November 1993

FOCUS

The Magazine of the North American Data General Users Group

DG & NADGUG: Looking back and forward

In Focus

Of time and the computer industry, part II
DG milestones
Conference reminiscing
I (don't) miss my CS-40

Plus

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FOCUS

The Magazine of the North American Data General Users Group

Cover design by Ann Soto

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Volume 9, Issue 11.

NORTH AMERICAN DATA GENERAL USERS GROUP

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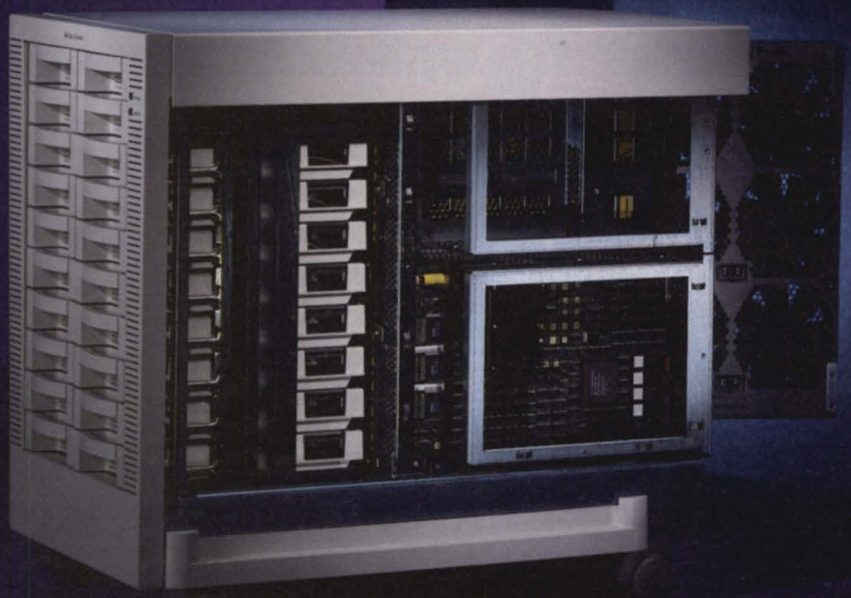

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Storage Technology endorses Clariion

Storage Technology Corporation will integrate Data General's Clariion open storage technology into its Nordique disk array product for an estimated value to Data General in excess of $100 million over three years.

DG's Clariion Business Unit, formed last fall, announced early on that the cornerstone of its marketing strategy will be the development of strong distribution channels, such as this agreement. Storage Technology designs, manufactures, markets, and services information and storage-retrieval subsystems for enterprise computer systems and networks. The company reported revenues of $1.52 billion for its most recent fiscal year.

DASH means cash

Data General Aviion servers and Dasher personal computers will be the systems used in a $60 million contract awarded to **Cordant, Inc.,** by the U.S. Department of Defense. The total value to DG is approximately $35 million.

Cordant, a systems integrator based in Reston, Virginia, was chosen as the prime contractor for the Department of Defense Medical Systems Support Center (DMSSC) Automation Support Hardware (DASH) project. It is expected that more than 1,000 Aviions and a similar number of Dasher PCs will be purchased over the contract's four-year term.

The system will be used by Department of Defense medical facilities worldwide, including 180 hospitals and more than 600 treatment centers, said James Ochse, Cordant's director of communications. Applications will include management of patient information and blood-tracking systems. **Informix** and **Intersystems** will provide data base 4GLs (fourth-generation languages) and MUMPS software to run on the high-performance workstations and PCs.

High marks from Vmark

Data General was named **Vmark Software**'s "most distinguished vendor" for topping all other system suppliers in sales of Vmark's Universe and PI/open software, which run on Unix-based Aviion computers. Universe and PI/Open are postrelational data bases on the Pick data model. They allow Aviions to run thousands of applications written for the Pick operating system. According to Data General, this has helped Data General become one of the fastest-growing vendors in the Pick/Prime market, and obtain new customers who formerly used Prime systems.

Wanted: beta-test sites

Monarch Software, Inc., is seeking beta sites for its OEO (Open Electronic Office) and OFM (Open File Manager) products. OEO offers CEO functionality

on Aviions and DG/UX, including electronic mail, calendar, filing, printing, mail lists, user commands, word processing, and spreadsheet integration. OEO is keystroke-for-keystroke compatible with CEO. OFM gives Infos functionality on DG/UX.

Both products will be demonstrated at Monarch's booth at the NADGUG 93 conference, October 25-28, at the Inforum in Atlanta. If you would like to be a beta site for OEO or OFM, contact Bill Cole at Monarch at 800/MIGRATE or 919/851-5408.

Wordperfect drops MV

Wordperfect Corporation (WPCorp) no longer sells products for Data General's AOS/VS-based Eclipse MV platform as of Sept. 30, 1993. Post-sale support for Wordperfect's MV products will end on August 1, 1994.

"At times, companies have to make difficult decisions concerning the future direction of their development efforts. Naturally, WPCorp wants to focus its resources on products that best serve the needs of its customers," reads a joint statement by President Alan C. Ashton and DG's Eclipse Business Unit Vice President Peter Gyenes (no longer with the company). Apparently, these days more customers are using Wordperfect products on PCs and workstations than on DG minicomputers.

For those who wish to continue using Wordperfect on another platform, Wordperfect is offering a DG AOS/VS Cross-Platform Upgrade Program. The program is valid through August 1, 1994. Those using Wordperfect integrated with DG's proprietary office-automation product, CEO, can get similar functionality by using DG's CEO Object Office, a PC product.

Wordperfect pledges to continue its DG relationship by supporting products for the Aviion platform. Wordperfect currently ships Wordperfect 5.1 for DG/UX-based Aviions. Office 4.0 for DG/UX is in development.

In this year of anniversaries, Data General's 25th, NADGUG's 20th, here's another reason for nostalgia: Wordperfect was developed originally on the Data General platform, as briefly described in the text of a full-page ad that ran several times in *Focus* during the late 1980s:

"Wordperfect Corporation's relationship with Data General goes back to the very first keystroke. Alan Ashton and Bruce Bastion had arranged with Orem, a small town in Utah, to write a word-processing program for the city's Data General minicomputer. Working around the clock in the basement of city hall, Bruce and Alan huddled over a Data General computer. They were developing what would become the new industry standard in word processing. Wordperfect." Δ

In General is compiled by Robin Perry. Contributions may be sent to: FOCUS *magazine, P.O. Box 200549, Austin, TX 78720; 512/335-3386 (phone); 512/335-3083 (fax).*

Movers, shakers, newsmakers

by Doug Johnson
Focus staff

A couple of afternoons spent sifting through more half a year's worth of COMPUTERWORLD issues leads me to discern things of cosmic proportions: There are two kinds of players in the ferociously competitive computer industry: 1) Those who get noticed (mentioned a lot in stories and articles); and 2) Those who don't and probably wish they did.

It was my impression that, relatively speaking, Data General doesn't get much ink in this publication that bills itself as "The Newspaper of Information Systems Management." I always turn first to the index of companies that appears in the back of each issue and look for "Data General Corp." Much of the time there's one listing, meaning a story mentioning DG begins on that particular page. And also quite often there are no listings at all.

So I did what any responsible journalist who wants to prove his point would do—I set about compiling some numbers and generating some stats. Now I'm prepared to unleash some wholly unscientific and potentially slanted conclusions.

To explain this quickly, I merely counted now many times various companies (including Data General, of course) were mentioned in COMPUTERWORLD issues beginning last January 4 and continuing through to September 6, added up the tallies to see who got the most, figured averages and even maximimums and minimums. My collection of COMPUTERWORLD back issues for 1993 was incomplete, missing 3 or 4 issues here and there, but in all I looked at 34 weekly editions that are usually about 100 to 150 pages in size. Even with all those disclaimers some clear patterns emerged.

Quick, name the corporate giant listed most often. Hey, that was an easy call. It's IBM, with 615—or to use a more meaningful number, about 18 mentions per issue, as many as 26 and never less than 8. We can all agree that there can be no computer-industry news summary that doesn't include *some*thing about Big Blue.

And who's No. 2 behind IBM? Right again, this is an easy game: Microsoft Corporation, with 499 listings, or almost 15 per issue. Bill Gates' software juggernaut (some would say rapacious monster) garnered as many as 29 mentions in any one issue and never dipped below 7.

IBM and Microsoft were far and away the most-named companies in COMPUTERWORLD's view of things. There was nothing surprising about that. Good or evil, they're the big stars, the weighty newsmakers—the industry leaders.

Numbers 3, 4, and 5 on this unofficial Most-Mentioned List were clustered tightly: Novell with 338 index references, Hewlett-Packard with 326, and Digital (DEC) with 320.

And Data General? Well, let's include first some others who got at least *twice* as many index listing as did DG, during that same period and roughly in descending order: Apple (253), Sun (209), Lotus (192), Intel (151), Oracle (164), Borland (112), Compaq (118), Sybase (97), and Unisys (66). Yes, those companies quite rightly account for a lot of computer-industry movin' and shakin'. The exact number of index mentions isn't important, just that these companies are mentioned *way* more often than Data General is.

I can't even assert that DG would be next up in the index rankings (15th), because I didn't bother counting *all* the companies that obviously out-indexed it during the first two-thirds of the year. What about Dell Computer and Motorola, just to name a couple? In a typical issue (say, July 26), Data General isn't mentioned any more often (once)

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TNT—Training, Networking, and Technology

There's real excitement in the air as we celebrate our 20th conference. The theme of the 1993 NADGUG Annual Conference captures this excitement and represents the three major foci of our conference: Training, Networking, and Technology.

- *TRAINING:* The track program for this year provides many opportunities for learning about the methods and tools we need to perform our jobs. This year, we are combining half-day, in-depth sessions with our traditional short sessions.
- *NETWORKING:* The conference provides superb opportunities for meeting other members with similar interests and responsibilities. The combination meeting allows you to meet with Data General developers and staff. And you have the chance to share useful information and solutions with others.
- *TECHNOLOGY:* The NADGUG exhibit hall will be filled with hardware, software, and service vendors and their products. We have a chance to see and learn about the newest technologies that can help us develop solutions.

Training, Networking, and Technology, represented by the acronym "TNT," also stands for the explosive growth of information technology and techniques that face us. There is no better place than the annual NADGUG conference to catch up with the changes and to position your organization to make the best use of the current and emerging technologies.

The Conference Committee looks forward to seeing you in Atlanta. Don't miss the greatest conference that we have ever had. Δ

Brad M. Friedlander
Track Chairman
Conference Committee

Continued from page 6

than Union Pacific Railroad, Waldenbooks, Babson College, and Otis Elevators, and not even as often (twice) as the Federal Trade Commission.

Data General's total for the 8-month period was 27, an average of only 0.79 listing per week. And 5 of those all came in one issue. The March 22 issue: "DG array performs unattended backup" was a short article about DG's Clariion tape array; and "The CW Guide to Servers," rated DG's Aviion RISC servers tops in value for the dollar. So, is it my imagination or is Data General the "Stealth Company," virtually invisible to the radar of publicity, at least in COMPUTERWORLD? DG didn't seem all that prevalent in the *Reader's Guide to Periodical Literature* when I looked up magazine articles for the feature that starts on page 11, but such observations are difficult to quantify. Maybe the newshounds can't (or simply don't) get its scent.

By their size, success, and innovation (and I suspect sometimes it has to do with how much advertising they buy), some companies become industry leaders. They end up driving and dominating the news, and that's just the way things are. Some are newsmakers, most are not. It's a status thing. And it's easy to pay attention more attention to the prominent. Big is spectacular, whether you're talking about success or failure. When in doubt, do a story on the big guys, even if nothing is going on. Δ

Company	Avg. index listingsper issue
IBM	18.09
Microsoft	14.68
Novell	9.94
Hewlett-Packard	9.59
DEC	9.41
Apple	7.44
Sun	6.15
Lotus	5.65
Oracle	4.82
Intel	4.44
Compaq	3.47
Borland	3.29
Sybase	2.85
Unisys	1.94
Data General	0.79

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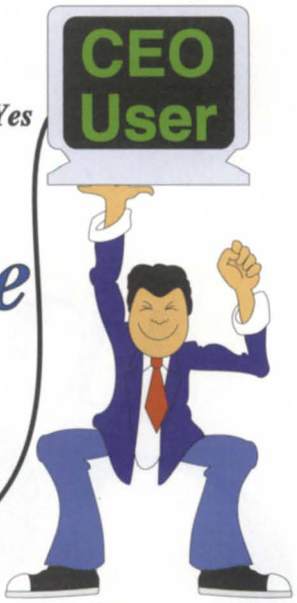
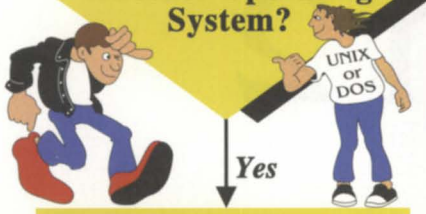


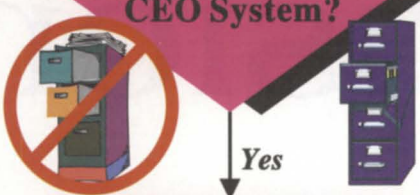
Yes

Moving to Another Operating System?



No

Need to Optimize Your CEO System?



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Tight On Disk Space?

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Of time and the computer industry, II

SYNOPSIS

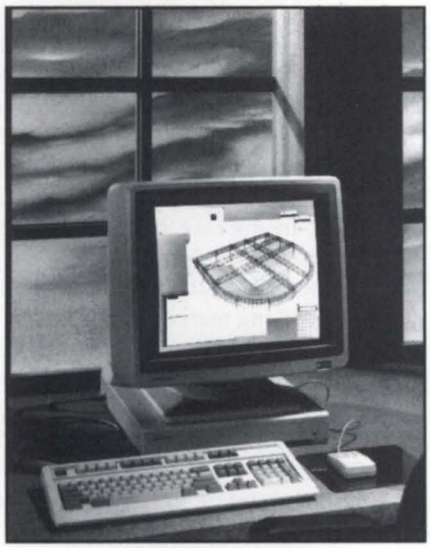
Continued from last month: Data General at age 25 isn't sitting passively in the face of the computer industry's sometimes brutal shifts and realignments.

by Doug Johnson
Focus staff

Imagine yourself back in June 1984, in the riotously chaotic computer industry. "And when has the computer industry ever been anything *but* chaotic?" you ask. But before you can expound, somebody who looks suspiciously like nobody you've ever met thrusts an icy-cold crystal ball into your hands and informs you that a company called Data General Corporation has just announced its own "DG/UX" version of AT&T's Unix operating system.

"What will happen over the next decade with this corporation?" you're asked. "We're stumped. Use the crystal and tell us, please."

"Who are you people?" you ask.



Aviion appeared in 1989

"We were sent by the *Focus* editor to dig up a snappy lead-in for the continuation of last month's article about DG's history, and you're it." You set the ball on a nearby table and stare intently into it as though you know what you're doing. Condensation has rendered the crystal opaque. They want an answer *now*, however, so you recite the fateful question: *Are MVs forever?* The words, uttered silently in your mind, hang like distant echoes. The air in the room feels heavy, damp, ominous. This isn't going well at all. The future seems so desperately uncertain. There's just no way to know what will—

And then the crystal answers: *What's this 'forever' stuff? Are you kidding me? Don't you know that nothing is forever? The only constant is change, change, change. Geez, didn't you take Clichés & Platitudes 101 in school?*

"What did it say?" they ask, evidently unable to hear the message. You turn to them and smile lightly, and then begin speaking with quiet authority:

"Yes, I can see it now. Not even five years from now, in February 1989, Data General will announce its new Aviion line of Unix-based workstations. By the mid-1990s the Aviion family will boast lots of additions and offer systems that roar and soar up to and even beyond 1.6 *billion* instructions per second. BIPS replaces MIPS, and soon there will be TIPS. Aviion revenues by 1992 will 'eclipse'—excuse me, I couldn't resist that one—revenues of DG's MV minicomputer line, and Data General the minicomputer company of the 1970s and 80s will have been radically and magically transformed into Data General the Unix network server company of the 1990s. There will be disk arrays called Clariion, document-imaging systems, improvements to DG/UX, and a host of customer services."

You pause a moment. Your audience is rapt, aghast—"And many computer companies, not just DG, will go through massive layoffs and financial contortions in the late 1980s and early 1990s, even Digital Equipment Corp.; and IBM will bleed $5 billion in a single quarter; it will not be a happy time

for those wedded to mainframes and minicomputers. And Bill Gates of Microsoft Corp. will become America's richest man, even richer than Ross Perot, who'll run for president and even get about 20 percent of the vote, and—"

"Enough of your lies!" comes the stern reproach, breaking the spell. They're on to you now. "No one can know all that, even from a crystal ball. There's no way Ross Perot will run for president!" Moral of the story: Whatever you predict in the computer industry, it will be wrong. Or someone will be sure to rip you for it.

A career change

When we left off our excursion into Data General history ("Of time and the computer industry," October 1993), DG was about to unveil its new Aviion product and set to charge into open systems. The events proliferate as we move closer to our present. More stuff seems to happen in the 1989-1993 period than there did in the whole 1968-1988 era.

In the middle of the rampant chaos of the time, *FORTUNE* magazine took a look around in its issue of Oct. 10, 1988, and pronounced: "It was one of those classic cases where the little guys forged ahead while the big boys weren't paying attention." Progress in the computer industry could be measured in terms of waves. The mainframe wave led by IBM and the other 1960s behemoths was assaulted from below by the subsequent minicomputer wave ridden by the likes of DEC and DG, which was in turn undercut by the PC wave, which was in the process of being swamped by the network computing wave—at least that's how it looked at the time.

Workstations would stride into the future on RISC (reduced instruction-set computing) architecture, said *FORTUNE* and others. "Virtually all major computer makers (and most microprocessor manufacturers) are either selling RISC designs or racing to bring them to market. Other large computer makers, including Unisys and Data General in the U.S. and Nixdorf in Europe, plan to follow suit." In any case, big boys IBM and DEC planned to "take on the little guys" in the growing battle for the workstation-networking market.

About two years earlier in its June 23, 1986, issue, *BUSINESS WEEK* commented on an industrywide sales-growth downturn and noted, "Since the computer slump first struck, Data General has taken on more water than many of its competitors in the minicomputer business. The order of the day: Batten down the hatches. Says President [Edson] de Castro: 'We're doing everything we can to hold down costs.' " That would mean closing a couple of plants and laying off employees.

In its issue of Aug. 17, 1987, *BUSINESS WEEK* spotlighted DG's latest condition: "The New Data General Is Leaner—But Is It Meaner?" asked the headline. A bar graph of the company's recent financial losses was titled, "Data

General's Slide."

President de Castro had announced plans to lay off about 1,000 employees and close several major facilities. "But after retrenchment—then what?" asked *Business Week*. "While de Castro's back-to-basics movement should make Data General profitable, analysts say it won't provide a growth rate to keep up with the rest of the computer industry." With 15,000 employees and $1.3 billion in annual revenues, DG was considered "too big to be a niche player and too small to be a large-scale systems supplier."

Meanwhile, "For 30 years the computer industry has been the ultimate growth business," mused *Business Week* toward the end of 1987. "Every year produced some breakthrough that created new jobs, spawned new companies, and changed the way the world did business." But the severe slowdown that began in late 1984 and lasted through the mid-1980s produced more change when sales did pick up again.

In what was termed the post-mainframe era, "hardware itself will tend to become a commodity that customers can buy in inexpensive chunks and install as needed." Future hardware profits would shrink as a share of the total. "But for the computer makers that come up with the software to tie small computers into a coherent information system, the profits should be substantial."

A fundamental shift

Profound events often don't receive their just due at the time they happen. And that's because we don't always (don't usually) know the long-term significance of something as it's only beginning to unfold. So in the timeline on page 14, Data General's announcement of its new Aviion family ("Feb. 27, 1989: Aviion workstation and server families and DG/UX 4.1 are introduced") looks no more important than anything else, when really it would later represent a foundational shift in the company's structure and direction.

In December 1989 Data General introduced Unix versions of Interactive Cobol and Business BASIC programming languages. Also that month DG announced the company's participation in a joint venture to market computers in the Soviet Union. Called Perekat, the venture was the first in which a Soviet software firm joined with a major U.S. computer supplier and a large European industrial firm to bring computer and industrial automation technology to Soviet commerce and industry.

And to finish off 1989 there was the first big Aviion order, announced Dec. 22: the awarding of a $127 million contract from the U.S. Department of the Interior.

Calendar year 1990 opened with many business and industry media preaching doom-and-gloom crunch times for computer makers. Put simply,

Continued on page 18

Milestones

1989

- Jan. 3, 1989 • Dasher/386 Unix system is introduced.
- Jan. 10, 1989 • DG/WCC, a Wang Cobol application-conversion utility, is introduced.
- Feb. 21, 1989 • TCP/IP supported by 386/IX operating system, Ethernet/IEEE 802.3 and Ethernet-StarLAN/IEEE 802.3 bridging unit are introduced.
- Feb. 27, 1989 • Aviion workstation and server families and DG/UX 4.1 are introduced.
- March 29, 1989 • DG and Teledyne announce plan to market and sell first minicomputer based on Unix Supervisory Control and Data Acquisition (SCADA) system.
- April 4, 1989 • Eclipse MV/1000 DC computer is introduced.
- May 23, 1989 • Fortran, C, and Pascal optimizing compilers available for use on Aviion and Dasher/386 systems.
- • Eclipse MV/15000S series is introduced.
- • PC*I Token Ring is introduced.
- June 27, 1989 • Sunnyvale, California, facility is sold.
- July 11, 1989 • 662 MB, 5.25-inch disk drive is introduced. This is the computer industry's highest capacity 5.25-inch storage device.
- Aug. 1, 1989 • Dasher/286-12c, Dasher/386SX, and Dasher/386-25 (MS-DOS) are introduced.
- Aug. 8, 1989 • AVX-30 X-Window Display Station is introduced.
- Sept. 8, 1989 • Intellibook Author and Intellibook Reader, hypermedia-based electronic document products, are introduced.
- Sept. 18, 1989 • CEO Object Office is introduced.
- Oct. 17, 1989 • Eclipse MV/18000 series is introduced.
- Nov. 13, 1989 • Walkabout portable terminal is introduced.
- Nov. 21, 1989 • Communications Server software is introduced.
- Nov. 28, 1989 • Dasher/386-16c is introduced.
- • CEO Answering Machine is introduced.
- Dec. 5, 1989 • AV 5010 is introduced.
- • DG, in association with Cincinnati Bell Information Systems, to market computer systems for Computer Aided Acquisition and Logistics Support (CALS).
- Dec. 12, 1989 • DG introduces Unix version of Interactive Cobol and Business BASIC programming languages.
- • DG announces its participation in joint venture to market computers in the Soviet Union. This is the first time where a Soviet software firm has joined with a major U.S. computer supplier and a large European industrial firm to bring computer and industrial automation technology to Soviet commerce and industry. The venture is called Perekat.
- Dec. 22, 1989 • DG awarded $127 million contract from the U.S. Department of the Interior.

1990

- Jan. 23, 1990 • AV 400 series workstations and AV 4000, AV 5200, and AV 6200 servers are introduced.
- Feb. 6, 1990 • AOS/VS II Release 2.00, AOS/VS TCP/IP, and AOS/VS ONC/NFS are introduced.
- • VSPAC/One is introduced.
- Feb. 12, 1990 • Netware for Aviion systems is introduced.
- March 20, 1990 • DG signs Western Micro Technology as first Aviion distributor.
- • Walkabout/SX is introduced.
- April 17, 1990 • Eclipse MV/5500 and Eclipse MV/9500 computers are introduced. These are the first systems based on the micro-Eclipse (WASHI) chip.
- May 15, 1990 • AV 200 workstation, and AV 3200, AV 4100, and AV 4200 computers are introduced.
- May 22, 1990 • PRECISmetals purchases Westbrook, Maine, precision metal fabrication operation.
- May 29, 1990 • Dasher/386-25k and Dasher/286-12j are introduced.
- July 10, 1990 • DG/UX 4.30 is introduced.
- July 30, 1990 • Top Level's Common LISP compiler is available on Aviion.
- Aug. 7, 1990 • Eclipse MV/3500 DC is introduced.
- Sept. 11, 1990 • Aviion workstations and servers are first RISC-based systems to integrate vector processing capability—Model 5069 vector processor.
- Oct. 2, 1990 • Dasher/486-25 is introduced.
- Oct. 9, 1990 • File Transfer Access and Management (FTAM), Virtual Terminal and OSI/Platform software are introduced.
- Oct. 23, 1990 • Eclipse MV/30000 computer series is introduced.

1991

- Feb. 12, 1991 • DG awarded certification as an authorized Novell Support Organization.
- • Open Systems Office/pc.DAA is introduced.
- March 13, 1991 • AV 8000, AV 7000, AV 6240, AV 5240, 5.0 GB HADA and DG/UX 5.4 are introduced.
- March 28, 1991 • Fountain, Colorado, facility is sold to Apple Computer.
- April 4, 1991 • Nippon-Data General is sold to Omron Corporation.
- May 1, 1991 • Clayton, North Carolina, facility is sold to Caterpillar.
- July 9, 1991 • Eclipse MV/5600, Eclipse MV/9300, and Eclipse MV/9600 computers, OpenMac for MV family systems, AOS/VS II, and TCP/IP 1.10 are introduced.
- July 16, 1991 • 30 new standards-based communications and

office automation products are introduced. They allow users to integrate existing desktop devices and computer networks.

July 29, 1991 • AV 530 workstation, and AV 4100, AV 4600, and AV 5225, and AV 6225 servers are introduced.

Oct. 15, 1991 • AV 4300 and AV 4320 are introduced.

Oct. 21, 1991 • Dasher 386 SX/16z is introduced.

1992

Jan. 14, 1992 • 2.5 GB HADA is introduced.

Jan. 17, 1992 • DG is first to qualify for worldwide ISO 9002 certification.

Jan. 20, 1992 • Dasher I-486/33TE is introduced.

Jan. 21, 1992 • DG and Dun & Bradstreet Software announce plans to bring business software to Aviion server platform.

March 17, 1992 • DG is first Unix vendor to ship Data Access Language (DAL) server software.

April 6, 1992 • Dasher II-386/33L and Dasher II-486SX/20a are introduced.

April 7, 1992 • Eclipse MV/60000, Eclipse MV/35000, and HADA/MV are introduced.

May 28, 1992 • OS/EYE*NODE introduced.

June 2, 1992 • Dasher II-486/33LE is introduced.

• Enterprise Mail Exchange from Soft*Switch is available on Aviion platform.

• AV/Alert is introduced.

June 4, 1992 • Dasher II-486/33LE is introduced.

June 5, 1992 • AV/Alert support system is introduced.

June 8, 1992 • Oracle's Version 7 made available on Aviion.

June 23, 1992 • DG to market Legato's Networker software.

June 30, 1992 • IPC America signs service agreement with DG.

July 6, 1992 • Adabas, Natural, and Net-Work software from Software AG available on Aviion.

July 7, 1992 • DG and Intrepid Software sign ISV agreement.

July 14, 1992 • AV 8000-8, AV 6280, AV 4625, AV 4605, HADA II, DG/UX 5.4.2, Eclipse MV/3600, and Eclipse MV/3200 introduced.

July 17, 1992 • DG signs service agreement with Teleprocessing Products.

July 20, 1992 • Eclipse MV/3200 and Eclipse MV/3600 introduced.

Aug. 4, 1992 • DG and Next Computer announce reseller agreement.

Aug. 5, 1992 • HealthNet, a local area networking support service, is introduced.

Aug. 20, 1992 • MHS Gate for Aviion systems introduced.

Aug. 21, 1992 • AV Object Office 2.0 is introduced.

Aug. 31, 1992 • Mezzanine software from Saros is made available on Aviion.

Sept. 3, 1992 • Walkabout/386SL and Dasher II-486/50TE2 are introduced.

Sept. 15, 1992 • Clariion family of mass storage subsystems is introduced.

Sept. 24, 1992 • Fund Manager software from Corfax Systems is made available on Aviion.

Oct. 6, 1992 • Network controllers for Aviion systems are introduced.

Oct. 8, 1992 • Learning Logic software from the National Science Center Foundation is made available on Aviion.

Oct. 20, 1992 • Enhancements made to IBM communications product suite. Included is computer industry's first open systems implementation of IBM's Systems Applications Architecture (SAA) Common Program Interface-Communications.

Nov. 3, 1992 • Dasher II-486SX/25A, Dasher II-486/33A, and Dasher II-486DX2/50A are announced.

Nov. 12, 1992 • GIS/uniVerse Interface available on Aviion product line.

Nov. 20, 1992 • Cincom Systems' Mantis application development system and Supra relational data base management system are available on Aviion.

Dec. 8, 1992 • Data Assurance provides hot-site disaster recovery services for DG.

Dec. 9, 1992 • Dickens Data Systems to distribute Clariion mass storage subsystems to IBM RS/6000 computer users.

Dec. 11, 1992 • AV Office Mail is introduced.

Dec. 16, 1992 • Advanced Visual Systems' AVS Visualization software made available on Aviion.

Dec. 22, 1992 • DG acquires minority interest in Microsystem R.T., a leading high technology company in Hungary.

1 9 9 3

Jan. 14, 1993 • VMARK's PI/Open software ported to Aviion.

Jan. 18, 1993 • Next Business Unit formed to strengthen and expand the strategic partnership formed between DG and Next Computer.

Jan. 26, 1993 • ERI adds Clariion storage subsystems to the open systems solutions for its Sun Microsystems customers.

Jan. 27, 1993 • Dasher II-486DX2/66LE2 and Dasher II-486/33LE2 are introduced. PC prices are reduced by as much as 26 percent.

Feb. 4, 1993 • ISOCOR to market asynchronous server-to-server X.400 electronic messaging solution for Aviion.

Feb. 16, 1993 • ONGO announced for use on Aviion.

Feb. 18, 1993 • Groups Bull to integrate Clariion with its open systems solutions.

March 10, 1993 • Aviion product line supports Open Software Foundation's distributed computing environment.

March 16, 1993 • DG and Oracle to jointly develop and deliver Oracle Parallel Server for Aviion systems.

March 17, 1993 • Clariion series 4000 tape array is introduced.

March 31, 1993 • AV Image document-imaging products are introduced.

April 2, 1993 • AV 7400 and AV 8400 computers are introduced.

May 5, 1993 • Model 5221 Series Handheld Point of Service computer is introduced.

June 29, 1993 • AV 8500 and AV 9500 servers, AV 500 workstation announced.

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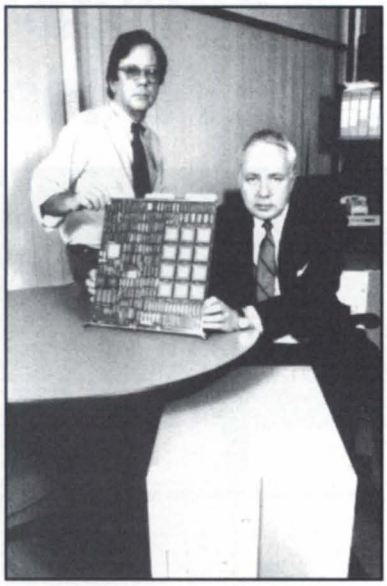
Continued from page 13

said *Business Week* in its Jan. 8, 1990, issue: "There will be tough times in the computer industry this year." Even historically monolithic IBM announced plans to cut 10,000 jobs in the U.S. to reduce expenses and boost sagging profits.

"Even cost efficiencies may not help some manufacturers of small machines," *Business Week* commented. "In that market, 1990 will likely see the beginning of a shakeout of suppliers that are unable to distinguish themselves with popular products."

As desktop PCs gained in power they would erode the market from the low end for traditional minicomputers and mainframes. PC networks were expected to be the wave of the future, and "most mini makers, including Wang Laboratories, IBM, Data General, and Digital Equipment, are positioning their machines as 'network servers' to help PCs share expensive printers and large data files."



Tom West and Ron Skates

Later that same year in its Oct. 15, 1990 issue, *Business Week* commented that the so-called Massachusetts Miracle, built in large part by the earlier success of computer makers Data General, DEC, and Wang, "has turned to a nightmare. And not just for Michael S. Dukakis." Since 1984 Data General had cut its payroll by 45 percent.

The microprocessor, the "computer-on-a-chip," was wreaking radical change everywhere, brushing aside old economic and competitive rules. "Mini makers once thrived on selling proprietary machines for $100,000 or more. Today, though, the same work may be done on a $5,000 machine based on one of a few standard microprocessors."

Meanwhile at Data General in early 1990, there were appearing a host of new Aviion offerings: the AV 400 series workstations and AV 4000, 5200, and 6200 servers. In May came the AV 200 workstation and AV 3200, 4100, and 4200 systems. Late in 1990 DG announced its MV/30000 series.

In 1991 the Aviion family underwent further proliferation with the in-

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troduction in March of the AV 8000, 7000, 6240, and 5240 systems. In July there was another flurry: AV 530 workstation, and AV 4100, 4600, 5225, and 6225 servers. October brought the AV 4300 and 4320 systems. On the Eclipse side there came in July 1991 the MV/5600, MV/9300, MV/9600 systems, along with AOS/VS II.

"Will Fast and Cheap Be Data General's Salvation?" asked *Business Week* in its March 25, 1991 issue. The article spotlighted new CEO Ronald L. Skates, and credited Skates for "paring the company down and planning its future around a single, relatively bare-bones product line, called Aviion."

Business Week asserted that Skates was taking Data General "back to its roots as a lean, mean maker of the fastest computers for the lowest prices," while leaving most programming chores and specialization up to customers. "That's how [founder Edson] de Castro built up DG in the 1970s, developing 'hot box' minicomputers that outran whatever Digital Equipment Corp. built."

Aviion would build its future on the blazing speed of Motorola's 88000-series microprocessor using reduced instruction-set (RISC) architecture and competing with similar systems from Sun Microsystems, IBM, and DEC.

"The danger, though," observed *Business Week*, "is that DG may not be able to push Aviion's price and performance fast and far enough to succeed in today's fiercely competitive 'open systems' market."

In its Nov. 11, 1991, issue, *Forbes* harkened back to those heady days at Data General that were captured in Tracy Kidder's bestselling book, *The Soul of a New Machine*, noted that the 32-bit Eclipse minicomputer became a huge moneymaker and helped push DG's earnings to its all-time peak in 1984 at $67 million, and reminded time watchers that "the moving finger of fate writes fast in the computer business." By Sept. 30, 1990, DG's fiscal-year loss was $68 million.

Data General's salvation, if it came soon enough for the company to survive, would be with its Unix-based Aviion series. "The niche that Data General is aiming at with the Aviion, which has been on the market for two years, is the market for servers." Servers were considered at the time to be "one bright spot in an otherwise sluggish computer hardware market." The top-line Aviion in early 1991 offered 117 MIPS for just $96,000. "A mainframe in a box."

Data General's shift into Unix servers "came in the nick of time," in *Forbes'* estimation. About four years earlier the company had to choose between spending lots of money developing application software for its older MV minicomputer to compete against IBM and DEC. "Or it could diversify away from its old proprietary ways and strike off in a new direction, open sys-

tems." Since 1986 DG cut its workforce to 8,500, selling off manufacturing plants and foreign operations.

FORBES credited departed President Edson de Castro for deciding in the first place to shift the company away from proprietary systems, and J. Thomas West (an important player in *The Soul of a New Machine*) for making a key decision: instead of trying to build its own microprocessor from scratch, DG would use Motorola's 88000 RISC chip. "West's next key decision was to make the server a multiprocessor, putting several of those Motorola chips on a single board. That was one way to keep the cost of the machine down." Then it would be a matter of developing an operating system to handle symmetric multiprocessing.

Commented *FORBES:* "Some manufacturers make disk arrays; others put multiple processors in a single computer. But few are beating Data General to the market for cheap mainframe substitutes in commercial computing. Edson de Castro can take satisfaction that, even after his departure, a decision he made helped save his company."

Too close to the future

As is always the case, the most recent events have yet to ferment into understandable history. But the events just keep proliferating in 1992 and 1993, and Data General isn't just introducing new Aviions. There were new pieces of important hardware like the Clariion disk and tape arrays. In the realm of open systems, Data General's business relationships with other companies and organizations become ever more important for a variety of products and services—data base management systems—electronic messaging, disaster recovery, networking support services, fourth-generation languages (4GLs), document imaging, and a host of others.

Year 1992 saw further development in the proprietary MV line, with the introduction of the top-end MV/60000 and midrange MV/35000, along with a HADA disk array for MV. Later in 1992 the HADA would evolve into the new Clariion family of mass storage subsystems for MVs, Aviions,

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Conference reminiscing

by Jan Grossman
NADGUG President, 1992-93

It's NADGUG 93 conference time in Atlanta, Georgia, home of the Atlanta Braves, Stone Mountain, Coca-Cola, Southern hospitality, the 1996 Olympics, and lots of Civil War history. I wish all of you (they say "y'all" here) were here with us celebrating this special occasion: the 25th-year anniversary for Data General Corporation, and 20 years for NADGUG, also 15 years for Source, Data General VARs and ISVs.

The NADGUG Board of Directors has been busy combing through the archives, and I would be remiss if I didn't share some of the reminiscing. Many of you (like me) may not remember some of this stuff, but looking back helps to point out that throughout the last 20 years, some things don't change. We go through cycles with our systems, management trends, and conferences.

Don Clark provided early *Focus* newsletters from 1982 to 1984, which gave us opportunities to laugh at the pictures—how young everyone looked! Times were exciting. Data General was thriving and NADGUG was growing along with the conferences, special interest groups (SIGs), regional interest groups (RIGs), and the overall organization's membership.

These were the early years when people on the NADGUG Board of Directors and Data General executives discussed critical user concerns. At times the discussions became heated. Today, the relationship between NADGUG and Data General is no longer adversarial, but rather more like a partnership. Many of those early issues no longer apply in today's technology, or perhaps we could say the issues went away because of NADGUG.

Focus coverage of the 1982 Conference in Washington, DC, included a remark from one attendee that still holds true today: "One of the best benefits is meeting people, exchanging stories, making contacts, and establishing a rapport with users and Data General!"

In Toronto, Canada, NADGUG 83, Data General's Del Hunter of the Technical Products Division stated: "The S280 is an example of the fact we're still very interested, not only in 32-bit business, but also in our classic users . . . The continuing support of 16-bit users is providing migration and growth paths. If you want more performance or a new feature, you've got to convert to 32-bit, but if 16-bit is doing your job, we want to provide better answers."

I (don't) miss my CS-40

by Tim Boyer
NADGUG Vice President

My first DG system was a powerhouse CS-40, bought in 1979. This was the Nova 3 with the added CIS (Commercial Instruction Set), so it could run ICobol, which in those days was called ICOS, which was not only a language, it was also its own operating system, a variant of RDOS. The system came with 256 KB of memory, 10 MB disk (5 MB fixed and 5 MB removable), two terminals (6053s, for about $3,000 a pop), and some kind of Centronics printer, and cost $39,000. I've now got a calculator that's more powerful.

I miss my CS-40 for two reasons only. First, it had 16 flashing lights on the front. This means that if things were taking an inordinately long time, you could walk over to the front panel and stare at the blinking lights. If they weren't blinking, odds were that you needed to reboot. I've often thought of marketing a stick-on set of lights for MIS managers reared in the 1970s.

Secondly, it had core memory. You laugh, but at times it was very useful. Yesterday, for instance, I installed a 6300 tape drive, which didn't work. I was going to load diagnostics, but—you guessed it—they came on tape. With core memory, the maintenance company could load diagnostics at their office, shut down their system, and remove the memory board, drive down to my place and install the board in my machine, and run the diagnostics.

Those were halcyon days, when men were men and computers had switches on the front panel. I miss them not a whit. Today's systems are faster, cheaper, smaller, quieter, and—I've almost gotten used to earthtone-brown—I can say prettier. Δ

Tim Boyer is author of FOCUS' *"Screen Test" column and will serve as 1993-94 NADGUG President.*

Looking waaayyyy back

It was 1980 when I first sat in front of a Data General D200 terminal connected to a C350. I was fascinated from the start. In February 1981 our company got its first S140, which became part of my everyday existence for 7 years on AOS Rev. 3.03. That's right, no rev upgrades until the MV/15000—wow, was I with it then! But I have since moved on, and now I'm an active user on an Aviion network with a Clariion storage system. Life is so different today.

Incidentally, just one month after installing the S140 in 1981, the now- legendary MV/8000 was introduced. The closest I got to that system was in reading Tracy Kidder's price-winning book, *The Soul of a New Machine.* Δ

— Jan Grossman

Sounds familiar, doesn't it?

Also in Toronto, the keynote speaker, Dr. Leon Jackson, discussed "Information Resource Management" and said: "We are all part of a revolution, and the ones that are inflexible are in trouble." He predicted further that by the 1988 user will be king . . . the data-processing professional will be the "officer in charge of the engine room rather than the pilot of the ship." That was one short decade ago.

Today we are faced with the uncertainties brought on by new technology, with how change will affect our companies and ourselves. What does it mean for skills earned and experience gained from the proprietary world, and can they be applied to the open systems world? There are NADGUG members who have moved from proprietary systems to the open systems environment, and they have transferred those skills and experiences successfully.

NADGUG's member profiles are changing, and we will work toward meeting those new needs in the open systems world. But we need your input, your participation on committees, your presence in special interest groups and regional groups. Again, conference attendance allows for effective networking with your peers, sharing ideas, making contacts, and learning—always learning! Throughout the NADGUG 93 conference, attendees will come across tidbits of NADGUG history. You can play NADGUG's version of "Trivial Pursuit," explore the best of today's technology, and train for the future.

Each year our international attendance grows. Our international users bring with them similar issues and concerns, and the conference provides the opportunity to share ideas and establish an international network of knowledge. Data General users are global, and we can work together in broadening our understanding of technology and its applications to the computer industry, plus influence Data General.

I would like to commend the Board of Directors and the Conference Committee for working so hard to make this event possible. I would like to thank the people at Data General for all the support they have provided, and I welcome the continuing partnership for the future. I would like to further recognize NADGUG presidents of the past who have each contributed richly to our organization. They are: Brad Friedlander 1978-83; Mort Kahl 1983-84; John Brudz 1984-85; Rene Dominguez 1985-86; Calvin Durden 1986-87; Joyce Carter 1987-88; Don Clark 1988-89; Lee Jones 1989-90; Frank Perry 1990-91; Dennis Doyle 1991-92.

At the end of the Atlanta conference I will be ending my year as NADGUG president and moving into the prestige of past president. I wish to thank the NADGUG Board of Directors and Board of Governors, Data General, all of the NADGUG members, and our association management for their support. Please plan now for the 1994 Conference, to be held in Nashville, Tennessee. Δ

David Novy

The need for network speed

SYNOPSIS

Whether it's a PC environment or a Unix environment, use the right networking tool for the right job. And: Our columnist recounts still further "adventures" with MS-DOS 6.0.

A colleague of mine called last week. He was trying to run Novell Netware on a DG 43xx series machine. But things weren't going very well. The system was terribly slow. A single user needed more than one and a half minutes to load an application. So my colleague ported the application to a 486 PC, and it ran four times faster.

I called one of my Data General colleagues and asked if this performance situation could be anticipated, and he said "yes." First, the speed of Netware on a Data General Aviion system is about that of a 33 MHz 386 PC. In addition, the Ethernet controller on a 43xx Aviion is not very fast.

Now that Novell has purchased the Unix Systems Laboratory and is responsible for Unix development, I imagine we'll see Netware speed on Unix file servers increase significantly during the next year. In the meantime, you should probably not run Netware on a Unix file server, at least not for mission-critical applications. Until now, Netware for Unix was never intended for more than casual use.

I asked my colleague why he chose to use Netware when Sun PC-NFS was available. He said he did so for Net BIOS capability. I asked if he was actually taking advantage of Net BIOS functionality in running any applications, or was it being used merely as a network protocol? As far as he knew, the program was running locally on the PC, and Netware was being used to provide virtual-disk capability. He was using Netware on the Aviion instead of on a PC because he had no desire to manage a PC file server network.

This situation once again emphasizes the need for choosing the right tool for the job. If you are going to be using Aviions as file servers for PCs, then you should give serious attention to using Sun PC-NFS for connecting the PCs to the Unix file servers. Sun PC-NFS runs native on Unix, and Sun has almost 10 years of experience tuning the performance of PC-NFS.

PC-NFS Version 5 is an outstanding product for achieving PC-Unix file server connectivity. In addition to virtual-disk capability, it also supports ftp, telnet, and remote printing. PC-NFS Version 5 comes with a VT220 emulator, which is excellent. The reason that PC-NFS does not get used as much as it could be used is that most people who install PC-Unix file server networks come from a PC background, not a Unix background. Netware is the defacto standard in the PC networking arena.

Although Netware may do well in the PC arena, Netware cannot as yet compete with the established Unix options for network connectivity. It is amazing what you can do if you no longer have to deal with the 640 KB limitations of MS-DOS, or if you have access to a multitasking, multiuser environment.

The moral of the story is that if you are working in a PC environment, then use the best PC tools available. When dealing with Unix, use tools that were developed in a Unix environment. Hybrid tools such as Netware for Unix, when used in mission-critical environments, will break your heart just when you need them most. In a PC environment Netware is an excellent networking application. However, if you have access to Unix file servers, then learn what Unix networking tools are available and how to use them. You will be much better off in the long run.

More fun with MS-DOS 6.0

I recently installed a CD-ROM drive and sound card on my PC emulator at home. Now I like Microsoft DOS 6.0 even *less* than I did before. After the dust has settled, the final result is that my hard drive has been so damaged by improper software terminations that I have had to rebuild my hard drive at least 10 times.

At times the crashes were so severe that Norton Disk Doctor reported media flaws on the drive itself. Now the problem may be mine alone, because I'm using a PC board inside an Amiga computer, and I'm using the disk drives on the Amiga. I have talked to the PC emulator distributor, and he says no one else appears to be having the problems that I am having.

It appears that MS-DOS 6.0 possesses some hidden memory or disk caches that cannot be disabled. When the system experiences an abnormal shutdown, data in these caches are sprayed all over the directory structure of the hard drive where the application that caused the abnormal shutdown was running. Microsoft continues to claim that MS-DOS Version 6.0 is one of the most reliable versions of DOS the company has ever released. At the same time, Microsoft officials point out how quickly DOS Version 6.2 will be coming to market. There is little or no reason for using DOS 6.0 at this time. If you want to optimize memory utilization, then use the older DOS 5.0 combined with Quarterdeck QEMM 7.01. If you want to use compressed drives, then use Stac

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Electronics' Stacker 3.1.

One thing I learned during my latest "adventures" is that the system seems significantly more stable if Windows 3.1 is stored and run from a normal, uncompressed drive. I do not think Stacker 3.1 is causing any problems. But just remember that when you blow away a disk cluster on a compressed drive, the disaster will affect twice as much data.

I discovered from my experiences with DOS 6.0 and Windows 3.1 that Windows 3.1 will not run less the "Smartdrv" program is running. I tried to avoid using Smartdrv, since it is a disk-caching program with write-caching capability. DOS 6.0 is known for being slow while writing information from write cache to disk. This can cause nasty results if the system crashes before the write cache buffer is empty. You can tell Smartdrv what drives to cache and whether read cache, write cache, and buffering to the drive should be enabled. I tried to tell Smartdrv not to bother with my hard drives, only to learn that Windows 3.1 will not run unless the Smartdrv read cache is enabled on all hard drives it accesses.

Another lesson learned from my recent DOS adventures: If you plan to load up a system with CD-ROM drives and sound cards, then make sure you dedicate such a machine to Windows applications. This is because the memory requirements of CD-ROM and sound card drivers are very large, and these drivers do not enjoy being stuffed into the upper memory region by a memory-management program.

One of DOS 6.0's really useful features: It allows you to have multiple startup paths (sounds a bit like Unix). You can have a full-featured Windows startup sequence and a barebones single-DOS-application sequence. There is no way that a DOS startup can be all things to all people.

A final aspect of using PCs is to question your children carefully, especially if they might have been using the machine when it happened to crash. My 12-year-old son was doing just that last weekend. I asked him what he'd been doing when the crash occurred, and he said he was merely working in Windows. I told him that I wasn't angry with him, but that I really needed to know what he'd doing, since I thought I'd worked all the bugs out of the system. He then said he was working with the Norton Desktop Icon Editor. That answer was surprising, but I know my son well enough that I don't second-guess him with respect to computers. Two days later he mentioned in passing that he was also trying to fire up a session of video Blackjack via the MS-DOS prompt from Windows 3.1.

Could that have had any effect? Δ

David Novy is a technical computer specialist with 3M in St. Paul, Minnesota. He is past chairman of the AOS/VS special interest group, and current chairman of NADGUG's SIG/UX.

Connect the dots

Instructions

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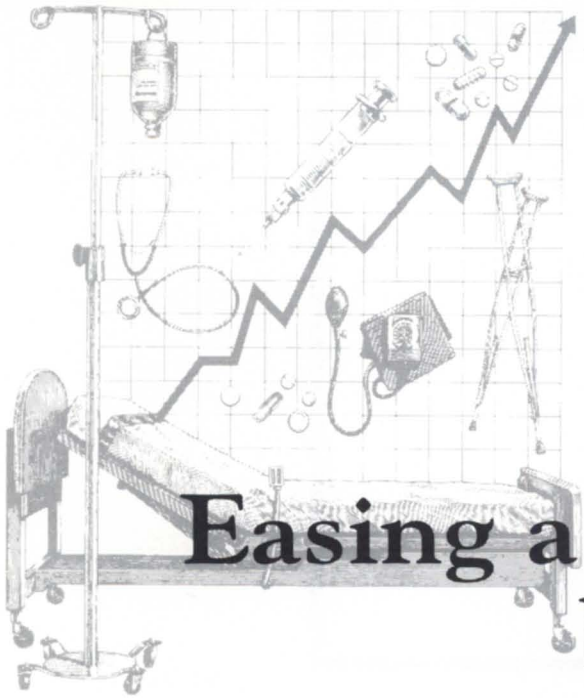

Easing a record burden

SYNOPSIS
Medical forms imaging, from scanning to archiving, has come a long way in recent years. The author profiles two up-to-date product offerings from Data General.

by Joe Cannata
Special to Focus

Data General's Professional Services has recently announced two products aimed at the hospital community. One offering is named DG/MedScan, a medical forms imaging system. This product was announced as a result of a Data General-Meditech partnership to bring an optical-imaging and archiving solution to Meditech hospitals. DG/MedScan enables medical records personnel to scan folders of documents kept on each patient, and then to store images of the documents on permanent optical storage for later retrieval.

Another product, DG/MedArchive, is used to archive ASCII data exported from the Meditech hospital information system. DG/MedArchive and DG/MedScan help to eliminate the cavernous amount of space necessary for the storage of paper records, and ease the burden of medical records forms management. In addition, these products allow archived documents to be retrieved and viewed on the hospital floor using the standard Meditech HIS user interface. (An image-display workstation is required for viewing document images.)

DG/MedScan is a client/server product—the server portion runs on a Data General Aviion server with one or more optical jukeboxes. The client portion runs on MS-Windows-based PCs in the hospital's medical records department. The simple graphical interface of Windows enables users to quickly accomplish desired tasks using a mouse or keyboard accelerators.

The hardware in a typical medical records department consists of scan stations (486/33 PCs, each with a 520 MB hard disk, 16 MB of memory, high-speed compression card, high-resolution 19-inch black-and-white monitor, and dual-sided scanner), Verify (QA) Stations (486/33 PCs, each with a 245 MB hard disk, 16 MB of memory, and high-resolution 19-inch black-and-white monitor), and Print Stations (486/33 PCs, each with a 245 MB hard disk, 8 MB of memory, high-speed decompression card, VGA monitor, and laser printer). The Aviion server runs Data General's DG/UX and Op*Star optical disk management software, and Sun Microsystems' NFS.

Document scanning takes place at the scan station. A logical folder is created by the user. The user decides if forms to be scanned are single- or double-sided. Hospital forms and charts vary; some are even 11 x 17 inches, folded to be a four-sided 8.5 x 11-inch form. It is possible to scan documents as double-sided, and eliminate blank pages later. The user also can set the scanner to scan at 200 or 300 dpi (dots per inch). The higher the resolution, the clearer the image. Another option is for scanning one form at a time or mutliple pages, one after the other. Single-feed requires more time but may be necessary when forms are of different sizes. The multiple-page option, by contrast, allows forms to be placed in an auto-

matic document feeder for continuous scanning.

As forms are scanned the images (front and back) appear on the monitor. Here a cursory check can be performed by the operator to see if the image is legible. The forms do not take long to scan, although scanning time will be best if color and gray are avoided on forms. Estimates from testing done by the Software Integration Services people indicate more than 2,000 forms per day can be scanned at one scan station during an 8-hour work session. After all forms for a folder have been scanned, the station operator submits the folder to the verify operation.

By default, scan stations come up in network mode with their file systems mounted on the Aviion server. Scanned documents are not stored on the local PC but on the Aviion server using NFS. Should the network server become unavailable, the station can go into local mode, by selecting the local mode option. Any forms scanned then are stored locally on the PC. There is enough capacity locally to store about two days' worth of scanning.

At the verify station, the operator must claim any folders that need verification. At this point the desired folder is assigned to the current verify station in use. The verification process involves several steps. The first is to check each image visually for clarity and skew. If a form was scanned crooked, it will be stored that way, and printed with that same skew if ever recalled. Generally, that will be not acceptable, so the skewed document will need to be marked for rescanning. Another reason to rescan would be images that turn out too light or too dark. As on a photocopier the scanner has intensity controls, so the document could be rescanned with the proper setting. In both cases the verify operator can enlarge the image on screen to perform a better check of the scan quality.

Another phase of the verification process is to identify individual images

by their form IDs. Each form scanned will probably have a hospital form number associated with it. The verify operator will use an online forms dictionary, indexed by number or description, to associate the image with a hospital form.

A built-in DG/MedScan feature allows for automatic identification of forms based on OCR (optical character recognition) logic. There is an OCR trainer station (to be discussed later) that enables the administrator to "train" DG/MedScan where to look for the form ID on an image. The automatic identification capability can greatly increase the verification process throughput.

Another byproduct of form identification is handling single- or double-sided forms. If charts were all scanned as double-sided for speed, the identification of the form as single-sided will automatically mark the "b" or back side image as blank. If this isn't performed automatically, the operator can click on the "Blank" button to mark the image blank. Blank images are not archived to optical disk.

For identifying patients, the operator enters a patient ID and account number, and DG/MedScan retrieves patient information from the Meditech HIS and displays it for verification. One patient is associated with each folder.

Once all verification has been completed the folder is submitted for permanent archival storage. If some documents have been marked for rescanning, the folder is sent back to the scan station for reprocessing. If every image is identified and approved on visual inspection, the folder is sent on to the optical archiver (DG/Med Archive), and the process is finished.

The trainer station is used to aid in the forms identification process. This station should be used by the system administrator or forms manager. This is the station allows that tells DG/MedScan where on the form to have the OCR software look for a form ID.

DG/MedScan also has a print station where hardcopies of previously scanned images can be produced. Images are retrieved from the archiver and sent on request to a high-speed laser printer.

There are some smaller administrative tasks, such as creating user IDs and passwords. The user ID record keeps track of a user's privileges for scanning, verifying, or training. It is possible to limit certain user IDs to specific functions. The admin functions also allow for creating and deleting users, and assigning the station's role. Any station can be made a scan, verify, or trainer simply by clicking on the appropriate option and rebooting. Role-changing will not be done often, and should be performed only by a qualified system administrator. The appropriate hardware must be present to support the station type selected.

The first installation of DG/MedScan was in mid-June at Credit Valley Hospital, in Mississauga, Ontario, a fast-growing Toronto suburb. Credit Valley is a 366-bed, full-service hospital, open since 1985. The hospital purchased DG/MedScan to help with medical records storage and management, as well as improve access to documents on the hospital floor.

The configuration at Credit Valley Hospital consists of 2 scan stations, 5 verify stations, 2 print stations, and an Aviion server functioning as the archiver. There's a Data General "OpStar" jukebox with 50 12-inch platters capable of storing 327 GB of data. The average image is 70 to 80 KB in size, so the system's image-storage capacity is set for a few years at least.

Training users took about 1 to 2 days depending on their prior PC experience. The graphical interface made learning easier. The greatest learning curve for the operators was learning to feed paper into the scanner properly and cutting down on rescans. The hospital staff had the task of loading the forms dictionary with their 250-plus form names and IDs. Once completed, the operators could locate any form ID. Credit Valley is currently redesigning its forms with DG/MedScan in mind to facilitate and take advantage of OCR capability. Δ

Joe Cannata is a systems training specialist, Educational Services, with Data General Corporation. He may be reached at the Atlanta Education Center, 4170 Ashford Dunwoody Rd., Suite 300, Atlanta, GA 30319; 404/705-2562.

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ANNUAL CONFERENCE AND EXPOSITION NADGUG's Conference and Exposition is part of the largest annual Data General gathering in the world. In conjunction with DG's Sales and Systems Engineers meeting and SOURCE, the annual VAR conference, NADGUG provides Data General users the ultimate forum to confer with everyone who is anyone in the Data General community. Join us in Atlanta, October 25–28, 1993, for NADGUG's 20th Anniversary celebration!

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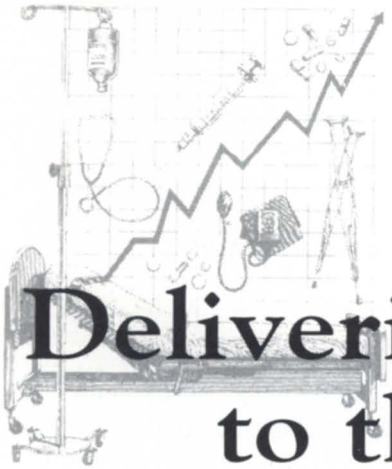

Delivering service to the medical environment

by Paula Jacobs
Special to Focus

SYNOPSIS

Data General open systems users can take advantage of a variety of innovative professional service solutions to streamline administrative, clinical, and patient-care processes in the rapidly changing healthcare industry.

In the current competitive healthcare environment, medical institutions are looking for creative ways to reduce costs while continuing to deliver high-quality patient care. The need is especially acute as healthcare reform sweeps across the United States. Administrative personnel require easy and quick information access since effective management decisions often depend on using accurate data to evaluate the performance of various hospital departments. Physicians, whether they are on the medical campus or in satellite offices, require immediate access to patient laboratory and clinical tests in order to make appropriate diagnoses.

"Today, CIOs must deal with an increase in managed care, health management organizations (HMOs), and payer groups, and they depend on technology to play 'What if?' scenarios," explained Julian Pittman, executive vice president of sales and marketing at Artrac, an Atlanta-based Data General value-added reseller (VAR). "Because of high patient involvement and the complexity of managing a large number of payers, most hospitals have inadequate resources and personnel to manage a tremendous account volume."

Citing focus-group findings, Pittman said that the hospital marketplace is looking for services and systems to assist in managed care. Artrac will be using Aviion systems to develop service alternatives related to managed care.

The widespread use of computerized medical applications and special hardware is hardly new. Data General open systems users can take advantage of a variety of innovative products to streamline administrative, clinical, and patient-care processes. But increasingly, medical users are demanding total solutions—from integrating special medical equipment to designing high-performance networks.

Such was the case at Little Company of Mary Health Services, which was formed by the recent affiliation of San Pedro Peninsula and Little Company of Mary Hospitals in Southern California. The two hospitals share computing resources, including a data base containing a hospital information system (HIS) from Medical Information Technology, Inc. (Meditech), a Data General healthcare independent software vendor (ISV) in Westwood, Massachusetts. The Meditech hospital information system runs on Data General Aviion AV 6200 systems. It is used for financial and admitting functions, medical records, billing, nursing, and patient-care inquiries.

"We wanted one LAN/WAN (local area network/wide area network) to allow both Meditech and other computers to share the network, including our Surgiserver system for scheduling surgical patients," explained Kevin Torres, central data center and network manager. "We needed to have everything on one network, so we required a simple, open-systems design using only one cabledrop to enable any PC to connect to any network on the backbone."

Now in place are 5 LANs (3 Novell, 1 Meditech, and 1 Sunquest), with plans to upgrade to 20 LANs at both campuses, with T1 communications for the WAN between the two sites. Approximately 1,200 users and a variety of PCs and other equipment access this network. Currently, there are 400 cabledrops at San Pedro Hospital in San Pedro, California, and 800 cabledrops

proposed at the Little Company of Mary in Torrance.

A laser beam connects the main hospital with its administration offices four blocks away. The connection provides complete Ethernet bandwidth, eliminating the need for digging up streets to lay fiber-optic cable.

According to Torres, Data General's Network Integration Services (part of DG's Professional Services Division) provided complete network design, planning, installation, and cableplant management services. Data General installed both the laser beam and the fiber-optic backbone, which connects over two T1s, and links the campus environments of these two hospitals, that are geographically about 13 miles apart.

Data General's Network Integration Services provided a full solution to accomplish our goal, including significant expertise integrating Meditech networks," said Torres. "This was very important to us because of the magnitude of this project, especially since we needed to maintain our current operations and plan for the new system implementation."

Data General's Network Integration Services provided the project-management expertise and worked closely with Torres, who monitored adherence to hospital policies. "With the DG solution you go to one vendor for all your computer needs. It's one-stop shopping," he said.

Reliability and flexibility

Reliability and flexibility are key concerns in the medical environment, according to Darryl LaPierre, President and CEO, Columbia Healthcare Corporation. "With our growing network we need to respond to our customers quickly, and expand and contract as required."

MedSim, based in Fort Worth, Texas, handles all data-processing requirements for the Columbia Healthcare Corporation's 99 hospitals located throughout the United States and in two foreign countries. A WAN supports clinical, radiology, physician, and administrative applications. This WAN is composed of 7 separate networks (3 in Texas and 4 in Florida) connecting more than 7,300 devices at the distributed hospital sites, using T1 lines and bridges to the central MedSim Data Center. There is also a Data General disaster-recovery center in Los Colinas, Texas, equipped with 12 Aviion systems and connected over T1 lines to the 7 networks.

"In designing this complex medical network it was necessary to address some very specific requirements in order to ensure high reliability," explained Terry Raney, network consultant for Data General's Network Integration Services, which planned, designed, and implemented the entire project. "We needed to provide redundancy in the network hardware and alternate data paths in case of disaster, or if a T1 line becomes inactive, and

also conform to the special communications protocol requirements of the Meditech Magic operating system."

Immediate response

Time is a critical factor in the medical environment. Medical personnel must respond immediately to their patients' requirements. Since hospitals now rely on mission-critical applications to run both patient care and administrative processes, instantaneous response time and high availability are crucial.

"Excellent response time is an important requirement of our customers," said Mike Cooper, director of technology development at HBO, a Data General healthcare VAR based in Atlanta. "We need to tune our systems and make sure they run properly."

To meet this requirement, HBO uses the ***sar*** Unix utility and includes the DG/UX Real-Time Performance Monitor (UX/RPM) with every system. According to Cooper, UX/RPM is a performance tool that enables system managers to monitor CPU utilization and system access rates.

Cost-effective storage

Another problem faced by hospitals is the legal requirement to store patient charts and records for long periods of time. Storing paper records consumes significant space; it is also highly inefficient, since users from different hospital departments may need quick, simultaneous access to the same patient records for diagnostic and scheduling procedures. This was the situation at the Credit Valley Hospital in Mississauga, Ontario. The hospital stores approximately half a million pages of paper per year, and must comply with Canadian law requiring available access to healthcare records for up to 28 years after patient discharge.

Data General has addressed hospital requirements for efficient, permanent storage of large volumes of patient medical records with its Medical Records Optical Archiving System, a cost-effective archiving and document-image-management software system. This integrated software solution stores and retrieves ASCII data and scanned document images from the Meditech hospital information system, and consists of two software products: DG/MedArchive (ASCII archiving software) and DG/MedScan (document-image-management software.

"Our strategy is to offer healthcare providers reliable, practical, and forward-thinking solutions," said Ladd Bodem, vice president, professional services at Data General. "By leveraging our strategic business partnerships and our extensive experience, Data General is able to respond to the challenges of a highly complex and rapidly changing healthcare environment." Δ

Paula Jacobs is an independent consultant and freelance writer based in Framingham, Massachusetts.

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Circle 12 on reader service card.

How safe is your system?

Take a day to find out

SYNOPSIS

You'll never make your system totally secure—at least not if any productive work is to get done—but you can certainly improve your odds for guarding against hackers, cyberpunks, and other malicious types. Start your New Year's resolutions one month early, on Computer Security Day.

by Tom Gutnick
Special to Focus

Is your system vulnerable to marauders, hackers, crackers, cyberpunks, computervredebreuk, or just plain disgruntled users? With more and more systems running mission-critical applications, every day *should* be Computer Security Day. But since most of us are too busy fighting fires and treading water, we can at least give the matter some thought one day a year. The Association for Computing Machinery (ACM) has designated December 1 as International Computer Security Day, to remind us that "Everyone who uses a computer should take appropriate measures to protect their computer, computer programs, and data."

It all started a mere five years ago. The Washington, DC, chapter of ACM's Special Interest Group on Security, Audit, and Control (SIGSAC) wanted to focus attention on the issues involving computer security. Since then, the grassroots movement has spread, to where more than a thousand organizations around the world, from Algeria to New Zealand, from Brazil to the Slovak Republic, are participating.

Do you want to join the movement? It's easy and it's free! To make your organization an official participant, just send a note on letterhead indicating your interest to:

Association for Computer Machinery
Special Interest Group on Security,
Audit, and Control
Computer Security Day Committee
P.O. Box 39110
Washington, DC 20016

They'll send you a list of suggested activities, along with a computer security poster; the rest is up to you. I know that some Data General user sites have begun holding computer security fairs, featuring videos and vendor presentations. See this article's accompanying sidebar for a number of the committee's suggestions for activities, along with several of my own that are specifically geared to Data General systems.

Why worry?

If you're already a true believer about computer security, you can skip to the end of this article right now. But if you're not yet a member of the choir I preach to, let's discuss why you should even be concerned.

Although the whole area of computer security can get rather complex, we can break down the most important issues to a few basic concepts. As a system manager, you are responsible for ensuring that your system provides:

Availability. The system and the applications are available to the users when needed

Integrity. The data are correct and can't be tampered with by unauthorized personnel

Confidentiality. The information stored in the system can't be accessed by unauthorized personnel; concerns include protecting proprietary information that would be valuable to a competitor, as well as protecting the personal information about employees.

Given these three areas, the system manager has three basic tasks:

Prevention. Ensure that losses of availability, integrity, and confidentiality do not occur.

Detection. Recognizing that breaches do occur, be able to detect such an occurrence.

Recovery. Be able to restore system availability and data integrity.

Not only are these responsibilities and tasks a matter of common sense for protecting the financial interests of your organization, but for publicly held corporations, there is a legal obligation to do so. Reading the newspaper headlines would make you think that your greatest threat is from computer hackers and viruses. Although those threats

50+ ways to participate in Computer Security Day

1) Ensure that all passwords on your AOS/VS system are encrypted.
2) Request a 30-day free trial of the AOS/VS Password Control System.
3) Turn on password aging for all your DG/UX users.
4) Ask your Data General sales representative for information about Trusted DG/UX.
5) Turn on your SYSLOG; if running already at minimal detail, consider running at full detail.
6) Obtain SYSLOG_FILTER and SYSLOG_STATUS programs from the NADGUG software library.
7) Establish procedures for reviewing audit trails on a regular basis.
8) Ensure that computer modem lines have unlisted phone numbers.
9) Ensure that modem lines will be disabled in the event of cracking attempts.
10) Display computer security posters.
11) Ask your Data General sales rep about computer security audits performed by Professional Services.
12) Present computer security briefings.
13) Change your password.
14) Change the passwords for your privileged accounts (OP, SYSMGR, root, etc.).
15) Ensure that the :UPD directory has a null ACL.
16) Check your PC for computer viruses.
17) Obtain PC virus-scanning software and make it available to all your users.
18) Present a computer security video, film, or slide show.
19) Remove Superuser and Superprocess privileges from users who don't need them. (But try not to start a war when you do!)
20) Protect against static electricity.
21) Modify the logon message on your computer system (either :UTIL:LOGON.MESSAGE or /etc/motd) to notify users that Computer Security Day is the first workday in December.
22) Vacuum your computer and the immediate area.
23) Clean the heads on your disk drives or other magnetic media drives.
24) Back up your data.
25) Delete unneeded files.

26) Publicize existing computer security policy.
27) Issue new computer security policy.
28) Declare an amnesty day for computer security violators who wish to reform.
29) Announce Computer Security Day in your internal newsletter.
30) Examine the audit files on your computers.
31) Verify that the "Welcome" message used on your computer is appropriate.
32) Put write-protect tabs on all diskettes that are not to be written to.
33) Take the write-protect rings out of the tapes in your library.
34) Verify your inventory of computer applications.
35) Verify your inventory of computer utilities and packaged software.
36) Verify your inventory of computer hardware.
37) Verify your inventory of computer networks (LAN, WAN, etc.).
38) Install and inspect the power-surge protection for your computer.
39) Install fire-smoke detection and suppression equipment in computer area.
40) Eliminate dust from computer areas, including chalk dust.
41) Provide dust and water covers for personal and larger computers.
42) Post "No Food or Drink" and "No Smoking" signs in
43) Develop a recovery plan for all computer systems.
44) Verify that passwords are not posted.
45) Verify that backup power and air-conditioning exist for your computer.
46) Have a mini training session to provide all computer users with a basic understanding of computer security.
47) Verify that all source code is protected from unauthorized changes.
48) Verify that each computer has a trouble log and that it is being used.
49) Verify that appropriate offsite storage exists and is being used.
50) Remove all unnecessary items such as extra supplies, coat racks, and printouts from the computer room.
51) Select a system on which to perform a risk analysis.
52) Begin planning for next year's Computer Security Day.
53) Protect the computer on your store-and-forward phone message system.
54) Hold a discussion of ethics with computer users.
55) Volunteer to speak about computer security at a local computer club.
56) Help a computer novice back up their files.
57) Plan to attend an ACM computer security meeting or seminar.
58) Send us an item to add to this list for next year.

are real, you are far more likely to suffer losses from the actions of malicious *authorized* users and from operational errors. In fact, if you look at the list of suggested activities, you'll notice that it encompasses some rather mundane areas, such as backing up files and cleaning tape drives, in addition to the more obvious ones such as password management. In any case, the first step is awareness.

If you've missed my presentations at the NADGUG conferences, you might be wondering just how secure Data General systems are. The good news is that both MVs and Aviions have very powerful and flexible security features available—but of course having a secure system depends on your effectively *using* those features.

AOS/VS security

AOS/VS was evaluated by the National Computer Security Center (NCSC) as meeting the criteria for class C2, discretionary access controls. This is sort of like the "Good Housekeeping Seal of Approval." AOS/VS II has the same security features as AOS/VS, and is also C2-compliant. It is currently undergoing NCSC evaluation.

The discretionary security controls for C-level security mean basically that the system manager can control the ability of users to access the system, and that an authorized user has the ability to grant or deny other users access to his files. Among the AOS/VS features that provide C2-level security are:

- EXEC's username-password validation for logging on
- Access control lists (ACLs) for files
- SYSLOG's capability for providing a complete audit trail of file-access attempts, and for recording possible security violations
- The chapter on security in the "Managing AOS/VS" reference manual.

DG/UX security

All versions of DG/UX have, at the least, standard Unix security facilities, including username-password validation and file-access permissions. And Trusted DG/UX adds a number of features to meet the criteria laid down by the NCSC. The Trusted DG/UX option comes in two flavors: C2, discretionary access controls; and B1, labeled security, mandatory access controls. In fact, my personal view is that you shouldn't even think about running a production system with anything less than the C2 option.

Security features in the C2 version of Trusted DG/UX include:

Identification and authentication. A very powerful username-password validation scheme, with the ability to set different passwords for different types of access (such as terminal login, file-transfer program, etc.). In addition, password aging (requiring that passwords be changed within certain time periods) can be separately specified for each type of access. Additional controls govern password lifetime, number of unsuccessful login attempts allowed, etc.

ACLs. Actually quite similar to AOS/VS file-access control lists. An additional feature is a directory ACL, which gets automatically applied to any new files created under that directory.

Audit. Analogous to the AOS/VS SYSLOG facility, but allowing separate audit masks by class of user as well as type of system access (local vs. remote login, file transfer, etc.)

These features are supplemented with additional features for the B1 option:

Labels. Up to 255 hierarchical classifications (such as Secret, Unclassified) and 128 nonhierarchical categories (such as project codes) may be defined per system. Each file has a label, which is used to enforce mandatory access controls against the file (ACLs still work, so that a user still has the discretion to further restrict access to a file).

Multi-level directories. In order to allow users running at a variety of security levels to create files in the same directory (such as /tmp), we introduced multi-level directories. What looks like a single directory is actually a series of directories, one for each possible classification. The end result is that

Continued on page 53

Program for efficiency

SYNOPSIS

If you design your major systems with relational principles in mind, then software will not become the bottleneck as the organization grows, adds more users, and more records to the files.

by Steve Handlos
Special to Focus

I noticed a newspaper article recently about a local company celebrating its 25th anniversary. The article discussed the company's founders, its products, and early history. Then it said, "and in 19xx, they purchased their first computer." That statement is significant because it recognizes that all successful organizations have computer systems. What it doesn't say is that the most successful organizations have the most successful data processing departments.

As a data processing professional your job is to promote the success of the organization. You do this by adding applications that help users do their jobs better, easier, and faster. This helps the organization grow and prosper. As you add applications, measure their impact on the computer. Every computer system has a limit. When this limit is reached the computer seems slow to the users. Benefits of the computer system can be restricted by slow response.

Design the computer applications with the assumption that the organization will grow and prosper because of it. As the organization becomes successful the files will hold more records and there will be more users trying to access those records. Growth will stress your computer system, especially if applications are not written efficiently. You want to use the computer completely, but you can't afford to waste any of its resources.

Here are some suggestions for writing efficient applications.

Direct versus sequential

Back in the early 1970s we conducted some tests to measure the difference between sequential and direct methods of I/O. We were writing a new application and needed to decide on the file organization for the master file. The tests indicated that if all or most of the records in a file needed to be accessed in a batch update or inquiry, it was much faster to use a sequential file organization.

We observed the disk heads (back then they were visible). For each direct access to an indexed sequential file, two reads are necessary. The first read is to the index. The second read is for data. Since the index and the data are stored in two separate files, there is disk arm movement between the reads unless the files are stored on two separate volumes.

If a small percentage of the file is normally accessed, then direct will be faster. If a large percentage of the file is accessed, then sequential will be faster. The break-even point for a file varies from system to system, but the important point to remember is that sequential is sometimes faster than direct.

The indexed sequential type of organization is the most frequently used direct-access organization because it permits both direct and sequential access. That means you don't always have to process the file directly. Here's an example of how much faster sequential access can be.

I was given an assignment to determine why a certain program was not selecting today's transaction records for a report. The file's organization was indexed sequentially. Today's transactions were scattered throughout the file randomly. They were a small percentage of the file each day.

When studying the misbehaving program I noticed that the original programmer was making a series of direct reads to several files in order to find the records. This was the necessary procedure under the circumstances, if the data were to be located with direct access. But I also noticed that the selection could be made by reading only one file if the entire file was read sequentially.

Before finding the reason for the error, I decided to rewrite the program using sequential access. After rewriting the program I noticed that the sequential method of access took only 4 min-

utes to run. The program that didn't work took 18 minutes. I did eventually find the reason for the error, but I never fixed it because of the runtimes.

Just imagine how much more you could get done if you could trim 14 minutes from every batch job you run.

It's my observation that many programmers don't learn to write applications that process files sequentially. To them, using direct access seems easier and more logical. Take the time to learn the sequential concepts, and measure program performance to gain an understanding of how these concepts affect overall system performance.

Remove the bottlenecks

Some applications are CPU-bound. These applications perform a lot of internal calculations and very little I/O. They can be a problem in a time-sharing system if the program runs for a long time, because they use all of their time slice. They rarely, if ever, make a system call for I/O, which releases the CPU for other processes. Here's a case in point.

We were using an MV/20000, and running a mix of scientific and commercial applications. The scientific users were research scientists, frequently running statistical analysis jobs that could run for up to 8 hours. While not programmers, they were smart users. They realized that the priority was better if the macro was executed interactively. They would start a job they knew would last for hours, and go do something else. Meanwhile, our commercial users were operating at a snail's pace.

To remove the bottleneck we wrote a small program that was capable of changing the priority of an offending process. It was written to come to life every 30 seconds and check for processes that had run a long time and were using a high percentage of CPU time. If the process was an offender, its priority was changed in a series of steps until it had the system's lowest possible priority. Of course, certain processes were exempt if they were part of the operating system.

The result of the program was happiness for the commercial users, and almost no noticeable reduction in performance for the scientific users. True, they received no CPU time when the commercial users were busy, but there was enough time left for them. When the commercial users weren't busy the scientific programs used 100 percent of the machine's CPU resources. It took the scientific users several months to realize what we had done. When we explained the situation to them, they couldn't complain because they weren't really hurt.

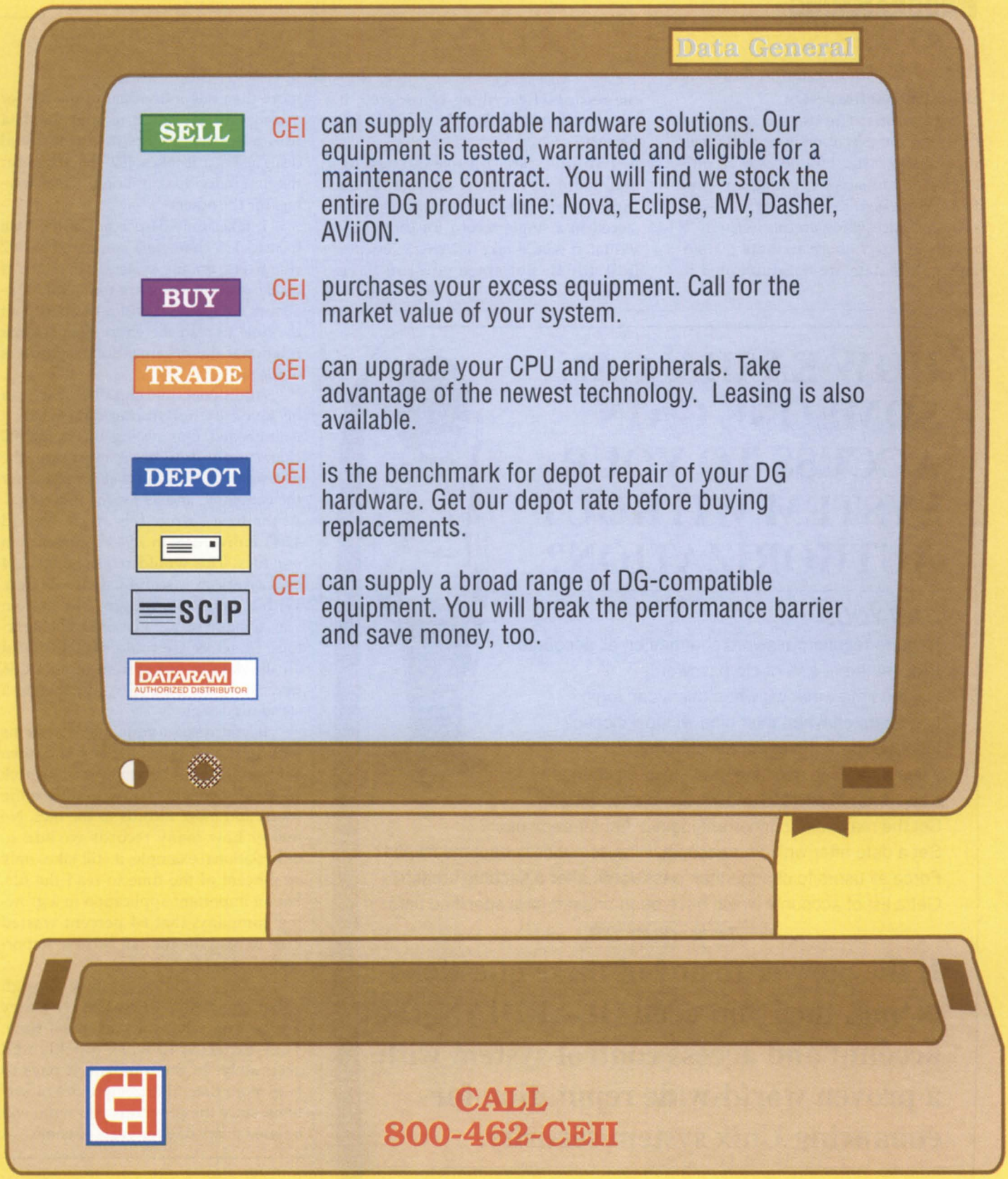
The I/O bottleneck

Most applications we write are I/O-bound. This means they are constantly waiting for completion of an input or output instruction. The operating system of a multi-user system allocates the wait time to other processes. This is good for resource utilization, but it still delays completion of the process. Unlike scientific applications, the I/O-bound program only delays itself.

As a programmer, you want to minimize I/O in all your programs. The time necessary to determine if I/O should take place will rarely be noticed in the total runtime of a program, since it will take less clock time than the I/O would take. To minimize I/O in all our programs, we perform tests to determine whether to read or write a record. Here are some examples.

We have many applications that use a look-up file to provide the description for a coded field found in a record. The description in the look-up file is needed every time that field is displayed on a screen or printed on a report. That way, the user can understand the meaning of the data. But you don't have to read the look-up file each time. Always check the value of the code previously described before reading the description record. This simple test will speed the execution of the program by eliminating redundant reads.

All our applications use interactive file-maintenance programs. The user may add, delete, or change records in the file. When the user changes a record it must be rewritten in the file. But what if a user locates a record, looks at it, and decides not to change it? When one of our Datagen programs arrives at the point in the program where the rewrite takes place, it checks a flag to see if the record was changed. If it wasn't changed, it isn't rewritten.



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Use relational file design

Relational file design results in faster system execution in several ways. It results in faster I/O because records are fewer and smaller, taking less time to read or write. It results in fewer records, since voids are not written. It results in faster, more accurate maintenance since data are not duplicated in the records. Everything considered, it results in much better overall efficiency.

To illustrate, I'll use our selling and mailing system. If all data for an individual within a company were stored in a single record for each individual, it would take 402 characters per individual. But since you can have more than one individual in the file for a company, it's smart to split the data into a series of files in a relational design. Then it takes 402 characters for the first individual, but only 135 characters for the others.

It takes only 34 percent of the time to read 135 characters compared to 402 characters, on any system. Therefore, if on the average there are three individuals per company, it will take about half the time to read the entire data set in a relational file organization, regardless of file size.

Additional time and disk space can be saved by not storing data when it isn't needed. Our system allows for 402 characters of data, but in most cases the minimum of 151 is all that is needed for the company, and 39 for the individual. At the time I wrote this article we had 4,742 individuals in 1,944 companies in our files. This would require 1,906,284 characters in a standard file design. With a relational design, our system was actually using just 683,942 characters. Therefore we could expect to read all the data in our system in about 36 percent of the time it would take in a standard design.

If you design your major systems with relational principles in mind, then software will not become the bottleneck as the organization grows, adds more users, and more records to the files. No matter how many records we add to our relational example, it still takes only 36 percent of the time to read the file. For an important application in a growing company, that 64 percent wasted time to read the file can become important in a hurry.

Your users don't know enough about computers to realize why they are getting what they want on time. They expect it to work quickly and accurately. In the long run it pays to take more time to develop efficient systems, since the programs you write will be used every day for years to come. Δ

Steve Handlos is founder and president of Productvity Systems Development Corporation. Products include contract programming, Datagen Cobol screen program generator, and software development training. He can be reached at P.O. Box 1931, Summerville, SC 29484; 803/851-6577.

Multidimensional elegance

SYNOPSIS

Data are what gets managed, not information, and DP professionals should look for the data model that provides the greatest ease and flexibility in accessibility.

by Daniel Sapir
Special to Focus

One of the most debated issues amongst DP professions, and in the computer industry in general, is what should the data model be for the next 20, 30, or even 100 years? Should it be relational? Object-oriented? Networked? Relational-distributed? Hierarchical? Or possibly a *multidimensional* data model?

The ongoing debate ignores one of the biggest problems in corporate data management, the problem that countless users complain about: that data isn't accessible at all.

I recall a conversation I had with Mr. Phillip Freedman, CFO at Bentley College. He told me that the college has spent more than $3 million replacing its Prime computers with systems from DEC running Oracle, and yet he said, "I have to go through hell to get a decent report out of the system . . . ."

One of the problems with data management systems is that they are based on a functional, or operational, concept. Operational data base structures have simple data architectures and primarily maintain transaction data. This model is what I refer to as the "Mainframe Model." In terms of data base accessibility, even the SQL model is rather inefficient in managing data since it has no built-in concept of time variance and cannot deal efficiently with conversions between data definitions. (SQL-92 has incorporated functionality to address the above limitations, however, they have not been fully adopted by RDBMS vendors).

The ongoing debate over the "correct" data model should begin really with defining data and information, and then proceeding with identifying the best data model that addresses real user needs, i.e., data accessibility. Over the years we have seen what Dick Pick, president of Pick Systems, refers to as "title creep": we have gone from data tabulation to data processing, to DBMS, to management of information systems.

Productivity and efficiency

The substance of what people do has not changed. However, we keep changing the name. Data are what gets managed, not information. Information cannot be managed since it's a byproduct of data. Information is what one makes of data, and in that sense it can be infinite. If we can agree that only data can be managed, and that to draw conclusions (information) one needs access to data, then it follows that DP professionals should look for the data model that provides the greatest ease and flexibility in data accessibility. Hence, the Pick multidimensional data model, also known as a post-relational data model.

Pick's productivity and efficiency are due to one of the most elegant characteristics of the entire system design—the Pick data model. The Pick post-relational data model moves beyond the capabilities of two-dimensional data bases to provide multidimensional relationships between data. Any given "file" is composed of "items" (data), which may contain "values" (data). These items and values have attributes (also data) that are located in a file dictionary. "Attributes" may describe, define, locate, or in some way operate on the values. Users retrieve data based on any relationship that makes sense to them and that satisfies their needs. Users actually "navigate" through their data using Pick's, intuitive English query and information-retrieval languages.

For the developer, a multidimensional data model means that any application requires only *one* repository for data—*one* data base where data and information are entered, modified, and updated rapidly and easily. For the user, a multidimensional data model means that *one* common data base serves as the core source of all information needed to run an application or a company. It also means that multiple users can interact with an application using common data.

For example, a business can share a single part number data base or a department can access a single name-and-address file used by the multinational corporation. Functions such as tracking inventory, sales, or telemarketing can be conducted real-time, with automatic data updates for the entire organization—without requiring intervention on the part of a developer or programmer.

Multidimensional architecture means developers produce new applications in a fraction of the time it takes with other approaches. And developers accrue equal productivity

when updating or modifying applications. The key to productivity resides in Pick's "Data Dictionary" approach.

All data in a multidimensional application are organized and stored in memory as items in files. Every file has an associated file dictionary. Aside from describing how data are viewed, the file dictionary also describes the properties and attributes of the file, such as processing codes, structure, data validation, and security codes.

Each file dictionary is also treated as a file whose structure is known to the system and accessed through the master dictionary. The master dictionary contains more than file and dictionary attribute-defining items. It also contains vocabulary-defining items created when a new master dictionary is developed using the "CREATE_ACCOUNT" verb. Initially, the master dictionary contains synonym items pointing to standard system files associated with the data-management account. File defining items are added to the master dictionary when a file is created using the "CREATE_FILE" verb.

Multidimensional ease of use results from this master dictionary vocabulary. The verbs and connectives of the master dictionary can be combined with the names (nouns) of file attributes to create intuitive, natural language commands for end-users. And since the master dictionary is itself a file, the vocabulary can be extended and changed, for example, to a foreign language.

Pick's data access and processing power is based on a concept known as "correlatives," which allow bidirectional movement along data paths, unlike other approaches that are unidirectional or use circular logic paths. Powerful correlative processing codes, based on inherent rules and paradigms, automatically process associated data at the system level instead of the programming-language level.

Correlatives eliminate the top-down, tightly structured DBMS architectures that so often frustrate developers and confound end users. Developers define dependencies at the dictionary level, and users query the data base and create reports without having to understand specific relationships and data dependencies.

Closely related to the correlative concept is the file-defining item. It allows independent, user-centered views of the corporate data base to exist. File-defining items are managed by the developer at the dictionary level. There is simply no need for complex programming.

One must realize that the Pick multidimensional data base model is a well-proven data base with hundreds of thousands of installations, and has been around for the past 25-plus years. This is significant in light of the fact that the ANSI std. x3.135-1992 (known as SQL92), were recently announced and included support for features that have been part of the Pick multidimensional data base for nearly three

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decades. SQL92 only now offers variable-length strings, DATE, TIME, INTERVAL, and BIT data types. The "ALTER TABLE" statement, which allows for changing the data base schema on the fly, has finally been added. It must be noted that in most conventional RDBMS, altering a table is either very restrictive or requires reloading of the data base.

Relational perceptions vs. reality

The perceptions many people have of relational data bases and the actual reality are entirely different. People may see the advantages of relational technology as the ability to relate arbitrary pieces of data to each other. The reality is that relational technology does not account for the way people think. A common way of thinking of data is in terms of ordered sorting and retrieval. To be purely relational, however, data must be unordered and random. "Joins" is another area where conventional RDBMS fall short, simply because most people do not understand what they are. Joining multiple tables (files) to provide an intuitive and obvious view of the data base is very difficult. Joins also force people into understanding the relationship among different pieces of data. That is a major weakness. Users should not have to be programmers. The relationships should be built into the data base. The relational model must be "re-architectured" to take advantage of the multidimensional data model.

Let's look at a real-life example that compares the two data models:

A library has books that it loans out. There are cardholders who borrow books. From time to time those cardholders give donations to the library. A simple application would track the cardholder's number, name, address, and phone number, what books the cardholder borrowed (currently and in the past), when books are due back, and any gifts that were donated to the library, including types and dates.

In a purely relational model it is necessary to go through a process of *normalization* to eliminate repeating fields and groups. This results in mapping the data into a cardholder table, a book table, a borrowed book table, a borrowed book history table, and a gifts table. The cardholder table contains the cardholder number, name, address, and phone number. The book table contains the book identifier, the title of the book, and the author. The borrowed book table contains the cardholder number, the book identifier, and the book's due date. The borrowed-book history file contains the cardholder number, the book identifier, and the date the book was returned. The gifts table contains the cardholder number, the type of gift, the value of the gift, and the date the gift was given.

If the user wants a report that contains the cardholder name, book title, and due date, it is necessary to join three tables to achieve the goal. If this is

a report that is generated frequently, the user will want to create an artificial "view" of the data that features this particular appearance. This results in more overhead and inefficiency.

If, after the application has been implemented, the library decides to allow more than one person to use a single card (family members, etc.), it is then necessary to go back to square one and re-analyze the entire data base. This will result in adding at least one table to the application and modifying another. Typically the entire system has to be shut down and regenerated after the analysis is completed.

Let's compare the relational approach to that used by Pick. To start with, the multidimensional approach will utilize two files rather than five tables. The cardholder file will contain the cardholder number, name, address, phone number, book identifiers of books that have been borrowed, due date and return date associated with those books, the date of any gifts donated, type, and value of those gifts. The book file will contain the book identifier, the title, and author. In addition to dictionary definitions for the actual data in the cardholder file, there are definitions for the book title and book author, which set up a permanent relationship between the book identifiers of borrowed books and data in the book file. When the user wants a report containing the cardholder name, book title, and due date, it is necessary to reference only that information with respect to the cardholder file. It is not required that the user figure out how to do a join, nor is it required that an artificial "view" be created.

If, after the application has been implemented, the library decides to allow family members to use the same library card as their mother and father, it is necessary to add only that additional definition to the cardholder file.

A multidimensional data model allows such flexibility because it allows a single field to contain multiple occurrences of specific data, something that is strictly forbidden in the simpler relational model. So, for example, the cardholder's children—Freddy, Billy, and Francie—all fit into a single record within the multidimensional model. In the simpler relational model it would have been necessary to have a separate table with Freddy, Billy, and Francie each appearing in a separate row. In the simple relational model, trying to keep track of which books were borrowed by which family member could be a sufficiently challenging task that the library might be forced to issue a separate cardholder number for each family member.

Another powerful aspect of the multidimensional model is the ability to define data permanently in the dictionary of one file, where the actual data exist in another file. This concept replaces the concept of a join and the artificial "view." For example, if the librarian wants a report of cardholder's names and book titles they have borrowed either currently or in the past,

with ACCESS, the standard query language of Pick multidimensional, the librarian simply types:

```
LIST Cardholders name title
```

In this example, "title" is a permanently defined field in the cardholders file that uses the book identifier to access the books file to automatically retrieve the title of the book. The librarian need not worry about the title being in a different file. This same example using the simple relational model, with SQL as the query language, would look like:

```
select name, title from cardholders,
    book where
cardholders.book_identifier =
    books.book_identifier;
```

In this example it is necessary for the librarian to know precisely which data are in which table, and to know the relationship that binds them together so that the relationship can be stated properly in the SQL statement. Since the "book_identifier" occurs in both the cardholder's table and the book table, it is necessary to preface the definition name with the table name in the "where" clause, so SQL won't get confused. The "where" clause in this SQL statement is the backbone of the "join" concept.

The simple relational model is a subset of the multidimensional data model. This means that a user who is extremely familiar with normalized tables, joins, views, and using SQL can do so with the Pick multidimensional DBMS. (SQL is available in version 6.1 of Advanced Pick multidimensional). The multidimensional approach allows users easier access to their data.

A quite successful implementation of a multidimensional data model is Universe from Vmark, Inc. Universe is an SQL-based, multidimensional data base that supports the multivalue architecture of the Pick data model as well as the relational model. Since its introduction in 1984, it has sold more than 12,000 licenses and has a VAR network of more than 250 worldwide.

Recently, Vmark has announced a product called Hyperstar, an object-oriented family of products that provide a client/server-based approach to connectivity and data base accessibility to standard desktop applications.

The Hyperstar product provides for *ad hoc* data capture, connectivity to Microsoft Windows applications, connectivity to custom-written applications, and access to other data bases such as Oracle, Informix, Sybase, and others. Such products are being developed by other vendors as well, so Pick-based applications can take advantage of them. Δ

Daniel Sapir is the managing director of Data General's Pick/Unix business unit. He may be reached at 508/898-6663. *The author would like to acknowledge Pick Systems' contribution to this article.*

The latest products for DG systems

Debugging

Dulles, VA—Virtual Technologies announced the release of Version 1.4 of the Sentinel debugging environment for Unix C, C++, and X-Windows programmers. Sentinel 1.4 debugs programs faster and more thoroughly, detects more types of errors, provides additional reports, and is easier to use.

Sentinel is a library of routines that can be linked into Unix C and C++ programs to help programmers locate and resolve hidden bugs in the use of dynamic memory. Providing runtime verification of pointer usage and dynamic memory allocation, Sentinel traps memory errors, and reports the source file, function name and line number of offending statements. It also provides developers with the same level of information concerning the allocation of memory and, if applicable, where memory was freed or overwritten.

New features in Version 1.4 have made Sentinel easier to install and use. Simply adding "sentinel" before the link command makes Sentinel automatically configure itself with the software to be debugged, reducing the need for developer intervention as well as knowledge of Sentinel internals. In addition, Version 1.4 automatically handles duplicate symbol references, eliminating the need for manual operations to work around a programmer or third-party library's defined functions that Sentinel needs to define.

Among Sentinel's reporting enhancements, a new e-mail option can send debugging reports to a specified list of recipients. This capability is useful when non-developers are testing software, since it allows technical information to be sent automatically to programmers who use it, rather than being displayed on a user's screen.

Sentinel, priced between $395 and $995, is available on a variety of platforms, including DG/UX and Data General's Aviion.

Virtual Technologies, Inc., 46030 Manekin Plaza, Suite 160, Dulles, VA 20166; 703/430-9247.

PRODUCTS AND SERVICES

ARC certified by 88open

Germantown, MD—Data Bank Associates, Inc., announced that its ARC compressed-library product has received compatibility certification from the 88open Consortium Ltd. Certification ensures that ARC will run on all 88000-based systems. Each certified system conforms strictly to carefully defined binary standards. The result is a single product, price, and support to cover all 88000-based system users. DBA joins more than 100 independent software vendors who have certified more than 500 products with 88open.

ARC files or programs may be added, moved, deleted, updated, printed, or executed from the library. An ARC library of compressed files can be moved and used to or from any system using Unix, AOS/VS, MS-DOS, or OS/2 operating systems. The most recent release includes "ZARC" to complement Unix ARC libraries on PCs. ZARC permits full access to the "longer" Unix filenames while under MS-DOS or OS/2. ZARC is being distributed as "freeware" to any licensed ARC user.

Under Unix, ARC provides options such as: a switch to force filenames to lowercase upon decompression; conversion of line endings to the target platform; and file encryption.

ARC for 88000-based systems is now available for an unlimited mode of operation for $395 per system. Initial licenses include one year of product updates, a no-charge version of XYZmodem, unrestricted use of ZARC, and hot-line support. The ARC program was developed by DBA under license from System Enhancement Associates of Wayne, New Jersey, the original developers of the ARC program for DOS and OS/2-based PCs.

Data Bank Associates, Inc., 20010 Century Blvd., Suite 104, Germantown, MD 20874-1118; 301/540-5562.

3D visualization

Dallas, TX—UNIRAS, Inc., introduced its next-generation 3D visualization software, Direct Insight, which incorporates a new visualization architecture paradigm, called "Steering." It also offers an intuitive input device (Spaceball) that allows users to perform on-the-fly exploration of large 3D and 4D data sets.

The steering architecture enables real-time input, display, analysis, and animation of 2D, 3D, 4D data sets, and redefines the way data are processed to create visual representations. Direct Insight will be marketed as a turnkey, plug-and-play visualization application to users in the earth and space sciences, computational fluid dynamics (CFD), advanced structural and mechanical analysis (FEA), geophysical modeling, medical imaging, defense, and scientific research markets. The Unix-based software is available at a U.S. list price of $9,900.

Users generate 3D images of their data simply by moving the Spaceball around the screen. The program automatically begins a real-time rendering and display of the underlying data as the Spaceball moves across it. Real-time functionality allows users to interactively explore the dataset, without having to wait for a perspective view to be rendered and then displayed.

Direct Insight is designed to require no previous graphics expertise or programming knowledge. The system incorporates available industry standards, making it portable to all major Unix-based operating systems. It utilizes the C/C++ programming language, the Motif and X-Windows user interfaces, "OpenGL" graphics rendering, and includes icon-based widgets that enable complex visualization functions to be performed interactively as data are being explored.

UNIRAS, Inc., 5429 LBJ Freeway, Suite 650, LB 144, Dallas, TX 75240; 214/980-1600.

Text management

Pointe-Claire, Quebec, Canada—Ardilog, Inc., announced the latest release of Naturel Pro, version 3.3, offering greater flexibility, maintaining ease of use, retaining its natural language search and retrieval, yet now offering additional features that further expand the ability of users to find and manage information, in small or large organizations.

Users may now attach unlimited private and public notes, directly to their full text or structured data bases, during a search operation without changing the original data. These notes can be searched, and may even contain their own notes. Hypertext linking allows users with expert knowledge of the information base to identify and create multiple links between interrelated documents, giving other users the ability to navigate easily through documents containing information relevant to any query.

As an aid in report generation, the user now has the ability to order and sort the results of a query in data bases containing structured information in alphabetic, numeric, or date format, before display. The sort can be ordered using one or more of the available fields or by the creation date of the files. A user may then select any number of these results, copy them to a file, or print them.

Two new functions, Linkbuild and Notebuild, consist of menu selections that permit users to provide a list of source and destination filenames with associated words, expressions, or phrases in an ASCII file, and then automatically build the hypertext links. Destination links may also be external to the data base. In place of these destination links, notes can be prewritten and attached automatically to their appropriate expression or phrases. Save and restore functions give users the ability to modify and automatically rebuild their links and notes in dynamic ever-changing information environments.

Naturel Pro allows common language queries of up to 1,024 characters (without the requirement to use Boolean logic). It then uses five relevance factors to sort automatically and rank the results of the query. This gives Naturel Pro precise sub-document retrieval capability and the ability to display the most relevant paragraphs containing results of the query.

Naturel Pro version 3.3 is priced at $495 for a single user.

Ardilog, Inc., 1000 Boul. St-Jean, Suite 324, Pointe-Claire, QB, Canada H9R 5P1; 514/694-9500.

Sort/merge

Craryville, NY—Information Resources, Inc., shipped Version 3.0 of its sort/merge software, COSORT. The new release is faster and contains more robust report-writing facilities for mainframe-to-Unix migration.

COSORT's new "BlockSize" tuning parameter allows users to assign very large record blocks for sorting. Users can set an optimal number of bytes per physical read and write for each sort execution. The resulting throughput improvement over Version 2.5 on average is between 15 percent and 25 percent.

The mainframe sort interface to

COSORT 3.0—called SORTCL (for "SORT Control Language")—offers an expanded command set to include record header and trailer labeling, multiple format input and output files, and field summing. COSORT 3.0 filenames follow ISO 9660 conventions and industry branding/compatibility-certification tests are in progress.

COSORT was the first third-party sort/merge package designed for Unix data processing and application development. The product includes three standalone utilities for end-user operations and can be called from programs written in C, Cobol, and Fortran. It permits all sizes and types of data files, including ASCII, EBCDIC, and MF, and RM Cobol binary forms. Records can be fixed or variable-length to 32,768 bytes, and any number of sort keys can be defined in stable or floating fields. COSORT's unique co-routine architecture imposes no limits on input, compare, or output criteria. It reduces I/O through simultaneous, in-memory record exchanges with the application (calling) program.

COSORT 3.0 is available on all Unix-based hardware, including Data General's Aviion series, with configuration-dependent license fees starting at $990.

Information Resources, Inc., 319 Decker Road, M/S RR1, Craryville, NY 12521; 518/851-2815.

High-speed remote access

AV PC

Sunnyvale, CA—Combinet, Inc., introduced a low-cost bridge that provides high-speed remote network access over economical public switched digital telephone lines. The Everyware 150-bridge allows individual users, such as telecommuters, small business owners, and workers at home or branch offices, to have full access to their enterprise network from the desktop platform—workstations, PCs, Macintoshes, Unix workstations, or X-terminals.

The new bridge works with all leading network operating systems, including TCP/IP, Netware, Sun, LAN Manager, and Vines, and is application-transparent. It provides a way to create a dial-up LAN over high-speed telephone lines.

The new Combinet Everyware 150 transmits text, images, and graphical information at up to 128 kilobits per second.

The Everyware 150 costs $990; volume discounts are offered. In addition, the Everyware 150 will be available through Combinet's NODE (Networking On-Demand for Education) program for $495 to students, faculty, and administrators at participating educational institutions.

Combinet, Inc., 333 W. El Camino Real, Suite 320, Sunnyvale, CA 94087; 408/522-9020 Δ

Continued from page 13

and—in an entirely new development—for computer systems made by other companies as well. In January 1992 Data General was the first to qualify for worldwide ISO 9002 certification, reflecting the company's seriousness in its push toward open systems. In March 1993 Data General's Aviion product line was designated as supporting the Open Software Foundation's distributed computing environment.

In 1993, Data General's Aviion line reached farther into the performance stratosphere with its mid-range AV 8500 and high-end AV 9500, offering performance up to 1,000 transactions per second and 1.6 billion instructions per second. DG's Aviions were rated tops in a COMPUTERWORLD survey of RISC servers. "The DG servers earned the highest score in value for the dollar, and a number of users said price/performance is the Aviion line's greatest strength," noted COMPUTERWORLD.

The Unix server market has become a game of leapfrog, with DG announcing new machines with unprecedented performance for the price, and other companies like Hewlett-Packard counterattacking in an ever-escalating cycle.

When announcing its latest line of Aviion systems last June 29, several of Data General's top executives expressed the company's future vision:

Ronald L. Skates, *president and CEO:* "We have more than 3,000 applications of all types that run on our DG/UX operating system. They are provided through a multitude of partnerships with software developers like those with us today."

J. Thomas West, *senior vice president, advanced development:* "The issue for computer systems vendors today is not how to design the fastest chip, the fastest bus, or the fastest disk. The problem is how to get the latest commodity technology integrated into your product line before your competitors. The trick here is to take advantage of commodities, without being yourself victimized by commoditization."

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The crystal ball remains clouded. Certainly we don't know how all this is going to turn out, and even the phrase "turn out" isn't useful in discussing the startlingly dynamic computer industry. But it's worth trying to anticipate what will happen because Data General at age 25 isn't sitting passively in the face of the computer industry's sometimes brutal shifts and realignments. Two things are certain, though: the future *will* unfold, and we *will* see. Δ

Continued from page 38

no user can look at—or even find out about—files that are at a different level.

These products are evolving rapidly, with many new features in each major release.

You probably have a lot riding on your system (including your own neck). Your organization wouldn't have made the investment otherwise. And in today's challenging world, it is more important than ever to ensure that the system is properly protected. You'll never make it totally secure—at least not if any productive work is to get done—but you can certainly improve your odds. And if things are a bit lax now, you can start your New Year's resolutions one month early, on Computer Security Day. Δ

Tom Gutnick is a systems engineering consultant in Data General's Technical Services Group for the Americas. He specializes in operating system issues including performance and security. He can be reached at Data General, 7927 Jones Branch Drive, Suite 200, McLean, VA 22102; 703/827-9600; Internet: Tom_Gutnick@dgc.ceo.dg.com.

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DASH Items...

Category: DG/UX

Author: **Susan Spaeth**
Subject: ***File permissions and C applications***

I have recently written some printing utilities that involve reading information from */var/spool/lp/tmp/*-0*. The programs work great, as long as the person executing them is logged on or "su"-ing as root. I was wondering if there was any way I could get around this without causing problems elsewhere on the system. Any ideas?

Reply by: **Elliott Lavy**

If you have the ***set-user-id*** bit turned on for your executable, have root as the owner, and have ***setuid(0)*** inside, the program will have root permissions for reading or writing files.

Author: **Kelly Andersen**
Subject: *GETTY PROMPT*

Does anyone know how to change the ***getty*** prompt? It currently prints "Aviion DG/UX Operating System Level 5.4.2.47." We would like this to print the name of our company.

Reply by: **Bill Legrand**

There is a file called */etc/issue* that can be modified to have whatever test you want to put in it for the login banner.

Author: **Doug Morgan**
Subject: ***Idle time on ports***

We are running rev 5.4.2 and I have noticed the ***who -u*** command doesn't seem to show the correct idle time for users logged in. At times when I know the terminal has not been touched, the ***who -u*** shows a dot in the idle time field. But the ***finger*** command shows the actual idle time. The ***finger*** command seems to be more accurate than the ***who -u*** on showing the correct idle times for ports. If anyone has any idea why this is happening, please let us know.

Category: AOS/VS

Author: **Arlene Blouch**
Subject: ***AOS/VS II rev 2.21***

I recently upgraded my MV/20 to 2.21. The only problem I seem to be having at this point is with a WRITE [!ASCII 036 106 105] command in my screen macros. I have found that any [!ASCII] write echoes the symbol and doesn't work as it should. The failure occurs in both CLI16 and CLI32. Is there a fix? I really don't want to backrev; especially since I don't know when the problem started (I was on 2.03, which was fine).

Reply by: **DG Customer Support**

Under CLI32, there is a switch on the write statement which will help. Try WRITE/7BIT [!ASCII 036 106 105]. Or, if you need to use CLI16, add a 2 to the leading digit—WRITE [!ASCII 236 306 305]. This is needed because CLI strips the high order bit if it is interpreted as an 8-bit value. You probably did not notice this in rev 2.03 because it did not check for this.

Category: Windows (X, etc.)

Author: **Richard K. Vandenberg**
Subject: ***Using AV 300 as X-terminal to AV 6220***

Please help! I need to know what it takes to utilize an AV 300 as an X-terminal on an AV 6220. I have X running on the workstation, yet can't seem to start X-sessions on the server. The workstation is fully configured and is running 5.4.2; the server is also running 5.4.2. I am trying to test the use of X-terminals for Ingres data base access on our server.

Reply by: **DASH Development**

I have a couple of comments on your problem. First, we are currently using both workstations and X-terminals to run the same applications on multiple servers, and have seen no differences in the operation of the application programs.

Second, you can easily run your workstation with the same kind of connection that an X-terminal would use, without trying to have ***xdm*** on the server service the X-server on your workstation. If you connect to the server with telnet or ***remsh*** or ***rlogin***, and then execute ***xterm -display <AV300:0.0***, you'll get an ***xterm*** running on the server, with a window on your workstation. This is exactly what an X-terminal does. You may want to set up a script file on the server that will set your DISPLAY variable as ***xdm*** would, and then ***exec*** the ***xterm***. You could then ***remsh*** the script file, and get a window on your workstation from the server. We do this kind of thing regularly, and from the server's point of view, there is no difference between a workstation and an X-terminal. This should enable you to execute your tests.

Author: **Richard K. Vandenberg**
Subject: ***More X-Windows help needed***

When using the ***Xterm -display hostname:0.0*** command I receive the message, "connection to 'hostname' refused by server. Client is not authorized to connect to Server."

As far as I know, all permissions have been granted. The ***host*** and ***host.equiv*** files have been updated, yet I still receive this message. What am I doing wrong?

Reply by: **DG Customer Support**

You need to issue an ***xhost*** command on the workstation. This gives other hosts permission to open the display on your workstation. You can use ***xhost +*** to let any host use the workstation display. Or you can list specific hosts in the ***xhost*** command. Δ

DASH runs on an Aviion 5200 server located at the Customer Support Center in Norcross, Georgia. The bulletin board is available 24 hours per day, 7 days per week, free of charge. Call 1-800-DASH-CSC (1-800/327-4272) for the modem rotary.

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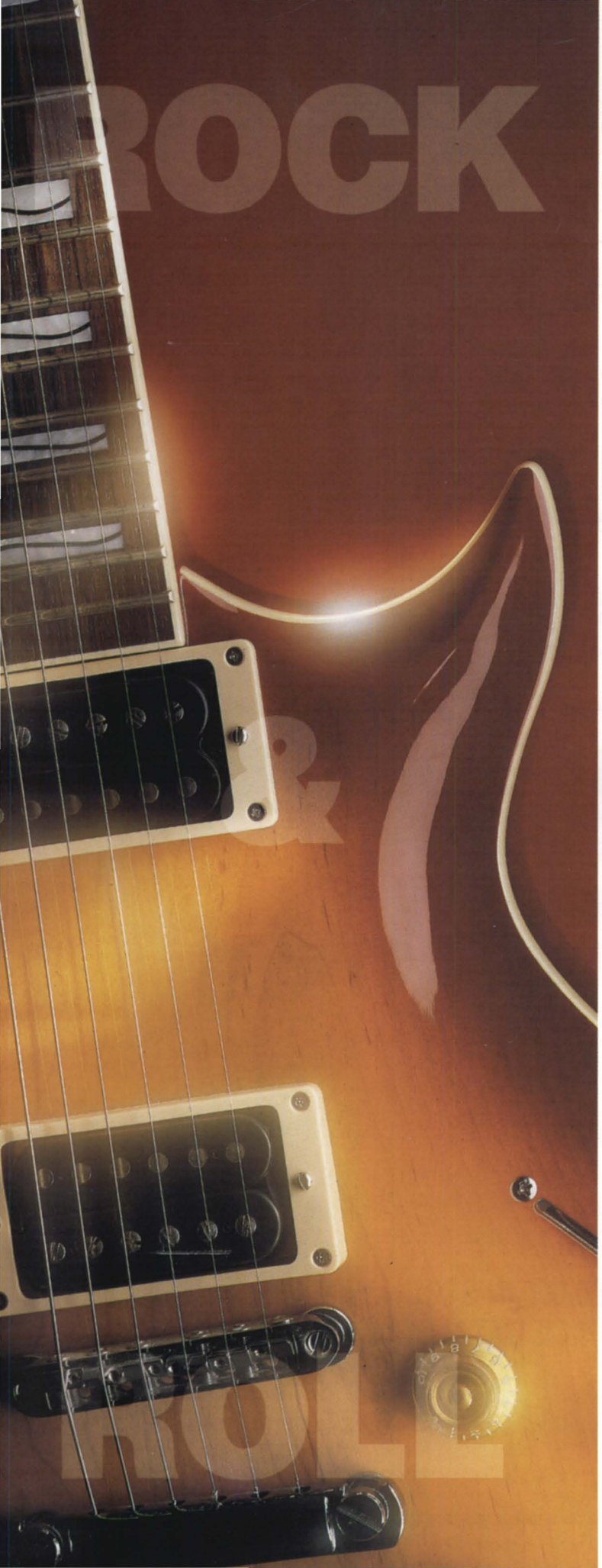

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