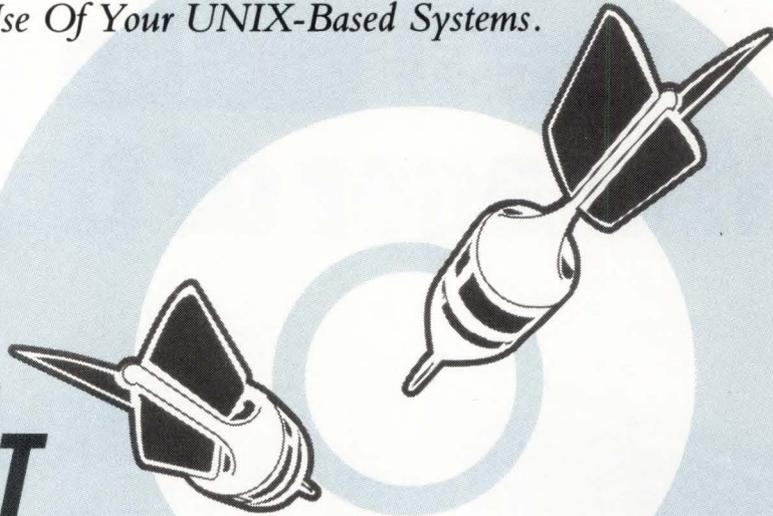
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TAKING AIM AT UNIX RESOURCES



As UNIX-based systems make their way into more commercial sites, accounting for system resources becomes an increasingly important issue. One solution to this problem is offered by Braintree Technology, which has introduced a resource and accounting package for UNIX-based systems. AIM Resource Accounting (RA) runs on a wide variety of machines and flavors of UNIX, including BSD 4.2 and 4.3, HP-UX, SunOS, System V and ULTRIX. It's compatible with VAX and DECstation RISC machines as well as with AT&T and HP machines. The product was developed by AIM Technology.

We installed RA V2.0 on our Lab's DECsystem 3100, which is a multiuser DECstation. This machine uses the Mips Computer Systems RISC chip. The product was provided on a TK50 tape in tar

group: 2	group: 4
disk 0.005	disk 0.005
cpu:	cpu:
mon-fri 09:00 17:00 45.0	mon-fri 09:00 17:00 30.0
mon-fri 17:00 22:00 30.0	mon-fri 17:00 22:00 20.0
mon-fri 22:00 9:00 20.0	mon-fri 22:00 9:00 20.0
sat-sun 00:00 24:00 15:00	sat-sun 00:00 24:00 10.00
holiday 15.0	holiday 10.0
login:	login:
mon-fri 09:00 17:00 10.0	mon-fri 09:00 17:00 7.0
mon-fri 17:00 22:00 7.0	mon-fri 17:00 22:00 5.0
mon-fri 22:00 9:00 7.0	mon-fri 22:00 9:00 5.0
sat-sun 00:00 24:00 7.0	sat-sun 00:00 24:00 3.0
holiday 5.0	holiday 3.0

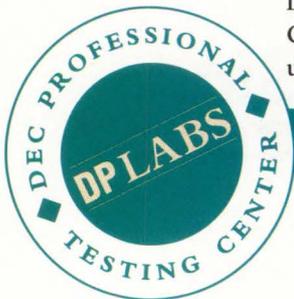
A portion of the AIM Resource Accounting rate file showing rates for administrators (group 2) and programmers (group 4). Rates are shown in dollars for time slot on days indicated.

format. We created a directory on our system:

```
/usr/local/aim_ra
```

and loaded the RA files into that directory. The software was delivered in

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Figure.

```
sobel personal login time
00:00, February 1 1990 to 14:44, February 26 1990
Period Hours Per-Hour Charge
mon-fri: 09:00 - 17:00 2:20 $ 7.00 $ 15.40
mon-fri: 17:00 - 22:00 0:00 $ 5.00 $ 0.00
mon-fri: 22:00 - 09:00 0:00 $ 3.00 $ 0.00
sun sat: 00:00 - 24:00 0:00 $ 3.00 $ 0.00
holiday: 00:00 - 24:00 0:00 $ 3.00 $ 0.00
Total: 2.20 $ 15.40

sobel personal CPU use
00:00, February 1 1990 to 14:44, February 26 1990
Period Seconds Per-Hour Charge
mon-fri: 09:00 - 17:00 7 $ 30.00 $ 0.05
mon-fri: 17:00 - 22:00 0 $ 20.00 $ 0.00
mon-fri: 22:00 - 09:00 2 $ 20.00 $ 0.01
sun sat: 00:00 - 24:00 0 $ 20.00 $ 0.00
holiday: 00:00 - 24:00 10 $ 20.00 $ 0.02
Total: 19 $ 0.08

sobel disk use
February 1 1990 to February 26 1990
1682 bytes per day
4 1/2k blocks per day
Charge for disk use: $0.01 - at $0.005 per 1/2k block per month

Statement for sobel
Login time: 2 hours, 20 minutes
Charge for login time: $15.40

CPU use: 0 minutes and 19 seconds
Charge for CPU use: $0.08

Average disk use: 1682 bytes per day
Charge for disk use: $0.01

Total Charge: $15.49
```

A portion of the statement for user sobel.

source code. A shell script, `ra_make`, is provided to compile the software and create libraries. The script asks you on which system you'll install RA and also about other parameters, such as maximum number of users.

We had a problem with the compile on our system. The compiler flagged a syntax error in one of the source modules. A check with the technical support staff at AIM Technology revealed that this occurs only on DEC's RISC platform. A VAX chip with the same version of ULTRIX won't flag the error. The temporary fix was applied. AIM Technology is addressing the problem in its next scheduled release. According to the company, no other problems should result; we didn't experience any.

The second part of the installation procedure requires that another shell script be run. This one configures RA for your system environment. You should be familiar with the setup of your system so that you can respond to the prompts. For example, this script will ask you to verify all possible user log in shells, because

RA needs to run each user's shell within one of its files to keep track of and charge system resources to the users.

Whoever installs RA at your site should understand UNIX directory structure and syntax. While the step-by-step installation instructions are complete, you must edit a system file (`/etc/passwd`) and be familiar with who's on your system and where things are located on your system.

Right On Track

RA can track UNIX system use and can

charge resource use to individual users as well as user-defined groups and projects. UNIX monitors CPU time used for each program run, when the program was run and the total elapsed time. It also identifies the user who ran the program by identification number and tracks user log ins and log outs. RA tracks total log in time for each user, CPU time and disk use in bytes.

The person designated as the RA system administrator can define rate groups, i.e., a set of rates to charge users for different types or levels of activity. A typical rate group will have the rates for CPU and time in dollars per hour. Disk use is logged in dollars per 1/2K block of storage per month. Rates for CPU and log in time can vary with time of day, day of week and holidays.

The rate groups are stored in the file called `rates`, which on our system was in the directory `/usr/local/aim_ra/adm`. This illustrates the default directory organization when you install RA. An `aim_ra` directory is created under `/usr/local`. Subdirectories, such as `adm` for

"RA administrator" files, bin for executables, and `admbin` for "administrator" executables, are created under the `aim_ra` directory, with applicable files placed in the directories.

For simplicity's sake, I'll indicate the filename with the path omitted. The RA documentation has a complete file and directory listing. Our rate groups setup for "administrators" and "programmers" is shown on page 82.

The next step is to add users to the rate groups you've defined. There are two ways to do this. You can run the script `ra_adduser`, which prompts you through the process, or add the users manually in the RA command mode. To get into command mode, type RA. This brings up the RA prompt, `->`. RA command language is 4GL-like, using statements with keywords such as "add," "get" and "put." For example, to add sobel to rate group 4, type:

```
->add sobel to rate 4
```

RA responds with:

```
assigned user sobel to rate 4
```

After you add your users to RA, you must edit the `/etc/passwd` file to change their log in shells. To track system use

AIM Resource Accounting V2.0

PLATFORMS: UNIX or ULTRIX

PRICE: From \$1,350 to \$9,900, depending on CPU

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FOUNDED: 1989

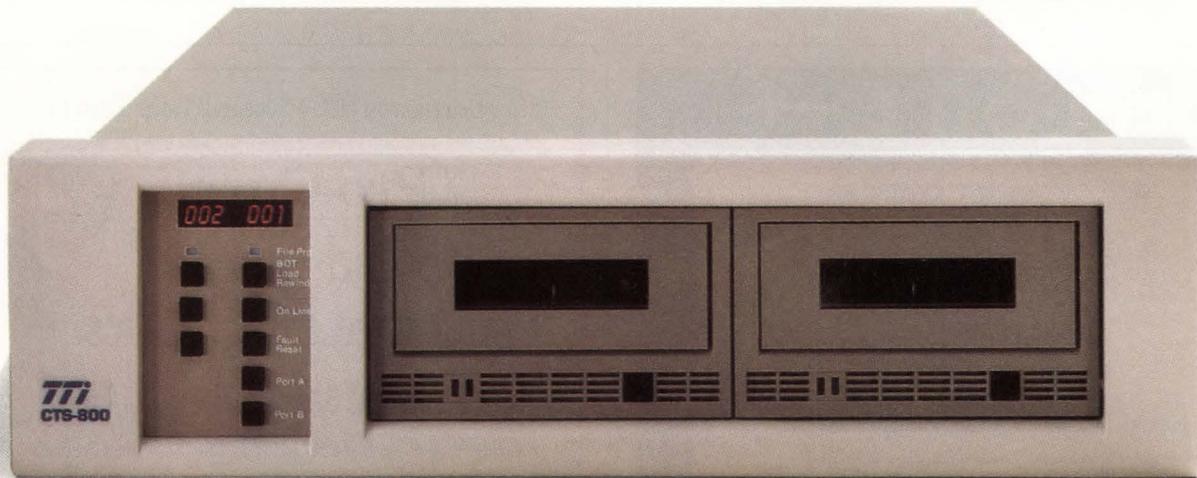
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For More Information

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950 deGuigne Dr.
Sunnyvale, CA 94086
(408) 720-1700
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for each user, RA runs each user's log in shell within its /acct_shells directory.

The last step is to run duacct to initialize disk charges. You must run duacct as root while in your system's RA directory.

Class Structure

Groups of various classes of users can be defined, as can group leaders. The members of the groups can still be assigned individually to rate groups. This feature lets you organize the users for reporting

purposes.

Optionally, projects can be defined and subdivided into tasks. Members (not necessarily from the same user group) and leaders can be assigned to each project. Projects can be assigned to a particular rate group. All work done for that project is recorded at that rate. RA also has scripts available to help with this job.

Various statements can be requested at the RA command level. Issuing the command:

```
->get sobel statement
```

produces a statement like the one that appears in the Figure.

RA has the flexibility to add and delete groups, users and projects, reassign users to different projects, and so on. These tasks can be performed by issuing simple Englishlike commands at RA's command prompt.

RA V2.0 offers a new feature. Reports of various formats can be created using built-in routines provided by RA. How-

ever, you must first produce an ASCII file by issuing a dump command at the RA command prompt:

```
->dump everyone's summary statement  
in asciifile
```

The file produced can be examined directly for the accounting information. Therefore, if someone at your site is proficient in C, you can write your own reporting routines using this raw data.

THE DOCUMENTATION CONTAINS a complete installation section, a command language reference and a listing and description of the system files. Separate sections are geared to administrators, group and project leaders, and users.

If you're a UNIX system manager confronted with an onslaught of new users or a VMS manager charged with managing an ULTRIX box, AIM Resource Accounting is worth a look. It'll help you get a handle on who's doing what on your system. ■

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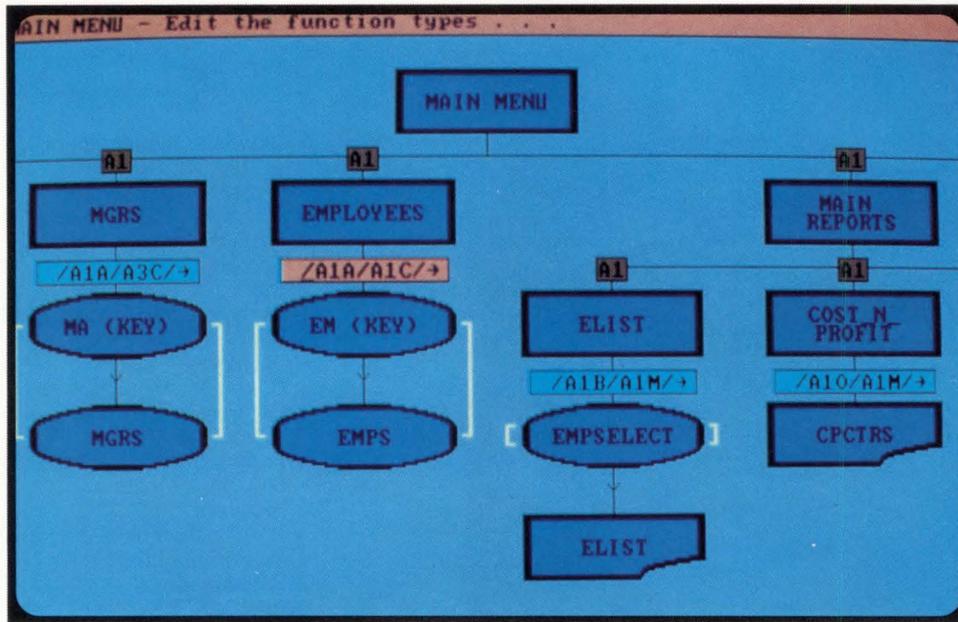
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Personnel system menu created with the Menu Diagrammer.

BUILDING FROM THE CORE

Cortex's CorVision V4.32 is an integrated computer-aided software engineering (I-CASE) tool for the VAX and IBM PCs and compatibles. It automates the design, programming, testing, implementation, maintenance and documentation of application software. Applications use DEC's Record Management System (RMS) and can use Rdb. Applications that benefit from CorVision include manufacturing-related systems such as inventory and quality control and order processing, as well as general business systems such as accounts payable and receivable.

CorVision consists of three major components: a set of picture-program-

ming software design tools, a central repository that resides on the VAX, and an application generator.

Through Picture Programming, you can diagram a complete application using CorVision's software design tools and the color graphics capabilities of your PC. These design tools include pop-up menus, icons and windows.

The central repository stores all application information and is managed by an intelligent guidance system that lets developers share application specifications with other CorVision developers across a network. This lets multiple developers work on an application simultaneously.



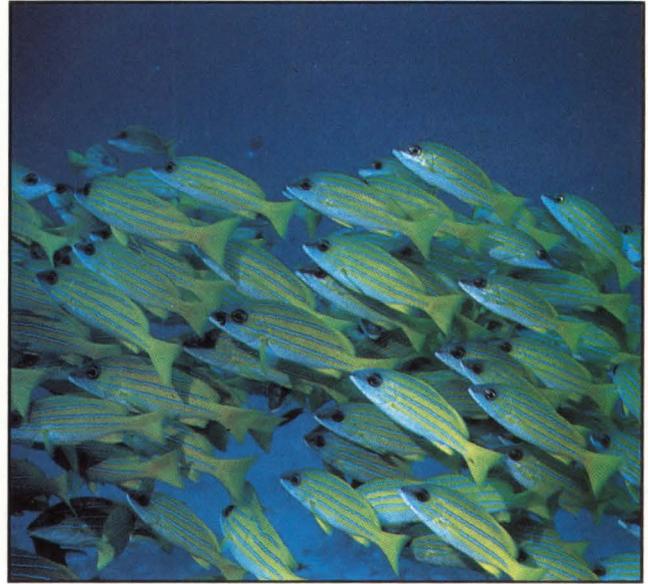
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The central repository also provides interactive help throughout the development process.

The application generator, running on the VAX, automatically generates 95 to 98 percent of the application in the form of compiled machine code. The remaining code may be added with Cortex's 4GL Builder or any VAX 3GL.

From The Inside Out

CorVision Version 4.32 arrived on two 1,600-bpi nine-track tapes. We installed it on our Lab's MicroVAX II running VMS Version 5.2.

Once you create your [CORTEX] account on the VAX, you should make sure your quotas, privileges, default protection and SYSGEN parameters are set to those specified in the CorVision release notes. After creating your CORTEX directory, BACKUP the files to disk and issue the VMSINSTAL command.

Following installation, you may install the Component Specification Reports (CSR). These arrived on two 1,600-bpi tapes. CSRs are CorVision reports that describe each of your application's data and program components. You can run these reports while you specify your application's components and use them to keep track of development progress. You can also use CSRs as technical documentation for your application. CSR installation instructions appear in the CorVision release notes.

CorVision software for the PC is supplied on two 5 1/4-inch floppy disks. Before installing CorVision on your PC's hard disk, make sure that the BUFFERS and FILES values in your CONFIG.SYS file are set to 22.

You also need a Microsoft mouse and driver software to use CorVision, and you need to include the command DEVICE = <directory path> MOUSE.SYS in the CONFIG.SYS file. <directory path> specifies the PC directory in

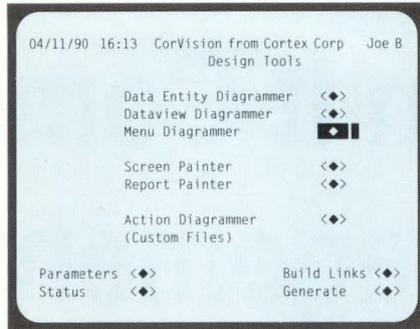


Figure 1: CorVision's Design Tools

which MOUSE.SYS resides.

CorVision Components

CorVision's software design tools include a Data Entity Diagrammer, Dataview Diagrammer, Menu Diagrammer, Screen Painter, Report Painter and Action Diagrammer. You can access these design tools through the Design Tools menu (see Figure 1).

The Data Entity Diagrammer lets you design a data model and create your application's data structure using icons. Data entity diagrams consist of datasets and data links. A dataset is a logical grouping of related fields represented by icons, while a data link is a connection that provides access from one dataset to another.

The Dataview Diagrammer helps you define access paths to data within files. With this diagrammer, you can create unique paths that let you access data that's relevant to your application.

The Menu Diagrammer lets you design hierarchical menu structures that represent the logical flow of an applica-

tion from the user's perspective. Screen and report icons in the Menu Diagrammer can be selected to access the Screen Painter and Report Painter.

The Screen Painter lets you lay out the appearance of an application's data screens, while the Report Painter lets you specify the content and layout of application reports.

Finally, the Action Diagrammer is an interactive screen editor designed to enter and modify Cortex's Builder code. With Builder, you can customize your application by providing additional procedural logic that CorVision's generated code can't provide.

CorVision's central repository on the VAX recommends logical steps toward the design of your application. It also performs consistency and completeness checks throughout the entire process.

Running CorVision

You can start CorVision automatically or manually by setting the AUTOLOGIN parameter to Yes or No, respectively, in the file C:\CORTEX\CVPARAMS.DAT on the PC. To start CorVision manually, enter CVMAIN at the DOS prompt. This takes you to the initial user screen. After you enter your username, CorVision's Design Tools screen is displayed.

The diamond character positioned to

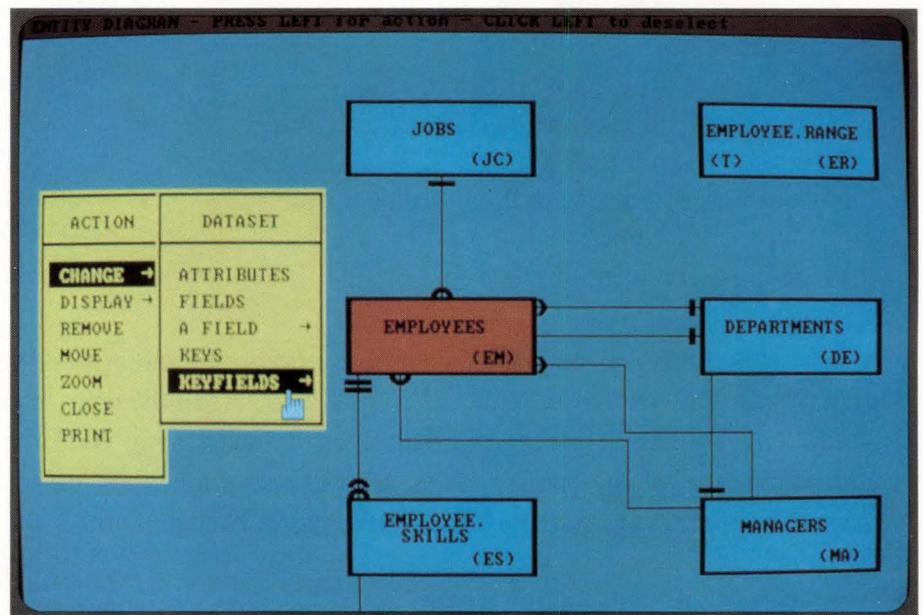
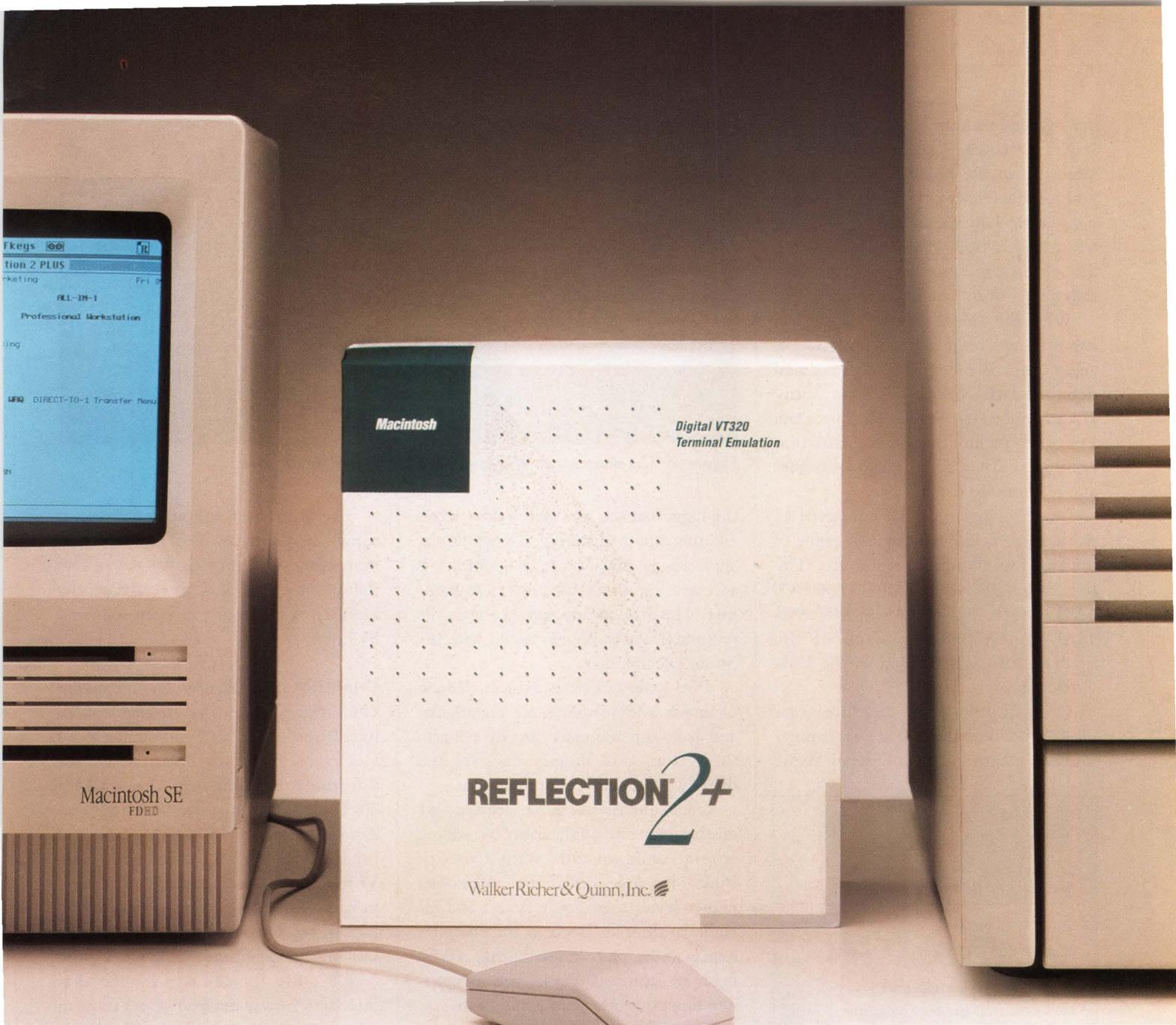


Figure 2: An Entity Diagram with links and relationship icons.



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CIRCLE 172 ON READER CARD

the right of an item is that item's gateway. To access a Diagrammer or Painter screen from the Design Tools screen, position the cursor over the corresponding gateway with the mouse and click the left mouse button. Pressing and holding the left mouse button brings up the action menu, from which you select Open.

With the aid of Cortex's technical support, we built a personnel system application. We began by creating and defining datasets with the Data Entity Diagrammer (see Figure 2). The Data Entity Diagrammer represents datasets as rectangles. Datasets are linked with lines and relationship icons.

Our Employees dataset contained 14 fields. Each field held a specific piece of information about the employee. The first five fields were EMPLOYEE.NO, LAST.NAME, FIRST.NAME, MID.INITIAL and ADDRESS. Each of the fields in turn was defined in the Data Dictionary.

Once all datasets and data links were created, we used the Menu Diagrammer to create menus. A Menu Diagram shows

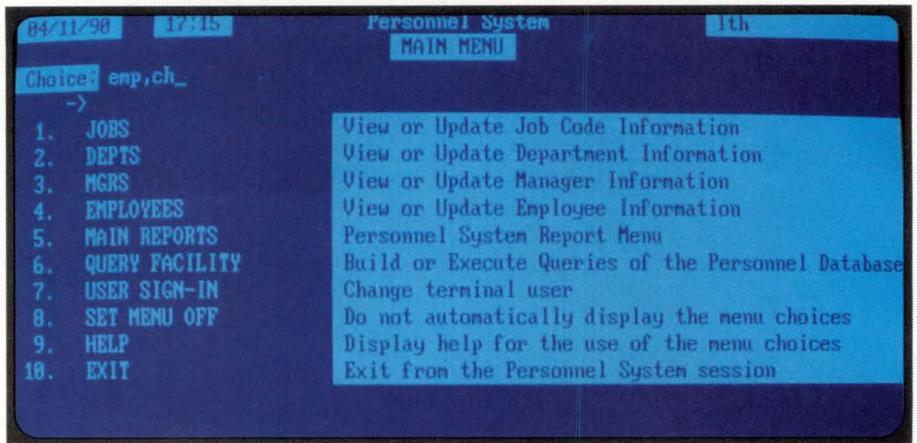


Figure 3: The main menu of a completed CorVision application.

the logic that the user will follow when entering and maintaining data within the application. The Menu Diagrammer is accessed like the Data Entity Diagrammer. The diagram on page 88 shows the personnel system menu created with the Menu Diagrammer.

Two types of menu exist in a Menu Diagram. Menu menus are rectangular and have other menus directly beneath them. Function menus are oval and directly access application functions.

Once our menus were created, we customized our application by adding several lines of code with Cortex's Builder language. Builder resembles other higher-level languages in syntax and includes arithmetic, Boolean and character expressions, pattern matching, verbs, fields and routines that let you incorporate functions into your application.

The following code is an example of Builder:

```
TOTAL.SKILL.VALUE:#EM=0
IF N..LINES GTO
SAVE..N=GROUP.NUMBER
GROUP ES WRITE SAVE..N
FOR LOOP.INDEX=1 TO N..LINES
GROUP ES READ LOOP.INDEX
TOTAL.SKILL.VALUE:#EM=
TOTAL.SKILL.VALUE:#EM+
SKILL.RATINGS:#ES
ENDFOR
GROUP ES READ SAVE..N
ENDIF
SCREEN_ITEM "TOTAL.SKILL.VALUE.EM"-
REDISPLAY
```

The final stages of development included generating the Builder source code for our application and then compiling it. Compilation took only a few minutes.

The main menu for our application is shown in Figure 3. You can select an item using the Up or Down arrow keys followed by Enter. Or, you can enter the number of the item you want followed by Enter.

THE DOCUMENTATION accompanying CorVision is extensive. It includes an installation guide, a three-volume set of CorVision reference manuals, a two-volume set describing the Builder Toolkit, an architecture handbook, an Action Diagrammer user's guide and other items. To get started with CorVision, Cortex recommends you attend its basic two-week training course, which introduces a step-by-step approach to building an application using CorVision.

Recently Cortex announced that interfaces now exist from CorVision to DEC's CDD/Plus and Index Technology's Exceleator. The CDD/Plus interface allows developers to distribute, maintain and control information via a central repository, while the Exceleator interface automates the transfer of design specifications from Exceleator to the development, code generation and maintenance phases of CorVision. The interfaces to CDD/Plus and Exceleator cost from \$2,000 to \$4,000, depending on CPU size.

Cortex plans to release CorVision V4.4 this summer. The new version will include pop-up windows, full support for VAX dates and times, metadata export, and transaction management. ■

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OWNERSHIP: Private

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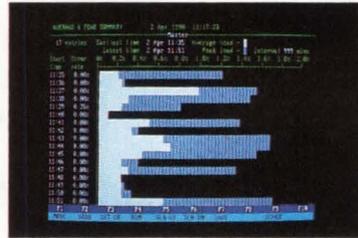
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CIRCLE 278 ON READER CARD

BOOKSHELF

PERSONAL TRAINER

Aside from restoring a trashed disk from backup tapes, the most unpleasant task a VAX system manager or administrator must endure is teaching new personnel the wonders of VMS. And perhaps the most pathetic site in VAXdom is that of a neophyte user ripping through the two-inch-thick *VMS User's Manual (VUM)* trying to figure out where the file he'd been working on for the past two hours disappeared to.

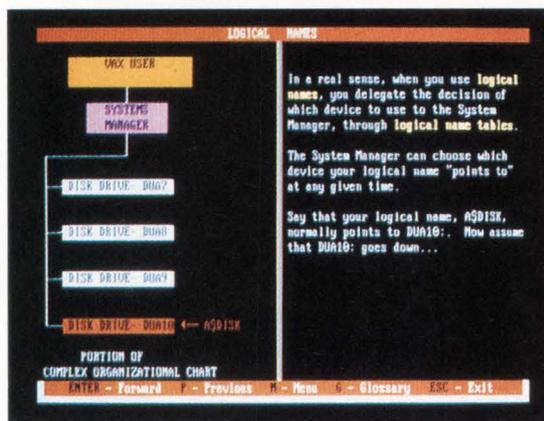
In DEC's defense, the *VUM* is a well-organized, completely indexed guide to VMS and contains almost everything the average user needs to know. But it's an intimidating work, and its abrupt, concise style is sometimes confusing.

A kinder, gentler approach to VMS is provided by Bernstein & Associates' Personal Trainer (PT). A PC-based training program that mixes colorful graphics and good, solid information, PT can help even the most dyed-in-the-wool computerphobe get up to speed quickly.

PT requires an IBM PC, XT, AT or compatible with at least 256 KB of memory. It also requires a color monitor (CGA or EGA) and a hard disk drive. It comes on four diskettes and requires a little more than 1 MB of disk space. An automated procedure reduces installation to a five-minute disk-swapping exercise. Once on the PC's hard drive, a simple batch file calls up the program.

There's no written documentation for PT, because none is necessary. You're presented a menu of topics. You just choose one and dive in. Seven subjects are covered: the VAX environment, the user environment, DCL, files, symbols, logical names and batch processing.

Each module provides a thorough discussion of its topic, including rudimentary animation to highlight the points being discussed. PT takes advantage of the limited graphics capability of the PC, using color to emphasize key



Bernstein & Associates' Personal Trainer provides a menu of seven subjects, including logical names, illustrated above.

points of interest. You can move forward and backward through a lesson, reviewing previously discussed points, or you can jump back to the main menu and move on to a different topic.

The screens are well-designed and uncluttered, and important points are emphasized with multiple-choice review questions. You must enter text to simulate typical VMS operations. The differences between the PC and VT keyboards aren't at issue here, since VT function and control keys aren't used.

PT comes with a hefty, three-ring reference manual that provides more in-depth information. The book alone is almost worth the cost of the entire package. Not only does it discuss the topics in the computer-based tutorial in more detail, it contains summaries that are extremely useful in daily operations. I have a sneaking suspicion the system manager will snatch the superb peripherals and VAX CPU performance comparison tables before releasing the manual to students.

I have only a few minor complaints about PT:

1. It would be convenient if PT allowed "book marks," enabling a user to return to a specific screen following an interruption. And since PT will probably be used

by more than one person at a site, some method for maintaining enrollment records would be a plus. Multiple users could use the same package on the same machine, with the software restarting the user at the point of interruption.

2. Some of the screens list questions in an "ABC" format, while the answers have to be input in a "123" format. This is a quibble, but it's distracting to someone trying to master the concepts being presented.

3. The PC running PT must have a color monitor. The

company should remember that some sites run monochrome only. My office PC doesn't have color, because I'm not pleased with the way reasonably priced color displays render text. I had to appropriate my son's PC to review the package. While color enhances the training process, it isn't really essential.

When I completed the review, my son took my place at the keyboard and restarted the package. In less than an hour he was fluent enough to be able to log on to my VAX and leave me an abusive mail message about hogging his hard drive.

Penny-pinching front office types may blanch at the price of \$1,050 per copy or \$5,000 for a site license. GSA, university and nonprofit firms get a price break. But considering the hidden expenses of employee training — distracted users and system managers, mistakes, lost data and the ever-present learning curve — hiring Personal Trainer for your operation is a training bargain. —*Reviewed by Kevin G. Barkes, DCL Editor*

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System Management On The Desktop, Part 2

Last month I described the use of FileView as a platform for system management. Although FileView provides a solid foundation from which to build, it has limitations. FileView's inability to support a complex dialog box from a command procedure is the biggest drawback for system management purposes. In this article I'll show you how to get around the FileView limitations by developing a simple DECwindows program. The source code is longer than can be presented here, but it's available on ARIS/BB. I'll explain the bulk of the program through code segments.

Point And Shoot

In Part 1, I discussed some of the benefits a workstation can bring to multisystem management. The ability to access many systems simultaneously from the same screen and keyboard is a powerful feature, but the potential benefit of using a workstation for system management goes far beyond the multisystem aspect. With the proper software, the novice or expert system manager can easily be more productive.

DECwindows is a user-to-operating system agent. In the nongraphical context, there's nothing you can do under DECwindows that can't be done at the DCL level. DECwindows simply makes using the features of DCL commands easier, but only for the limited set of commands supported by FileView. To extend this benefit to other DCL commands, you must develop programs.

Unfortunately, FileView's developers didn't provide a means to expand FileView's built-in verbs, such as COPY, RENAME and DELETE. I call these verbs built-in verbs because they're linked to

widgets defined in VUE\$MASTER.UID and to callback routines in VUE\$MASTER.EXE (the FileView image). To invoke one of the built-in verbs, a FileView subprocess executes the special symbol VUE\$GET_COMMAND with the name of a verb widget, such as VUE\$C_COPY_VERB, as its parameter.

To emulate FileView's interface with DCL commands, it's necessary to build a dialog box with the appropriate widgets and gadgets to collect parameters and qualifiers from the user. From the dialog box, a DCL command can be assembled and spawned to a subprocess. If this is done within the context of a FileView subprocess, FileView will provide support for the subprocess's terminal output.

Using UIL

UIL is a programming tool that programmers can use to create user interfaces that conform to the X User Interface (XUI) Style Guide. UIL is a specification language for defining the initial state of a user interface for an application. Using UIL, you can describe widgets such as windows, menus, dialog boxes, labels, push buttons and others that will be used by your X application.

UIL is a pseudo programming language. Its source, a UIL file, is a series of object definitions. The output of the UIL compiler is a User Interface Description (UID) file, which is interpreted at run time by the Digital Resource Manager (DRM). DRM is a routine you must initialize in your main program.

There are several advantages to using UIL to create a user interface. The biggest advantage is that it's very easy to specify a user interface. Using UIL, there's no need to be familiar with the numerous widget creation routines. To create a UIL object, simply include the object

arguments to be changed. Another advantage is UIL's ability to separate form from function. Because you define your user interface in a separate module, its form (what the objects look like) has little

**“
UIL programming is
nothing more than a series
of object definitions.
”**

to do with the application code that uses it. Finally, it's easy to prototype a new application. Using UIL, a programmer can whip up a working user interface in a matter of hours.

UIL programming is nothing more than a series of object definitions. You specify an object in a UIL module by declaring its name, type, arguments, controls and callback reasons. The object's name is any text string you choose. Arguments are one or more attribute modifications. Each object type has a different set of supported arguments and default values. Controls are widgets or gadgets associated with the object. For instance, when you define a pull-down menu, you must list each entry in the menu as a control. In turn, each control you list must be defined as an object. Finally, within an object you can specify callback routines for one or more reasons (object-specific). Common callback reasons are activate, create, destroy and help. The callback reason provides a simple way of connecting the user's input (manipulation of the user interface) to an action routine.

The typical object would be coded in

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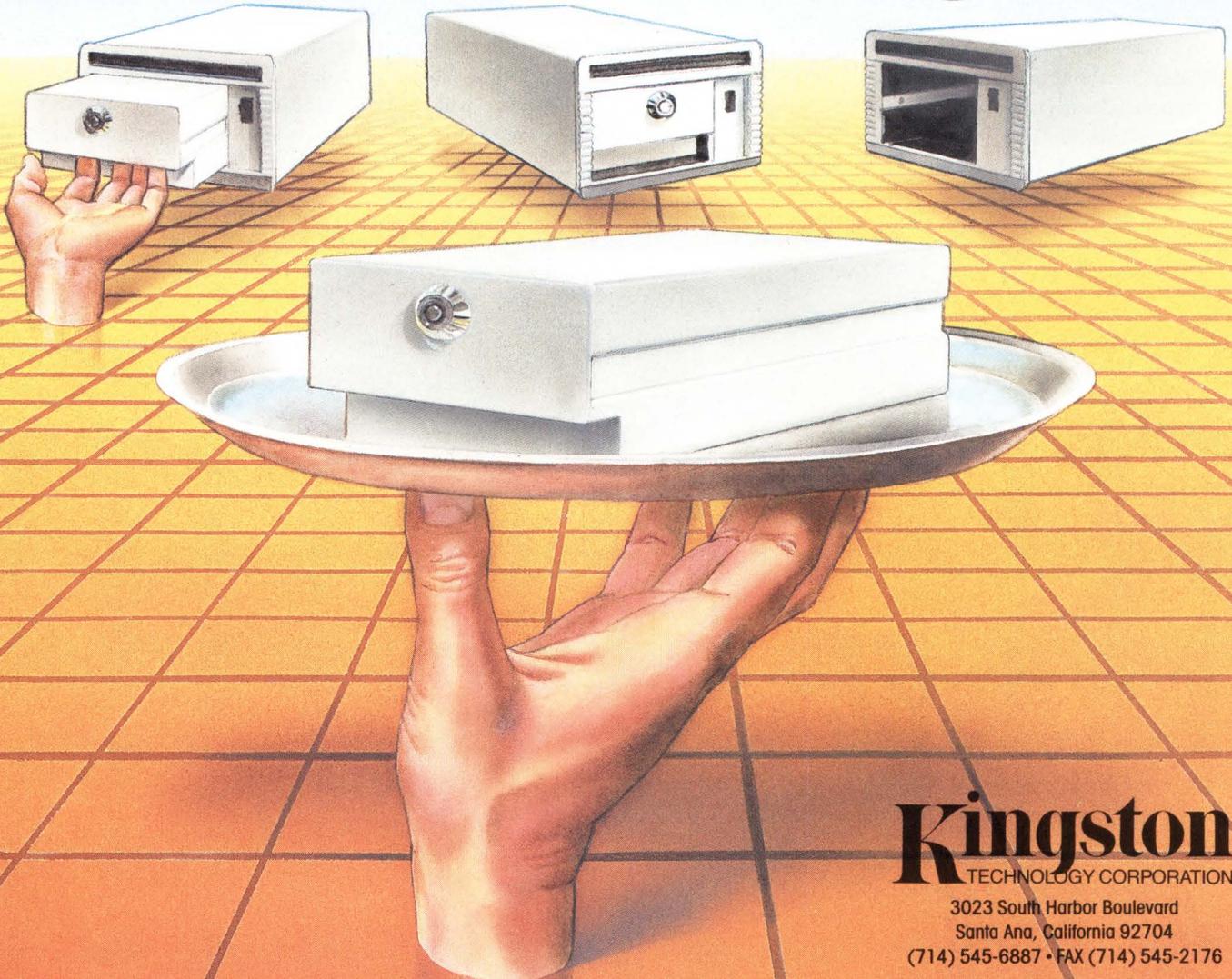
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the following manner:

```
object
  object_name : object_type {
    arguments {
      ...
    };
    controls {
      ...
    };
    callbacks {
      ...
    };
  };
};
```

To make the linkage between your UIL objects and your callback code, the callback routines must be defined. This is done through a procedure section. All callback procedures listed within the callback section of a UIL object definition must be defined in the procedure section. A typical procedure section might look like:

```
procedure
  create_proc (integer);
  activate_proc (integer);
```

Notice that the procedures defined in the example identify a parameter type. This is an option. The parameter is known as a callback tag and must be a

valid UIL value type. I use the tag to tell my callback routines which object has called it. To do this, I use a value section in the UIL module to identify each object with a callback procedure:

```
value
  w_main_menu_bar      : 1;
  w_exit_button        : 2;
  w_nc                  : 3;
  w_image_dialog       : 4;
  w_image_ok           : 5;
  w_image_cancel       : 6;
  w_saveset_name       : 7;
  ...
```

I use corresponding definitions in the C source of the main routine:

```
#define w_main_menu_bar      1
#define w_exit_button        2
#define w_nc                  3
#define w_image_dialog       4
#define w_image_ok           5
#define w_image_cancel       6
#define w_saveset_name       7
...
```

Through the use of an array and a simple routine (`create_proc`), I can log the widget identifications of widgets as they're used. The benefit of doing this is that it avoids having to manage widgets before it's necessary. My `create_proc` routine looks like this:

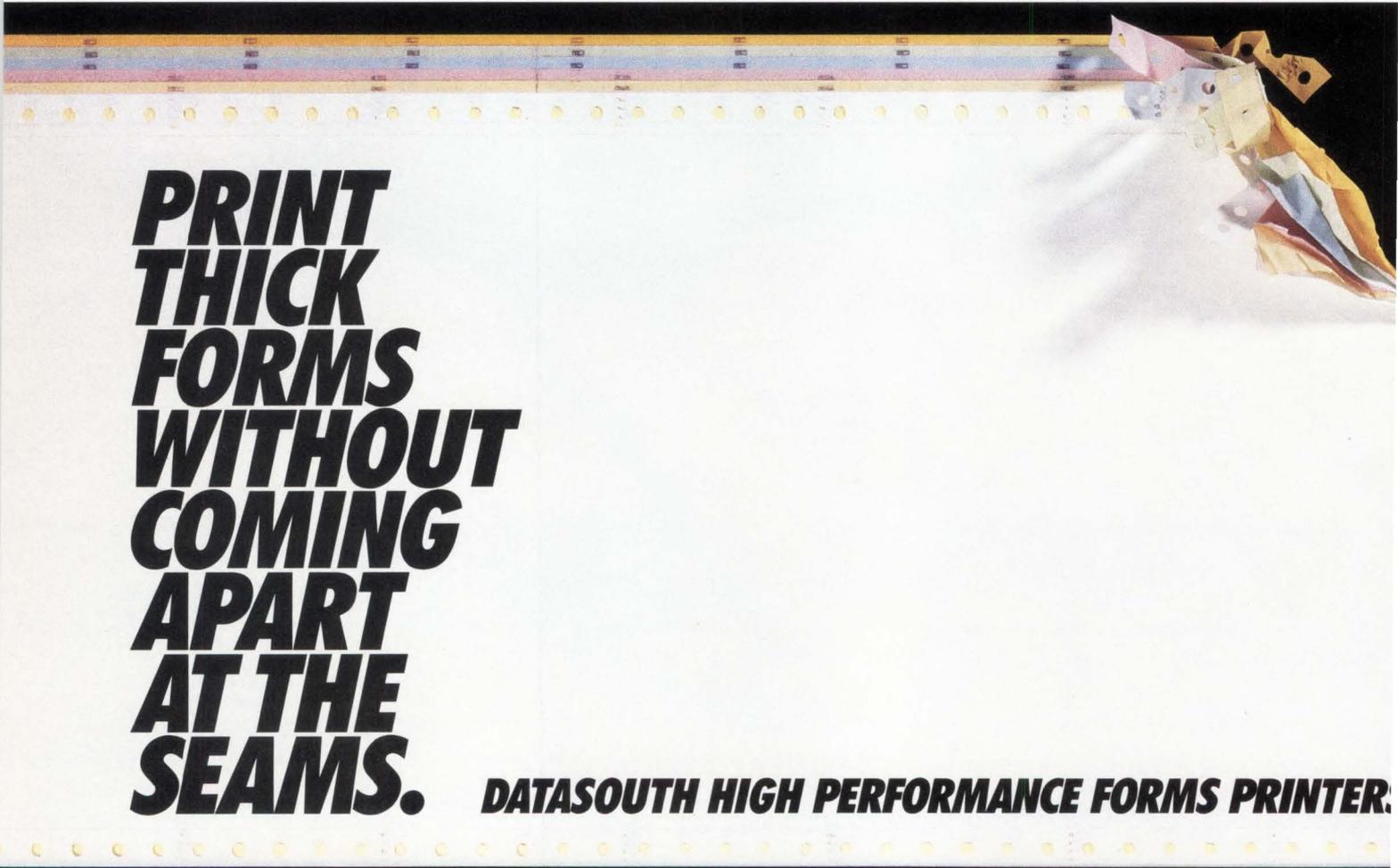
```
static void create_proc(w, tag, reason)
Widget w;
int *tag;
unsigned long *reason;
{
  int id = *tag;
  widget_farm[id] = w;
}
```

Power Of The Callback

To use the objects specified in your UIL module, you must create an application program with the callback routines referenced by your UIL objects.

A callback routine is a procedure linked to a widget action, such as a button press or pointer location. In the standard X.11 programming environment, the callback facility is managed through a callback structure. In this environment, each callback routine must be declared before the main routine. The widget-to-callback linkage is static.

Using UIL, the widget-to-callback procedure must be dynamic, because the UIL module can change without the need to rebuild the executable image. This dynamic linkage is managed by the



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DRM, which you must use to open your UID file and register your callback routines. The following is an example of the necessary definitions and the initialization of DRM:

```
static DRMHierarchy s_DRMHierarchy;
static char *vec[]={"my_program.uid"};
static DRMCode class ;
...
static void create_proc();
static DRMCount regnum = 1;
static DRMRegisterArg regvec[] = {
    {"create_proc", (caddr_t) create_proc}
};
...
DwtInitializeDRM();
DwtOpenHierarchy(1, vec, NULL,
    &s_DRMHierarchy);
DwtRegisterDRMNames(regvec, regnum);
```

Once these calls to DRM have been made, you can fetch widgets (using `DwtFetchWidget`) from the UID file. The first widget to be fetched is always your main window. Once fetched, the widget must be managed (using `XtManageChild`) so the X server can display it. Widgets can then access their associated callback routines. For example, the callback procedure for the "Exit" function on a pull-down menu might be coded

as follows:

```
static void activate_proc(w, tag, reason)
Widget w;
int *tag;
unsigned long *reason;
{
    int i;
    int widget_num = *tag;
    switch (widget_num) {
        case w_exit_button:
            exit(1);
        ...
        default:
            break;
    }
}
```

X Backup

To demonstrate the use of UIL and callback routines, I've written a user interface to the BACKUP utility. Several widgets, including a main window, pull-down menus, dialog boxes and toggle buttons, are demonstrated. The program has limited functionality to make it as easy to understand as possible. From the same basic program core, I've written several front ends to my favorite system management utilities. You can do the same.

The XBACKUP program consists of a

main window with two pull-down menus, Control and Backup, in its menu bar. The Control menu provides an exit path, and the Backup menu lists backup types: Image, Incremental and Physical. When you select a backup type, a dialog box with the appropriate qualifier and parameter widgets pops up. Using the mouse and keyboard, you can complete the dialog box information, and the backup will begin.

The BACKUP command is an extraction of information from the dialog box widgets. A command string is built parameter by parameter and qualifier by qualifier. If enough information is available, the BACKUP command is spawned to a subprocess. If XBACKUP is installed as a verb on a FileView menu, terminal output from a BACKUP subprocess will display in a terminal window created by FileView.

Although my XBACKUP program is limited in its present form, it demonstrates what can be achieved with a little programming effort. ■

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new technology and keep their higher priced products. The only way you do that is by providing enormous amounts of computing power for the same money, for the same revenue that you were getting in the past. Well, they haven't done that. I think they are going to fly both of those companies into the ground." — Gordon Bell, former DEC employee and chief architect of the VAX, speaking in Fortune, March 26, 1990.

Responding to competitive pressures from companies that have caused customers to begin thinking in terms of mips rather than software compatibility or big-company support, DEC and IBM are lashing back with processing power as great and inexpensive as the industry has ever seen.

On April 3, DEC introduced the DECstation 5000 Model 200, which clocks in at 24 mips for \$14,995, about \$625 per mip. That's 20 times the power of the VAX-11/780. Similarly, IBM's new RS/6000 RISC workstations and servers are providing the strongest floating-point performance in the industry, and the HP-Apollo merger will now result in a processor board favoring neither mips nor Mflops, instead providing a clean 100 of both — in parallel. This product, a blending of the HP/PA and Apollo PRISM architectures, is expected by 1992. Users will have the option of plugging multiple processor boards into a system bus in parallel for virtually unlimited computing power.

But what about when the architect, engineer or scientist running one of these machine takes a coffee break? Billions of

machine cycles are wasted. This is the problem the Network Computing System (NCS) was originally designed to solve. Software engineers at Apollo decided to build a software system that would "steal" that power right off the engineer's desk, even if he were only on the phone or his application wasn't processor-intensive.

NCS has since become much more than an attempt to harvest idle processor cycles, though that remains one of its primary applications. Equally important is the ability to add processor power to the network and transparently migrate applications to the new resource, regardless of the hardware architecture. This is the same functionality provided by the VAXcluster, whereby processor power may be added incrementally. But now unlike processors machine power may be added, as well.

A Happy Union

DEC is expanding the VAXcluster and uniting the VAX architecture with its new RISC machines via NCS. The April 3 announcement included native support for NCS in ULTRIX V4.0 and the addition of NCS to the VMS/ULTRIX Connection (UCX) in V1.3. UCX runs on VMS and provides services designed to integrate the VMS and UNIX environments.

Although technically considered a service in DEC's Network Application Support (NAS) group, NCS is developing a life of its own. It was originally engineered at Apollo, but DEC has worked with HP-Apollo to improve NCS by adding support for WANs and other features.

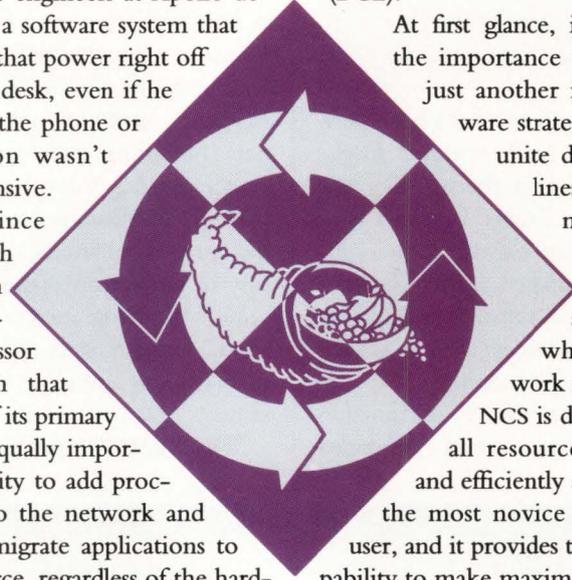
Furthermore, on May 15, OSF announced full support for NCS as part of the OSF Distributed Computing Environment (DCE).

At first glance, it's easy to miss the importance of NCS. It isn't just another innovative software strategy or attempt to unite disparate product lines. It's the beginning of a new way of treating the network as a unified system, whether that network is local or global. NCS is designed to make all resources transparently and efficiently available to even the most novice programmer or user, and it provides the important capability to make maximum use of all resources — especially processor power — thus staving off the need to add expensive new resources.

RPCs

The Remote Procedure Call (RPC) is at the heart of NCS. An RPC may occur with a node five feet down the Ethernet or on the other side of the globe. An RPC consists of a procedure name, a node address and parameters. The addressed node executes the named procedure using the supplied parameters and returns the results to the calling routine on the calling node. Hundreds or even thousands of RPCs may occur every second on a busy network computer.

The RPC is at the heart of client/server computing. Without the RPC, the programmer would have no easy way to partition his program to take advantage of the various compute servers and other



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resources on the network. As RPCs mature, the server and client components are becoming more clearly defined. Server machines of the future will support libraries of RPCs, and client programs running on less-powerful machines will tap into these large libraries across the net.

The NCS RPC isn't, however, the only one. Sun Microsystems' Open Network Computing (ONC) services also provide one, and numerous products are appearing that facilitate the implementation of RPCs, most notably the RPC Tool from Netwise.

A fierce and perhaps unfortunate battle is developing between AT&T/Sun and OSF/IBM/DEC/HP-Apollo in regard to the RPC, and DEC's incorporation of the NCS RPC into ULTRIX is the third solid and seemingly irreversible commitment made by a large company. The other two occurred when AT&T incorporated ONC into UNIX System V.4 and when HP-Apollo built NCS in HP's HP-UX UNIX operating system. According to a Sun spokesperson, however, the problem began when Apollo failed to implement the Sun RPC when it first installed NFS on its systems. Apollo instead developed its own, giving us the two incompatible RPCs we have today.

The two RPCs will coexist at least for the near term. At this point they're too different to interoperate. Where this will eventually lead is anyone's guess, but to make informed choices, system managers must be aware of the issues regard-

ing the different RPC mechanisms. There are four primary issues:

1. Data representation.
2. Transport protocols.
3. Development tools.
4. Naming.

Let's look at each and see how DEC is supporting them in ULTRIX V4.0 and the next release of UCX. Improvements with regard to all four categories are happening fast. Ram Sudama, project leader of the RPC project at DEC, provided the details on DEC's current work in each category.

Data Representation

The data representation problem is one of the most difficult issues in RPC implementation. Machines vary widely in their native data types. Integer size, floating-point precision and byte ordering all differ even among machines from the same manufacturer.

In an effort to deal with the problem, Sun developed the External Data Representation (XDR) model, which uses what's called a canonical format to represent data on the network. The data is converted to a common format known to all machines so that they may individually convert from the canonical format to their native data types. The OSI Abstract Syntax Notation One (ASN.1) is another canonical solution to the problem and includes a variety of other features that allow canonical representation of complex data types and data structures.

There are two primary problems with the canonical approach. One is the truncation or loss of precision of numbers that are larger or more precise than can be represented by the canonical format in use. More common are the inefficiencies that occur when a network is for the most part made up of the same machines — conversion occurs even though it isn't required. In general, canonical formats work best on networks in which there are many different machine architectures in place.

NCS uses a different representation model called the Network Data Representation (NDR) model, whereby data transferred on the network is tagged with

the make of machine from which it's being sent. It's then up to the target node to convert the data to its own data types. If the communicating machines use the same architecture, then no conversion is required. If they're different, it's up to the target to take care of the conversion. Of course, a problem emerges when there are many different types of machines on the network. The overhead of run-time libraries that must include support for every type of machine on the network grows rapidly as machines are added.

In its first release of NCS, DEC is supporting NDR. So if the network consists of only DECstations/DECsystems, no overhead will be incurred. Add a VAX and the conversions begin. Add an MC68000 machine and a couple of SPARCstations, and the performance problems with NDR rapidly appear. Sun criticized Apollo when it developed NDR, because the method is biased against multivendor environments. But DEC is fully behind the OSI Presentation Syntax Notation (PSN) and ASN.1 and promises support for whatever data representation models become popular as the RPC marketplace matures.

Transport Protocols

With many RPCs occurring every second on a busy network computer, network performance becomes a serious issue. FDDI will receive a significant boost as RPCs catch on, and the debates continue as to how to improve RPC performance. Network protocol issues become extremely important, as a slow RPC can radically impact application performance. NCS has dealt with the problem by building the network protocol into the RPC mechanism.

For example, in NCS the distinction is made between *idempotent* and *nonidempotent* RPCs. An idempotent RPC may be unintentionally executed more than once, whereas a nonidempotent must occur no more than once. An example of an idempotent RPC is a mathematical calculation on a vector processor. An

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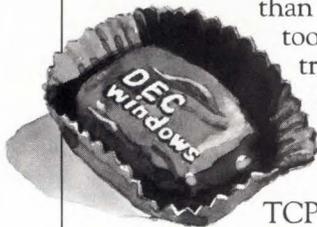
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example of a nonidempotent RPC is an update to a record in a data file by reading an amount and adding to it, then writing the new value back to disk.

In NCS, nonidempotent RPCs are carefully tracked. The protocol specifies several packet exchanges to guarantee proper execution. On the other hand, idempotent RPCs use the minimum number of packet exchanges to execute the call without error-checking. NCS may thus be implemented at the datagram level or over a fully connection-oriented protocol. In its first release of NCS, DEC is supporting NCS on the TCP/IP, UDP/IP and DECnet protocol stacks.

To accommodate the different types of RPCs and available system resources, it's desirable for the appropriate transport for the RPC to be selected at run time rather than compile time. AT&T built this functionality into UNIX System V.4 with the Transport Layer Interface (TLI), and now DEC is doing the same with the Dynamic Transport Selection (DTS) mechanism.

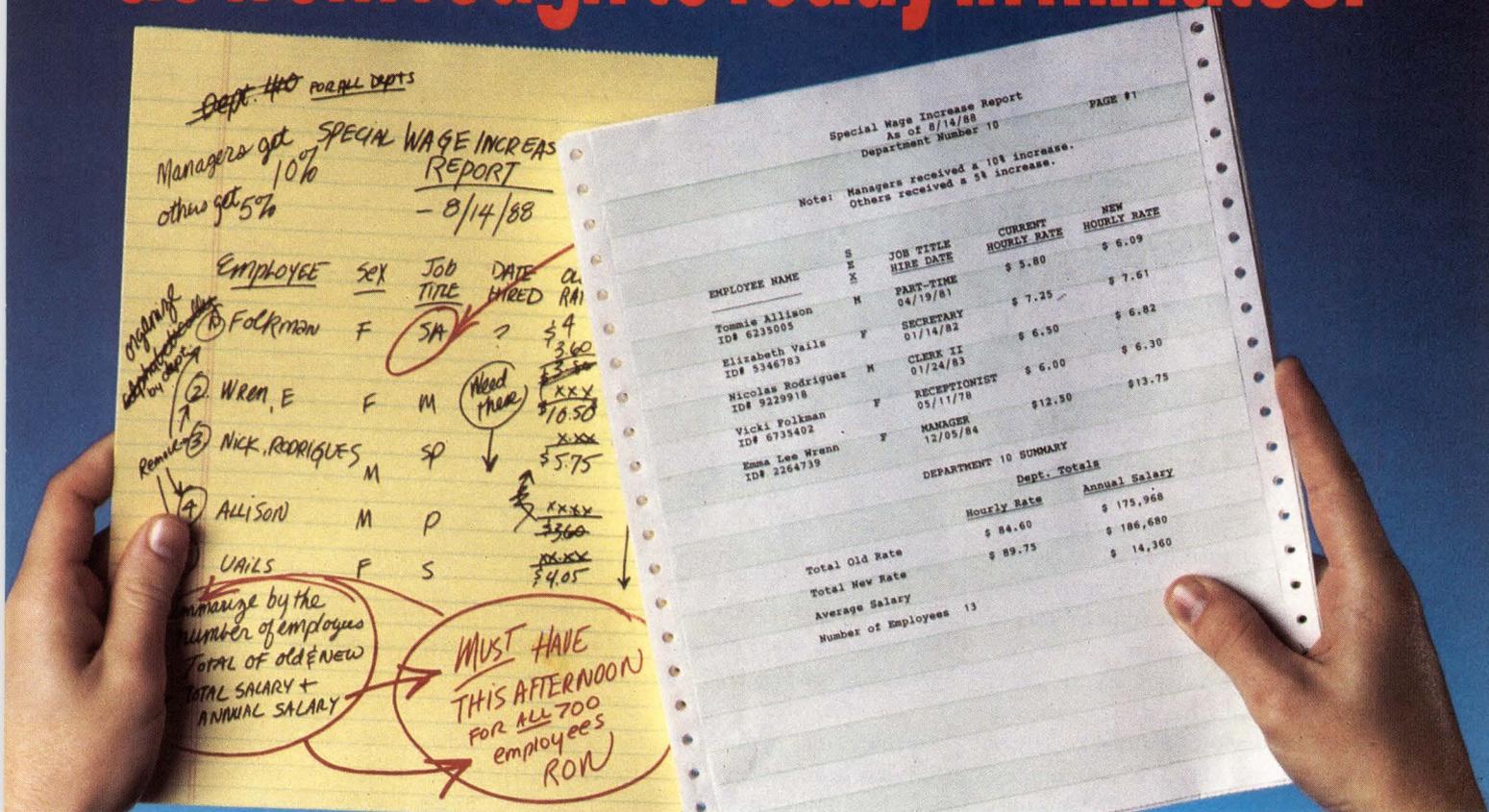
Development Tools

To implement RPCs efficiently, programmers need sophisticated tools to simplify their work. Early RPC development tools such as Sun's RPCgen required programmers to have an intimate knowledge of the network and addressing mechanisms. This is changing quickly. The goal is total transparency in which the underlying structure of the network needn't be known and the programmer or user deals with network resources via simple mnemonic designations. However, it will be several years before this goal is achieved. DEC's Sudama estimates that we're perhaps 30 to 40 percent of the way there, though the underlying mechanisms are pretty much in place. In fact, according to Sudama, much of the work DEC has been doing with VAXclusters during the past several years has laid the groundwork for much of this technology.

With RPCs, the programmer is confronted with a range of new considerations. Whereas previously he partitioned his program into procedures based on

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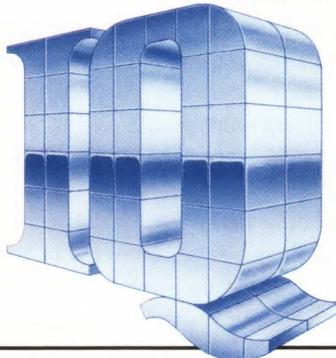
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logical functions within the program and was concerned with performance primarily through analysis of the order of his algorithms, he must now also consider the amount of data that may be transferred across the network for execution on a remote machine. Transfer time versus execution time becomes a consideration, as well as the data types and data structures that may have to be transferred. Procedures no longer share a common main memory.

RPC compilers accept as input specific information about the interface between the calling procedure and the called procedure. The procedures may be written in any number of languages, including C, Pascal and FORTRAN. Routines don't have to be written in the same language, but they must be able to act on the same parameters.

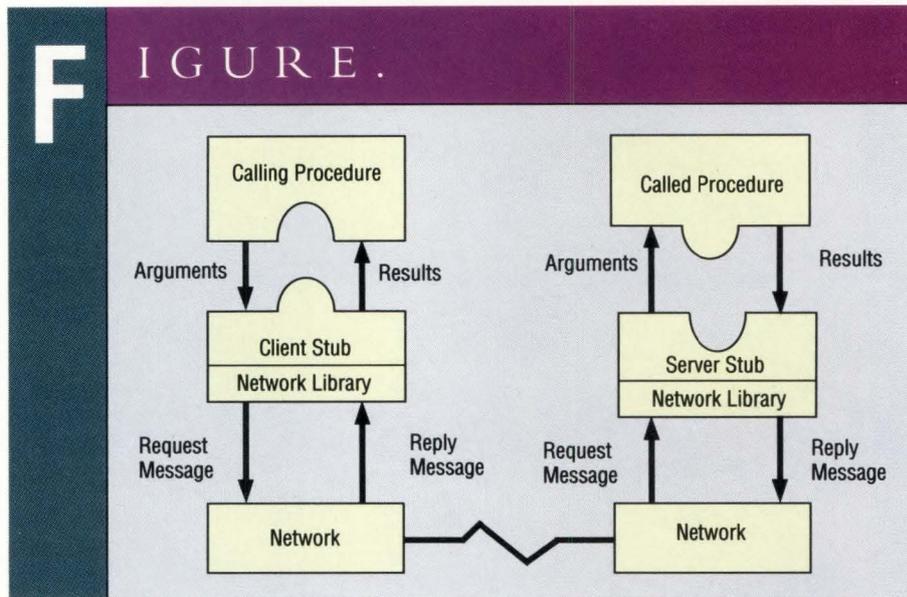
The language used with the RPC compiler is usually based on C, though Apollo also supports Pascal-like syntax and the Netwise RPC Tool also supports Ada. Client and server "stubs" are output from the RPC compiler, usually in C. The C stubs are then compiled on the machines where the client and server routines they support are located, and the procedures are ready to communicate (see Figure). The stubs cause procedure calls to appear local to the procedures.

Multiple stubs and their corresponding procedures may be compiled on a variety of machines and selected automatically at run time according to which machine is the least loaded and thus has the freest amount of processor time to execute the procedure.

DEC's enhancements to the Network Interface Definition Language (NIDL), the NCS compiler, currently support only C-based calling conventions. However, the company will be expanding language support for the compiler as the NCS product line develops.

Naming

Since RPCs are being implemented on a variety of existing networks, it's important that a mechanism be included that allows for flexibility in binding RPCs to the various nodes on which they may



Client and server stubs are output from the RPC compiler. The stubs are compiled on the machines where the client and server routines they support are located. The procedures are then ready to communicate.

Courtesy Netwise Inc.

execute. DEC is supporting the Name Service Independent (NSI) interface, which supports its Distributed Name Service (DNS) and the NCS Location Broker (LB).

Clients and servers are "bound" according to three different mechanisms. In implicit binding, the client-serving binding is set up once at compile time. The remote procedure is always executed on a specific node. In explicit binding, the node may be specified by the programmer each time the remote procedure is called. The network is given all the information it needs to make the call by the application. In automatic binding, a mechanism is invoked to determine the node on which the procedure will execute according to what the mechanism knows about the current load (or some other characteristic) of the network nodes that can execute the procedure. In NCS, this functionality is achieved with the LB. In ONC, it's achieved with Yellow Pages.

The naming service is responsible for translating from the logical names used by the various components of the network computing system to the physical locations. Directories may reside in multiple locations on the network, and it's the responsibility of the naming service to return to the calling node the network

address of the system with which it's to communicate. On a WAN, physical addresses may be diverse.

WILL RPC TECHNOLOGY sweep the industry? To be sure, there's competing technology, including VAXclusters. And products such as The VXM System from VXM Technologies provide an alternative to RPCs by making "extended virtual machines" of each machine on the network. The application programmer thus views the network as consisting of machines with the same fundamental architecture. This is accomplished with "shells" that provide a consistent view of each machine. The programmer then writes "scripts" instead of procedure calls to access a wide variety of remote resources. All resources are dealt with according to common conventions. The VXM System also supports NCS, letting programmers use conventional RPC technology if required.

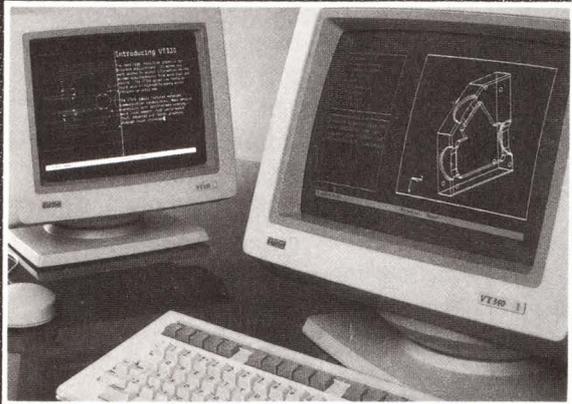
Perhaps all these technologies are leading in the same direction and will eventually coalesce in network-level user and programmer interfaces as simple to use and learn as the Macintosh. The road may not be smooth, but it's quite clear in which direction it's leading. ■

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VAXshare In DEC LanWORKS For Macintosh

Editor's note: Last month Macintosh Editor Al Cini introduced

the basic capabilities of DEC LanWORKS For Macintosh. This month he focuses on the product's file and print services.

Conceptually, VAX/VMS-based network file and print services for Macintosh users aren't new. These basic capabilities have been available for two years, in products such as AlisaTalk from Alisa Systems and PacerPrint/PacerShare from Pacer Software.

Like its predecessors, the VAXshare component of DEC LanWORKS for Macintosh provides file and printer services using Apple's AppleTalk Filing Protocol (AFP) and Printer Access Protocol (PAP). As we'll see, VAXshare adds important new technical features to an old and proven product idea.

File Services

Using Apple's AppleTalk for VMS V3.0, which is included with LanWORKS, the VAXshare file server is VAX/VMS-based software that emulates a Mac running Apple's AppleShare file server software. To Mac users, a VAXshare file server appears through their Chooser desk accessory and allows them to access VAX-based files as though the files were on a Mac hard disk (see Figure). The VAXshare file server publishes one or more Mac volumes, which behave like mounted hard disks on a connected Mac. On the VAX, each volume is linked to a specific VMS disk directory, and any Mac folders created in a volume have corresponding VMS subdirectories.

Under the Macintosh Operating System, each disk file consists of three distinct elements:

1. A Mac file's catalog information includes its dates of creation and other

statistics as well as its Mac creator and type fields. The creator and type fields of a Mac document tie it to the Mac application that created it and allow a Mac user to "double-click" (select and open) a document icon from the Mac desktop and automatically execute the appropriate Mac program to work with it.

2. A Mac file's resource fork contains Mac-specific technical information, such as icons, Finder reference information and the source code for application programs. Among other things, the resource fork determines how a file looks on the Mac desktop.

3. A Mac file's data fork contains user-specific information. For a word processing or graphics program, this would be the user-created document or drawing.

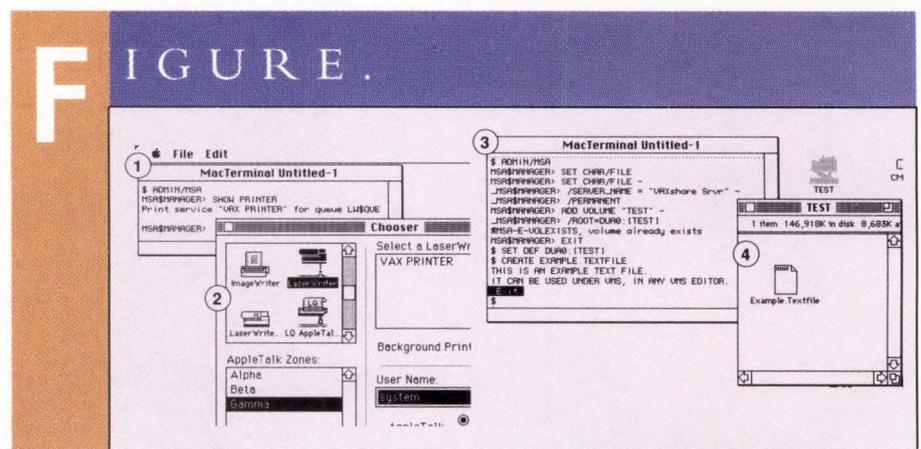
When a Mac user creates a file on a VAXshare server, VAXshare separates its various elements into three areas on the VAX. The Mac file's data fork appears as a file in the VAX/VMS directory that corresponds to the Mac folder into which the Mac file was placed. Its resource fork

appears as a file by the same name, in the [.MSAF\$RESOURCES] subdirectory of the data fork's directory, which is invisible to the Mac user through VAXshare.

VAXshare keeps a Mac file's catalog information as a record in a special RMS indexed file. VAXshare maintains a different catalog file for each VAXshare volume in the "root" directory MSA\$ROOT. Catalog filenames correspond to their Mac volume names, with a .CAT file extension.

Sharing Data

VAXshare's "Apple Double" approach to representing Mac files as two separate files on the VAX/VMS host allows the exchange of information between certain Mac and VAX/VMS applications. VAX/VMS systems equipped with DEC LanWORKS for MS-DOS (PCSA) can also equate their VAX/VMS-based MS-DOS file server directories with those of the LanWORKS for Macintosh volumes, allowing Mac and MS-DOS users to exchange information through the



The \$ADMIN/MSA command on the VAX creates a VAX process that emulates a LaserWriter printer (1) and appears through the Mac's Chooser (2). Print jobs sent from the Mac are automatically queued to LW\$QUE on the VAX. Similar commands create VAXshare file server volumes (3), which can be accessed from a client Mac as if they were Mac hard disks (4).



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common host VAX.

For example, the data fork of a word processing document that's saved to the VAX as a text-only file can be edited on the VAX using TPU or EDT. A Microsoft Word document saved to a LanWORKS volume in MS-DOS format can be directly opened by an MS-DOS user of Microsoft Word. Where the on-disk data representation formats of the user software under all client operating systems agree, for example, WordPerfect word processing documents, a Mac data fork on the VAX can be used interchangeably with a VMS or MS-DOS file.

Where the formats don't agree, a conversion utility can be used. LanWORKS will probably include a \$CONVERT/DOCUMENT feature that can convert MacWrite-format compound documents to DEC's DDIF document interchange format. Users of other word processors might want to consider third-part conversion solutions such as Keyword Office Technologies' Keypack.

Since the VMS and MS-DOS computer environments don't naturally support Mac catalog information, VAXshare allows the files they create on the VAX/VMS host to inherit specific Mac creator and type codes. By editing a control file in the VAXshare root (MSAF\$FILE_TYPES.DAT), the VMS system manager can specify the Mac creator/type fields that non-Mac files should inherit based on their RMS characteristics or file extensions. A VMS-created text file with the extension .WKS, for example, can be given a text type field and Microsoft Excel's creator field. Mac users see an Excel text icon for this file in their LanWORKS volume window, and double-clicking the document's icon automatically launches the Microsoft Excel application.

Print Services

Like the VAXshare file server, VAXshare printer receiver processes running on the VAX use AppleTalk for VMS to emulate

an Apple LaserWriter, allowing a Mac user to see VAX/VMS printer queues through the Mac's Chooser. The VMS print queue, in turn, can be directed to an Apple LaserWriter that's connected to an Apple LocalTalk LAN or via an async line to a DEC terminal server or VAX terminal multiplexer.

Print jobs in the VMS print queue can also be directed to a DEC PostScript-equipped printer, such as the LN03-R or LPS-40. This feature lets Mac users print to DEC printers using standard Mac system software as though the printers were AppleTalk-networked LaserWriters.

What's New?

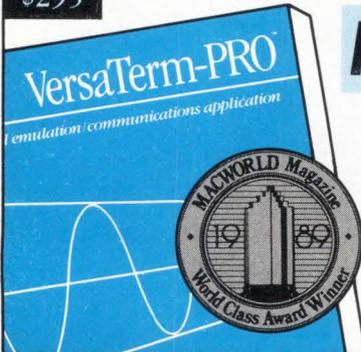
More than a year ago DEC announced that it would license the basic technology found in AlisaTalk, so it should come as no surprise that the basic capabilities found in VAXshare closely parallel their AlisaTalk counterparts. There are several important VAX-visible differences between the two, however, with respect to system management and VMS file security.

Unlike AlisaTalk, which is managed by editing various parameter and command procedure text files, VAXshare is administered using a new \$ADMIN/MSA (Macintosh Systems Architecture) DCL command. Similar to the \$ADMIN/PCSA command interface for MS-DOS, the command line syntax for \$ADMIN/MSA controls file and printer services and is much easier to work with than its AlisaTalk config file ancestors.

Like AlisaTalk, VAXshare uses a single VAX/VMS-based process to handle file server access for all connected Mac clients. Unlike AlisaTalk, the VAXshare file server uses VMS file security system services to determine whether access to specific VAX files should be allowed or denied, and it fully supports Access Control Lists and UIC group-based protection.

As with AlisaTalk, special AppleShare folder protection modes, such as Drop Folders, are supported by VAXshare. In addition, the VAXshare server adds a management option that automatically changes the protection codes of VAX

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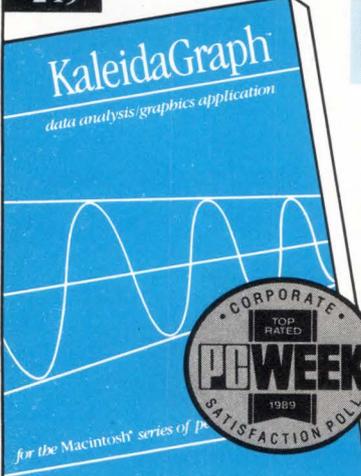
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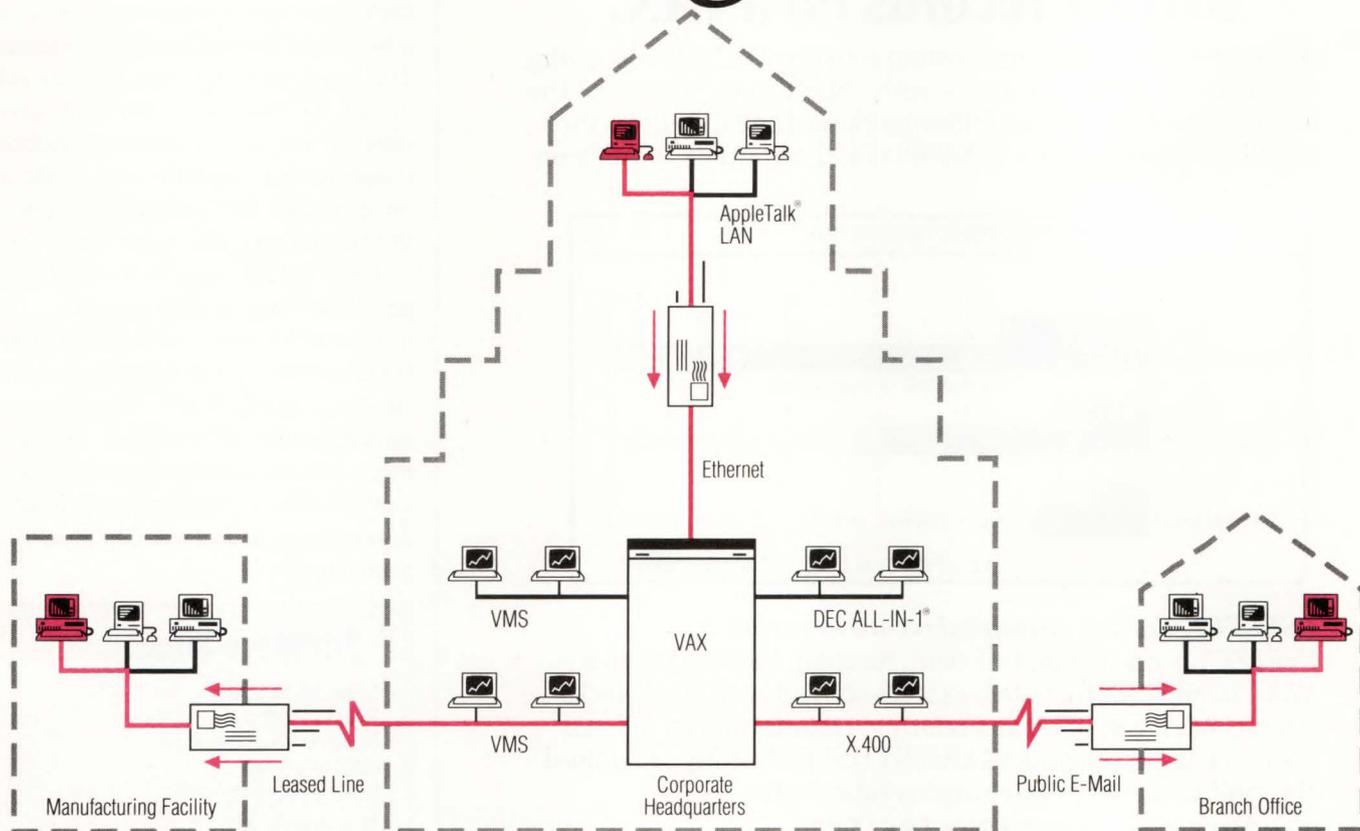
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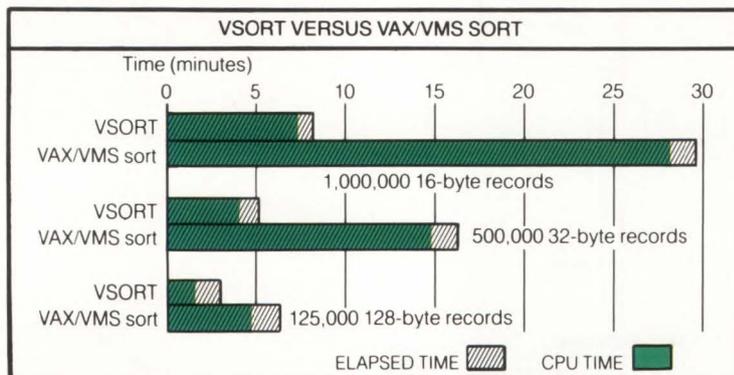
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files contained in folders to match their folders' protection characteristics. This option compromises VMS file security in some cases but eliminates the annoying operational problem of Mac users losing access privileges to their files when their folder ownership is changed.

INCLUDED WITH LANWORKS, VAXshare is implicitly licensed on all VAX systems. The LanWORKS kit costs \$440, including all the necessary client and server software and one set of documentation. Customers can install the server software on all of their VMS servers, regardless of VUPS, with no additional licensing costs.

LanWORKS usage is licensed on a per-client basis at \$295 per Mac. This license includes not only the ability to use VAXshare but also to download and use all other LanWORKS client features, including terminal emulation, DECwindows, DECnet for Macintosh and e-mail. LanWORKS is shipping to application developers now and will ship to users in September 1990.

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Expert Systems: From Promise To Reality

Over the years there have been numerous claims about the benefits of using artificial intelligence (AI) systems in service delivery. Most of these promise a Utopian service environment in which all problems will be solved with minimum delay. At the same time, the service provider could cut costs drastically by reducing its field force.

Today, those of us responsible for service better understand the role of AI (or expert systems, as it's now often referred to) in the service environment. Expert systems are just a tool. Like any other tool, they aid but don't replace the field engineer (FE). By realizing the true role and limitations of expert systems, we can better use their many benefits in the service arena. They aren't a cure-all for every service and maintenance problem. Rather, they support the field organization by turning knowledge and expertise into companywide assets available to all personnel.

With expectations of their value brought down to earth, expert systems are beginning to have a positive impact on service quality. Expert systems packages allow a service or maintenance vendor to computerize the troubleshooting knowledge and experience of its best engineers and technicians. This knowledge base can be made available to all personnel at any time. Less-experienced FEs can draw on this database of expert knowledge, enabling them to troubleshoot like the experts.

In a typical expert systems application, the FE receives hand-holding guidance via a laptop or desktop computer without outside assistance or a product manual. He is led step-by-step through the problem. After the FE enters a description of the symptoms, the expert

system suggests procedures, diagnostics, corrective action, and how to verify that the fault has been resolved. When put online, expert systems can evaluate troubleshooting results and suggest corrective action from a remote location.

Expert Technology

The definition of an expert system program is murky. Some service companies call their remote diagnostics and analyzing tools expert systems, while others don't. Any program that can see that a fault exists and recommends corrective action is a service tool that aids in the maintenance process. But it isn't necessarily an expert system. Most of these software packages are conventional database programs.

What makes expert systems programs different isn't the end result but the manner in which the troubleshooting process and analysis occurs. In a true AI package, the computer mimics human behavior, i.e., the computer troubleshooting follows the same reasoning process that an experienced technician would in approaching and solving a problem. Further, the computer "learns" from each troubleshooting experience.

Expert systems used in field service combine this approach with a more conventional database "lookup" feature created with input from experienced FEs. The database is constantly expanded as additional information is gathered during the use of the program. This is why today's systems aren't considered true AI programs but rather expert systems.

A number of expert system methodologies are in use, and each has benefits and drawbacks. The following is a summary of the most common expert systems technologies:

Rule-Based — Rule-based systems work by compiling in-depth knowledge of how a product can fail. They also re-

quire programming knowledge. Usually, you must hire a knowledge engineer — that is, a specialist familiar with AI programming techniques. This engineer must work with product specialists, engineers and FEs to translate their troubleshooting expertise into rules.

Chances are the knowledge engineer has little or no experience in field service. Therefore, communication and an understanding of the troubleshooting process is all-important during the knowledge-acquisition phase of the project. Editing data and adding information is easy for small knowledge bases but becomes harder as complexity grows.



Model-Based — Model-based systems function by describing how a product works as opposed to how it fails. They describe the product in much the same way a technician would learn about it in a training class. Programming knowledge

A hand is shown holding a wooden egg. The egg has the words "THE FIRST MONTH IS FREE!" written on it in a bold, hand-painted font. The background is a warm, golden-brown color, possibly a wooden door or wall, with a soft light source creating a glow around the egg.

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isn't required. Input can be entered directly by the technicians, engineers and other specialists who work on the product.

A complete knowledge base doesn't have to be built at the beginning. It can be augmented and refined progressively. Model-based systems are easier to edit and change than rule-based systems, although they may require more start-up time. Thus, model-based systems are ideal for implementing service on new products, since they can be formulated while the product is in the design stage.

Custom-Made Programs — Most expert systems used in field service are custom made. These programs either were written from scratch or customized to fit the user's needs.

Until recently, most expert systems were rule-based programs. In a commercial situation, the cost of building and updating this type of troubleshooting tool was often prohibitive. Usually only an OEM could afford the investment in such a program.

The emergence of expert system shells, which permit the building of expert systems without programming, put these troubleshooting tools within reach of third-party vendors and self-maintainers. With shells, users can cost-effectively create and implement customized databases for the systems and equipment being serviced.

Expert system shells simplify the way data is collected and input, making it possible to build the knowledge database in-house. AI developers have long been aware that the service industry is a prime market for expert systems and continue to modify existing shells to orient them toward the service environment.

Off-The-Shelf Programs — Rosh Intelligent Systems created one of the first off-the-shelf expert systems for the service industry. Jaron Lotan, general manager at Rosh, reports that his com-

SMART SERVICE

Rosh Intelligent Systems calls its off-the-shelf expert system the Computer Aided Intelligent Service (CAIS). The product was introduced in October 1988 and today is used by over 16 companies. It includes modules for troubleshooting, call logging and closing, and automatic generation of product-service manuals. CAIS consists of three main parts:

1. Central CAIS (the main program).
2. Knowledge CAIS (the informational database).
3. Brief CAIS (the field laptop unit, which is the FE's troubleshooting aid and link to the main program and database).

One unique feature of CAIS is its Advisor Option. The Advisor Option tells the FE what tests to run and how to run them, displays graphics detailing test connection points and interprets test results. It leads the FE step-by-step from fault isolation to solution. The replacement advice starts with the most logical, least costly part and continues down a chain of possible components until the problem is resolved and correction is verified.

At any point in the troubleshooting process, the FE can accept the system's advice, reject it or return to it later. This permits CAIS to be used by all levels of field personnel. Inexperienced technicians can follow its step-by-step recommendations, while experienced troubleshooters can selectively ask for help.

At the end of the troubleshooting and problem-correction phase of the service call, the CAIS log replaces the paperwork that was once done by the FE. A complete service call report is generated, detailing the symptoms, action taken, parts used and additional information. Previously unlisted symptoms or actions taken are added to the database. A management report is output that includes the final status of the service call. — R.L.

pany uses a model-based approach that requires no user programming. Product specialists enter their knowledge directly into the computer's database. The knowledge base is built by inputting complete descriptions of products.

Data entered includes physical and functional structures, product illustrations, detailed symptoms of malfunctions, tests available for diagnosing faults, and repair/replacement actions. According to Lotan, this method of building an expert system reduces the time and cost of knowledge acquisition to about one-tenth of what it would be under a rule-based approach (see box, "Smart Service," for more information on how the Rosh product works).

Expert Systems Benefits

Used correctly, expert systems can provide many benefits in equipment servicing. By making the knowledge of the best and most experienced product specialists available to everyone, it's possible for a less experienced technician to complete complex repairs with one service call.

Most service vendors that employ expert systems should find that not only will repair time be reduced but also the number of "no problem found" service

calls. Bell Technical Services (Canada's largest TPM, with more than 8,600 contracts and offices in 47 locations) found that, before employing an expert system, 45 percent of its service calls required repeat trips to the site. With expert systems, that number has dropped to 23 percent. And the company's number of good board swaps also has been reduced, thus freeing inventory.

Further, for TPMs and self-maintainers, expert systems make it possible to take on new products without the eight to 12 months of waiting time usually required to learn about new offerings. With an expert system, a product can be supported from the start.

As expert systems technology evolves, it will become a built-in component in more devices. Diagnostics, test equipment and computer and peripheral chips will incorporate expert systems abilities for predictive, preventive and corrective maintenance activities. And, possibly most important, the knowledge of product specialists becomes a corporate asset, not a perishable commodity.

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Debugging And Profiling

Philip E. Bourne, Ph.D.

Editor's note: We continue our introduction to UNIX for VMS users by

debugging and profiling a high-level language application in a UNIX environment.

Sir Winston Churchill once was approached by a temperance group member who accused him of always being inebriated. Allegedly he replied, "So much done and so much to do." So it is with programming. Writing the code is only the beginning. Debugging and profiling — determining where computer resources are being used — may take longer than writing the first draft of the code. Streamlining the resource-intensive portions of code is particularly important when using hardware architectures that support, for example, symmetric multiprocessing or vectorization, in which significant improvements can be made if code is organized efficiently.

All versions of UNIX have a number of tools for handling high-level language programs. Some ULTRIX tools are shown in Figure 1.

We'll confine our discussion to three of the most commonly used tools: **error**, for finding syntax errors in a source code file (compare the VMS /LIST qualifier); **dbx**, for debugging (compare VMS DEBUG); and **prof**, for profiling (compare VMS Performance and Coverage Analyzer [PCA]). The novice UNIX user most likely will be disappointed with the first two tools, because they're cumbersome compared to their VMS counterparts. But **prof** is included with every ULTRIX distribution and doesn't require a separate license as VMS PCA does.

Finding Syntax Errors

The UNIX command **error** inserts syntax error messages directly into the source-code file for any of the supported compil-

ers. Compare the VMS /LIST qualifier, which provides a separate file (.LIS) locating syntax errors and displaying other useful information. Fortunately the **error** lines are inserted as comments and thus don't affect subsequent compilations. Still, the presence of numerous obsolete error messages for code that has been repaired is annoying when reading the code — who needs to be reminded of previous mistakes? You have the option to:

1. Remove each comment as the error is fixed.
2. Periodically filter the file, removing all error messages.
3. Make a copy of the file into which the error messages are inserted.

The command **sed /[^]C###/d myprog.f** takes care of the second case for the FORTRAN source file **myprog.f**. That is, any record beginning with **C###**,

the flag used by **error** for FORTRAN code, is deleted. Figure 2 illustrates the use of **error** on the simplest of FORTRAN programs.

The command sequence **f77 myprog.f | & error** compiles **myprog.f** and pipes the error messages to the **error** command, which inserts them at the appropriate places in the source code. Each error begins with string **C###** followed by the line number, interpreted as a comment in later compilations. Note that in a C program the string would be **/*###...*/**.

Debugging

The BSD UNIX program **dbx** is a source-level interactive debugger included with ULTRIX. Like its VMS counterpart, **DEBUG**, it can be used with a variety of high-level languages. Figure 3 compares some of the **dbx** commands with the VMS **DE-**

FIGURE 1.

UNIX	VMS Equivalent	Function
adb	DEBUG	General-purpose debugging program
ar	LIBRARIAN	Archive and library maintainer
cb	-	C program beautifier
ctags	-	Locate functions within a C or FORTRAN program
dbx	DEBUG	Source-level debugger
error	/LIST	Analyze and disperse compiler error messages into source
fpr	PRINT	Print files with FORTRAN carriage control
fsplit	-	Split a multiroutine FORTRAN program into individual files
gcore	ANALYZE/PROCESS	Get core image
gprof	PCA	Profile program execution
indent	-	Indent and format C programs
lint	-	C program verifier
lorder	-	Find ordering relationship for an object library
make	VAX DEC/MMS	Maintain a group of programs
mkstr	-	Create a C error message file
nm	LINK/SYMBOL_TABLE	Print the name list (symbol table) of an object file
pdx	DEBUG	Pascal debugger
pmerge	-	Pascal file merger
prof	PCA	Profile program execution
px	-	Pascal interpreter
pxp	-	Pascal execution profiler
pxref	-	Pascal cross-reference program
ranlib	LIBRARIAN	Randomize libraries
sccs	VAX DEC/CMS	Source code control system
size	-	Display size of an object file
strings	-	Display ASCII strings in a binary file
strip	-	Remove symbol table and relocation bits
symorder	-	Rearrange name list
time	SHOW PROCESS - /ACCOUNTING	Determine system, user and elapsed times
xstr	-	Extract strings from C programs
yacc	-	Compiler writing assistant

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BUG counterparts.

Users of VMS DEBUG may be disappointed with **dbx**. Figure 3 indicates that both debuggers offer similar functionality, albeit using a different syntax. How-

ever, **dbx** doesn't offer the degree of interaction possible with DEBUG. For example, it isn't possible to use a split screen with **dbx** to concurrently display the values of variables and the section of

code that generated them. The availability of a DECwindows interface for VMS DEBUG compounds this discrepancy.

Figure 4 illustrates a simple example of using the **dbx** debugger—the debugger is

FIGURE 2.

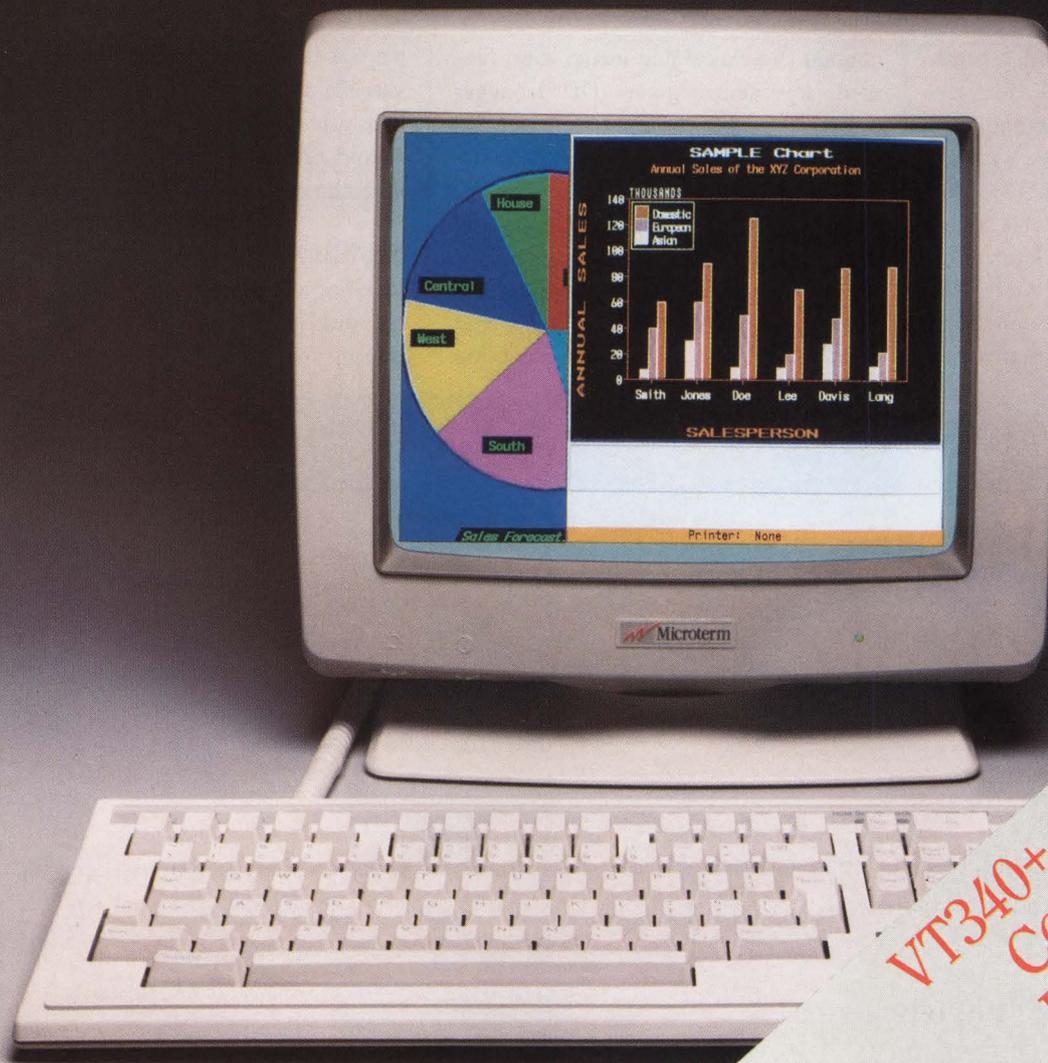
VMS	UNIX
form: \$ FORTRAN/LIST source-file	% f77 source-file & error
form: \$ CC/LIST source-file	% cc source-file & error
example: \$ TYPE MYPROG.FOR	% cat myprog.f
READ(5,*)A	read(5,*)a
WRITE(6,*)A	write(6,*)a
END	end
\$ FORTRAN/LIST MYPROG.FOR	% f77 myprog.f & error
%FORT-F-MISSDEL Missing operator or delimiter	1 file contains errors "myprog.f" (1)
[write(6,*)] in module MYPROG\$MAIN at line 3	File "myprog.f" has 1 error.
...	1 of these errors can be inserted into the file.
	You touched file(s): "myprog.f"
\$ TYPE MYPROG.LIS	% cat myprog.f
...	read(5,*)a
0001 READ(5,*)A	C###2 [f77] Error on line 2 of myprog.f Syntax Error at "]"%%%
0002 WRITE(6,*)A	write(6,*)a
%FORT-F-MISSDEL, Missing operator or delimiter	...
...	

Using error on a simple FORTRAN program.

FIGURE 3.

UNIX dbx	VMS DEBUG	Function
Execution and Tracing:		
run [args]	GO [address-expression]	Begin executing
rerun [args]	GO [address-expression]	Restart execution
trace [trace] [if]	SET TRACE/QUALIFIER(S) - [WHEN.. DO]	Trace execution of a line or procedure, change to a variable, or print expression when line is reached
stop [if, at, in]	SET BREAK/QUALIFIER(S) - [WHEN.. DO]	Stop execution at some point
status	SHOW BREAK/QUALIFIER(S) SHOW TRACE/QUALIFIER(S)	Display active trace and stop points
delete	CANCEL BREAK/QUALIFIER(S) CANCEL TRACE/QUALIFIER(S)	Remove active trace and stop points
cont	GO	Continue execution
step	STEP	Execute one source line
next	-	Step to next line, executing calls
call [proc]	-	Execute object code associated with procedure
Printing Variables and Expressions:		
dump [proc]	SHOW SYMBOL	Display names and values of variables in procedure
print	EXAMINE/QUALIFIER(S)	Display variables
whatis	SHOW TYPE	Display declaration of variable, e.g., real
where	SHOW MODULE	Print active procedure and function
Source File Access:		
/pattern/	SEARCH/QUALIFIER(S)	Search forward or backward for pattern
edit [file]	EDIT [MODULE_NAME\LINE]	Invoke editor
file [file]	SET SOURCE	Change current source file (or return name if no argument is given)
func [function]	SET MODULE	Change current function (or return current function if no arguments are given)
list [line1,line2]	TYPE line1:line2	Display lines of text (default 10)
use [dirs]	-	Search directory for source files
Aliases and Variables:		
alias [chars string]	DEFINE/QUALIFIER(S)	Define chars to be an alias for string
set var [=expr]	DEPOSIT/QUALIFIER(S)	Define value for a variable
unalias [chars]	UNDEFINE/QUALIFIER	Remove an alias
unset var	-	Remove a variable
Miscellaneous:		
help	HELP	Online help,
quit	EXIT	Quit the debugger
sh [command]	SPAWN	Pass command to shell for execution
source [file]	@file-spec	Read commands from a file

A subset of dbx commands.



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invoked, the source code listed, a break point set, a variable examined, the variable's value changed and the program run.

Code is compiled and loaded with the **g** option (compare VMS /DEBUG), providing the additional symbol table information needed by the debugger. The command **dbx** (compare VMSRUN/DEBUG) invokes the interactive debugger. The debugger assumes the file **a.out** to

contain the executable image if no filename argument is given. The debugger displays the (dbx) prompt (compare VMS DBG>).

The **dbx** command **list 1,7** lists the first seven lines of the source file, **stop at 4** sets a break point at line 4, and **run < hkl.in** begins execution. Rather than take input from the keyboard, input is read from the file **hkl.in**. When execution

stops at the break point, the value of the variable **nref** is displayed with **print nref**. This value is changed with **assign nref = 4**, and program execution is continued with the **cont** command.

Profiling

Profiling determines where a program is spending its execution time. This is useful for improving the efficiency of code. The

FIGURE 4.

```

VMS
form: $ FORTRAN/DEBUG/NOOPT [source-file]
      $ LINK/DEBUG [object-file]
      $ RUN [executable-file]

      VAX DEBUG Version V4.7-1
      %DEBUG-I-INITIAL, language is FORTRAN,
      module set to FCONVERT$MAIN

DBG>

example: $ ASSIGN HKL.IN FOR005
         $ R FCONVERT.EXE
         DBG> TYPE 1:7

1 integer h
2 dimension fii(10)
3 nref = 0
4 read (5,2) nsf
5 write (6,2) nsf
6 10 read (5,2,end=100)h,k,l,fo,sigf, stol,(fii(i),i=1,nsf)

7 write (6,2) h,k,l,fo,sigf, stol,(fii(i),i=1,nsf)

DBG> SET BREAK %LINE 4

DBG> SHOW BREAK
breakpoint at FCONVERT$MAIN\%LINE 4

DBG> GO
break at FCONVERT$MAIN\%LINE 4
4: read (5,2) nsf

DBG> EXAMINE NREF
FCONVERT$MAIN\NREF 0

DBG> DEPOSIT NREF = 4

DBG> EXAMINE NREF
FCONVERT$MAIN\NREF 4

DBG> GO
...

UNIX
% f77 -g [source-file]

% dbx

dbx version 2.0 of 4/2/87 22:10.
Type 'help' for help.
enter object file name (default is 'a.out'):
reading symbolic information ...
(dbx)

% dbx fconvert.exe
(dbx) list 1,7

1 integer h
2 dimension fii(10)
3 nref = 0
4 read (5,2) nsf
5 write (6,2) nsf
6 10 read (5,2,end=100)h,k,l,fo,sigf, stol,(fii(i),i=1,nsf)

7 write (6,2) h,k,l,fo,sigf, stol,(fii(i),i=1,nsf)

(dbx) stop at 4
[1] stop at 4

(dbx) status
[1] stop at 4

(dbx) run < hkl.in
[1] stopped in MAIN at line 4
4 read (5,2) nsf

(dbx) print nref
0

(dbx) assign nref = 4

(dbx) print nref
4

(dbx) cont
...

```

A simple example of using the dbx debugger.

FIGURE 5.

```

UNIX
form: % cc -p myprog.c
      % f77 -p myprog.f
      % a.out
      % prof

example: % f77 -p fconvert.f
         % a.out < hkl.in > /dev/null
         prof

%time cumsecs seconds calls name
42.7 2.71 2.71 mcount
9.6 3.32 0.61 9172 _s_wsfe
7.3 3.78 0.46 1091 _rd_ned
6.9 4.22 0.44 8969 _flsbuf
.....

```

An example of prof.

FIGURE 6.

```

%time The percentage of the total running time of the
program used by this function.
cumsecs A running sum of the number of seconds accounted
for by this function and those listed above it.
seconds The number of seconds accounted for by this
function alone. This is the major sort for this
listing.
calls The number of times this function was invoked, if
this function is profiled, else blank.
name The name of the function. This is the minor sort
for this listing.

```

prof nomenclature.

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tools available, how they're used and the output produced differ for different versions of UNIX. Only **prof** is discussed here. **prof** is the simplest of the profiling tools and is distributed with most versions

of UNIX based on BSD, including ULTRIX. If desired, the output from **prof** can be passed to another UNIX command, **graph**, which, when used with the appropriate filters, displays the results in a

graphical form.

To produce a profile with **prof**:

1. Compile the program with the **p** option.
2. Run the program to create the file used in profiling (by default, **mon.out**).
3. Invoke **prof**.

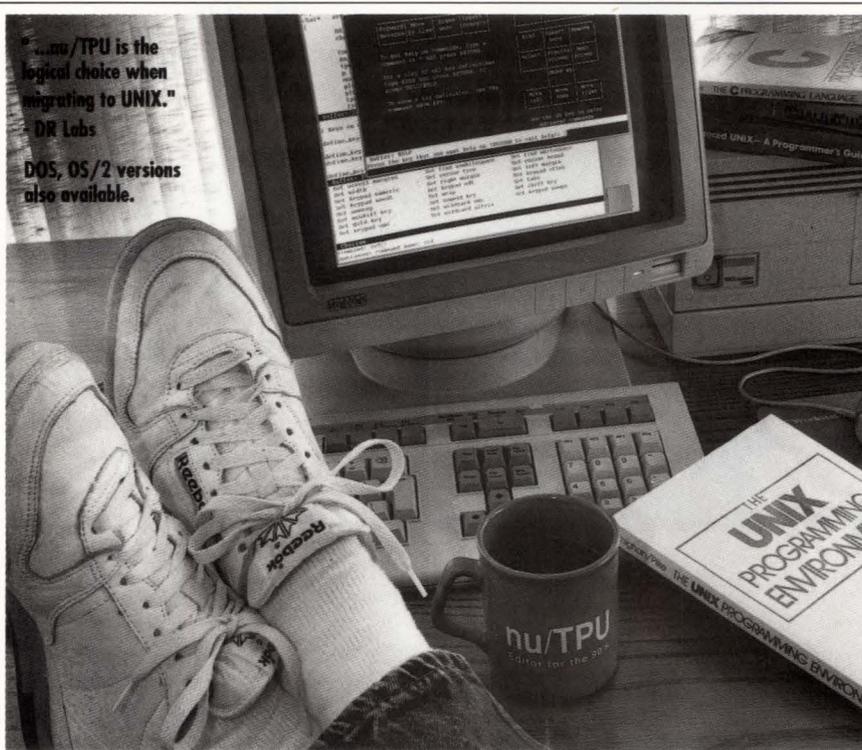
Figure 5 illustrates the use of **prof** by profiling the same FORTRAN program used to illustrate **dbx**. Each time **prof** is invoked, the output includes a description of each field displayed.

f77 -p fconvert.f produces a FORTRAN executable image file, **a.out**. The command **a.out < hkl.in > /dev/null** runs the program, reading input from the file **hkl.in** and sending output to **/dev/null**. The device-special file **/dev/null** (compare VMS NL:) is the "bit bucket" used to discard unwanted output. The command **prof** then displays profile information by reading data from the file **mon.out**, created when the program was run. The output is referred to as a flat profile, displaying, in descending order, the amount of time spent in each routine and system call. The fields are shown in Figure 6.

The tool **gprof** (not described) takes this a step further, displaying the interrelationships between function calls — for example, how often one routine calls another. Some versions of UNIX provide an even greater level of detail by providing tools that display how many times each line of code is executed.

Purists might say that the tools described here aren't needed, because good programmers get it right the first time. I wouldn't know. What I do know is that **error**, **dbx** and **prof** have been invaluable in getting my applications to run in a UNIX environment.

INFORMATION REGARDING hints and kinks useful to VMS users grappling with UNIX will be gratefully received. Send it via e-mail to SYSTEM@CUMBG.BITNET or system@cuhhca.hhmi.columbia.edu. — Philip E. Bourne, Ph.D., a senior associate of the Howard Hughes Medical Institute, is the author of UNIX for VMS Users, published by Digital Press.



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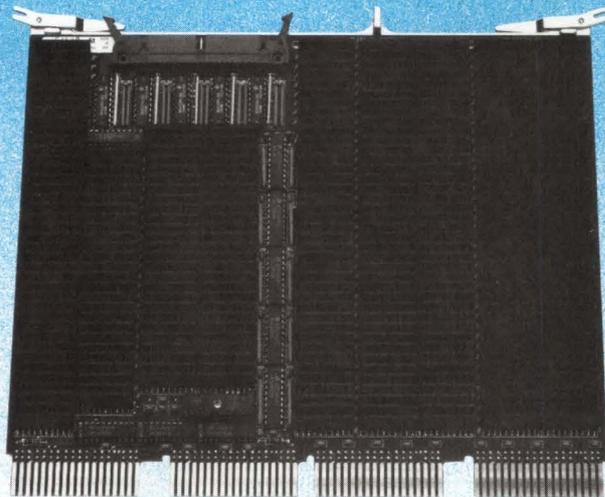
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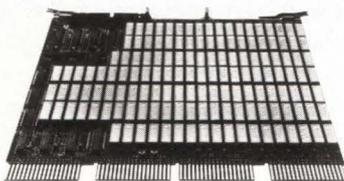
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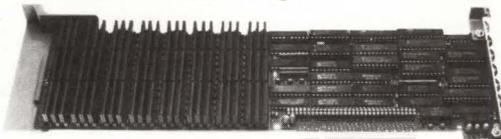
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CIRCLE 179 ON READER CARD

UNIX

Elaine L. Appleton

The ULTRIX Dream

It was 3:00 a.m., and my hair was standing on end. I had just

awakened from a dream that was so remarkable I have to share it with you. In my dream, Ken Olsen announced that ULTRIX is now DEC's core technology. VMS, he said, is fading away. He beckoned me to him, his eyes glowing.

"Can't you see?" he asked in a whisper. "Look around you! We have fancy new graphics processors that compete not only with HP-Apollo and Sun Microsystems but also with Intergraph and Silicon Graphics. We can hold our heads up in the best graphic studios in the auto industry. Engineers can solve machine design problems with the touch of a few buttons."

"OK, OK," I said wearily. "You have nice boxes. It's about time, by the way. But graphics is still a niche market. That isn't proof that DEC has forsaken VMS to move into the UNIX camp."

"Ah," he said, pulling a playing card from his rolled-up sleeve. "But you aren't paying attention. We added symmetric multiprocessing [SMP] to ULTRIX and came out with some hot new multiprocessors that will sling your numbers through before breakfast. In fact, they'll eat your breakfast for you."

"That's great, Ken," I said. "But you guys have been promising this for ages. What's the news?"

"Don't you see? Easy to upgrade, high throughput at decent prices — oh yeah, and with SMP we're giving ULTRIX users something VMS hacks have had for a long time."

I was beginning to get excited, but I was still skeptical. "But Ken, everybody knows VMS is comfortable and easy to

use. How will you persuade the masses to move to user-unfriendly UNIX?"

"Nah," I said, turning to leave. "It can't happen."

"Wait!" he cried, grabbing my hand. "Of course it will happen. After all, we've got Motif on our workstations now. You don't have to wade through UNIX commands. Applications that work on our systems will work on others, as well — after all, what are open systems all about?"

"You mean to say that off-the-shelf software can run on your systems? That with a little work, I can write programs to Motif and save a lot of money porting the software from one vendor's system to another?"

"Sure, sure, no problem," he said.

"Well," I agreed reluctantly, "anything can be had for a price."

"No, no, no! You have the wrong idea!" He was shouting now. "We've reduced prices on all our current RISC systems by 25 to 40 percent. Naturally you'll want to buy the more powerful new systems. But the way this industry is, those prices will drop any day."

"You can bet on it," Olsen contin-

ued, taking another card from his sleeve.

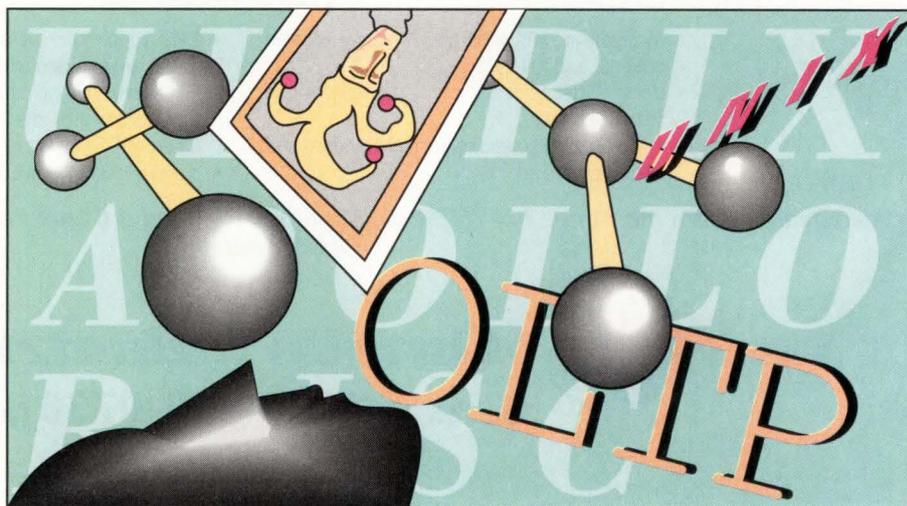
"Besides," he said, lowering his voice, "we know how to compete. We have 700 applications on our RISC boxes, and we're adding 100 each month. Our price/performance is the best in the industry, if you include discounting. And we've consolidated model numbers, so our salespeople and customers aren't confused anymore."

I looked around. It looked like a DEC office building: masses of beige cubicles, blank white walls, computers everywhere, empty desks.

"But Ken, what about Sun? I've heard they have the lowest priced RISC workstation in the market? IBM's new RISC lineup screams. And how do you catch up to Sun's sales volume, not to mention HP-Apollo? How do you convince all those graphic gurus to switch from Intergraph and Silicon Graphics to DEC? I don't get it."

He cut me off at the knees, flicking a playing card at me. It was the Joker. "Can't say — proprietary, you know. But we have plans, big plans."

Now I felt more comfortable. This was the DEC I knew talking.



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CIRCLE 279 ON READER CARD

"Come to our press conference tomorrow morning," he said, pulling a last card from his sleeve. He turned to leave, but I had to know one more thing. "Ken, will you go on record and admit that ULTRIX is your core technology and that Motif is its de facto user interface?"

"Could be ... you figure it out. Take a look at these numbers." He pulled a scroll of paper from his sleeve and shook it out. It unrolled toward me. As it sailed across the floor it gathered speed. Olsen shouted, "SPECmarks, SPECthruput, Dhrystones, Whetstones, Integer mips, Linpacks — we have them all!" The rolling paper hit my feet and started climbing over my legs. "Four at 9.3!" Olsen whooped. "Three at 9.4!" The paper hit my neck. "Bisons, gawk and doduc!" Numbers rolled over my face, suffocating me. I was terrified. "Sixteen point seven million displayable colors! Twenty-four-bit Z-buffer!" Olsen bellowed.

It was too much for me. I screamed — and awoke, the covers over my head.

ULTRIX Reality

I knew it had to be a dream. I thought about DEC's April announcements. When DEC announced the DECstation 5000 family of graphic workstations, the DECsystem 5830 and 5840 multiprocessors, and a multitude of enhancements to ULTRIX, the company line was that, although it looked good for ULTRIX, ULTRIX was still "incremental business" for DEC. But at a private briefing, a DEC official told analyst Chuck Barney of market research firm Workgroup Technologies, Hampton, New Hampshire, that ULTRIX will become the core technology for DEC. ULTRIX Marketing Manager Joe Menard straddled the middle, saying, "We still see a strong demand for VMS, but we're also seeing a strong demand for UNIX. We're going after that market with a new aggressiveness."

A DEC official also told Barney that Motif will be ULTRIX's de facto user interface, although as of this writing Motif was available solely as a layered product. By December, Motif will ship with

THE RISC LINEUP

DECstation 5000 Model 200 — This RISC-based workstation is designed for 2- and 3-D graphics applications such as electronic and mechanical design, molecular modeling, 3-D modeling and animation. The four configurations include the 200CX entry-level and 200 PX, both for 2-D work, and the 200PXG and 200PXG Turbo. Prices range from \$14,995 to \$51,100.

All configurations support DEC's TURBOchannel open I/O interconnect, a new bus structure hailed by analysts. The DECstation 5000 supports a variety of graphics standards, including Graphics Kernel System (GKS), Programmer's Hierarchical Interactive Graphics System (PHIGS), and PEX, which links the PHIGS/PHIGS+ Extension to X. The higher end systems, the PXG and PXG Turbo, include the Intel i860 64-bit RISC microprocessor, which runs at 33 MHz and functions as a graphics accelerator for fast 2- and 3-D geometric transformations. All DEC RISC-based systems are binary-compatible.

DECsystem 5830 and 5840 — Three- and four-processor systems respectively, these new members of the DECsystem family are based on the Mips Computer Systems R3000 microprocessor. They use ULTRIX V4.0, which includes SMP. They feature up to 256 MB of standard ECC memory, up to 115 GB of disk storage, up to five VAXBI channels and up to four Ethernet connections. They run at up to 62 Integer mips. Throughput scaling is good: SPECthruput ratings run from one processor at 10.0 to four at 9.3. This modular system allows for simple upgrades. The 5830 is priced from \$140,000, and the 5840 is priced from \$160,000.

ULTRIX V4.0 — Version 4.0 includes SMP, Remote Procedure Calls (RPC) and new distributed computing services.

RPCs, the first step in a joint-development effort with HP-Apollo, enable portions of applications to run concurrently on several computers in a multivendor network. RPCs are designed to let applications access the most appropriate computer for their tasks — one that not only has enough power and the correct features but also has free time.

Other distributing computing services include Network Time Protocol, which provides networkwide clock synchronization; Hesiod name services, which provide centralized password database administration; and Kerberos authentication service, which improves ULTRIX security. MIT's Project Athena, which developed X, developed Hesiod and Kerberos.

ULTRIX now supports up to 144 GB of storage in 96 disks — a 300 percent increase. DEC increased support for physical memory by 400 percent, going from 128 to 512 MB. Version 4.0 also includes an optional security environment being evaluated by the National Computer Security Center.

New Languages — DEC announced Pascal for RISC, an entirely new product, and FORTRAN for RISC V2.0, which includes extended compatibility with VAX FORTRAN. The company has joint-distribution agreements with Micro Focus for its COBOL/2 mainframe-level compiler and with Verdex for its Verdex Ada Development System (VADS). —E.L.A.

ULTRIX and will then be the default interface. As Barney said, "DEC is supporting DECwindows because customers are slow to move over to Motif." Menard admitted that the company will support DECwindows as long as customers ask for it and that with new versions of ULTRIX it will be possible to toggle to DECwindows rather than use the default Motif interface.

As I pondered these conundrums, I

remembered what DEC spokesperson Sarah Miller said about the DECsystem 5830 and 5840 three- and four-processor systems. They're efficient, she said, and suited to any general-purpose, compute-intensive task. "We don't like to narrow the niche for them," she stated.

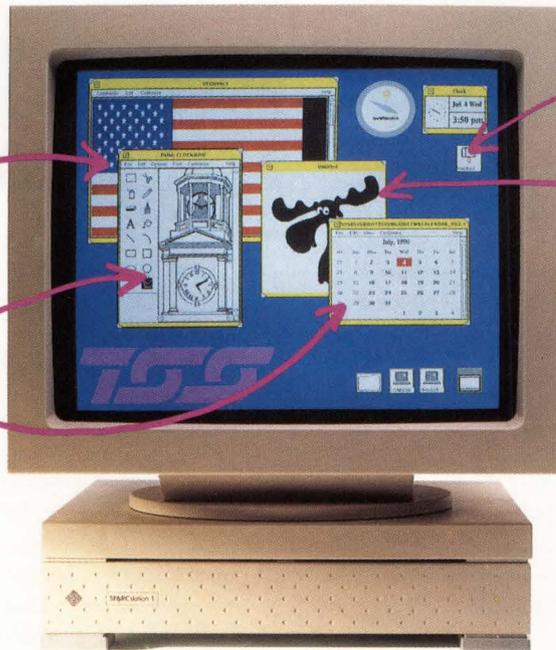
A year ago, DEC official Dave Zwicker admitted that DEC would try to

DEC Terminal Emulation

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OPEN STANDARDS STANDOFF

OSF Merger Shut Tight — A proposed alliance among rival computer groups that would have established an open software environment was rejected in April. Negotiations among the Open Software Foundation (OSF), UNIX International and AT&T's UNIX division were cut short after repeated attempts to guarantee equal voice for each organization fell by the wayside. OSF expects the first shipment of its initial open standards product, OSF/1 V1.0, to occur in November 1990.

In related news, on May 15 the OSF announced its Distributed Computing Environment. OSF plans to divide its distributed computing responsibilities between Fundamental Distributed Services and Data-Sharing Services. The former allow for software developers to create remote procedure call software, naming and directory services, time services, PC integration and parallel programming support. The latter provide users with distributed file services such as diskless operation capability and MS-DOS file and printer support.

Have Your Cake And Leave It, Too — DEC's longstanding policy of no layoffs is beginning to inch inevitably toward the scrap heap after a voluntary retirement program took effect in late March. DEC targeted manufacturing plants in Phoenix, Arizona, and Burlington, Vermont, as the first outposts participating in the companywide program. Digital hopes to oust some 300 employees from these locations by offering redeployment at another location, retraining at another site, or a cash and benefits package to leave the firm. Employees who opt to take the money and run can look forward to a generous severance package based on length of service (a maximum of 104 weeks' pay for workers with 20 or more years of service) and complete medical, dental and life insurance for one year after termination.

As of May, only 800 DEC employees had accepted the retirement package after 4,500 had received the offer. Analysts fear that DEC will be unable to pare its work force by the estimated 8,000 employees needed to avoid further steps to cut payroll. DEC recently told analysts it expects that 2,000 employees will have left the firm through voluntary layoffs by October 1. While no one at DEC is using the "L-word," analysts predict that unless more employees opt for voluntary retirement, more cost-cutting measures will be undertaken, perhaps as early as autumn.

Thumbs Up To LAT Accord — DEC has approved a licensing agreement that allows communications software developer Walker Richer & Quinn to resell DEC's LAT protocol. Walker Richer & Quinn is best known as a major supplier of PC-to-VAX connectivity software and will incorporate LAT into its existing R-LAT line.

Ross Opens DECwindows — VAX financial software firm Ross Systems has announced the availability of DECwindows facilities for its series of financial applications software.

Another DEC financial software firm, Coda, has signed a Complementary Software House (CSH) agreement with DEC. Established in late 1989, DEC's CSH program enables software customers to purchase products directly from the source and integrate them in-house.

VW Bugs Nixdorf With DEC — German auto manufacturer Volkswagen has replaced neighbor Nixdorf Computer with DEC as its contractor for a major computer-integrated manufacturing (CIM) project. DEC will invest \$12 million and 25 employees into the Tool Construction 2000, or Ibis, project. Sources indicate that beleaguered Nixdorf lost \$30 million on the Ibis project since its 1987 inception.

In a related announcement, DEC has been awarded a \$100 million contract by Deutsche Telepost Consulting GmbH of West Germany to supply operational support systems for a pan-European digital cellular telecommunications network.

DEC Gets Small — DEC unveiled three multiuser systems using the SCO UNIX System V/386 and the Intel 386 processing line as a blueprint. The DECsystem 316+, 325 and 333 have more than 3,000 small business applications available on SCO UNIX V/386. The new systems are geared toward organizations with annual revenues of \$5 to \$50 million and from two to 64 users. The DECsystem packages support entry-level four- to eight-user configurations with 4 or 8 MB of memory, an 80- or 170-MB disk drive, backup tape, a terminal multiplexer and unlimited user license and distribution of SCO UNIX System V/386. Pricing starts at \$9,690 for the DECsystem 316+, \$14,455 for the DECsystem 325 and \$15,360 for the DECsystem 333.

Sorbus By Any Other Name — Sorbus, the computer services subsidiary of Bell Atlantic, has changed its name to Bell Atlantic Business Systems Services. For 30 years Sorbus has been a maintenance provider for IBM and DEC computers, joining Bell Atlantic in 1985. The name change comes on the heels of Bell Atlantic's purchase of Control Data's TPM operations in January.

Sharing Knowledge — Citing the need for next-generation software technology that will capture and manage knowledge assets, DEC, the Carnegie Group, Texas Instruments, US West and Ford Motor have joined to form the Initiative for Managing Knowledge Assets (IMKA). Knowledge assets are the assets that exist primarily in the minds of a company's employees. They include design experience, engineering skills, financial analysis skills, competitive knowledge, market knowledge and knowledge of the company's policies, practices, goals, objectives and strategies.

IMKA's objective is to develop an industrial-strength knowledge asset management technology that's nonproprietary, easily integrated within conventional systems and applications, and distributed and portable within heterogeneous computing environments. The effort represents a combined contribution of more than \$10 million from the member companies.

Array In Tandem — Tandem Computers announced it has merged with disk array specialist Array Technology. Under the terms of the agreement, Array will become a wholly owned subsidiary of Tandem. Array designs, develops and markets software and hardware disk subsystems based on redundant arrays of inexpensive disks (RAID).—Brian O'Connell, East Coast Editor. Pamela F. Fullerton, Assistant Editor/Articles, contributed to this report.



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position ULTRIX-based systems as useful for OLTP. He also said, "Online transaction processing will be the dominant computing style of the 90s." With the 90s upon us, multiple processors and SMP are critical features for OLTP. OLTP is a profitable arena. It all adds up — except for crucial missing components such as trans-

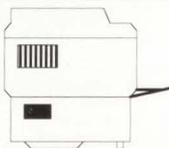
action journaling, queuing and security. Using ULTRIX for OLTP applications is still a risk. But since DEC has added SMP and SQL to ULTRIX, as well as support for 144 GB of disk storage and 512 MB of memory, OLTP on ULTRIX may not be too far in the future.

I reached for the pen and paper by my

bed. As I fumbled in the dim light, I saw something strange: a tangled roll of paper. It was a massive list of facts and figures detailing the April RISC/ULTRIX announcements, including performance specs (see "The RISC Lineup").

You can read them. I'm going back to bed. ■

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CIRCLE 277 ON READER CARD

Kevin G. Barkes

DCL Trivia

In some respects, writing this column is akin to being a gunslinger in the Old West. Every time I go to a DECUS symposium or similar event, there's some DCL guru lurking there ready to ambush me in front of an appreciative crowd. I guess I ask for

trouble. Fellow speakers tell me they structure their talks so there's no time for questions and answers, thereby eliminating the possibility of wholesale humiliation.

I try to leave a few minutes to clear up any ambiguities caused by my rambling delivery and general mental fuzziness. And it never fails that a nondescript

fellow shuffles up to the mike and asks something like, "What's the maximum number of characters permitted in a DCL command line after symbol and lexical expansion?"

This guy won't accept "more than you could possibly imagine" as an answer. He smirks and says "one thousand twenty-four" and disappears into the

FIGURE

<p>Command Interpreter</p> <p>Size of verbs and qualifiers examined by CLI is 4. (Keywords read in entirety.)</p> <p>Minimum abbreviation for verbs and qualifiers is 1 (assuming truncation is unique). Exceptions: CONTINUE, DEPOSIT, EXAMINE and RUN can be truncated to one character even though the truncation isn't unique.</p>	<p>Label Names</p> <p>Maximum size is 255.</p> <p>Logical Names</p> <p>Maximum size is 255 (31 for table names entered in LNM\$PROCESS_DIRECTORY or LNM \$\$SYSTEM_DIRECTORY).</p> <p>Maximum size for logical nodename is 15.</p>	<p>Recall</p> <p>Range of RECALL command specifiers is 1 to 20. Size of RECALL buffer is 1,025.</p> <p>Maximum number of characters that can be read from a RECALL command is 255.</p>
<p>Command Procedures</p> <p>Maximum number of parameters that can be passed to a command procedure is 8 (P1 ... P8).</p> <p>Maximum depth of nested command procedures is 32 (including the top-level procedure).</p>	<p>Password</p> <p>Maximum size is 31.</p> <p>Print (see also Queues)</p> <p>Range of values to /COPIES qualifier is 1 to 255.</p> <p>Range of values to /JOB_COUNT qualifier is 1 to 255.</p> <p>Maximum size of /NAME qualifier is 39.</p> <p>Maximum size of /NOTE qualifier is 255.</p> <p>Maximum size of /OPERATOR qualifier is 255.</p>	<p>Reply/Request</p> <p>Maximum size of message text is 128.</p> <p>Symbols</p> <p>Minimum size for symbol name is 1. Maximum size for symbol name is 255.</p> <p>Range of integers in substring replacement (symbol[x,y] := string) is 0 to 768 (x+y must =< 769).</p> <p>Maximum size of arithmetic overlay is 32.</p> <p>Maximum size of evaluated string expression without /SYMBOL qualifier on WRITE command is 1,024.</p> <p>Maximum size of evaluated string expression with /SYMBOL qualifier on WRITE command is 2,048.</p>
<p>Command String</p> <p>Maximum size after symbol and lexical expansion is 1,024.</p> <p>Maximum size without using hyphen (command string extension) is 256.</p> <p>Maximum size per element is 255.</p> <p>Maximum number of elements is 128.</p>	<p>Process Names</p> <p>Maximum size is 15.</p> <p>Prompt</p> <p>Maximum size is 32.</p>	<p>UICs</p> <p>Range of numeric group number is 0 to 37,776 octal.</p> <p>Range of numeric member number is 0 to 177,776 octal.</p> <p>(Named format) maximum size of group name is 31.</p> <p>(Named format) maximum size of member name is 31.</p>
<p>File Specifications</p> <p>Maximum size for full file spec, including delimiters, is 255.</p> <p>Maximum size for node name is 6.</p> <p>Maximum size for optional access control string used with node name is 42.</p> <p>Maximum size for device name, including controller and unit number, is 15.</p> <p>Maximum size for filename is 39.</p> <p>Minimum size for filename is 0 (null).</p> <p>Maximum size for file type is 39.</p> <p>Minimum size for file type is 0 (null).</p> <p>Maximum version number is 32,767.</p> <p>Maximum size for directory name is 39.</p>	<p>Queues</p> <p>Range of process priorities with /BASE_PRIORITY= qualifier is 0 to 15.</p> <p>Maximum size of queue name is 31.</p> <p>Maximum number of concurrent jobs per queue (/JOB_LIMIT qualifier) is 255.</p> <p>Maximum number of parameters for /PARAMETER qualifier is 8. (Maximum size of each parameter is 255. Total length of all 8 parameters is 480.)</p> <p>Range of values to /PRIORITY qualifier is 0 to 255.</p> <p>Range of pages that can be printed with START/QUEUE/ALIGN is 1 to 20.</p> <p>Maximum size of START/QUEUE/SEARCH string is 63.</p> <p>Range of buffers with START/QUEUE/MANAGER/BUFFERS command is 0 through 127.</p> <p>Range of blocks with START/QUEUE/MANAGER/EXTEND_QUANTITY command is 10 to 65,535.</p>	<p>Volume Names</p> <p>Maximum size of disk volume name is 12.</p> <p>Maximum size of tape volume name is 6.</p> <p>Alternate maximum size for ANSI-labelled mag tape is 15 (14 for owner identifier field, 1 for volume accessibility field).</p>
<p>Forms</p> <p>Maximum size of form name is 31.</p> <p>Range of form numbers is 0 to 999.</p> <p>Maximum size of form description is 255.</p> <p>Range of form length values is 1 to 255.</p> <p>Maximum size of stock name is 31.</p> <p>Range of form width values is 1 to 65,535.</p>		

snickering crowd as my self-esteem, reputation and breakfast depart ignominiously. Suppressing an urge to shout, "Get a life!" to my faceless tormentor, I return

“

Every time I go to a DECUS symposium, there's some DCL guru ready to ambush me in front of an appreciative crowd.

”

to my dark hotel room and watch the day's events calendar scroll silently by on the TV screen.

In self-defense, I've developed a cheat sheet that contains many DCL trivia answers (see Figure). Aside from protecting myself at DECUS symposia, it's also been helpful in routine operations.

Since some of these values changed between VMS V4.0 and V5.0, it may be possible for you to catch your resident guru in a DCL gaffe. But be gentle with him. Someone plunked a DECstation on his desk, and he can't understand why DIR doesn't work anymore.

FOR YOUR VERY OWN "I Love DCL" sticker and/or a listing of all FidoNet public bulletin board systems in the U.S. featuring message areas with DEC-related topics (VAX, PDP-11 and Rainbow), send a self-addressed, stamped envelope to BBS List (and/or) DCL Sticker, Kevin G. Barkes Consulting Services, 4107 Overlook Street, Library, PA 15129. The list also is available online from my SYS\$OUTPUT bulletin board system: (412) 854-0511, 1,200/2,400 baud, 8 bits, 1 stop bit, no parity. If you're active on FidoNet, ask your local sysop to file request DECBBBS.LST from 1:129/38. — *Kevin G. Barkes is an independent consultant in VAX systems software, management, tuning and training.*

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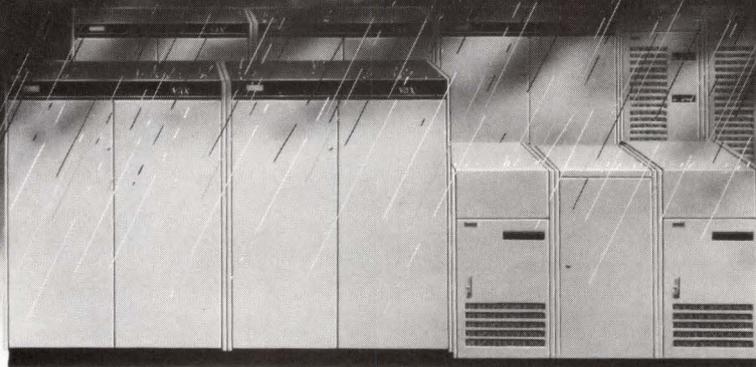
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CIRCLE 136 ON READER CARD

PRODUCTS

Shadow V2.2 Allows Unlimited Shadow Sets

Advanced Systems Concepts Inc. announced Shadow V2.2, a VMS disk mirroring system. This host-based, disk-independent mirroring system provides transparent support of volume shadowing for local and VAXcluster systems.

Shadow V2.2 lets you create an unlimited number of shadow sets. Each shadow set supports up to 10 members. The product supports the creation of shadow sets for VMS system, quorum and data disks. Using a DCL interface, you create a shadow set usually consisting of two or more disk devices. When a shadow set is created, Shadow uses a high-speed volume catch-up facility to ensure that all members in the shadow set contain the same data. User applications continue to reference the original disk device. In the event of a media failure, Shadow continues read and write operations within the set of surviving eligible members.

Shadow for VMS costs from \$2,000 to \$10,000. A right-to-copy license costs \$1,000. For more information, contact Marie C. Murphy, Advanced Systems Concepts Inc., 33-41 Newark St., Hoboken, NJ 07030; (201) 798-6400.

Circle 405 on reader card

EDT+ V5.0 Features 50 Percent Speed Increase

Boston Business Computing Ltd. announced version 5.0 of EDT+, a complete emulation of the VAX EDT text editor for MS-DOS and UNIX systems.

EDT+ V5.0 is 50 percent faster than the previous version. It features multiple windows, a status line and ruler, 132-column mode, insert/overwrite modes, color support, adjustable tab stops, command editing and recall from within EDT+, an UNDO command, and improved buffer manipulation. Enhancements have been made to the EDIT and SAVE commands, HELP, JOURNAL and LEARN facilities, and the keyboard interface. The product can edit multiple files using wildcards on the command line. It supports more than 50 UNIX systems and such keyboards as the LK250, and it includes interfaces for EVE, EMACS, vi and WPS.

Licenses cost from \$295.

For more information, contact Edward J. Gaudet, Boston Business Computing Ltd., 3 Dundee Park, Andover, MA 01810; (508) 470-0444.

Circle 407 on reader card

Univision Graphics Controller Reaches 33 Mflops Performance

Univision Technologies Inc. announced the UDC-7000-TI, a single-board graphics controller for AT-based systems. It features the Texas Instruments TMS34020 graphics controller and optional TMS34082 floating point unit.

The board reaches 33 Mflops performance and a vector drawing speed of 200,000 vectors per second. It can display images of 1,280 x 1,024 x 32 bits from a display memory of 2,048 x 2,048. The onboard 33-Mflops coprocessor, 20-MHz peripheral VSB bus and local pan and zoom hardware let a single add-in board handle imaging and graphics applications at up to 32 bits per pixel. The VSB bus, used in conjunction with the company's UPX-1000 frame grabber, lets images of 1,024 x 1,024 x 8 bits be digitized and viewed at 20 frames per second. Single-screen IBM monochrome, CGA, EGA and 8514/A display standards are emulated in firmware and hardware using a proprietary ASIC gate array. Software support includes TIGA, X and

SDSL. Applications such as Microsoft Windows, CADKEY, AutoCAD and HALO run without modification.

The product costs from \$3,895.

For more information, contact Bonnie Shields, Univision Technologies Inc., 3 Burlington Woods, Burlington, MA 01803; (617) 221-6700.

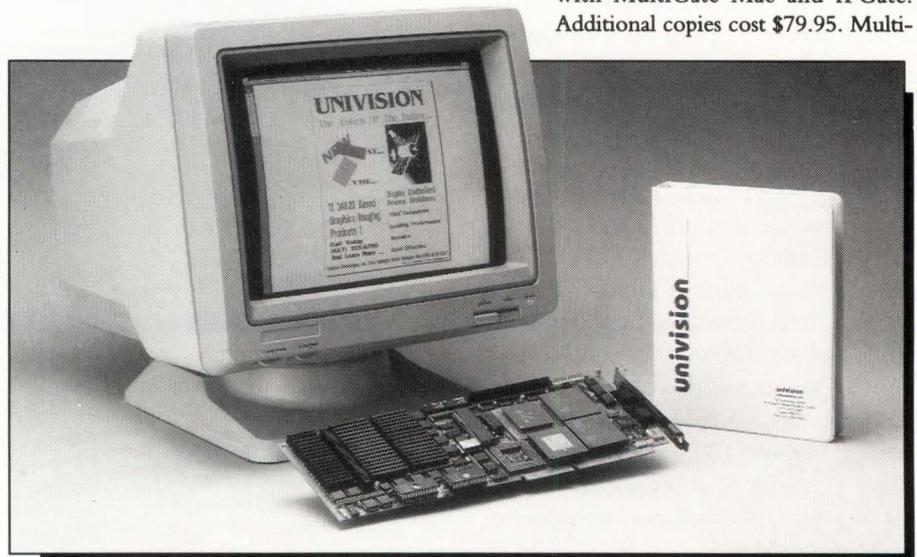
Circle 427 on reader card

MultiGate Family Connects Mac Users To TCP/IP Networks

Network Resources Corporation announced the MultiGate family. It gives Mac users on AppleTalk enhanced connectivity to TCP/IP-based networks.

MultiGate Access lets you perform file transfer, terminal emulation and editing of host-based files in a Maclike manner. The MultiGate Mac software router runs on the Mac II family and provides IP-to-IP, AppleTalk-to-IP and AppleTalk-to-EtherTalk routing. MultiGate Manager runs on the Mac II family and provides network management capabilities in configuration, performance and security management. The MultiGate 2000 standalone router connects AppelTalk networks or devices to Ethernet, fiber optic or broadband networks. IPGate software downloads to the MultiGate 2000.

A copy of MultiGate Access is included with MultiGate Mac and IPGate. Additional copies cost \$79.95. Multi-



The UDC-7000-TI Display Controller with TMS34020 and optional TMS34082.

Gate Mac costs \$795. IPGate costs \$395. MultiGate Manager costs \$795. Three MultiGate 2000 options are available: AT1 connects an AppleTalk device to the backbone and costs \$1,195; AT2 connects two AppleTalk devices to the backbone and costs \$1,395; LT connects a LocalTalk network to the backbone and costs \$2,395.

For more information, contact Bradley Brown, Network Resources Corp., 2450 Autumnvale Dr., San Jose, CA 95131; (408) 263-8100.

Circle 464 on reader card

C Solution's Pro-C Builds Applications In K&R C

C Solutions Inc. announced Pro-C, a source code generator that builds applications in K&R C. It generates C code for screen programs, reports, menus and multfile updates.

With Pro-C, generated C code is fully commented, allowing freedom for later modification. Pro-C enables complete control over application development. It supports RMS sequential and indexed files, Rdb, Oracle and Ingres database managers and can interface to increase flexibility while maintaining 4GL systems. It offers prototyping capabilities. Nonprogrammers can create screens, menus and reports without C experience. DEC's Screen Management Guidelines have been incorporated to ensure compatibility with the range of DEC terminal products. Applications migration from VAX to ULTRIX systems is a straight transport of generated C code, a recompile and link process.

For more information, contact C Solutions Inc., 210A Regina St. N., Waterloo, ON N2J 3B6; (519) 725-2634.

Circle 408 on reader card

GatorBox V1.5 Supports AppleTalk Phase 2 And SNMP

Cayman Systems Inc. announced GatorBox V1.5, an AppleTalk-Ethernet gateway. It connects remote AppleTalk networks over a TCP/IP backbone without using EtherTalk and selectively filters the AppleTalk zones so that remote zones don't automatically appear in the Choosers of Mac users behind the GatorBox.

This new version supports AppleTalk Phase 2 and acts as a bridge between Phase 1 and Phase 2 networks. It also supports SNMP so that network administrators can use SNMP-based network management tools from DEC, Sun and others. It connects AppleTalk networks over TCP/IP networks that don't support EtherTalk, so Mac users can see zones that reside behind IP serves that

don't pass AppleTalk. It selectively filters AppleTalk devices, networks and zones, allowing greater security and controlled access to AppleTalk networks. It can be used to prevent zones from appearing across a tunnel.

The product costs \$2,795. V1.5 will be distributed to registered GatorBox owners at no charge.

For more information, contact Carol McGarry, Cayman Systems Inc., 26 Landsdowne St., Cambridge, MA 02139; (617) 494-1999.

Circle 409 on reader card

Racal InterLAN Announces Software Drivers For DECnet-DOS

Racal InterLAN announced software drivers for the NI5210 data-link controller for PC/XT and the NI9210 data-link controller for MCA. The drivers support DECnet-DOS and DECnet V2.1 and V3.0.

DECnet-DOS lets IBM PC, XT, AT, compatible or PS/2 Micro Channel PCs running PC- or MS-DOS V3.2 or later participate as end nodes in DECnet networks. DECnet-DOS software also lets PCs be connected to VAXs in a DECnet network and access information and services contained on other types of DEC systems in the network.

CLARIFICATION

In "Controlex CM331 Delivers 10 ms Access Time" (May 1990, page 182), the access time of the CM331 RAM-disk was quoted at 10 milliseconds (ms). The correct access time is 10 microseconds. For more information, contact Controlex Corp., 16005 Sherman Way, Van Nuys, CA 91406; (818) 780-8877.

Circle 536 on reader card

Support for DECnet-DOS lets you access data-link cards that offer performance levels twice that of the DEPCA card. The drivers provide online user information and printer support.

For more information, contact Mark Williams, Racal InterLAN, 155 Swanson Rd., Boxborough, MA 01719; (508) 263-9929.

Circle 421 on reader card

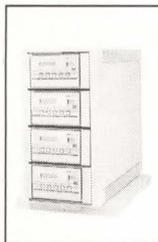
MAXview Tools Support Proactive Network Management

Xyplex Inc. announced a family of Ethernet-based LAN management and analysis tools called MAXview. MAXview includes Scriptor/UNIX, Scriptor/VMS and Scope. Each features a user interface that supports proactive network management and preventive

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*as of May 1, 1990

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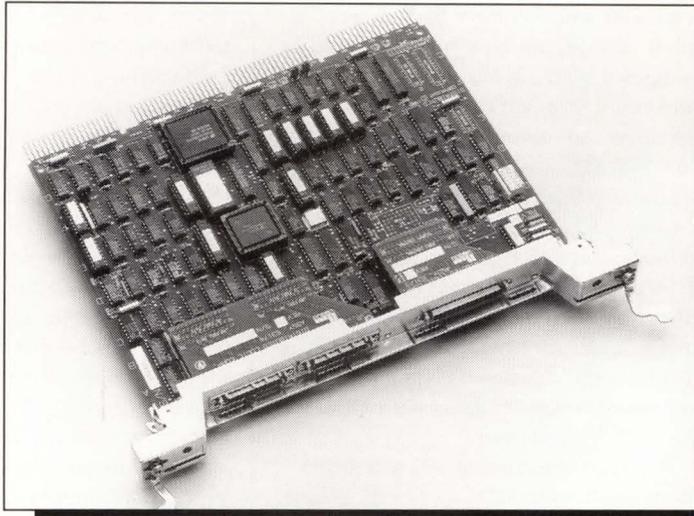
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maintenance and can configure, monitor and manage any Xyplex TCP/IP- or LAT-based server installed on an Ethernet network.

MAXview Scriptor is supported on UNIX hosts and VAXs running VMS and ULTRIX. It uses Xyplex's Remote Telnet Console Facility or DEC's Remote Console Protocol to communicate transparently over the Ethernet network. Scope is a network

analyzer that collects packets from the Ethernet and stores them for later display and analysis. The MAXview Scope software program is supported on the MAXview 7610 Network Manager Card. Xyplex also announced MX-TSERV-J16, a 16-port terminal server card for its MAXserver communications server. It provides concurrent support for LAT and TCP/IP Internet protocols.

The Scriptor/UNIX and Scriptor/VMS cost \$1,995. MAXview Scope is included in the standard Xyplex TCP/IP-LAT software kit. The MAXview 7610 Network Manager Card costs \$2,995. The MX-TSERV-J16 costs \$2,495.

For more information, contact Kathleen Coleman-Goodwin, Xyplex Inc., 330 Codman Hill Rd., Boxborough, MA 01719; (508) 264-9900.

Circle 514 on reader card

Dilog ESDI Controllers Feature Smart Shadow

Dilog announced three ESDI controllers featuring a Smart Shadow that can enhance data access times by as much as 20 percent over standard ESDI subsystems in DEC systems.

The SM696 and SM686 interface up to two and four 24-MHz ESDI Winchester disk drives, respectively, to MicroVAX IIs and MicroPDP-11s. The SM3686 interfaces up to four 24-MHz ESDI Winchester drives to MicroVAX IIIs and includes a card-edge bulkhead cover compatible with the MA213/215 system enclosure for the MicroVAX III. The controllers handle data transfer rates up

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to 3 MBps on Winchester drives and provide interfacing for one or two SA450 5 1/4- or 3 1/2-inch floppy disk drives. The Smart Shadow feature is implemented using a dual Winchester disk shadow set. It uses the spindle synchronization option available on some ESDI drives. The secondary drive is formatted 180 degrees out of sync with the primary, reducing disk rotational latency by one-half. The controllers are compatible with the DU driver contained in DSM, RSTS/E, RSX-11M+, ULTRIX and VMS.

The SM696 costs \$2,050, the SM686 costs \$2,250 and the SM3686 costs \$2,450.

For more information, contact Judie Dutton, Dilog, 1555 Sinclair St., Anaheim, CA 92806; (714) 937-5700.

Circle 411 on reader card

StorEdge Offers 2 GB Of Online Storage Capacity

Fujitsu America Inc. announced an enhanced version of StorEdge, a data storage subsystem with more than 2 GB of online storage capacity.

StorEdge is designed for compatibility with NetWare 386 and is certified for Net-

Ware 286 and NetWare SFT. It provides online storage and tape backup. It can be configured with any combination of up to three Fujitsu 778-MB or 380-MB 5 1/4-inch disk drives and half-inch cartridge tape drives. The 778-MB drive features an expected MTBF of 200,000 hours. The half-inch tape cartridge backs up 220 MB of data in about 20 minutes. It features an average access time of 16 ms and a transfer rate of up to 1.875 MBps. Up to three StorEdge units can be daisy-chained to provide up to 4.5 GB of online storage capacity. The product can be configured for compatibility with DEC and MS-DOS V2.1 or later.

StorEdge costs from \$4,995 to \$10,985.

For more information, contact Holly Bourne, Fujitsu America Inc., 3055 Orchard Dr., San Jose, CA 95134; (408) 432-1300.

Circle 414 on reader card

Tachion-I Provides Throughput Of 4.8 Samples Per Second

KineticSystems Corporation announced the Tachion-I, a multichannel data acquisition system with net throughput to disk of 4.8 samples per second. This CAMAC-based

system uses Parallel Transfer Disk (PTD) technology and interfaces to VAX/VMS.

Tachion-I includes from one to eight CAMAC crates interfaced to the company's differential bus, providing a direct data path from the CAMAC Dataway to a PTD controller. In data acquisition mode, the system streams data from the CAMAC module via the Dataway and the bus to the disk controller and disk. The system supports analog and discrete inputs through a variety of configurations. Data is sampled at precise intervals controlled by the 3656 Timer-Sequencer module. The time base is generated by an internal crystal or an external clock. With suitable CAMAC I/O modules, all input channels can be sampled simultaneously.

A single-crate system, including a CAMAC front end with 32 analog channels, a 600-MB PTD, a MicroVAX II, VMS, FORTRAN and drivers, costs from \$115,000.

For more information, contact KineticSystems Corp., 11 Maryknoll Dr., Lockport, IL 60441; (815) 838-0005.

Circle 416 on reader card

Here it is . . .



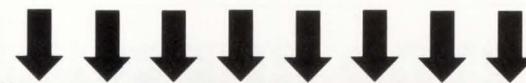
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MDS32/C Provides Automatic Translation Of C Datatypes

Ergodic Systems Inc. announced MDS32/C, a C language interface for MDS32, the company's menu design tool for VAX/VMS. The interface provides automatic translation of C datatypes to the VMS calling standard observed by MDS32.

MDS32 provides a nonprogramming interface that supports the development of menu environments through text-based menu definition files. This feature lets you incorporate high-quality menus with DCL and third-party applications. Rapid prototyping can be achieved by combining user-coded extensions in MDS32/C with the text-based definitions.

The MDS32 basic license costs from \$213 for VAXstations to \$5,925 for VAX 88xx-series machines.

For more information, contact Steve Duff, Ergodic Systems Inc., 23666-A Birtcher Rd., El Toro, CA 92630; (714) 380-9719.

Circle 413 on reader card

Epoch-1 File Storage Server Available For VMS Users

Epoch Systems Inc. announced that the Epoch-1 InfiniteStorage Server is available to VMS users through TGV Inc.'s MultiNet NFS Client software.

The Epoch-1 is an NFS- and TCP/IP-compatible file storage server that transparently integrates the high capacity and low cost of optical disks with the high access speed of magnetic disks. The product line includes systems that can be configured from 1 to 1,000 GB. These products provide central data storage and management for networks requiring fast online access to high-capacity disk storage over an Ethernet network. They're based on an online hierarchical storage architecture that seamlessly integrates rewritable or WORM optical disk technology into a high-speed Winchester storage system.

The Epoch-1 costs from \$61,000. TGV's MultiNet NFS Client costs from \$1,680.

For more information, contact Andrew Hettinger, Epoch Systems Inc., 8 Technology Dr., Westboro, MA 01581; (508) 836-4300.

Circle 412 on reader card

NDC Brings Conversion Services To DEC Minis And Workstations

National Data Conversion Institute (NDC) announced expanded data conversion services that include all DEC minis and workstations.

NDC can translate information between

more than 2,500 computer formats and DEC minis. It supports all standard DEC operating systems and application programs and translates between databases and spreadsheets. It lets dedicated word processing documents and mainframe data be downloaded into DEC computers. The company offers media conversion services to allow disk-to-disk (3 1/2-, 5 1/4-, 8-inch) and tape-to-disk (TK-50, half-inch, magnetic) translations.

OCR scanning is offered for automatic input of typeset and typewritten materials. Supported software includes such word processing programs as Microsoft Word, WordPerfect and WPS-Plus.

For more information, contact Michael J. Daniec, National Data Conversion Institute, 5 E. 16th St., New York, NY 10003; (212) 463-7511.

Circle 418 on reader card



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Calendar Manager V3.4 Offers Scheduling Flexibility

Russell Information Sciences Inc. announced Calendar Manager V3.4. It offers scheduling flexibility and ease of use.

Calendar Manager lets you schedule meetings and standby meetings for the same time. It sends up to three "tickler" messages prior to each confirmed appointment. DECnet scheduling has been improved with automatic confirmation of resources and facilities designated "first come, first served." A link to VAXmail is included in all print windows. Schedules of attendees, resources and facilities are searched, with conflicts automatically resolved. It's available in VMS standalone, ALL-IN-1 and X-O integrated versions.

Calendar Manager costs from \$795 to \$34,995.

Also recently announced is Xecutive Office System (X-O), a menu-driven, easy-to-install, "system managerless" operating environment with operating benefits for VAX system managers and users. With the menu interface, the system manager can let others add and delete users, manage printer queues

and selectively back up user directories.

The X-O system is available for any VAX or VAXstation running VMS. It costs from \$795 to \$34,995.

For more information, contact Russell Information Sciences Inc., 25201 Paseo de Alicia, Ste. 111, Laguna Hills, CA 92653; (714) 768-5000.

Circle 422 on reader card

TapeNet Equips LS200T Subsystem With RS-232 Port

Lago Systems Inc. announced a tape monitor feature for its LS/200T 8mm cartridge tape subsystem used for backup on VAXclusters. Called TapeNet, this optional feature equips the subsystem with an RS-232 port that can be attached to any communications port on a VAX system, DEC terminal or terminal server. It includes a firmware upgrade to the LS/200T that allows it to accumulate and transmit status information on all drives in a subsystem. TapeNet provides data on the amount of tape remaining on a cartridge and the ECC count for an operation. It also provides data on all types of tape errors that occur, the tape

commands being executed, tape labels and cartridge size.

The LS/200T consists of two or four 8mm cartridge tape transports and an STI adapter board that translates signals between the SCSI tape drives and DEC's tape controller. It's designed for attachment directly to the tape data channel on an HSC storage controller. Each 8mm cartridge stores up to 2 GB of data.

A standard LS/200T costs \$24,000. TapeNet costs an additional \$1,000 on new units and \$1,200 on currently installed units. For more information, contact Gordon Orsborn, Lago Systems Inc., 160E Albright Way, Los Gatos, CA 95030; (408) 374-1818.

Circle 417 on reader card

Kappa Uses Object-Oriented Programming

IntelliCorp Inc. announced Kappa, a software development environment for PCs that aids in the development of low-cost, high-impact business applications.

Based on C, Kappa features object-oriented programming, rule-based reasoning, active graphics, and intelligent links to appli-

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cations, spreadsheets and databases. These features let software developers build solutions on standard platforms. Application builders use objects to represent company information directly in software and use rules and other language constructs to capture decisions and policies associated with their business activities. The product integrates with such PC software as dBase III, Lotus 1-2-3, graphics and CAD packages, and ASCII files. It provides access to applications in FORTRAN, Pascal and C. It runs on an IBM AT or compatible with 640 KB of RAM, MS-DOS and Microsoft Windows V2.1.

Kappa costs \$3,500. Run-time versions, which can be embedded in the final applications, cost \$450.

For more information, contact Erin Barrite, IntelliCorp Inc., 1975 El Camino Real W., Mountain View, CA 94040; (415) 965-5500.

Circle 415 on reader card

nthPower Software Includes X User Interface

Signal Technology Inc. announced nthPower, an object-oriented application environment for digital signal processing, data analysis and presentation.

nthPower is an integrated software solution for X-based workstations and client/server networks. It features an X user interface, a client/server distributed architecture, and extensive signal and data analysis functionality provided through a symbolic high-level application language. It also features easy menu selection of commonly used analysis functions with customizable menu setup using point-and-click mouse operations. A bidirectional 3GL interface allows preservation of software investment. Network licensing techniques allow concurrent users to access software. The product initially is available on VAX/VMS, ULTRIX and Sun systems.

nthPower costs from \$6,000 to \$24,000.

For more information, contact Hollie Straub, Signal Technology Inc., 120 Cremona Dr., Goleta, CA 93116; (805) 968-3000.

Circle 423 on reader card

Le tX Improves X11 Graphic Operations

Peripherals Design Inc. announced Le tX, a high-resolution X station. It combines the graphics quality of UNIX stations with the ease of use of a terminal.

Le tX improves and optimizes X11 graphic operations using GROPE, a custom

Xccelerator ASIC. GROPE ensures high-speed X graphics regardless of the number of planes. The X server can be downloaded for ease of upgrade and uses the TCP/IP-TFTP network protocol. The system hosts a real-time kernel and is based on an open 32-bit bus architecture driven by a 16-MHz Motorola 68030 microprocessor and a 68881 floating point

coprocessor. A memory management unit highly coupled to the X11 protocol ensures the integrity and use of the station even if too many windows are opened. Expansion slots allow the addition of a data compression board and SCSI scanners. The product offers built-in support for PostScript printers. Two models are available: the Le tX M+ 19-inch



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monochrome with 1,280 x 960 resolution and 2 MB or more of memory and the Le tX-C8 19-inch 8-bit color with 1,280 x 1,024 resolution and 4 MB or more of memory.

For more information, contact Peripherals Design Inc., 3060 Business Park Dr., Ste. E, Norcross, GA 30071; (404) 263-0067.

Circle 420 on reader card

UniSolutions Announces UNIX System Administration Software

UniSolutions Associates announced version 4.1 of the SysAdmin UNIX system administration software package. It provides such administration utilities as account maintenance, multilevel file backup and restore, tape library management, tape manipulation, system security and monitoring, network administration and monitoring, resource accounting and reporting, and performance monitoring.

The UniSol user interface provides multi-level menus, layers, forms, selection lists, command and browsing windows, and context-sensitive help. A user interface toolkit

for C lets you develop windows-based applications for ASCII terminals and workstations. SysAdmin includes the UniMenu and SysAudit software utilities, also available standalone. UniMenu provides a user-modifiable menu interface to UNIX commands and local applications. SysAudit provides system monitoring and auditing tools. SysAdmin is available in binary or source/site license format for systems running ULTRIX, 4.2 BSD, 4.3 BSD, SunOS 3.x and 4.0, and other UNIX variants.

For more information, contact Laurie Craig, UniSolutions Associates, 2103 Mathews Ave., Ste. 1, Redondo Beach, CA 90278; (213) 542-0068.

Circle 426 on reader card

Deft Enhances Its CASE Solution With Deft V4.1

Deft announced Deft V4.1, a CASE solution for RDBMS engineers. Deft V4.1 enhances Deft V4.0 with Rdb and Sybase gateways, editor and gateway support for Ingres V6.0 and Oracle V6.0, Deft dictionary improvements and enhanced diagram editors

and reporting.

Deft's CASE solution consists of four main products. Deft Analyst is an RDBMS CASE system for the Mac that lets the analyst build requirement specifications and perform a detailed analysis of user needs. Deft Designer has all of Analyst's features, adding general and detailed design facilities. Deft Professional has Analyst's and Design's features, adding a multiserver-based repository. Deft Gateways link a Mac running Deft to a VMS host running Oracle, Ingres, Rdb or Sybase. Deft also announced its Gateway to Rdb for VAX/VMS. Database programmers now can compile their Deft designs on the Mac into Rdb/VMS SQL schema on the host.

The Deft Analyst costs \$4,500. Deft Designer costs \$5,900. Deft Professional costs \$7,900 and Deft Gateways costs from \$10,000. Deft's Gateway to Rdb costs from \$10,000 to \$20,000, depending on configuration.

For more information, contact Deft, 557 Dixon Rd., Ste. 111, Rexdale, ON M9W 1H7; (416) 249-2246.

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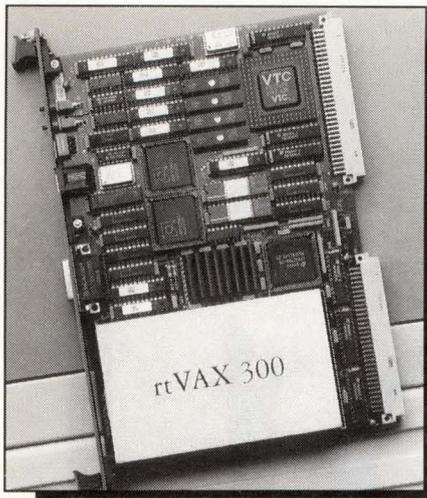
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The Aeon VME 300 incorporates the rtVAX 300 in a 6U board with a local memory of 1, 2, 4 or 8 MB.

Aeon VME 300 Incorporates rtVAX 300 Subassembly

Aeon Systems Inc. announced the Aeon VME 300 processor board. It incorporates the rtVAX 300 subassembly.

The rtVAX 300 includes a VAX processor, an FPU coprocessor and an Ethernet controller coprocessor integrated on a small daughterboard. The Aeon VME 300 incorporates the DEC subassembly in a 6U board with a local memory system of 1, 2, 4 or 8 MB and a VME interface. The VME 300 interface includes the slot zero system controller functions defined by the VME 300 bus specifications. VME master and slave transactions are supported. VME system installations can range from a single VME 300 to multiprocessor systems. The Aeon VME 300 comes with external connections for Ethernet and RS-232. The Ethernet, included with the rtVAX 300, incorporates ThickWire access. ThinWire Ethernet connections can be made using external hardware. One of two RS-232 ports acts as the console device.

A 1-MB version of the product costs \$4,995.

For more information, contact Steve Kadner, Aeon Systems Inc., P.O. Box 10300, Albuquerque, NM 87184; (505) 828-9120.

Circle 406 on reader card

VersaTerm-Pro V3.1 Supports Apple Comm Toolbox

Synergy Software announced VersaTerm-Pro V3.1, which supports the Apple Comm Toolbox and VT220 text terminal emulation.

An installation disk lets Mac users with

System 6.0.2 or later add the Comm Toolbox software. VersaTerm and VersaTerm-Pro support the connection and file transfer managers of the Toolbox. By dropping in connection and file transfer tools provided by Apple and others, VersaTerm and VersaTerm-Pro can connect to new networks/protocols. They can also support new file transfer protocols. VT220 emulation includes downloadable character sets, host-definable function keys, and 7- and 8-bit operation. Other features include double-high double-wide characters, protected fields, selective erase, and the DEC multinational character set. The product offers pop-up soft keyboard support for simulating the Apple Extended, VT220 and Data General D200 keyboards as well as support for the Mac Portable keyboard. It includes additional host text printing commands, improved ANSI color support and added ANSI graphics character set support.

For more information, contact Synergy Software, 2457 Perkiomen Ave., Reading, PA 19606; (215) 779-0522.

Circle 425 on reader card

Soft-Switch X.400 Gateways Operate With SprintMail Service

Soft-Switch Inc. announced binary file and revisable document exchange certified to operate over X.400 using the X.400 Gateway Model-10 and Model-20. The capability is based on a NIST Implementor's Workshop agreement.

The X.400 Gateways operate with Sprint's SprintMail Service. Customers of the two companies can exchange spreadsheets, revisable documents, software programs, engineering drawings, CAD/CAM documents and other binary information across X.400 networks. The gateways connect through Soft-Switch Central to more than 30 e-mail systems, including ALL-IN-1 and VMS Mail; IBM OfficeVision, PROFS and DISOSS; Wang Office; HP DeskManager; Banyan Vines Mail; and 3Com 3+Mail. The Model-10 is based on a 16-MHz Intel 80386SX processor with 4 MB of memory, two Motorola 68000-based dedicated communications processors, and 40 MB of disk storage. The Model-20 is based on a 25-MHz Intel 80386 processor with 8 MB of memory, two Motorola 68000-based dedicated communications processors, and 322 MB of disk storage.

The Model-10 costs \$30,000. The Model-20 costs \$55,000.

For more information, contact Donald M.

Fisher, Soft-Switch Inc., 640 Lee Rd., Wayne, PA 19087; (215) 640-9600.

Circle 424 on reader card

NIS Announces Interface To Rdb/VMS

National Information Systems Inc. (NIS) announced the Accent R SQLgateway to Rdb, an interface to Rdb/VMS.

The product was designed for the VAX SQL interface to Rdb. It's ANSI SQL-compliant and supports VAX CDD/plus. It lets databases be created and updated through DEC's run-time version of Rdb. It lets developers and users read and write Rdb tables by embedding SQL statements with Accent R's Structured Programming Language. Access to Rdb databases is available through the Access R 4th Generation Tools and through the Accent R Express Executive Information System. The SQLgateway to Rdb can be used to manipulate tables for read and write in conjunction with such DEC products as Data Distributor, Rally, TEAMDATA, VAXLink and VIDA.

The product costs from \$825 for the VAXstation 3100 to \$27,100 for the VAX 9000 Model 410.

For more information, contact Dave Wagner, National Information Systems Inc., 1190 Saratoga Ave., San Jose, CA 95129; (408) 985-7200.

Circle 419 on reader card

Vocal Introduces Portable Modem

Vocal Technologies Ltd. announced Stowaway 2400, a TLP-based modem product. Vocal's TLP technology eliminates the possibility that a line will be dropped during a communication session due to low battery power.

Stowaway measures 2 x 3 x 3/4 inches and weighs 2.2 ounces. It's compatible with IBM and Apple using any standard RS-232 serial interface. It operates on all telephone lines and supports V.22 bis, CCITT, V.22/Bell 212A/Bell 103 and the extended Hayes AT Command Set. It features autodial, autoanswer, nonvolatile memory, a 40-character command buffer, and 2,400, 1,200 and 0-300 baud with automatic fallback. It doesn't require an internal slot or an AC outlet and can be used on more than one computer.

The product costs \$295.

For more information, contact John Blume, Vocal Technologies Ltd., 3032 Scott Blvd., Santa Clara, CA 95054; (408) 980-5181.

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VXM Technologies Focuses PAX-1 On VAX/VMS

VXM Technologies Inc. announced a version of its PAX-1 software for VAX/VMS. It transforms a network of VAXs into a parallel processing, networking supercomputer.

PAX-1 precompiler technology allows asynchronous computation of networked applications across multiple VAXs. The networked applications thus use techniques

available up to now only on multiprocessor machines. PAX-1 applications can be developed for this environment, or existing ones can be modified. The product can replicate a process to create a given number of "workers," or identical processes, that can work on a large or complex problem. It uses a fully distributed approach and runs on VAX/VMS over a DECnet Ethernet LAN.

A primary PAX-1 development node costs from \$7,500 to \$29,900.

For more information, contact VXM Technologies Inc., P.O. Box 9121 Kenmore Station, Boston, MA 02215; (617) 730-8490.

Circle 429 on reader card

DMG Adds Graphics Capability To Its VAX-To-FAX Product

Digital Management Group Ltd. announced the addition of graphics capability to its VAX-to-FAX product, DMG/FAX. DMG/FAX can now add corporate logos, signatures and other graphics to fax messages sent directly from VAX/VMS systems.

DMG/FAX lets any VAX terminal send a fax directly from ALL-IN-1, VMSmail, WordPerfect, WORD-11, Mass-11 or ASCII text directly from the DCL level. It also can be integrated into customer applications such as purchase-order processing.

DMG/FAX uses a standard fax machine as its hardware component, supplied by Pitney Bowes.

For more information, contact John Dightam, Digital Management Group Ltd., 4711 Yonge St., Ste. 600, North York, ON M2N 6K8; (416) 225-7788.

Circle 515 on reader card

Henco's Synchrony Integrates Varied Data

Henco Software Inc. announced Synchrony, a software product for the information integration market. Synchrony applies the relational model of database management to combine data types such as structured data, text and images from different sources, providing information in a thorough, concise manner.

Synchrony is designed to enhance your decision-making capabilities. It can integrate text, data and images from a variety of sources such as online research, corporate databases, optically scanned documents and word processing packages including WordPerfect, Mass-11 and WPS-Plus.

For more information, contact Lauren S. Levenson, Henco Software Inc., 100 Fifth Ave., Waltham, MA 02154; (617) 890-8670.

Circle 516 on reader card

NX850-XL Speeds VAX 8550 CPU From 6 VUPS To 7.5 VUPS

Nemonix Inc. announced the NX850-XL, an in-cabinet CPU accelerator for the VAX 8550. The Nemonix NX850-XL helps MIS directors meet the demands of new users, new

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applications and improving response time. The upgrade improves a VAX 8550's CPU performance from 6 VUPS to 7.5 VUPS. This level of performance exceeds a VAX 6000 Model 410.

Nemonix's upgrade is fully transparent to existing hardware and software and requires a 30-minute installation. Its add-on module can be disabled with a switch, which returns the system to its original configuration.

As part of the Nemonix Technology Advancement Program (TAP), the NX850-XL costs \$9,995, with free installation. For more information, contact Peter Cholakis, Nemonix Inc., 106 South St., Hopkinton, MA 01748; (508) 435-9087.

Circle 520 on reader card

Q*file Manages Disks, Directories And Files

W. Quinn Associates Inc. announced Q*file V1.0c, a disk, directory and file management command shell software package. Q*file is the first of the Quinn Software Portfolio family of VMS utilities.

Q*file is a fast but simple user interface to VAX/VMS. It offers a tree-structured interface for managing disks, directories and files. It uses pull-down windows and point-and-shoot menus for entering commands. Files can be selected based on 46 criteria, many of which let you identify potentially wasted disk space or performance bottlenecks. It features a multiple window display, a Lotus-like command mode, online context-sensitive help and a fully integrated VMS command line.

Prices range from \$795 for a VAXstation to \$7,995 for VAX 9000.

For more information, contact Bill Peake, W. Quinn Associates Inc., 12030 Sunrise Valley Dr., Ste. 300, Reston, VA 22091; (703) 476-2255.

Circle 430 on reader card

Compass Available For MicroVAX And VAX

Bonner & Moore Consulting Services announced the Compass maintenance management system for the MicroVAX and VAX. It operates under Rdb or ADABAS.

Compass includes fully integrated equipment, work order, inventory control and purchasing features. A modular design lets you match your needs with system function and operation. Compass can be used with minimum training. Electronic scratch pad, single-key transaction access and automatic

key recall add to ease of use. Online help text and individual field help are available. Table-verified data entry and automatic data default increase operator speed and efficiency. For more information, contact Irasema Emerson, Bonner & Moore Consulting Services, 2727 Allen Pkwy., Houston, TX 77019; (713) 831-9786.

Circle 460 on reader card

DCMS-TSB Storage System Backs Up More Than 14 GB

Clearpoint Research Corporation announced the DCMS-TSB 8mm tape storage subsystem for VAX 8000 and VAX 6000 systems. The DCMS-TSB includes a proprietary gate array, providing users with TMSCP emulation and a third-party VAXBI direct-attachment subsystem.

The TSB tape controller functions as a VAXBI-to-SCSI host adapter that plugs directly into the VAXBI peripheral bus. Using one slot, but providing ports for up to seven tape devices, it offers flexible configurations and backup capabilities from 2.3 to more than 14 GB. It also provides simultaneous operation of DEC's TU81 Plus and Clearpoint's 8mm tape drive.

An RS-232 port is standard with the TSB. The Clearpoint Service and Maintenance Utility (CSMU) feature provides maintenance and operating status information including ECC error correction rate to determine the tape quality and amount of unused tape.

The DCMS-TSB storage subsystem costs \$17,850.

For more information, contact Greely Summers, Clearpoint Research Corp., 35 Parkwood Dr., Hopkinton, MA 01748; (508) 435-2000.

Circle 509 on reader card

Objectivity/DB Meets Engineering Applications Requirements

Objectivity Inc. announced Objectivity/DB, a DBMS designed to meet the functional and performance requirements of engineering applications. It supports diverse hardware platforms, applications vendors' products, and engineering domains and provides foundation-level functionality.

Objectivity/DB supports mixed networks of DECstations and Sun3s. It also supports distributed control of data. It's designed as a layered toolkit that lets application developers select the functionality they need and specify the granularity of database operations. Data is managed at the object level and can be logically combined into composite objects and physically clustered on disk. Any type of data is supported, including dynamically varying arrays of virtually unlimited size.

Development systems cost \$30,000. Run-time systems are also available.

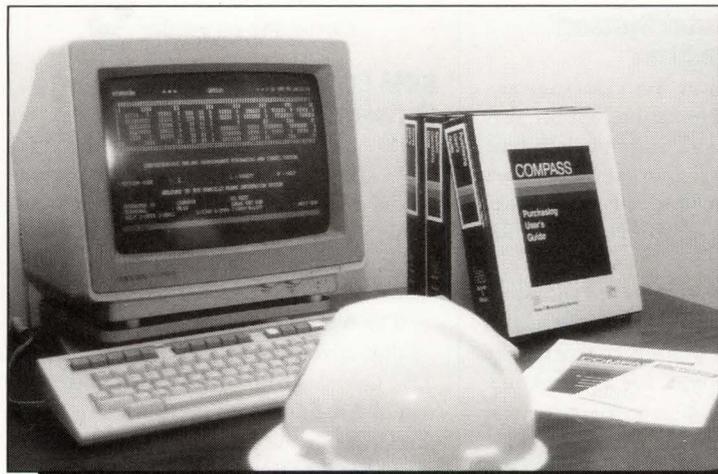
For more information, contact Bob Field, Objectivity Inc., 800 El Camino Real, 4th Fl., Menlo Park, CA 94025; (415) 688-8000.

Circle 465 on reader card

Phaser PX Networking Printer Switches Ports Automatically

Tektronix Inc. announced the Phaser PX, a color PostScript-compatible, 300-dpi printer, with multitasking connectivity designed for mixed office environments. It includes serial, parallel and AppleTalk ports standard and can automatically switch among the ports. This lets the printer be shared across platforms and environments, which may be a combination of IBM PCs and compatibles, Macs, workstations, minis or mainframes.

The Phaser PX also supports HP-GL. HP-GL emulation is compatible with HP7475A



The Compass maintenance management system operates under Rdb or ADABAS.

plotter drivers, including extensions for 256 colors, user-selectable timeouts and scaling. Phaser PX can switch between PostScript and HP-GL emulation. One input port can be set to accept HP-GL files while the others are set to receive PostScript files.

The Phaser PX costs \$7,995. Any Tektronix color thermal wax transfer printer can be upgraded to the PX's capabilities for \$3,995.

For more information, contact Tektronix Inc., P.O. Box 1000, MS:63-583, Wilsonville, OR 97070; (503) 682-7392.

Circle 518 on reader card

BAC-Up Backs Up And Restores VAX/VMS Systems

Professional Software Associates Inc. announced BAC-Up, a VAX/VMS backup librarian. It backs up and restores VAX/VMS systems and includes an archival librarian capability for cataloging tapes and setting up restores.

BAC-Up is compatible and works with the VMS BACKUP utility. Operations can be done interactively by user, or requests can be transferred ready for processing to a computer operator. The command file of any session can be saved to be used later. All tape operations can be double-checked for correct tape labels. Listings and queries of the online database can locate data files quickly. Backup is performed in DEC's backup format using DEC software. Logging and reporting let the manager oversee use of backup operations.

The product costs from \$495 to \$6,995, depending on processor.

For more information, contact Professional Software Associates Inc., 1822 E. Carnegie, Santa Ana, CA 92705; (714) 852-0288.

Circle 466 on reader card

Innovative Computer Systems' FCX Reduces File Sizes

Innovative Computer Systems Inc. announced a file compression system that reduces file sizes up to 90 percent in little time with few computer resources. FCX solves problems associated with limited disk space, lengthy file transfers and conversion of files among systems.

Several files can be compressed and packaged together in one FCX file, saving an average of 50 to 70 percent of space. The input files can be any type, size and structure. FCX preserves the different file types and structures as it expands the compressed files. The expanded file will exactly match the original input files both in file structure and

data content. FCX increases available disk space without adding software. It also lets you exchange files between VMS and MS-DOS systems in compressed format. Conversion of files to the proper VMS format is automatic or can be specified manually. FCX requires VMS V4.4 or later and will run on any VAX, MicroVAX or VAXstation under VMS. For more information, contact Innovative Computer Systems Inc., 72 Crooked Ln., Cherry Hill, NJ 08034; (800) 848-4FCX.

Circle 513 on reader card

SAS System Provides Windowing And Menu-Driven Interface

SAS Institute Inc. announced the SAS System V6.0. It provides a menu-driven interface, interactive windowing capabilities and other enhancements.

SAS/Assist software, a task-oriented, push-button user interface, provides access to the most-used SAS System capabilities. It lets you point and click through an application to access, manage, analyze and present data in a report or graph. It also provides a facility for constructing executive information systems. The SAS Display Manager System supports window styles familiar to users. Icons, pull-down menus and windows are available, as is a graphics window that lets you view graphics output in a zoomable, scrollable window. It includes a cut-and-paste facility for moving nongraphics output from one window to another. The SAS System V6.0 also includes data access, management, analysis and presentation enhancements. It's available for IBM mainframes under MVS and CMS and for DEC minis and workstations under VMS.

For more information, contact Mike Truell, SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27512; (919) 677-8000.

Circle 467 on reader card

KOM Expands Optifile II Software Capabilities

KOM announced Optifile II for the ATG GD 6000, the Kodak 560 ADL and the UNIX environment. It's available for stand-alone, cluster and networked environments. No changes are required to the operating system or application.

The ATG GD 6000 high-reliability optical disk drive provides 6.4 GB of storage per disk. Optifile II for the ATG GD 6000 lets optical disk drives emulate standard magnetic disk drives. It costs from \$5,000 to \$50,000.

The 560 ADL supports ISO-standard and nonstandard disk cartridges and can be fitted

with WORM and erasable drives. Optifile II for the Kodak 560 ADL lets you plug the 560 ADL into a VAX/VMS host. It costs \$25,000.

Optifile/UNIX lets SPARCstation 1 and SPARCserver 330 users configure a device driver and plug the optical disk drive into the built-in SCSI adaptor. It costs from \$1,500 to \$5,000.

For more information, contact Bill Hopkins, KOM, 145 Spruce St., Ottawa, ON K1R 6P1; (800) 267-0443.

Circle 462 on reader card

Queman And Outpost Integrate To Form PostPrint

Data Center Software Inc. and ECAP Systems Inc. jointly announced PostPrint, a utility that integrates VMS PostScript printing with automated queue and forms management.

PostPrint integrates portions of Data Center Software's Queman VAX queue and forms management utility with ECAP's Outpost VMS ASCII PostScript utility. Its user interface lets you select files to be printed and, by determining if they're PostScript files, limit the selection to queues that are attached to PostScript printers.

If the files aren't already PostScript and you choose to send them to a PostScript queue, PostPrint will present a menu of printing parameters for you to choose from for the printing job. Converting plain ASCII data to PostScript lets you print these files to the PostScript queue.

For more information, contact Data Center Software Inc., 70 Herrick St., Beverly, MA 01915; (508) 922-5500.

Circle 512 on reader card

DDS-1300 DAT Offers 1.3 GB Of Tape Storage

Symmetrical Technologies Inc. announced the DDS-1300 DAT subsystem. Announced in conjunction with the DDS-1300 was an agreement with WangDAT to supply raw DAT drives for the product.

DDS-1300 offers 1.3 GB of high-performance tape storage. It's based on a half-height 5 1/4-inch 4mm DAT drive. DDS-1300 subsystems are complete, ready-to-use and available for transparent access with Symmetrical Technologies interfaces to VAX, Sun and Macintosh computers.

The DDS-1300 is directly plug-compatible with the SCSI hardware and operating system software of Wang, HP-Apollo, Mips, and Convergent computers. It also is supported on the SPARCstation 1 and



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DIGITAL PRODUCTS

■ DEC expanded its Sales & Marketing System, a set of applications and communications capabilities that address the needs of sales and marketing organizations. New networkwide packages include communications, proposal development, presentations and pharmaceuticals, as well as a new consulting group specializing in sales and marketing solutions.

More than 500 sales and marketing applications are available, including those for market analysis and planning, headquarters sales and marketing operations, field sales operations, and customer service. Information can be shared across the network using industry-standard devices and NAS. Planning, design, implementation and management services are provided through the Enterprise Integration Services (EIS). The Sales and Marketing Solutions Consulting Group is part of EIS and works directly with customers and DEC's sales support organization.

■ DEC announced two programs that provide enhanced parts replacement services for customers who maintain their own DEC equipment.

DECmailer Plus provides 24-hour turnaround time, selection of more than 2,500 parts, parts shipped at current revision levels, return freight paid by DEC, and a 90-day warranty.

Factory Express is for parts that don't contain DEC proprietary components. It includes a five-day turnaround, selection of over 1,800 parts, parts shipped at current revision levels, return freight paid by DEC, and prices 5 percent below those of DECmailer Plus.

■ DEC's DECrouter 250 assigns the most efficient path for information to travel over the network based on factors such as cost

and network congestion. It operates with DECnet Phase IV and DECnet/OSI Phase V. It provides the functionality of the DECrouter 2000 for up to eight lines and in a variety of speeds and enables sync or async connectivity. It costs \$6,000.

The DEC ISDNcontroller 100 and VAX ISDN Software are the first complete ISDN hardware and software offerings. ISDN, a CCITT standard, enables text, speech, images and data to be carried over the same end-to-end digital telephone network.

The ISDNcontroller 100 interconnects two or more LANs and enables any MS-DOS, ULTRIX or VMS system on a DECnet/OSI network to use ISDN software applications that integrate voice, data and images. The ISDN Software, residing on the MicroVAX, controls the ISDN signal and bearer channels and lets you run DECnet-VAX networking software and other protocols. The ISDNcontroller 100 costs \$4,000. The ISDN Software license costs \$2,000.

■ DEC announced the VAXft 3000 Model 310 fault-tolerant system. In the Model 310, every component, including the backplane, is mirrored. During power failure, the in-cabinet system is kept running for up to 15 minutes by a built-in power supply. The Model 310 runs existing VMS applications without change and can be used standalone, as part of a LAN or WAN, or as part of a mixed-interconnect VAXcluster. It costs \$229,000.

DEC also announced two disk storage options and a tape drive featuring error detection and error-checking, read-back verification, and automatic switch-over. The disk options cost \$8,500 and \$9,600. The tape drive costs \$7,100.

For more information, contact your local DEC sales office or call (800) DIGITAL.

DECstation 3100.

For more information, contact Robb Sexton, Symmetrical Technologies Inc., 301 Gallaher View Rd., Ste. 231, Knoxville, TN 37919; (615) 690-3838.

Circle 510 on reader card

ScriptServer V3.1 Converts HP-GL Files To PostScript

GrayMatter Software & Consulting Inc. announced V3.1 of its ScriptServer Printing System. The system interfaces and manages the local or network attachment of multiple-vendor PostScript printers to VAX/VMS systems and supports HP-GL plot language. When sent to a PostScript printer, HP-GL plot files are converted to PostScript output by the software. Conversion capability includes full support for HP-GL output to Color PostScript printers.

ScriptServer V3.1 allows software initiation and control of printer-based emulations, including HP LaserJet II, Proprinter, Diablo and DEC LNO3. You can

intermix emulation jobs with ASCII text and PostScript jobs in a job queue invoking the emulations as needed. ScriptServer operates with printers that haven't implemented the CTRL/T Adobe PostScript standard for back channel communication with the host.

Licenses for ScriptServer V3.1 cost from \$495 for VAXstations to \$3,895 for a VAXcluster.

For more information, contact Jerry Beresford, GrayMatter Software & Consulting Inc., 1300 Dexter Ave., Ste. 550, Seattle, WA 98109; (800) 477-0348.

Circle 511 on reader card

Intermetrics C Compilers Conform To ANSI Standard

Intermetrics Inc. announced V4.0 of the Whitesmiths C compilers for the PDP-11 (RSX-11M+) and VAX/VMS. They conform to the C standard defined by the ANSI X3J11 Committee under ANS X3.159-1989.

The PDP-11 compiler is highly compat-

ible with the VAX compiler. They share a common front end that allows code written for the PDP-11 to be migrated to the VAX. A VAX-to-PDP-11 cross compiler can be used interchangeably for writing code for PDP-11 applications. The compilers provide support for programmers from the compile stage through debugging. Three kinds of compile-time type checking include a lint-style check, an ANSI/ISO standard check and a check for standard C with Whitesmiths extensions. Extensions to C have been added to V4.0, including in-line assembly to provide faster access to code written in assembly language.

The compilers cost from \$4,000 for a single license on the PDP-11 and \$3,000 for a single license on the VAX. A single license for the VAX-to-PDP-11 cross compiler costs from \$5,000.

For more information, contact Patricia Arcand, Intermetrics Inc., 733 Concord Ave., Cambridge, MA 02138; (617) 661-0072.

Circle 461 on reader card

Accel8 Technology Enhances Transl8

Accel8 Technology Corporation announced Transl8 V1.2, an enhancement to Transl8, its data conversion utility that lets you share data among dissimilar computer systems. Transl8 handles text and binary files and resolves architectural differences, including byte ordering, data alignment, floating point representations, and differences in file and record organizations. In one of Transl8's many applications, a binary data file consisting of integer and floating point data is moved to and from a VAX/VMS computer system to a UNIX computer system for rapid processing.

Transl8 V1.2 adds features for handling data alignment, changing record formats and repeating data structures. It's available on VAXs, RISC systems and IBM RT systems, and runs on DECnet and TCP/IP.

Transl8 V1.2 is priced from \$2,076. Site licenses are available.

For more information, contact Barbara Eddy, Accel8 Technology Corp., 303 E. 17th Ave., Ste. 108, Denver, CO 80203; (303) 863-8088.

Circle 517 on reader card

Persoft's LAT Implementation Uses 33 KB Of Memory

Persoft Inc. announced its SmarTerm products with built-in LAT support. Persoft's implementation is compatible with Novell Netware and takes 33 KB of memory, has increased speed and the ability to completely unload from memory. It also supports a variety of Ethernet boards including Novell, Western Digital, Racal Interlan and 3Com products.

Persoft's implementation is releasable from memory, allowing you to clear PC memory when finished with LAT. Developed with DEC's specifications, it's completely accurate and compatible with LAT from DEC, including identical command line switches. Multicasting is supported but not required, enabling Persoft's implementation of LAT to access directly a network node independent of its services.

Persoft's implementation of LAT is included free as part of every copy of SmarTerm 240 V3.1 and SmarTerm 320 V1.1. SmarTerm 240 costs \$345 for an individual package. SmarTerm 320 cost \$195.

For more information, contact Mary Bigus, Persoft Inc., 465 Science Dr., Madison, WI 53711; (608) 273-6000.

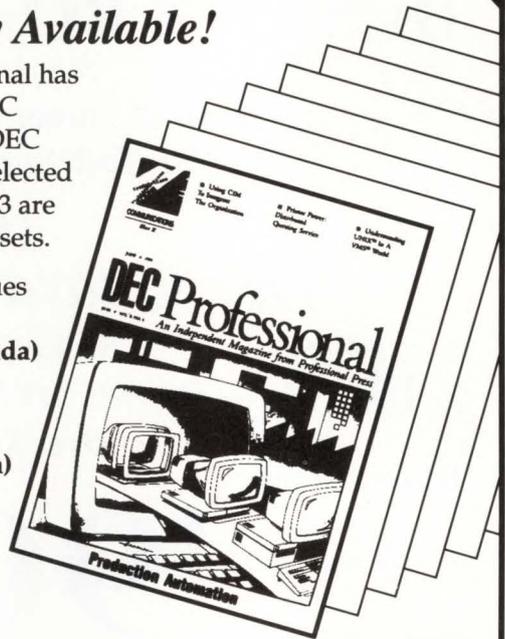
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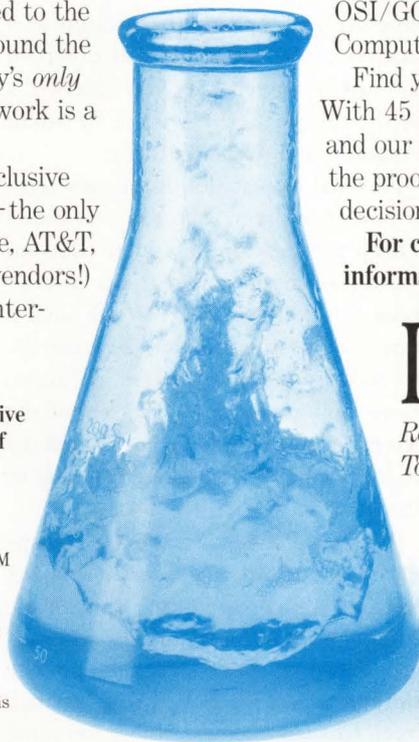
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BACK END

John C. Dvorak

The Name Game

The computer marketplace is confused not only by changes in technology, but also by changes in terminology. Cache, CISC, folder, 486, icon, LAN, mouse, parallel processing, RISC and window are terms that were unknown to the desktop user five years ago. Although it seems that new terms should be confusing to the hapless user who feels he can't keep pace with technology, the opposite is true.

New terms provide a clue that a technology is changing. They aren't developed for old aspects of a technology. They indicate change and make that change easy to follow.

An example of a basic change is the title DP manager. This evolved into MIS manager and then IS manager. These changes in nomenclature reflect a basic change in the environment. If you noticed that MIS is now IS, then a little research will indicate some change in function or environment.

This change in function, no matter how trivial, is always reflected by a change in nomenclature. With technology, a new term means that something new is happening. People who follow the industry are often intimidated by names and acronyms they've never heard before. I spend much of my time reading computer literature, and two or three times each day I find a new term or buzzword. I wonder who dreams up these terms. For example, who coined TSR — terminate and stay resident — or GUI — graphical user interface?

TSRs used to be called memory-resident. The design of the programs changed when people began loading more than one or two into their systems. The nature of the programs changed,

and they had to live not only within the computer, but also with one another. It was then that the nomenclature changed from memory-resident to TSR, indicating some sort of basic transformation.

Some terms have disappeared. Few computer writers now write about microcomputers or even PCs. As the industry oriented itself toward the business user, the machines came to be called desktop computers — the desk being the primary piece of furniture in a business environment. If you observed the terminology change, you observed a basic change in the nature of small computers and who uses them.

Personal workstation is the new term for microcomputer. This term is needed as the basic desktop computer takes on a tower configuration that sits near or under the desk. It's hard to call such a thing a desktop computer. Because the terminology is never reversed, the terms PC and microcomputer are out of the picture. A minor change in technology produces a new term to make it easy to follow.

The word terminal has almost disappeared. Diskless workstation defines today's terminal, indicating some basic change in the terminal and the relationship between the terminal and the computer. We've gone from a small screen to a large screen, color, and some inherent processing power.

If we're to carry these observations to a logical end, we must assume that if a change in technology is to be successful, a change in terminology is required. If this doesn't occur, then subconsciously you assume that the technology hasn't changed. Anyone with experience in the industry senses the connection between changes in terminology and changes in technology. Therefore, you suspect a level of old-fashioned stodginess when

discussing COBOL or multiuser computing, for example. Even mainframe sounds clunky.

Ask yourself which sounds newer — mainframe or minisupercomputer? COBOL or C++? Now what if you heard something such as COBOL/99 or X-COBOL or any other provocative new name? It would be hot, right?

While some think this is ludicrous, it's the only way to communicate change. While marketing people, gurus and writers try to invent new terms to add to the list of new product names, it's the market that accepts or rejects the new term and technological change. HyperCard is a term that caught on, while desktop video is a term that languishes. Multimedia caught on, but hypermedia didn't. Lotus-compatible caught on, but TopView-compatible died.

Many aspects of this observation are worth studying. If a company is advancing the state of the art in some established technology, it should be aware of the necessary terminology change that's required to signal the change. Vendors of a jazzy new COBOL compiler, for example, should rename COBOL. If they don't, we'll figure that nothing has changed. The vendor will complain about lack of respect and recognition.

But we should be the ones complaining. It's the vendor's job to follow the pattern of this industry and let us know that things have changed. If nothing has changed *except* the name, then the vendor will be ridiculed. Conversely, we assume that the reason the vendor didn't change the name was to avoid such a fate. Complainers can't win unless they do some work, follow the rules and give us something better *and* a new name. ■



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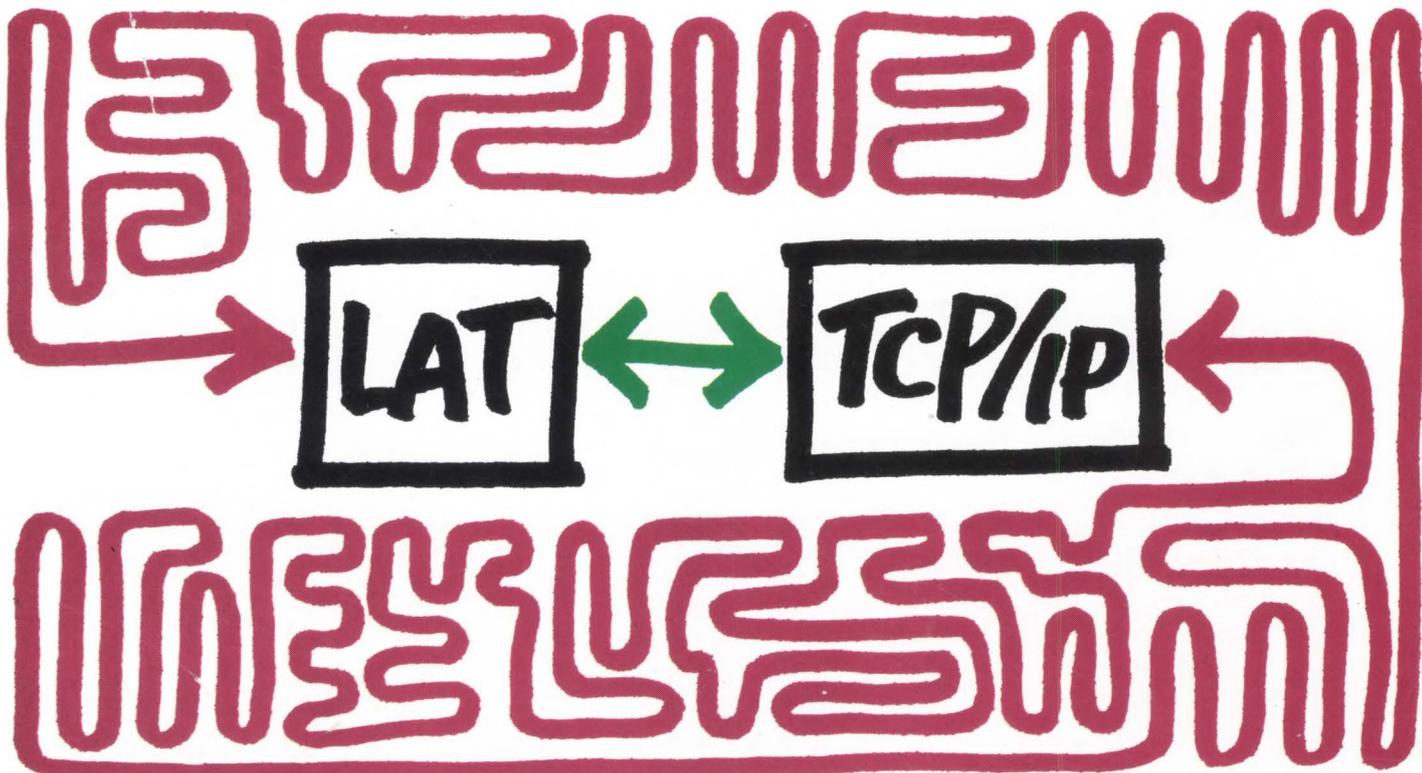
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