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AUGUST ■ 1990

DEC Professional

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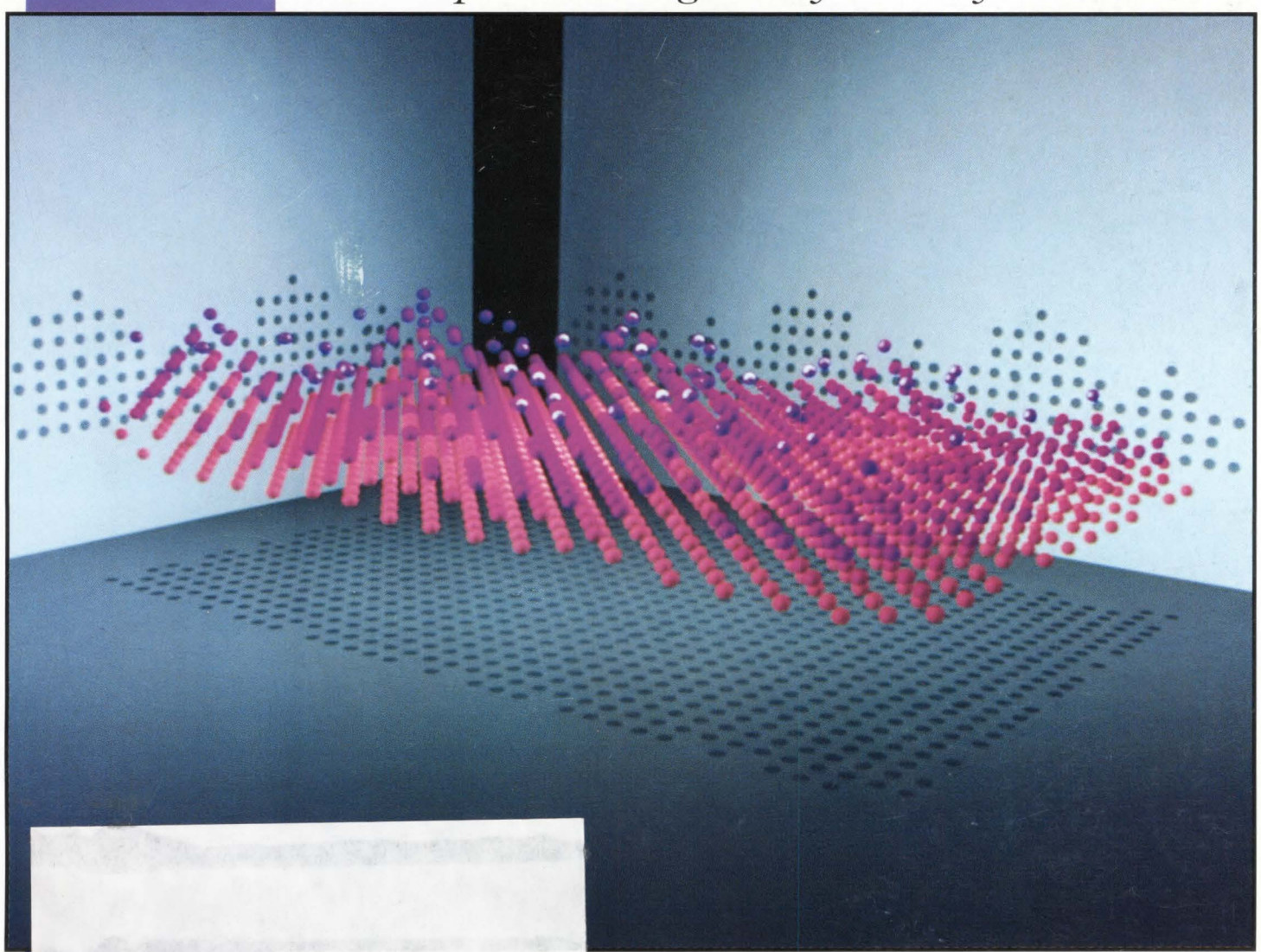

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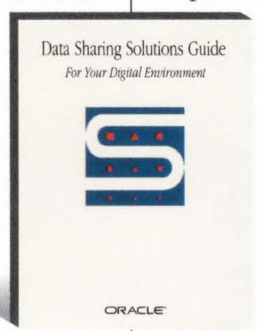

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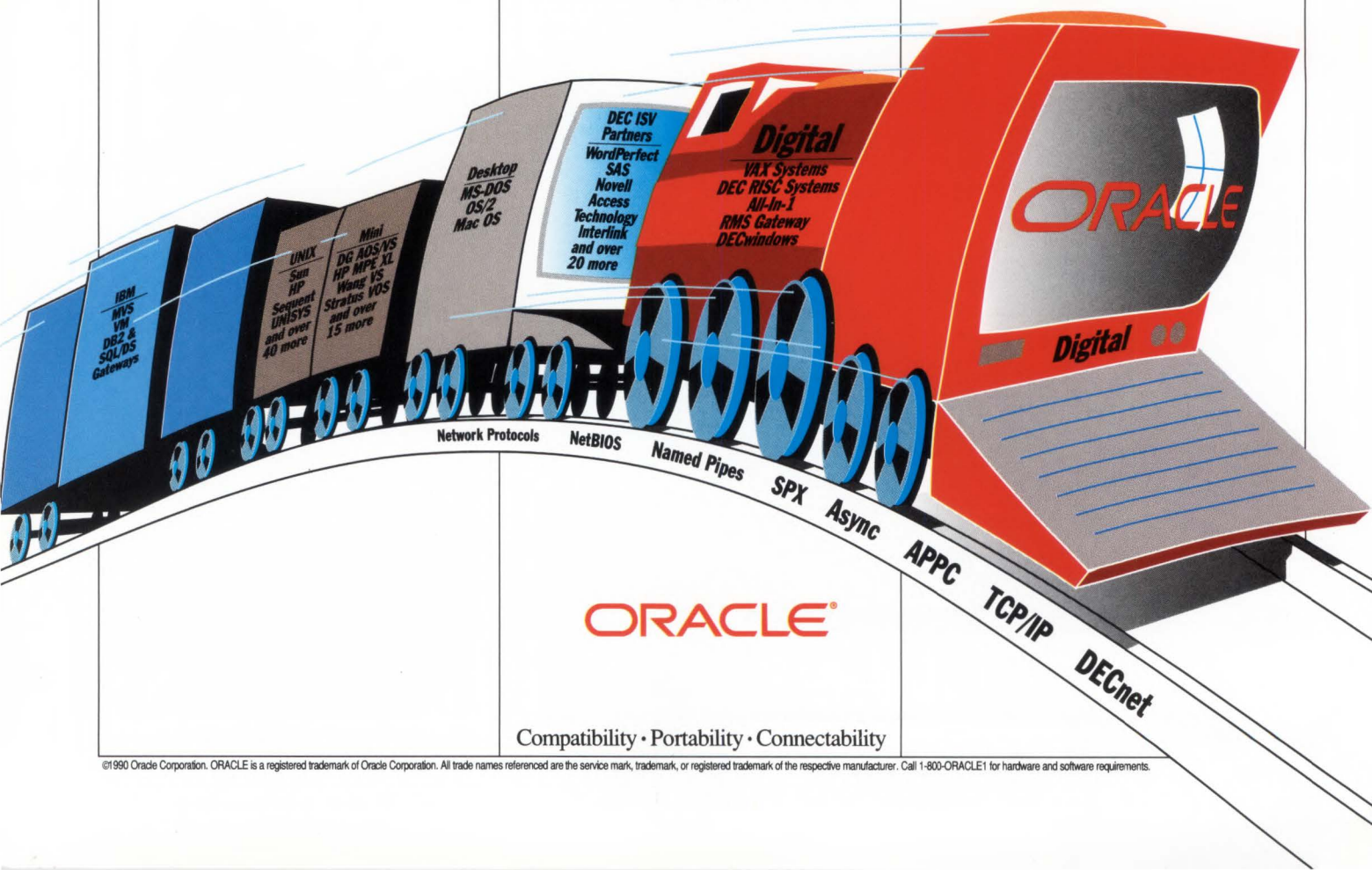

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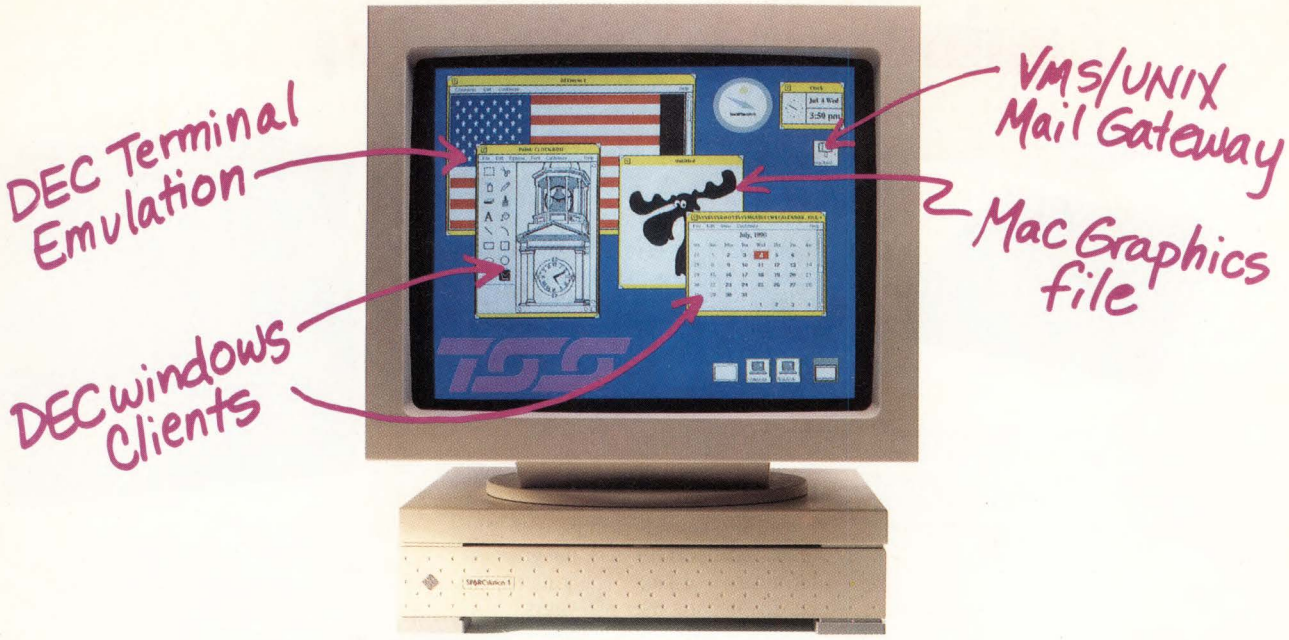

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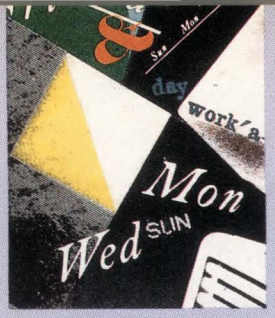

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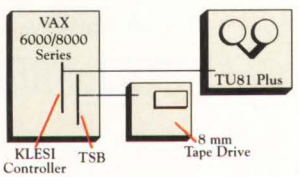

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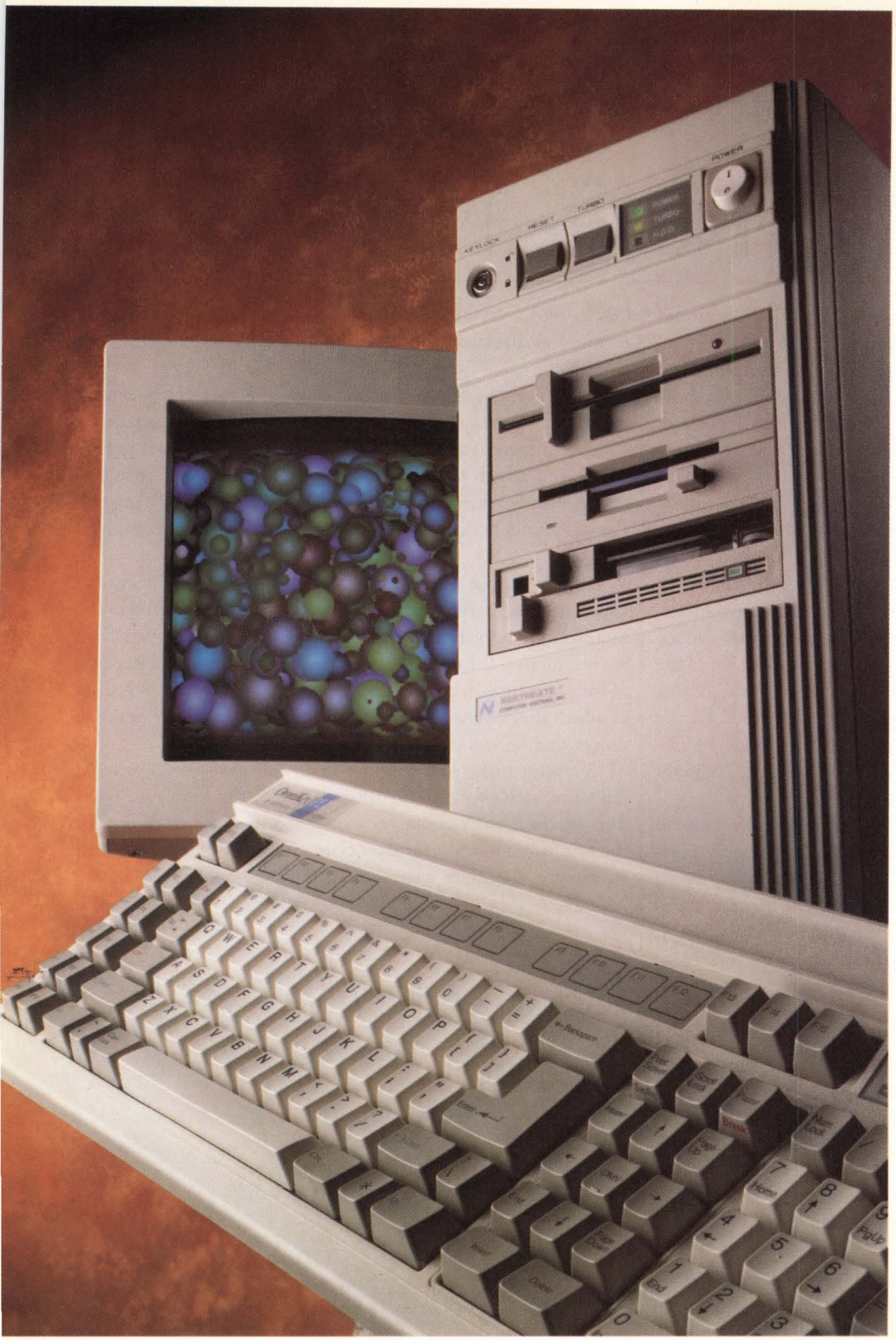

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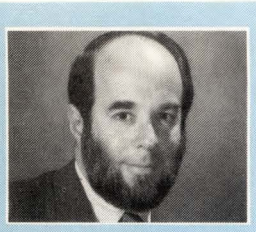

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Robert Noyce, 1928-1990

The computer industry lost a friend recently when Robert Noyce, co-inventor of the integrated circuit, died at the age of 62. He was not only a brilliant scientist and inventor but also a businessman with a vision for the future — a vision that shaped the computer industry and a vision that he made happen.

In 1968, Noyce co-founded Intel. In the '70s, Intel manufactured integrated circuits that together formed computers. Eventually the designers reached their goal: putting a whole computer on one chip. In the design, a single chip did the work that until then had been done by more than 12 chips on a board.

While I don't know exactly what took place, I heard Noyce describe the scene at Intel. The company was faced with the decision of whether or not to sell one chip instead of the 12 that until then had been necessary. Some thought it would be the end of Intel, because sales could drop by a factor of 12. Thinking well beyond this shortsightedness, Noyce and Intel brought us firmly into the age of microcomputers.

The short-term approach, previously used by the railroad industry and Wall Street, would have been to indefinitely postpone improvements in chip design. The long-term approach, championed by Noyce, was to improve the product and enlarge the market. What would railroads be like today if, instead of rails, we used magnetic levitation and achieved speeds of 300 mph instead of the same clackety-clack 60 to 90 mph we've had since 1930?

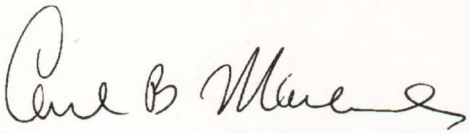
Even after his success at Intel, Noyce was thinking of the future when in a 1984 speech at the Computer Museum in Boston he told us to expect to be able to put components on a chip 10 times closer together in 10-year cycles. We thought he meant simply a tenfold increase in component count on a chip until he pointed out that chips have length, depth and height. Thus, a tenfold increase in linear density means 10 x 10 x 10, or a 1,000-fold increase. Chips that hold 1 million devices today can be expected to hold 1 billion devices 10 years from now!

The challenge, Noyce told us, was to discover what to do with this power that would reside on our desktops. Computing for the '90s will almost certainly tax our software's ability to keep up with the rapid growth in computer power. Noyce's 1984 speech was made before RISC technology really became a factor. PCs in 1984 were pushing 1 mip, while today we have 30 mips or more available on the desktop, with 100-mip machines not far away.

Most recently, Noyce was the head of Sematech, a consortium of 14 U.S. chip-makers hoping to help the U.S. regain semiconductor manufacturing market share. After the failure of U.S. Memories, which tried to do the same for memory manufacturing, Noyce returned to help get Sematech successfully started. He was giving back some of the rewards the industry had given him.

Robert Noyce left behind an example of bold decision-making, a long-term view of the industry and a will to help the industry remain viable in the U.S. American businessmen have been criticized for taking quick-and-easy profits at the expense of long-term goals, of being selfish in not helping the industries in which they operate. Noyce showed us the other way of doing things, and he will be missed.

We must make sure that the things he did and the way he did them aren't forgotten. When it comes time for your decision-making, think about how to make the hard decisions for the future and not just for the current moment or even the next six months. Consider what Robert Noyce would have done.



MA92, 3480 on the HSC

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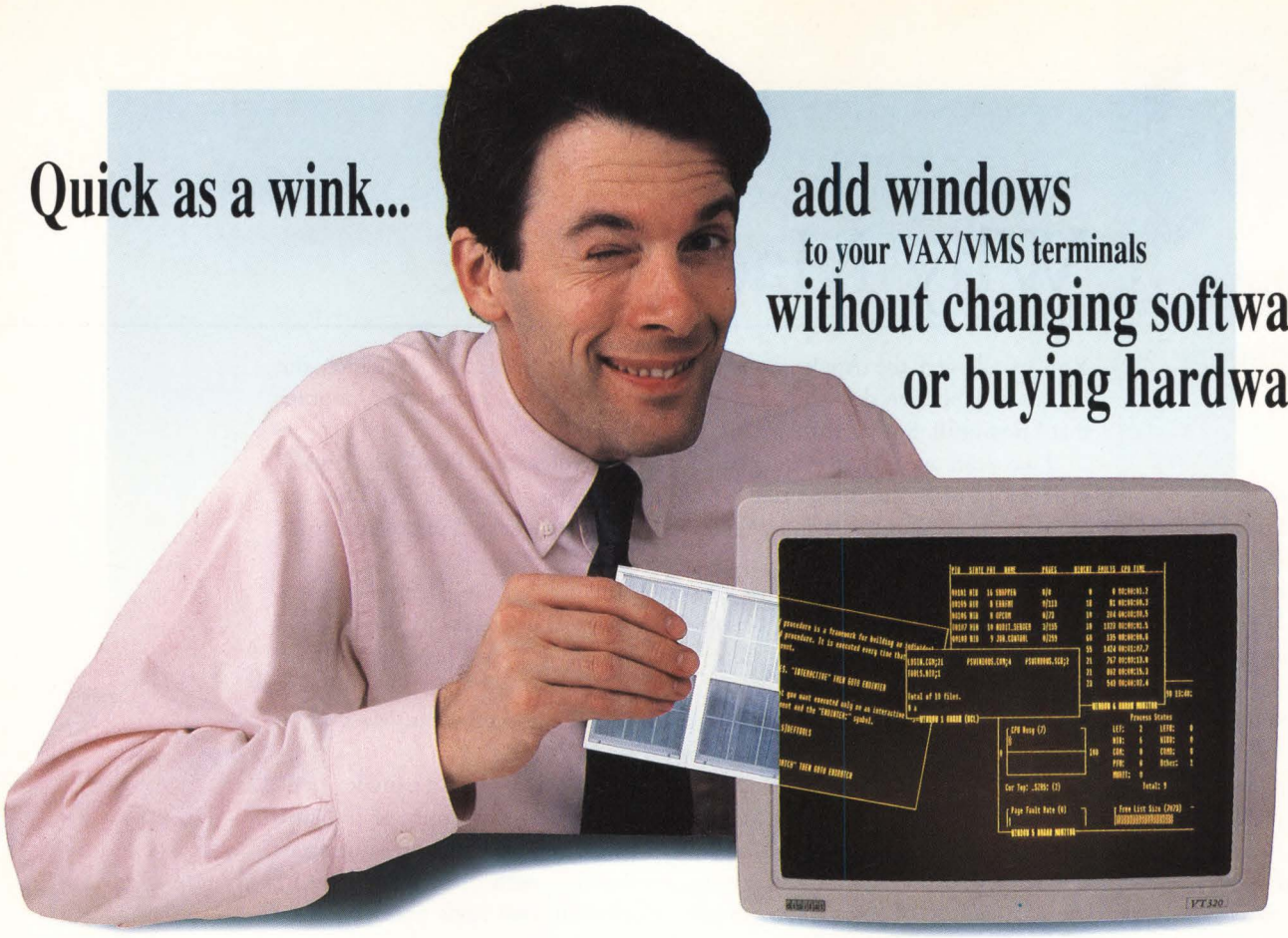

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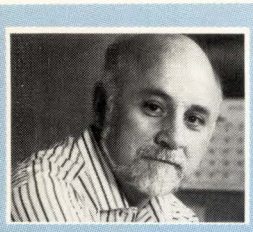

EDITORIAL

Dave Mallery

Why Macs Work

You've all seen the Apple Computer television commercial in which the bemused executive discovers that the computer that's used is the computer that's powerful. Strong stuff!

Two years ago, when we began converting Professional Press' art department from the world of wax and razor blades, I set a new Mac II next to a new 25-MHz 386. Both ran PageMaker. In fact, the 386 ran it faster and had better resolution. After two weeks, I removed a thick layer of dust from the 386 and bought Macs.

Now, all Professional Press publications are produced on Macs. We run on the edge of technology. Our color work is so advanced that there are no consultants to tell us how to do it. We have no typesetters or paste-up people. Soon we'll completely stop producing anything on paper other than PostScript-proof pages.

One question drives me nuts: Why do we have to buy overpriced and underpowered Macs when faster and better hardware is available — including workstations from DEC?

The answer is the same as the answer in the commercial. It isn't the power. It isn't a single application. Our first 386 was blown out the door by the Mac user interface and the family of software from many vendors that was bound together by the toolkit — by a single and learnable user interface.

The last two years have been wasted by the UNIX vendor community with its internecine wars between UI and OSF. The Mac family of software continues to open ironclad leads over any contender in publishing (and probably many other fields) simply because the solution set is larger than any single vendor can supply.

Only a coherent set of standards — a single set — can produce an environment in which many vendors can produce the multifaceted software necessary to conquer an industry such as publishing. In the case of Apple, these "standards" come with the operating system. In the case of UNIX, they'll have to come from the manufacturers. Since the manufacturers seem unwilling (not unable) to do that, we'll have to continue voting with our purchase orders.

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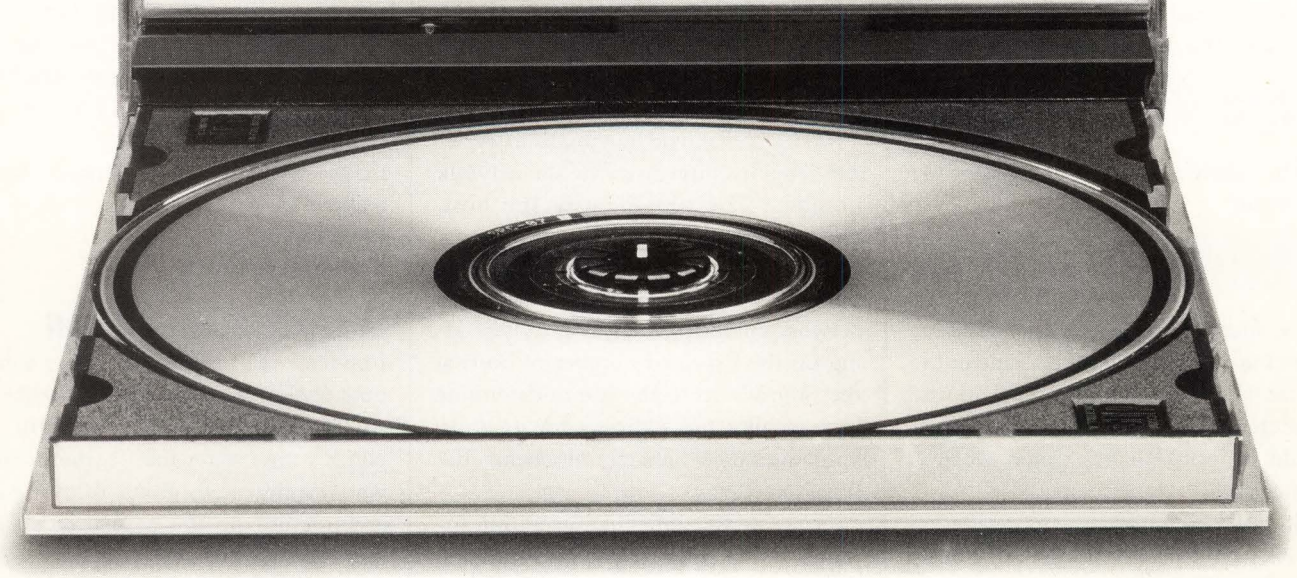

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CIRCLE 141 ON READER CARD

LETTERS

OUR U.S. MEMORIES

Right on Dave Mallery ("On The Demise Of U.S. Memories," March 1990)! Take me back to the '60s! These are definitely the issues of the '90s: our land, air, water, health and jobs. The question is, can and will we take to the streets as we did 20 years ago, with equal vigor?

Steve Sloan
Findlay, Ohio

GRAMMATICAL FINE-TUNING

In "EDT As Grammarian" by Chuck Laws (April 1990), the author describes how to use EDT to correct the grammar in documents produced on the VAX. While the article is technically correct, it fails to mention two important points.

First, the EDT substitute command doesn't search for words or phrases that span over two or more lines. Thus, the method described in the article may not be sufficient to remove or replace all occurrences of a specified target string. For example, suppose you want to replace all occurrences of the words *have a tendency to* with *tend to* in a document containing the following phrase:

```
... while it seems that programmers have a
tendency to ...
```

The article instructs you to enter the command:

```
"s/ have a tendency to / tend to / whole"
```

Because the phrase *have a tendency to* doesn't appear entirely on one line in the phrase above, it's left "as is" in the corrected document. A similar effect would be noted if a targeted word is hyphenated.

Second, not all documents created on the VAX can be edited using EDT. Documents produced using word processing packages usually aren't stored in a format that can be operated upon by standard VAX editors. And if you attempt to change these documents by editing them outside the word processor program, the entire document could be rendered unreadable or unusable.

Despite these oversights, the article presents an interesting new application for an old standard function.

Richard J. Chester
Rochester, New York

INTERNET IMPORTANCE

I have a few comments about "The Global Network" by Philip E. Bourne, Ph.D. (April 1990), regarding the information provided about the Internet and TCP/IP. First, the author's description of IP addresses is incorrect. There are three classes of IP addresses in use, broken down as follows:

Class A: first byte ranging from 0 to 127. The first byte is the network number. The rest identify the host. Allows 16 million hosts in the network.

Class B: first byte ranging from 128 to 191. The first two bytes are the network number. The rest identify the host. Allows 65,000 hosts in the network.

Class C: first byte ranging from 192 to 223. The first three bytes are the network number. The rest identify the host. Allows 256 hosts in the network.

The NIC administers the network numbers only. Once a site is assigned a network number (class A, B or C, depending on the expected number of hosts at the site), it's up to the site to determine how to allot the addresses for its hosts. Some sites use a hierarchical scheme, but it isn't necessary.

Second, the information about Internet host names neglects to mention the Domain Name System (DNS) that the Internet now uses to map host names to addresses. Internet hosts aren't supposed to use host tables anymore (though admittedly many still do). The DNS also stores other information, such as mail gateways for non-Internet-connected hosts, and is distributed in its administration, making for much better control of host names.

Finally, the article spends a considerable amount of space on BITNET and GMAIL, practically neglecting the Internet. With the advent of regional networks such as NYSERnet, NEARnet and BARRnet, all of which connect into ARPANET and NFSnet, it's becoming easier for commercial sites to connect directly to the Internet. Even BITNET sites will use these networks, using TCP as a transport for NJE (the BITNET II project). While I won't say that the Internet is more important than BITNET in terms of the "global network," the relatively small coverage it received makes it seem less important than it really is.

Matthew Madison
Troy, New York

UPGRADE CLARIFICATION

I noticed two inaccuracies in the editor's note under "MicroVAX II To III/III+" in ARISTALK (April 1990, page 20). The editor's note states that "...the memory was rearchitected, going from a parity architecture on the MS630 to an ESC memory on the MS650." This should read "ECC memory."

It also states that "you don't have to

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trade in old memory for the new one." This should read "you have to trade in the CPU module and memory modules, whether DEC or third-party."

Our upgrade quote form containing the upgrade terms and conditions has always stated that the CPU module and memory modules must be returned. Each system upgrade is quoted separately due to operating system licensing, I/O option revision levels and associated revision control concerns. A free, no-obligation quote can be obtained by completing a quote request form from our Support Hotline at (800) 832-6277.

R. Thomas Lowery
MicroVAX 3/3+ Upgrade Marketing Manager
Digital Equipment Corporation
Merrimack, New Hampshire

Editor's note: The information on Digital's MicroVAX upgrade policies reported in ARISTALK, April 1990, was based on data supplied to DEC PROFESSIONAL *by Digital.*

SYMBOL SYNTAX

I found Kevin G. Barkes' "What To Do Before The Lights Go Out" (February 1990) to be a refreshingly informal method of enlightening people to the BATCH procedures available. I was recently refreshing my memory from the *User's Manual* (just before *DEC PROFESSIONAL* arrived) and came across the equivalent of the article's Figure 2 (page 127). In this case, however, the labels were before the definition of their respective symbols. I don't see a real difference between either method — is there one?

James Laferriere
Kent, Washington

Kevin G. Barkes: Mr. Laferriere is correct: The difference is mostly stylistic. I prefer defining the symbol before the label. Interestingly, no one pointed out that the required SET DEFAULT command wouldn't be executed during a restart. Such is programming in the field. Perhaps a "Dangers of Onsite Hacking" column is in order. ■

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CIRCLE 164 ON READER CARD

ARISTALK

VMS HELP LIBRARIES

QUERY:

Martin Stanell *(SIG 37/MESS 1290)*: According to VMS HELP, HELP will search the logical name tables for logical names of the form HLP$LIBRARY, HLP$LIBRARY_1, HLP$LIBRARY_2, and so on. This should happen if HELP/USERLIBRARY is specified (/USERLIBRARY is the default). My HELP doesn't search the alternate user libraries. It's possible to use HELP/LIBRARY=FILE.HLB, but there are several user libraries to which I'd like access every time HELP is invoked. I'm using VMS V5.1-1.

REPLY:

Comet *(SIG 37/MESS 1293)*: First, make sure you have a logical called HLP$LIBRARY. I'm fairly certain that you must have a contiguous chain of logical names:

```
HLP$LIBRARY
HLP$LIBRARY_1
HLP$LIBRARY_2
.
.
.
```

If you're missing HLP$LIBRARY, HELP won't search HLP$LIBRARY_1. And if you're missing HLP$LIBRARY_1, HELP won't search HLP$LIBRARY_2, and so on. Second, make sure you don't use a symbol HELP that equates to HELP/NOUSERLIB or something like that. Last, make sure you ask for help on a topic found not in HELPLIB.HLB but in your user library.

SET HOST/DTE IN BATCH

QUERY:

Christopher Boswell *(SIG 42/MESS 716)*: I attached a Hayes 2,400-baud modem to a DS500 terminal server port and have done what's necessary to access it from VMS using Set Host/DTE. Is there any way to access this modem in batch mode? I assume I must write a program, but where do I start?

REPLIES:

Robert G. Schaffrath *(SIG 42/MESS 717)*: You can access the modem in batch, but you won't be able to use Set Host/DTE. You'll need to write a program using $QIOs. Better yet, get a copy of VAXNET (now called UUCP, I believe). There are excellent modem control programs in that package.

Christopher Boswell *(SIG 42/MESS 722)*: Thanks for the response. I received another reply on DECUServe, and the suggestion was to use a program called HOST32. I downloaded it from CompuServe, but it appears to support only one transfer protocol, Quick B. Does anyone have experience with HOST32?

Richard B. Gilbert *(SIG 42/MESS 724)*: I'm quite familiar with HOST32, having written modifications to the original. Stu Fuller wrote the original.

HOST32 only does B protocol, but it's Classic B, not Quick B. Other protocols could be added, but because the program was intended to allow VAXs to communicate with CompuServe, there didn't seem to be much point.

Stu Fuller is working on the code again. He hasn't released any of the new source (V3.0 or V3.1), but he might be persuaded to do so. You can contact him on the VAX Forum on CompuServe.

UNCLOGGING PORTS

Scott Martin *(SIG 21/MESS 135)*: I talked to DEC Customer Support about a clogged port problem that has happened to us several times. There's a known bug in the YFDRIVER. The YFDRIVER software has the XOFF bit set without the terminal controller board (we have the DHV11) knowing about it, and it doesn't always get cleared. DEC has a patch for

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To log in, you'll need your subscription number from your mailing label. Set your terminal to seven data bits, one stop bit and space parity, or eight data bits, one stop bit and no parity. Set your terminal emulation to VT100 and dial:

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XMODEM and Kermit are available.

SIG Identification

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

21 ..... Controllers/Memory
37 ..... VMS
42 ..... Communications/File Transfer
44 ..... Graphics
45 ..... Programming Languages/AI

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the YFDRIVER through V5.2, but the support person didn't know if it was fixed in V5.3. There's a workaround to the problem without having to reboot:

```
$ SET TERM/READSYNC/PERM
    frozen_terminal_device:
$ SET TERM/NOREADSYNC/XON/PERM
    frozen_terminal_device:
```

Issue these commands from another terminal. This will restore the terminal port back to working order. You also can enter the frozen terminal's setup mode and set the terminal to Ignore Received XOFF and Clear Communication. This will allow terminal operation but won't fix the XOFF problem. Issue the above Set Terminal commands to correct the XOFF problem.

John Wilkerson *(SIG 21/MESS 136)*: I thought I was the only one to discover this. We have an in-house device with which a MicroVAX II (VMS V4.5) converses. Our fix was to set a timer on the I/O and, when it expired, send out an XON. This fixed most of the problems. However, we may have to provide a better fix for our customer. When I reviewed the YFDRIVER and the DHV11 docs, I concluded that the driver code assumes that setting a bit on the control interface will force an XON. However, there are overriding conditions in the hardware that might, under some conditions, prevent it from being sent.

FMS CALLS FROM DIBOL

QUERY:

Scott Coleman *(SIG 45/MESS 491)*: Does anyone have information on using FMS calls from DIBOL? We're attempting this, and although we don't receive any errors when compiling, we also don't receive any forms.

REPLY:

Melanie Stewart *(SIG 45/MESS 515)*: The newer version of DIBOL (V4.0 and greater) allows calls to FMS using the %REF function. In some cases constants are allowed, and in others they aren't, and you must use variables.

REGIS COMMANDS

QUERY:

Scot Shaw *(SIG 44/MESS 108)*: Having recently discovered ReGIS, the only documentation I have is that found in the *VT330 Programmer's Reference*. Where can I find documentation on how to use ReGIS commands in a program, specifically BASIC, or any other good information on ReGIS?

REPLIES:

Chuck Sydenstricker *(SIG 44/MESS 109)*: DEC has a product called RETOS (ReGIS To Sixel) graphics, which includes a RETOS manual.

Phil Gravel *(SIG 44/MESS 110)*: I've done programming in ReGIS. All I do is WRITE or TYPE the appropriate ReGIS commands from a FORTRAN program. Here are four strings from a program:

```
'<ESC>P0p'
'S(E),S(C1),P[100,440]'
'V(S),[+100,+0],[+0,-10],[+0,+10],(E)'
'<ESC>\'
```

The first line puts the terminal in the ReGIS mode. The second line puts the graphics position at X=100, Y=440. The origin in ReGIS is the top left corner of the screen. Positive X goes to the right and positive Y goes down. The third line draws a vector from the current position (100,440) 100 pixels to the right at the same vertical position, then draws another vector up (remember negative Y is up) 10 pixels and draws a vector back down 10 pixels. Finally, the fourth line exits the ReGIS mode.

To help you develop ReGIS applications, use the ReGIS Graphic Library (RGL). Available from DECUS (VAX365), it allows you to make high-level calls to the ReGIS primitives.

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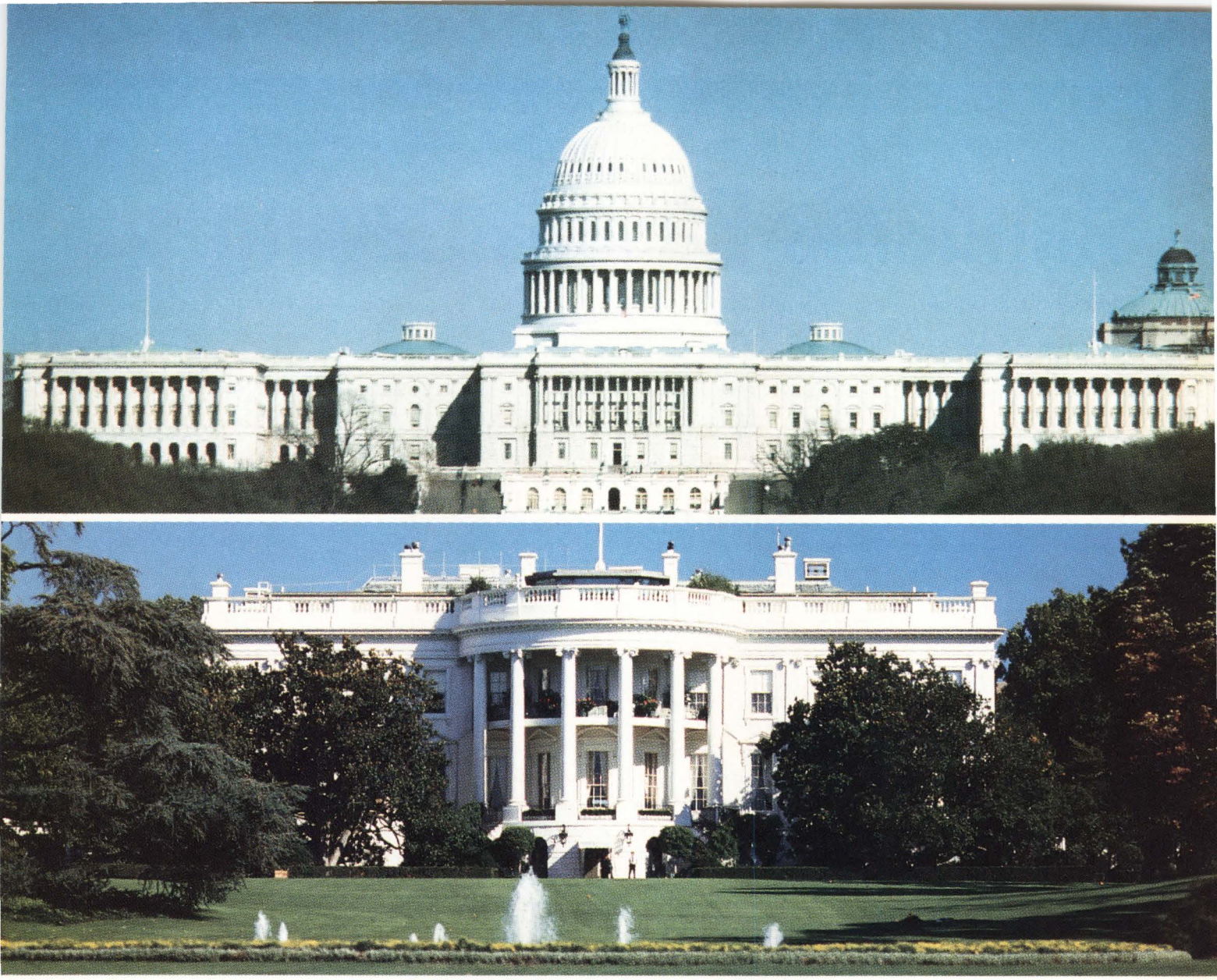

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Standards-Based Imaging

Evans & Sutherland Computer Taps Into 3-D Graphics Market With RISC-Based Workstations

The evolution of industry-wide, standards-based hardware platforms has led to the emergence of several standards-related graphics workstation products. One headache facing 3-D graphics workstation manufacturers, though, is creating a system that doesn't trade graphics speed or image quality for standards compliance. Evans & Sutherland Computer's solution to standards-based graphics lies in its latest release, the ESV series of RISC/UNIX-based, 20-mip 3-D workstations.

The ESV series provides an integration of standards and graphics performance once unavailable in the 3-D graphics workstation market. The ESV series supports the PEX standard (a 3-D graphics extension to the X Window System), PHIGS (a graphics subroutine library approved by ANSI and the ISO in 1988), X, Motif and UNIX. The series works best under PEX, providing full support of the PHIGS Graphics Library in an X environment. It also supports industry-standard networking protocols such as TCP/IP, Ethernet, NFS, and FDDI.

According to ESV Design Systems Division leader Gary Hodgman, ESV workstation hardware was specifically designed to support PEX. The "native mode" PEX implementation provides graphics speed and performance typical of proprietary graphics interface systems. Competitive products, says Hodgman, may not offer standards, and if they do, the PEX standard is layered over another graphics library, causing performance slowdowns.

"Previous to ESV," notes Hodgman, "you could expect to take a performance hit if running under graphics standards such as PHIGS and X. ESV was designed with PHIGS as its native graphics interface in an X environment with the goal of high performance under standards. The PHIGS transformation pipeline is implemented in ESV graphics hardware. Custom VLSI supports X to provide faster 3-D windows."

The company considers the ESV series to be in the midrange to high end of high-performance, 3-D workstations. The top-of-the-line ESV50 provides 1,000,000 depth-cued vectors per second and more than 100,000 four-sided, independent Gouraud-shaded polygons per second. The entry-level ESV5 boasts performance of 277,000 vectors per second and 19,000 polygons per second.

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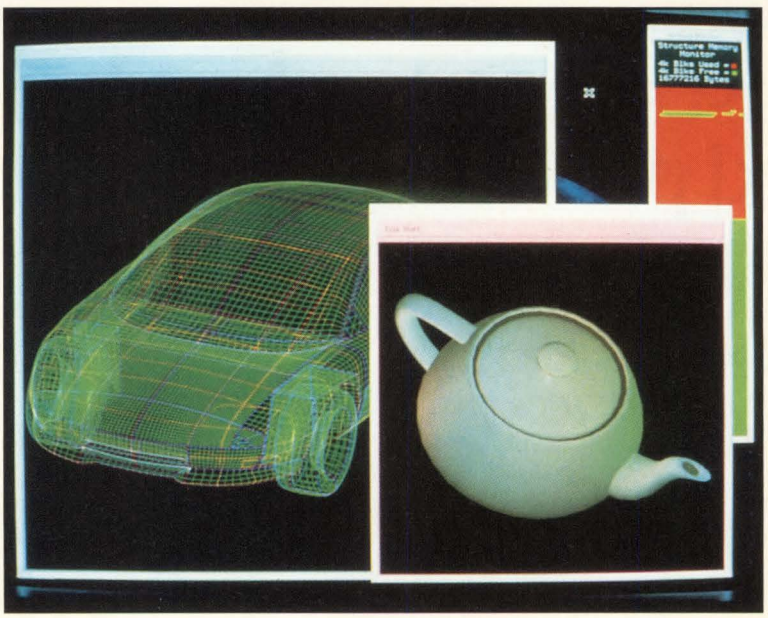
The ESV series includes five system configurations, all with CPU performance of 20 mips (RISC-based) running under UNIX System V with BSD extensions. Floating-point performance is 4 Mflops double-precision and 8 Mflops single-precision. The ESV CPU is based on Mips Computer Systems' R3000 processor.

Evans & Sutherland is targeting industries such as molecular modeling, mechanical computer-aided engineering (MCAE) and science/research/math (SRM) applications. The ESV series also supports more than 200 third-party software application packages that are binary-compatible with the Mips R3000 processor.

You can upgrade from entry-level to higher performance ESV workstations by adding circuit cards. The ESV series ranges in price from $49,000 to $85,000 and is currently available.



The ESV series of RISC/UNIX-based, 20-mip systems provides powerful graphics on a standards-based platform.

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ARSAP's unique, open architecture allows it to produce consistent management reports across VMS, Unix, Ultrix, and Intergraph platforms, even accepting data from non-VMS systems such as Convex and IBM. This remarkable flexibility allows ARSAP 7 to handle system accounting efficiently in virtually any environment.

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ARSAP	✓	✓	✓	✓	✓	✓	✓	✓	✓
PACS*				✓	✓				
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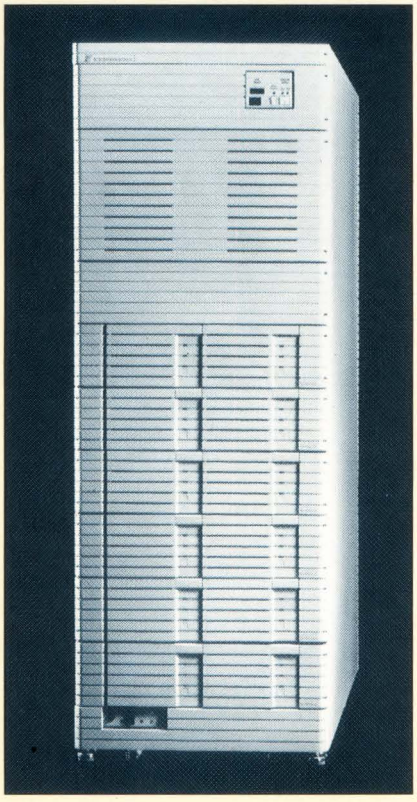
G E J A C I N C O R P O R A T E D

Strengthening Storage

System Industries Flexes Data Storage Muscle With Powerful Subsystem Releases

System Industries (SI) announced a storage subsystem based on an eight-inch disk drive that offers 1.748 GB of formatted capacity, as well as a family of tape subsystems based on two controllers for Q-bus and UNIBUS that let up to four CPUs share up to four tape devices. The company also announced data compression capability for its SI2480 tape subsystem, as well as two high-capacity VAXcluster-compatible subsystems based on 5 1/4-inch disk drives.



The SI817 C-Series storage subsystem features an eight-inch drive that provides 1.748 GB of formatted capacity.

SI is marketing its eight-inch data storage release, the SI817 C-Series, against DEC's recently announced 1.57-GB RA92 disk drive, providing nearly 200 MB more formatted capacity.

The SI817 eight-inch form factor provides subsystems with more than double the maximum per-footprint capacity of DEC's nine-inch RA92 — 27.9 GB for the SI817 versus 12 GB for the RA92. The SI817 connects directly to DEC's HSC40/50/70 controllers and to DEC's KDB50, QDA50 and UDA50 controllers.

The SI817 delivers a 13 ms average seek time and a 2.75-MBps transfer rate. It incorporates embedded drive interface circuitry, providing cable streamlining and allowing more drives to be placed in a cabinet. The only external cables are the SDI cables that link the DEC controller to the SI817 subsystem.

SI's tape subsystem releases, the QS1000 Q-bus controller and the US1000 UNIBUS controller, are quadwide boards that support VMS, ULTRIX, TMSCP tape protocol and TU drivers. They support attachment of the SI59 8mm and SI9625 nine-track tape drives.

The QS1000 and US1000 let you combine CPU types, operating systems and tape drives. Any combination of Q-bus- or UNIBUS-based CPUs running VMS or ULTRIX can be connected to any combination of supported tape drives.

The QS1000 and US1000 achieve clusterlike functionality by creating a tape device switching environment that's software-transparent. It appears to the CPU that four dedicated tape drives are available. QS1000 and US1000 configurations differ from DEC-style clustering in that different operating systems can be in use on the host CPUs, because shared system functionality is monitored at the controller level.

With its SI2480 tape subsystem, SI becomes the first 3480-compatible tape drive supplier in the DEC marketplace to provide data compression compatibility. Up to four SI2480 drives can be installed in a cabinet, providing unattended backup capacity of 16 GB per footprint. Each SI2480 cartridge holds 200 MB without data compression and roughly 400 MB with data compression.

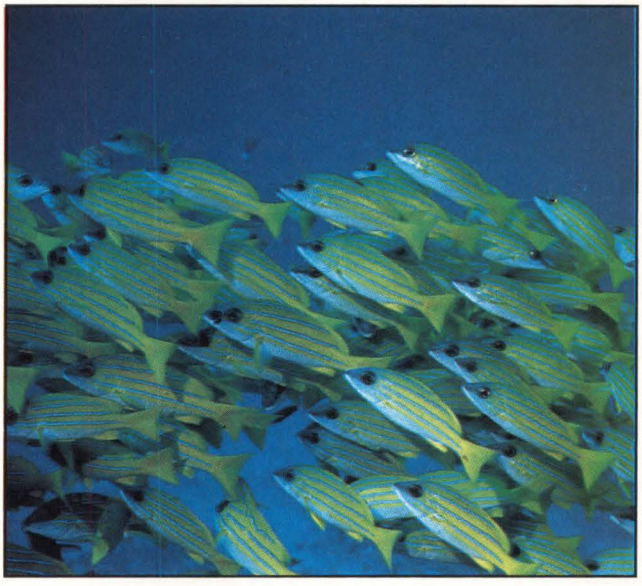
SI's SI512 and SI506 C-Series provide up to 22 GB per footprint and 1.1 GB and 557 MB of formatted capacity respectively per drive. The SI512 includes two physical drives featuring 557 MB of formatted capacity each, though it appears to the DEC controller as a single unit with 1.1 GB of formatted capacity. Up to 20 SI512s or 20 SI506s can be installed in a single cabinet for a maximum capacity of 22 GB.

The SI817 costs from $25,875, including installation and a one-year warranty. The QS1000 and US1000 are offered with SI59 or SI9625 tape drives as part of integrated subsystems. Upgrades for current SI59 or SI9625 users are available. The SI59 costs from $7,500, while the SI9625 costs from $21,900. SI2480 subsystems with data compression cost $58,200 for a master unit and $39,800 each for up to three slave units, including a one-year warranty and installation. The SI512 and SI506 cost from $18,400 and $26,000 respectively, including a one-year warranty and installation.

FOR MORE INFORMATION

System Industries Inc.
560 Cottonwood Dr.
Milpitas, CA 95035
(408) 432-1212
Circle 448 on reader card

There are Two Schools of Thought When It Comes to Tape Management



SAVE TIME

- ✓ Automatic On-Line Tape Journal
- ✓ Journal Search by File Name or Saveset
- ✓ Full Reporting Capabilities (by tape creation date, expiration date, dataset name and/or scratch tape listing)
- ✓ Automated Tape Handling with Multiple Tape Pool Support
- ✓ Menu-Driven Interface

INSURE DATA INTEGRITY

- ✓ Cross References Every Tape Access to Protect ALL Tapes in the Library, Regardless of Origin
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Regardless of the size of your tape library, the integrity of your organization's information depends on how well you manage it. TAPECONTROL, *new* from RAXCO, combines both schools of thought, insuring your data integrity and saving you time. TAPECONTROL, an automated tape management system, monitors and manages the activity of magnetic tape storage in the VAX/VMS® environment.

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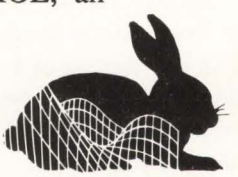


RAXCO
SOFTWARE INC.

CIRCLE 158 ON READER CARD

Database Tools

SQL Solutions Unveils SQL Productivity Tools For Multi-RDBMS Applications

As the RDBMS market moves toward enterprise-wide, networked applications, SQL Solutions has responded with tools that provide the productivity gains and flexibility necessary to develop these applications. The company, which offers services and products for RDBMSs, announced three tools for the development and maintenance of multi-RDBMS applications:
1. Easy SQR, a query builder and report generator.
2. SQL Batch, a batch processor for major RDBMSs.
3. Performance Accelerator, a software optimizer for Oracle SQL*Forms applications.

Easy SQR is designed for users and SQL developers. It provides flexibility in building queries and generating reports in the development and implementation phases and in production mode. It lets nontechnical users create formatted reports without writing SQL code. It features a window-driven interface and can produce graphics-quality business reports. A full-screen editor lets you refine report layout on-screen.

Easy SQR can be used by SQL developers as an application prototyping tool. With a Build SQR option, it generates modifiable SQR code, allowing you to enhance template Easy SQR reports. Reports can be rerun and modified whenever necessary.

SQL Batch is designed to let you perform multiple tasks with your terminal and RDBMS, particularly during the testing and performance-tuning stages. With SQL Batch, you submit any RDBMS procedure to a VAX/VMS batch processor, leaving the terminal free for work that can only be done interactively.

SQL Batch lets system managers balance the load on a CPU by deferring reports and other time-intensive tasks to off-peak hours. It follows DCL command line standards to minimize learning time.

Performance Accelerator is designed for system administrators and developers. It solves two Oracle SQL*Forms performance problems: increased CPU use through poor memory management and costly database interaction through use of the Oracle DUAL table.

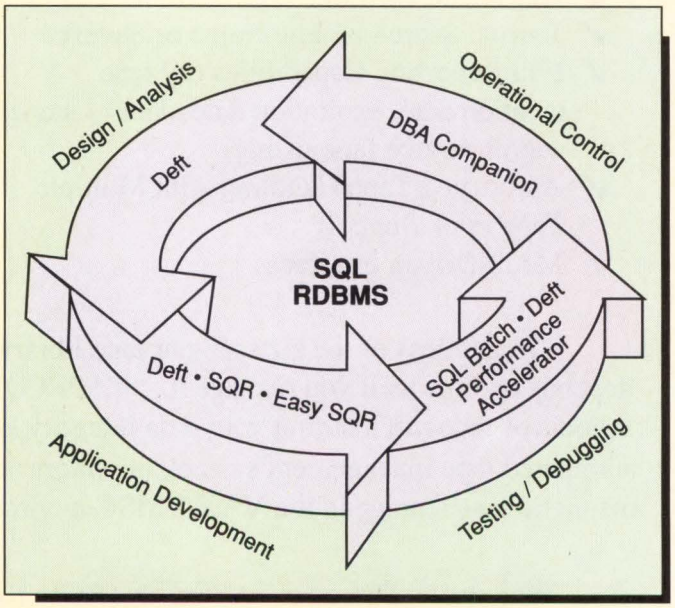
Performance Accelerator advances an enhanced memory management model by caching open cursors (memory used to parse SQL statements) and leaving them open via a least-recently used algorithm. This improves response time up to 50 percent for application users by reducing CPU use, allowing more users to access the system and increasing throughput. The product also eliminates the need for calls to the Oracle DUAL table used to perform application programming in SQL*Forms.

Easy SQR runs on DOS, OS/2, UNIX and VMS. Prices range from $495 to $40,000, depending on CPU and number of users. SQL Batch runs on VMS platforms with major RDBMSs. Prices range from $750 to $30,000, depending on CPU. Performance Accelerator runs on major computing platforms with Oracle. Prices range from $495 to $30,000, depending on CPU and hardware platform.

SQL Solutions also announced SQL Advantage, which facilitates writing and debugging of SQL code; SA Companion, an operational control environment for Sybase client/server networks; and SQR V2.O. SQR is a procedural 4GL and report writer for SQL developers and programmers. New features include a full callable library, enriched preprocessor support, enhanced debugging facilities, dynamic query variables, complete variable scoping and new character and numeric functions. SQR V2.0 runs on DOS, OS/2, MVS, VM, UNIX and VMS platforms with all RDBMSs.

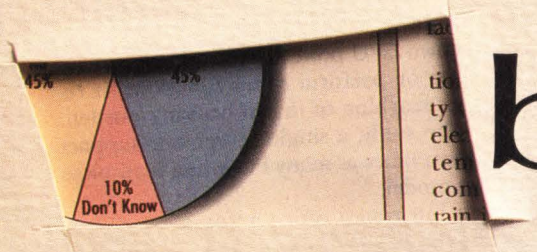
FOR MORE INFORMATION

SQL Solutions Inc.
8 New England Executive Park
Burlington, MA 01803
(617) 270-4150
Circle 400 on reader card



SQL Solutions' new SQL productivity tools join its existing lineup to address the entire SQL application lifecycle.

There are shortcuts to backup.



no tape

Cut the tape management headaches out of your VAX backup, with Interlink Computer Sciences' DATAstore 1000,™ the product that backs up *all* of your VAXes directly to your IBM/370.

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Fault-Tolerant Mainframe

Stratus Goes Online In A Big Way With 13 New Computers

A growing number of naysayers in the computer industry predict the demise of the mainframe. But no one among the gloom-and-doom crowd has convinced IBM, DEC or, for that matter, Stratus Computer, whose recent release of 13 computer products extends its hardware-based fault-tolerant technology to the mainframe class.

According to Stratus Product Manager Jeff Spotts, the online business application marketplace is growing at a rapid pace. "Our mainframe philosophy focuses on online computing. This product release confirms this philosophy while stressing our commitment to standards and our broad capability up and down the product line," he says.

Stratus strengthens its arsenal with four mainframe-class, seven high-end and two midrange XA2000 systems. All are compatible with previous generations of XA2000 systems, providing around-the-clock system uptime, symmetric multiprocessing, industry-standard communications and online databases.

The midrange and high-end systems support FTX (Stratus' UNIX System V-compatible operating system), the Pick Open Architecture V2.0 operating environment, and VOS (Stratus' proprietary operating system). The mainframes support VOS.

The mainframes are the XA2000 Models 2260, 2460, 2660 and 2860. These machines can handle huge critical online processing applications at a fraction of the cost of traditional mainframes, says company President William E. Foster. They feature transparent fault tolerance, advanced online maintenance, industry-standard databases and an open and flexible network architecture.

Stratus Computer's mainframe-class XA2000 Model 2860 includes 3,576 communications lines to support online users and network interfaces.

The Stratus mainframes are billed as competitively priced alternatives to the VAX 9000 and IBM 3090. The crucial difference between the Stratus mainframes and the VAX 9000 lies in the fault-tolerant architecture, says Stratus spokesperson Denise Ferbas. "When configured for high-availability clustered mainframes, the XA2000 class is competitive with the VAX 9000. The customer needs to be ensured of system reliability, which is what fault tolerance is all about. To achieve true VAX fault tolerance, the customer must purchase additional tools such as dual-host or clustered configurations," she explains.

The Model 2860 includes 48 duplexed processors, 1 GB of duplexed main memory, 249.6 GB of duplexed disk storage (499.2 GB total disk storage) and 3,576 communications lines to support online users and network interfaces. The Model 2660 includes 36 duplexed processors; the Model 2460 includes 24 duplexed processors; and the Model 2260 includes 12 duplexed processors.

The high-end computers are the XA2000 Models 200, 210, 220, 230, 240, 250 and 260. They provide up to 2.4 times the performance of the earlier Models 110 through 160. They provide the same hardware-based fault tolerance, support for online processor upgrades, and symmetric multiprocessing as the previous systems.

The midrange models, geared for distributed critical online applications, are the XA2000 Continuous Processing Systems 75 and 80. Both fault-tolerant models are targeted for use throughout corporate networks, as is the XA2000 Model 30, but can handle greater workloads.

The mainframes cost from $2,350,000 for the Model 2260 to $9,100,000 for the Model 2860. The high-end systems are currently available on VOS or Pick and cost from $125,000 for the Model 200 to $1,070,000 for the Model 260. The midrange models cost $94,000 for the Model 75 and $194,000 for the Model 80.

FOR MORE INFORMATION

Stratus Computer Inc.
55 Fairbanks Blvd.
Marlboro, MA 01752
(508) 460-2000
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CIRCLE 170 ON READER CARD

Managing Disk Resources

*W. Quinn Associates' Q*file V1.5 Includes Full DECnet Support*

W. Quinn Associates has released version 1.5 of its tree-driven VMS command shell, Q*file. Q*file is designed to act as a fast, powerful, but simple user interface to VAXs running VMS. Q*file is aimed at professional systems personnel and novice users. 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.

Version 1.5 includes full DECnet support, greater user flexibility, user window customization, a user-oriented Soft Delete command and more extensive online help. A major new feature is VMS Command Substitution (VCS). The VCS feature integrates the Q*file and VAX DCL environments.

VCS works with Q*file's selection facilities. You first select the desired files by means of Q*file's directory tree and 46 interactive selection criteria. The selected files are displayed in Q*file's right-hand or Files Window. You then invoke Q*file's VMS command by pressing V or pointing at the VMS command in the menu window. A window is opened within Q*file that prompts you for a DCL command by displaying a $ prompt.

At this point, any valid DCL command can be entered. A special character (#) tells Q*file that VCS is desired. Q*file executes the DCL command by substituting the highlighted filename or group of marked filenames in place of the # character. If desired, VCS can create and save a command procedure containing the generated DCL commands for future use. This automatic DCL command procedure generator lets you quickly create large numbers of complex command procedures.

Version 1.5 includes many new features. The Soft Delete command option allows all deleted files to be moved to a special scratch directory associated with each login. The purpose is to let you easily recover files that have been accidentally deleted. The special Soft Delete directory works with the Whoops command that has been added to the Files commands. Whoops lets you automatically restore the last file deleted in the current session or select multiple files from a list of all deleted files.

The GOTO command positions the cursor at a particular file or directory. GOTO performs a pattern search for directories or files based on user input of some portion of the directory or filename. Only the first character of the filename need be used. For example, if D is entered, Q*file positions you on the first directory that starts with D. The search can be continued for the next occurrence with a keystroke. The GOTO command also can be used in the Files Window. This allows rapid search of large directory trees or file lists.

The Modify Windows command permits user customization of the Q*file Window environment. It lets you interactively select the data elements that will be displayed for each file in the File Window. There are 13 selections for each column. Also, the size of the Inspect Window, which shows the contents of each file as it's scrolled, can be changed interactively based on user command.

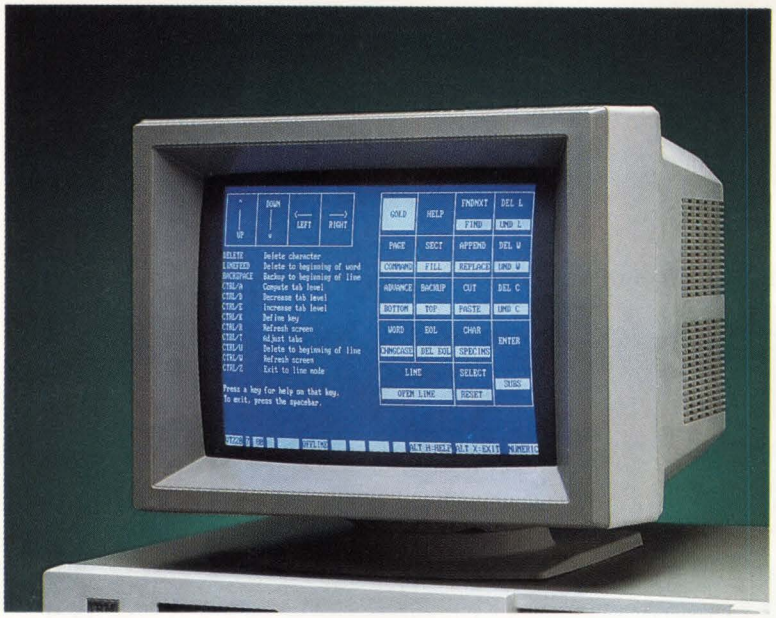
Q*file is written in a combination of Pascal and MACRO. DEC's SMG screen management utility is used for displays. The load image is about 900 blocks.

Licenses are on a CPU basis with discounts for second standalone or clustered CPUs. Prices range from $795 for a VAXstation to $7,995 for a VAX 9000. The DECnet feature requires that a separate Q*file DECnet module be installed on each DECnet node to be accessed. The license fee for the Q*file DECnet module is 30 percent of the standard Q*file license for the CPU(s).

The # character in the backup command string causes the backup operation to be performed on the file BACKUP.LOG or all of the marked (*) files.

FOR MORE INFORMATION

W. Quinn Associates Inc.
12030 Sunrise Valley Dr. #300
Reston, VA 22091
(703) 476-2255
Circle 406 on reader card



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CIRCLE 120 FOR INFORMATION ON VT320 EMULATION. CIRCLE 349 FOR INFORMATION ON 4105 EMULATION.

Color It X

Tektronix Puts Its Best Foot Forward With The TekXpress Family Of Color X Terminals

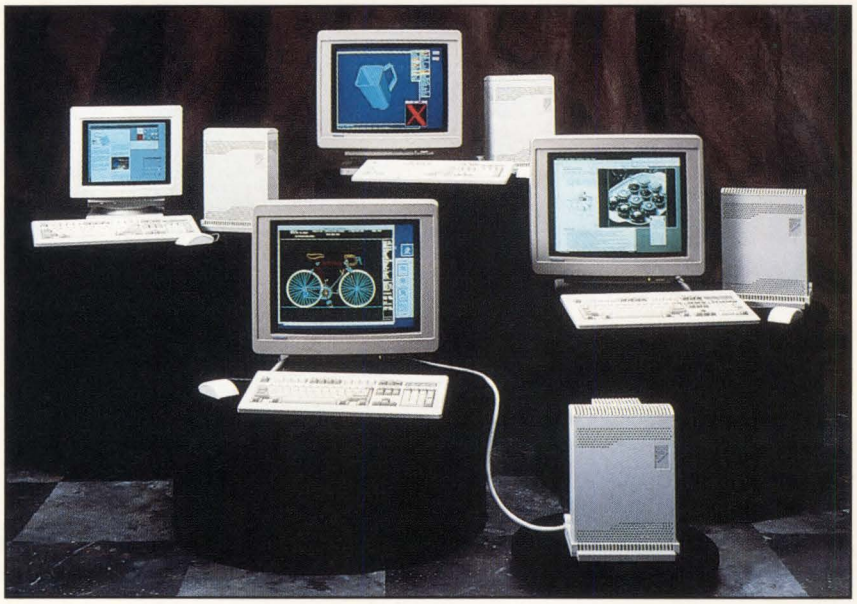
As the X standard gains prominence, vendors are pushing to get their terminal footprints in the door of the X marketplace. Tektronix has taken another step in that direction. Its Interactive Technologies Division recently announced TekXpress, a family of second-generation grayscale and color X terminals.

The XP25, XP27 and XP29 feature the TekColor Color Management System (CMS), a method of color selection, editing and screen-to-printer color matching. In addition to simplifying color selection and making its use more intuitive, TekColor CMS provides a match of screen colors to printers and other peripherals.

TekColor CMS is based on the company's TekHVC (hue, value, chroma) color model. The TekHVC model was developed by Tek Labs and is being evaluated by the MIT X Consortium as an extension to the X standard.

The TekXpress family also includes the XP23, a grayscale model that features 16 shades of gray.

In the TekXpress family, the vertical logic model, or central component, is designed for placement on a floor, desk or shelf. It incorporates video, keyboard and mouse connections in the company's ErgoCable, a single cable connection. The module is convection-cooled.



Tektronix's TekXpress color X terminals feature the TekColor Color Management System for matching screen and print color.

In networking, the TekXpress family supports an environment of software standards, including TFTP, NFS, Ethernet with TCP/IP, and DECnet. Along with the X.11 Release 4 server, these standards give TekXpress users improved font downloading, efficient memory consumption, optimized speed, XDCMP support and access to various input extensions. The server can be downloaded across the network or optionally loaded from ROM. TekXpress terminals feature a Motiflike menu-driven user interface.

The TekXpress family features parallel processing based on the Motorola 68030 and the Texas Instruments 34020. The terminals boast 3 MB of memory expandable to 13 MB, thick and thin Ethernet with TCP/IP, an IBM 101-key keyboard and a three-button mouse. Options include DECnet, an A-size tablet and a VT200 keyboard. DEC's new LK401 keyboard will be available for the next generation of TekXpress.

The grayscale XP23 features a 19-inch screen with a resolution of 1,280 x 1,024. The XP25 features a 14-inch screen with a resolution of 1,152 x 900. The XP27 features a 19-inch screen with a resolution of 1,152 x 900. The XP29 features a 19-inch screen with a resolution of 1,280 x 1,024. The XP25, XP27 and XP29 provide 256 displayable colors from a palette of 16.7 million.

The terminals are designed for such applications as process control, mapping, data analysis, transaction processing, CASE and CAE. The XP23 costs $3,495; the XP25 costs $3,995; the XP27 costs $4,995; and the XP29 costs $5,995. All come with a three-year warranty.

FOR MORE INFORMATION

Tektronix Inc.
Interactive Technologies Div.
P.O. Box 1000, MS: 60-380
Wilsonville, OR 97070
(503) 685-2927
Circle 449 on reader card

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IT'S A NATURAL HUMAN TENDENCY TO speak and write in images. To explain difficult topics, we "draw" analogies in conversation. To explain complex relationships, we grab the nearest napkin and sketch boxes connected by arrows. We need to understand visually not only observable events and relationships but also those that are unseen or hard to see. When we visualize small objects such as cells under a microscope or large objects such as the earth through a satellite image, we gain enormous amounts of useful information.

Experts in visual understanding are marrying their knowledge with ever-increasing computer power, making graphics one of the fastest-growing computer technologies. Growth in graphics workstations will shoot along at 40 to 50 percent per year for the next five years, say experts such as Chuck Barney of WorkGroup Technologies, a Hampton, New Hampshire-based computer industry analyst, and Lew Platt, executive vice president of Hewlett-Packard's Computer Products Sector.

Graphics and visualization technology is increasing rapidly in sophistication while becoming more affordable, allowing engineers, scientists and financiers to understand and manipulate complex cause-and-effect relationships on their computer screens. Whether or not you develop graphics technology, you'll be affected by it as the technology becomes pervasive.

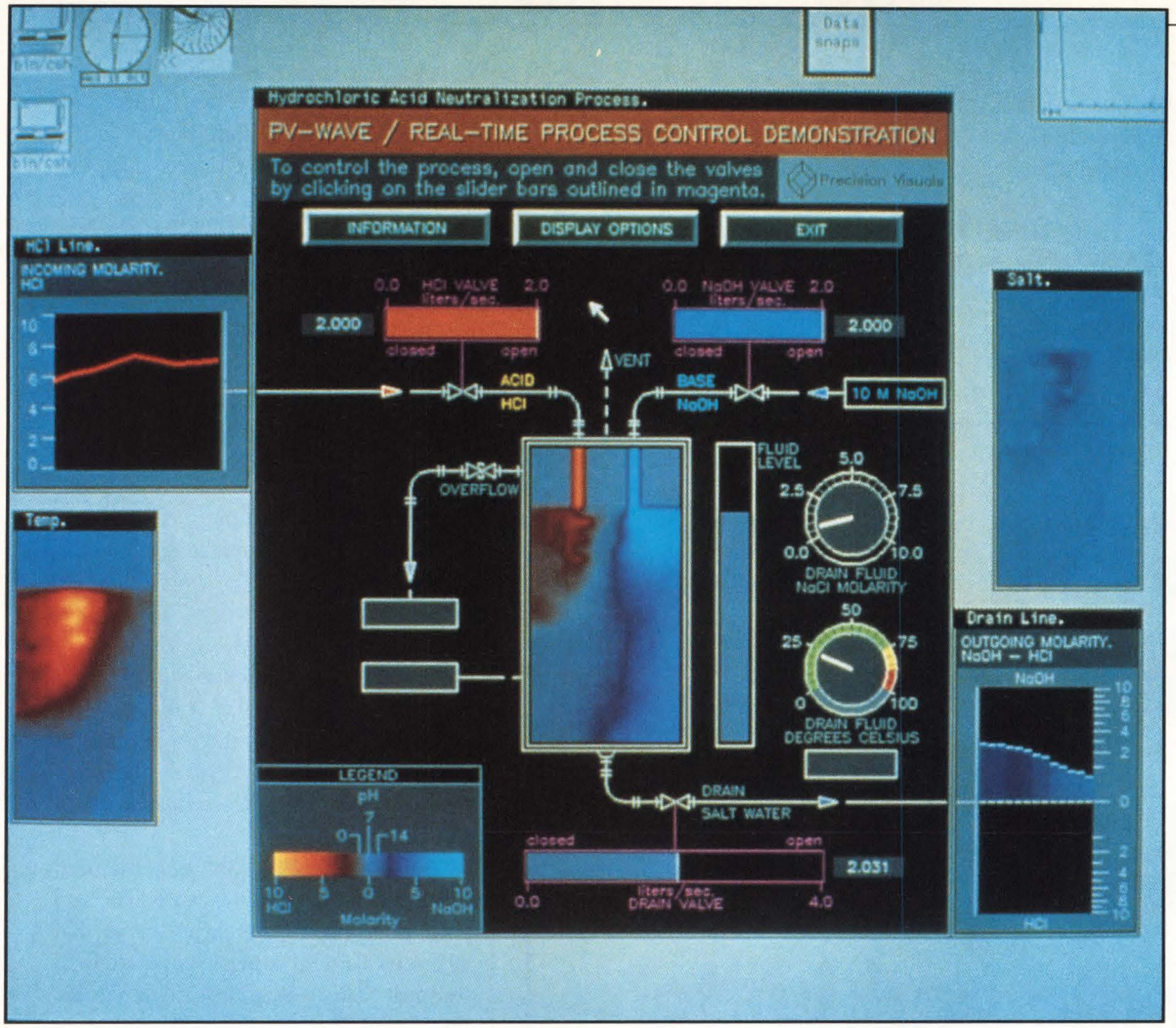
Broad Horizons

At least six factors have made it possible for sophisticated visual technologies to enter many practical fields of human endeavor:

- Affordability.
- Ease of use.
- High-speed bus architectures.
- High-speed networks.
- Graphics standards.
- Interactivity.

Affordability — According to HP's Platt, what's considered high end in the graphics workstation market today will be the midrange in two years and the low end in four, because demand and competition will push innovation. Like other computer products, graphics and hardware price/performance move exponentially in the buyer's favor.

Ease Of Use — As the user base grows, ease of use becomes critical. For instance, SCO Inc.'s Graf Systems allows users to create contours; histograms; maps and map data overlays; 3-D surfaces and solids; X,Y graphs; and 3-D graphs. Currently, says Technical Support Engineer Jerry Ackerman, users must write code to make SCO Inc.'s package



An external process used to neutralize acid outflow is monitored and controlled using Precision Visuals' PV-Wave interactive data analysis and display system. Input and output pH levels and flow rates can be controlled by interaction with the display. Other critical parameters of the process can be monitored in additional windows.

meet their needs. Although SCO Inc. provides specific examples that ease the programming burden for nonprogrammers, users are demanding that the need to program disappear. In five years or less, Ackerman says, Graf Systems and other packages will let users with very little experience create graphs.

This usually requires that the developer work in a high-level language such as C or C++, avoiding the FORTRAN still employed at SCO Inc. Although tuning applications for people who know only how to point and click makes the software easier for users, and therefore marketable to a much larger audience, high-level languages add overhead to graphics software, which is already compute-intensive. Currently, an image can contain 50 to 60 MB of data — an unwieldy file size. In the future, as more capabilities are available and graphics subsystems replete with multiple processors become more powerful, file sizes will grow to even greater proportions.

High-Speed Bus Architectures — Computing today is less and less a standalone enterprise, and this is especially true when it comes to data visualization, which often asks that teams of people analyze masses of data. But sharing graphics files is difficult. I/O bus architectures and networks are often stretched beyond their capacities to handle large file sizes, which slows graphics processing, manipulation and transfer. And the lack of standards has meant that transferring files from one device or package to another is a nightmare. Additionally, users demand interactivity — processing at so-called real-time speeds.

It's no easy task to output files to a printer, video capture device or other peripheral, says Terri Douglas, a spokes-

person at Precision Visuals. She notes that the lack of standards for input and output means getting data in and producing useful images that you can take away from the computer screen is a significant problem.

Luckily, all this is changing. A variety of network and I/O solutions are evolving that serve the needs of graphics creation. The IEEE Computer Society is working on Futurebus+, a set of standard specifications for a scalable I/O bus architecture that will address from 32 to 256 bits at a time. A 128-bit implementation should perform Direct Memory Access (DMA) transfers at 1.7 GBps, effectively eliminating the I/O bottleneck for graphics users.

Further, Digital recently announced TURBOchannel, which is said to be machine-independent but is shipping with the RISC-based DECstation 5000 Model 200. A proprietary I/O bus, this is a synchronous 32-bit implementation with what Workgroup Technologies' Barney calls "a theoretical data transfer rate of 100 MBps." He says Digital claims that real software applications have been tested at 93 MBps, or "all the performance they're going to get out of TURBOchannel." In addition to VME, Digital announced support of Futurebus+, but TURBOchannel is useful in the meantime.

Graphics Link

High-Speed Networks — In network bandwidth, the graphics world is looking intently toward the evolution of Integrated Services Digital Network (ISDN) and Fiber Distributed Data Interface (FDDI).

AT&T defines ISDN as a planned hierarchy of digital transmission and switching systems, synchronized so that all digital elements operate compatibly to transmit voice, data and video signals. ISDN will become more important in the future in part because sophisticated graphics will become the basis of evolving multimedia communications involving video and voice as well as static and animated graphics and text.

FDDI, a network protocol that relies on pulses of light to send data across fiber optic cables, is in the final stages of adoption by the American National Standards Institute (ANSI). It's intended to provide data communication at 100 to 200 million bps.

Graphics Standards — Is it wise to count on committee-created standards for graphics file transfer and manipulation? In this case the answer is yes. According to Barney, "Graphics standards seem to be well-accepted. There isn't much controversy about them any more." This is at least true in the hardware arena, in which vendors are concentrating on supporting the 2-D Graphical Kernel Standard (GKS); Programmer's Hierarchical Interactive

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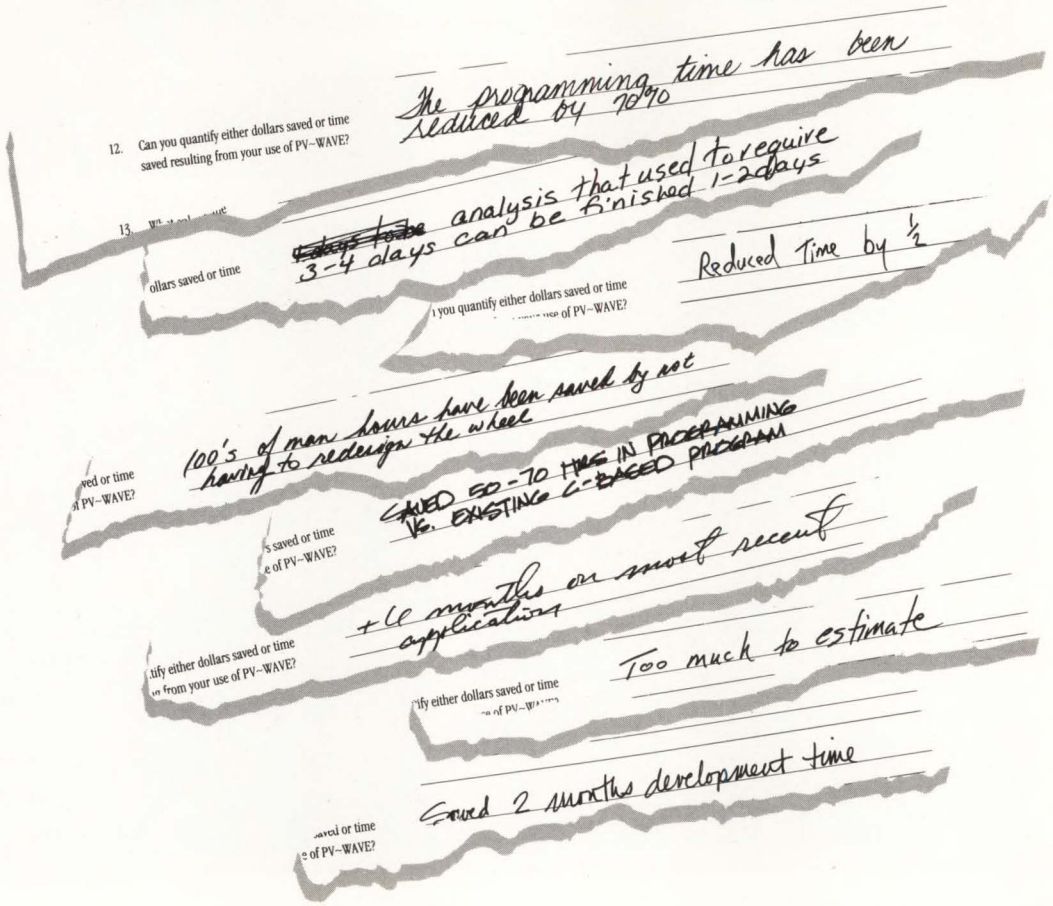

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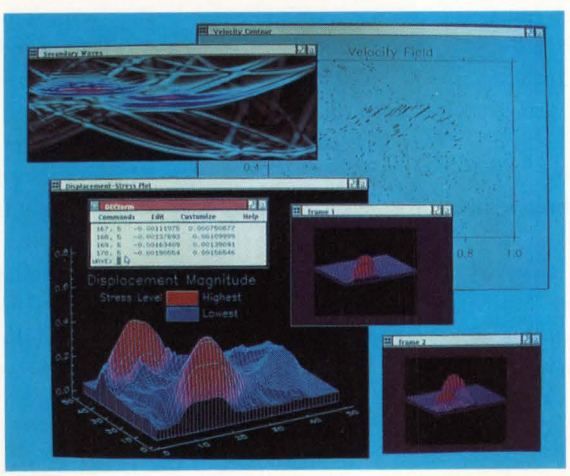

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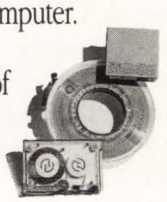

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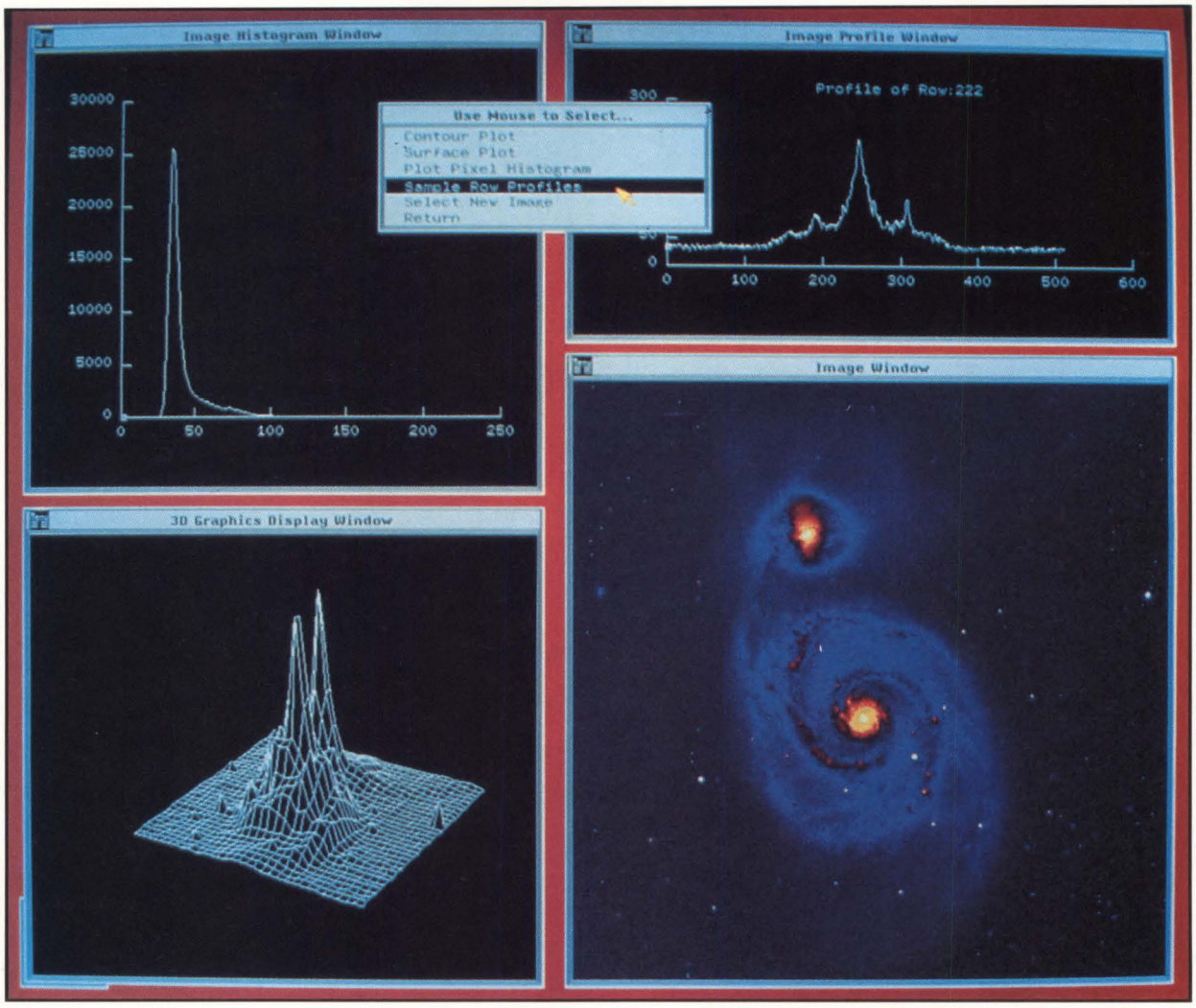

A 512- x 512-byte image of the M51 galaxy created with PV-Wave.

Graphics Standard (PHIGS), a 3-D drawing standard; and PHIGS On X (PEX), which marries PHIGS with MIT's X Window System.

Additionally, GKS 3-D is supported by many hardware vendors, including Digital, although SCO Inc.'s Ackerman says it's more popular in Europe than in the U.S., where PHIGS is widely used. And many vendors support Computer Graphics Metafile (CGM), a device-independent standard for capturing, storing and transporting multiple 2-D picture definitions (static graphics). No device directly interprets CGM, but because it's a standard, most have some way to convert CGM to their machine-specific format.

Digital also has pioneered "standards" of its own: namely, Digital Document Interchange Format (DDIF) and Image Interchange Format (IIF). DDIF converts graphics files for transfer to output devices and Digital machines other than the one on which the graphics originated. IIF does the same, but specifically with images. DDIF and IIF files can be converted into formats needed for specific applications, such as PostScript protocols for Adobe PostScript printers. These formats are Digital-only. You'll need X to transfer files or work with graphics applications across a multivendor network.

One area of controversy involves working at the machine level. Some software vendors claim that they can meet users' requirements for speed, interactivity and flexibility faster by working at the machine level rather than on top of these base software standards. Says Gary Stump, vice president of marketing for Wavefront Technologies: "It's faster for Wavefront to do graphics computation at the machine level. Hardware vendors don't like this — they want software vendors to go to PHIGS, PEX and X." There's a balance to be found between speed and portability.

Interactivity — In recent years, graphics software developers have worked furiously to meet users' demands for interactivity. If you want to do what-if design, process control or financial trading on your workstation, slow screen redraw rates hurt productivity and, in the case of financial applications or process

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Background color is an unretouched photograph of an image produced by the VCT-Q.

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control, accuracy. Interactivity is crucial whether input is data, as in image processing applications, or "imagined," as in CAD drawings. It's particularly critical in real-time applications.

Notes Chris Wilson, vice president of marketing for SL Corporation, "One man's real-time is another man's slow-motion." The screen changes as a stock feeder ticks numbers into a trader's workstation, for example, but those ticks are quite a bit slower than the milliseconds in which a process control engineer must measure time. Yet the trader and the engineer both consider their processes real-time.

Whatever you call it — interactive graphics, dynamic graphics or real-time graphics — the technology is appearing in more offices, from airplane cockpits to Wall Street trading houses. For instance, one European automaker is developing a pilot using SL's dynamic GUI tools. Screens installed in the ceiling over an assembly line provide a bird's-eye view of the entire factory floor, says Wilson. In this view, all of the belts move, as do screen objects that represent car bodies, accurately reflecting their positions relative to the whole line. "If the line stops because of some problem," says Wilson, "so does the belt on the screen."

Common to all real-time graphics is an alert: a color that changes when a specified limit is exceeded, a bell that sounds or a window that pops up with an urgent warning. For instance, says Wilson, "If the problem on the auto line is with a welding machine, that part of the screen map blinks red." The benefit is that people react to a blinking red light more quickly than to information printed on a spreadsheet. Additionally, assembly lines often cover more ground than an operator can see at one time, sometimes because lines move from one building to another. Graphics allow users to observe the entire process.

Visual Literacy

Only recently has manufacturing benefited from high-tech help. At the opposite end of the spectrum are engineering applications in space and defense that have pioneered the use of graphics to save money and facilitate the understanding of extremely difficult concepts.

Says James Banister, president of Animated Technologies, "We're born visually literate — we aren't born lexically literate. Information visualization helps others form a mental image that matches yours, which is very important in high-tech fields."

Terry Hawkins, a research engineer with Lockheed Missiles and Space, uses Wavefront Technologies' Visualizer products. "There's a boom in engineering visualization," he reports. "We're taking something from design to completion, conveying and portraying complicated geometries and advanced dynamics to convey messages quickly."

Hawkins and others like him use real data to create graphic simulations, thus allowing them to manipulate a graphic prototype or "soft mockup" of a very expensive product, such as a satellite. Hawkins runs simulations on VAXs or Cray supercomputers to study altitudes and positions of spacecraft, using actual data to control the craft. Hawkins' team now is designing systems with CAD and graphics for computer-integrated manufacturing (CIM) environments rather than building prototypes, because, "The data is true enough that you can cut parts with an engineering milling machine."

> Interactivity is crucial whether input is data, as in image processing applications, or 'imagined,' as in CAD drawings.

The key to scientific visualization in any field, says Mike Wilson, Wavefront Technologies' marketing manager for scientific applications and scientific visualization, is that you can look at multiple elements of data — position, shape, color, time, texture and transparency — at one time. Numbers representing this data are difficult to understand.

Additionally, you can't animate numbers, although numbers that represent time, position, shape and even color may symbolize movement. Animation, which first surfaced in the motion picture industry, has been received with enthusiasm by engineers as it has moved into technical fields, because it's often helpful to animate images to understand results intuitively. For example, engineers use animation in tests of force, wind and pressure. Interactivity allows design

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engineers to change concepts on the screen until the product is equal to the real-world force that will be applied.

PHOTOREALISTIC, ANIMATED COMPUTER graphics are great for simulating and communicating. But not every problem has been solved. Says Wavefront's Mike Wilson of sophisticated graphics that simulate planetary evolution: "It takes too much CPU power, it's still done by graphics experts, the software is complex, requiring a week of training [at Wavefront Technologies] and a lot of practice, and the hardware is specialty hardware that doesn't fit easily into a scientific environment [due to expense]. Additionally, the graphics are used primarily for presentation, not analysis. Most of the science has been done by the time we get to video. And a lot of programming is required to do polygonal representation of nonpolygonal data."

In the future, says Wilson, many of these problems will be fixed. Graphics software will be used directly by the scientist or researcher, who won't be required to program; network compatibility will improve; and scientific data, which operates without standards now, will work with standard formats.

Finally, says Wilson, hardware will be "real world." What does that mean? Says Wavefront's Stump, "In one year, it will be tough to tell the difference between a PC and a workstation, and prices for software visualization will fall to under $10,000."

Further into the future, visualization will advance to the point at which, some say, we may have trouble knowing the difference between reality and graphics. As object-oriented programming and iconization of concepts become ubiquitous, we may be able to control machines with the turn of a dial or the touch of a button — onscreen. And in some laboratories, visualization has progressed to the point at which science fiction meets reality.

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GRAPHICS WORKSTATIONS

POWER BEHIND THE PALETTE

A look at the hardware that generates complex graphics models, graphics and imaging techniques, and scientific visualization in the future.

Philip E. Bourne, Ph.D.

I don't remember much from my senior year of high school. However, one lesson that has become ingrained in my memory was given by a particularly frightening chemistry teacher. His message was that scientific endeavor is a continuous process of observation, record-keeping, visualization, deduction and reporting.

In 1969, neither of us knew that I'd learn from that lesson or that I'd be using a computer to help in the visualization process. The computer I now use, according to John Poduska Sr., founder of Prime Computer, Apollo and Stellar, is as powerful as all of the computers on earth in 1969. It not only performs numeric calculations at a startling rate but also permits chemistry to be modeled at the molecular level in real-time.

Which computers can be used to generate these models? What gives these models a realistic 3-D appearance? How can you manipulate these models as if you were holding them?

Any terminal, workstation or PC that displays results can be a tool in the visualization process. However, we'll concentrate on hardware, such as machines from Silicon Graphics, Evans & Sutherland Computer (E&S), Stardent Computer, Intergraph and Tektronix, specifically designed for creating realistic images that subsequently can be manipulated. This hardware possesses special display and rendering capabilities. That is, it has a display processing unit (DPU), also called a graphics processor, and peripherals that assist in object manipulation, such as dials and button boxes.

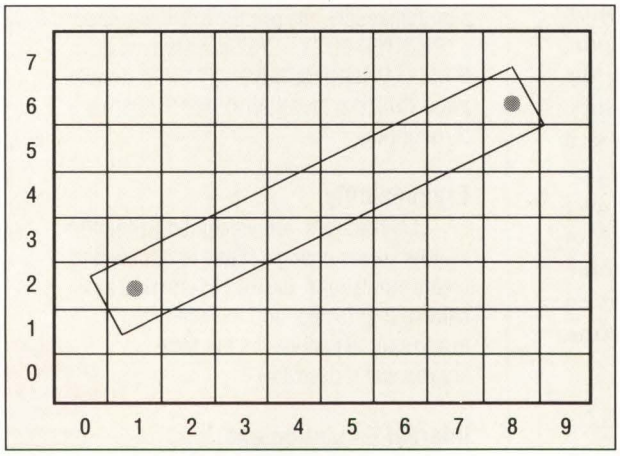


Figure 1: An example of antialiasing.

Vendors With Vision

In chemistry, molecular modeling and many other fields, the market is dominated by Silicon Graphics, which quickly embraced the RISC chip for its range of CPUs and developed highly sophisticated graphics hardware and software. This didn't go unnoticed by IBM. IBM licensed the technology for its own RISC workstation, the 6000 Series Model 730, which is capable of 3-D manipulation. On paper, the 730 has impressive performance, but it probably won't be available until the end of this year at the earliest.

Silicon Graphics offers a range of machines, from the 4D25, the so-called personal Iris, to the Power Series 380VGX, an eight-processor RISC machine exhibiting course-grained parallelism. In other words the compiler, either automatically or with the help of directives, distributes portions of the code across the various processors that share a common physical memory. Typical prices for Silicon Graphics' 3-D workstations range from $20,000 to $200,000. All are binary-compatible. However, applications developed on the single-

processor personal Iris, for example, should be recompiled to take advantage of the multiprocessor capability of the two- to eight-processor machines.

Silicon Graphics hasn't always dominated this market. In the late 1970s and early 1980s, Evans & Sutherland Computer had the largest market share with its PS series of graphics processors, which were attached to VAXs and other host computers for numeric processing while image-rendering was performed on the graphics processor. E&S wasn't quick to realize that the speed of the VAX and the Ethernet interface were limitations, and it subsequently lost much of its market share to Silicon Graphics.

E&S' problem was compounded by a failed attempt to market a minisupercomputer, the ES-1, which presumably would have offered a fast back end for a number of graphics terminals. It also was compounded by the VAXstation 8000, a joint development with Digital. The VAXstation 8000 was overpriced, underpowered and a poor seller. Reminiscent of Digital's forays into the PC market, the failure of the VAXstation 8000 carried over to the VAXstation 3540, a four-processor CMOS machine that uses the same chip found in the VAXstation 3200. Time will tell how the DECstation 5000 Model 200PXG Turbo will fare. E&S recently released the ESV series, a line of workstations that compete with Silicon Graphics at all levels.

Software Inertia

The problem any company faces in attracting real-time graphics customers is software inertia — the need to overcome a large reluctance to rewrite code for a different type of graphics processor. Programmers' Hierarchical Interactive Graphics Standard (PHIGS), PHIGS On X (PEX), a 3-D extension to the X subroutine libraries, and GKS 3-D are graphic standards. However, complex and efficient rendering of 3-D objects requires use of the vendor's proprietary software libraries. Hence, there are *no* real soft-

Courtesy Hewlett-Packard Company

Figure 2: This image of the Chartres Cathedral was created using HP's radiosity library on the HP9000 TurboSRX.

ware standards for 3-D rendering. Converting to a different graphics processor is a major undertaking.

For example, although most applications are written in a high-level language, notably FORTRAN and C, the display and manipulation of objects is controlled by a proprietary graphics library, for example Graphics Support Routines (GSR) and Graphics Library (GL) for E&S and Silicon Graphics, respectively. Converting from one graphics processor to another may require an in-depth understanding of the capabilities of both software libraries and perhaps a reformulation of the code.

Stardent Computer, the 3-D workstation vendor that resulted from the merger of Ardent Computer Systems and Stellar Computer, has recognized this problem and developed software tools to compensate. The Advanced Visualization System (AVS) has been licensed by several vendors, notably Convex Computer and Digital. AVS represents possibly the first attempt to rationalize 3-D graphics software development. AVS uses Dore, Stardent's proprietary graphics software; PHIGS; and PEX.

With these software tools and powerful hardware such as the Stardent 3020, a two-processor version of the 3000 that offers vector and parallel capabilities, Stardent is well-placed as a major vendor of superworkstations. The high cost of this type of machine is justifiable for certain applications. For example, neither manipulating a large molecular model nor the calculations resulting from the visualization study is feasible on small machines.

How well a solid object can be manipulated is reflected by how many Gouraud polygons can be shaded per second — a common benchmark for 3-D graphics processors. A biologist can't effectively visualize the type of event to which 3-D graphics are suited if the movement of the object at the touch of a dial, button or some other peripheral device isn't instantaneous. The application may not only require extended rendering capabilities but also impressive computational power. The airplane designer doesn't want to wait hours to calculate the air flow resulting from a change in the design of a wing.

Superworkstations address these needs with speeds approaching those of early-model supercomputers. Alternatives to superworkstations are minisupercomputers or array processors with attached graphics capability. Alliant Computer Systems (with the purchase of Raster Technologies) and Star Technologies are examples of companies that use this client-server approach.

The advantage of superworkstations and workstations that use minisupercomputers or array processors as back ends is that they may also be used as compute servers, serving other members of a group who don't require graphics capabilities but have CPU-intensive needs.

Another approach is to modify an existing workstation to support a specific type of 3-D graphics or imaging application. Ramtek's Millennium, a graphics processor that replaces the display proc-

Parallel Processing

Like ice cream, parallel processing comes in many flavors. But just as butter pecan isn't to everyone's taste, neither is one, or in some cases any, form of parallel processing suitable to a particular application. However, vendors of 3-D graphics workstations have recognized that their hardware usually supports a class of application that's parallelizable. Hence, parallelizable workstations continue to proliferate.

Stardent Computer's 3040 is a tightly coupled multiple-instruction multiple-data stream (MIMD) machine. Vector hardware handles the processing of multiple data elements by a single instruction, while from two to four processors execute multiple instructions in a synchronized fashion using shared memory.

Silicon Graphics' Power Series offers from two to eight processors, but without the vector processing capability. Digital also uses this type of architecture in the VAXstation 3520 and 3540, which use the symmetric multiprocessing (SMP) capabilities introduced with VMS V5.0.

More novel yet less commercially successful to date are systems using massive parallelism. Hypercube's Chemputer 701 is one such entry in this market. The system can be expanded to a maximum of 64 nodes, each node a 20-MHz Inmos Transputer.

Inmos was the first to design chips, complete with a 64-bit floating-point processor, for use specifically in building massively parallel architectures. Such systems are modular, and only current generations of software limit the number of processors employed.

Evans & Sutherland Computer's use of the DSP chip from AT&T is another example of a modular processor design. Interestingly, the company uses the chip in its graphics processor rather than the single-processor CPU, which is based on Mips Computer Systems' R3000 chip.

Just as 3-D workstation vendors have seen the advantages of parallelism, the makers of minisupercomputers have seen the advantages of visualizing the results of computations run on single-instruction multiple-data stream (SIMD) or MIMD architectures. Hence Alliant Computer Systems' acquisition of Raster Technologies and Digital's and Convex Computer's licensing of Stardent's AVS software technology.

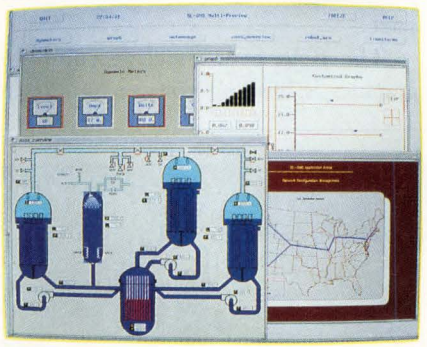
MasPar Computer, a newcomer using the massively parallel architecture, has plans to offer a graphical front end, but no products have been announced.

When it comes to compilers that support parallelization, top marks go to those that automate the process. Often the code is broken into threads of execution that occur simultaneously on a number of processors, with data taken from shared memory. Directives placed in the code give the application developer the level of control necessary to gain maximum performance. Automated parallelizing compilers of conventional computer languages such as Ada, C and FORTRAN work well for a small number of processors. Massive parallelism requires massive programming — not just a modification to existing codes, but a complete reorganization, possibly using a new programming language.

The performance of successive generations of serial processors is still on an upward curve. In the next few years, as this performance increase levels off, more attention will be given to massive parallelism. My four-year-old son may well be one of a new breed of programmers who for the first time will program as they think — in parallel. —*P.E.B.*

NOW

Beyond Widgets



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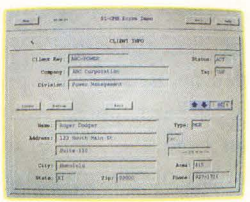
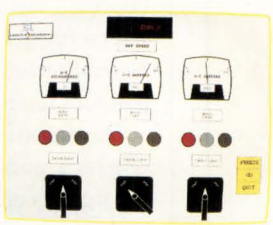
Standard widgets are not enough:

With the rise of graphics workstations has come a demand for tools that speed the development of graphics screens for applications. A bewildering array of tools has appeared to aid developers with X Windows and the primary GUI styles: MOTIF, Open Look and DECwindows. Many of these tools are WYSIWYG editors limited to the creation of standard widgets such as menus, scroll boxes, sliders and buttons. Standard widgets, however, are not enough for application visualization. Inevitably, the need arises for custom screen objects (graphs, maps, icons and other pictures) which are beyond such tools, and which are too time-consuming to create with Xlib. Developers also need a way to visualize changing data in real time.



A complete graphics tool must provide:

A Powerful Drawing Tool – The ability to create custom screen objects. Not limited to canned graph types, this flexible tool with many CAD features and an interface like familiar PC drawing tools allows you to draw whatever you need, attach dynamic behaviors and test those behaviors–all within the drawing tool.



Dynamics – The ability of screen objects to instantly reflect changes in data values, receive user input or execute callback functions. Over forty attributes such as color or text changes, visibility on/off, percent fill, line width, rotation, movement, scaling, font style or size, zooms and window creation can be triggered by changes in data values or user input.

Complete Xt Widget Integration – SL-GMS graphics can fully incorporate Xt widgets. Screen objects created with SL-GMS fully interact with MOTIF, Open Look, DECwindows or other toolkit widgets, whether in the same or different windows.

GISMOs™ – Graphical Interactive Screen Management Objects are called GISMOs to distinguish them from Xt widgets. Fully interactive with Xt widgets, GISMOs can become "superwidgets", capable of complex and compound behavior beyond Xt widgets. GISMOs can take any appearance you wish and trigger any user-defined function or external program. Created with the drawing tool, GISMOs provide developers with tremendous design flexibility.

HyperCard-like Screen Management – After screens have been created, the user must be able to button from any screen to any other screen in the application. With the Screen Management System (SMS) included in SL-GMS, the developer can give the user this ability without writing a line of code. SMS is HyperCard-like but with full dynamics: SMS can bring up new screens with data sources attached and dynamics up and running.

Data Source Management – The ability to connect screen objects to data sources such as files, databases, expert systems and real-time feeds. With the Data Source Manager of SL-GMS, these connections are easily made.

Runtime Editors and Configurators – The ability of the enduser to customize or reconfigure screens to match the current environment.

Cross-Platform Portability – The ability to develop screens on any major workstation and run them on any other through simple ASCII file transfer. SL-GMS also supports PixWin, Iris GL, GKS and other non-X graphics environments. Versions such as Iris GL take advantage of special accelerator hardware and double buffering capability.

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essing portion of a workstation with a sophisticated graphics engine, is an example of this approach. The workstation becomes an X server to the Millennium.

What You See Is What You Get

While WYSIWYG is a desirable feature for word processing, it's essential for visualization. An architect "walking through" a simulation of a building will only see flaws in the design if the simulation is a true representation of what the building would look like if it were constructed. "Get real!" should be the motto of any programmer writing visualization software.

The field of interactive computer graphics is bustling with techniques to achieve this level of realization. We'll look at some techniques, but first let's explore the basic principles for displaying and manipulating an object.

Today's 3-D graphics systems are raster displays. Earlier systems were vector displays, with lines being drawn by moving an electron gun between two points on the fluorescent screen. Although this technique was adequate for line drawing representations, it was limited in its ability to draw solid objects. Raster displays refresh each picture element (pixel) — the smallest addressable point on the screen — at least 30 times per second to avoid flicker. They're suited for representing solid objects.

A pixel is stored in a refresh, or frame, buffer — the result of any number of operations by the DPU. In many systems, the image resolution is 1,280 x 1,024, with pixels refreshed from top left to bottom right. Compare this to a television, which uses the same technology at a resolution of about 256 x 256. In its simplest form, which is a black-and-white monitor, each pixel is represented by a single bit, which is either on or off. Color or grayscale requires that each pixel be a composite determined by a third dimension. The deeper that third element, represented by 24 or 48 bits in our sample systems, the larger the color palette that can be used by each pixel.

What happens when you manipulate an object — for example, rotating an image of the space shuttle on the z axis, the axis perpendicular to the screen? If you do it slowly, the DPU will determine a new value from a 3-D coordinate set and pass the value to the frame buffer for subsequent display. For a smooth rotation, this must occur at least 30 times per second for each pixel. But just being able to move an object smoothly isn't enough. Visualization requires that the screen images appear real to the viewer. Several techniques are used in most 3-D graphics systems to achieve this realism.

Antialiasing — This is used to give objects a smooth appearance by removing jagged edges that result from the limited resolution of the computer screen relative to the human eye. Figure 1 (see

page 46) shows a line drawn from pixel (1,2) to pixel (8,6). If the line passes through one pixel that's on and another that's off, the line will appear jagged. However, if the intensity of the pixel is modified to reflect the percentage of the line that passes through it — antialiasing — a smoother line is seen. Thus, (2,2) would have an intensity of about 60 percent and (3,2) would have about 10 percent compared to a pixel completely covered by the line.

Hidden Surface Removal — When you pass a hand across your face, it obscures everything behind it, because your hand is opaque. For realistic visualization, this must occur when you move one object in front of another on the screen. Likewise, the front of an opaque object must obscure the rear. Computationally, this isn't a trivial problem, and a number of algorithms have been employed to deal with it. One such method is the z-buffer, or depth-buffer image space algorithm, which requires the use of additional hardware called the z-buffer. In qualitative terms, it can be thought of as a mechanism for determining, for each pixel, what's in front and what's behind for any given orientation.

Shading — Objects don't look real if displayed with uniform lighting, because this isn't how we generally see them in real life. A more realistic image is produced by taking into account the light sources, surface characteristics, and positions and orientations of surfaces and sources. Algorithms have been devised for shading objects, though many of these algorithms are invalid where rapid changes in the intensity of the light source occur.

Gouraud shading is one such method. This technique is so popular that the speed with which Gouraud-shaded polygons can be displayed is used as a benchmark for solid rendering. To manipulate a large solid object requires a speed of 100,000 Gouraud-shaded polygons per second.

Hewlett-Packard has taken shaded image rendering one step further through radiosity and ray tracing, which take into account not only how light impinges on the object but also how light refracts from the object. This leads to a very realistic representation as shown in Figure 2 (see page 47), which is *not* a photograph but a simulation of the Chartres Cathedral in Chartres, France. However, there's a price to pay for this fine level of detail: The picture took 15 minutes to generate and can't be manipulated in real-time.

Depth Perception — This can be achieved in several ways. The simplest way is to draw objects with perspective. A more elegant method, offered by StereoGraphics as an add-on to several types of workstations, uses polarized light, that is, light waves arranged in a certain way.

If you view an object first through one eye and then through the other, you see two images slightly displaced from each other. This is referred to as binocular disparity. Our brain fuses these two images into one image that appears to have depth. StereoGraphics simulates binocular disparity with a device that attaches to a standard monitor and causes two images to be displayed, each at least 30 times per second and each using a different plane of polarized light. By wearing appropriate glasses, each eye detects only one of these two images. The result is two images slightly displaced from each other, which the brain interprets as a single image with depth.

Farsighted Technology

Improved scientific visualization requires that the models we create and how we interact with them become even more realistic. At the simplest level, this requires better-resolution images. Looking at monitors with resolutions of 1,280 x 1,024 pixels from a typical viewing distance of two feet, each pixel covers about two minutes of the visual field, that is, two-sixtieths of one degree of head rotation. The latest monitors with a resolution approaching 2,000 x 2,000 have pixels that cover 1.4 minutes of the visual field.

We need even higher resolution monitors that cover one minute of the visual field — the resolution of the human eye — before we can view objects on the screen with the same clarity that

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we see the monitor. Further, today's 3-D workstations require the use of your hands to change the field of view. Yet we change our field of view just by moving our heads. Monitors that respond to head movements are available but are still in an experimental stage.

Today, manipulating an object on the screen usually requires a total of six dials, three for each of the x, y and z axes of rotation and three for each of the x, y and z axes of translation. One device, the Spaceball from Spatial Systems, represents an improvement, providing many of the movements, such as a twist, achievable by the human hand. But it doesn't support the individual finger movements and control achievable with the human hand. A prototype dataglove is available, which the user wears like any other glove. It aims at manipulating objects in the same way you would if you were holding them in your hand. However, the dataglove is currently too expensive to offer a viable alternative to the mouse, trackball or other conventional devices.

To take object manipulation one step further, we require tactile feedback. It would be very useful, for example, for a drug designer to pick up his model drug and attempt to attach it to a protein, the repulsive force pushing his "hand" away as he moves the drug into a less energetically favorable position. As computers become faster and algorithms for calculating these types of forces improve, this will become possible in real-time.

Perhaps the flight simulator represents the best visualizer available today. Visualization techniques, hardware and software are improving, but we're still a long way from approaching this level of sophistication in the average graphics laboratory. For the next few years, I must take solace from the only other lesson my high school chemistry teacher taught me: When all else fails, think!

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DIGITAL WATCH

Digital's Server Strategy

Evan Birkhead

Bill Demmer Discusses Digital's Networked Server Strategy For The 1990s.

In the weeks preceding the July announcement of the VAX 4000 and related products, *DEC PROFESSIONAL* obtained an interview with Bill Demmer, Digital's vice president of Midrange Systems. The discussion focused primarily on the company's networked server strategy for the 1990s, but Demmer also delineated his role as cheerleader for open systems architectures and protocols. The VAX 4000, he said, is a powerful addition to the low end of the VAX line that will supplant the MicroVAX 3000 series and that can support multiple server functions and applications.

Demmer has been with Digital since 1973. He helped form the original VAX program in 1976 and managed the architecture development of the first VAX. In 1981 he was made vice president of the Midrange Business Group. Still heading up the Midrange Business Group as vice president of Midrange Systems, today he answers to Senior Vice President Jack Smith, explaining that all of Digital's "operating groups" now report to Smith, not President Ken Olsen.

Demmer is soft-spoken and selects his words carefully. He speaks with such authority on strategy matters, however, that it's clear his is the last word on decisions regarding the direction of the RISC-based 5000s and the VAX-based 3000s, 4000s and 6000s. He particularly emphasized the ever-increasing ability of these

Bill Demmer, Digital's vice president of Midrange Systems.

machines to participate as dedicated application servers for multiple hardware platforms. Demmer painted a picture for the near future in which multifunction and application-dedicated servers are the fulcrum for networked database and other DP users.

With that in mind, the conversation harked back to familiar open systems themes, specifically Digital's Network Application Support (NAS), the International Standards Organization's (ISO) Open Systems Interconnect (OSI), the Open Software Foundation's (OSF) Motif and MIT's X Window System. Demmer contends that Digital is committed to each and will enhance its position in these areas with a succession of CPU announcements, including servers and workstations, beginning this fall.

The NAS Factor

The Midrange Business Group's strategy for the 1990s is summed up in the Figure, a diagram to which Demmer frequently referred. Whereas in the 1980s Digital built its VAXs to

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FIGURE.

	1980s	1990s
User	Application/User Interface	Application/User Interface
Operating Environment	VAX/VMS	NAS
Hardware Platform	VAX	Multivendor Architectures

Bill Demmer's model for Digital's leadership role in networking in the 1990s.

run VMS applications, the focus today is to build an open operating environment (NAS) that runs on a variety of networked multivendor platforms and supports a new style of software application designed for open environments.

"NAS is the architectural strategy for our overall integration associated with multiple applications in a multivendor networking environment. [It's] the open software environment that we provide to support the creation of applications across different platforms," explains Demmer. He continues with the sweeping statement, "All of our products are now being geared toward being a participant in this mass environment."

In short, Digital is promoting the NAS program as its open systems cornerstone, pivotal to its success in selling into multivendor networks.

Specifically, the vehicles to this success will be support for networking protocol standards TCP/IP, OSI and NFS. "Our goal is to be able to support any operating system environment that people want to make adhere to the interfaces we provide with NAS," Demmer says. "What you'll see, though, is us focusing on three major operating systems: VMS, UNIX and OS/2."

The momentum behind the POSIX specs, he adds, which are currently being readied for VAX/VMS, is also critical to the overall success of the NAS program. The primary advantage of DECnet, he adds, is that "it will be coincident with OSI."

At Digital's Electronic Data Interchange (EDI) announcement in May, Ken Olsen confirmed that EDI also is an integral part of the NAS strategy and that NAS is adhering to a "list of standards" that help link most desktop devices. Olsen insisted, "It's a strategy that we've been arguing for 15 years now — that an organization should be networked thoroughly."

The Competition

Demmer maintains that Digital has two fundamental advantages over its competition in the client/server arena with its approach. First is what he calls the "scaled workmanship index" of the VAX and RISC CPUs, which permits all classes of servers — from 9000s down to 4000s — to function in the same LAN. This sustains an organization's or department's investment in older systems, he argues. Second is the company's extensive support for multivendor networks and "the breadth of desktops."

Apparently, Digital will focus on complex network servers rather than simple application servers during this decade. This will require heavy overtures for open systems such as X and Motif. The competition isn't pushing this as hard, according to Demmer. "Sun and HP, for example, support open systems as long as they meet their definition of open. Their definition of open to me is somewhat limited. Therefore it isn't what I call true openness. And surprisingly, I think IBM has a broader definition of

DEC Centers On Supercomputing

DEC Opens Supercomputer Lab — DEC has opened a Supercomputing Technology Center in Marlboro, Massachusetts, that will examine ongoing efforts to vectorize, accelerate and test supercomputing applications and will study I/O and parallel processing. DEC plans to open four more centers in Houston, Los Angeles, Washington and Sophia Antipolis, France.

On a related note, the University of Tokyo announced the completion of a computer that outperforms most U.S. supercomputers at a fraction of the cost. Project leader Toshikazu Ebisuzaki claims that the computer, using large-scale integration chips, operates at a speed of roughly 120 Mflops and costs significantly less than the average American supercomputer.

Novell Bows Out — The industry was surprised in May by the collapse of the proposed merger between Lotus Development and Novell. Lotus had gambled on harnessing Novell's networking expertise for use with 1-2-3, but for now all bets are off.

However, Lotus can celebrate a recent victory in its ongoing battle against software piracy. Federal marshals, acting on behalf of the software developer, raided a California computer school in May, seizing 600 copies of allegedly pirated software disks. The software, valued at $250,000, included copies of Lotus 1-2-3, WordPerfect and MS-DOS.

License To Drive — DEC has awarded the first unlimited VAXBI licensing rights to Perceptics. The agreement marks the first step in DEC's long-range plan to provide VARs direct access to the VAXBI bus. Perceptics, a Westinghouse subsidiary specializing in WORM-based optical subsystem storage for VMS- and UNIX-based computers, isn't restricted to a specific product or product line, according to terms of the agreement. Under previous agreements, VAXBI licenses were limited to specifically designed products that could interface to the VAXBI.

Landlord DEC — DEC has launched a computer rental program in response to growing demand by companies seeking short-term use of DEC products. The Digital Authorized Rental program is DEC's initial venture into the $1 billion domestic computer rental market. DEC has signed distribution agreements with two electronic equipment rental companies, Electro Rent and Data Preference.

DECUS Measures New Orleans — DECUS has released a survey taken at its U.S Chapter '90 Spring Symposium in New Orleans showing increased use of computer products. According to the poll, 34 percent of the attendees state that all members of their work force have a terminal or PC on the desktop, an increase of 8 percent over a similar survey taken in November 1989. More than half the respondents said they spent more than six hours each day logged into their computers. Firms are spending more on information technology, as well, with 64 percent buying computer products at a rate higher than the inflation rate.

BBC And Braintree Bind — Boston Business Computing and Braintree Technology have agreed to a joint marketing alliance. Under terms of the agreement, Braintree will market and support BBC's EDT+, VCL, Vmail and Vbackup.

IDE And Saber Hook Up — Interactive Development Environments and Saber Software have agreed to integrate IDE's Software through Pictures CASE environment with the Saber-C software programming environment. The joint venture aims to be the foundation for an integrated CASE environment that supports the entire C software development life cycle.

ISA Throws Down The Gauntlet — VAX software outfit ISA Solutions is mad at DEC manufacturers. ISA President Irv Shapiro claims that most DEC outlets don't adequately support their goods. "The customers deserve a bill of rights," says Shapiro, "and they also deserve a company who believes in its products and will stand by them forever — with a full, money-back guarantee." Shapiro is challenging the industry to match his firm's commitment to a lifetime guarantee on its products, free unlimited phone support and multilevel development partnerships that promote customer participation in product development. So far, according to Shapiro, there have been no takers.

Driving DEC — More than 1,000 Chrysler Motors engineers in 15 manufacturing locations in the U.S. and Canada will be motoring two VAX 9000 Model 210 mainframes. The mainframes will be used primarily for manufacturing support design and local and wide area DECnet/OSI networking throughout Chrysler.—*Brian O'Connell, East Coast Editor*

open, but they don't choose to market as strongly as, say, HP and Sun."

Demmer is also critical of AT&T's role in retaining control of its open operating system. "... AT&T's definition of open is that [they] will give a license to anybody as long as they're willing to pay [AT&T] quite a significant royalty and give [AT&T] the opportunity to control the architecture. ... Digital's definition of open really applies to having some kind of a standard that is not under control of any vendor."

Indeed, Digital has covered the bases in this area. In late spring, the company announced that it will ship OSF/Motif in the form of the DECwindows Developer Kit for OSF/Motif. Media and documentation cost $385 for ULTRIX or VMS. The license fee for ULTRIX workstations is included in the cost of the ULTRIX Worksystem Software license. The license fee for VMS workstations is $50.

Digital sources have said that by 1991 Motif will be the default graphical user interface (GUI). This came on the heels of the OSF's announcing the development of its Distributed Computing Environment (DCE) technology in May, a set of network services for distributed application support that OSF claims will easily port to OSF/1, System V, OS/2 and VMS.

Evolutionary Steps

Demmer hints that his Midrange Business Group will soon split into two seg-

ments: one for UNIX and RISC servers and one for VAX 3000-, 4000- and 6000-based servers. Demmer says he will continue to oversee the progress of both operating units. This is significant for several reasons.

First, this will give Digital better leverage in targeting RISC and VAX servers at different audiences. For example, Demmer acknowledges that in transaction processing installations, "Today we do not have the functionality available on the UNIX servers that we have on the VAX/VMS servers."

Second, regarding current support for multivendor (NAS) networks, Demmer says that "there is certainly more support available on our VMS-based products." However, the potential for RISC ULTRIX machines is pretty much the same, he says. This point shouldn't be taken lightly: Demmer is saying that he and the brain trust at Digital believe that VMS and UNIX environments can survive in the world of open systems.

"At the beginning of the VAX family, we had the same goals around scalability and peer-to-peer network support. We have spread out the homogeneous environment and brought this capability to a heterogeneous environment," sums up Demmer. "We think it's an evolutionary step for us to support this multivendor environment."

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XHIBITION '90

By the close of Xhibition '90, held May 22 - 24 at the San Jose Conference Center in San Jose, California, more than 5,000 developers and users of the X Window System had attended seminars or visited the exhibit hall. On the exhibit floor, vendors showcased a broad range of X-related hardware and software products, including X terminals, software tools for developing X-based applications and X-based software products. The seminars were highly technical and narrowly focused, providing information on developing applications using X.

The most prevalent X software applications were X-based tools for building X applications. Several vendors showed visual user interface editors and builders. Some tools, such as Builder Xcessory from Integrated Computer Solutions and XBuild from Nixdorf Computer, generate standard X source code (UIL) and C. These tools have the advantage of generating code that can easily be ported to any system running the OSF/Motif version of X. Other tools, such as TeleUse from TeleSoft and XFaceMaker 2 from Non Standard Logics, interpose their own library of user interface routines between the generated code and the X calls. This approach has the advantage of being able to support non-X systems, but it may suffer somewhat in portability.

The most popular flavor of X seemed to be OSF/Motif, with roughly two-thirds of the vendors using the Motif widget set. Several vendors showed X tools for improving the user interface to UNIX. Looking Glass from Visix Software and X.desktop from IXI are two such tools that replace the command line interface of UNIX shells with an iconic point-and-shoot interface. Files are represented by icons, and the tools offer a variety of methods to use different icons to represent different kinds of files.

Many vendors showed workstations running X. X terminals also were shown, including an impressive new entry from NCR. The NCR X terminal software includes a built-in window manager, a local terminal emulator and an extensible terminal multitasking executive. The hardware features a split-server architecture that uses a Motorola MC68020 and a Texas Instruments 34010 graphics coprocessor, and an expansion interface.

DEC's presence at the show was somewhat muted. The company's booth was in a prominent location, but little new was shown. DEC did announce that it will ship OSF/Motif as a layered product for VMS this summer, a bit sooner than previously indicated. DEC also showed its VT1000 X terminal together with its full line of VAX and RISC workstations.

DEC technology was featured prominently in a three-hour presentation by OSF on its new Distributed Computing Environment (DCE). The OSF DCE offering includes several technologies from DEC, including a time service, name service, multithread architecture and work on other components of the OSF DCE. — *Philip A. Naecker, Technology Editor*

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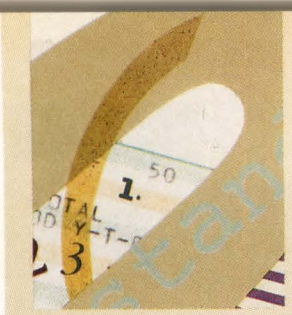

PERFORMANCE

Memory Interleaving

Charlie Cassidy

Optimizing Memory Performance In VAX 9000, 6000 and 8500/8700/8800 Systems.

Matching memory capacity to your application requirements is key to getting maximum performance from your VAX system. In interleaved VAX systems, how you configure memory is important because it can impact performance significantly.

Interleaving is a performance-enhancing feature that provides access to multiple memory modules in parallel. This feature is especially effective in multiprocessor systems in which several processes occurring simultaneously can place heavy demands on memory. VAX 9000-, 6000- and 8500/8700/8800-series systems incorporate interleaving capabilities to enhance performance. In these systems, sequential memory accesses are directed to multiple memory banks based on the low-order portion of the memory addresses. The resulting parallelism increases average memory bandwidth and decreases average access time by reducing memory request queues.

Because not all VAX systems interleave in the same way, you should understand how your system interleaves before configuring memory. To configure memory optimally for an interleaved system, you first have to determine the total memory required. Analyzing current workload and projecting new application demands helps define total memory requirements. The VAX Performance Advisor (VPA), VAX Software Performance Monitor (VAX SPM) and the VMS MONITOR utility can help you analyze your workload. These packages report performance data that characterize your system's utilization.

Digital's *Guide to VMS Performance Management* describes the process for analyzing system performance. It also provides recommendations for determining whether additional memory is needed and, if so, how much. For example, VMS guidelines state that a hard page fault rate greater than 10 faults per second on an otherwise well-tuned system indicates a need for additional memory. Adding memory also can improve memory performance when memory bandwidth is saturated. This situation can be caused by the combination of CPU demands on memory and extensive reads and writes to memory generated by I/O-intensive applications.

Once you've determined your total memory requirements, you can configure the memory to get the greatest performance boost from the system's interleaving capabilities.

The High End

The VAX 9000 series implements two-way interleaving within a main memory unit (MMU). Each MMU, which is made up of four memory modules, is logically divided into two segments each containing two memory banks. This logical division into segments and banks cuts across the four modules as shown in Figure 1.

Memory is interleaved between segments of the MMU on a 64-byte boundary. The system maps sequential memory addresses to alternate

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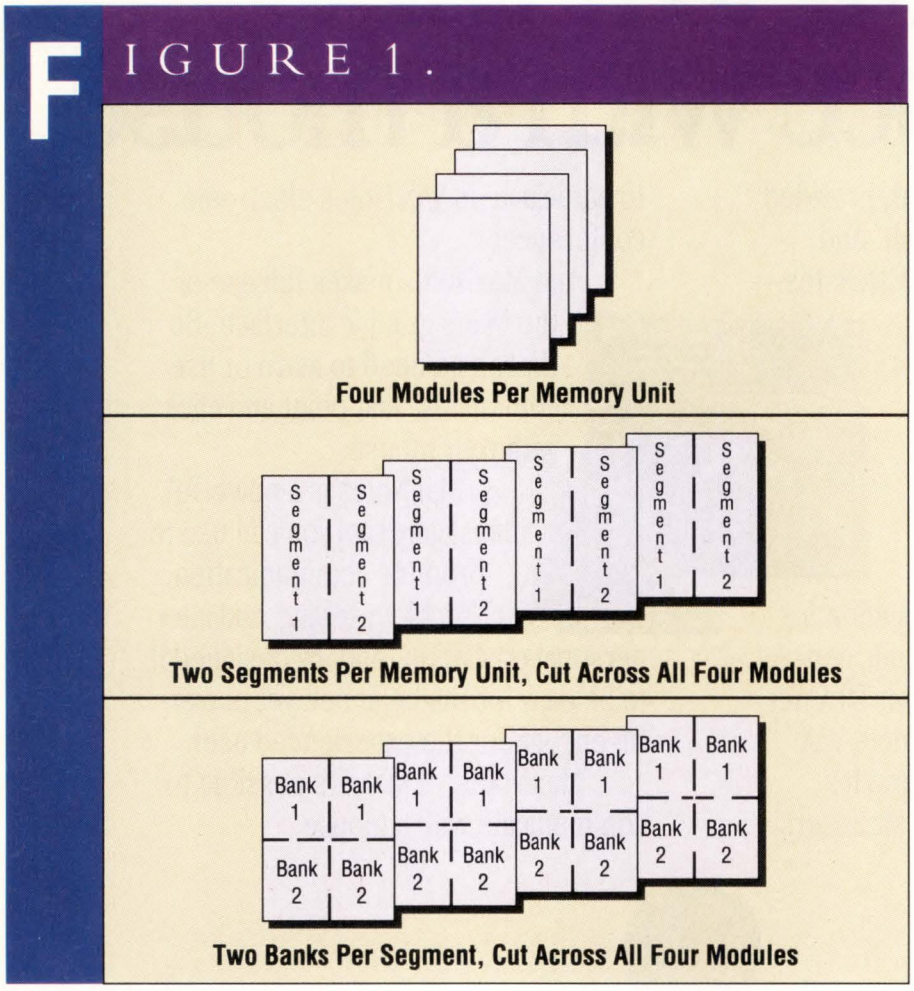
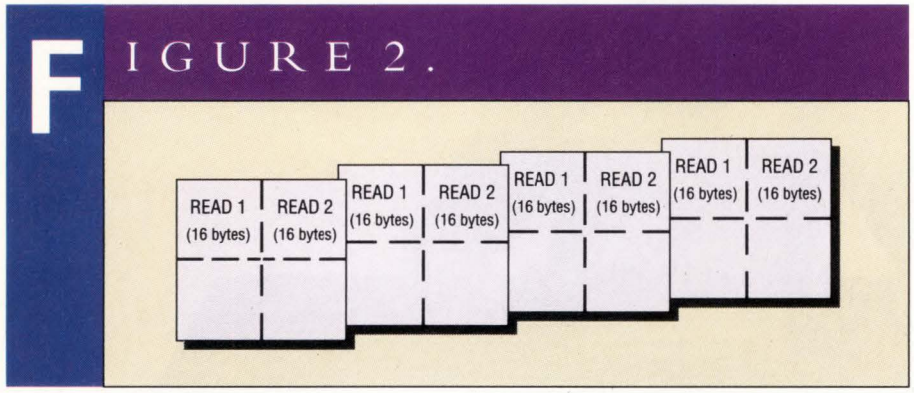


The VAX 9000 main memory unit.



Interleaved memory read.

segments of the memory unit in address blocks of 64 bytes. It uses address space within one bank (half the segment) at a time and spreads the access across the four modules, 16 bytes per module. For example, when two sequential read commands are executed, they're directed to two different memory segments.

In the example shown in Figure 2, the first sequential read is directed to bank 1 of segment 1. The 64-byte access is spread across the four modules. The second sequential access is directed to bank 1 in segment 2, also spread across the four modules. These two commands can be cycled almost simultaneously by the memory.

Up to two memory units can be configured on a VAX 9000. With the addition of the second MMU, the MS900-BA memory option, the VAX 9000 can perform four-way interleaving — with the aggregate effect of two memories, each capable of two-way interleaving. When four-way interleaving occurs, sequential accesses are alternated among four memory segments, two in each MMU.

The performance boost you get with interleaving on a VAX 9000 relates directly to the interleaving design of the memories and to the interconnect topology of the VAX 9000, which is a crossbar switch. The VAX 9000 is the first VAX to implement this crossbar technology.

The most important difference between a bus and the crossbar switch is the switch's ability to support up to four simultaneous transfers of data. In a VAX 9000 configured with two memory units, the memory subsystem can receive write data from two CPUs and send read data to two different CPUs at the same instant. If a single memory unit is configured on a system, data can flow from the memory to a processor and, at the same time, from that processor to the same memory.

How should you configure memory on a VAX 9000 to reap the greatest performance benefits? The most important decision is to configure enough total main memory (one or two memory options) to satisfy your application demands. The interleaving characteristics of the VAX 9000 don't require a special configuration to take advantage of interleaving. Interleaving occurs within a single memory unit (two-way). It can also occur between two memory units (four-way).

The VAX 9000 can be configured with up to four scalar processors. Each scalar processor can be teamed with a vector processor. For multiprocessor systems, two memory options may be the best choice to service the increased demand

made on memory by multiple processes. With two options, you can achieve four-way interleaving and benefit from a sustained bandwidth of more than 700 MBps and a total peak bandwidth of 2 GBps (two memories operating at 500 MBps in two directions).

For a single-processor system, one memory unit may provide sufficient capacity and bandwidth, depending on the application. The MS900-BA memory option should be considered for all VAX 9000s configured with vector processors. In particular, the additional memory unit is recommended for systems with a combination of three or more scalar and vector processors.

6000 Series

In the VAX 6000 series, the multiple memory modules — each with its own memory controller — cooperate with one another to perform interleaving. Interleaving occurs among whole memory modules on a 32-byte boundary. For example, if you have two interleaved memory modules, A and B, then addresses 0 through 31 will be mapped to memory A, 32 through 61 to memory B, 62 through 91 to memory A, and so forth.

The VAX 6000 can do two-, four- and eight-way interleaving, depending on the number of modules configured into the system. Interleaving increases VAX 6000 memory bandwidth from 36.68 MBps for a single memory module to 73.4 MBps with two interleaved modules. With four-way interleaving, you can take full advantage of the maximum bus speed of 100 MBps. Although eight-way interleaving doesn't increase bandwidth further, it reduces the average latency by spreading memory traffic across more modules, thus reducing queuing delays.

If a system is configured with one memory module, no interleaving occurs. For a system with three memory modules, two modules are interleaved, while the third isn't. Four modules are interleaved in a system configured with five memory modules. The system always attempts to interleave memory in the most efficient way. For example, in the configuration including three memory modules, the system assigns the two interleaved modules to the lowest address space.

What's the best way to configure memory on the VAX 6000 to achieve optimum performance? The total amount of memory you should have depends on the number of processors in your system and the memory requirements of your applications. The VAX 6000 can have up to four processors. The following guidelines will help you decide how to configure the memory you need.

A good guideline is to configure at least one memory module per processor. This typically will satisfy both the demands on memory that the CPUs make in accessing instructions and those generated by disk I/O, which requires data to pass through memory. A second guideline states that, to optimize parallelism and performance through inter-

leaving, you should configure two, four or eight memory modules. Therefore, if your system is configured with one or three processors, you have to make a choice.

For a single-processor system, you should decide between one or two memory modules based on the I/O intensity of your workload and the presence of the optional vector processor. As with the VAX 9000, the addition of a vector processor to the system increases the bandwidth demand on the memory. Additional memory interleaving may be required to get the most from the vector unit.

I/O-intensive applications also can achieve significant performance benefits by configuring two memory modules into your system. The VAX 6000 Model 410 may require two modules to accommodate the 7-VUP processor speed — based on the historical average of 10 MB per VUP. If a system is configured with three processors, a decision should be made between two and four memory modules based on the I/O intensity of the applications workload and the presence of vector processors.

> ***"Many VAX systems incorporate a variety of techniques to enhance memory performance."***

8000 Series

VAX 8500/8700/8800-series systems interleave multiple memory modules through a single memory controller. They can interleave parts of a memory module with multiple other modules as well as interleave whole modules. VAX 8500/8700/8800-series systems perform two-way interleaving between 2-MB chunks of memory on a 16-byte boundary. At system boot time the system automatically defines the pairs of 2-MB chunks to be interleaved in such a way as to maximize the amount of memory interleaved.

In order for you to take full advantage of interleaving on VAX 8500/8700/8800-series systems, the total memory capacity must be at least twice as great as the largest memory module. This allows the system to interleave all memory by interleaving sections of your largest module with other modules of

the same or smaller size.

For example, if you have a 64-MB memory module and four 16-MB modules, the system can interleave 16 MB of the 64-MB board in 2-MB chunks with each of the four smaller memory modules. In a configuration with one 64-MB board and two 16-MB modules, complete interleaving can't occur. Only 32 MB of the larger module will be interleaved.

It follows then that, for applications demanding high memory performance, four 16-MB modules is a more efficient memory configuration than a single 64-MB memory board. This configuration is also beneficial for multiprocessor VAX 8800-series systems, which tend to place heavy demands on memory.

If your total memory capacity is more than twice that of the largest module, the system frequently can still interleave all of the memory. For example, in a system with a 64-MB memory board (A) and five 16-MB modules (B-F), memory can be interleaved as follows:

```
A1->B1, A2->C1, A3->D1, A4->E1, A5->F1,
A6->B2, A7->C2 ... A30->B6,
A31->B7, A32->C7,
D7-B8, C8->D8, E8->F8
```

1 through 32 refer to sequential 2-MB chunks of memory on a board.

MANY VAX SYSTEMS incorporate a variety of techniques, such as multiple word access and fast page mode, to enhance memory performance. These techniques are transparent to the user and don't involve special configuration considerations. For example, in VAX 8600/8650-series systems, memory bandwidth is increased by accessing multiple words in parallel within a single memory module. The system accesses in parallel four 32-bit longwords with the associated check bits and transfers the data over the bus serially. MicroVAX 3000 systems use fast page mode to increase memory bandwidth. Fast page mode allows the memory to be accessed in multiple locations without incurring the full memory access overhead for each access.

Interleaving provides parallelism in memory access and increases memory performance in VAX 9000-, 6000- and 8500/8700/8800-series systems. In addition, other techniques that aren't impacted by memory configuration, such as multiple word access, are built into systems to enhance memory performance. You can maximize your memory investment by gearing your memory capacity to your application requirements and by configuring memory to optimize your system's interleaving capabilities.

—Charlie Cassidy is a principal engineer in Digital Equipment Corporation's Advanced Development and Technology Group in Electronic Storage Development.

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VT1000: Network Tool

Digital's X Terminal Delivers Workstationlike Features As It Provides Access To Network Resources.

DAVID W. BYNON

I can't recall any terminal product in recent history getting as much attention as X terminals. Nor can I recall a DEC product that was delayed as many times as the VT1000. I first learned of the VT1000 development project in June 1987. The initial plan called for MicroVAX CPU technology. Somewhere along the development path, those plans changed. The only common feature between VAXstations and the VT1000 is the monitor.

From inception to delivery, however, the VT1000 concept doesn't appear to have changed. It's a LAN-based terminal that's feature-rich but performance-poor. My initial out-of-the-box experience with the VT1000 was less than exciting. Its graphics performance is comparable to that of a VAXstation 2000. Fortunately, what the VT1000 lacks in performance it more than makes up for in features.

An X terminal is a low-cost alternative to a workstation or a high-cost alternative to a graphics terminal. The VT1000 isn't a workstation. Anyone buying an X terminal such as the VT1000 as

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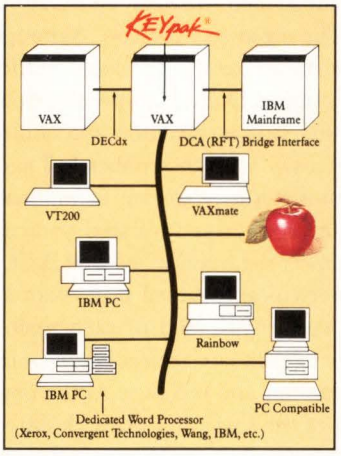

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a substitute for a workstation may be sorely disappointed.

As an X server, the VT1000 can provide display services for an X application. Given the appropriate software and will-

> ***As an X server, the VT1000 can provide display services for an X application.***

ing host systems, an X terminal user can enjoy and benefit from workstationlike features.

However, there's a significant hidden cost for this functionality. Simply put, an X terminal user is far more likely to consume greater host resources than the typical terminal or workstation user. This is a result of the graphical nature of X applications. The majority of workstation users use the workstation processor for most tasks. The X terminal user taxes the host in a way character-cell terminals never could.

From The Inside Out

The VT1000 features a slim base unit that can be configured with one of three video options: the VR150 15-inch monochrome monitor, the VR262 19-inch monochrome monitor and the VRE01 19-inch flat panel monitor. Each VT1000 monitor features a screen resolution of 1,024 pixels by 864 scan lines, but the dots per inch varies. The base unit is a computer system. Its operating system, in ROM, is a highly tailored version of the original MIT X server.

In addition to its X server duties, the VT1000 operating system software manages two RS-232 ports and the ThinWire Ethernet port. One of the serial ports is designated as the printer interface. The other is for host communications. Each can be used for host communication via modem or direct connection. The primary communication interface is Ethernet, on which the VT1000 supports the LAT and TELNET network protocols.

The only option for the VT1000 is additional memory. The 1-MB standard configuration is adequate for light-duty terminal emulation (three or four DECterm windows) and graphics. The average X user will require at least 2 MB. To upgrade the VT1000's memory, a special daughterboard with a 1-MB SIMM must be purchased from DEC. The daughterboard accommodates two additional 1-MB SIMM strips for a total of 4 MB.

My biggest surprise when unpacking the VT1000 was its LK-401 keyboard. This new keyboard has the same basic layout as the older LK-201 but supports international standards. The LK-401 also has a new feel. It's smoother than the LK-201, and the function keys are easier to reach. It's also arched, whereas the LK-201 is flat.

The mouse is new, too. Although the new mouse retains the look and feel of the original Digital Corporate Mouse, it has superior acceleration and control. It does away with the rubber ball and potentiometer mechanism. Its internals use a pair of U-shaped infrared transceivers. To break the beam of infrared light, DEC uses two cantilevered shafts with a slotted cup on the end of each shaft. The edge of each cup rotates between the IR transmitter and receiver. At the opposite end of the shafts is a plastic knob. With the angle of the shafts, a single edge of the knob touches the mouse (desk) surface. The shafts are phased 180 degrees out. One measures fore and aft movement, the other measures side-to-side movement.

Plug And Play

Installation of the VT1000 was quick and easy, and the unit worked on first try. This device truly is plug-and-play compatible with VMS and UNIX host systems. You plug the monitor, keyboard and mouse into the base unit and plug the base unit into Ethernet and power. In five minutes you're ready to work.

Because the VT1000 uses LAT, little if any configuration is necessary. You can log into a VMS host using the "LAT Terminal Window..." option. LAT services are broadcast to the VT1000 through multicast messages. To use the "LAT X Session..." option, a font path and preferred service name must be defined. To connect with ULTRIX or UNIX hosts, you must establish an IP address for the VT1000.

All VT1000 setup functions are managed through the Terminal Manager's Configuration pull-down menu. The Terminal Manager appears on the screen at the beginning of each session when the system is switched on. As the VT1000 operating system executive, it serves the same basic function as the DECwindows Session Manager or the Motif Session Manager — it manages the windows on the display.

User Concerns

The VT1000 base unit is one-half the height of a VAXstation 3100, and its tiny fan produces less than half the noise. This makes the VT1000 suitable for most office environments.

Although the veteran workstation user will feel at home with the VT1000, new users appear to have some difficulty. There's no help facility, and the Terminal Manager menus provide little clue as to what you should do first. Also, using

VT1000

PLATFORMS: VMS, ULTRIX or UNIX-based host systems

PRICE: The 15-inch VR150 costs $2,895; the 19-inch VR262 costs $3,595; and the 19-inch flat panel VRE01 costs $13,995. The 1-MB memory upgrade option costs $395

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the VT1000 for a simple task such as logging in to read mail involves more steps than the same task using an ANSI terminal. I question the VT1000's suitability for the general user population.

For the veteran workstation user or even the moderately sophisticated VAX user, the VT1000 solves a basic problem associated with distributed computing: simultaneous and single-point access to multiple systems and services. With the VT1000, I could tap the resources of a LAN, including remote non-DEC systems integrated via LAT services on a terminal server. LAT and TELNET resources are as close as a pull-down menu. As a terminal emulation and communication system, the VT1000 is superb.

When I shifted from terminal emulation use to DECwindows application use, I saw the other side of the VT1000. When it comes to graphics, the VT1000 runs out of steam. In a side-by-side comparison with a monochrome VAXstation II, the VAXstation II is slightly faster. This shows how DEC is positioning this product — at the bottom of DEC's workstation product line.

THE VT1000 IS quality equipment. There were no problems, surprises or quirks. I simply plugged it in and it worked. In this way, it was more like a VT320 than a workstation. It's 100 percent compatible with VMS V5.3-1, ULTRIX V3.2, LAT and VMS DECwindows V5.3.

Connectivity is the VT1000's strong suit, and in this regard I found it far superior to a VAXstation. Its ability to communicate using LAT and TELNET is a plus, especially in a multivendor or mixed operating system environment. The twin serial communication ports are another useful feature that I used extensively. I installed a modem on the host port and an LA240 printer on the printer port.

If you require high-performance graphics, the VT1000 isn't the device for the job. But if you need a tool with workstationlike features that will help you access network resources, you won't be disappointed with the VT1000. ■

When Professional Press Added A VAX 8800 To Its Computing Capability, The Result Was 13 VUPS Of Pure Performance.

POWER CLUSTER

It has been several years since the first VAXcluster was formed at Professional Press. If you read the "Cluster Chronicles" series of a few years ago, you discovered with us everything that was right and wrong about LAVcs. Our LAVc's fatal flaw was the boot node. An 8350 is a terrible boot node. There are design factors having to do with using the BI-bus as a system bus and DEBNA constraints that constrict the machine's capacity.

Starting with an LAVc running VMS V5.1-1, we went through the following steps in making our transition to an 8800-based cluster. First we removed the disks from the KDB50 on the 8350 and cabled them to the HSC. We made no changes to the contents of the disks. Then we had to convince the 8800 to boot. This was fairly difficult, since we had no console documentation. Our consultant for the evening, however, had done it a few times in the past.

A VAX 8800 took Professional Press' available computer power from 2.2 to almost 13 VUPS.

The console on an 8800 is a grand anachronism. It's a PRO-380 and has the world's slowest VT emulator. On the plus side, all the diagnostics are installed on its RD53.

Booting is interminable, but fortunately you don't have to do it often. Finally, we were rewarded by seeing the 8800 connect to the HSC (the "online" light goes on), the system disk connect to the HSC and the banner appear.

At this point, the 8800 had simply

DAVE MALLERY

DEC PROFESSIONAL TESTING CENTER — DP LABS

been substituted as the boot node for the 8350. We could have installed the CIBCA in the 8350 first, but we went for the gusto.

The transition from 2.2 VUPS to almost 13 VUPS is quite refreshing. There are few things that 10 more mips won't cure. We had left a 32-MB 8350. With our working sets set for the 8350, we discovered the next day that we were using only 32 of the 64 MB of available memory. Opening the working sets quickly consumed the full 64 MB.

We do a great deal of monitoring on the new machine. The only time it slows appreciably is when our free list goes below 1,000 pages and swapping and hard faults start. This can consume 6 VUPS of kernel mode in no time. Fortunately there are several easy fixes for this problem. We can use a load balancer to trim the working sets a bit and to swap idle processes. More memory is also quite economical. A second 64-MB board is especially attractive, because it will interleave fully with the first. I believe this is especially desirable in the SMP environment. More memory is also attractive because it will allow us to use caching products.

After a few years of a KDB50, an HSC is pure delight. First, you're freed from the four-drive constraint. We now have one tape and three disk requestor cards installed. The fourth requestor card required a fairly expensive additional power supply for the HSC. We have both 8mm (Micro Technology's MA24) and nine-track (System Industries' SI2100) installed on the tape requestor. We have two DEC HSC5x-DA cards and an Emulex DA equivalent. The Emulex card is running a 2-GB Seagate Sabre-6 drive. The Sabre-6 runs at 3 MBps and operates only on the faster Emulex DA card — flawlessly so far.

Getting rid of our VAX 11/750 liberated a pair of Fujitsu 2333s. The 2333 is a 250-MB, eight-inch SMD drive that has a long track record of reliability. We got two disk cards for the SI storage director box (which had the tape card already installed for the nine-track) and installed the tray of 2333s in the SI cabinet. Two formats later, we had about 440 MB more, with two actuators on the HSC.

The next step was to connect the 8350 back to the cluster. In the absence of the 11/750, the 8350 got to use the recently vacated root on the system disk.

After a week of operation, we got out our SYSGEN tapes and moved to VMS 5.3-1. This allowed us to upgrade our DEBNA cards to DEBNI. This is a PROM change that produces amazing throughput improvements in the Ethernet. DEC sells the upgrade for $472 through DECdirect — money well spent. We'd been having sporadic cluster disconnects and reconnects since the 8800 went in. All Ethernet problems related to timeouts disappeared after this upgrade. The DEBNI upgrade is sufficient reason for going to V5.3.

As of this writing, all printer queues and low-priority batch jobs run on the 8350. Almost everything else runs on the 8800.

Since 8xxx machines have been devalued to about $6,000 per VUP, you should consider one to carry your cluster in style during the next few years. ■

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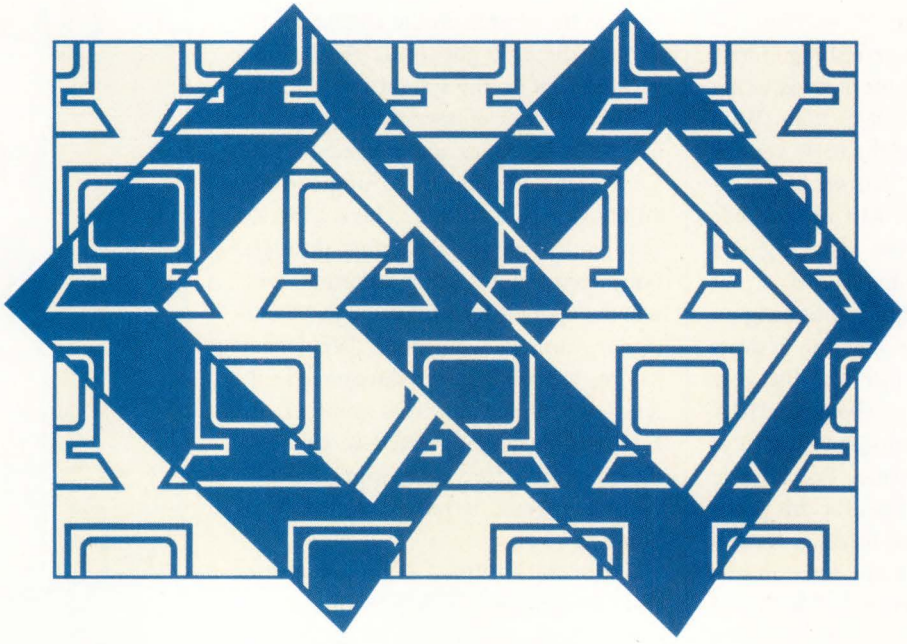
Mitek Systems' OpenConnect Server Ties The Knot For IBM And TCP/IP-Based Systems.



TCP/IP & AS/400:

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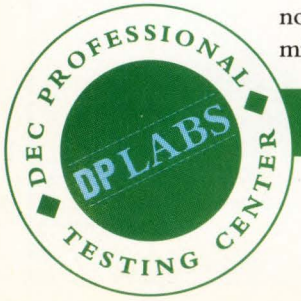
As managers and users feel more comfortable with UNIX, TCP/IP and other products that allow connectivity, multivendor sites are becoming more common. Although connecting one TCP- or DECnet-based system to another is straightforward, connecting to a Big Blue machine, where EBCDIC, LU 6.2 and SNA are the major buzzwords, can be challenging.

To encourage the TCP/IP-SNA wedlock, Mitek Systems developed the OpenConnect Server, a hardware/software solution that lets TCP/IP network nodes connect to IBM mainframes and midrange systems. In our Lab, the OpenConnect Server Model M2130-LS successfully allowed our MicroVAX II, DECsystem 3100 and HP9000/834 to talk to our IBM AS/400 model B10.

The hardware component of the system is the Mitek Control Unit, also called the SNA Network Server and OCS Control Unit. Our unit contained a Motorola 68000-based CPU, a floppy-disk drive, an Ethernet card and 2 MB of memory. The rear panel has a standard ThickWire Ethernet connector for the TCP/IP network hookup, a serial port for the connection to your IBM host and another serial port to which you can attach a local terminal to perform hardware



DAVID B. MILLER

configurations and diagnostic functions.

Control Units can be configured to be remotely attached to your AS/400 via a modem or modem eliminator, or they can be directly channel attached. Models are also differentiated by speed. Our Control Unit was a low-speed model, providing data rates up to 19.2 Kbps. A high-speed unit can achieve data rates up to 256 Kbps.

Software resides in various places. On the TCP/IP side, Mitek supplies OpenConnect Server Administrative Utilities, which are used to configure the Control Unit. Also provided for TCP/IP hosts is SNS Presentation Services, offering IBM 3270 and 3770 terminal emulation and an Application Program Interface, which is a set of procedures you can call from C programs to interact with the IBM emulation features.

The Control Unit has its own software, provided on a 5 1/4-inch floppy. The floppy contains the Control Unit's operating system, terminal emulation software, such as 3278 and 5250, network configuration files, communications management software and a private copy of a UNIX-like **termcap** file defining all the DEC and non-DEC terminals supported by the unit. TCP/IP software resides in PROM on the Ethernet board. AS/400 software provides FTP and TELNET capabilities to allow you to log into and exchange files with the remote TCP/IP-based systems.

Although our project primarily involved our MicroVAX II running VMS V5.3 and TGV Multinet V2.0 and our AS/400 Model B10 running OS/400 Release 2.0, Mitek provides connectivity solutions enabling a wide range of TCP/IP-based computers to connect to many IBM machines, such as the System/36, the System/38 and mainframes.

Down The Aisle

The Control Unit is attached to your ThickWire Ethernet segment via any transceiver that generates Signal Quality Error (SQE), otherwise known as heartbeat. On the IBM side, we attached the Control Unit to our IBM AS/400 Model B10's 2,400-baud modem port. A Black Box modem eliminator was installed between the AS/400 and the Control Unit to provide clocking signals.

The Control Unit is larger than a desktop PC and weighs about 50 pounds. A rackmount unit is available. The floppy drive boots the system. An LED front panel displays diagnostic codes for troubleshooting.

The only problem we encountered with the physical unit installation was a feisty Ethernet connector. The cable required some jiggling before a good connection could be made. Otherwise, the Control Unit was well-built.

Our MicroVAX II was the recipient of the SNS Administrative Utilities, which were used to configure the Control Unit software. Configuration files for the Control Unit are included with this software. You edit the files on the VAX, then

Figure 1.

```
                    TCPIP INSTALL PARAMETER FUNCTION
MODIFY PARAMETERS UNTIL CORRECT THEN HIT  CMD 3 TO EXIT WITH SAVE
                                         CMD12 TO EXIT WITHOUT SAVE
TCPIP LIBRARY: TCPIP                        HOST  NAME:    SNS1
LINE NAME: TCP01          LINE-CONN: *MP        LINE #: 01        BAUD: 02400
                          3 2 7 4   P A R A M E T E R S
CONTROLLER (NAME: TCPIP3274    ADDRESS: 40   DEVPFX: T0140  )
DEVICE COUNTS (3277: 00 3278: 23 3279: 08 3287: 01       )
                          A P P C   P A R A M E T E R S
SUBSYSTEM NAME:                TCPIP
CONTROLLER (NAME:              TCPIPAPPC     ADDRESS:  C1      BOX-SEQ-#: 01 )
LOCAL-LUNAME:                  TOSNS1        XID-S:    05600101
RMT-LUNAME:                    FRSNS1        XID-T:    03E00111
DEVICE (NAME:                  TCPIPBOX      MODE: TCP01    SRVR-MODE: FTPS1  )
```

The AS/400 TCP/IP parameters must match corresponding parameters in the Control Unit's configuration file.

Figure 2.

```
 5/31/90        T C P I P   A D M I N I S T R A T O R   M E N U          12:16:12
Select one of the following:
 1. Maintain Network Hosts address file     20. Display Version/Release IDs
 2. FTP                                     21.
 3. TELNET LINE MODE                        22. TELNET FULL SCREEN
 4. DIAGNOSTIC MENU                         23.
 5. FTP BATCH COMMANDS MENU                 24.
 6. Start TCPIP SUBSYSTEM                   25.
 7. Terminate TCPIP SUBSYSTEM(*immed)       26.
 8.                                         27.
 9.                                         28.
10.                                         29.
11. Display TCPIP SUBSYSTEM                 30. DISPLAY MODE STATUS
12. Display active jobs                     31.
13. Change TCPIP SYSTEM parameters          32.
14. Build TCPIP APPC line                   33. BUILD VIRTUAL CONTROLLER devices
15. Create TCPIP SUBSYSTEM                  34.
16. Create TCPIP SYSTEM objects             35.
17. Display line status                     36. DISPLAY VIRTUAL CONTROL UNIT
18. Browse a physical file                  37.
19. Display a file definition               38. Sign off
Option      Host (Options 2 and 22 only)
```

You can perform many AS/400 configuration functions directly from this administrator's menu.

use a Mitek-supplied utility, snsadmin, to copy the files to the Control Unit. TCP/IP is the only software required on other nodes on your TCP/IP network.

The Administrative Utilities only need to reside on one TCP/IP node, the node that you'll use to configure and maintain the Control Unit. The utilities are TCP/IP implementation-specific, so you must specify to Mitek which vendor's TCP/IP software you're running on the node that will become the administrative hub.

Also installed on our MicroVAX II were the SNS Presentation Services. This software provides IBM 3278 and 3279 standard and enhanced terminal emulation, as well as IBM 3777 Remote Job Entry (RJE) station features, 3287 printer emulation and 3270 PC file transfer.

VAX/VMS software is distributed in standard VMS BACKUP format. Logical names and foreign commands are defined in the file SNA.COM, which can be executed from SYLOGIN.COM or from each user's local LOGIN.COM. VMSINSTAL isn't required, and the files only need to be BACKed UP to your VMS hosts. Equivalent software is available in a variety of media for other TCP/IP-based hosts.

The software packages installed on our AS/400 in addition to the base installation included:

1. TELNET Client Line and TELNET Client Full Screen — These packages let you initiate a terminal session on a remote TCP/IP host from your AS/400, using a standard 5250 terminal. TELNET Client Line forces you to enter all input at the bottom of the screen. TELNET Client Full Screen provides a terminal session which, in our case, looked like a VT terminal.
2. FTP Server and FTP Client — These packages let you exchange files and use other standard FTP commands with TCP/IP hosts.

At The Altar

The configuration file sna_cfg, supplied with the Administrative Utilities, is edited on your TCP/IP host, converted to machine-readable format, then copied to the Control Unit's floppy drive with the snsadmin utility. sna_cfg defines logical SNA LU and PU devices used to access the SNA host. The device definitions in sna_cfg also appear on your SNA host to allow connections. SNA device definitions are created when you install the required software on your AS/400.

In addition to defining the logical devices between TCP and SNA hosts, sna_cfg also includes parameters for data link, APPC and 3274 controllers and Internet address and gateway information.

It's critical that sna_cfg parameters match the parameters entered when Mitek software is installed on your AS/400. Mitek provides configuration checklists and worksheets that you can fill out to record this information.

Don't forget to include the Control Unit's Internet address in your TCP/IP hosts' file or on your name server node. By default, the Control Unit's Internet address is 137.1.0.240, but that can be changed via a VT terminal connected to the Control Unit at boot time or by modifying the sna_cfg configuration file

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and rebooting the Control Unit.

A Mitek-supplied procedure made installing the AS/400 software simple. The tricky part was making sure the APPC and 3274 parameters on the AS/400 matched the entries in the sna_cfg file that was copied from the VAX to the Control Unit. The TCP/IP parameter screen is shown in Figure 1.

After setting the proper parameters on the AS/400, you can proceed by accessing a set of AS/400 administrative functions, which mustn't be confused with the Administrative Utilities on your VAX or other TCP/IP nodes. From the AS/400's TCP/IP Administrator Menu, you can establish and maintain a UNIX-like hosts' file to contain the Internet addresses of all the nodes to which you'll connect from your AS/400. You also build and start all the required AS/400 communication lines, data structures and subsystems from this menu. Logical units are configured that map to those defined in your Control Unit's sna_cfg file. Figure 2 shows the complete AS/400 TCP/IP Administrator Menu.

In addition to providing configuration information on this menu, you can invoke terminal and file transfer sessions, perform diagnostic tests, work with AS/400 files and display software version and release information.

Something Old, Something New

I used two methods to log into the AS/400 from our MicroVAX II. You can TELNET to the Control Unit, then hop to the AS/400. Or, you can save the TELNET step and connect directly to the AS/400 if you have SNS Presentation Services installed.

Once you're on the AS/400, the familiar login screen appears. The difference is that you're using your ASCII terminal. As with any terminal emulation product, the keyboard mapping provides the first hurdle. A help screen is available by pressing ESC h.

Most keystroke sequences used for function and special-purpose keys required only a CTRL or ESC followed by one keystroke. Some sequences required more. A challenge arises when you're

OpenConnect Server

PLATFORMS: TCP/IP-based networks, IBM midrange and mainframe computers

PRICE: The Model M2130-LS costs from $11,450 to $22,900, depending on line speed and number of concurrent sessions to the AS/400

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Carrollton, TX 75006
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PRODUCT LINE: Multivendor connectivity products

FOUNDED: 1984

OWNERSHIP: Private

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two emulations removed from the AS/400. For example, to begin you might be on a PC running a VT terminal emulator, then logged into an AS/400 using Mitek's 3270 emulation (5250 emulation is also available). This is a test in manual dexterity and short-term memory!

If you're using SNS Presentation Services, you'll have access to many features in addition to terminal emulation. For example, you can exit your IBM session temporarily to go to VMS. With this feature, you can suspend your current 3270 session and start another, exiting each with the ESC key. You also can perform normal VMS functions on your VAX.

Screen contents can be captured to a local VAX disk or printed directly to a VAX printer. The spool file name and location as well as the print queue to use for directly printed screens are fully configurable. Screens can be copied selectively on a screen-by-screen basis, or they can be copied continuously as output scrolls on your terminal. This is analogous to using your VT's Print Screen and CTRL-Print Screen options.

Other features supported by SNS Presentation Services include IBM 3287 printer emulation and PC file transfer. Keyboard mapping can be changed to suit your preference.

And Some Things Blue

Thus far, I've described logging in from the VAX or other TCP/IP node to an AS/400. What options exist going the other way? The TELNET Client Line and TELNET Client Full Screen features realize this goal. We were able to log in to our MicroVAX II and DECsystem 3100 from our AS/400.

Differences between IBM and ASCII terminals are apparent immediately. For example, there are no IBM keyboard symbols for the ASCII characters [,], ^, * and ;. These must be simulated on the IBM side. The VMS directory specification DUA0:[DIRECTORY.ONE] must be entered as DUA0:¢DIRECTORY.ONE|. The VT PFx, keypad, CTRL and ESC keys, and other heavily used ASCII keys are mapped to the IBM terminal's function keys.

IBM terminals are block-mode rather than character-oriented devices. When you perform an operation such as a directory listing, you'll experience slight delays of screen output followed by bursts when the screen fills entirely with data.

No support for VT double-high, double-wide characters is provided. IBM terminals only support dark backgrounds. However, reverse image, bold intensity, underscore and blinking attributes are available.

Given these differences, using a VAX editor or word processor can be a learning experience, but getting used to the keyboard differences shouldn't be harder than getting used to any VT emulator.

Exchanging Vows

FTP Services are provided to do file transfers. The FTP Client, residing on your AS/400, lets you log in to your TCP/IP host and perform file transfers. FTP Server, also on the AS/400, accepts requests from TCP hosts.

ASCII, binary and IBM source file type transfers are supported. Standard FTP commands are supported. Mitek's FTP utility is interactive and guides you through the necessary steps. After invoking FTP from your AS/400, you log in to the target TCP host.

You can type the entire file transfer command at once, or you can let Mitek do the work. You enter get or recv to transfer files from your TCP host to your AS/400. You enter send or put to transfer files from your AS/400 to your TCP node.

To make file transfers easier, a fully menu-driven system, called FTP Client (Batch), is provided. You fill in the screens with the transfer information, and Mitek does the rest.

IN ADDITION TO the snsadmin utility and the utilities available on the AS/400 TCP/IP Administrator Menu, three more management tools should be mentioned:

1. SNA_STATUS lets you monitor LU activity. It also displays detailed information about APPC and 3274 controllers.
2. SNA_START is used to manage the configuration file that's copied to the Control Unit. SNA_START can be used to parse the raw sna_cfg file into sna_bin, the machine-readable version of the configuration file that the Control Unit needs. SNA_START also can be used to read sna_bin and display its contents, so you can check the exact configuration that the Control Unit thinks it has.
3. SNA_STOP stops all active emulation sessions.

Documentation is voluminous. I needed to consult at least 16 manuals, ranging from a high-level system overview to a detailed discussion of the Application Program Interface offered by SNS Presentation Services. I longed for a master index where I could find references at my fingertips.

This project was our first attempt to connect systems this foreign. It can be done more efficiently in an environment that has both TCP and IBM administrators. I recommend using Mitek's support and training, especially if you're solely responsible for managing both systems.

We were pleased to connect the two foreign systems and do useful work. Many options and customization features are available that I haven't discussed. Suffice it to say that there's more we could have done to make our IBM-TCP/IP more elegant. Keep your eyes open for additional reviews of IBM-to-DEC and other connectivity products. ■

For More Information

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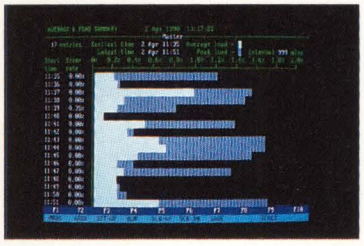

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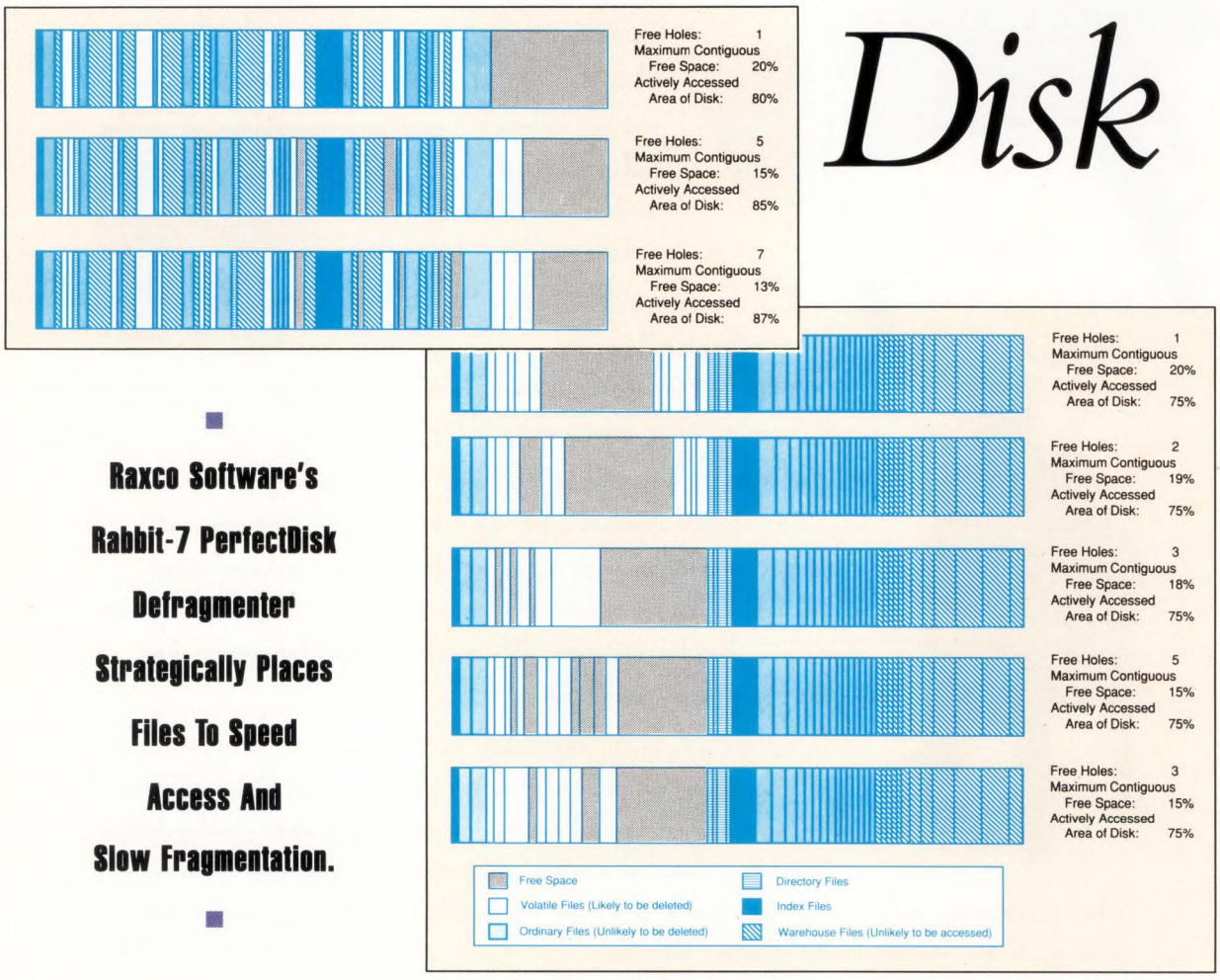
The Optimal Disk



The Backup Model (top) and the Optimized Model (bottom).

Raxco Software's Rabbit-7 PerfectDisk Defragmenter Strategically Places Files To Speed Access And Slow Fragmentation.

Many VMS system managers, operators and systems programmers wonder why DEC hasn't introduced a disk defragmenter as a part of or at least as an option for VMS. There has been much speculation in this regard.

Whatever the reason, third-party vendors are happy to fill the gap. A product from one such vendor is Raxco Software's Rabbit-7 PerfectDisk. The product's name reflects Raxco's aim to supply a perfect disk not only by making files and free space as contiguous as possible but also by placing files in an "optimal" position on the disk to speed access and slow fragmentation.

We installed PerfectDisk on LABDOG::, our Lab's MicroVAX II, with

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VMSINSTAL. During installation, you're asked if you want to update DCLTABLES.EXE with the R7 command verb. If you elect not to, then you must type:

```
$ SET COMMAND R7_V4:R7
```

before you run Rabbit-7 to add the R7 command to your process DCL table. We elected to update the system table. Incidentally, one system logical must be defined with the command:

```
$ DEFINE/SYSTEM R7_V4 ddcu:[directory]
```

where ddcu:[directory] is the device and directory specification for where you choose to install R7. We used the default that the installation procedure gives:

```
SYS$SYSDEVICE:[RABBIT7V40]
```

If you're upgrading from a previous version of PerfectDisk, be sure to delete the old Rabbit-7 files as suggested in the PerfectDisk manual.

Rabbit-7 is invoked by typing R7 at the DCL command prompt. You can choose from many qualifiers to run PerfectDisk in the best way for your system. The command syntax can be expressed by the following:

```
$ R7[/DETACHED] devicelist[/switch...]
```

Preparing The Disk

I wanted Rabbit-7 to work on a somewhat fragmented disk. LABDOG::'s user disk is a Seagate Wren V (DUB1:). I wrote a DCL command procedure to repetitively copy and delete files to a two-level directory tree in my home directory.

After approximately 100 passes, I thought I'd disordered the disk sufficiently to give PerfectDisk something to work on. To confirm this, I ran Rabbit-7's built-in disk analysis utility by typing:

```
$ R7/CHECK DUB1:
```

This produced a report showing numerous disk statistics, including a disk map display, depicted in Figure 1. The disk was in pretty bad shape. Compare that to the report produced after using Rabbit-7 for three days, depicted in Figure 2.

Aside from the usual index file and directory files, Raxco defines the following file types:

1. Volatile files — Files less than three days old and therefore most likely to be deleted. In the following examples, volatile files represent about 20 percent of the disk.
2. Warehouse files — Files rarely accessed (25 percent of the disk).
3. Ordinary files — Files likely to be accessed but unlikely to be deleted (25 percent of the disk).

Figure 1.

File Fragmentation Statistics

_DUB1:

	Directory Files	Volatile Files	Normal Files	Rarely Accessed Files	Total Files
Files	123	77	409	3,611	4,220
Fragments	123	103	488	3,716	4,430
Total Size	903	2,571	385,194	199,959	588,627
Average Frag. Size	7.3	25.0	789.3	53.8	132.9
Average Frag./File	1.0	1.3	1.2	1.0	1.0

Free Space Size Statistics

_DUB1: Size Range	Number of Holes	Size Range	Number of Holes
0 - 4	44	1,001 - 2,000	5
5 - 10	6	2,001 - 4,000	5
11 - 20	2	4,001 - 10,000	2
21 - 40	3	10,001 - 20,000	0
41 - 100	16	20,001 - 40,000	1
101 - 200	3	40,001 - 100,000	0
401 - 1,000	1	100,001 and up	0
		Total:	88

Selected information from the R7/CHECK display.

Figure 2.

File Fragmentation Statistics

_DUB1:

	Directory Files	Volatile Files	Normal Files	Rarely Accessed Files	Total Files
Files	118	38	364	3,612	4,132
Fragments	118	38	368	3,656	4,180
Total Size	888	288	382,569	202,653	586,398
Average Frag. Size	7.5	7.6	1,039.6	55.4	140.3
Average Frag./File	1.0	1.0	1.0	1.0	1.0

Free Space Size Statistics

_DUB1: Size Range	Number of Holes	Size Range	Number of Holes
0 - 4	54	1,001 - 2,000	0
5 - 10	3	2,001 - 4,000	1
11 - 20	2	4,001 - 10,000	1
21 - 40	4	10,001 - 20,000	0
41 - 100	4	20,001 - 40,000	0
101 - 200	2	40,001 - 100,000	1
201 - 400	3	100,001 and up	0
401 - 1,000	2	Total:	77

Selected disk statistics on DUB1: after running Rabbit-7 for three days.

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Free space takes 20 percent of the disk. The remaining space (10 percent) is taken by the index file and the directory files.

Bear in mind that Raxco's goal is to optimize, not just defragment your disk. In the documentation, Raxco illustrates how disks become fragmented after beginning in an "ideal" state.

DEC's recommended defragmentation strategy is to use BACKUP and RESTORE. This produces a disk that illustrates what Raxco calls the Backup Model (see the diagram at the beginning of this review). After a RESTORE, files are contiguous and placed at the beginning of the disk, with free space at the end (see top line of the Backup Model). The largest chunk of the index file is at the middle of the disk. As files are subsequently created, copied and deleted, the disk progresses to the fragmented state shown in the third line of the Backup Model.

The idea behind Raxco's Optimized Model is to place certain files at a place on the disk that presumably will speed performance (see diagram). Directory files are placed near the index file at the center of the disk, minimizing seek time if a directory file and then the index file are accessed. Warehouse files are placed at the back of the disk.

The front of the disk is arranged with free space centered between the rest of the files, with the most volatile files closest to the free space. The strategy is that as volatile files are deleted, they tend to enlarge an existing chunk of free space rather than open a hole elsewhere on the disk. In the Optimized Model, the fifth line shows a disk after several passes of creating, copying and deleting files. The disk is in better shape than it would have been if we'd started with the Backup Model.

Rabbit-7 can be set to run according to your particular environment. By using qualifiers, you can control the specific times and frequency with which PerfectDisk works. You also can specify times for Rabbit-7 to hold back. You can run PerfectDisk interactively or request that it start as a detached process. The options are best illustrated by example.

We started Rabbit-7 on our user disk

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by issuing the following command:

```
$ R7/DETACHED DUB1:/WATCH/NORUN/CYCLE= -
_$ (LENGTH=1-)/AVOID=(START=0-8:00:00,-
_$ END=0-17:00:00)/THROTTLE=(START=-
_$ 0-17:00:00,END=0-21:00:00)
```

The /DETACHED qualifier starts R7 as a detached process. /WATCH with the /NORUN qualifier instructs Rabbit-7 to make an initial pass to determine the level of fragmentation and run only when the level of fragmentation becomes too high (the threshold isn't indicated in the documentation). I called Raxco to find out exactly how PerfectDisk knows when to start a defragmentation pass and was told that the limit is based on a proprietary algorithm.

The /CYCLE qualifier in this case indicates in VMS delta-time format that the cycle length is one day. You also can specify the START time and the END of the cycle in VMS absolute time format. The /AVOID and /THROTTLE qualifiers indicate the START and END times, in delta-time format, when PerfectDisk shouldn't run and should slow down, respectively. You can put your PerfectDisk startup command in your system startup command file if you wish.

How did Rabbit-7 perform? In three days, we went from a fairly fragmented disk to one as contiguous as we could hope for (compare Figures 1 and 2).

The documentation does a good job of explaining the product. Numerous examples are provided, and the installation section is complete. The appendix contains a command-qualifier reference that organizes the qualifiers on separate pages alphabetically, complete with examples.

If you're in the market for a disk defragmenter, Raxco might have what you need. PerfectDisk is a flexible, easy-to-use product that lets the harried system manager worry about one less thing. ■

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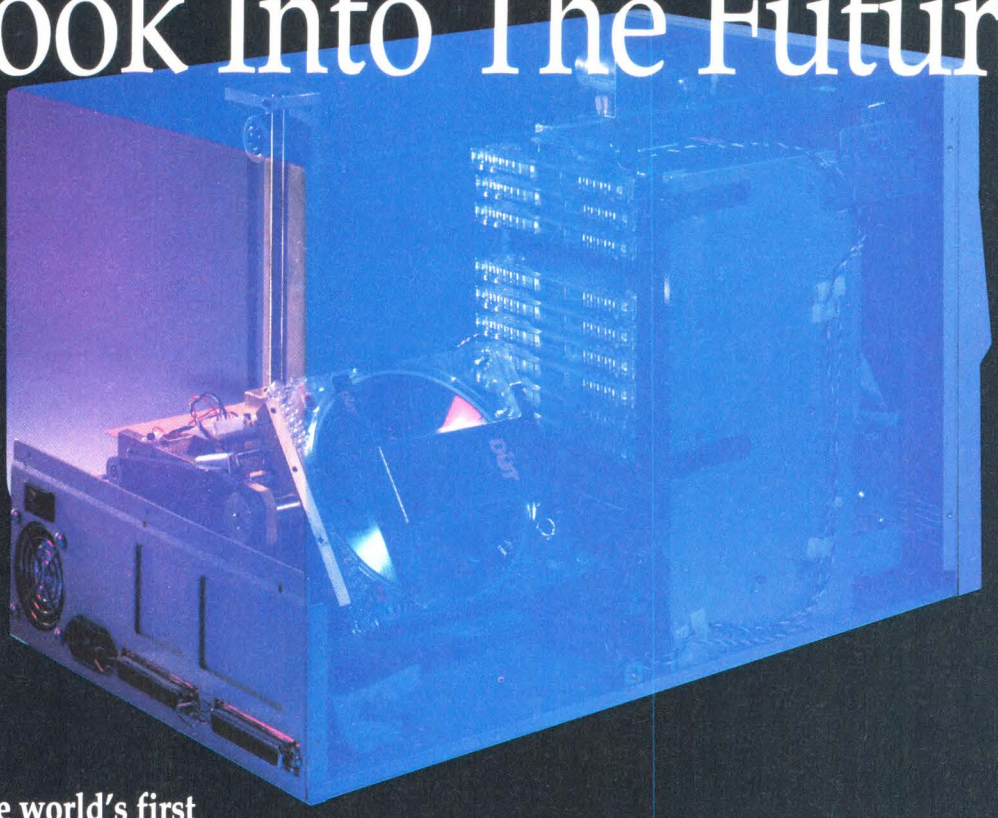

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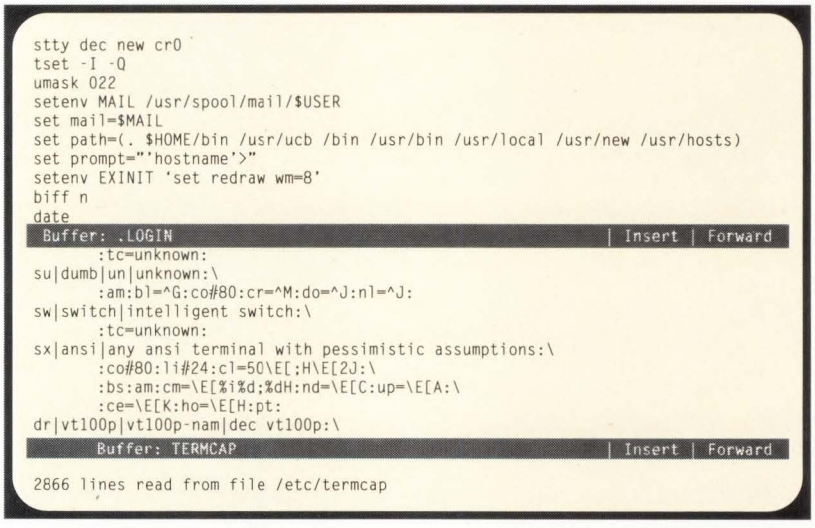
Get A Full-Function Version Of VAX TPU For The UNIX/ULTRIX Environment With a/Soft Development's nu/TPU.

TPU GOES UNIX



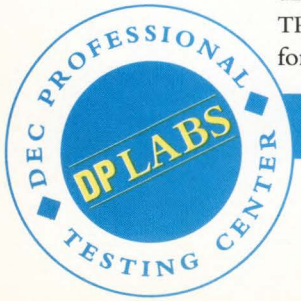
The familiar EVE editing screen with two windows containing a .LOGIN file and a TERMCAP file.

One of the first of many frustrations for anyone migrating from VMS to UNIX or ULTRIX is the text editor. If you're accustomed to EDT or EVE, vi can be maddening. In fairness, vi's forte is that it's usable on many terminals. But if you like the DEC LK201 keyboard, you'll still yearn for your favorite VMS editor. To solve this dilemma, a/Soft Development offers nu/TPU, a full-function version of VAX TPU for the UNIX/ULTRIX environment.

We installed version 2.0.3 of nu/TPU on our Lab's DECsystem 3100. The software was provided in tar format on a TK50 tape cartridge. Installation requires root(su) privileges and 1 MB of disk space. A serial number, which is provided, is requested when the installation script is run.

We installed nu/TPU under our **/usr/local** directory. A top-level nuTPU directory is created at this level, and the tpu binary executable file is placed in **/usr/**

BARRY SOBEL



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local. I'll refer to **/usr/local/nuTPU** as the nu/TPU environment variable **TPU_HOME**. All that's needed is to copy the files to the desired location and type nuTPU/install at your UNIX prompt to run the script.

When we ran the script, the installation completed, but we got a message saying:

```
cp: ~/.TPUdefaults:
  No such file or directory
```

The software seemed to function OK after that. We assumed it was because we didn't have a default file set up in our home directory. A check with a/Soft confirmed our theory — the message is informational and will go away once you create a default file. The company plans to get rid of the message in a future release.

Let's Get Started

To run nu/TPU, type tpu at your system prompt. The program then goes through a startup procedure based on the environment you have set up.

The program first establishes your home directory based on the HOME environment variable. It then establishes its own home directory, usually **/usr/local**. Then nu/TPU looks for a . TPU defaults file in your home directory. This is a file in which you'd place any deviations from the nu/TPU default environment variables or any command line options (or qualifiers in the VMS world). For example, you could specify your terminal type as VT200 by including the line:

```
TERM:VT200
```

in your defaults file. This variable should be set to a valid **/etc/termcap** device.

It's also a good idea to set the variable KEYBOARD to a valid nu/TPU keyboard device. Valid nu/TPU devices are listed in the file **TPU_HOME/dev**. If nu/TPU doesn't find the defaults file, it gives the informational message shown above.

If no command line switch is specified, the default section file **TPU_HOME/common/tpusec.ini** is executed. A nu/TPU section file is equivalent to the default section file read when executing the VMS EVE editor. An nu/TPU section file is a compiled binary file of nu/TPU procedure definitions and statements. As with VMS, you can SAVE the current environment or compiled nu/TPU procedure or command file to a designated

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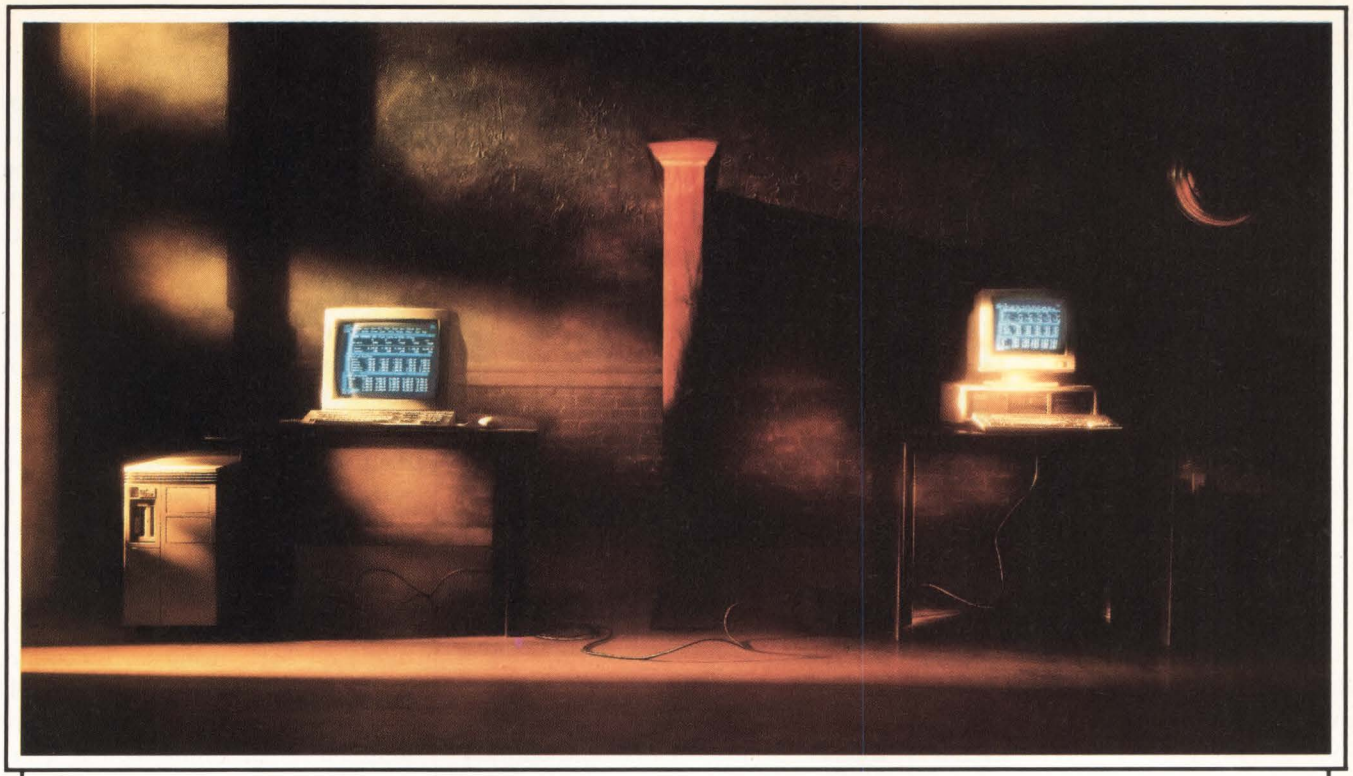

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Code AAZ

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> ***There are numerous ways to customize your environment by either modifying startup files or using EVE commands.***

section file and refer to it with the command line /SECTION= switch or place the definition in your HOME defaults file:

```
SECTION_FILE:mysec.ini:
```

The command file is now executed; if none exists, the **TPU_HOME/common/tpuini.tpu** file is executed by default. Then TPU$INIT_POSTPROCEDURE is executed, followed by the screen manager/keyboard driver loop.

As with VAXTPU using the EVE interface, there are numerous ways to customize your environment by either modifying startup files or using familiar EVE commands. The most important ones that allow full customization of your environment as in the VMS world are:

```
DEFINE KEY
LEARN
EXTEND EVE
EXTEND TPU
SAVE EXTENDED EVE
SAVE EXTENDED TPU
```

You can customize your editing environment as extensively (pun intended) as on a VMS system.

Edit To Forget

I went into nu/TPU with the intention of forgetting that I was on an ULTRIX rather than a VMS system. Once you bring up the familiar EVE screen, this is easy to do (see screen at the beginning of this review).

I usually start by defining function keys to do windowing and file manipulation using the LEARN command. I defined F17 to ONE WINDOW, F18 to TWO WINDOWS and F19 to the OTHER WINDOW command. I also defined PF4 to ERASE LINE.

I had a problem executing SAVE EXTENDED EVE when I tried to save my customizations to a section file. If I didn't specify the path (I was running nu/TPU from my home directory), I got the message:

```
pid 8588 (tpu) was killed on unaligned
  access, at PC0
Bus error (core dumped)
```

At this point, the only way I could get out was to kill my shell process from another terminal. I called Soft, but they couldn't resolve the problem. It appears that the program writes to protected areas of memory — perhaps it can't deal with an unspecified file reference and causes a shift in byte alignment. It's the first occurrence of the problem, and a/Soft and I suspect that it might be related to the C compiler on the Mips Computer Systems chip in the DECsystem.

I also discovered that nu/TPU makes an ungraceful exit if you try to SAVE EXTENDED EVE over a file you've just created. The message reads:

```
PROGRAM ERROR! Do you want to save
  your work? (Y/N):
Abort session by Control-C
```

a/Soft hopes to have these problems solved in V3.0, which is targeted for release in December.

Once I was able to create my section file, I could reference my "personal" section file by using the /SECTION switch at the command line. You also can specify the switch with the UNIX dash convention (-). Be aware that nu/TPU expects to find a section file in the **TPU_HOME/common** directory, so you need to specify the full pathname, if your file is in your HOME directory, or use the UNIX/ULTRIX current directory "shortcut" reference:

```
tpu -section=./mysec.ini myfile.dat
```

The program supplies default keypad mappings for the EDT, WPS and (if you still want it) vi editors. You simply enter SET KEYPAD editor_name at the EVE command prompt. The default mapping is EVE.

THE PROGRAM COMES with a Pascallike programming language. You can design a new word processing interface, including the exact conditional operation of, say, the down arrow key. Most users won't want to go this far to tailor the program for normal work, but this is useful if you need to define functionality for a forms design system, for example.

The documentation is contained in one paperback manual. A complete command reference is included, as well as keyboard diagrams, a list of built-in functions and a programming tutorial. A list of error messages and their explanations is also provided.

nu/TPU is one of a growing number of products designed to make UNIX more palatable to the world outside the UNIX community. a/Soft has brought a popular and powerful text processing system to the UNIX/ULTRIX world. Once the company gets the bugs out, the combination of nu/TPU's versatility and the RISC chip's speed will be hard to beat. ■

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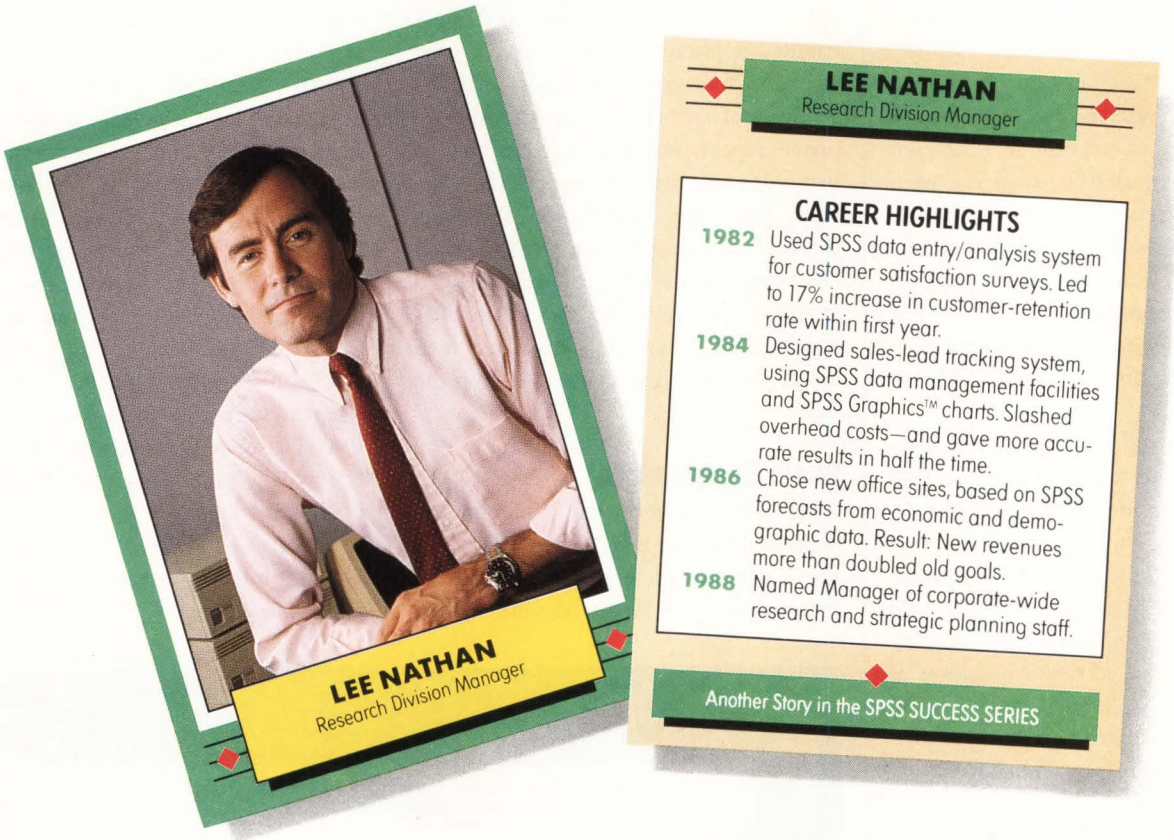

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NETWORKING

Distributed Computing: DCE Versus ONC

Bradford T. Harrison

As of May 15, the computer industry officially had two distributed computing standards. On that day, the Open Software Foundation (OSF) announced, to no one's surprise, its selection of the DEcorum Distributed Computing Environment (DCE) from entries received in response to a Request For Technology (RFT) issued last year. The DCE environment includes technology not included in the original DEcorum package — most notably, support for Sun Microsystems' PC-NFS — but the package was for the most part adopted as submitted by DEC, IBM, HP and others.

Also to no one's surprise, Sun condemned the selection and the selection process and promised the industry that, regardless of the fact that its Open Network Computing (ONC) submission was rejected by OSF, it will continue to build on the 1.2 million nodes already supporting ONC. Sun called OSF's inclusion of PC-NFS in DCE "trivial" and implied political bias against Sun and other companies whose affiliations are with UNIX International (UI).

Primarily because of the Network File System (NFS), the first service made available in ONC in 1984, ONC represents the de facto standard distributed computing environment. Further, ONC has been incorporated into UNIX System V version 4 by AT&T, and PC-NFS was selected by x/Open as the primary component for its PC-to-UNIX connectivity specification. Ostensibly, the ONC submission was dismissed by OSF due to lack of technical merit. ONC has had its problems, but it represents a grass-roots movement in the industry and has demonstrated a remarkable upward compatibility as upgrades and revisions have been brought to market by Sun and the extensive third party that Sun technology has fostered.

The contest between the two distributed computing environments ultimately will be decided by the quality of the distributed applications they produce over the next few years. For users of DEC equipment, the DCE standard should prove especially attractive, since DEC technology constitutes much of the standard. With the exception of the Network Computing System (NCS), which DEC supports but which already has been available for several years from HP-Apollo, DEC's head start will allow it to be the first company to get DCE into the field.

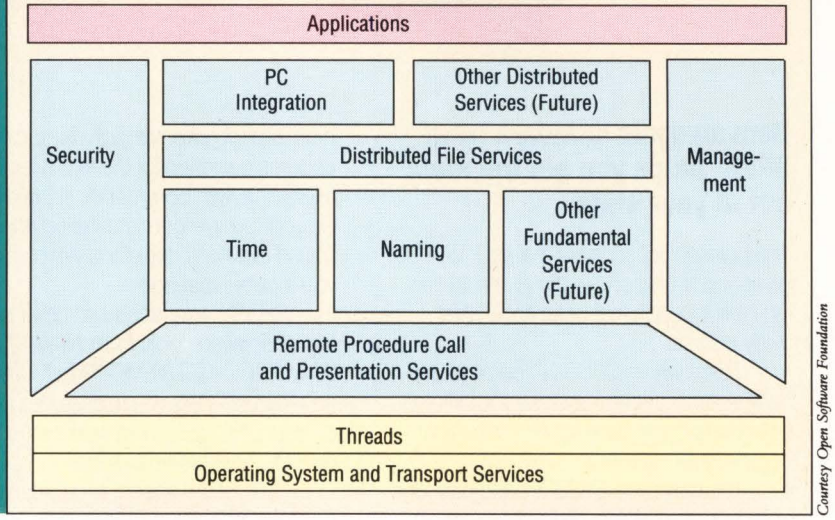
Basic Components

Figures 1 and 2 show the basic components of DCE and ONC respectively. Figure 3 itemizes these basic components. Functionally, the two environments are the same and even overlap in some areas. The similarities are far greater than the differences.

Unfortunately, the biggest difference is in the Remote Procedure Call (RPC) mechanisms, which form the foundations on which the other components are constructed. Both environments were born in the UNIX world and continue to rely heavily on C. DCE is written in Standard C and uses standard interfaces such as those specified by POSIX and x/Open for operating system services. It's easily ported to any UNIX-based operating system, and support is becoming available for other operating systems, particularly VMS and MS-DOS. DEC has already announced support for NCS on VMS via the VMS/ULTRIX Connection (UCX), and OSF will be sponsoring a third-party port of NCS to DOS.

ONC, also written in C, is already available on all primary operating systems, including DOS, OS/2 and the Mac

FIGURE 1.



Courtesy Open Software Foundation

The components of the DEcorum submission constitute the bulk of DCE technology.

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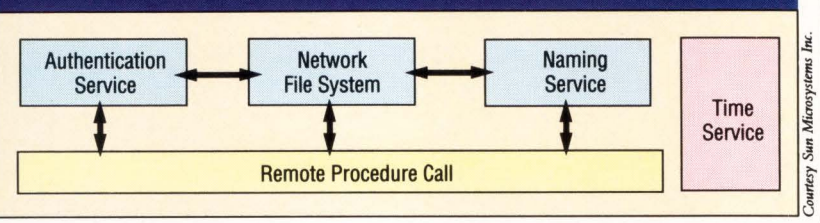
FIGURE 2.



Courtesy Sun Microsystems Inc.

Sun Microsystems will build on the 1.2 million nodes already supporting its ONC services.

FIGURE 3.

Function	DCE Component	ONC Component
RPC	NCS RPC	ONC RPC
RPC Compiler	NCS NIDL	RPC Tool
File System	AFS	NFS
PC Integration	PC-NFS, LM/X	PC-NFS
Naming Service	DECdns, DIR-X	NIS
Time Service	DECdts	NTP
Security	MIT Kerberos	MIT Kerberos

When the basic components of DCE and ONC are compared, it becomes clear that the similarities are greater than the differences.

OS. Sun claims that 1.2 million nodes already support ONC, though the company distinguishes between "exposed" and "unexposed" ONC nodes. Sites where NFS is the only ONC service in use usually won't provide programmers with libraries that allow them to use RPCs directly from their applications, whereas sites where the RPC is exposed support these libraries. Sun estimates that 800,000 nodes worldwide support exposed ONC RPCs.

ULTRIX supports exposed RPCs. According to Herrick Johnson, a product manager in the ULTRIX software group at DEC, customers have access to the ONC RPC in ULTRIX, but it isn't well-supported by DEC, and programmers more or less have to work with it on their own. "It's a primitive mechanism," says Johnson, "but as long as we support NFS in ULTRIX, programmers will have access to the RPC libraries." All ONC services may thus be implemented in ULTRIX, though NCS and the other components of DCE are rapidly being incorporated into the operating system.

RPC Wars

NCS and ONC RPCs were discussed in detail in "Harvesting Processor Power With NCS" (July 1990). The RPC is the fundamental component of distributed computing, and the NCS and ONC RPCs are engaged in a cutthroat battle for market share.

Sun has enlisted support for its RPC from AT&T, Banyan Systems, Netwise, Novell, 3Com and others, while the market force of the traditional mini and mainframe companies — the OSF members, for the most part — is solidly behind the NCS RPC. The differences between the two RPCs aren't great, but they're substantial enough that interoperability is impossible.

The primary differences are in data representation methods and the compiler interface definition languages (IDL). Further, an ISO RPC standard is expected soon, and OSF and Netwise, the dominant vendor of ONC RPC-compatible compiler products, are attempting to predict and provide migration paths to the standard. Netwise in particular has marketed its RPC Tool under the OSI compatibility umbrella. The product is compliant with ISO 8824 ASN.1 Basis Encoding Rules, and Netwise has delivered beta versions of the RPC Tool that adhere to the ISO application, presentation and session layer protocols (ISO standards 8650, 8823, 8327).

Sun is fully behind Netwise and its RPC Tool. In fact, Sun has lessened support for its own RPCgen compiler in favor of the Netwise product, and AT&T will be making RPC Tool available with UNIX System V.4 later this year.

On the other hand, OSF claims that NCS is better positioned to respond to developments in the area of international standards. That's primarily because its IDL as implemented in the Network Interface Definition Language (NIDL) compiler is less dependent on C calling conventions than is RPC Tool. OSF also states that the DCE implementation of the NIDL compiler allows substitution of the Network Data Representation (NDR) method of data representation with ASN.1 and that an agreeable encoding mechanism between peers may be negotiated at run time, making the NCS RPC highly flexible.

But according to Larry Lytle, director of strategic relations at Netwise, OSF is hard-pressed to prove any compliance with any OSI standard. "I challenge OSF to name a single OSI spec with which DCE is compliant," says Lytle. "It's all propaganda."

Doug Hartman, director of RFT engineering at OSF, admits that OSI compatibility at this point is tenuous, but there's no reason to believe that Netwise is any closer than OSF. "We're all watch-

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ing and attending the meetings," says Hartman. "But one thing's for sure: Once an OSI RPC is finalized, there's going to be no such thing as 94 percent compliance. It's going to be all or none."

Apart from the OSI compatibility issue, Netwise also objects to DCE and NCS on the basis that NCS is, by OSF's own admission, a tightly coupled and therefore closed system. In fact, OSF points out that one of the primary reasons for rejecting the RPC Tool DCE submission was because of its RPC Extensions feature, by which programmers can customize code and change the RPC protocol according to the needs of the application.

"They've got it backward," says Lytle. "That's a strength, not a weakness. Programmers need that level of control."

But according to Hartman, the flexibility works against the standard. "Look at TCP/IP and NFS," says Hartman. "It's because they were fully specified and immutable that they're the worldwide standards they are today. The same is happening with NCS. The programmer has all the control he needs."

Some third parties are choosing to be neutral in the RPC wars and are evolving their products to support both camps. A good example is TGV, manufacturer of TCP/IP client and server software for VMS systems.

TGV has announced support for both RPCs in its MultiNet product (see Figure 4). Because MultiNet supports multiple $QIO interfaces to its networking kernel, the product provides ONC RPCs through the native MultiNet $QIO interface (NETDRIVER) and NCS RPC support via emulation of the UCX $QIO interface (UCXDRIVER).

> ***"Some third parties are choosing to be neutral in the RPC wars and are evolving their products to support both camps."***

File System Submissions

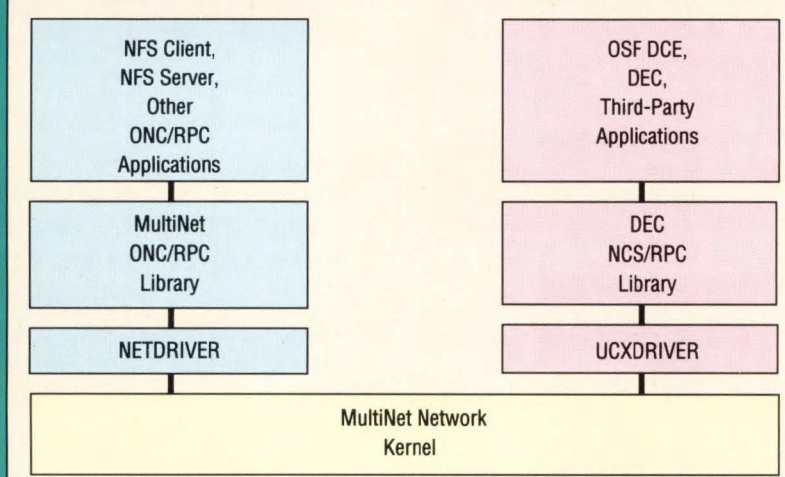
Sun originally designed its RPC to implement NFS. It was a crude mechanism, but it has undergone substantial improvement. Still, AFS, the file system developed at Carnegie-Mellon and submitted by Transarc as part of the DEcorum package, is a far more sophisticated file system than NFS. It isn't stateless, as is NFS, so it allows for added functionality and performance, although at the cost of poor crash recovery capability. Further, AFS supports NFS and PC-NFS via a mechanism that identifies NFS requests and responds in a way that's indistinguishable from an NFS server.

Originally, AFS sent an entire file to a client, and the client was responsible for writing the file back to the AFS server with any changes. Now AFS works in 64-KB chunks, which may or may not encompass the entire file. Full network file system transparency is preserved, and support for file and record-locking is included. AFS is implemented using NCS.

But Sun and the third party have a lot in store for NFS, as well. Companies such as Auspex Systems, Epoch Systems and Omni Solutions have developed server products explicitly engineered to support NFS, and the companies are keen on participating in improving the technology. Sun has promised greater NFS performance by streamlining NFS requests and using local disk caching to allow for better client/server ratios. Other improvements are on the horizon, as well, including mechanisms that make read-only NFS resources more available through replication.

Interestingly, OSF included PC-NFS, along with LAN Manager/X (LM/X), submitted by HP and Microsoft, as the Personal Computer Integration (PCI) component in DCE. PCI ensures that the huge base of DOS machines is included in DCE. LM/X adds sophisticated print queuing and network management capabilities to the file access capabilities pro-

FIGURE 4.



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vided by PC-NFS.

Sun is unimpressed by the inclusion of PC-NFS in DCE and states that it didn't even include PC-NFS as part of its original submission to OSF. OSF's Hartman says that it was included because of the large number of DOS client applications that rely on NFS. But Netwise's Lytle claims that it was selected because it's too difficult to implement NCS on DOS machines due to the limited memory. "NCS is a memory hog," says Lytle. "They can't get NCS on PCs." But Hartman rebuts by saying that NCS has already been implemented under DOS, and an official OSF port can be expected soon.

Complementary Components

Naming and timing, two young but important characteristics of distributed computing, are receiving increased attention as networks expand. Humans need simple methods of referring to network resources. At the same time, distributed computing mechanisms need efficient directory look-up capabilities and rapid access to information regarding network resource availability.

Similarly, since distributed systems share no common clock or memory, a synchronization scheme based on some sort of distributed timing mechanism must be implemented.

With its background in distributed computing and clustering, DEC was in the perfect position to provide the successful candidates for DCE naming and timing mechanisms. DCE includes the DEC Distributed Naming Service (DECdns) and Distributed Timing Service (DECdts).

The core ONC naming service is called the Network Information Service (NIS), formerly known as Yellow Pages (YP). ONC was designed to operate with other naming services as well, including the OSI X.500 standard, which is finding rapid acceptance worldwide. DEC has also been working on incorporating X.500 into DECdns, but X.500 capabilities weren't demonstrable during the DCE evaluation period. OSF thus selected an X.500 service submitted by Siemens called DIR-X.

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For timing, Sun supports the Network Time Protocol (NTP), an Internet standard defined by the Internet Activities Board (IAB). A public domain implementation of NTP was also submitted to OSF by Transarc, but since DECdts interoperates with NTP, the public do-

main implementation wasn't selected.

For network security, OSF membership almost unanimously endorsed the MIT Kerberos authentication system. Sun has also announced support for Kerberos, which will be used in conjunction with its existing Secure RPC based on the Data Encryption Standard (DES) defined by the National Institute of Standards and Technology (NIST). Kerberos implements a "ticket granting service" that uses data encryption keys and "tickets" to enable secure client/server communications. The system is unique in its use of a physically secured device responsible for issuing the tickets to the nodes on the network that wish to communicate.

Finally, OSF incorporated thread technology based on a submission from DEC. Sun also has announced its intent to support threads in ONC distributed computing environments. Threads are used most often in multiprocessing environments and have gained popularity as part of the Mach operating system. They're distinguished from processes because they're "lightweight," that is, a single process can provide a common execution environment for several threads. Threads can substantially speed execution and improve network performance, especially on servers. Threads also provide the programmer with an easy-to-use method of implementing concurrency in distributed applications.

YOU CAN EXPECT distributed applications and advanced programming tools for distributed environments to appear in force later this year, though Sun already claims some 90 distributed ONC applications, and interest in the ONC RPC is growing rapidly. Similarly, the HP-Apollo Domain environment has already fostered a variety of NCS-based distributed applications, and HP is providing full support for NCS in HP-UX programming environments. The migration away from single-machine programming is well under way, and though the industry can't agree on distributed computing standards, the benefits of distributed computing can certainly already be realized. ■

FIELD SERVICE

Ron Levine

Servcon, Sorbus/Bell Atlantic And Value-Added Services

The service industry holds a number of conferences and exhibits during the year that showcase services and new products. Two such events are the May Servcon (Service Conference), sponsored by United Publications, and the upcoming Frost & Sullivan Third-Party Maintenance Conference in September. They focus on products, services and trends of interest to those who service systems, those who purchase service or maintenance and those responsible for maintenance services.

This year's Servcon, held in Naples, Florida, included sessions that focused on the decade's trend away from traditional hardware-only maintenance toward value-added services. This is a major shift in the service industry that will affect everyone who works in or is responsible for service, both at the user and service-provider levels.

More than 60 speakers participated in 30 high-level sessions covering subjects from in-house maintenance management to decreasing your dependence on the OEM; from disaster recovery to negotiating a service contract; and from implementing expert system service solutions to selecting the best services package to meet corporate goals. Other sessions covered subjects such as improving service productivity, logistics management and remote software support — all of particular interest to managers planning or performing self-maintenance.

An end-user forum provided exceptionally informative insight into "partnering" in-house and outside services. Most notable was an account of how one DEC user, a financial company, saved $700,000 the first year and $1.2 million the second year and expects to save more than $4 million next year with this type of maintenance plan. The company did this with an in-house staff of 46 people and in the process improved its equipment uptime-to-downtime ratio.

Servcon '90 illustrated that the hottest new products in field service center around software "tools," training and maintenance management programs to make the job of keeping your system up and running easier. Whether you're a self-maintainer or an outside service vendor, these latest items will have a major impact on the way you deliver service in the near future.

At Servcon we learned that although standard hardware-type test equipment is no longer the hottest game in town, it's still making impressive advances. And there are a number of new devices that will become available later this year to aid the technician in troubleshooting complex systems and data communications networks. For example, tools for cable-checking and cable-monitoring, wire-crimping and circuit board repair are entering the marketplace — all compact and able to be used quickly with little or no training.

On the more exotic end, artificial intelligence/expert system troubleshooting tools (see "Expert Systems: From Promise To Reality," July 1990) and completely automated voice interactive service call logging and handling systems are making their appearance in the service industry. Add to this remote diagnostics with predictive maintenance capabilities and disaster prevention packages that protect your computer room against adverse environmental conditions and intruders, and it's easy to see why serv-

Heard In The Field

■ The San Francisco Maintenance Group (SFMG) underwent a complete restructuring in June. Company President and Founder Paul Files resigned, and the company's San Francisco office was closed. Former vice president — and new president — Mike Clark moved all operations to the company's Sandy, Utah, office near Salt Lake City.

SFMG encountered financial difficulty when promised venture capital never materialized. Since its inception in October 1989, the company had been successful in landing major vendors and clients for its service and related offerings (see "Freedom Of Choice," January 1990). According to Clark, however, it was stretched too thin across too many product and service lines.

The company will now limit its focus to providing diagnostics, equipment and spares for the DEC market. It has secured new bank financing and is filling orders without problems, reports Clark. SFMG customers include Bell Atlantic Business System Services, General Electric, Maintech and McDonnell Douglas Field Service (MDFSC).

■ The soap opera continues at MDFSC. Once again the company missed its deadline for going private. As reported in *DEC PROFESSIONAL* in March ("LBO Of McDonnell Douglas Field Service Company?" page 132), a management buyout had occurred but hadn't been completed. Most recently, MDFSC was hoping for a June 30th announcement and name change.

■ Maintech is looking to acquire service companies working with DEC and/or Sun Microsystems computers in the Boston and Chicago areas.— *R.L.*

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Misnomer No More

In April, Sorbus, a major independent maintenance and service company, changed its name to Bell Atlantic Business Systems Services. This renaming reflects the changing role of the service industry in meeting the needs of users.

The hardware service industry produced revenues of more than $11 billion in 1989 and is forecasted to grow to more than $14 billion by 1994, according to industry research firms. However, although hardware maintenance and service will grow as we progress through the '90s, it's expected to be an ever-decreasing piece of the service pie. The new so-called value-added services will become the hot growth sector for service providers.

Sorbus, with more than 30 years' experience in the computer industry, has noted this shift. The company worried about being left out of this '90s trend by being wrongly perceived as a hardware-only maintenance provider and not as a full-service organization. The new name more accurately reflects the company's capabilities.

"The changing requirements of business computer installations demand that today's successful service companies offer more than traditional hardware maintenance," says Gene Greer, Bell Atlantic Business Systems Services president and chief operating officer.

At the same time, Business Systems Services is strengthening its hardware maintenance. For example, the company recently announced an agreement with Sun Microsystems to supplement Sun's delivery of hardware-related customer service in the Eastern U.S. The accord expands the number of FEs available for on-site hardware maintenance calls for Sun equipment. Sun will retain complete responsibility for customer service on its products.

Sorbus was acquired by Bell Atlantic in 1985. Business Systems Services, together with its sister organization, Computer Technology Services, offers many value-added services and customer support options, including disaster recovery, software support and remote diagnostics, as well as traditional hardware maintenance services. Greer indicates that these service offerings will be broadened across a wide range of technologies to meet the needs of the marketplace. ■

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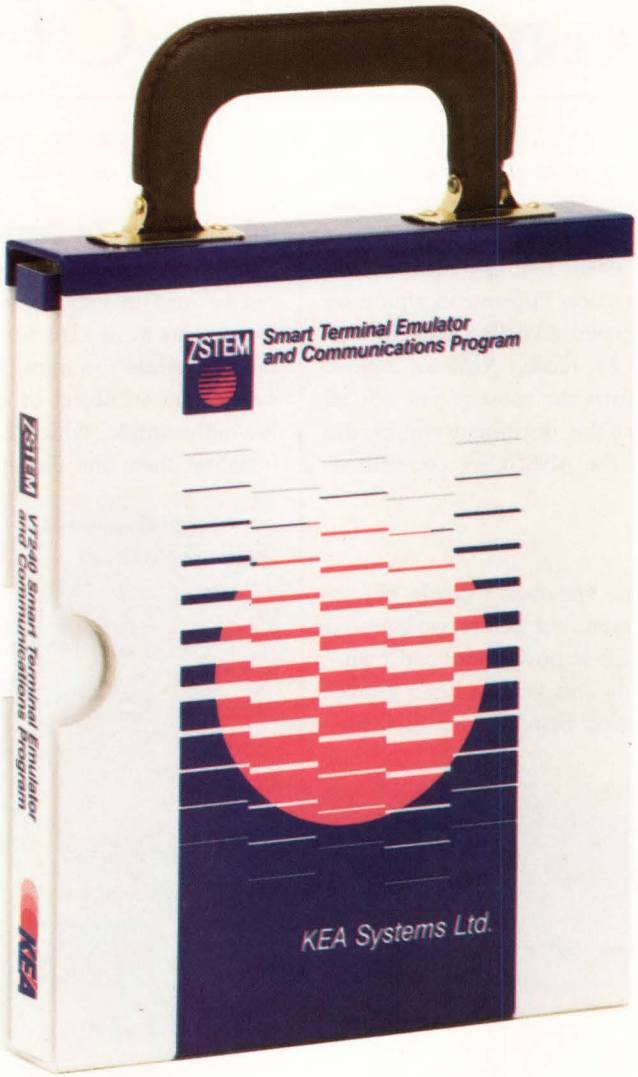

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LET'S C NOW

Rex Jaeschke

Constructors In C++

Editor's note: C Editor Rex Jaeschke continues looking at the C++ language. This month he introduces us to the world of constructors and destructors.

Since my last C++ column (April 1990), I've upgraded to V2.0 of Zortech's C++ compiler. This version implements almost all of C++ release 2.0. I've also purchased AT&T's UNIX System V C++ Language System Release 2.0 *Product Reference Manual* (Select Code 307-146), because this is the most recent official definition of the language. I expect this document will be the base used in the deliberations of the ANSI C++ committee, X3J16.

Classes Revisited

In an earlier installment on classes, we used a **circle** object. We'll continue to use this object type, but before we proceed with new information let's look back at how classes and member functions are declared and used. This version has a simpler version of the **print** member function than the one used previously:

```
#include ,<stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
public:
         void init(long, long, unsigned long);
        void print(char *);
};

main() {
        circle c1;
        circle c2;

        c1.init(5, 4, 10);
        c1.print("c1");

       c2.init(2, 9, 5);
       c2.print("c2");
}

void circle::init(long xo, long yo, unsigned long rad)
{
       xorigin = xo;
       yorigin = yo;
       radius = rad;
}

void circle::print(char *name)
{
        printf("%2s: %2ld %2ld %2lu\n",
                name, xorigin, yorigin, radius);
}

c1: 5 4 10
c2: 2 9  5
```

Since all or part of the class definition and some of the member functions are used in multiple examples below, common parts will be omitted where possible.

Introduction To Constructors

Simply stated, a constructor is a special member function that can be used to initialize an object. The name of a constructor is the same as its class name. For example, any constructor for the class **circle** also must be called **circle**. A constructor is called every time an object of its type is created. Consider the following example, which creates four automatic **circle** objects, initializes them and displays their contents:

```
// Introduce constructors

#include <stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
public:
         circle();
          circle(long, long, unsigned long);
         circle(long, long);
         circle(unsigned long);
         void print(char *);
};

main()
{
          circle c1(3, 5, 2);
          circle c2(4, 6);
          circle c3(2);
          circle c4;       // default initial value

          c1.print("c1");
          c2.print("c2");
          c3.print("c3");
          c4.print("c4");
}

circle::circle(long xo, long yo, unsigned long rad)
{
           xorigin = xo;
           yorigin = yo;
           radius = rad;
}

circle::circle(long xo, long yo)
{
          xorigin = xo;
          yorigin = yo;
          radius = 1;
}

circle::circle(unsigned long rad)
{
          xorigin = 0;
          yorigin = 0;
          radius = rad;
}

circle::circle()
{
          xorigin = 0;
          yorigin = 0;
          radius = 1;
}

c1: 3 5 2
c2: 4 6 1
c3: 0 0 2
c4: 0 0 1
```

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There are four different constructors, each called **circle**. They're declared using:

```
circle();
circle(long, long, unsigned long);
circle(long, long);
circle(unsigned long);
```

Since we already know that member functions can be overloaded, this isn't peculiar to constructors. And as you might expect, the declarations:

```
circle c1(3, 5, 2);
circle c2(4, 6);
circle c3(2);
circle c4;
```

cause each object created to be initialized with the constructor with the matching argument list. Since **c4** has no initializer, the default constructor (the one with no arguments) is called.

There's also an equivalent but longhand way of writing these declarations:

```
circle c1 = circle(3, 5, 2);
circle c2 = circle(4, 6);
circle c3 = circle(2);
circle c4 = circle();
```

Since a constructor is a member function, default arguments can be specified. For example:

```
circle(long = 1, long = -1, unsigned long = 2);
```

Although a constructor is really a **void** function, you can't declare or define it using the **void** keyword; **void** is simply implied. Also, you can't call a constructor yourself. It only gets called when an object of that class is defined.

Perhaps the main purpose of a constructor is to help eliminate the age-old problem of forgetting to initialize an object. In the C world, this can have disastrous consequences, especially with automatic pointers. If you don't have an explicit initializer in an object definition, the default constructor is called to provide a guaranteed default initial value. To define a default constructor, declare and define one that has no arguments and that initializes the object as you need it. Here, the default attributes of a circle are origin 0,0 and radius 1.

An object's initializer also can be an expression. For example:

```
circle c3 = 2;
```

is equivalent to:

```
circle c3(2);
```

For nonclass objects, C++ supports the same initializer format as C. Class objects also can have a C-style (brace-delimited) initializer if certain conditions exist. However, objects of a class that has one or more constructors can't be initialized in this way. A constructor or other member function must be used instead. As such, the following three declarations are invalid:

```
circle c1 = {3, 5, 2};  // invalid
circle c2 = {4, 6};     // invalid
circle c3 = {2};        // invalid
```

In May, I discussed VAX/VMS string descriptors. Two of the four fields in a descriptor are specific to a descriptor type and, if properly coded, never need to be seen by the application programmer. It would be straightforward to create a string descriptor class and have each constructor initialize these two fields to the same value each time an object of that class is defined. This completely eliminates the need for this initialization to be handled elsewhere.

Aggregates Containing Objects

As you might expect, it's possible to have an array of objects of class **circle**. Also, objects can be nested inside structures, unions and other classes. An array of circles is declared just as in C. The interesting issue is the initializer format. For example:

```
// Initializing class object arrays

main()
{
        circle c[6] = {
                circle(1, 2, 3),
                circle(1, 2),
                circle(2),
                4
        };

         c[0].print("c[0]");
         c[1].print("c[1]");
         c[2].print("c[2]");
         c[3].print("c[3]");
         c[4].print("c[4]");
         c[5].print("c[5]");
}

c[0]: 1 2 3
c[1]: 1 2 1
c[2]: 0 0 2
c[3]: 0 0 4
c[4]: 0 0 1
c[5]: 0 0 1
```

The declaration of **c** specifies an array of six circles. However, only the first four are initialized explicitly, as follows:

```
circle c[6] = {
        circle(1, 2, 3),
        circle(1, 2),
        circle(2),
        4
};
```

In Standard C, all expressions in an initializer for an aggregate must be constant expressions — even those for automatic objects. This isn't true in C++, however. Clearly, a constructor is a function that must be called at run time. And as we'll see, even static objects can have initializers. Such objects are allocated and, as far as C is concerned, initialized at compile or link time. When the constructor approach is used to initialize an object, C++ permits nonconstant expressions. How then are the initializer expressions handled and what are the default values used for the last two elements?

According to their argument list, the first three expressions map into three distinct constructors. And as we saw earlier, the

expression 4 is equivalent to **circle(4)**. That results in a call to the constructor with one argument. The unspecified elements take on the value provided by the default constructor **circle( )**. The same approach is used for other kinds of nested aggregates and multidimensional arrays.

Destructors

Having a function get called each time an object of a class is created can be useful. However, it might be useful to also have one called when the object is destroyed. C++ supports such a capability, and it's called a destructor — a member function similar to a constructor.

Consider the following example in which four objects are created and destroyed based on their scopes in the program. A count of the number of objects in existence at any time is maintained, its value being displayed each time an object is created or destroyed:

```
// Introduce destructors

#include <stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
        static unsigned count;
public:
         circle();        // constructor
         ~circle();       // destructor
         void print(char *);
};

main()
{
         circle c1;

         c1.print("c1");
        {
                 circle c2;

                 c2.print("c2");
                {
                         circle c3;

                         c3.print("c3");
                }
        }
        {
                 circle c4;

                 c4.print("c4");
        }
}

circle::circle()
{
        xorigin = 0;
        yorigin = 0;
        radius = 1;
        ++count;
         printf("In constructor, count = %u\n", count);
}

circle::~circle()
{
        --count;
         printf("In destructor, count = %u\n", count);
}

In constructor, count = 1
c1: 0 0 1
In constructor, count = 2
c2: 0 0 1
In constructor, count = 3
c3: 0 0 1
In destructor, count = 2
In destructor, count = 1
In constructor, count = 2
c4: 0 0 1
In destructor, count = 1
In destructor, count = 0
```

A destructor is declared and defined using the following form:

```
~circle();
circle::~circle() {...}
```

Since you can never call a destructor directly and there's no implied argument list as exists in a constructor, you never have more than one destructor per class. Destructors never have arguments and like constructors are implicitly **void** functions.

> ***Private members having the storage class static are shared by all objects of that class.***

As we learned in a previous installment, private members having the storage class **static** are shared by all objects of that class. That is, all **circle** objects share the same count field. Since a static member has an initial value of zero, it can be used to keep track of the number of objects of type **circle** at any time. This is done simply by incrementing **count** each time a constructor is called and decrementing it when the destructor is called, as shown.

Since this example doesn't require the circle origin coordinates, they've been omitted. Here, all objects have automatic storage duration, so conceptually they come and go at the start and end, respectively, of their parent block. And as shown, the constructor is indeed called at the start of the parent block. Similarly, the corresponding destructor is invoked immediately when that block terminates. Standard C doesn't say when an automatic object is destroyed. It just says that it's undefined behavior to try to access it after you've terminated its parent block. In fact, most C compilers don't release automatic object space until the parent function terminates. This is an implementation issue that isn't affected by C++'s requirements. C++ simply requires the destructor to be called at the expected place regardless of whether the object is physically freed at that point or not.

Nonautomatic Data And Ordering

Thus far, all of the objects used have been automatic, and it's clear when such objects are created and destroyed. But what about static objects? If they're really created at compile or link time, what's the order of evaluation of their constructors and destructors?

The following example contains global circles, static circles outside any function, and automatic and static circles within functions. The output shows the order in which the constructors and destructors are called. This ordering is intuitive:

```
// constructor/destructor calling order

#include <stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
public:
        circle(unsigned long);
        ~circle();
};

circle c1(1);
circle c2(2), c3(3);
static circle c4(4), c5(5);
static circle c6(6);

main()
{
        circle c(7);
        circle c8(8), c9(9);
        static circle c10(10), c11(11);
        static circle c12(12);

        {
                circle c13(13);
                {
                        circle c14(14);
                        void test(void);

                        test();
                }
        }
        {
                circle c15(15);
        }
}

void test(void)
{
        circle c16(16);
        static circle c17(17);

        {
                circle c18(18);
        }
}

circle::circle(unsigned long rad)
{
        printf("In constructor, %lu\n", rad);
        radius = rad;
}

circle::~circle()
{
        printf("In destructor, %lu\n", radius);
}
```

```
In constructor, 1
In constructor, 2
In constructor, 3
In constructor, 4
In constructor, 5
In constructor, 6
In constructor, 10
In constructor, 11
In constructor, 12
In constructor, 17
In constructor, 7
In constructor, 8
In constructor, 9
In constructor, 13
In constructor, 14
In constructor, 16
In constructor, 18
In destructor, 18
In destructor, 16
In destructor, 14
In destructor, 13
In constructor, 15
In destructor, 15
In destructor, 9
In destructor, 8
In destructor, 7
In destructor, 17
In destructor, 12
In destructor, 11
In destructor, 10
In destructor, 6
In destructor, 5
In destructor, 4
In destructor, 3
In destructor, 2
In destructor, 1
```

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CIRCLE 173 ON READER CARD

To make the output easier to follow, the radius of each circle created is the same number used in that variable's name. For example, **c6** is initialized with 6, **c10** with 10, and so on.

First, all objects of static storage duration, such as globals and those explicitly containing the keyword **static**, are initialized in the order in which they were declared in the source file — their lexical order. This accounts for objects 1, 2, 3, 4, 5, 6, 10, 11, 12 and 17.

Then, all automatic objects have their constructors and destructors called as the objects are created and destroyed — just as we saw in the previous example. This takes care of objects 7, 8, 9, 13, 14, 16 and 18.

At this point the program is executing inside the innermost loop of function **test**. As blocks are terminated, destructors are called in the reverse order, taking care of objects 18, 16, 14 and 13. Control then drops into the block containing **c15** in **main**, and **c15** is created and then destroyed. Then the remaining automatic objects in **main** go out of scope, taking care of objects 9, 8 and 7. Finally, before the program terminates, the static objects are also destroyed in the reverse order in which they were created, taking care of objects 17, 12, 11, 10, 6, 5, 4, 3, 2 and 1.

A similar situation occurs with aggregate initializers. For example, the following program shows the order in which constructors and destructors are called for the six elements in a 2-D array:

```
#include <stdio.h>

class circle {
        long xorigin;
        long yorigin;
        unsigned long radius;
public:
        circle(unsigned long);
        ~circle();
};

main()
{
        circle c[][2] = {
                {circle(1), circle(2)},
                {circle(3), circle(4)},
                {circle(5), circle(6)}
        };
}

In constructor, 1
In constructor, 2
In constructor, 3
In constructor, 4
In constructor, 5
In constructor, 6
In destructor, 6
In destructor, 5
In destructor, 4
In destructor, 3
In destructor, 2
In destructor, 1
```

As you might expect, based on the previous discussion of ordering, the elements are initialized in lexical order and destroyed in the reverse order.

We've learned about the ordering within a program built from a single source file. However, real programs are made up from many source files, each of which may contain static and automatic data declarations. How does that affect the order in which constructors and destructors are called? How does the executable program know which static constructors and destructors to call?

The compiler only sees one source file at a time. Apparently, for a linker to handle C++ objects it has to be much smarter than for C, and work is done at link time to handle all this. While I don't know the implementation details of this, I believe that the order in which you link your objects may be important, particularly if the initial value of one static object is somehow based on that of another. My advice is to experiment and read your implementations manual.

The definition of C++ doesn't include a library, and about the only "standard" header is stream.h.

Abnormal Scope Terminations

This explains a lot about the order of calling constructors and destructors, but what if you call **exit**, **abort** or something like **longjmp**? These functions unconditionally transfer control to some other place in the program and in the process bypass the usual block termination. Specifically, will destructors be called for objects in existence at the time of such a library call?

The definition of C++ doesn't include a library, and about the only "standard" header is **stream.h**. It's reasonable to assume that ANSI C++ will be a superset of ANSI C as much as possible and that the complete ANSI C library will be part of a Standard C++ environment. Meanwhile, it has to be that way: C++ is partly being sold as a concept because you can build on top of your existing C programs, adding only the C++ features you need.

According to Zortech's C++ manual and my research, **exit** causes constructors to be called only for static objects. **abort** doesn't invoke destructors, which is in keeping with **abort**'s purpose. However, by trapping **SIGABRT**s, using the **signal** function, you could intercept them and call **exit** yourself. This would be useful if you use the **assert.h** macro **assert** in debugging. This macro expands to a call to **abort** when **NDEBUG** isn't defined.

The **setjmp/longjmp** facility also behaves as you might expect. When **longjmp** restores to some previous context, all automatic objects created since that context was saved are de-

stroyed. However, no destructors are called, since the parent blocks are exited "abnormally."

The situation regarding **goto** is also intuitive. For example:

```
main()
{
        static circle c20(20);

        {
                circle c21(21);
                {
                        circle c22(22);

                        goto label;
                }
        }
        {
                circle c23(23);
label:          ;
        }
}

In constructor, 20
In constructor, 21
In constructor, 22
In destructor, 22
In destructor, 21
In destructor, 1311978
In destructor, 20
```

Even though control is transferred out of the blocks in which **c21** and **c22** are declared, their destructors still are called. However, because the block containing the definition of **c23** is entered in a way other than dropping into it, that object isn't initialized, as is the case with C. As such, the constructor isn't called for **c23**, but the destructor is.

If you intend to use utilities such as **exit**, **abort**, **longjmp** and **goto** in conjunction with constructors and destructors, you may have to be careful that they behave as you want.

A FEW FINAL NOTES: Constructors and destructors can be applied to **const**- and **volatile**-qualified objects. Objects whose class has a constructor or destructor can't be members of a union. You can't take the address of a constructor or destructor function.

Readers are encouraged to submit C-related comments and suggestions to Rex Jaeschke, 2051 Swans Neck Way, Reston, Virginia 22091 or via e-mail to uunet!aussie!rex. —*Rex Jaeschke is an independent consultant, author and lecturer. He's* DEC PROFESSIONAL*'s representative on the ANSI C Standards Committee and the U.S. Representative for ISO as well as editor of the* Journal of C Language Translation, *a quarterly publication for C implementers. His new book,* Mastering Standard C, *is available from Professional Press. For more information, call Trish Dunkerley at (215) 957-4265.*

DCL DIALOGUE

Kevin G. Barkes

Hacking By The Numbers

Operators and others who work weekends at firms with "trunked" telephone lines are familiar with the problem: The night service bell rings, you dial the number to access the line, and you get a recording selling aluminum siding or velvet Elvis portraits.

You hang up. Ten seconds later the night bell rings again. It's the same recording. An automated computer system is sequentially dialing every number in the telephone exchange. Depending on how many phone lines your company has installed, you can spend up to an hour wasting your time.

I have seven lines in my office, most connected to my computer systems. My weekends are frequently spent watching with bemused detachment as these electronic salesmen attempt to hawk their wares to my screaming modems.

The Invasion Begins

Last Saturday was different. One of my extra voice lines rang, and when I answered I heard a modem tone. The line is unlisted but has a number similar to my BBS. I figured someone had misdialed. I hung up.

Ten minutes later, one of the modems attached to my VAXstation went off-hook. Then it connected. I popped over to the window where I keep Kermit attached to the line and was somewhat alarmed to see:

```
HELLO? ANYONE THERE?
```

I immediately disconnected the modem. Less than a minute later it rang again and connected. The anonymous caller was persistent:

```
FIELD
SERVICE
SYSTEM
MANAGER
LOGIN
SHO SERVICES
```

And obviously he was familiar with VMS. I reset the modem. It went off-hook again almost immediately. After another abortive attempt to log in, a stream of garbage began flying across the screen. I guess the caller was attempting to cause the program attached to the port to abort, hoping it would drop him down to the DCL prompt. I hit the disconnect a third time.

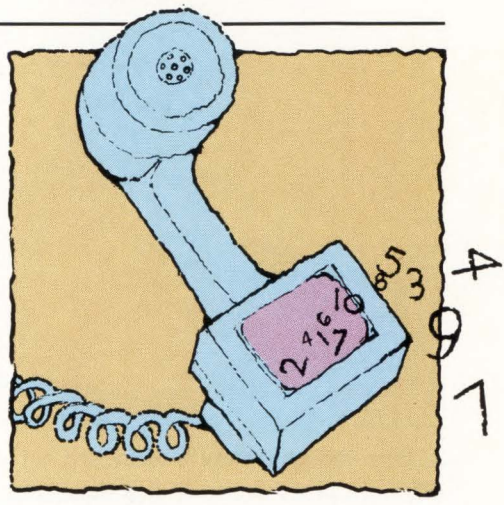
The calls stopped, but I was apprehensive. A few hours later, the fax machine answered its line, then dropped carrier. Twenty minutes after that the second line on the VAXstation rang and the modem connected. The data lights were flashing. I did a show user and saw:

```
Username Process Name     PID    Terminal
<login> _TTA3:        00000047 TTA3:
```

Soon after, the security alarm went off. Someone was trying to log in to the field service account. Enough was enough. I turned off both modems.

I took note of the order in which the hacker called my various lines. The person was using an automatic system that started at the lowest number in an exchange (0000) and sequentially dialed up to the highest (9999). Since my telephone exchange is in a residential area, I had to assume the would-be intruder had specifically targeted me. Even more convincing was his use of VMS-specific log in sequences. Not many private residences have VAXstations off the master bedroom.

My office, fax and BBS phone numbers are widely publicized, as is the fact



that I have several systems and communications lines. Through brute force and persistence, the hacker managed to identify the remainder of my unlisted voice and data numbers in less than five hours.

Making Things Secure

Unlike Clifford Stoll, author of *The Cuckoo's Egg*, I don't have the time and money to "track the elusive hacker." Because of the sophistication of the hacker's break-in attempts, I assumed he was bright enough not to call from a line that could be traced easily. So I decided to shore up my defenses.

Making a computer system secure against dial-up break-ins is easy. You unplug the modems or set them so they don't answer the phone. Unfortunately, this makes it a trifle difficult to conduct business, especially when you need to access your system remotely.

I double-checked the entries in my VAXstation's SYSUAF file, making certain the default accounts were set to DISUSER. I'm thankful my machine isn't a big VAX with scores of users; it would have been an arduous chore.

I changed passwords again, making certain my selections were unique and

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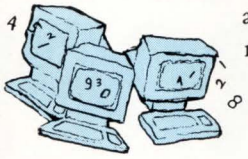
included numeric characters.

An attorney friend noted that the standard "Welcome to VMS" announcement could be used as a defense. After all, "Welcome" implies access. So I changed SYS$ANNOUNCE from "Energizing transporter..." to "Unauthorized access prohibited. Violators will be prosecuted." To be doubly sure, SYS$WELCOME now displays "Kevin G. Barkes Consulting Services. Unauthorized access prohibited. Violators will be prosecuted, whipped, beaten, called nasty names, beaten, whipped and then prosecuted some more. I'm not kidding. So there. VMS version 5.3-1." Maybe Digital should rename it SYS$INTIMIDATE.



Next I called the phone company. For a slight charge (equal to the gross national product of some Third World nations) it was possible to arrange "foreign exchanges" for my dial-in lines. Instead of the 854-prefix, I could get an exchange that "looked" as if it were somewhere else. My hacker friend would have to make about 600,000 calls to locate me now.

Pound Foolish

The most frustrating thing about trying to make the serial ports of a VAXstation 3100 secure is that DEC intentionally designed them to be wide open. In an engineering change that must have saved them ones of dollars, the serial lines on my VAXstation don't support true modem signals. My 3100 is blissfully oblivious to such luxuries as the carrier detect signal. This means that if I somehow get knocked off the line when logged in, the VAX doesn't automatically kill my process. If someone else calls in before I redial . ... Well, you get the picture.

I'm going to get a terminal server to circumvent the problem in the long term. I need more than two ports anyway, with all the dial-out lines, printers and other doohickeys I have jury-rigged together with ABCD switches. I wish DEC would fix this problem — er, feature. My guess is that there are a lot of exposed VAXstations out there. In the meantime, I put together a little Rube Goldberg device that ensures I get logged out if the line drops.

This diverting adventure consumed 25 hours of one week. As an independent consultant who bills by the hour, that's a sizable chunk of change out of my pocket, plus the expense of hardware. The next person who tells me hackers don't really do any harm will learn a wondrous new use for null modem adapters.

Still, I'm uneasy. Somewhere out there is a modem with my name on it.

DECUS Enlightenment

The May DECUS Symposium in New Orleans was quite enjoyable. Thanks to all of you who looked me up at the Professional Press booth at DEXPO or attended my alleged session on DCL and DECwindows.

I say "alleged" because the airline managed to lose my bag containing the overheads and handouts for the session. Even worse, they lost my underwear. While the latter could be replaced, the overheads and notes couldn't, so I ended up doing a "stream of DCL consciousness" session for 35 minutes and hosting a DCL roundtable of sorts for the balance of the hour. The suggestions and tips offered by the attendees were useful.

Aaron Leonard of the University of Arizona revealed his method of suppressing the Digital logo, which is displayed on the VAXstation 3100 at bootup.

DEC provides, in SYS$MANAGER:SYSTARTUP_V5.COM, a "hook" for substituting a user-supplied display. For example, adding the line:

```
$ DEFINE/SYSTEM/EXEC -
  DECW$LOGIN_BACKGROUND -
  SYS$MANAGER:BACKGROUND.COM
```

to the startup file will cause DECwindows to create a new process named LOGO to execute the commands in the BACKGROUND.COM file.

To eliminate the Digital logo, I had assigned DECW$LOGIN_BACKGROUND to the null device (NL:). While it worked, it had the unfortunate side effect of causing the LOGO process to consume about 80 percent of the CPU as it unsuccessfully but incessantly attempted to read from the nonexistent file.

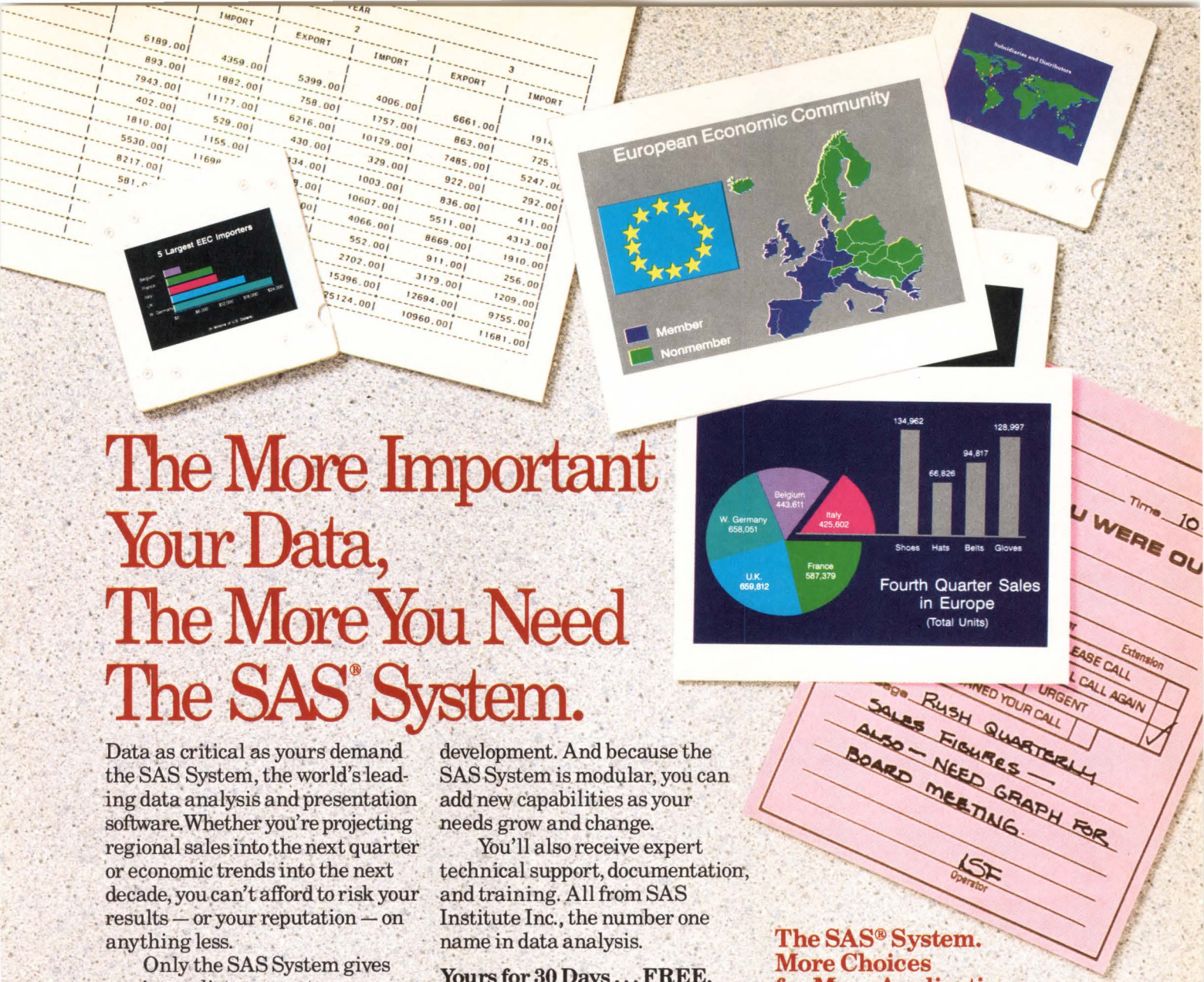
Aaron's tip was to put a single command in BACKGROUND.COM: $LOGOUT. The result is a commercial-free VAXstation startup with no CPU load.

The real crowd-pleaser was from John McMahon of NASA-Goddard. John noted that by editing the DECW$SM_GENERAL.DAT file on your VAXstation and changing the value on the line sm.pointer_shape: to -142, the mundane digit-shaped pointer is magically transformed to the far more aesthetically pleasing outline of the Starship Enterprise. It's too bad John's original posting on Internet came after "DCL On The Edge Of Forever" (June 1990). I've been happily clicking the accursed Romulan-derived FileView box into the Icon Dimension for the past two months.

If you couldn't make DECUS and would like to hear some of the goings-on, you can order cassettes of selected sessions from National Audio Video Transcripts at (800) 373-2952. If you'd like the first set of "reverse-engineered" notes from my somewhat disjointed session, send a self-addressed #10 business envelope with 45 cents postage to the address below.

Onward to Las Vegas in December. ...

FOR A ONE-INCH-DIAMETER "I Love DCL" sticker and/or a listing of all FidoNet bulletin board systems in the U.S. featuring message areas with DEC-related topics, send a self-addressed #10 business envelope with 25 cents postage to Kevin G. Barkes Consulting Services, 4107 Overlook St., Library, PA 15129. The list is also available online from the SYS$OUTPUT BBS: (412) 854-0511, 1,200/2,400 baud. If you have FidoNet access, ask your local sysop to file request DECBBS.LST from 1:129/38. —*Kevin G. Barkes is an independent consultant and is publisher of the monthly* KGB Report *newsletter.*



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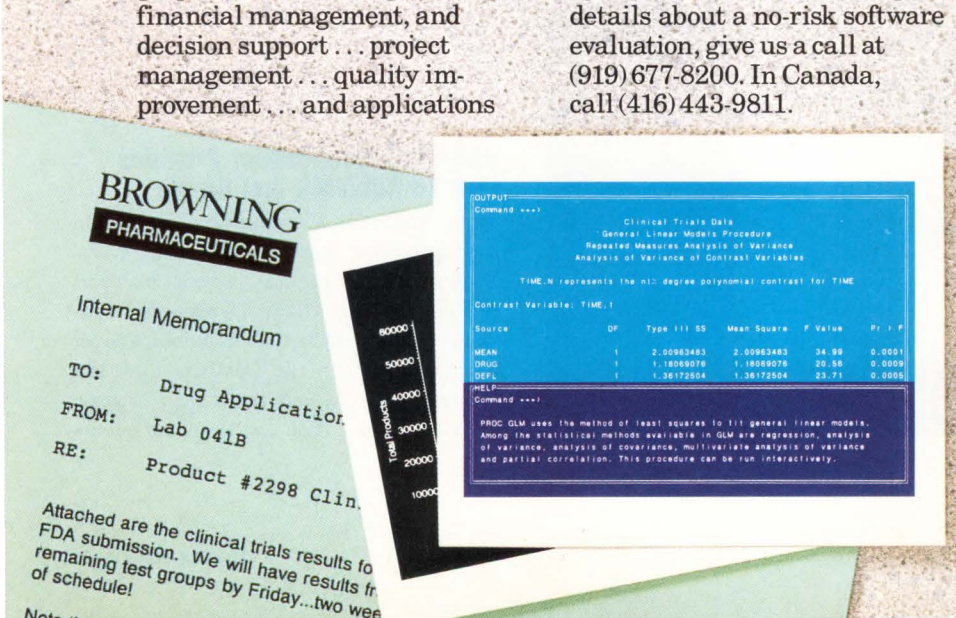


PRODUCTS

SmarTerm 340 Comes In Single- Or Multiuser Versions

Persoft Inc. announced single- and multiuser versions of SmarTerm 340. It emulates the VT340 and supports page memory, report sequences and DEC character sets.

SmarTerm 340 combines terminal emulation and communications features. Page memory lets you keep 144 lines of the most recently displayed text in memory at 80 or 132 columns. Report sequences exchange information about the PC's terminal state with the host. The product supports DEC Technical, National Replacement, Multi-National and ISO Latin-1 character sets. It features an interface with pull-down menus, online help screens and an automated installation procedure. International support via code page handling and character translation during file transfers is included. The multiuser SmarTerm 340 for File Servers provides network support through a multiuser copy residing on a file server. It can be configured for the network or for individual workstations. Requirements include an IBM PC or compatible running DOS V2.1 or later.

SmarTerm 340 costs $349 for the single-user version and $1,495 for the multiuser version.

For more information, contact Mary Bigus, Persoft Inc., 465 Science Dr., Madison, WI 53711; (608) 273-6000.

Circle 441 on reader card

Micro Technology Offers HSC-Compatible Optical Subsystems

Micro Technology announced the Lightening Library, a DSA-compatible, RA-emulating, read/write optical disk storage subsystem jukebox featuring a Library Management System.

The Lightening Library offers 20 to 50 GB of formatted user storage capacity attached to one port channel of a DEC HSC5X-BA or DA port card. The system uses standard RA disk commands and provides a DCL command set that automates any robotic function of the jukebox. It will perform an average disk load and access in 15 seconds. The single-drive Lightening version uses front-loading, removable, double-sided erasable media. It offers 929 MB of formatted user-storage capacity, has a sustained read transfer rate of 290 KBps and a sustained write transfer rate of 170 KBps. Peak transfer rate is 1.25 MBps. Average access time is 90 ms. Using a split optics mechanism, it has a 35 ms seek time with average latency of 40.5 ms.

The single-drive Lightening costs from $10,000. The Lightening Library jukebox, available this fall, costs $85,000.

For more information, contact Tom Raimondi, Micro Technology, 5065 E. Hunter Ave., Anaheim, CA 92807; (800) 999-9MTI.

Circle 538 on reader card

Syntek case/ap Provides Fast Code Generation

Synthesis Computer Technologies Inc. announced Syntek case/ap, an application generation system for VAX/VMS. Based on an advanced COBOL code generator, Syntek case/ap is a CASE development system that lets you define and create an initial prototype solution, refining it through an iterative process until the application is completed. Each iteration enhances the previous solution by incorporating new functionalities. The last iteration becomes the application. Intermediate solutions are full-working applications, totally compatible with the previous ones.

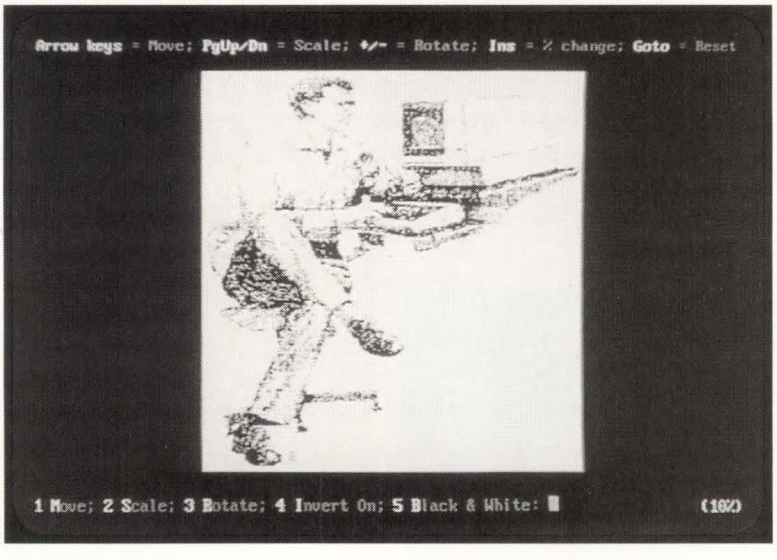
Because of the modularized coding techniques it uses, Syntek case/ap provides faster code generation and lower software maintenance costs. The main system requires an additional COBOL compiler to create fully documented and executable applications.

Syntek case/ap costs from $5,000 on a VAXstation to $75,000 on high-end VAXs. For more information, contact Robert Murialdo, Synthesis Computer Technologies Inc., 5199 E. Pacific Coast Hwy., Ste. 601, Long Beach, CA 90804; (213) 494-4069.

Circle 427 on reader card

VAX/VMS Spreadsheet Provides Link To Rdb/VMS And Oracle

Stone Mountain Computing Corporation announced that Graphic Outlook, its VAX/VMS spreadsheet package, provides interfaces to Rdb/VMS and Oracle. Developed in conjunction with DEC's Rdb Solutions Vendor Program (RSVP), the Database Link lets Graphic Outlook users access their database via SQL queries. You can automate queries



SmarTerm 340 Sixel graphics support includes scrolling.

so that when you use a particular worksheet, it's refreshed with up-to-date data. You can also generate database graphs automatically.

Graphic Outlook fully integrates spreadsheet functions with graphics. A low-resolution graphics feature draws bar charts and line plots on VT220-type terminals. Graphic Outlook accommodates spreadsheets up to 65,535 rows and columns, reads and writes Lotus 1-2-3 and Symphony Spreadsheet files and includes a Lotus command mode.

The Database Link is available as an extra cost option with V5.4 of Graphic Outlook.
For more information, contact Chris Andrews, Stone Mountain Computing Corp., 42 Aero Camino, Ste. 209, Goleta, CA 93117; (805) 968-3838.

Circle 428 on reader card

Alisa Systems Enhances TSSnet For The Macintosh

Alisa Systems Inc. announced an enhanced version of TSSnet, its DECnet package for the Mac. TSSnet V2.0 includes the White Pine Mac220 terminal emulator and multisession LAT or CTERM terminal protocols, wild-card operations to find files or back up Mac files from the VAX, a style interface with window-to-window file transfer, point-and-click operation and multiple file selection by shift/click. The VMS mail facilities include an address book and distribution list for easier addressing.

TSSnet installs on the Mac and lets it communicate with DECnet networks to provide terminal emulation, file transfer and mail between Mac and DEC computers. It connects to DECnet using standard EtherTalk hardware from various vendors and LocalTalk using the Shiva Fastpath or serial asynchronous lines.

TSSnet costs $495.
For more information, contact Suzanne Young, Alisa Systems Inc., 221 E. Walnut St., Ste. 175, Pasadena, CA 91101; (818) 792-9474.

Circle 431 on reader card

Microterm Releases High-Saturation Color Terminal

Microterm announced the 5540 color graphics terminal in its 5500 series. The 5540 runs ReGIS, Tektronix 4010/4014 and Sixel graphics and emulates the VT340, VT200, VT100 and VT52. Its 14-inch diagonal, nonglare CRT has a sharp, 800 x 500 resolution, overscan screen and a six-color display from a 262,144-color palette with individual color control for each session.

The Microterm 5540 delivers a graphics-drawing speed of 2.5 million pixels per second. It comes with a custom ASIC graphics accelerator. The terminal displays dual sessions from one host (with SSU) or single sessions from two hosts simultaneously. User-selectable options allow for a vertical or horizontal split screen and let you switch between sessions with full-screen viewing. The 5540 incorporates a DB25 connector and three DEC-compatible MTI 423 connectors, two for host communication and one for the printer port. Standard features include 15 user-programmable and host-downloadable function keys, VT340-style block mode and pop-up windows.
For more information, contact Carl Morath, Microterm, 3630 S. Geyer, St. Louis, MO 63127; (314) 822-4111.

Circle 530 on reader card

Winchester Systems' FlashDAT Offers Up To 5 GB Of Backup

Winchester Systems Inc. announced FlashDAT, a VMS backup subsystem. Each FlashDAT subsystem accommodates up to four DAT drives on one controller for attainable throughput of 720 KBps and provides up to 5 GB capacity of backup.

Winchester incorporates a 4mm DAT drive by Archive Corporation with tape handling and direct drive motors in FlashDAT. To keep up to four drives streaming continuously under all VMS-loading conditions, FlashDAT combines 1 MB of RAM in each drive with a custom adaptation of Touch Technologies' Dynamic Tape Accelerator. FlashDAT is designed for use on Q-Bus, UNIBUS and HSC systems running VMS. The cartridges are 100 percent compatible with DEC's DDS backup systems using TMSCP emulation. The capacity of each tape cartridge is 1.3 GB.

The base-level MicroVAX II FlashDAT system costs $4,995. The four-drive FlashDAT Array for the MicroVAX II costs $12,995.
For more information, contact Ted Gumer, Winchester Systems Inc., 400 W. Cummings Pk., Woburn, MA 01801; (617) 933-8500.

Circle 526 on reader card

Demax's Securemax Operates In Network Environments

Demax Software announced Securemax, a security management system that lets you secure VAX/VMS nodes from a single point

TurboCache Enhancement Automates Caching

EEC Systems Inc. announced an automatic dynamic cache allocation scheme for its TurboCache software package.

When caching is activated, the software control module automatically allocates memory to the device caches. You can set parameters to control which portion of free memory is allocated to caching and how often the cache-tuning software re-adjusts itself to accommodate changes in system resource use. You choose the disks to be cached. The software automatically scans the disks every sampling period and determines the relative I/O loading on each disk for that period. Based on relative I/O loading and cache bucket size, the software transparently allocates memory from the free page list to each device cache. At the end of the sampling period, a snapshot of the cache statistics can be sent to a LOG file. The caches then are automatically deallocated and reallocated after adjustment in size for the new amount of free memory and the new I/O loading on each disk. The product is available for VMS V5.0 and later.

For more information, contact EEC Systems Inc., 327 Boston Post Rd., Sudbury, MA 01776; (508) 443-5106.

Circle 540 on reader card

Process Software Announces TCPware V2.0 For VMS

Process Software Corporation announced TCPware V2.0 for VMS, a modular suite of TCP/IP networking protocols. TCPware V2.0 supports VMS V4.0 to V5.3 and provides networking between VAXs and other systems.

With TCPware V2.0, you can start or shut down individual TCPware components without having to reboot the system. The number of connections is restricted only by the number of processes and system memory. A DECwindows transport layer for TCP/IP lets DECwindows applications on VMS V5.3 use TCPware for communication with other systems. Other features include a QIO Programming Interface for access to TCP/IP and UDP layers, a socket library and related subroutines for application programming, and concurrent operation with DECnet, LAVcs and LAT. TCPware V2.0 supports all standard DEC Ethernet controllers.

TCPware V2.0 for a VAXstation 3100 costs $1,115. Prices vary for other VAXs and MicroVAXs.

For more information, contact Donna Rouleau, Process Software Corp., 959 Concord St., Framingham, MA 01701; (508) 879-6994.

Circle 541 on reader card

Qwiknet Professional Features Graphic Input Window

Project Software & Development Inc. announced a graphic input version of Qwiknet Professional project management software. It offers a solution to companies that need planning and scheduling software for novice and expert users across a variety of platforms.

Qwiknet Professional V2.0 offers a "drawing board" feature that lets you sketch a project on a graphic input window. It features platform-to-platform connectivity with a drawing board interface on PCs, PS/2s and compatibles, VAXs, VAXstations and LANs. All versions can exchange data with Project/2, the company's mainframe- and minicomputer-based project management system. An Oracle database option is available for the VAX to connect project management data with other corporate database applications.

The product costs $2,500 for a standalone copy; $4,725 for standalone VAXstations; $8,600 for a four-concurrent-user package on a LAN; and $18,900 for a four-concurrent-user package on a VAX.

For more information, contact Lois Tilles, Project Software & Development Inc., 20 University Rd., Cambridge, MA 02138; (617) 661-1444.

Circle 542 on reader card

SAS Applications System Links To Rdb/VMS And Oracle

SAS Institute Inc. announced the new SAS Applications System, an integrated applications system for data access, management, analysis and presentation.

The new SAS Applications System includes database engines that link the software under VMS to VAX Rdb/VMS and Oracle. Each of the SAS/Access interface products includes an engine that lets users combine the analysis and presentation capabilties of the product with DBMSs. In addition, the mainframe version includes engines to IBM's DB2 and SQL/DS and SAS Institute's System 2000 data management software. The SAS Applications System also supports DECwindows and includes a task-oriented, menu-driven interface and an enhanced programming interface.

For more information, contact Mike Truell, SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27512; (919) 677-8000.

Circle 543 on reader card

Morss Software Automates Batch Processing For VMS

Morss Software Development Inc. announced Command File Scheduler V4.0 (CFS), a software package that automates batch processing for VAX/VMS. CFS is a batch processing scheduler that automatically schedules user's requests for processing reports and all other batch processing functions. It performs user-definable error detection and handling, custom report distribution, multiple job dependencies and routine maintenance of DCL.

A Resource Dependency feature is added to CFS V4.0 which ensures that required resources such as available disk space, critical files and devices are available at execution time. Another feature provides transparent processing across DECnet, which allows an MIS department to control the batch processing for multiple systems.

CFS costs from $6,000.

For more information, contact Robert Morss, Morss Software Development Inc., 1215 120th Ave. N.E., Ste. 206, Bellevue, WA 98005; (206) 455-1838.

Circle 544 on reader card

Park Software's Xentis Interfaces With RDBMS

Park Software Inc. announced that Xentis, a report writer and query system for VAX/VMS, interfaces with Ingres' and Sybase's RDBMSs. It also works with Rdb and DBMS-32 databases as well as RMS files described in Xentis/Dictionary or DEC's CDD. You can use data from any or all of these data structures in the same report.

The Xentis screen is divided into three sections. The top window contains the format of the report as it's being defined. The middle window shows various tables of valid responses such as filenames or field names. In the bottom window, Xentis/Report guides you through the definition of a report with a series of questions. Other add-on modules include Xentis/Dictionary, Xentis/Edit, XenTis/Update, Xentis/File, Xentis/Model and Xentis/Word.

For more information, contact Jim Foley, Park Software Inc., P.O. Box 31529, Seattle, WA 98103; (206) 343-0447.

Circle 545 on reader card

via DECnet. Securemax has the full range of reports, functions and features found in Demax's Securepak V3.0 but also works in the DECnet environment to establish, maintain or monitor security on remote nodes and the host system.

Securemax operates in conjunction with two versions of Demax's Securenode, a data collector that resides on remote nodes. To implement a solution specific to your security-management problems, you can obtain any degree of centralization through different combinations of Securemaxs and Securenodes. Securenode operates through the use of DCL commands. No training is required. For more information, contact Jacques Guerette, Demax Software, 1260 Old Innes Rd., Ottawa, ON KIB 3V3; (613) 748-0209.

Circle 531 on reader card

Hitachi America Offers 1.23-GB And 1.65-GB Drives

Hitachi America Ltd. announced the DK516-12 and the DK516C-16, its highest capacity 5 1/4-inch Winchester disk drives with unformatted data capacities of 1.23 GB and 1.65 GB.

The 1.23-GB DK516-12 has an average seek time of 14 ms and a data transfer rate of 2.75 MBps. It's equipped with ESDI. With an ESDI-to-SDI adapter, the high data transfer rate lets DEC-compatible subsystem users use the DK516-12. The 1.65-GB DK516C-16 has an average seek time of 13.5 ms and a data transfer rate exceeding 3.03 MBps. It uses high-performance SCSI that supports enhanced SCSI-2 commands and features a 5-MBps maximum data transfer rate in synchronous mode. It also features a 256-KB data buffer that has a read-ahead cache function, allowing increased data transfer rates and decreased disk transaction time.

The DK516-12 costs $3,200. The DK516-16 costs $4,300 in OEM quantities. For more information, contact David Marin, Hitachi America Ltd., Hitachi Plaza, 2000 Sierra Point Pkwy., Brisbane, CA 94005; (415) 589-8300.

Circle 429 on reader card

EM320 Offers Full VT320 Functionality

Diversified Computer Systems Inc. announced EM320, a VT320 terminal emulation and communications software package. EM320 upgrades Diversified Computer System's EM220 software.

Along with full implementation of the VT320 functionality, EM320 offers multisession support for leading networks, including DECnet and Sun. It also has Kermit long-packet support (1,000 bytes), which can speed file transfers by as much as 60 percent. Extended key-remapping capabilities include all normal, shifted and control alphanumeric keys and the Tab and Shift Tab keys. Improvements in the integral modem dialer include support of initialization strings and use of softkeys. These improvements provide greater control of modem devices and permit insertion of access codes and credit-card dialing information.

The EM320 costs $189. Network versions cost an additional $20 per copy.
For more information, contact Peter Citarella, Diversified Computer Systems Inc., 3775 Iris Ave., Ste. 1B, Boulder, CO 80301; (303) 447-9251.

Circle 430 on reader card

Clearpoint's DCME-V86/64MB Upgrades The VAX 8600/8650

Clearpoint Research Corporation announced a 64-MB single-board memory upgrade for

the VAX 8600/8650. The DCME-V86/64 MB uses 4-Mbit DRAM technology to provide a single-slot upgrade alternative to DEC's MS86-DA, a two-slot board with multiple cards.

All Clearpoint memory products are covered by a lifetime warranty and a toll-free technical support hotline. Clearpoint has dedicated inventory in multiple locations to support its 24-hour replacement program.

The DCME-V86/64MB costs $19,000. For more information, contact M. Greely Summers, Clearpoint Research Corp., 35 Parkwood Dr., Hopkinton, MA 01748; (508) 435- 2000.

Circle 527 on reader card

Chipcom's Midnight Bridge Joins Multichannel Networks

Chipcom Corporation announced Midnight Bridge, a local bridge that interconnects facility Ethernet and IEEE 802.3 LANs transparently. Compatible with Chipcom's fault-tolerant Online System Concentrator, Midnight Bridge lets you segment your network, optimizing overall performance. It also extends the power of Chipcom's Online TriChannel architecture by providing bridged interconnection among multiple backplane channels. Midnight Bridge has hardware-based address filtering to support large networks and field-upgradable firmware to ensure long-term software compatibility.

Chipcom also announced a strategy for TriChannel "hub-based" internetworking built around its Online System Concentrator and a joint development agreement with Cisco Systems for LAN/WAN interconnection.

Midnight Bridge is available in three standalone versions: baseband-baseband, baseband-fiber and fiber-fiber. It costs $2,950, $3,450 and $3,950 respectively.

For more information, contact Mary Stewart, Chipcom Corp., Southborough Office Pk., 118 Turnpike Rd., Southborough, MA, 01772; (508) 460-8900.

Circle 432 on reader card

Compu-Share Announces Human Resources System

Compu-Share Inc. announced a Human Resources Management And Imaging System that fully incorporates DECwindows and imaging technologies. The Human Resources and Imaging product lets computer systems capture, store, retrieve, display, transport and manage personnel information in the form of image data.

With the Human Resources And Imaging System, any manager in an organization can review photographs, job applications, insurance claims, W-4 forms or other critical employee applicant documents. Underlying the imaging technology is Compu-Share's Human Resources Management Software V5.5. The system provides comprehensive personnel history in six categories: attendance, benefits, events, family members, review and skills. A list of user benefits includes expansive internal and governmental reporting capabilities and seamless integration with Compu-Share's Payroll Management System. For more information, contact Dr. Neil Baldridge, Compu-Share Inc., 5214 68th St., Lubbock, TX 79424; (806) 794-1110.

Circle 434 on reader card

DAP/CP8 Family Enhances DAPs Up To 1,000 Percent

Active Memory Technology announced the DAP/CP8 range of its massively parallel computer systems. The DAP/CP8 family is based on a custom 8-bit, VLSI, coprocessor

chip (CP8) that will enhance the performance of the current Distributed Array of Processors (DAP) massively parallel systems by up to 1,000 percent.

An 8-bit coprocessor is added to each 1-bit processor in the DAP/CP8 computer systems. The 510C model contains 1,024 8-bit coprocessors and the 1,024 1-bit processors. The 610C model contains 4,096 of both processors. The 8-bit coprocessors are used for complex arithmetic such as floating-point operations. The 1-bit processors are used for memory access, data movement, fast I/O and Boolean or logic operations. Existing users' source code will run unmodified on the new family.

For more information, contact Pat Harriman, Active Memory Technology, 16802 Aston St., Ste. 103, Irvine, CA 92714; (714) 261-8901.

Circle 435 on reader card

Pinnacle Releases 3 1/2-Inch Erasable Optical Drive

Pinnacle Micro Inc. announced a 3 1/2-inch erasable optical drive. The REO-130 is a SCSI device with a 28 ms seek time. Each 3 1/2-inch disk holds 128 MB of data and has a shelf life of 10 years.

The REO-130 3 1/2-inch erasable optical drive is available in both internal and external versions with interface kits for Sun, DEC, IBM and compatibles.

The REO-130 costs $2,995. Each cartridge costs $129.

For more information, contact Scott Blum, Pinnacle Micro Inc., 15265 Alton Pkwy., Irvine, CA 92718; (714) 727-3300.

Circle 436 on reader card

TGV Ports Sun's XView Toolkit To VAX/VMS

Sun Microsystems Inc. and TGV Inc. have signed an agreement under which TGV will port Sun's XView toolkit to VAX/VMS. XView is used to design applications that include the Open Look graphical user interface and the X Window System. The new toolkit, MultiNet XView, will be sold and supported by TGV, a vendor of networking and application software for VAX/VMS systems.

Using MultiNet XView, application developers can design or port software for VAX/VMS that uses windows and a user-friendly graphical interface. MultiNet XView includes pull-down and cascading menus, dialog boxes and full keyboard and mouse support. Versions of XView are available for RISC platforms made by DEC, HP, IBM and Sun platforms. MultiNet XView lets applications developed for the VAX be ported easily to other hardware platforms.

Multinet XView will be available in the third quarter of 1990 and will be priced under $1,000.

For more information, contact Cathleen Beall Garfield, Sun Microsystems Inc., 2550 Garcia Ave., Mountain View, CA 94043; (415) 960-1300.

Circle 433 on reader card

Digital Data Systems And Setasi Design PDP-11 Upgrades

Digital Data Systems Inc. and Setasi R & D announced a selection of upgrades for the PDP-11/24, 11/34, 11/44, 11/45, 11/50, 11/55 and 11/70. The PEP-70 and HC70

are high-performance upgrades for the PDP-11/70.

With the assistance of Digital Data Systems and Setasi's enhancement products, users of PDP-11/70 and other PDP-11s can upgrade their existing systems without replacing them. The combination of the PEP-70 and HC70 provides a PDP-11/70 with improved performance. DEC distributes the PEP-70 and HC70 and includes them in its service offering.

For more information, contact Digital Data Systems Inc., 1551 N.W. 65th Ave., Plantation, FL 33313; (305) 792-3290.

Circle 437 on reader card

Virtuoso For VMS Supports Creation Of Virtual Disks

Advanced Systems Concepts Inc. announced version 1.0 of the Virtuoso virtual disk and disk caching system for VMS. Virtuoso supports the creation of virtual disks — disk devices that use memory and/or real disk drives for greater performance, resource utilization, security and reliability than can be achieved with a RAM disk or real disk.

Virtuoso supports memory- and disk-based virtual disks. It also supports read/write disk caching for local and VAXcluster systems, as well as caching of hot files. Caching can be static or dynamically allocated for the desired disk device. The product uses the standard DCL interface for system management. A real-time status display and command workbench are available for operational monitoring and control of virtual disks. Virtuoso requires no modifications to VMS.

Virtuoso V1.0 is priced from $750 to $15,000 for initial license, documentation, media and warranty services.

For more information, contact Marie C. Murphy, Advanced Systems Concepts Inc., 33-41 Newark St., Hoboken, NJ 07030; (201) 798- 6400.

Circle 408 on reader card

Hyperdrive 3000 Allows Clusterwide Disk Shadowing

Bear Computer Systems Inc. announced version 5.3 of Hyperdrive 3000, a disk shadowing program. It supports clusterwide disk shadowing on all VAX processors, including mixed clusters. This software disk shadowing solution can be resident on all hosts with no limitations on the number of disks supported.

Hyperdrive 3000 allows "masters" of the shadow set — virtual disks with no data of their own — to reside on each machine in the cluster. If a machine goes down and there's still a physical path to the data, there's no interruption in data availability. No operator intervention is required to re-establish access to the data due to disk failure. When the failed disk is restored, the catch-up facility restores all prior disk activity. Hyperdrive 3000 can shadow all or part of multiple disks and works with all DEC-compatible disk drives and controllers.

The product costs from $1,200 for the VAXstation.

For more information, contact Bear Computer Systems Inc., 9346 DeSoto Ave., Chatsworth, CA 91311; (818) 341-0403.

Circle 409 on reader card

MAXlink Lets PC Users Share VAX/VMS Resources

Digital Area Networks Inc. announced version 3.1 of its MAXlink VAX-to-PC networking software. Using less than 10 KB of PC RAM, MAXlink lets PC users share

such VAX/VMS resources as files, disks and printers over standard Ethernet.

The new version adds such features as command-line control of VAX print queue server options, enhanced virtual disk support for shared and password-protected disks, and international character translations for file transfer services. Virtual disk access speeds range from 30 ms on low-end VAXs to 8 ms on the 3000-series workstation. Through a licensing agreement with Polygon Inc., users of Banyan, DEC, Novell or 3Com PC LANs can use existing Ethernet adapters, PC LANs and MAXlink concurrently. PC LAN users can perform such PC-DOS functions as BACKUP, RESTORE and XCOPY between PC servers and VAX resources.

For more information, contact Paul Jones, Digital Area Networks Inc., 2200 Green Rd., Ann Arbor, MI 48105; (313) 761-4848.

Circle 410 on reader card

DataLens Connects Data Source And Lotus 1-2-3 For VAX/VMS

Lotus Development Corporation announced the DataLens Developer Toolkit for VAX/VMS, a set of programming tools designed to let third-party and corporate programmers build connections between their data sources and Lotus 1-2-3 for VAX/VMS.

Connections, or drivers, developed with DataLens technology give users transparent access to a variety of external data sources from directly within their applications. Using the 1-2-3 menu commands "/Data External" and "/Data Query," Lotus 1-2-3 for VAX/VMS users can access and analyze data from any data source for which there's a DataLens driver. Drivers under development include Ingres, Oracle and Sybase. A driver for VAX Rdb/VMS is included in Lotus 1-2-3 for VAX/VMS.

The DataLens Developer Toolkit for VAX/VMS costs $250.

For more information, contact Lisa Leonard, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; (617) 225-1263.

Circle 411 on reader card

The MaxTerm X Terminal Supports Virtual Memory

Micronics Computers Inc. announced the MaxTerm X terminal. It offers interoperability with any other X-compatible device on a network.

The MaxTerm supports virtual memory, eliminating restrictions on the number of windows you can open. It manages each window between available RAM and free disk space on the host. Total memory needed for each window is divided into pages, and the MaxTerm loads as many pages into memory as it can support. Additional memory requirements are sent via the NFS protocol to the host for temporary storage on disk. As windows are opened, the MaxTerm reallocates RAM space to accommodate them and reallocates more segments of other programs from RAM to disk space to make room. The MaxTerm comes with an 80386 CPU operating at 25 MHz, 2 MB of RAM upgradable to 8 MB, a 19-inch monochrome display with a 1,280 x 1,024 resolution, and a 70-Hz refresh rate. Network interfaces include Ethernet TCP/IP and SLIP.

The MaxTerm costs $2,995.

For more information, contact Micronics Computers Inc., 232 E. Warren, Fremont, CA 94539; (408) 732-0940.

Circle 413 on reader card

Netcor NC-208 Provides Repeater Interconnection

Netcor Inc. announced the NC-208 10-segment local Ethernet repeater, a LAN intraconnection product.

The NC-208 provides a repeater interconnection between Standard Ethernet (10Base5) coaxial segments and Thin Ethernet (10Base2) coaxial segments. It's fully compliant with the Ethernet V2/IEEE 802.3 Repeater Specifications for CSMA/CD 10-Mbps operation. It has two AUI ports and eight BNC-type ports. Preamble bits for each packet received are amplified, retimed and regenerated. A new packet is then transmitted on all ports with data unchanged. Collision detection, jam generation, collision fragment extension, automatic segment isolation and reconnection are provided. Each coaxial segment has four front panel LED indicators for transmit, receive, collision and segment isolation. BNC ports are terminated from inside the NC-208 enclosure with 50-ohm resistors that allow direct Thin Ethernet coaxial cable-to-repeater connections.

The product costs $2,495.

For more information, contact Stephen M. Loring, Netcor Inc., 850 Auburn Ct., Fremont, CA 94538; (415) 853-1800.

Circle 414 on reader card

Camintonn Announces DMA Communications Multiplexer

Camintonn Corporation announced the CM-CXY08, a DMA serial communications multiplexer for the MicroVAX III BA200 series, VAX 4000 and DECserver 500/550 systems. It offers user-configurable options and complete DEC compatibility.

The CM-CXY08 uses DMA technology and a RISC-like architecture. The controller's DHU11 emulation reduces system I/O overhead. The board has eight RS-232/RS-423 serial lines for terminals, serial printers or modems. All eight lines have full modem control and can be configured for RS-422 operation. It features ESD/EOS protection of all signal lines and conforms to DEC specifications for EMI noise suppression and shielding. A 38.4K baud-mapping option lets it operate with the VT420 dual-session terminal. Another option provides transparent DTR/DSR flow control on up to four lines.

The CM-CXY08 with cables costs $1,395.

For more information, contact Geneva Zagarnaga, Camintonn Corp., 2332 McGaw Ave., Irvine, CA 92714; (714) 553-0247.

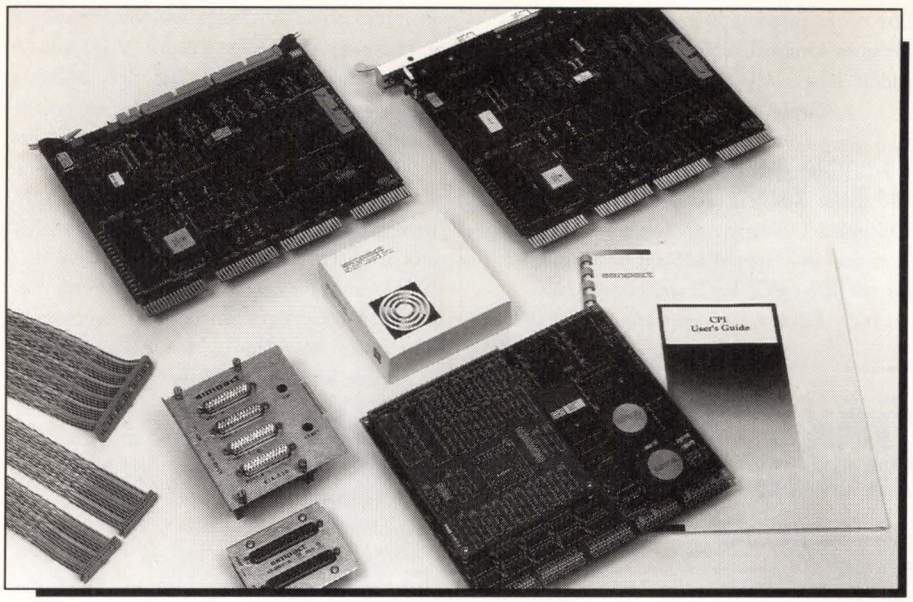
Circle 407 on reader card

Video V2.3 Supports Remote Terminals Over DECnet

Performance Software Inc. announced version 2.3 of its Video terminal monitoring and recording software for the VAX. Video V2.3 features full support for remote terminals over DECnet. A new parameter, Intervene, lets you take over any terminal you can monitor.

Video provides system management functions useful for system support, training, security and quality control. It includes three modules — Video Slave, Video Seer and Video Replay — that can be used separately or in combination. The product requires VMS V5.0 or later.

Video V2.3 is priced from $1,950 for a single-processor license to $30,000 for a full



Simpact's range of high-performance, front-end communications platforms significantly increase X.25 performance.

corporate license.

For more information, contact Cary Stratton, Performance Software Inc., 28 Green St., Newbury, MA 01951; (508) 462-0737.

Circle 418 on reader card

Simpact's X.25 Products Offer Full CCITT 1984 Compliance

Simpact Associates Inc. announced X.25 connectivity products. The CPI 2101 and the VCI 2000 series implement all CCITT 1984 X.25 specifications and optional features while achieving high-data throughput.

The CPI 2101 and VCI 2000 use Simpact's latest 68020-based Intelligent Communications Processors (ICP). They incorporate two independent memories and buses to achieve simultaneous protocol processing and communications I/O. The CPI 2101 is available for VAXBI and Q-bus systems running VMS, ULTRIX and UNIX System V. VCI 2000 is available for VMEbus systems running UNIX System V and UNIX BSD.

The CPI 2101 series costs from $9,975 to $16,250. The VCI 2000 series costs from $5,800 to $7,200.

For more information, contact Kari Nogle, Simpact Associates Inc., 9210 Sky Park Ct., San Diego, CA 92123; (619) 565-1865.

Circle 523 on reader card

The DOCZ System Streamlines Software Life Cycle

Software Toolz Inc. announced The DOCZ System, a software development tool that can provide efficiency in a development environment by making shareable code resources available to everyone in the environment. It streamlines and automates the software life cycle while reducing the need for code documentation administration.

The DOCZ System is built on the concept that documentation and source code can be combined in one file, thus encouraging the developer to keep documentation and code in synchronization. It extracts the information from the code and builds reference manuals for the code. The manuals contain a table of contents; documentation for each module that includes a description of the module, calling parameters, a description of its use, a quick description, return values and cross-referencing; a list of application keywords; an operating system platform summary; a set of text permutations of the module descriptions; a summary of the quick descriptions; and a quick reference of the calling parameters.

For more information, contact Software Toolz Inc., 8030 Pooles Mill Dr., Ball Ground, GA 30170; (404) 889-8264.

Circle 415 on reader card

AutoWord Exchanges Documents Between Word Processors

White Crane Systems Inc. announced AutoWord, a translation system for exchanging documents between word processors.

AutoWord translates format codes and basic graphics formats from one word processor to another and includes compatibility with many word processing packages. It supports text-to-text, text-to-graphics and graphics-to-graphics conversions. It automatically recognizes input document files and lets you view the file fully formatted. It supports files created by such word processing packages as WordPerfect V4.x and 5.x; WordStar and WordStar Professional; IBM Writing Assistant and IBM DisplayWrite versions 2.0, 3.0 and 4.0; and Microsoft Word and Word for Windows. AutoWord also supports such graphics formats as PC Paintbrush, Microsoft Windows Paint, Aldus/Microsoft TIFF and WordPerfect WPG. It lets you import a graphics file into a word processing system supporting such files or transfer graphics files between desktop publishing systems.

The product costs $149.95.

For more information, contact Patricia Parker, White Crane Systems Inc., 6400 Atlantic Blvd., Ste. 180, Norcross, GA 30071; (404) 446-0660.

Circle 420 on reader card

Math Pack Ada Library Offers Mathematical Subprograms

MassTech Inc. announced Math Pack, an Ada source code library that provides the scientific and engineering communities with mathematical tools in Ada once available only in FORTRAN.

Math Pack's mathematical subprograms provide solutions to Ada numerical problems. The subprograms are based on such algorithms as LINPACK for linear systems, EISPACK for eigensystems and QUADPACK for integration. Math Pack consists of 19 Ada generic packages containing more than 320 mathematical subprograms. It includes a package containing data types and data type manipulation subprograms for complex operations, as well as a package containing numerical, physical and chemical constants. Other packages include Transform_Pac, Interpolation_Pac, Special_Functions_Pac, Probability_Pac and Basic_Statistics_Pac.

For more information, contact MassTech Inc., 3108 Hillsboro Rd., Huntsville, AL 35805; (205) 539-8360.

Circle 412 on reader card

Binary File Transfer Adds To OfficeAccess Capabilities

Western Union Corporation announced an enhancement for its OfficeAccess software for DEC users. The enhancement allows the transmission of binary files.

OfficeAccess software gateway products are for Data General, DEC, Wang and other office systems. This integrated applications program links office automation systems to

Western Union's Easylink e-mail services. With OfficeAccess, you can send documents, files and messages from the terminals on which they were created. Binary file transfer capabilities let you transmit graphics, engineering drawing, and spreadsheets. Because the system sends entire files, including equations and instructions, the documents are revisable. In addition, binary file transfer is simple for the user to implement with minimal training.

For more information, contact Jean Stritt, Western Union Corp., 1 Lake Street, Upper Saddle River, NJ 07458; (201) 818-5843.

Circle 447 on reader card

Columbia Announces MS-DOS Kermit V3.0

Columbia University Center for Computing Activities announced MS-DOS Kermit V3.0 for the IBM PC, PS/2 and compatibles.

New features include transfer of text files in international character sets via a protocol extension. MS-DOS Kermit V3.0 allows emulation of the VT320. It offers a sliding window packet protocol for improved file transfer performance over public data networks and long-distance satellite connections. It also offers expanded support for LANs, including AT&T StarLAN, DECnet LAT and CTERM, IBM Netbios, Novell NASI/NACS and TES, and TCP/IP with vendor-provided utilities. Enhanced Tektronix graphics terminal emulation with VT340 extensions is suitable for use with mainframe WordPerfect V4.2, V5.0 and other applications. Graphics screens can be saved in TIFF V5.0 format for importation into such applications as Pagemaker, Ventura Publisher and WordPerfect.

MS-DOS Kermit V3.0, on a 5 1/4-inch disk, is packaged with *Using MS-DOS Kermit* by Christine M. Gianone, published by Digital Press. Kermit software is unlicensed.

For more information, contact Columbia University Center for Computing Activities, 612 W. 115th St., New York, NY 10025; (212) 854-3703.

Circle 518 on reader card

I*XNS V3.3 Enhances DEC LAT Load Balancing

InterConnections Inc. announced I*XNS V3.3. This version includes a load balancing capability that lets VAX system managers and Net/One network managers balance the loading of VMS users on VAXs connected to an Ungermann-Bass Net/One network via IVCS. IVCS is InterConnections' implementation of the Ungermann-Bass Virtual Circuit Service.

Load balancing is accomplished through an algorithm in IVCS. It selects which VAX will accept the next Net/One connection request from VAXs using IVCS in a VAXcluster or anywhere on the network. IVCS load balancing is an enhancement to DEC LAT load balancing. It can tune the load balancing algorithm, and load balancing takes place at the VAX, not at a terminal server. Further, IVCS won't select a relatively lightly loaded VAX that's at its limit of interactive users due to a management or license constraint. Thus, workstations connected directly to the network are balanced equitably with other interactive VAX loads.

For more information, contact Michael Neirby, InterConnections Inc., 14711 N.E. 29th Pl., Bellevue, WA 98007; (206) 881-5773.

Circle 438 on reader card

Vivid Presentation Graphics Supports ALL-IN-1

Access Technology Inc. announced Vivid Presentation Graphics V2.0, which brings the ease of use associated with PC graphics to VAX/VMS.

Vivid enhancements include full support of ALL-IN-1, including its file cabinets and Gold Keys. Vivid charts can be mailed and printed within ALL-IN-1 and imported and exported to VMS. They also can be integrated with WPS-Plus, WordPerfect and Mass-11. Vivid can import and export industry-standard Computer Graphics Metafiles (CGM). This lets you import and export files and clip art by using CGM files from other products. Vivid supports output devices such as HP Draftmaster/DraftPro plotters. It has an enhanced help system and the ability to print charts and slide shows directly from DCL.

Vivid Presentation Graphics costs from $800 for a VAXstation.

For more information, contact Geoff Spillane, Access Technology Inc., 2 Natick Executive Park, Natick, MA 01760; (508) 655-9191.

Circle 546 on reader card

Gigatrend's 2.5TurboDAT Offers 2.5 GB Of Storage

Gigatrend Inc. announced 2.5TurboDAT, a 2.5-GB 4mm DAT device. It contains all the features of third-generation helical scan, such as random file access and three-level Reed Solomon error correction. It has a SCSI interface and a 5 1/4-inch form factor. Its 2.5-GB data capacity media is a standard DAT cassette the size of a credit card.

Designed by Gigatape GmbH, GigaTrend's parent company, 2.5TurboDAT's data compression techniques identify patterns of similar information. These patterns are substituted with new patterns to achieve a shorter data stream, permitting more host data to be stored on a cassette. Gigatrend/Gigatape's installed base of VersaDat 1-GB drives for DOS, LANs, Pick, Sun, UNIX and VMS will be able to upgrade and still to read existing tape libraries.

For more information, contact Karina Lion, GigaTrend Inc., 2234 Rutherford Rd., Carlsbad, CA 92008; (619) 931-9122.

Circle 547 on reader card

Logical Multiplexer Supports 200 Pages Per Minute

The Logical Company announced the CCQ-1601, a 16-line async multiplexer with a parallel port for high-speed printing. It installs directly into DECserver 500/550 terminal servers and MicroVAX 3xxx, MicroVAX II and Micro PDP-11 computers.

With throughput of 1,600,000 characters per minute, the CCQ-1601 can be used for laser and high-speed printing applications. It supports continuous printing of up to 12,000 lpm (200 ppm). It uses DMA output on each async line and transmit and receive silos to reduce processor overhead, improving system performance and character throughput. All async lines support modem control signals for remote dial-up operation. The printer port is IBM PC-compatible and supports Centronics and Dataproducts interfaces.

The CCQ-1601 costs $2,770.

For more information, contact Les Wellington, The Logical Co., P.O. Box 549, Cottage Grove, OR 97424; (503) 942-3610.

Circle 548 on reader card

Pacer Offers Microsoft Mail Server And Gateway For VAX

Pacer Software Inc. announced PacerPost, a software package that lets VAXs running VMS function as a Microsoft Mail-compatible server, gateway or client.

PacerPost's internal message database is optimized for mail applications. The product includes a mail gateway that provides microcomputer users with transparent access to VMSmail. It also provides a VAX TTY client that enables access to the local VAX mail server or any other Microsoft Mail-compatible server on a network. PacerPost takes advantage of VAX/VMS features that benefit a mail network, including high performance, user security, ease of message backup and server administration flexibility.

PacerPost consists of three separately licensed components. The VMSmail server, which includes a single VMS TTY client, costs from $2,000 based on VAX configuration. Pricing for additional VAX clients begins at $1,000. The PacerPost VMSmail gateway option costs from $2,000.

For more information, contact Geof Blum, Pacer Software Inc., 1900 W. Park Dr., Ste. 280, Westborough, MA 01581; (508) 898-3300.

Circle 549 on reader card

OTC Launches Office Line Printers

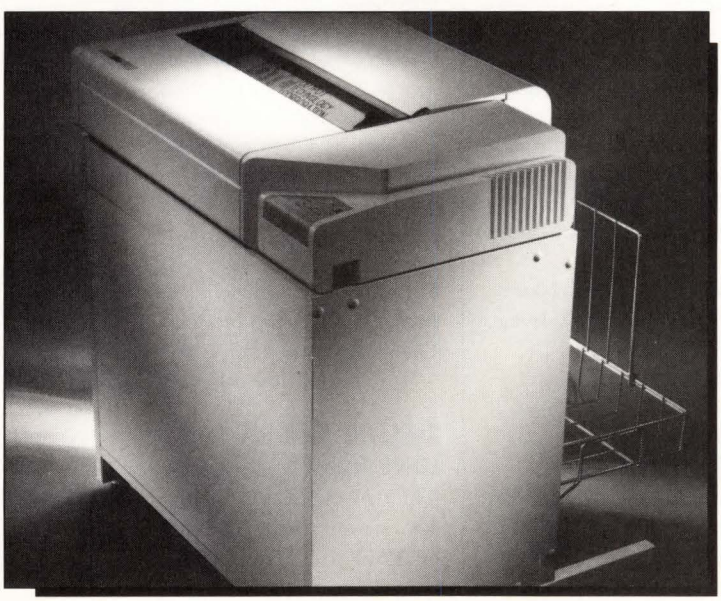
Output Technology Corporation announced the 800 SE Office Partner Series, a series of office line printers. It comprises three heavy-duty models, each with a speed of 240 lpm (850 cps). Two accessory packages are available for configuring the printers for office and data processing environments.

The 800 SE series features built-in bar codes; NLQ printing; graphics; DEC, IBM and Epson emulations; multipitch printing; and 12 international character sets. The 850 SE is the parallel/serial model for standard PC and networking environments. The 888 SE is geared toward IBM 3x and AS/400 environments. The 889 SE is for coax users in the IBM 3270 environment and offers coax and parallel ports as standard.

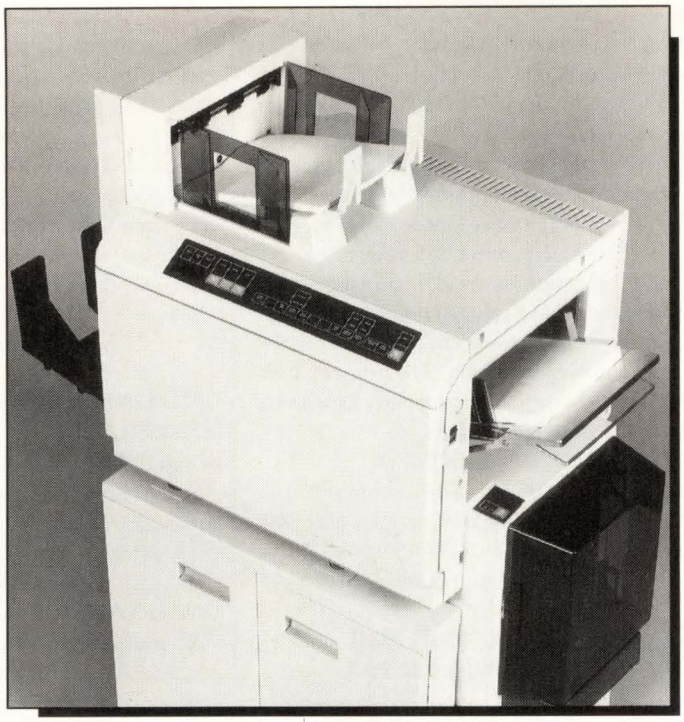
The 850 SE costs $2,495; the 888 SE costs $3,795; and the 889 SE costs $3,995.

For more information, contact Marie Hartis, Output Technology Corp., E. 9922 Montgomery, Spokane, WA 99206; (509) 926-3855.

Circle 550 on reader card



OTC's 800 SE Office Partner Series With Office Accessory.



MegaServe Ion Printers are matched to network applications requiring extensive connectivity.

MegaSeries Ion Page Printers Output 250,000 Pages Monthly

Image Systems Inc. announced the MegaSeries ion printers, which are designed for duty cycles of up to 250,000 pages per month.

MegaSeries printers come in three basic models: MegaLine, MegaPro and MegaServe. MegaLine has throughputs ranging from 2,000 lpm to more than 7,000 lpm. It allows for overlayed forms, rule lines and gray bars. MegaPro is targeted for applications requiring complex electronic forms overlay, enhanced bit-imaged graphics and a wide selection of fonts. MegaServe accommodates network applications requiring extensive connectivity and several selectable emulations. It has three standard host interfaces, an optional Ethernet connection with software drivers for UNIX and DECnet systems, and eight emulations and interpreters, including LN03 Plus, HP LaserJet II, HP-GL and PostScript.

The MegaSeries printers cost from $12,995 to $29,995.

For more information, contact Daniel Jones, Image Systems Inc., P.O. Box 25139, Irvine, CA 92714; (714) 757-4489.

Circle 524 on reader card

Intermetrics Announces Compilers And Debuggers

Intermetrics Inc. announced Whitesmiths optimizing C cross-compilers and CXDB C source-level cross-debuggers for the Motorola 68HC11 and Intel 8051 microprocessors. They're preintegrated and provide a C development environment for designers of embedded systems.

The compilers support ANSI/ISO Standard C with Whitesmiths chip-specific extensions. The extensions bring low-level assembly language features to the C environment. The compilers include full macro assemblers that provide cross-references, generate relocatable code, and include support utilities to automate the production of ROMable code. The compilers are available on IBM PCs and compatibles and Sun, HP-Apollo and VAX/VMS hosts.

The debuggers feature a multiwindow user interface, breakpoint and program step control, user-defined functions, C and Assembler display, data monitoring, access to local and global symbols and simple and aggregate types, and simulated I/O. The debuggers run on IBM PCs and compatibles.

The compilers cost from $1,800. The debuggers cost $1,500.

For more information, contact Patricia Arcand, Intermetrics Inc., 733 Concord Ave., Cambridge, MA 02138; (617) 661-0072.

Circle 439 on reader card

Joiner's Jnet BSC/400 Links VAXs to AS/400s

Joiner Associates Inc. announced Jnet BSC/400. It works with Jnet to link NJE services on VAXs to SNA SNADS on AS/400s.

Jnet BSC/400 can be added to a Jnet installation quickly using standard VMS installation procedures. It's transparent to users and is tightly integrated with VMS and other DEC software products. BSC lines are used for transport between the product and AS/400 communications utilities. Jnet BSC/400 works on all VAXs that support DSV11, DMB32, DMF32, DPV11 or DUP11. Jnet works on all VAXs and interoperates with other VAXs running Jnet, with IBM and compatible mainframes running VM or MVS, with UNIX systems running UREP, and with other implementations of NJE. Requirements to run Jnet BSC/400 include Jnet V3.4A, VMS and, for DSV11 and DMB32 synchronous devices, the VAX Wide Area Networking Device Drivers. Jnet includes device drivers for the DMF32, DPV11 and DUP11.

A permanent, single-node license for the Jnet BSC/400 option, including the right to run the software version initially licensed, costs $6,000.

For more information, contact Brian Koenig, Joiner Associates Inc., 3800 Regent St., Madison, WI 53705; (608) 238-8637.

Circle 440 on reader card

ScriptServer Supports IBM PostScript Printer On VAX

GrayMatter Software & Consulting Inc. announced that device support for the IBM 4019 LaserPrinter with PostScript option has been added to its ScriptServer Printing System V3.1. ScriptServer interfaces and manages the local or network attachment of multiple-vendor PostScript printers to VAX.

ScriptServer supports 17 resident PostScript fonts on the 4019 with PostScript option and an 22 outline fonts via a font card. It also supports an optional 500-sheet second drawer and envelope feeder. Software switching of printer emulations, a standard feature of ScriptServer, enables control of the HP LaserJet II and HP-GL emulations on the IBM printer. ScriptServer features full LAT support and compatibility with terminal emulation products, allowing sharing of printer resources by workstation, Mac or PC users. PCSA and SNA Gateway products from DEC also are supported.

ScriptServer costs 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; (206) 281-8800.

Circle 529 on reader card

Desktop Imaging Supercomputer Performance

Performance, standards, plus ease of integration, add up to MILLENNIUM, Ramtek's most powerful image processor yet!

HIGH RESOLUTION
1280 x 1024 displayable from independent 2048 x 1024 graphics and imaging frame buffers.

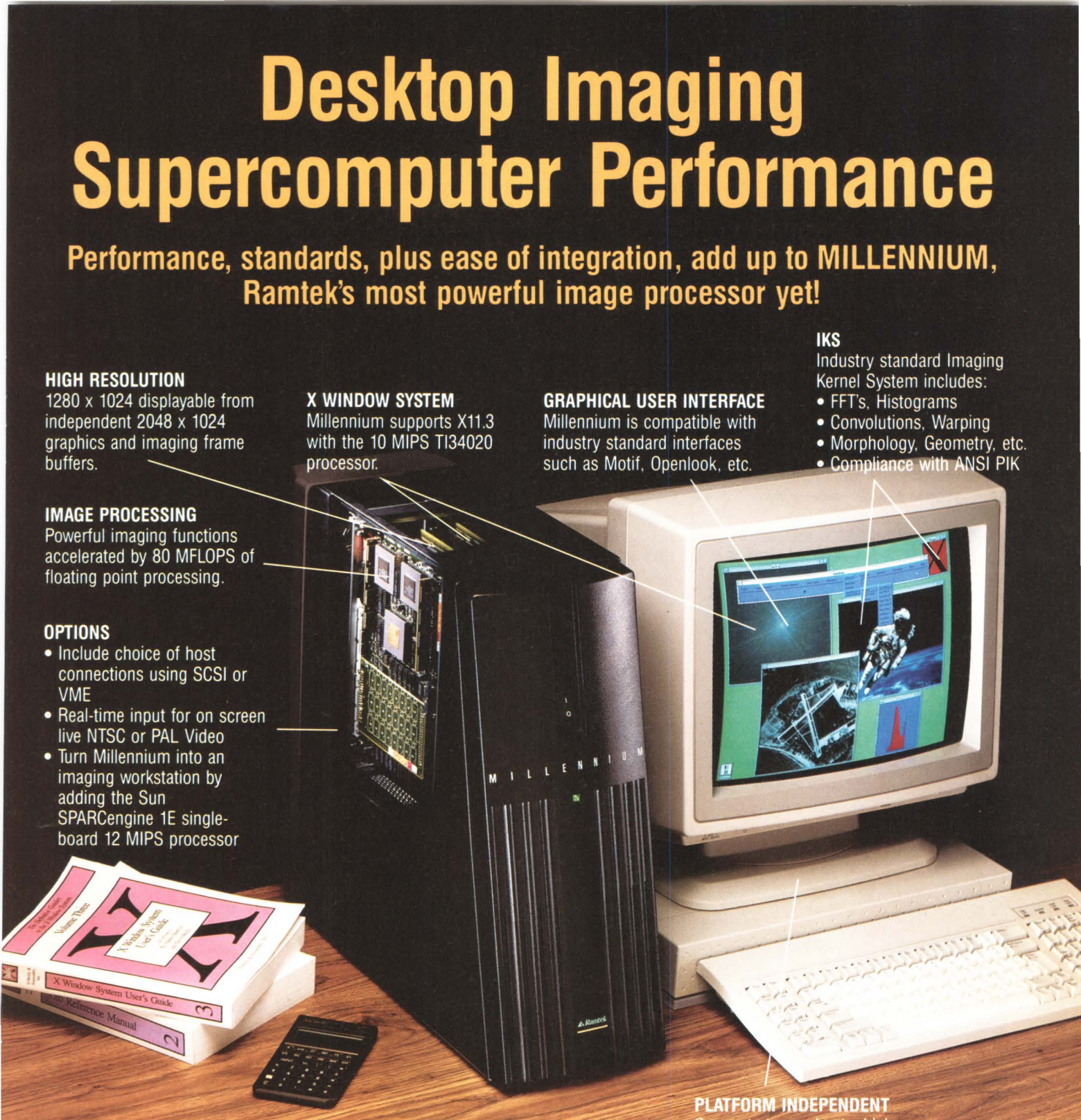
X WINDOW SYSTEM
Millennium supports X11.3 with the 10 MIPS TI34020 processor.

GRAPHICAL USER INTERFACE
Millennium is compatible with industry standard interfaces such as Motif, Openlook, etc.

IKS
Industry standard Imaging Kernel System includes:
- FFT's, Histograms
- Convolutions, Warping
- Morphology, Geometry, etc.
- Compliance with ANSI PIK

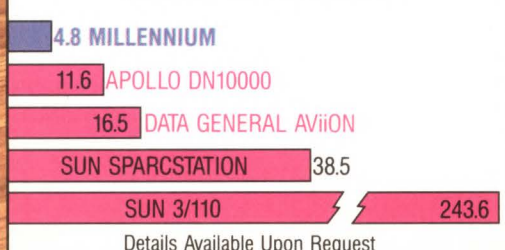
IMAGE PROCESSING
Powerful imaging functions accelerated by 80 MFLOPS of floating point processing.

OPTIONS
- Include choice of host connections using SCSI or VME
- Real-time input for on screen live NTSC or PAL Video
- Turn Millennium into an imaging workstation by adding the Sun SPARCengine 1E single-board 12 MIPS processor



PLATFORM INDEPENDENT
Connects to any host which supports the X Window System and has either VME or SCSI ports available.

FAST FOURIER TRANSFORM
512x512 – IN SECONDS



Details Available Upon Request

Ramtek

Ramtek Corporation
1525 Atteberry Lane
San Jose, CA 95131
1-800-RMK-MILI

CIRCLE 337 ON READER CARD

FaxScript Integrates PostScript With VMS Fax Product

ECAP Systems Inc. and Wilco Communications jointly announced FaxScript. It integrates the facilities of ECAP's Outpost VMS PostScript printing utility and Wilco's Autofax VMS fax product.

FaxScript lets ALL-IN-1 and VMS users automatically send and receive faxes, incorporating all the typesetting abilities of Outpost and EPS. It can support up to 512 fax lines, TELEX and other carriers. VMS and ALL-IN-1 users can send a complete fax including letterhead, fax cover sheet and digitized signature directly from their terminals.
For more information, contact Eric Covington, ECAP Systems Inc., 83 Ste Euphemie, Casselman, ON K0A 1M0; (613) 764-3889.

Circle 520 on reader card

Spaceware Provides Configuration Routines For 3-D Graphics Device

Spatial Systems Inc. announced version 2.0 of its Spaceware library of software routines for the Spaceball 3-D graphics control device. Spaceball provides complete spatial control of 3-D graphics objects by translating all forces and torques applied by the user.

Spaceware V2.0 provides complete hardware and graphical interfaces for Spaceball, allowing you to use Spaceball's intuitive control in existing 3-D applications. It provides configuration routines that let you configure Spaceball to drive your applications. It also provides a series of windows that let you interface Spaceball with your graphics workstation. The graphical interface can be displayed or modified at any point during the application session without exiting the current program. A help window provides online reference and displays the status of each of Spaceball's eight user-definable function keys. You can modify the functions keys with mouse clicks. The product works with the DECstation 5000 and 3100.
For more information, contact Roy Sanford, Spatial Systems Inc., 900 Middlesex Tnpk., Bldg. 8, Billerica, MA 01821; (508) 670-2720.

Circle 419 on reader card

CompuServe Releases Interfaces To System 1032

CompuServe Data Technologies announced menu-driven interfaces to CA-TELLAGRAF and 20/20 for its VAX/VMS-based System 1032 4GL/RDBMS. System 1032 is used to query, manipulate and study large or complex databases for scientific, research and commercial applications.

The interfaces to System 1032 let you access data and transfer it to either CA-TELLAGRAF for graphing or to 20/20 for spreadsheet analysis. The 20/20 interface is bidirectional, supporting both updating and importing of data to and from System 1032 and 20/20. You can preview data before it's sent to CA-TELLAGRAF or 20/20 and modify the query as needed. You can also drop records from the query result and refine and modify it before importing the data. All query and graph specifications are stored and available for future modification or reuse.

The System 1032 CA-TELLAGRAF and 20/20 interfaces each cost from $500 for a VAXstation to $15,000 for a VAX 9000-series license.
For more information, contact Linda Hamel, CompuServe Data Technologies, 1000 Massachusetts Ave., Cambridge, MA 02138; (617) 661-9440.

Circle 522 on reader card

VCM/CAD Kit Brings CAD/CAM/CAE To VAXstations

Peritek Corporation announced the VCM/CAD Kit, a DECwindows/X Window System-compatible graphics hardware package that provides VAXstations with a second terminal for CAD/CAM/CAE applications. The VCM/CAD kit runs DECwindows or X-compatible CAD/CAM/CAE packages from a VMS- or ULTRIX-based VAXstation.

The VCM/CAD kit provides the processing power and hardware required for graphics-intensive applications such as animation and special effects, image processing, simulation, terrain mapping and video archiving. The kit features Peritek's VCM-Q high-resolution color graphics display, a half-height Q-bus board with an on-board 16-bit intelligent display controller (ACRTC). The VCM/CAD kit also provides an X server (X11.R4), a monitor, keyboard, mouse and all required cables. Software provided includes X and diagnostics.

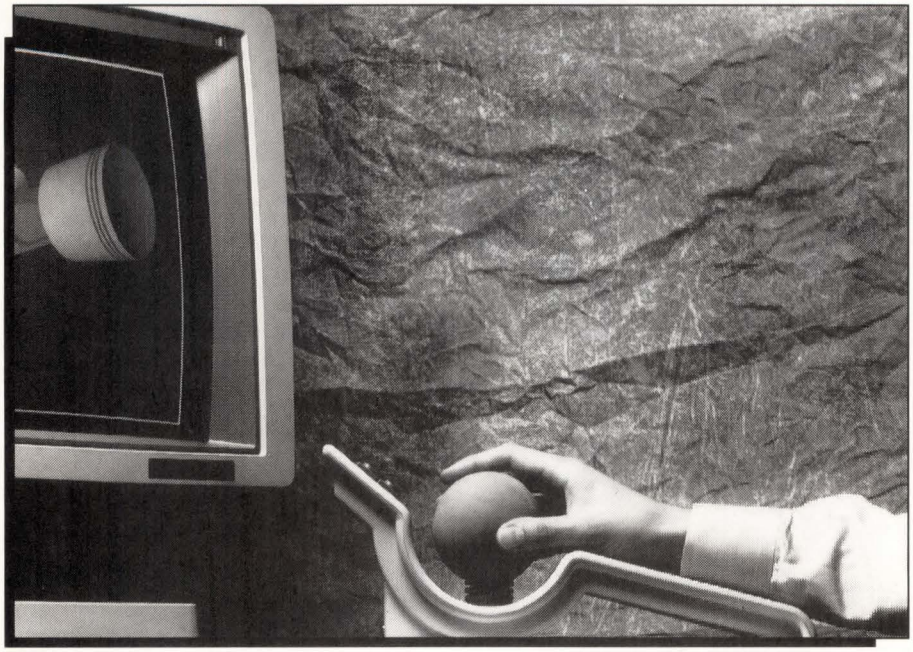
The VCM/CAD kit costs from $8,175.
For more information, contact Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619; (415) 531-6500.

Circle 451 on reader card

Focaudit Auditing Tools Offer Menu-Based Solution

Information Builders Inc. announced Focaudit, a set of interactive auditing tools for VAX/VMS. Focaudit offers financial auditors a menu-based solution that integrates predefined, standard audit routines with an underlying report writer for industry- and company-specific requirements.

Written in the company's Focus 4GL, Focaudit performs all audit functions, including analyzing fields, sampling and validating data, testing and converting dates and producing statistical summaries and exception reports. It provides access to many DBMSs, including Rdb, RMS and DEC's DBMS

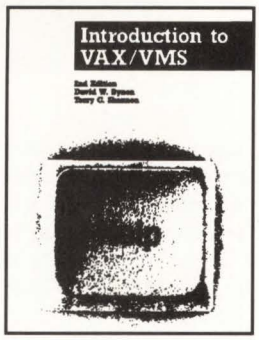


The Spaceball 3-D graphics control device translates user-applied forces and torques.

Increase Your Computing Skills With Books From Professional Press

Introduction to VAX/VMS, 2nd Edition

by David W. Bynon and Terry C. Shannon



The perfect "get started" book for computing professionals new to VAX/VMS. It covers the basics of the operating system, DCL, Files & Directories, the EDT Text Editor and much more. With easy to understand, step-by-step examples, Introduction to VAX/VMS is also a great desk reference for experienced users. Softcover, 239 pages, $29.95.

Mastering VMS

by David W. Bynon

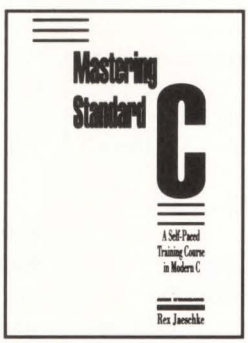
Brand New Book!

The perfect tool for teaching intermediate-level VMS skills and a valuable desk reference for any system manager, programmer or operator who works in VMS. Includes chapters on the VAX, DECnet, VAXclusters, Utilities and Commands, Command Procedures, VMS Operational Management, System Performance Management, DECwindows and much more. Order this valuable reference now. Softcover, 465 pages, $39.95.

To order, just follow the instructions below.

Mastering Standard C — A Self-Paced Training Course in Modern C

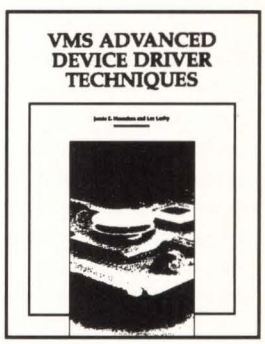
by Rex Jaeschke



World-renowned C expert Rex Jaeschke's ANSI-compliant tutorial teaches C novices and experienced users alike the latest innovations in C language. Provides detailed explanations and teaching examples on topics ranging from Arrays, Functions and Pointers to the C Preprocessor, Standard Library I/O Routines and C's Typing Mechanism. Learn Modern C the quick and easy way — with Mastering Standard C. Softcover, 366 pages, $39.95.

VMS Advanced Device Driver Techniques

by Jamie E. Hanrahan and Lee Leahy



The book for hands-on VAX/VMS pros who want to design, implement and debug device drivers. Explains simple VMS device drivers, full duplex and state machine-based drivers, VAX BI drivers, user-written ACPs and debugging techniques. Become proficient in device driver techniques from low-level building blocks to high-level design issues. Order VMS Advanced Device Driver Techniques. Softcover, 347 pages, $59.95.

Indicate how many copies of each book you wish to order on the form. Be sure to include shipping and handling charges when you calculate total cost.

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DIGITAL PRODUCTS

■ DEC announced five terminal and printer products. The VT420 text video terminal is for tasks that require alphanumeric and associated characters. Features include dual sessions with flip-screen or split-screen viewing; a choice of data lines to match application needs; and off-screen memory that can store six 24-line pages.

The VT330+ is a two-plane monochrome text/graphics terminal with a 14-inch flat CRT screen featuring a paper-white phosphor. The VT340+ is a four-plane, 16-color unit with 14-inch display. Both offer dual sessions with session switch key; single- and dual-wire multiple-session capabilities; and horizontal and vertical split-screen viewing.

The LA70 is a nine-wire-head dot-matrix printer for workstations and PCs. It can be used with the VT420 for receiving data from the host — with dual sessions on the terminal, it can print from one session while data is entered in the other. It operates at 52 dBA and features draft mode at 200 cps, memo mode at 100 cps, NLQ mode at 40 cps, and built-in serial and parallel interfaces.

The DECprint Utility for PostScript-to-Sixel Printing runs under VMS and lets VAXs output files in PostScript format to DEC non-PostScript printers. It supports dot-matrix, color ink-jet and desktop laser printers and can generate color graphics transparencies for overhead projectors. Its lay-up feature lets printers output reduced, multiple-image prints.

■ The MicroPDP-11/93 and PDP-11/94 provide a 40 percent performance increase over the previous high-end PDP/11s. Both are program-compatible with earlier models, allowing you to run existing software without revision, recompiling or relinking. They support such programming languages as FORTRAN, BASIC, COBOL, Pascal, C and the Macro-11 assembler.

The MicroPDP-11/93 costs from $14,175. The PDP-11/94 costs from $21,420.

■ DEC announced the Rackmount VAX 6000, which is a VAX 6000 housed in a 19-inch-wide EIA industry-standard rack-mountable format. It offers a solution for OEMs, systems integrators and customers with special packaging requirements in such applications as telecommunications and manufacturing. The Rackmount VAX 6000 fits a fully functional VAX 6000 and more than 7 GB of storage in the same cabinet.

For more information, contact your local DEC sales office or call (800) DIGITAL.

databases. It can join a Focus file to any supported third-party file for single-view reporting. The release complements existing implementations for the IBM VM and MVS operating systems and DOS-based microcomputer workstations, with complete portability of applications among all versions.

For more information, contact Information Builders Inc., 1250 Broadway, New York, NY 10001; (212) 736-4433.

Circle 519 on reader card

CIE America Announces CI-1000 Line Printer

CIE America Inc. announced a shuttle matrix line printer for high-volume, multitask printing applications. It's compatible with the CI-400/800 series of line printers and emulates the Printronix P6080 and IBM ProPrinter II/XL, making it compatible with a range of host minicomputers, mainframes and PCs.

The CI-1000 prints 940 lpm in high-speed draft mode, 700 lpm in data-processing mode and 200 lpm in letter-quality mode. Its 16-inch carriage prints up to 233 columns. The CI-1000 can print up to five copies of an original. You can store and recall four task-specific printer setups for special printing operations from the printer control panel or host computer. Also announced were the CI-400/800 series matrix line printers and the 18-wire CI-5000 series dot-matrix printers.

The CI-1000 costs $9,995. The CI-400/800 series printers cost from $5,595 to $8,690. The CI-5000 series dot-matrix printers cost from $1,995 to $3,195.

For more information, contact Harry Slam, CIE America Inc., P.O. Box 25137, Irvine, CA 92714; (714) 660-1421.

Circle 521 on reader card

KEYPak And Network Courier Become Network COURIERpak

Keyword Office Technologies Ltd. and Consumers Software Inc. announced Network COURIERpak, the integration of KEYpak, Keyword's document exhange product, and Network Courier, Consumer Software's network e-mail offering. The joint product provides fully integrated e-mail enabled document interchange.

Network COURIERpak lets you compose a document in MS-WORD and send it to a PC user who can receive, edit and print it using WordPerfect. Document conversion takes place when the e-mail recipient saves the document. A two-keystroke command performs the conversion. The process occurs automatically and is transparent to the sender and the recipient. Network COURIERpak provides total document interchange among more than 35 systems including DisplayWrite 4, Microsoft Word, MultiMate and WordPerfect.

Network COURIERpak costs $2,495 and includes three document interchange formats. Network Courier e-mail customers can add KEYpak document interchange capability to their existing environment.

For more information, contact Louise Gallagher, Keyword Office Technologies Ltd., 2816 Eleventh St. N.E., Calgary, AB T2E 757; (403) 250-1770.

Circle 525 on reader card

Tektronix Offers XD88/35 Visualization Superworkstation

Tektronix Inc. announced the XD88/35 visualization superworkstation. The company also announced that all XD88 series workstations will include image-processing capability as a standard feature.

The XD88/35 provides the overall system performance needed for high-end visualization applications. It offers 21 mips, 2.5 Mflops and accelerated 3-D graphics. It also includes Core TekImaging, Tek's 2-D image processing toolkit, and Tek's graphics accelerator, which redraws more than 1 million 2-D and 3-D vectors per second. TekImaging is a comprehensive image processing software library designed for the XD88's Motorola 88000 RISC-based processors. It lets you interact with real-world data sets from satellites and seismic sensors and display the abstract data in picture form. Core TekImaging comes standard on all XD88s. Advanced TekImaging can be purchased as an option.

The XD88/35 costs $31,995. Advanced TekImaging costs $14,000.

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BACK END

John C. Dvorak

The Japanese Challenge

I'm amused by the amount of Japan-bashing we see today. The Japanese penchant for focusing on a market and then producing an outstanding product with hopes of dominating that market upsets many people. The Japanese have done this with cars, machine tools, memory chips, bicycles, and so on. But instead of working harder and smarter than the Japanese, we complain about them. In my opinion our cultures have more in common than any other two cultures.

Except for race and language, there are striking cultural similarities between American and Japanese societies. Both are preoccupied with gadgetry, electronics, cars, motorcycles, baseball and sushi. To make a contrast, ask a Bulgarian if he likes baseball or sushi and see what he says.

American and Japanese societies share a common farming heritage and each has adapted many of the mores of its heritage into a modern industrial structure. Both societies strive to win and are the most competitive nations on earth.

Competition can be good or bad. It can result in continual improvement of the community at large. Or it can become a peace-threatening pursuit if one player, instead of competing fairly, wants to dominate the opponent at any cost.

Recent trade talks between the two countries indicate that the Japanese want both communities to remain competitive for the betterment of all. Americans spend too much time complaining about aspects of Japanese trade that to us seem impossible to live with.

The worst practitioner of this is the deplorable Lee Iacocca of Chrysler Motors. One of his biggest gripes is that people perceive Japanese cars as better than American cars. He says that the Mitsubishi Eclipse sells better than the Plymouth Laser, even though it's the same car. But why not? People would rather buy a Nikon camera than a Sears camera made by Nikon.

The Japanese perceive our complaining as whining, and rightly so. It's a trait neither of us likes. So why do we do it? Partly because we like to complain. It's fun. We can complain until all hours of the night. We love it. But there's a fine line between whining and griping. The Japanese must understand this in order to work with us. Then again, maybe we should stop moaning.

The main complaint about trading with the Japanese is aimed at their distribution system, which seems to be part of a complex welfare scheme to keep people employed. We complain about the Japanese penchant for layers of distribution between supplier and consumer. Many demand that the Japanese change this, because it's a barrier to fair trade.

This is less a barrier to trade than it is a barrier to a closer understanding of the Japanese version of capitalism. It's a system that works but makes no sense to us. Group decision-making, for example, seems like a time-consuming waste of energy. The seemingly slow process doesn't give Americans the quick feedback they need in order to know whether or not they're doing the right thing. However, once a decision is made, the Japanese take action more quickly than Americans. Hence Japanese car makers' ability to produce new models in less time than it takes American car makers.

Sociology is one of the few understudied disciplines in Japan. Being one race and culture, there's no need to study Japanese sociology. But it would behoove Japanese businessmen to investigate sociological principles to better understand American businessmen and their needs. We're the ones doing the catering. For example, American businessmen don't consider the Asian concept of "face" important. We don't care if we "lose face." Americans prefer people to be blunt. A Japanese might want to be nice, whereas Americans don't necessarily prefer that approach.

> ***"There are striking cultural similarities between American and Japanese societies."***

What do any of us know about the Japanese computer market? It's as much a part of that culture as the Carp baseball team. I wonder what the American companies in the market know. They know that NEC is the king of the hill. It's the IBM PC of Japan. There doesn't seem to be a way to unseat this dominance. Or is there?

Is it possible for a U.S. company to penetrate the Japanese small-computer market? How will opportunities in the Japanese PC market become open to U.S. vendors in the '90s? Will U.S. vendors be required to make a bigger effort at localization to enter into the Japanese PC market? These are the questions of the decade. If they aren't answered, we may see the computer business go the way of consumer electronics — out of the United States. ■

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The boss paused and got that far-away look in his eyes, the one that usually means more work for us. Then he sat back down and quietly said, "What we offer, above all, is **peace of mind.** Think about it. When programmers install CCC, they eliminate all that repetitive tracking of changes. Their boss, the manager, gets an unprecedented level of control over projects, and their financial people get a solid return on their investment, while insuring the company's software assets. **Everybody wins.**"

Finally, he fixed each of us with "the look" and ended: "Now if you guys can't sell *that,* you don't belong here."

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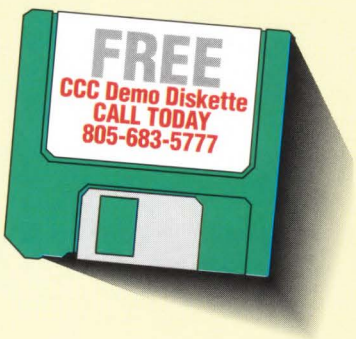

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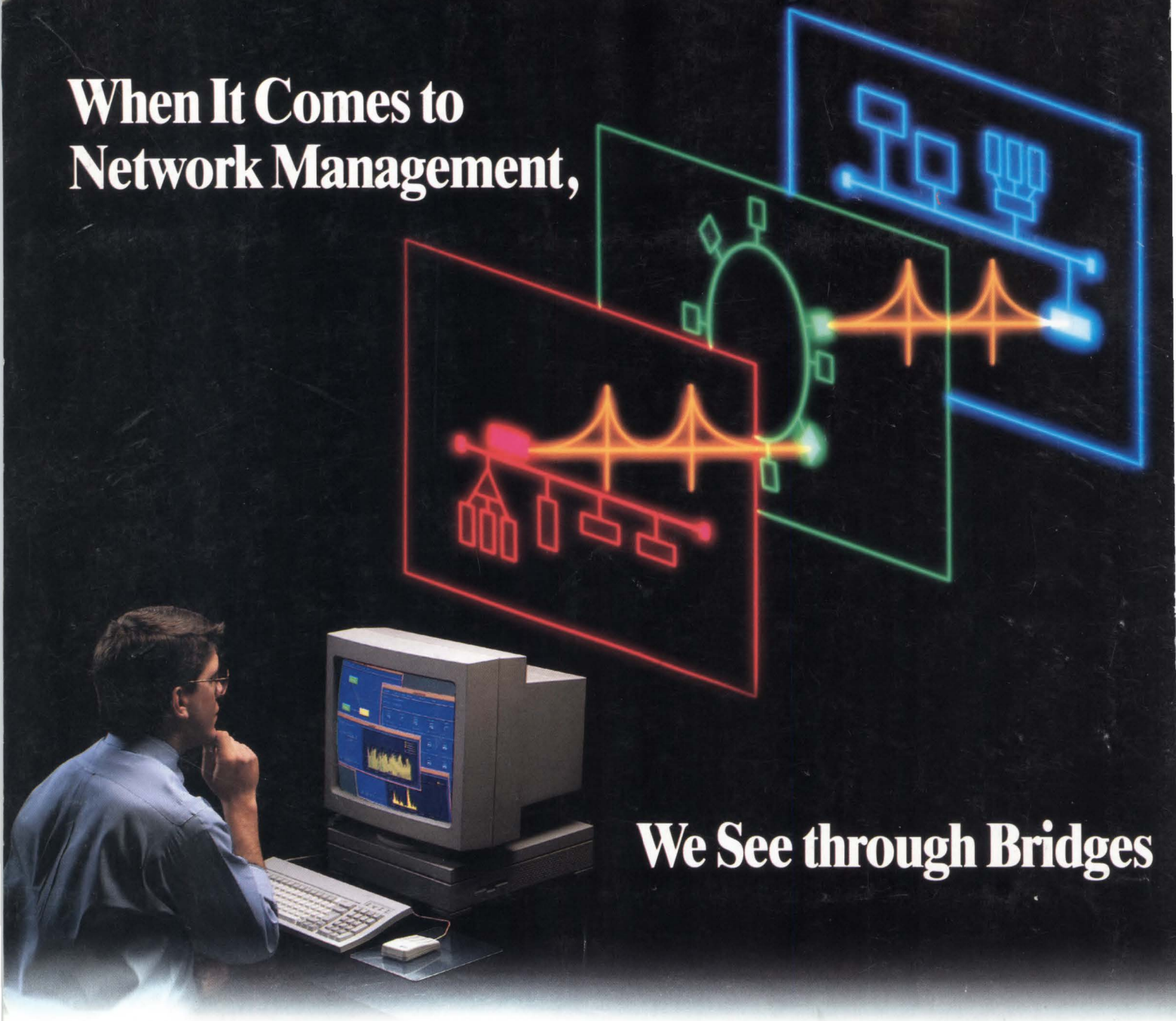

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