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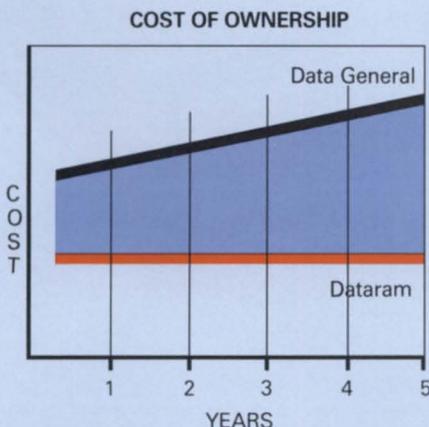
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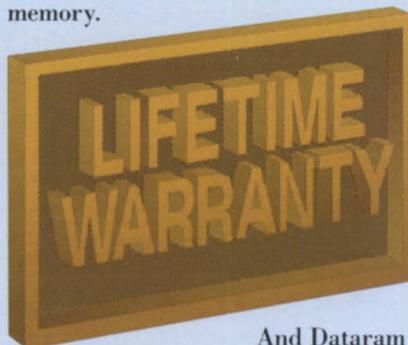
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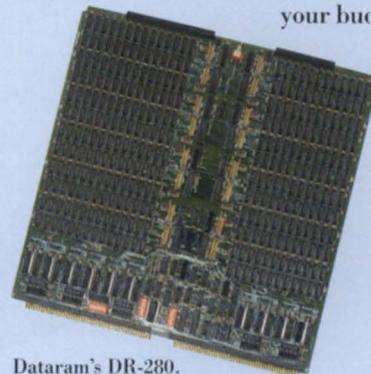
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FOCUS

The Magazine of the North American Data General Users Group



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ON-LINE HELP

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(300 or 1200 baud modem)
Rational Data Systems 415/924-3652
OIS (to get an OIS ID and
password, contact a DG field
engineering telemarketing
representative) 800/325-3065
In Massachusetts 800/952-4300
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NADGUG staff 617/870-7721

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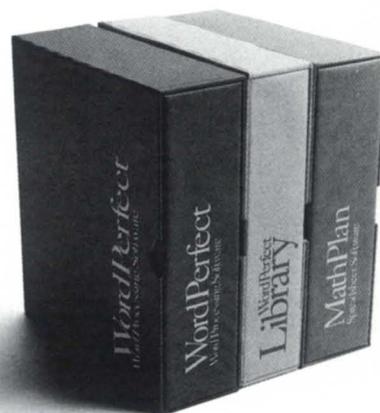
products. Our price for WordPerfect on the new MV/15000 is \$5000 for Model 8, \$6000 for Model 10, and \$7000 for Model 20. The prices are the same for WordPerfect

Library on each of the three models, and MathPlan runs \$3000, \$3500, and \$4000 for models 8, 10, and 20, respectively.

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In addition to software for DG and IBM PC computers, we also have versions for the VAX and Apple IIe/IIc/IIgs. Later this year, we will be running on the Macintosh, Amiga, Atari ST, IBM 370 mainframes, and some UNIX computers.

Down-home concern

Such widespread success in other markets does nothing but strengthen our commitment to the DG Division.

To enhance our telephone support, we recently hired Chuck Swank, previously the Factory MIS Manager at Ore-Ida foods. We've also organized a new testing group to carefully inspect

products and develop new software. Word processing is only a part of our product line.

After just four months in the market, WordPerfect Library for AOS/VS, our office automation solution for DG systems, is now installed on more than 150 machines. The integrated electronic mail, calendar, scheduler, shell, and phone message systems are proving to be valuable office tools.

In *Data Base Monthly*, Tom Robinson described WordPerfect Library: "Their technique for putting jobs on hold and switching among them is easy to use, easy for users to grasp, fast, efficient, and just plain clever."

In addition to WordPerfect Library, MathPlan (our spreadsheet) and P-Edit (our program editor) round out the WPCORP product line for DG hardware.

More on the way

As DG introduces more machines, we're ready with the software to get the best perfor-

GRAND TRADITIONS

What's in a name, anyway?

by Calvin Durden
NADGUG President

A couple of years ago—I can't remember exactly when—there was a movement afoot to change NADGUG's name. I think it started as a joke, but before long people were taking it pretty seriously. During Brad Friedlander's term as president, some of the more irreverent members of the Executive Board started calling the organization "BradGUG." Then when Mort Kahl took over as president, we heard NADGUG pronounced in a way nobody has been able to match since—you could almost feel his tonsils slamming against the roof of his mouth as he said it: "NAD-GUGGGG."

In any case, somebody made a more-or-less serious proposal to look for a name that would be more dignified. We even had a contest to see who could come up with the best new name. Scores of imaginative souls tried to craft an acronym that would capture the essence of the organization without assaulting the ears or the larynx. Several of the suggestions were pretty good, but in the end we decided to stay with good old NADGUG. Once you get over the initial embarrassment of saying it, NADGUG actually sounds kind of friendly—in an endearingly ugly sort of way.

Maybe that's why so many of the regional and special interest groups ended up with the letters D, U, and G lodged in their names (and in their members' throats). If you take a look at the RIG/SIG Roster on page 58, you'll see what I mean: AADGUG, CADGUG, NNEDGUG, PUDGE, and even NO-CAL FUDGE (only in California . . . ?).

While you're looking at the roster, I hope you'll also notice how many new groups have started up since last October. Following the annual meeting last August, there was a rush of requests to the NADGUG staff to get information and help for starting up new regional and special interest groups. Many of those requests have since resulted in active groups—with names like CODGUG, BUDGE, and FEDSIG. They're upholding a grand tradition.

By the beginning of March, many RIG and SIG officers were working on the reports they will give at the spring meet-

ing of NADGUG's Executive Board on March 19-20. The spring Board meeting is one of only two chances we have each year to get together and work through the mass of details that have to be decided as we run the organization and prepare for our annual meetings. As NADGUG has grown, governing it has become more complex. Although we have a professional staff, we still depend heavily on volunteers who can give their time and energy to keep us moving forward.

This year's spring meeting will be no exception. Nearly every name listed on the Roster will be contributing something important—whether it's the progress report from a RIG, or the meetings committee's proposed agenda and schedule of events for next October's Conference 87.

Getting all of this to happen in two short days sometimes means we have to take a few liberties with *Roberts' Rules of Order*. And in years past, it's always been an open question whether we would be able to move things along fast enough to adjourn by five o'clock on the second day. This year, in honor of our meeting site in Las Vegas, I'm thinking of taking odds on it. I'll let you know next month how it comes out.

By next month, I also hope to be able to share more details about Conference 87. At this point, planning is in full swing. The call for papers was sent out in January, and meetings committee Chairman Lee Jones met with the Focus editorial advisory committee in February to map out a theme and organizational scheme for the Conference. If the preliminary returns are any indication, we should expect the 1987 sessions and speakers to be the best ever. Likewise, we're hoping to have even more exhibitors on hand than we had at Conference 86.

The deadlines are bearing down, but if you or your company would like to give a presentation or make an exhibit at Conference 87, there may still be time. Call Barbara Hoogasian, the NADGUG coordinator, at 617/870-7721 ASAP if you need more information. Δ

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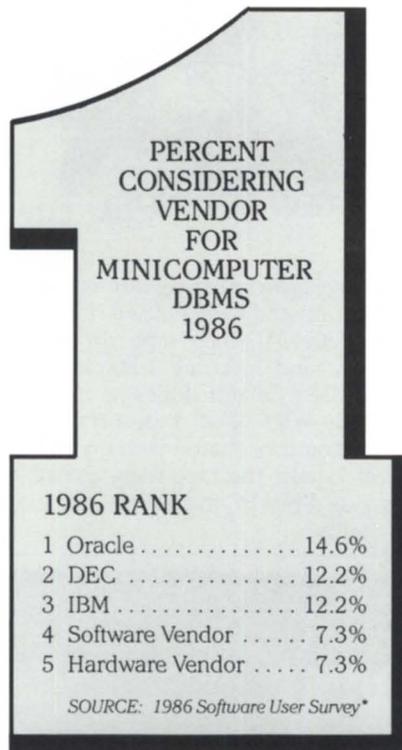
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U.S. SEMINARS

AK Anchorage..... Apr 14	FL Ft. Lauderdale..... Mar 5	Grand Rapids..... Apr 9	Syracuse..... Mar 10	Houston..... Mar 12,
AL Birmingham..... May 12	Orlando..... Mar 11	MN Minneapolis..... Mar 12	OH Cincinnati..... Mar 19, Apr 22	Apr 9, May 7
Huntsville..... Mar 26	Tampa..... Apr 8	Apr 23, May 13	Cleveland..... Mar 3,	San Antonio..... Apr 2
AR Little Rock..... Mar 27, May 12	GA Atlanta..... Mar 18, May 6	MO Kansas City..... Apr 9	Apr 1, May 5	UT Salt Lake City..... Mar 24, Apr 29
AZ Phoenix..... Apr 15	Savannah..... Mar 19	St. Louis..... Apr 14, May 12	Columbus..... Mar 4, Apr 2, May 6	VT Burlington..... May 6
Tucson..... Mar 25	IA Des Moines..... Apr 15	Apr 14, May 12	Dayton..... Mar 18, Apr 21	WA Seattle..... Mar 3, Apr 7, May 12
CA Los Angeles..... Mar 11,	IL Chicago..... Mar 11,	NC Charlotte..... Mar 18	OK Oklahoma City..... Apr 7, May 29	WI Madison..... Mar 31
Apr 7, May 12	Apr 9, May 14	Raleigh..... Mar 12	Tulsa..... Mar 24	Milwaukee..... Mar 10, Apr 29
Newport Beach..... Mar 17, May 5	Springfield..... May 7	NE Omaha..... Mar 3	OR Portland..... Mar 24, May 7	WV Charleston..... Apr 15
Pleasanton..... Apr 8	IN Indianapolis..... Mar 18,	NH Manchester..... Mar 5	PA Allentown..... Mar 5, Apr 21	
Sacramento..... Mar 10, May 5	Apr 22, May 20	NJ Iselin..... Mar 10, Mar 26,	Harrisburg..... May 6	
San Diego..... Mar 3, May 14	Apr 2	Apr 1, Apr 15, Apr 29,	King of Prussia..... Apr 23	
San Francisco..... Mar 12,	KY Louisville..... Apr 8	May 13, May 19	Philadelphia..... Mar 18,	
Apr 9, May 7	LA New Orleans..... Apr 15	NM Albuquerque..... Apr 30	Apr 9, May 7	CANADIAN SEMINARS
San Jose..... Mar 26, Apr 30	MA Boston..... Mar 18, Apr 15, May 14	NV Las Vegas..... Apr 1	Pittsburgh..... Mar 10	Calgary..... Mar 18, May 19
CO Colorado Springs..... Apr 21	Springfield..... Apr 9	NY Albany..... Apr 23	Treviso..... Mar 26	Edmonton..... Apr 14
Denver..... Mar 17, Apr 16, May 5	MD Baltimore..... Apr 2	Buffalo..... Apr 8	SC Columbia..... Apr 7	Hamilton..... Mar 17, Apr 21, May 19
CT Hartford (Farm.)..... May 5	Bethesda..... Mar 4, Mar 12,	New York City..... Mar 11, Mar 19,	TN Nashville..... Apr 9	London..... Mar 24, Apr 28, May 26
New Haven..... Mar 25	Mar 18, Apr 7, Apr 15, Apr 21,	Mar 25, Apr 8, Apr 16,	TX Amarillo..... Apr 7	Ottawa..... Mar 5, Apr 2, May 7
DE Wilmington..... Mar 31, May 5	May 5, May 13, May 19	Apr 22, May 6, May 14, May 21	Austin..... Apr 1	Toronto..... Mar 10, Apr 7, May 12
	ME Portland..... Apr 22	Apr 22, May 6, May 14, May 21	Dallas/Ft. Worth..... Mar 17,	Vancouver..... Mar 10, May 14
	MI Detroit..... Mar 10, Apr 7, May 12	Rochester..... Mar 19,	Apr 14, May 5	Victoria..... Apr 21
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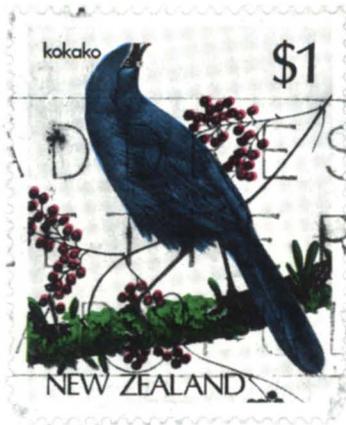
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News and requests from New Zealand

I have acquired an aging Data General CS/60 C5 (256 KB of memory; a 25 MB Winchester and an 8-inch 1.2 MB diskette; a 10/10 MB removable disk subsystem; a 6021 NRZI 800 bpi magtape; and six 6053 terminals) which has the ICOS rev 4.5 operating system.

This occupies my study, which was my son's bedroom until he was displaced. He now uses my daughter's bedroom, which she no longer needs because she has gone to France. This is not as bad as it sounds, because we all moved into larger rooms except for the CS/60.

No, I can't use all the terminals at once, and yes, I do get strange comments about why on earth I've got such a large computer in my home. The truth is I fancied having it, as I got it for less than a new micro. So it sits there; it is used to modify the odd ICOBOL program and sometimes to do productive work, but I tend to use my two PCs more.



I have been browsing through various magazines and have noticed that several firms offer 1/2-inch tape drives, controllers, and software suitable for use with IBM PCs and clones. Is it possible that the 6021 NRZI tape drive on the CS/60 could be shared with my PC? This would make the tape more useful and provide direct PC/mainframe media compatibility.

Obviously, the PC would need some MS-DOS 2.1 compatible software utilities that could handle DUMP/LOAD/REORG equivalent instructions for file backup and I/O of data export tapes in ANSI or EBCDIC formats. It would also presumably need a tape I/O controller board and cable to interface with the current DG tape unit to controller cable. No doubt there are power/current/isolation factors to consider as well. This type of interfacing is not of interest to DG locally; I am interested to find out if anyone in the U.S. can provide any clues, suggestions, or answers on how or where some helpful information can be obtained.

Also, does anyone know if it is possible to get a version of the XMODEM or Kermit public domain software suitable for use on an ICOS/RDOS CS/60 C5 model DG minicomputer?

Bryan Mitchell
Dixon Road, Rukuhia RD2
Hamilton 2021
New Zealand

P.S.: We occasionally do "home hosting" of visitors to New Zealand. Should persons in the computer industry wish to holiday here (away from the normal tourist, hotel/motel scene), we could provide a stay with a difference.

Clarification from DG Customer Support Center

I read with interest Jim Siegman's column in the February issue of *Focus* (page 46). His answer to the question concerning which graphic devices were needed to run Present was correct. It is Trendview that actually does the charting, and a variety of graphic devices are supported by Trendview.

I'd like to point out that Jim's answer to the second question about Present is not quite correct. Revision 4.40 of Present allows users to specify a "View," which is an overview or description of information that resides in multiple data bases.

Had Jim (or Doug Clover from Data General) contacted the Customer Support Center in Atlanta, they would have received the information they needed much sooner. Please feel free to contact us any time with questions of this sort.

Marc White
National Software Tech Support
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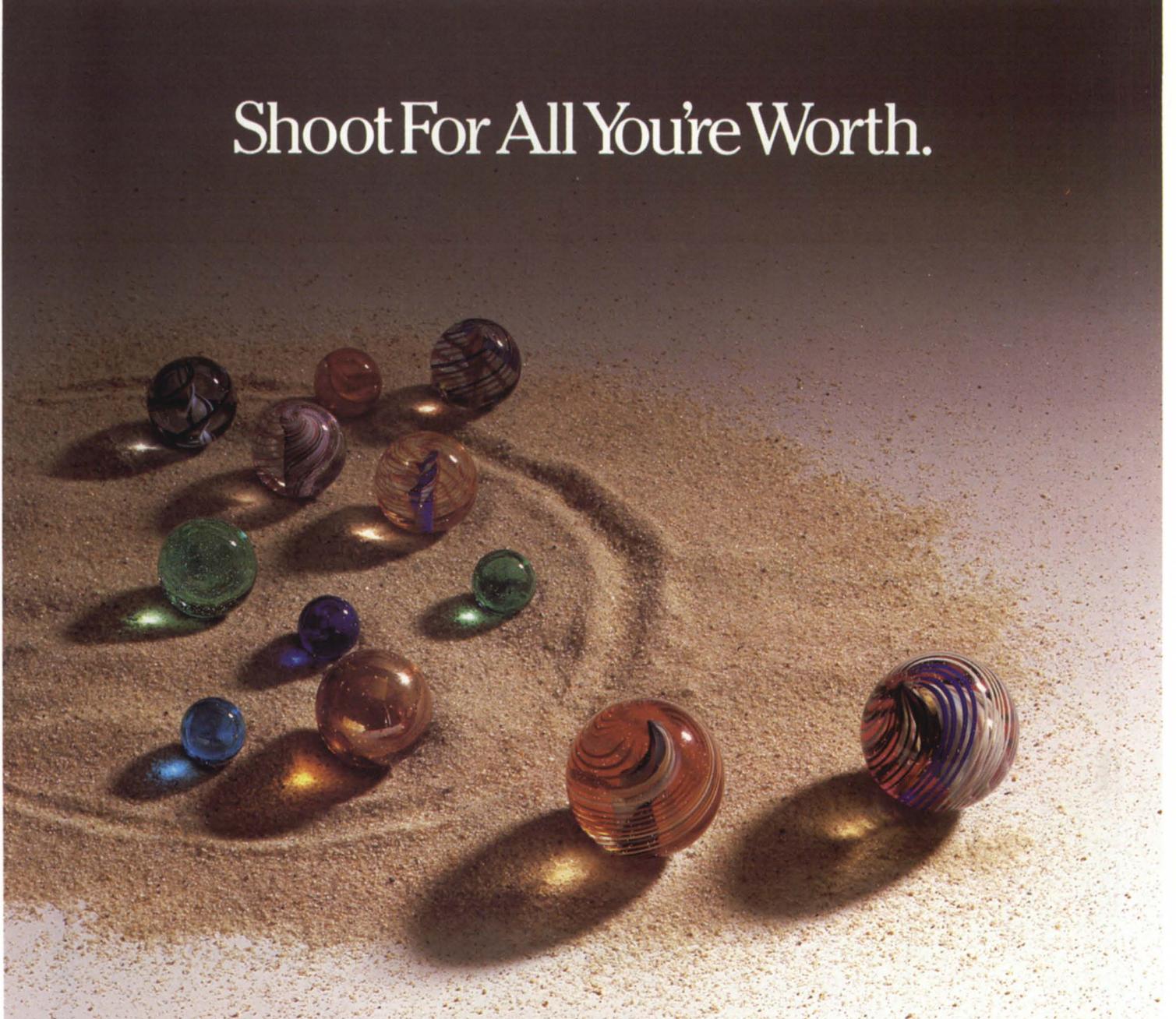
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tion, return insurance and shipping, even managing the trade-in and software license transfers. Our upgrade program protects you against surprise expenses. And your contract credits and discounting agreements remain in force.

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NEWS FROM CHICAGO

CADGUG's February meeting presents PC integration alternatives

by Jim Siegman
CADGUG Treasurer
Special to Focus

The February 11, 1987 general meeting of the Chicago Area Data General Users Group began with a thank-you from President Art Lewandowski to Data General for hosting the meeting and for providing refreshments. Lewandowski then reviewed upcoming meetings. There will be two meetings in April, the first on April 9 at the Marriott Hotel on North Michigan Avenue in Chicago, hosted by DG in conjunction with their week-long road show. The second April meeting will be a CEO workshop at the Westin Hotel in Rosemont on April 23.



It will be held in conjunction with OASIS, the Office Automation Special Interest Subcommittee. The May meeting will be held on the 13th at McDonnell Douglas's new offices in Rosemont. The featured speaker will be from Zetaco, Inc.

Lewandowski then asked those present to fill out three forms: a member profile to be used to update membership records, a meeting survey to give the planning committee members some feedback and/or ideas for future meetings, and a questionnaire about users' concerns. The questionnaire results will be

forwarded to NADGUG officers for their regular meeting with Data General management representatives.

Committee chairs were introduced and a short description of each committee (membership, technical, participation, meetings, and the CEO special interest sub-group) was offered. This was followed by an appeal for additional volunteers for the committees.

Lewandowski then gave the floor to Don McAfoose, the manager of the technical services group for Data General. He

OA Workshop Registration Form

Attendee name _____

Company _____ Title _____

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discussed DG's strategy for the PC-to-mainframe environment. He started by describing the company's current hardware offerings, including the Dasher/One, the DG/One Model 2, and the Dasher/286. He then gave a brief summary of the DG software for these machines—CEO Connection, CEOwrite, and the PC Liaison.

McAfoose apologized for not being

able to give any specific information about the future directions of the product line. He did review the current offerings and market trends; he concluded that we can expect to see more products to integrate PCs and network them more effectively, making it easier to share and exchange data both between the PC and host and other PCs throughout the company. He also said that MIS departments

will be forced to have PC integration plans in the future even if they attempted to ignore them in the past, because the PC has proven to be a very important part of the information processing needs of companies in today's market.

The next speaker, Doug Kaye, president of Rational Data Systems, was also not at full liberty to reveal what was coming in the near future. He discussed mainly the products that RDS is currently offering. He has observed the following five levels of PC integration:

- 1.0—Terminal emulation;
 - 1.1—Asynchronous file transfer;
 - 2.0—LAN-based print/disk servers;
 - 2.1—Surrogate servers/cooperative computing;
- 3.0—Application integration.

Note the numbering scheme. Kaye used this scheme to emphasize the different levels of complexity. The first generation is typified by any PC with SmartTerm, SoftTerm, Pop/Term 200, Emu, or any of the other terminal emulators. These simply allow your PC to act like a Data General 200 or 400 series terminal. In addition, some of them also allow session logging and text file uploading/downloading. Full asynchronous transfer is present in packages such as CEO Connection or DG/BLAST.

The next generation started with some sort of local area network with one or more devices dedicated as servers of some type. A typical example of this is RDS' PC/VS, which allows any number of PC users to have virtual MS-DOS disks resident on the AOS/VS disk drive. These virtual disks can be mounted into one of four MS-DOS virtual disk drives and treated just like any other floppy disk or hard disk drive.

Taking that one step further, users can begin to do what Kaye terms "cooperative computing." This means that the software on the PC is working in conjunction with the host system. Kaye gave the RDS PC/VS Notifier as an example. This software is memory-resident in background on the PC and works with the CEO post office agent. Without it, PC users wouldn't know if CEO mail had anything for them unless they went and checked it. With it, they can be running Lotus, DBase, or any other standalone application. When mail is received in their CEO mailbox they will be notified—and can then process their mail without interrupting their local application.

The next generation of application integration is an approach that has been around for some time, but only recently became cost-effective for many com-

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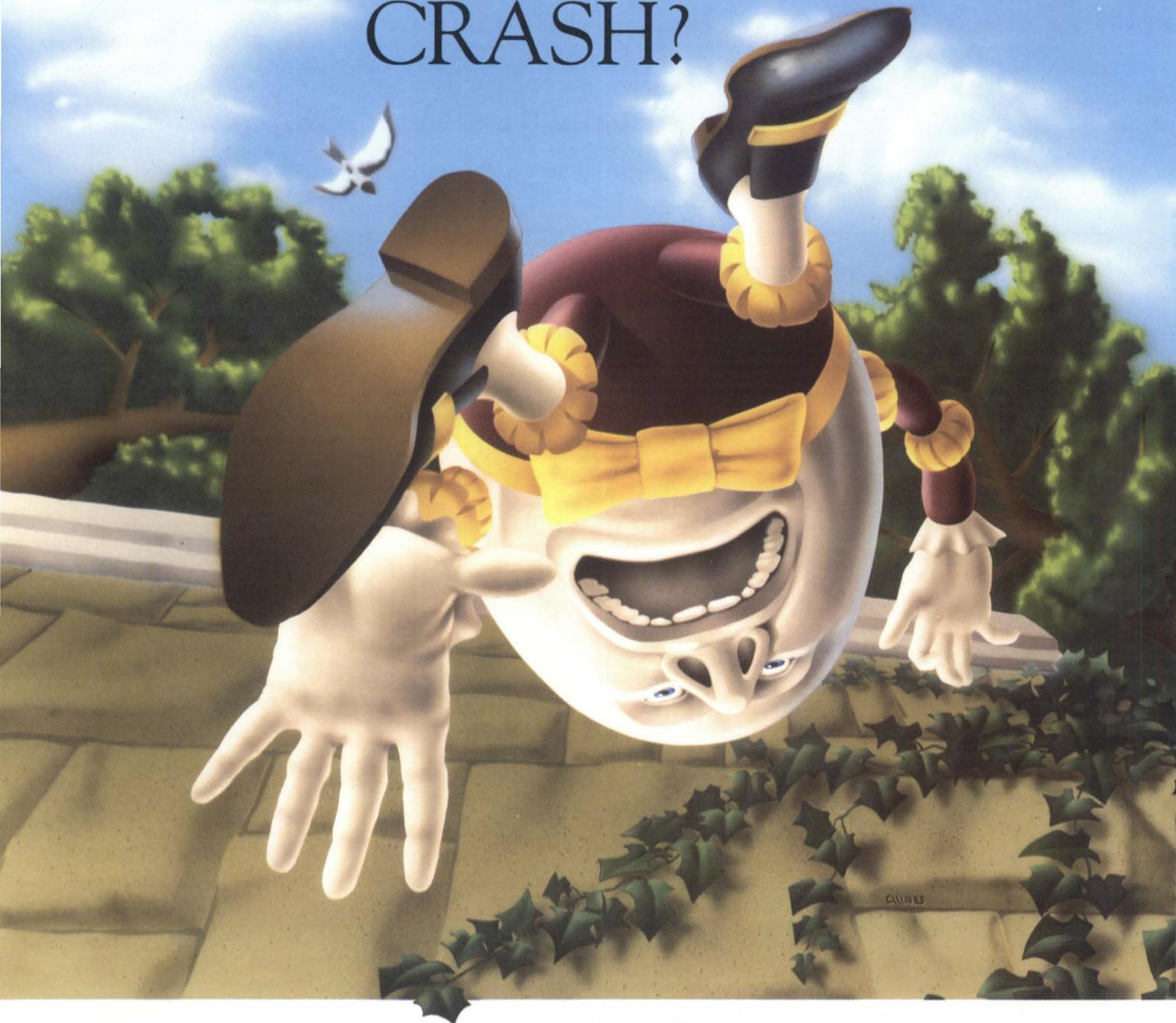
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panies. A typical system might be represented by a company with a PC or departmental computer to allow data entry and verification of orders. Once completed, the entire order is transmitted to the corporate mainframe. Since all of the editing and other preliminary work is done by the PC, the expensive corporate computer is used mainly for major

data processing requirements. This type of distributed processing will become more widespread in the near future. Doug stated that there should be little or no reason to ever buy another terminal. Instead, he recommended getting a PC and a software package to emulate a terminal. The price is only slightly higher, but the future expansion potential is

much greater. You can start using it immediately for personal applications such as word processing and spreadsheets.

The addition of software like PC/VS brings several other benefits. First, you can share the printers by using the DG host as a print server. By storing data on virtual disks, you bring professional system management to the PC without any great cost. Since all the PCs in the company have their data on the DG, it can all be backed up using AOS/VS DUMP_II by the DG system operator. Also, data sharing is just a matter of mounting other users' virtual disks. Thus, the clutter of floppy disks (all too frequent a sight in today's office) is eliminated, and the users don't have to spend a large portion of their day backing up their data.

Doug concluded with a quick review of the features available with PC/VS. These are:

- Virtual disks—up to four 32 MB MS-DOS disks;
- Remote printing—all printers shared by all users;
- File transfer—at 25 KB/sec network speed;
- CLI access on the DG—without logging on;
- Notifier (CEO interface)—for real-time mail processing;
- Terminal emulation;
- PC/Mail.

At the close of the formal presentations, DG provided refreshments, and terminals were set up to demonstrate the features of PC/VS.

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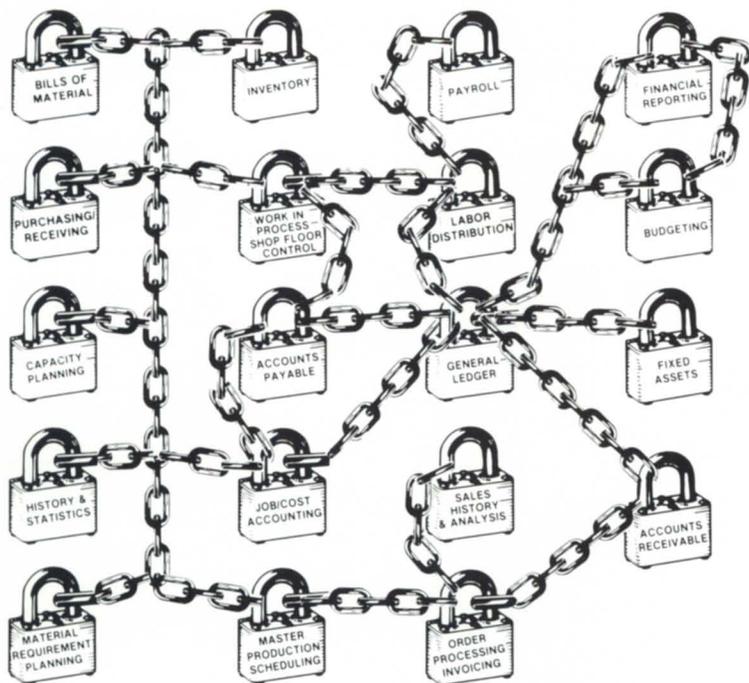
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WHEN TWO IS BETTER THAN TWO

AOS/VS and multi-processors. Part II

by J. R. Gilgis
Special to Focus

This is the second in a two-part series. Last month the author outlined the benefits of a tightly coupled multi-processor, gave an overview of the MV/20000 hardware and software, and concluded with a general performance discussion. This month's article discusses (1) performance comparisons of the MV/20000 Model 2 and the Model 1 (under AOS/VS rev 7.50) on a series of controlled tests, and (2) the comparative performance of the two machines on an INFOS mix and CEO mix while varying the number of users.

When we defined the testing philosophy for comparing the uni-processor version of the MV/20000 to the dual-processor version, two performance questions seemed to be of the most interest to users:

- How much degradation, if any, does a single process see when running on a dual-processor versus a uni-processor?
- How can we characterize dual-processor performance so that users can understand the performance gain of the dual-processor over a uni-processor?

To answer the first question, all we had to do was execute single-process jobs in both a uni- and dual-processor environment and measure the difference in performance.

The answer to the second question is more complex. Every system has a different environment and mix of jobs executing at any one time, so it's not possible to test even a small cross-section of the different system environments. Because of this, we approached the problem from two directions:

- Determine the characteristics of a typical user application, then test those characteristics individually in the worst possible environment to try to set some outer bounds on dual-processor per-

formance. Our theory was that if the characteristics at the worst case extremes looked very good, then a mixture of those characteristics in a more moderate environment would produce very good, or better, results.

For the controlled tests, the environment was kept as constant as possible so that only the characteristic being tested would affect the result

- Execute some interactive Data General product mixes over a variety of user loads to determine how the dual-processor system scaled as the user load increased. In this case, both an interactive CEO software mix and an interactive INFOS transaction processing application were chosen, since these seemed to be areas where there might be much user interest.

Having planned a strategy, the next step was to determine the main characteristics of a typical user application. It seemed that most applications would exhibit some combination of three characteristics: compute, disk I/O, and system

calls. In addition, we decided to mix system calls and compute in the same test case, since most applications don't issue the same system call over and over again without doing anything between the calls. Since each test exercised a very specific characteristic while the environment was held as constant as possible, we referred to them as "controlled tests."

In thinking further about the "compute" test with regard to the hardware implementation, we decided it might be interesting to see if the write-through data cache has any effect on system performance. This could be done by creating two compute tests, one that just loops in the cache (minimizing any cache/memory bus activity), and a second one that does heavy data storing into memory (thereby keeping the memory bus busy).

For all the controlled tests, the environment needs to be kept as constant as possible so that only the characteristic being tested affects the result. Therefore, for the tests that compute, the effects of both memory and disk I/O need to be minimized or eliminated. To eliminate memory as a factor, the system environment had plenty of available memory. To eliminate I/O as a factor, all code/data paging was done at the start of the test; the test was run long enough so that the effect of both the initial process startup and termination activity would be very small compared with the overall test time.

Controlled test discussion. The controlled tests that were executed are:

1. Very tight compute loop.
2. Tight memory read/write loop.
3. Disk exerciser test.
4. "Run anywhere" system call test.

NEW POWERHOUSE VERSION SUPPORTS DG/SQL

Cognos Incorporated bridges the gap between fourth generation languages (4GLs) and relational databases in the Data General environment with the recently announced version 5.00 of PowerHouse. Henry Urion, Cognos' Senior Product Line Manager, says the release includes over 110 enhancements and new features.

On hand for the signing of the Strategic Alliance agreement between Data General Europe (DGE) and Cognos: Left, Gordon Dennis, Director of Marketing for DGE; and Jim Cluchey, Vice-President and General Manager for Cognos' European operation.

SQL Support

"PowerHouse 5.00 is the industry's first 4GL software package to provide full DG/SQL support," says Urion. "It offers DG customers a solid relational solution, along with a fully-compatible, industry-leading 4GL."

Reduced Development Time

Urion says the new release also features compatibility with multi-level DBAM, DG's data base access method,

continued on page 2



PowerHouse helps keep track of Madonna albums.

See page 3 for details.

COGNOS, DG EUROPE FORGE ALLIANCE

Cognos and Data General Europe (DGE) have announced a joint marketing agreement to form a European partnership called the "Strategic Alliance." Its objective is to promote the use of PowerHouse as a corporate business solution on DG computer systems. The agreement follows DGE's decision to install PowerHouse in 26 regional and national European MIS centers.

A cornerstone of the Strategic Alliance is the release of PowerHouse version 5.00, which runs on DG's ECLIPSE/MV family series. It includes important new features such as DG/SQL support, enhanced CEO integration and full DBAM support for INFOS users. DGE selected PowerHouse version 5.00 as their preferred fourth generation language.

Unbeatable Combination

"By combining industry-leading hardware with leading-edge application development software, we can offer our customers an unbeatable combination," says Chuck Boesenberg, Vice-

President and General Manager, DGE. "And with the announcement of PowerHouse 5.00, DG and Cognos can now offer our customers an even stronger fourth generation solution."

Relationship Strengthened

"The Strategic Alliance is yet another step in our continuing relationship with DG," says Michael Potter, Cognos Chairman and CEO. "With the strengthened position offered by version 5.00, we can offer a superior solution for our customers' application development needs."

The Alliance includes joint marketing and sales support materials, and a training program for all Data General and Cognos field representatives.

"The slogan for the agreement, 'The Winning Combination for Increased Productivity,' reflects what the Alliance means to our customers," says Boesenberg. "This solution gives them the competitive edge they need to be leaders in their business." ■



RECORDING INDUSTRY GIANT TO TRACK SALES WITH POWERHOUSE

Warner/Elektra/Atlantic Corporation (WEA), the exclusive distributor of pre-recorded music and video products, has just purchased PowerHouse to enhance its order processing, shipping and receiving activities.

Among the products to be tracked are the latest releases of Madonna, Van Halen, David Lee Roth, Phil Collins, Genesis, Z.Z. Top, Peter Gabriel, Bill Cosby and Frank Sinatra.

State of the Art

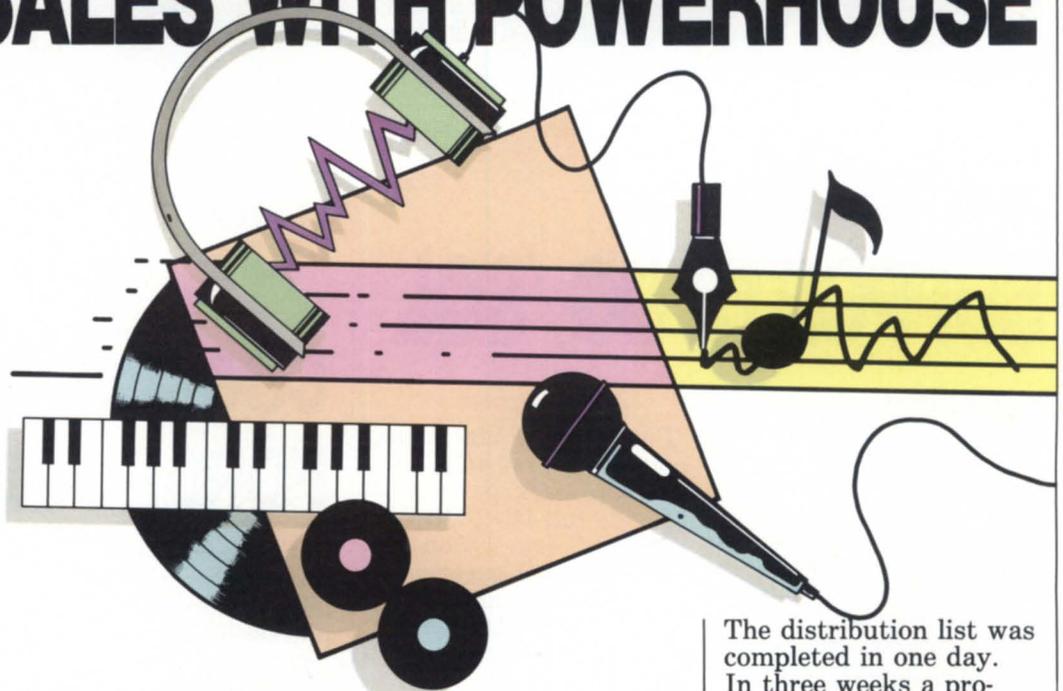
"WEA can now offer service that is more efficient and that will bring us in touch with state-of-the-art technology," says Marid Slobko, WEA's Vice-President of Data Processing.

WEA will use PowerHouse in its four warehouse locations across the U.S., computerizing operations in shipping and receiving.

The main reason WEA chose PowerHouse was that it could access their existing systems - which had all been written in FORTRAN.

"PowerHouse will enable us to double our programming staff without having to hire anyone," says Slobko. She says she also expects the purchase of PowerHouse to pay for itself within a year.

Slobko has a staff of 23, half of whom are non-programmers who had previously worked in accounting, warehousing and other areas of WEA. Having completed the introductory course to PowerHouse, they can



now write their own ad hoc reports by themselves. "Our support staff has never been able to do that before, and they're ecstatic," says Slobko.

WEA's first Power-

House application was the development of a small distribution list to keep track of employees receiving various reports. WEA wanted to start off small, working with a simple data base.

The distribution list was completed in one day. In three weeks a programmer working on the same project in FORTRAN had still not completed the work. He gave up once he found out that the project had been completed in one day with PowerHouse. ■

NEW POWERHOUSE

(Continued from page 1)

allowing current users of any INFOS file structures to create applications with PowerHouse. "This will save the programmer a substantial amount of development and coding time," he says.

Enhanced CEO Integration

Release 5.00 also provides enhanced interface between PowerHouse and DG's office automation software product, CEO, offering customers more direct integration between CEO and business applications implemented in PowerHouse, including support for CEO status line and interrupt capability.

"This latest version of PowerHouse is significant because for the first time we are supporting both relational and traditional file management systems in the DG market," says Ron Nordin, Vice-President of Marketing for Cognos.

Joint Development

Release 5.00 exemplifies the tight integration between PowerHouse and the DG software environment. "We wanted to ensure the enhancements added to PowerHouse would address the latest developments and demands in the DG

users' market," says Nordin. Adds Orion: "Our shared view of the 4GL/RDBMS relationship has been key to the recently-signed DG/Cognos Strategic Alliance agreement."

DG/Cognos Relationship

The development of the latest PowerHouse release and the recent recognition of PowerHouse by Data General Europe emphasize the significance of this relationship. It will enable Cognos and Data General to continue offering mutual customers a very strong business automation solution. ■

5. "Run anywhere" system call test with compute.

6. "Run anywhere" gate call test.

For each of these controlled tests, I'll briefly explain the test, discuss the expectations, then present the actual test results along with the discussion of any deviations. I'll express the measurements as a ratio of the "elapsed time of the test on a uni-processor" divided by the "elapsed time of the test on a dual-processor." This will be referred to as the "uni/dual ratio."

The "compute loop" was the simplest test. It consisted of a loop that incremented an accumulator from 0 to 900,000,000. The iteration count was kept in an accumulator, in order to eliminate memory accesses for data and the usage of a "serializable" instruction such as XWDSZ where it was not required. The elapsed time for the test was approximately 462 seconds. It would be expected that the uni/dual ratio for a single copy should be close to 1.00, indicating no interactions between processors, and that two copies should be close to 2.00, indicating maximum efficiency with two processors. In actuality, the single copy uni/dual ratio was measured at .998, and the two-copy uni/dual ratio was measured at 2.011, so the expectations were met in both cases.

The "load/store loop" was a little more complex. It consisted of a loop that moved 64 32-bit words between two buffers using XWLDA/XWSTA instructions. The iteration count for the loop was 18,432,000, which caused the test to execute for approximately 352 seconds. It would be expected that the uni/dual ratio for a single copy should be slightly less than 1.00, indicating a slight interaction between processors with regard to memory accesses, and that two copies should be slightly less than 2.00 because of increased contention for the memory subsystem. In actuality, the single copy uni/dual ratio was measured at .964, and the two-copy uni/dual ratio was measured at 1.961—once again, both met expectations.

For the "disk exerciser" test, the CONTEST DISKTEST was used. It writes a 20-sector data file, then it reads all 20 sectors of that data file using ?RDB and checks the data using a WCMP instruction between the "read" buffer and a "known good" buffer. It then repeats the ?RDB/WCMP sequence 4,000 times. The DISKTEST was executed under control of the CONTEST Monitor so that it could be restarted when it completed.

Note that the DISKTEST consisted of both I/O and compute (when it was

doing the WCMP), but predominantly it was waiting for the I/O to complete. The I/O environment consisted of a single Argus drive on a single controller. In this case, the number of copies of the DISKTEST that were executing at the same time was varied from 1 to 6 to 20, then the uni/dual ratio calculated for each. The total test time was 30 minutes when 1 or 6 disktests were executed, and 120 minutes when 20 disktests were executed. It would be expected that the uni/dual ratio in all cases would be approximately 1.00, since multiple processors should neither help nor hinder disk I/O performance. In

When looking at the MV/20000 Model 2 versus the Model 1 from strictly a performance standpoint, the MV/20000 Model 2 provides significant additional throughput

actuality, the single copy uni/dual ratio was measured at 1.003; the six-copy uni/dual ratio was measured at 1.122; and the twenty-copy uni/dual ratio was measured at 1.000. Current speculation is that the six-copy uni/dual ratio jumped to 1.122 because of seek optimization, but this has not been verified.

The "run anywhere" system call test was again very simple. It consisted of a loop that issued the ?GHRZ system call 900,000 times; it generated an elapsed time of approximately 242 seconds. A "run anywhere" system call is one that can execute to completion on either processor. ?GHRZ was chosen because very little is required to satisfy the call but

it still executes all the common system call code paths. It would be expected that the uni/dual ratio for a single copy should be close to 1.00 and that two copies should be somewhat less than 2.00, because there would be some interactions between processors. In actuality, the single copy uni/dual ratio was measured at .980, and the two-copy uni/dual ratio was measured at 1.627.

The two-copy ratio is lower than expected. We suspect that since there is heavy CPU activity touching a number of memory pages, in addition to crossing rings from ring 7 to 3 to 0 then back, the cache/memory bus is kept very busy, contributing to the increased degradation. It does not appear to be an operating system contention problem, since there are very few common data bases touched, and the software lock collision counters do not indicate a problem. This is currently under further investigation.

In real life, though, applications do not issue simple system calls over and over again. They usually issue a system call, do some compute, issue another system call, etc. It might be interesting to see what effect mixing heavy system call usage with compute has on the ratios.

The "run anywhere" system call test with compute is the same as the ?GHRZ test above, except that a compute loop of approximately 102 microseconds was executed between issuances of the ?GHRZ system call. The compute time was randomly chosen and does not relate to a particular situation. Because of the addition of the compute loop, the iteration count was reduced to 200,000, which allowed the test to execute for approximately 89 seconds.

It would be expected that the mixture of compute and system call activity would increase the uni/dual ratio for a single copy closer to 1.00 and that two copies would increase to a lot closer to 2.00. In actuality, the single copy uni/dual ratio increased from .980 to 1.00, and the two-copy uni/dual ratio increased from 1.627 to 1.886. This indicates that when system calls and compute are mixed, the uni/dual ratios become significantly better.

The "run anywhere" gate call test is again very easy. A "gate" call is a type of system call that enters ring 0 through a special architectural gate, executes very quickly, then returns directly to the user. The major differences between a gate call and a regular system call are that the gate call is extremely fast and requires very few system resources to execute. For this

example, the ?SIGWT gate call was chosen because of its use in many applications for synchronization. Since the call requires communication between two entities, this test was structured slightly differently than the previous ones.

For the ?SIGWT tests, communication occurred both between two tasks within the same process or between two processes. The task in the initial process would create either the second task or process, then loop while issuing 50,000 ?SIGWTs to it. The receiving task/process would simply issue a ?SIGWT back. The initial process was timed; the elapsed time was approximately 31 seconds. It would be expected that the uni/dual ratio for both the task/task case and the process/process case should be close to 1.00. In actuality, the task/task case was measured at 1.033, and the process/process case was measured at 2.222.

Although we were surprised that the process/process case was measured at 2.22, it seems reasonable in hindsight. With two processes executing on a uni-processor, there is very frequent switching between processes. Each "switch" requires a process state save, a reschedule, a context mapping, and the setup to run the process. All of this adds overhead to the total elapsed time. In the case of two processes and two processors, potentially each process can execute on its own processor so that if the signals are being sent back and forth quickly enough, which they were, much of the uni-processor overhead is eliminated;

this reduces the dual-processor elapsed time below half the uni-processor elapsed time and generates a ratio > 2.00.

I want to add two notes on the ?SIGWT test. First, this test was not contrived to generate a uni/dual ratio greater than 2.00. It is an actual benchmark that a customer asked Data General to execute. Secondly, although it is possible, it should not be expected that actual customer applications will measure greater than a 2.00 performance ratio.

Controlled test summary. The "controlled tests" were designed to simulate the main characteristics of an application program. The assumption was that if those characteristics at the worst case extremes looked very good, then a mixture of those characteristics in a more moderate environment would produce very good, or excellent, results.

The controlled test results we observed on a Model 1 and Model 2 show:

1. Dual processor operation degrades the performance of a single executed job by less than four percent.
2. Compute-bound job mixes on the dual processor get close to twice the performance (1.96 to 2.00).
3. I/O-bound jobs running on the dual processor see very little, if any, additional throughput from the addition of a second CPU.
4. "Run-anywhere" system calls, when mixed with compute, see a significant

increase in throughput on the dual processor (1.886).

Obviously, individual job mixes will see varying uni/dual processor ratios depending on how much of each above component is included.

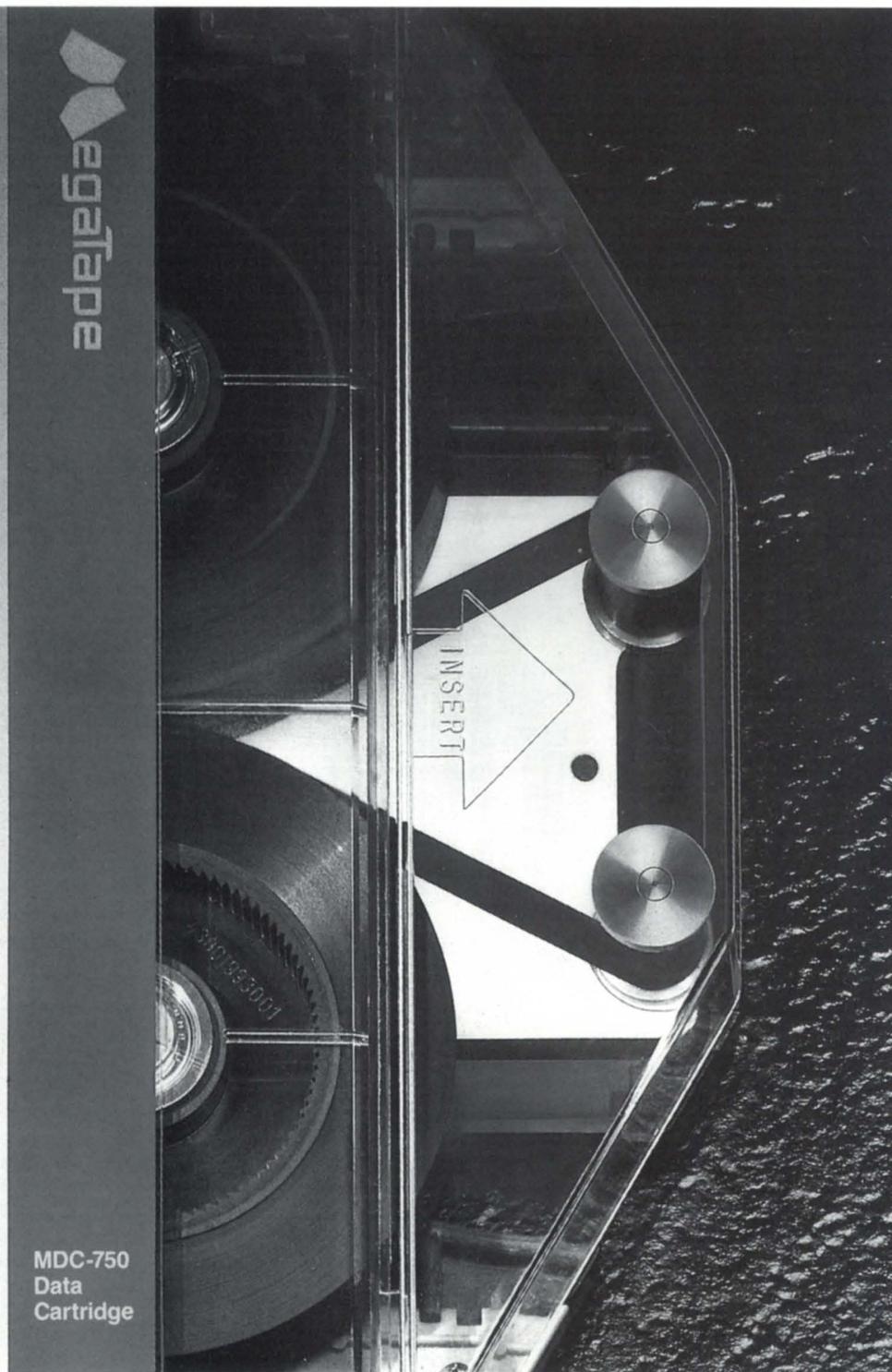
Distributed Data Processing Test. The "Distributed Data Processing" (DDP) test is an INFOS II-based transaction test involving two 100,000-record data bases and an output log file:

1. Purchase order consisting of 200 byte records.
2. Inventory file consisting of 100 byte records.
3. Output log file consisting of 100 byte records.

The software test environment initiates one process per user. Processes are "blocked" when they are PROC'd, then all are unblocked at the same time to eliminate the PROC time from the measurements and better simulate an active system of transaction processing users. The configuration for the test included 44 MB of memory; three Argus disk drives on a single controller; and eight intelligent asynchronous controllers (IACs), which were split with four on IOC0 and four on IOC2. The IAC split between IOC0 and IOC2 wasn't done for any performance reason; it was just how the system was configured with the lines that were used. Each data base was on a

Figure 1				Figure 2			
# Users	Uni MR	Dual MR	Uni/Dual Ratio	Test Conditions	Uni MR	Dual MR	Uni/Dual Ratio
32	2.89 s	2.88 s	1.003	# Scripts 36			
				Equiv. Users 108	.40 s	.40 s	1.000
48	3.95 s	2.92 s	1.353	# Argus disk drives 6			
64	4.88 s	3.40 s	1.435	# Scripts 64			
				Equiv. Users 192	1.03 s	.73 s	1.411
80	5.93 s	3.81 s	1.556	# Argus disk drives 6			
96	7.44 s	4.63 s	1.607	# Scripts 80			
				Equiv. Users 240	1.64 s	.96 s	1.708
112	8.79 s	5.45 s	1.613	# Argus disk drives 7			
128	10.08 s	6.31 s	1.597	# Scripts 80			
				Equiv. Users 240	1.51 s	.83 s	1.819
				# Argus disk drives 9			

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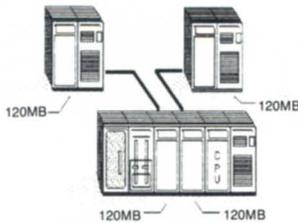
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separate disk spindle to minimize overhead.

Each user process would initially paint a skeleton format on the screen. Then it would:

1. Get a random number between 0 and 999,999 using the terminal number as the seed. It will use this random number to read a record from the purchase order data base.
2. For four iterations: get another random number between 0 and 999,999; use this random number to read the inventory file data base; do a little compute; then loop.
3. Using the purchase order and inventory information, fill in the fields on the screen and write an output record to the output log data base.

This complete sequence is considered a single transaction.

In this test, the number of users was varied from 32 to 128 while monitoring the mean response time on both the uni- and dual-processors. For each user load point, a uni/dual ratio was generated from the two mean response times. Performance expectations for this type of mix are that the uni/dual ratio would increase up to some peak, then either level off or fall off as the system runs out of CPU time on both processors or (before that point) as the system encounters some other bottleneck such as I/O. The test configuration eliminates memory as a bottleneck.

Performance is not expected to be as good as a strictly compute-bound test for several reasons: data base access requires I/O; controller interference is possible since all the spindles are on the same controller; system calls need to be issued, and there is quite a bit of data movement that could affect both the data cache hit rate and memory bus, etc. Figure 1 shows what we actually measured.

The first 20 transactions were eliminated for each user to allow settling of the test environment. The standard deviations for the mean response times were clustered around .546 s., with only two points around 1.213 s.

The results observed met our expectations. The uni/dual ratio began at 1.003 for 32 users, increased to 1.613 for 112 users, then fell off a little to 1.597 at 128 users. The peak ratio of 1.613 was limited by the intense movement of data in memory, initiated concurrently by both processors, using the optimized wide character move instruction, WCMV.

CEO Test. The Comprehensive Electronic Office (CEO) test attempts to measure dual-processor performance in an office automation environment. It uses remote terminal emulation programs on external processors to generate a load on the MV/20000. These remote terminal processors emulate three categories of users:

1. Manager/Professional: doing mailing; calendar access; scheduling of meetings; and using Decision Base to create data tables and spreadsheets.
2. Secretary/Typist: doing filing; phone message handling; mailing; word processing at 60 wpm; list processing; and accessing spreadsheets.
3. Power Typist: doing word processing at 120 wpm.

The percentages of each of these user scripts in the overall mix was 50 percent, 30 percent, and 20 percent, respectively. An individual test script generates about three times the load on the system (with the exception of memory usage) that individual users would generate in the same amount of time. Therefore, each script represents a load of three users in a memory-rich environment. The hardware configuration included 32 MB of memory, eliminating any memory contention; between six and nine Argus disk drives on three controllers; and six intelligent asynchronous controllers (IACs), all on IOC0. The software test environment went from 36 up to 80 scripts. This generated a load of 108 up to 240 users. The approximate maximum number of processes on the system was "3.5 • (number of scripts)." The test measured mean response time on both the uni- and dual-processors, from which a uni/dual ratio was generated. We expected this test to generate results similar to the DDP test with the uni/dual ratio low for a lightly loaded system, then increasing to some peak. Again, performance will not be as good as a strictly compute-bound test, for reasons listed in the section on the DDP test. Figure 2 shows what we actually measured.

Note that at 36, or fewer, scripts, there was no benefit from a dual-processor, since there was idle time remaining when the tests were executed on a uni-processor. Also, remember that the "equivalent users" translations in Figure 2 are for environments without any memory contention. Performance would have been worse if memory contention were present. The drop-off in perfor-

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mance would depend on the degree of memory contention present.

The uni/dual ratios show that the CEO test results exceeded our expectations—1.000 for 36 scripts and 1.819 for 80 scripts. We don't know if this is a peak, since we didn't configure the terminal emulation systems to a higher number of lines. However, at 80 scripts, there was still 38 percent idle time remaining between the two processors while the single processor test had shown 0 to 1 percent idle time.

As with most test mixes, if the mix is changed, the uni/dual ratio will change. Also, as the number of scripts increases, better performance can be gained by the addition of more disk drives. At 80 scripts, representing 260 users, and seven Argus drives, the uni/dual ratio was 1.708, whereas by increasing the number of spindles to nine Argus drives and moving some files around, the uni/dual ratio increased to 1.819. This just re-emphasizes the point that as a system is expanded, the addition of more memory and disk drives may be necessary to

maintain performance at a given or increased level.

To summarize, the MV/20000 Model 2 tightly coupled multi-processor running AOS/VS provides the customer, user, and system manager with a number of benefits. From both an ease-of-use and price standpoint, here are the benefits when compared with a loosely coupled system:

1. Both processors appear as a single processing unit.
2. Automatic load balancing of both batch and interactive jobs between processors.
3. Automatic file and data base sharing.
4. Efficient physical memory sharing and usage.
5. No duplication of peripherals.
6. Easy upgrade path from uni- to dual-processor.
7. Single operator console.
8. Much easier system management.

When looking at the MV/20000 Model 2

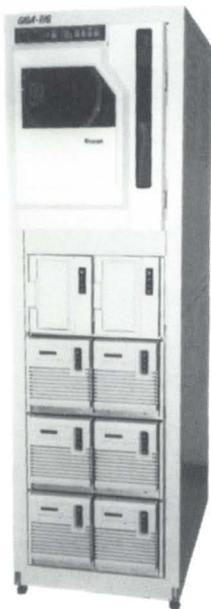
versus the Model 1 from strictly a performance standpoint, the MV/20000 Model 2 provides significant additional throughput over the MV/20000 Model 1:

1. Most compute-bound job mixes will see a uni/dual ratio of around 2.00. Some jobs within a mix might even exceed 2.00.
2. A typical DDP transaction processing mix with 112 users had a uni/dual ratio of 1.613.
3. A CEO mix with an equivalent load of 240 users in non-memory contention had a uni/dual ratio of 1.8.

It is important to note that dual processors do not improve performance for single process environments; nor do they add throughput for I/O-bound systems—but neither would an upgrade to a larger single processor. Δ

J.R. Gilgis is a programming staff specialist for Data General operating software development.

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INTERNALLY YOURS

More than you ever wanted to know about CEO

by Paul M. Duck
Special to Focus

When the editor of *Focus* asked me to write an article on CEO "internals," my reaction was, "You must be joking." Well, here I am, about to embark on a tour of topics like the CEO file server, queue manager, and many other gory details about Data General's Comprehensive Electronic Office (CEO).

This article concerns CEO rev 2.1X. Since the biggest mystery for CEO users is the servers and how they relate to the way CEO works, I'll take a look inside each of the five CEO servers.

The CEO file server agent (CEO_FSA)

CEO_FSA is a server process that is used by the control program to store and retrieve files and documents. The minimum requirement for running CEO_FSA is that you have CEO_FSA.PR, INFOS_II.PR, and a directory called :CEO_FILES. The latter is a 900,000-block CPD containing the user directory, plus users' filing, calendar, reminders, and things-to-do directories. It also contains the INFOS_II index and data base, and other files and directories.

CEO_FSA uses a four-level INFOS DBAM structure, with levels corresponding to users, drawers, folders/keywords, and documents. Each level has an index, with keys corresponding to data base records. INFOS_II maintains the relationship between user-assigned names, which are keys in the index, and AOS {/VS} names assigned by the file server agent, which are contained in data base records. INFOS_II data base records also contain information such as record length, user ID, ownership, and control program information.

The control program and CEO_FSA pass information via a shared file. Each control program process must create this shared file before communicating with CEO_FSA.

The control program uses CEO_FSA to create, delete, move, copy, and set ACLs on content files, which are located in :CEO_FILES.

CEO_FSA interfaces with the control program to create a shared file ?CEO_SF_[!PID].TMP in :CEO_FILES:[!USERNAME]. One page of this shared file is

reserved for a user's CEO profile.

After creating this file, each control program tries to establish a connection with CEO_FSA during initialization. CEO_FSA then accepts and translates requests from the user control program into INFOS_II requests. CEO_FSA then formulates each request into a special packet in a page of the shared file, and issues a ?IS.R.

The main difference between low and high priority requests is the way CEO_POA completes them

On a new installation, CEO_INDEX is created by the installation macro. The macro moves a copy of initial CEO_INDEX (.DB) into :CEO_FILES. Never use the MOVE/DELETE command CEO_INDEX_.DB. Although MOVE/DELETE deletes and replaces differential and volume files, this command does not update the UDA to reflect any changes; mismatching will result. As I have previously mentioned, the CEO_INDEX is a four-level INFOS_II DBAM file consisting of user records (including the public cabinet), drawer records (including the wastebasket), folder and keyword records, and document records.

Now, what you've all been waiting for. . . when users specify the drawer, folder, and document they want to view or edit, this is what happens: 1) the control program passes a request to the CEO_FSA to find a document called DoCl. (The request also contains the document's drawer and folder names.); 2) CEO_FSA makes a call to INFOS_II to find DoCl in CEO_INDEX; 3) INFOS_II

looks for the key DoCl in CEO_INDEX; 4) the key DoCl points to the corresponding record in CEO_INDEX.DB; 5) CEO_FSA passes the document record to the control program; 6) the control program reads the AOS{/VS} pathname of the record and uses it to find DoCl in :CEO_FILES[!USERNAME]; and 7) the control program notifies CEO_WP to open the file for viewing or editing.

If you're still reading, keep going—it only gets better. If you understand what you've read and are still awake, wait till you hear about shared filing drawers and the public filing cabinet!

Briefly, INFOS_II uses inverted writes and linked subindexes at the drawer level to permit shared drawer ownership. Each owner of a shared filing drawer has an index entry that points to a single copy of the drawer record, and the drawer subindex of the folder and keyword entries. Additional drawer owners have an index entry that is a link to the creator's index entry for the shared drawer. Each public filing drawer owner has an index entry for each drawer owned, and the public cabinet has an index entry for every public filing drawer. Each index entry for a public filing drawer points to the single record for that drawer. CEO_INDEX does not duplicate information about the drawer for each owner. There is an entry for the public cabinet in the first level (i.e., the user level) of the CEO_INDEX. This entry contains the default CEO profile. Unlike all other users, the public cabinet has no wastebasket.

The CEO post office agent (CEO_POA)

CEO_POA is a 32-bit server process that enables CEO users to communicate with each other. CEO_POA maintains user names, aliases, and mailing lists, and controls message, document, and file exchange. The CEO_POA environment requires CEO_POA.PR, X.25, or XTS network software (for sending between systems), and CEO_MAIL (a 900,000-block CPD). CEO_POA uses five calls (prior to CEO 2.23) with X.25; they are ?NACALL, ?NCALL, ?NREAD, ?NWRITE, and ?NCLOSE.

In CEO rev 2.23, the POA uses MTA (message transfer agent) for its remote mail delivery. The CEO post office will continue to provide the user interface and local delivery services that it provided prior to CEO 2.23. However, the remote delivery of mail now passes through MTA.

The control program uses ?ISEND system calls for all requests to CEO_POA. These consist of connect and disconnect requests, low priority requests, and high priority requests. The control program must issue a disconnect request when a user logs off. Low priority and high priority requests correlate to the mail menu options.

The main difference between low and high priority requests is the way CEO_POA completes them. As the above menu shows, sending messages, mailing documents, and getting copies of mailing lists are low priority requests. CEO_POA sends high priority requests to a nondisk-based CEO_POA internal queue. Because CEO_POA does not write high priority requests to disk, it can complete them more quickly; but it cannot recover them after a crash. Although losing a high priority request is inconvenient, the time needed to repeat a request and receive information is minimal. This is because high priority requests involve displaying output that already exists, or result in internal bit map flag modifications that are transparent to the user.

Structurally, low and high priority requests are similar. Both consist of IPC headers, followed by message headers of fixed and variable length fields. No additional information follows the IPC header for connect and disconnect requests or for special requests.

The CEO queue manager (CEO_QMA)

The CEO queue manager accepts user requests for printing, spelling, default closing, and list processing, and places them in the appropriate internal queue for subsequent completion. It includes sections regarding CEO_QMA initialization, interface with AOS{VS}, the control program, CEO_FSA, EXEC, and utilities. The CEO_QMA process requires the :CEO_FILES:CEO_MGR directory, as well as the CEO_QMA.PR program.

CEO_QMA.PR includes several internal tasks and queues. First, the interpreter task receives incoming requests on :PER:CEO_QMA by issuing global ?IREC system calls, acknowledges receipt of requests (except closure requests),

builds queue history file entries, and builds work entries and places them on the WORKQ. It also initiates other CEO_QMA tasks.

The worker task removes entries from the WORKQ and performs actions to complete requests, such as creating a process for a utility (i.e., CEO_FOR-MATTER, CEO_DOC_CONVERT, etc.) or closing or opening queues. Three worker tasks run on AOS/VS systems concurrently; AOS systems have only one worker task.

The midnight task creates a new history file at the start of each day. At one a.m., it moves all uncompleted entries from the old history file into the new one, and then unlocks the other tasks.

Next, CEO_CLOSING_TIME looks through the AFTRQ to determine which documents require closing. This task checks the pathnames for all documents in the AFTRQ for a .CHG extension; if it doesn't find this extension (indicating that the document is already closed), it proceeds to the next entry in the queue. The interpreter task creates the task after receiving the first closure request.

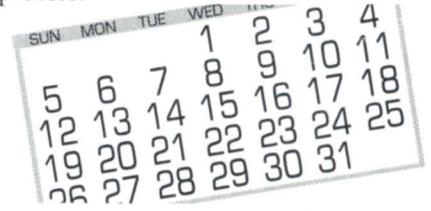
*System managers
should
periodically
delete old history
files by
running the
CEO.JANITOR
macro
with a /D switch*

The queue history file is in the list of requirements for CEO_QMA. It maintains a daily account of users' requests to CEO_QMA, and points to the block locations of queues on disk. System managers should periodically delete old history files by running the CEO.JANITOR macro with a /D switch.

Two basic events happen when a local user enters CEO. First, the control program issues a system call to get a two-word global port number for CEO_QMA. Secondly, the control program uses this global port number to issue ?ISEND system calls to CEO_QMA. Each time the control program wants to talk to CEO_QMA, it reissues the system call to get the global port number for CEO_QMA. Unlike the other servers,

there is no connection management between the control program and CEO_QMA. Because the control program never receives an obituary from CEO_QMA, it must look for :PER:CEO_QMA before sending a message.

The control program sends a seven-word message, consisting of flag words, port number information, and any other necessary command strings, to request CEO_QMA services. CEO_QMA's interpreter task receives these IPC messages by issuing ?IREC calls, and then builds work requests for worker tasks to process.



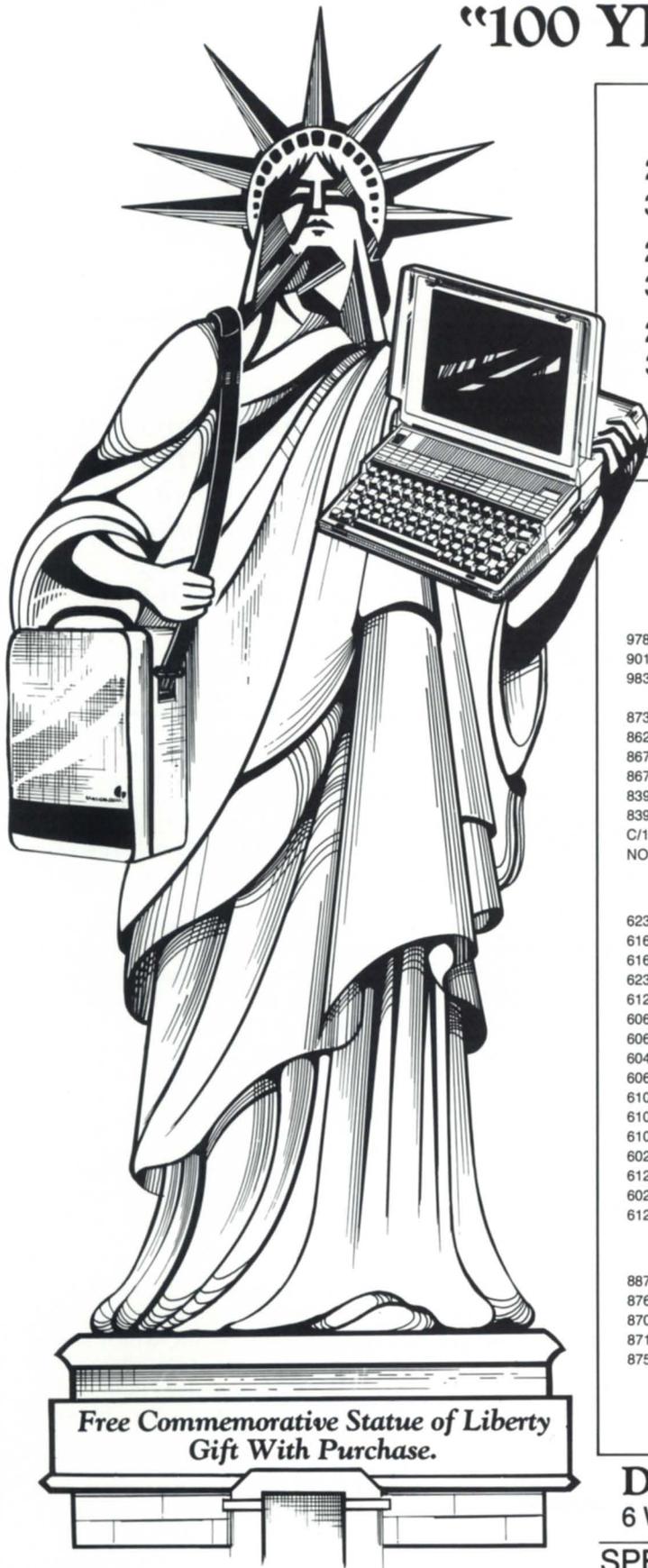
The calendar server agent (CEO_CSA)

CEO_CSA works with the control program, CEO_POA, and X.25 to perform users' requests to schedule events in their personal calendars or to reserve resources such as conference room, audio visual equipment, and so on, using the resource directory (:CEO_FILES:CEO_CALENDARS:RES_DIR). As is true of all servers, CEO_CSA runs under the user name CEO_MGR. The CEO_CSA requires CEO_CSA.PR, a set of directories called :CEO_FILES:CEO_CALENDARS:[!USERNAME], :CEO_FILES:CEO_CALENDARS:RES_DIR, and a shared file for the control program CEO_CSA communication.

When a user ID OP issues CEO.SYSTEM START from PID 2, the CEO_CSA must complete many steps for successful initialization. If any step fails, CEO_CSA terminates. The initialization process goes something like this:

1. Gets the process ID number and user name for CEO_CSA.
2. Clears the global variables and the LRU chains for open and shared files.
3. Clears and opens the calendar server's internal customer table.
4. Creates an IPC port for the CEO_CSA process to communicate with users' control programs (:PER:CEO_CSA).
5. Changes the working directory to :CEO_FILES:CEO_CALENDARS.
6. Gets the current date from the operating system and stores it in a CEO_CSA global variable.
7. Opens the resource directory.
8. Declares to the operating system that it is a server process.

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9. Gets the host name of where this CEO_CSA process is running.
10. Starts the scheduler task, which is used for the event or resource scheduling. Starts the main process task, which enables users to view menus. Starts the network task, used for the remote scheduling network task.
11. Issues a global ?IREC to receive incoming IPC messages.

If any of the above steps fail, CEO_CSA immediately terminates. An AOS{/VS} message at the OP console should indicate what caused the failure.

When CEO_CSA terminates abnormally it creates a break file, usually in :CEO_FILES:CEO_CALENDARS, with the format ?065.15_30_50.7.BRK, where:

?065 = the PID number
15_30_50 = the time of day
7 = the ring number

If the server terminated during the first steps of initialization, there may be a break file in :PER rather than in :CEO_FILES:CEO_CALENDARS.

When a user enters CEO, the following happens:

1. The control program issues a ?ILKUP to get the port number of CEO_CSA. The control program uses this global port number to issue ?ISEND system calls to CEO_CSA.
2. The control program issues a ?CON to define itself to the operating system as a CEO_CSA customer and establish the logical control program/CEO_CSA connection.
3. The operating system creates an entry in its connection table, specifying the PIDs of both the control program and CEO_CSA.

CEO_CSA maintains an internal customer table that is distant from the operating system connection management table. CEO_CSA's internal customer table stores up to 1,024 entries, each consisting of a control program PID number and the user ID, as a least recently used (LRU) chain.

The first time the control program makes a request to the server, CEO_CSA puts the entry for that user on the top of the LRU chain of the customer table. When the user makes subsequent requests, CEO_CSA checks the table to see if that user still has an entry. If so, CEO_CSA moves that entry to the top of the LRU chain. If the table is full and

does not contain an entry for a user who makes a calendar request, CEO_CSA removes from the table the entry used least recently and places the customer at the top of the chain.

CEO_CSA and the control program send and receive information via the users' shared file. The control program and CEO_CSA use IPC calls to communicate, but use the shared file to pass all information.

If you still have your doubts about CEO, I could only wish you many unhappy days dealing with PROFS and DISSOS

The voice server agent (CEO_VSA)

Just a few words about this fairly new tool that Data General has integrated into the CEO family. CEO_VSA is a 32-bit server process that enables CEO users to use the CEO Voice Mail functionality introduced in CEO rev 2.20.

Digitized voice files are organized by a two-level pointer scheme, so that voice messages can be created, filed, and mailed without need for duplication of the digitized voice file.

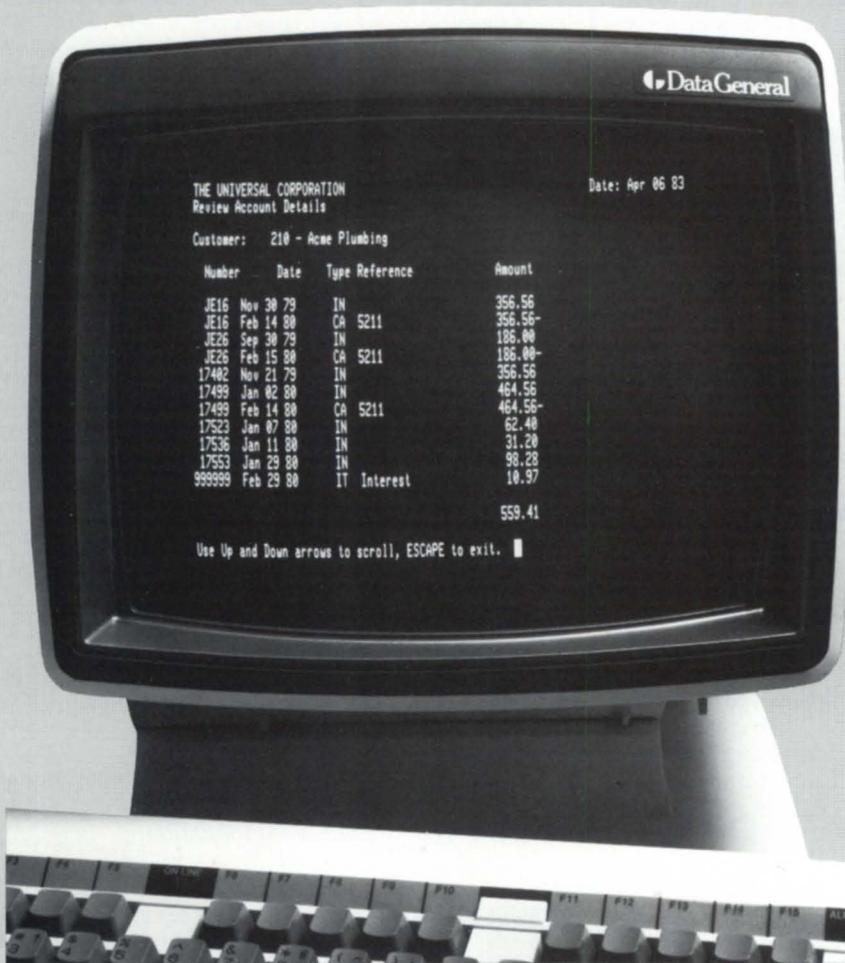
I won't get into the "nitty gritty" of CEO_VSA, because the product is not too widely known or used as of yet. Feel free to call me on this if you want to get more details.

Well, CEO fans, that covers the five servers of CEO. The only piece left to talk about is the all-important CEO control program.

The control program (CEO_CP)

All CEO programs must communicate with the control program, which is the user interface to the CEO system. The control program connects to three of the servers when a user enters the CEO system (it does not connect to CEO_QMA, CEO_VSA, or to CEO_LOG). Each control program receives a global port number for each server, and communicates with them via IPCs. In addition to IPCs, CEO_CSA, CEO_FSA, and

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FOCUS ON: TOOLS FOR MANAGEMENT

CEO_QMA communicate with the control program via shared files, and CEO_CSA and CEO_POA also transfer data via shared disk files.

When a user enters CEO, AOS/VS issues the following command line to create a CEO_CP process:

```
PROC/BLOCK/SONS/IOC/DEFAULT/NAME=&
  CEO_CP_[!PID] CEO_CP.PR%0/%/%1-%
```

At initialization, CEO_CP starts seven tasks (including EXEC, View, and stat line) in a procedure that goes something like this:

1. Opens CEOERMES
2. Gets the host ID
3. Opens the console for input (@INPUT)
4. Creates and opens the shared file ?CEO_SF_[!PID].TMP
5. Gets the terminal type
6. Connects to CEO_FSA
7. Opens the text file containing the menu formats and message texts for the language indicated in the user profile
8. Checks whether :PER:CEO_CSA is an IPC file on a local host or a link file on a remote host to determine how to communicate with the server. An example of a server is a desktop configuration integrated with CEO running on the MV/system
9. Checks to see if CEO_QMA is running
10. Determines the specific type of terminal by sending a MODEL_ID request
11. Gets general characteristics for the terminal
12. Opens the users' inbox message file (CEO_MESSAGES)
13. Counts the new, urgent, and rejected messages
14. Tries to connect to the CEO_POA by issuing a ?CON, looking up the global port of the CEO_POA (?ILKUP), and sending an IPC message (?ISEND). The CEO_POA responds with the primary alias of the user, which the CEO_CP stores in a global variable.
15. Declares itself a server and creates an IPC file so that CEO_WP and other standard applications can communicate with the control program
16. Opens the command file
17. Opens the users' reminder and things-to-do files
18. Displays the status line via the status line task and the mail menu via the EXEC task.

The CEO integration toolkit is a library

of routines for programmers writing integrated applications software for use within the CEO environment. The routines included in this library offer easy access to many commonly used CEO features including mail, interrupt, filing, help, and user commands. In addition, the toolkit contains an Agent User Interface (AUI) section, with protocols required to use CEO_FSA, CEO_CSA, and CEO_POA.

The integration toolkit enables application programmers to communicate with the control program without knowing anything about how to send, receive, interpret, or build the IPC messages necessary for such communication. The integration toolkit routines enable communication with a minimal amount of information; some routines only require the AOS document pathname as an argument. For example, application programmers won't have to perform the four steps below:

1. Build a control program request
2. Send a message (?ISEND)
3. Return a message (?REC)
4. Decode the message

Instead, programmers can use the following step:

CALL IT_ROUTINE(argument);

Global variables or the arguments to the called procedure will return the requested information.

Whew! That's it, folks. That's the amazing world of CEO and how it works.

After spending several years evaluating all vendors' business/office automation "solutions," I can honestly say that CEO stands alone. It is a product that is maturing and will only get better. Data General was really the first vendor to supply a fully integrated business automation product—as a result, the product has had more time to mature.

If you still have your doubts about CEO, I could only wish you many unhappy days dealing with PROFS and DISSOS. If you (and your management group) choose CEO, congratulations! You've just passed the first major test in understanding office automation!

I hope you enjoyed the journey. Pause for a moment now and ask yourself one final question: "Do I now know more about CEO than I've ever cared to know?" I would hope so! Δ

Paul Duck is chairman of NADGUG's RIG/SIG committee. He can be reached at 21930 Ivan Ave., Euclid, OH 44123; 216/261-0237.

INFO-mation

Henco Software designed INFO to work both CEO and existing data bases

by Richard Spinello
Special to Focus

Almost anybody involved with the computer industry has heard of fourth-generation programming languages (4GLs) and advanced data base management systems (DBMS). For organizations that are looking into the productivity advantages of these products, one of the major criteria should be ease of integration into the Data General environment. Organizations have to consider the time or money required to rebuild large data files that already reside on their system or to reformat this data for use with new software. Also, users want to use their new software in conjunction with pre-existing tools such as CEO.

This article discusses INFO, a product of Henco Software, which can be integrated into the Data General environment through the interface with INFOS II files and the link to CEO. The product is designed to work with previously established INFOS II files, either DBAM or ISAM. It can also be directly accessed from CEO, and once in INFO, users can invoke CEO to send or receive messages, perform calculations, or move files.

For end-users, INFO provides simple tools that can be mastered in a matter of hours to make the information in INFO files easily accessible. For programmers, it provides the power to develop sophisticated applications quickly.

A situation that clearly demonstrates the requirement of end-users to handle their own information management needs is seen in the following example. A major company in England, a subsidiary of Ford Motor Corporation, uses INFO to manage their personnel data base. At times, users need a report in a slightly different format than the standard reports written by programmers. With INFO, they can create their own report and access the data in the format

they need. They don't have to go to the MIS department and wait to get a small application developed.

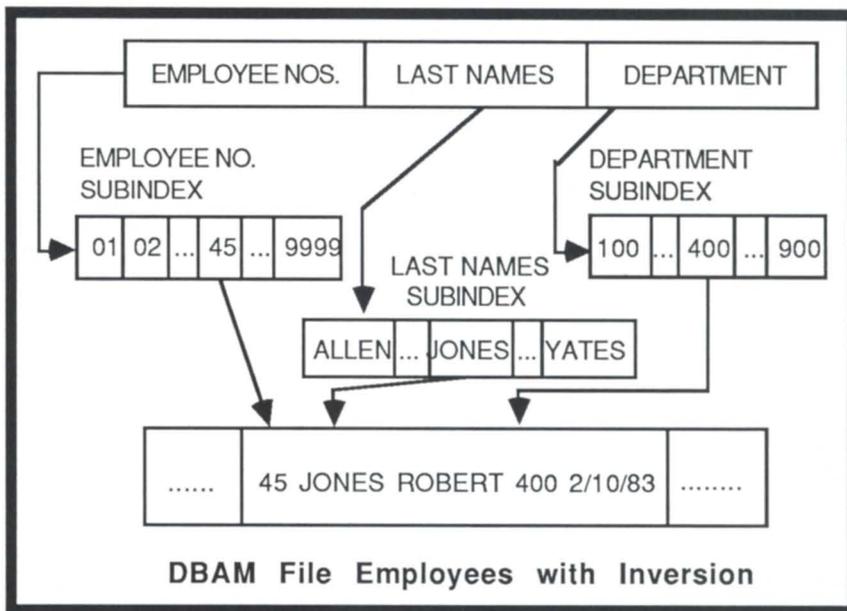
Programmers, on the other hand, need the ability to prototype quickly. They need to design their data files and quickly implement input screens, reports, and processing algorithms, in order to get an overview of the system they intend to develop.

The following paragraphs provide an overview of some of the key characteristics of INFO.

Data entry: In addition to its ADD

Using the RESELECT command, the working set can be narrowed down to a subset of records required for a specific purpose. NSELECT is the INFO query command that gives a complement of the current working set. The ASELECT command, which means "additionally select," allows users to expand the working set once it has been narrowed down.

The three commands RESELECT, NSELECT, and ASELECT give the user flexibility for querying their data. In addition to these commands, there are Boolean connectors and logical operators to help facilitate the query process.



An example of an inverted DBAM file that can be accessed and updated with INFO through any key path.

command, the product provides an INPUT FORM capability to expedite the data entry process. These forms, which can be easily set up, allow users to establish all types of validation criteria. This will help ensure data integrity in the data entry process. Range checking, related file checking, list checking, and other criteria can be incorporated into an INPUT FORM along with customized error or "help" messages.

Query language: INFO's non-procedural query language allows users to select data based on certain conditions.

Report writer: A report can be easily established at the interactive level using this particular 4GL. The report writer can develop difficult and sophisticated reports in a short time. It has five levels of control breaks. For example, reports can be organized by divisions, departments, and then by supervisor within the departments.

Users work interactively in INFO to create and edit their reports. Part of the creation process may involve tailoring report formats by specifying totals, sub-totals, averages, counts, running totals, and other more complex calculations on

a certain column in the report.

An adjunct to the report writer is INFO's special form capability. This feature allows the user to produce output on a special form—such as a check, W-2 form, or an invoice.

Relational feature: As a relational data management system, INFO accesses and manipulates information according to the traditional relational model. Its RELATE command allows users to join two or more files and to thereby get a whole new view of the data. There is no need for any predefined relation. Files are related through a common data item. Once the files are related together, the user has access to all the related data. For example, a payroll file and a personnel file can be joined together.

This operation is the equivalent of creating a new file with all the data that's necessary for the application in question, but no physical change to the data is necessary. INFO uses standard AOS and INFOS II files, so no reformatting of existing data is needed.

The advantage of using the RELATE command is that it allows users to avoid redundancy by keeping their data in third normal form. With data kept in non-redundant files that are related together only when necessary, greater efficiency and increased processing power is achieved.

Programming: INFO as a fourth-generation language allows considerable economy of code compared to third-generation languages such as Fortran or COBOL.

In INFO programs, any of its standard facilities and commands can be utilized. For example, in a program one can execute a report, relate files, or perform queries. The INFO language contains powerful commands that allow for repetitive processing and conditional processing along with other commands that enable programmers to set up and execute menus.

The product also offers interfaces to third-generation programming languages such as COBOL, Fortran, C, Pascal, and PL1. These interfaces work both ways. Programmers, for example, can go from INFO out to Fortran if they have a complex computation to perform that already exists in some library. From a COBOL or Fortran program they can call INFO, either to access data, execute INFO commands, or bring data into the calling program for manipulation purposes.

INFO can be easily and quickly linked

to either an INFOS II ISAM file or DBAM file. The ISAM facility allows one level of indexing, that is, one INFOS II ISAM file can be linked to one INFO data file. The DBAM facility allows several levels of indexing. With DBAM, the user chooses a view of the INFOS II file and specifies that view to INFO as an INFO data file. Both ISAM and DBAM access records through keys that identify a particular data record. A key path containing one or more keys is associated with each data record. Sometimes a data record has more than one path to it from the highest level of the INFOS II file. In those cases, the file is said to be inverted.

Every INFO data file associated with a file in INFOS II has a key path that links the data file to its records in the INFOS II file. Within this key path, one key is allowed to vary. When the INFOS II file is a DBAM file, the INFO data file shows only one view of it. A view is a subset of the DBAM file that contains only one key path through the DBAM file and only records of the same length and format.

The first step for linking an INFO data file to either an ISAM file or DBAM file is to create the INFO data file template using the DEFINE command. The user must then specify the keys in the INFO file that will be used to access records in the INFOS II file. Finally, the external command is used to actually establish the association between the INFO data file and the INFOS II records.

INFO provides full support for inverted files, so one can use any key to safely access or update the data.

For example, a user may access an employee record through one of several keys or indexes: an employee number, department number, or last name. If he or she accesses the employee's record through the employee number key and changes the employee's department number from 400 to 900, INFO will make sure that a change will automatically be made in the pointer from the department index to the employee record so that department number 400 instead of 900 will now point to that record. In this way, no matter what key path is chosen to access the desired record, the pointers are rearranged and data integrity is assured.

INFO's support of inversion and other features associated with INFOS II files should maximize a user's flexibility for dealing with all INFOS II file types, especially complex DBAM files with multiple keys.

Interface to CEO: Using the CEO integration tool kit, a link can be made

into CEO to provide users with a seamless connection of INFO and CEO. This link between the two products permits users to access CEO while working in INFO to move back and forth between INFO and the CEO environment.

INFO can be accessed through a CEO menu option. One advantage of this level of integration is that a user can store an INFO spool file, an INFO output file, or an operating system level ASCII file in the CEO file cabinet. In addition to accessing INFO directly from CEO, users can use all of CEO's functionality while working in INFO. These functions include CEOLIST, STORE, STATUS LINE, CALCULATOR, and interrupt capability.

Through CEOLIST, an INFO user can merge data from INFO files into CEO text documents to customize form letters and special documents. Taking data from the INFO data file permits CEO users to maintain and manipulate large amounts of data to be used within CEO documents. Moreover, INFO's relate capability enables users to merge information from multiple files into one CEO document. This data can include temporary information such as results of calculations or today's date.

Another feature of the INFO interface is the interrupt capability. This lets users invoke the CEO interrupt menu while maintaining their INFO environment. Users can enter into CEO to use any of its functions and then return to work in progress in INFO. When the user returns to INFO, the terminal screen looks as it did before invoking the interrupt menu. All select and relate states are maintained.

To check CEO messages without leaving INFO, users can access a status line by pressing a function key. The status line will then appear across the top of the screen notifying the user of any new or urgent messages, or even any rejected messages. At this point, the user can either invoke CEO or disable the status line and continue working in INFO.

The CEO Calculator can also be invoked by pressing a designated function key. The CEO Calculator displays at the top of the terminal screen above any existing text. When users return to INFO, their environment remains completely intact. Δ

Richard Spinello is product manager for Henco Software in Waltham, Massachusetts. He can be reached at 100 Fifth Ave., Waltham, MA 02154-7527; 617/890-8670, RCA telex 261807.

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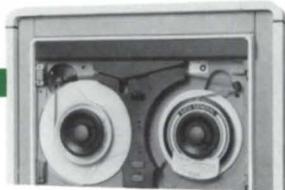
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MIS MANAGEMENT'S GUIDE TO COMMUNICATIONS

by N. Onamus
Special to Focus

No MIS manager in today's demanding environment wants to be caught without an answer when corporate management asks tough questions about data communications. But communications technology is evolving so quickly that it's nearly impossible to keep up with new techniques and terminology. However, savvy MIS managers have discovered that any answer will do in a pinch, because corporate management probably won't understand what you said anyway. Often it's good enough just to keep the questioner at bay with a snappy response until we can find the real answer. In the interest of keeping top management off-balance, I have compiled the following glossary of communications terminology.

auto-dialer A device used in conjunction with the mobile cell system for dialing telephone units installed in cars.

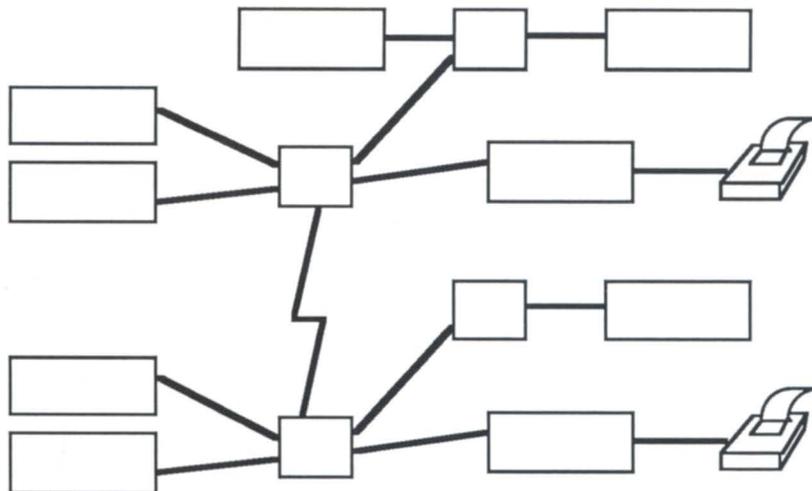
baseband Network technology used for transmitting game highlights for the national sport. Triple-play modems may be used to improve performance.

broadband Communications technique that uses a broad range of frequencies, including those for cable television, on a computer network. Useful for watching "Sesame Street" with 16,025-line, three-dimensional, full-color resolution.

bug A feature you didn't know about until it found you.

cable fault indicator This feature lights up when a "seek incomplete" occurs on a local area network (see "LANmark").

carrier sense This term is a misnomer; carriers have no sense (see "common carrier").



CBT Acronym for console boot terminator—a device used to abort a console boot operation in progress.

cookie Token composed of random numbers (see "ether egg").

collision Normal occurrence on a Massachusetts traffic rotary.

collision detector Massachusetts State Trooper.

common carrier Propagation medium for the common cold.

console carrier Mule-like device used by field service personnel to carry console to site.

data communications (see "magic").

disk A soon-to-be-obsolete computer peripheral. ("Disk too shall pass.")

down-line-load-mode-node-code Inebriation test used by collision detectors.

EIA/IO Abbreviation for a generic communications interface developed on Old McDonald's Farm.

ether Theoretical medium for propagation of electromagnetic radiation.

Ether Bunny Actual medium for the propagation of messages on Ethernet.

ether egg Token carried by Ether Bunny (see "token").

etherjack Beverage made by distilling ether.

ethernet System for catching messages dropped by the Ether Bunny.

gateway LAN entry point for Ether Bunnies.

heartbeat Pulse from ethernet tap to indicate proper operation. Requires CPR to restart after failure.

LAN Abbreviation for local area network.

LANding Alarm bell installed on most local area networks.

LANmark Contrasting rings located every 2.5 meters on an ethernet cable.

LANlord Tech control for ethernet.

links (1) Things that are usually missing; (2) The Ether Bunny's golf course.

magic (1) Term used to explain any highly technical operation; (2) "The way I did it."

MULTICS High-security operating system that requires users to constantly feed it cookies (see "cookie").

network (1) Interconnection of computers that facilitates losing large blocks of data at high speed simultaneously on many computers; (2) Loose association of media types whose common purpose is to fill certain broadband frequencies with random data.

node The facial feature that becomes "stuffed up" during the course of the common cold (see "common carrier").

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Pearly Gateway Uplink for satellite access. User is responsible for providing proper access code.

repeater Bi-directional amplifier; amplifies signals in both directions at the same time (see "LANlord").

report (see "magic").

router Device for forwarding messages in a circle; hence the term roto-router (see "collision").

server Waiter. This explains the long waits for network access.

tap tester Ball-peen hammer; used to shock test suspect hardware.

TDR, low-voltage LAN tester based on mirrors and stopwatch.

TDR, high-voltage LAN tester based on tap tester and explosives; overtime generator.

telephone Device for voice transmission at great expense, or data transmission with built-in encryption.

teletype An off-line impact printing device powered by a Chevrolet 250 cubic inch V-8 engine with an EPA rating of 250 words per rebuild.

terminator Arnold Etheregger.

tie-line Designation for telephone circuits rejected by the phone company (see "voice scrambler").

token Coin-like object often found in gateway turnstiles.

Unix A 4K operating system based on MULTICS; requires 128Ky of patches to run.

VAX VOBISCUM Acronym for DEC motto—"Very Optimistic, But It Still Can't Use Memory."

virtual computer What you received on the promised delivery date.

virtual memory What the boss has concerning your projects.

virtual results What you get from a virtual computer.

virtual stockroom Regional field support laboratory.

virtual terminal Terminal residing in regional field support laboratory.

voice scrambler Voice activated device for scrambling ether eggs. Δ

The author is N. Onamus by popular demand.

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BULLETPROOF?

How to protect AOS{/VS} from your "idiot-proof" programs

OK, so you think you've written a bulletproof interactive program. You've carefully guarded all of the keyboard input, and it can recover from just about everything a user can throw at it. Well, be careful—that bulletproof program may cause your system to crash!

In order to be considered "bulletproof," a good interactive program must have a certain amount of guard code in order to be able to recover from all keyboard errors. These errors fall into two categories: data errors and I/O errors.

Data errors occur when a value is entered that is invalid in the current context, for example, an invalid menu selection or a negative salary in a payroll program. The guard code allows the program to ignore the invalid entry and repeat the query:

Example 1A:

```
iselect=0
do while(iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a no. from 1 to 5',$)")
  read(11,*) iselect
end do
```

or it can issue an error message with more detail or help:

Example 2A:

```
iselect=0
do while(iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a no. from 1 to 5',$)")
  read(11,*) iselect
  if(iselect.lt.1.and.iselect.gt.5) then
    write(10,*)"Invalid: enter a no. from 1 to 5"
    write(10,*)"please try again"
  end if
end do
```

or it can simply "beep" at the user:

Example 3A:

```
iselect=0
do while(iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a no. from 1 to 5',$)")
  read(11,*) iselect
  if(iselect.lt.1.and.iselect.gt.5) then
    write(10,fmt="( '<7>' , $)")
  end if
end do
```

All keyboard entries must be validated immediately after entry. Even if the value of "iselect" isn't required until halfway through the program, it should be checked as soon as it is entered. This is especially true for filenames: you don't want to enter the names of 10 input files at the beginning of a program and *then* get a FILE DOES NOT EXIST error for the first file.

The other type of keyboard input error to guard against is the one causing I/O errors such as INVALID INTEGER INPUT FORM FOR LIST DIRECTED INPUT. Such errors are usually caused by a race condition between the user's master control unit and peripheral devices (i.e., "fumble fingers"). Other typical errors are A PARTIAL RECORD WAS READ BEFORE AN END OF FILE, ATTEMPT TO READ PAST THE LOGICAL RECORD (line too long), and END OF FILE.

In all three examples above, the program will crash and burn and spill its guts all over the screen if a non-integer variable (REAL or CHARACTER) is entered. You can prevent this by using the F77 IOSTAT option on READ statements to retrieve the error code: *never* do a keyboard READ without guard code to check for an I/O error! The next three examples repeat the first three, but add guard code for I/O errors:

Example 1B:

```
iselect=0
ier=1
do while(ier.ne.0.or.iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a number from 1 to 5',$)")
  read(11,*,iostat=ier) iselect
end do
```

Example 2B:

```
iselect=0
ier=1
do while(ier.ne.0.or.iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a number from 1 to 5',$)")
  read(11,*,iostat=ier) iselect
  if(ier.eq.0) then
    if(iselect.lt.1.and.iselect.gt.5) then
      write(10,*)"Invalid: enter a no. from 1 to 5"
      write(10,*)"please try again"
    end if
  else
    write(10,*)"Invalid entry, error code =",ier
  end if
end do
```

Example 3B:

```
iselect=0
ier=0
do while(ier.ne.0.or.iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a no. from 1 to 5',$)")
  read(11,*,iostat=ier) iselect
  if(ier.ne.0.or.iselect.lt.1.and.iselect.gt.5) then
    write(10,fmt="( '<7>' , $)")
  end if
end do
```

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Instead of just listing the error code number (IER) in example 2B, you can also use the F77 intrinsic ERRCODE routine to list the text that corresponds to the error code. Use 0 for the second argument so the program won't terminate:
 call ERRCODE(ier,0)

There are far too many application programs out there with no guard code to protect the program from invalid input. I define "far too many" as greater than zero

However, ERRCODE produces a very messy screen listing; I'll present a much nicer version in a future article.

Most of this isn't new to most of you, but it never hurts to repeat it: there are far too many application programs out there with no guard code to protect the program from invalid input. I define "far too many" as greater than zero. While I'm on the subject, there are also too many programs out there that don't accept both upper and lower case character input.

For example, usually a YES/NO type of response to a query is considered to be "no" if anything other than "Y" or "y" is entered. But what if the program is coded only to check for "Y" and the user enters "y"? In that case, "y" will be considered a "no" response. An ideal solution is my YES subroutine (see my column in *Focus*, July 1986, page 36).

You now have a bulletproof interactive program that can survive users who fall asleep on an auto-repeating keyboard or who take a swipe at a bee sitting on the keyboard. What happens if such a program is executed in batch mode? Wait a minute, how can an interactive program be executed in batch mode?—it requires keyboard input! Well, that's true, but don't forget that the input can always come from a prepared input file:

```
) PROC/DEF/BLOCK/IN =STUFF/OUT/CONSOLE MY_PROGRAM
```

and the equivalent batch command is:

```
) QBATCH PROC/DEF/BLOCK/IN =STUFF/OUT/CONSOLE MY_PROGRAM
```

If the input file (STUFF) contains correct responses that are synchronized with the program's queries, then everything will be OK. But what if there's an error in the file, i.e., a "YES" response where an INTEGER was expected or perhaps the answer to the last query is missing (causing a premature END OF FILE)? The bulletproof program will loop forever on the DO WHILE code; what you'll have on your hands is a runaway program. Well, that's not so serious, is it? It will only burn up a little CPU time, and after a while you may wonder what's taking the program so long to run (unless you headed for the tavern after QBATCHing the program). Not so! The output from the program will be an endless series of messages such as "invalid entry: please enter a number from 1 to 5."

Unless you have specified QBATCH/QOUTPUT=@NULL, this output will be spooled to a disk file called USERNAME.OUTPUT.NNNNN in :QUEUE. This file will grow in size until

it fills up your entire system disk, causing AOS{/VS} to panic on INSUFFICIENT NO. OF CONTIGUOUS BLOCKS or something similar. I think this is a serious flaw in AOS{/VS}. This type of error should not cause the system to panic: there should be some way for AOS{/VS} to recover without crashing the system. If there is insufficient disk space for paging or swapping, then AOS{/VS} should simply terminate the process "with extreme prejudice." Dennis Weeks' column (see *Data Base Monthly*, January 1987) elaborates on this problem.

Here's another situation that may occur. One of the (many) elegant features of AOS{/VS} is the similarity between batch and interactive jobs. To illustrate the simplicity of using batch mode, I often tell users that *any* CLI command or macro can be prefixed by the QBATCH command to execute the command or macro in background (batch) mode. This is fantastic! How simple can you get? Of course this assumes that everyone will know that it is meaningless to execute an interactive program without specifying an input file:

```
) QBATCH XEQ MY_PROGRAM
```

Since MY_PROGRAM is coded to read from the keyboard (@INPUT), then the IOSTAT=IER option on READ statements will return the error code ERIFN (INPUT FILE DOES NOT EXIST), and once again the program will loop on the error until AOS{/VS} crashes.

Figure 1: Logical Function Batch Mode

```
logical function BATCH_MODE()
include      "qsym.f77.in"      see July 86 article

integer*4    ac0,ac1,ac2,ier
integer*2    pkt(0:?xfsts-1)  |[0,3]
integer*4    ba_buffer
equivalence  (ba_buffer,pkt(?xfp2))
character*128 buffer

integer*4    isys              !f77 intrinsic

c->>begin
c-->make ?exec call
      pkt(?xfnc)=?xfsts        !status
      ba_buffer=byteaddr(buffer) !console name/stream

      ac0=0                    !reserved
      ac1=0                    !no rma deflection
      ac2=wordaddr(pkt)
      ier=isys(?exec,ac0,ac1,ac2)

c-->batch mode if dg bit 1 is set (f77 bit 14)
      if(ier.eq.0) then
        BATCH_MODE=btest2(pkt(?xfp1),int2(14))
      else
        BATCH_MODE=.true.      !assume true
      end if

      return

      end
```

How do you protect your system against these runaway programs? Well, you could use the /CPU=HH:MM:SS switch on the QBATCH command to limit the CPU time allowed for the program. However, this requires some planning in the selection of the time limit, and just how much time is "enough," anyway? It's frustrating to have a job run out of CPU time when

it's 98 percent complete! Also, there is no way to force users to use the /CPU switch.

On the other hand, if there was a way for the program itself to detect if it was running in batch or interactive mode, the program could terminate itself if a "keyboard" input error occurred while running in batch mode. Who else but EXEC would know what mode the process is running in—after all, EXEC creates batch and initial CLI processes. Function BATCH_MODE (see Figure 1) uses the ?EXEC system call to ask EXEC if the program is in batch or interactive mode. This is probably how the CLI [!LOGON] pseudo-macro works: it returns BATCH if the CLI is running in batch mode and CONSOLE if in interactive mode.

If you're interested in the actual batch stream name, you can get it from the buffer, but all you really want to check is DG bit 1 in offset ?XFP1 of the ?EXEC packet.

Returning to our examples of guard code, it's a simple matter to check for batch mode each time an error is encountered on keyboard input:

One final note: perhaps one reason why someone might execute a normally interactive program in batch mode with:

```
) QBATCH XEQ MY_PROGRAM
```

is that they might assume that the program had the capability to detect batch mode and would therefore use default values and skip the interactive dialogue. Well, now that you have the capability to detect batch mode, that's not a bad idea, is it?

Example 2C:

```
logical BATCH_MODE

iselect =0
ier =1
do while(ier.ne.0.or.iselect.lt.1.and.iselect.gt.5)
  write(10,fmt="(Enter a number from 1 to 5 ', $)")
  read(11, *,iostat =ier) iselect
  if(ier.eq.0) then
    if(iselect.lt.1.and.iselect.gt.5) then
      write(10,*)"Invalid: enter a no. from 1 to 5"
      write(10,*)"please try again"
    end if
  else
    write(10,*)"Invalid entry, error code =",ier
    if(BATCH_MODE()) stop
  end if
end do
```

△

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ONCE MORE INTO THE BREACH

Securing the all-powerful master console

It was about this time last year that I started to get a lot of mail about [!READ], along with quite a few good suggestions on how to plug the possible security breach it allowed. When I first addressed the subject it really seemed quite innocent—a trivial item that would only rate an occasional comment. Little did I suspect how much discussion it would start, or that the end result would be a new switch in the operating system that works quite effectively to close this particular loophole.

In this month's column I would like to review the options available on DG systems to help secure another possible security problem: the all-powerful master console. As it turns out, the SMI interface goes a long way toward the goal of a secure system. But first, let me present some background on what has evolved to help us system managers protect the system from the terrible nemesis known as a "nut loose on the keyboard."

Most minicomputer systems have a master or system console that controls the operation of the system. It is at this console that you can initiate anything, terminate anything, change things around, and basically wield power for either good or bad. As owners of these systems became more aware of potential security problems, they demanded protection from abuse. (No one seemed to worry much about misuse.) Systems vendors offered a number of approaches, of which the three most common were: 1) passing the buck to the end-users, 2) providing "locks," and 3) delegating the power to privileged users.

To their credit, Data General has given us all three. Since the advent of the MV/2000, end-users can pick the most comfortable method for securing the system console at their sites—without being forced to add overhead they don't want.

The first approach can be summarized as follows: "If you want your master con-

sole to be secure, put it in a locked room and don't let anybody mess with it." Many users have done just that. All three of DG's main operating systems (RDOS, AOS, and AOS/VS) have an all-powerful master console that a malevolent user (or maybe just an ignorant one) could use to generate more havoc on a system than anyone would ever want to recover from. However, behind a locked door the system is relatively safe from most "loose nuts."

In some cases this isn't enough. This brings us to the second method, "locks." With RDOS (and ICOS), unfortunately, there aren't any easy-to-use utilities built in to provide additional security, although the runtime interpreters do offer a little protection. AOS and AOS/VS systems, on the other hand, provide a utility called LOCK_CLI, which many of you are familiar with. By disabling nearly all of the potentially dangerous commands when the console is "LOCKED," this utility reduces the potential havoc that could be raised on a well-installed system to little more than performance problems. (If you are the kind of system manager who has done "ACL # + OWARE" from the root because you don't want to be bothered by ACLs, you deserve what you get.)

The major drawback with this method is that you have to trust the few people who know how to unlock the console to remember to re-lock it when they are done. This is tempting the fates with human failure, which after all is the number one cause of system security breaches.

The third method is to change the design of the software so there is no system console! Personally, I have mixed feelings about this solution—I feel a little uncomfortable without my all-powerful master console to threaten users with. This is exactly what the SMI accomplishes. Since it is really PID 2 that has most of the power on Data General sys-

tems, all you really need to do is find a way for PID 2 to run without being attached to a console. That sounds fairly simple, and when you think about it, it isn't that hard to do, especially with the new AOS/VS pipes. The only real problem is that it has to be done at process creation time. For PID 2, this means it has to be as part of the AOS/VS initialization.

As near as I can tell from watching the behavior of the SMI on the MV/2000 system, DG solved this problem by creating the PID 2 process with @INPUT assigned to a pipe. Since it does not require a console, CON0 is not even included in the VSGEN. The system creates a link from @CON0 to @CON3 during the initialization, and all messages to @CON0 get sent to @CON3 instead. The power normally associated with the master console is now accessible only through certain system calls that are implemented in the SMI.PR utility. In order to use SMI.PR to send CLI commands to PID 2, you must have the system manager privilege in your PRE-DITOR profile.

This scheme has a number of pros and cons. If you're a system manager, you now have the convenience of being able to access PID 2 power from any console. There is some difficulty in having error messages sent back, or in retrieving certain information (such as the current default characteristics on a console port). The "master" console looks almost like any other console in all respects since it is under control of EXEC logon.

There is still one power associated with the master console that has not been separated from it at this time: the power to interrupt AOS/VS and return to SCP-CLI with the <BREAK> key. I've known people who accidentally hit <BREAK> while their system was in full production. Not realizing what had happened, they decided to enter RESET and BOOT to bring the system back up. They weren't pleased when they dis-

covered their data base was corrupted beyond recovery. Had they known that, they should have immediately typed "CON" (short for "CONTINUE"), and they would have been a lot happier. This condition is mentioned in several places in several manuals, thus proving it really is a good idea to at least look through them if you don't have time to read them cover to cover.

There is a way to disable this feature, however—use the LOCK command in the SCP-CLI to disable the BREAK. There's only one thing I know of that there may not be a way around: the CTRL-C sequences on the master console of MV/4000 and larger systems. Early reports from our tech support group concerned the problem with the CTRL-C sequences not interrupting the process on CON3 (alias CON0). Since CON0 is assigned to EXEC and the /SHR bit is set, I must conclude that the CTRL-C sequences are being passed to EXEC, the original owner of @CONSOLE. EXEC captures them without passing them to the CON0 son process. When we find a way around that, I'll let you know.

The SMI and its protection may be fine and dandy for the MV/2000, but what about us old-timers with *real* mainframes who like to have PID 2 at our beck and call? Never fear, you can regen the MV/2000 system to look just like a plain old vanilla AOS/VS system that never heard of the SYSMGR.

However, you had better write your own UP.CLI (which I have dubbed UP_CLI.CLI) to replace the UP_EXEC.CLI and UP.CLI that are supplied with the installed system. I frequently do this on the SMI systems I install, since I usually must modify UP or UP_EXEC and occasionally don't catch a typo, which can cause the system to hang during the boot process (see my December 1986 column). Since the only remedy is to reload the system software (or a custom-made abridged version), which takes well over an hour, I prefer the extra five minutes to VSGEN a standard PID 2 system.

If you are running an AOS or AOS/VS "PID 2" system, there are three frequently used (and a number of infrequently used) methods I have seen to secure the master console. The first is to either chain or

execute LOCK_CLI. This is by far the easiest of the three methods, and it does provide a great deal of protection for all but the most devious of hackers. It also allows the flexibility of being able to send CONTROL @EXEC commands without unlocking the CLI. If you are concerned about someone sending CONTROL @EXEC TERMINATE commands, you can even protect against that by using PROC instead of XEQ and changing the username from OP to anything else (including a username that doesn't exist on the system.) That also will prevent the busy fingers of your "loose nuts" from using the "Q" commands.

The second method is to have the UP macro execute a system management type macro. Many of our clients use this approach. It features menu-driven master consoles that allow you to start and stop printers, plotters, enable and disable consoles, bring down the system, and even load a new revision of software under menu control. Although it did take a few revisions and updates, the menus are fairly bulletproof, and generally allow untrained operators to perform many

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operational tasks. As long as you don't hit CTRL-C CTRL-A, you have little to worry about. This approach would work equally well on a hardcopy console—you just wouldn't be able to use cursor positioning and other special features.

The third method is to simply run a utility that no one has been trained on. The most frequently used one at sites I

have dealt with is PED. Good old PED! This only works at sites where the users have been instilled with the fear of the unknown. They have been highly trained in the use of their applications software, but have also learned that if they don't know what is happening on a terminal, they shouldn't touch it. They see PED, don't know what it is, and leave it alone.

(Thinking back on that statement, it gives me pause to reflect that those users are to be considered ideal—perfectly competent but absolutely unadventurous.)

The last type of site is also easy to implement. The last two lines of the UP.CLI might look like this:

```
PREFIX MASTER[!ASCII 251]
LOCKIT
```

LOCKIT is a CLI macro that looks like this:

```
[!ueq,[!pid],2]
  x cli pedf
[!else]
  pedf
[!end]
```

PEDF is a CLI macro that brings up PED with my favorite assortment of switches. I would like to specifically point out the PREFIX command. This changes the prompt on the master console from the standard “)” to “MASTER)”. That way, if an operator finds the master console in the CLI, he or she can instantly recognize whether or not the master console has been brought down to PID 2 just by looking at the prompt.

There are other ways to add a measure of security to the master console. All of them have their strong and weak points. The things that amuse me most are the insecurities that frequently get installed along with the security. For example, one site I know uses LOCK_CLI to prohibit tampering from the master console. However, taped to the transparent cover on the TP1 is a slip of paper with “UNLOCK<CR> EXODUS<CR>”. I tried it and sure enough, it unlocked the console.

Another site wrote LOCK and UNLOCK macros to change the prefix on the CLI to “LOCK)” and “UNLOCKED)” as was appropriate. This worked really great until the system manager decided it would be a neat idea to have the macro do more than prompt you for the password and end with UNLOCK; he went ahead and changed it so the password was in the macro. Next thing he knew, all of his users had superuser privileges and it took him quite a while to get the system back to normal.

The moral of the story is that when you decide something needs to be secured, you must think through all possible ways around the method you intend to use. You must remember that users can be incredibly ingenious and creative and sometimes will break through a security system just to prove to themselves that they can do it.

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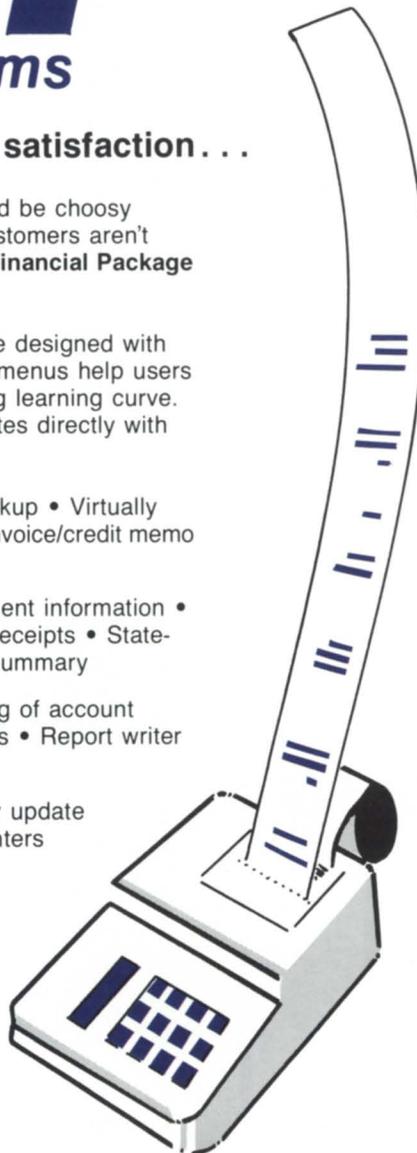
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Let's pay a quick visit to the mailbag . . .

R.W. Steer of Westinghouse Power Systems replied to Mr. B. G. Redmon's appeal for help with his Tektronix 41XX series terminals. They use mainly models 4107 and 4115 and "have developed drivers for those (and other) terminals. I [Mr. Steer] am not sure that our definitions of driver are the same; our software package provides an interface between a pseudo-CORE graphics package and the terminal . . ." If anyone else is interested in this, drop me a line via the Quick Connect card.

*The moral of
the story is
that when you decide
something needs
to be secured,
you must
think through all
possible ways around
the method you
intend to use*

Dennis Berman of Crown Petroleum has informed me that there is indeed a way for DG's Present software to handle multiple input files. He said that the feature was added about a year ago, but documented only in the update notice on the tape (file 093_000168_03). Dennis said it can impact performance noticeably. However, you can retrieve data from more than one file using Present as documented. Dennis is planning an article on Present in an upcoming issue of *Focus*, and this is one feature he plans to discuss.

Along the same lines, Marc White of DG's National Software Tech Support group in Atlanta wrote to say that rev 4.40 of Present "allows users to specify a 'View' that is an overview or description of information residing in multiple data bases." Marc included a description of the new feature, and I will work the information into a future column.

Kim Christensen of Aerojet Electro Systems would like to talk to anyone who

has migrated an application (DG/L, assembly) from an Eclipse to an MV/10000. I know of a few and have given those names to Kim, but I'm sure he would welcome some additional comments. However, I can't help with his other request: "Has anyone connected a DG/DAC to an MV/10000, either directly or through a DCU?" If you can help, give Kim a call at 818/812-2552.

Don Brown of Lockheed wants to know when DG will support the full implementation of the SCSI specs on the MV/10000 and MV/20000. As we all know, DG tends to be rather close-mouthed about future products. However, I will post this on the NADGUG bulletin board and report on any rumors that may be appropriate. If anyone in DG can help Don with his long-range planning but wants to keep it off the record, give him a call at 512/448-9031.

Gary Summers of Niagara Envelope Company, Inc. asked if there is a list of companies that provide disaster recovery services for DG. A few issues back I put out a call to send in Quick Connect cards with information on other companies. To date we know of Sysgen, Data Assurance, Fast Track, and NPA systems. We hope that we can expand this list, and we're planning something on hot and warm site vendors in a future issue.

Richard Sheehan of Kinnett Dairies, Inc. asked if there is any way to unfragment a disk other than DKINIT. The answer depends. DKINIT (RDOS/ICOS) or DFMTR (AOS{/VS}) is still the best way. However, in the case of a system disk, if you have not installed a new revision of the operating system since the last time you ran the formatter, you can dump and delete all non-system directories, reboot the system and reload them. Although not quite as complete as the software format route, it will have about the same degree of effectiveness. If you take care to build your disk and load all static directories first (those whose contents have not changed and are not used for work files), then those would not have to be dumped and reloaded. Δ

Jim Siegman is a contributing editor to *Focus*, chairman of the NADGUG publications committee, and treasurer of the Chicago Area Data General Users Group. Send comments or questions to him c/o *Focus Magazine*, 5332 Thunder Creek Road, Suite 105, Austin, TX 78759-4022.

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BIRDS, BEES, AND BBASIC



Dr. Ruth talks frankly about a very touchy subject

Last week I had one of those "good news, bad news" experiences. The bad news was that I was stranded in the Atlanta airport with nothing to think about but this month's column. The good news was that I wasn't alone.

The diminutive woman next to me looked rather familiar, but I couldn't place her at first. It wasn't until after a few minutes of daydreaming that I suddenly realized she was Dr. Ruth Wessonheimer, the noted psychologist and system therapist. I introduced myself, and was astonished to learn that we shared an interest in a side of the DP profession few people feel comfortable talking about: the strong emotional attachment that sometimes grows between DP personnel and their computers. Since we had nothing better to do, Dr. Ruth agreed to let me interview her for my column. I hope the following frank exchange of views will help bring this important topic the attention it deserves.

Dr. Ruth: First, let me say to you all how glad I am to take part in this interview. *Focus* is a magazine I have long admired, and I think your readers have fewer problems that I can help with than almost any group I can think of.

GH: Thank you very much. There are,

however, a few things I think our readers might be very interested in hearing about from you.

I understand one of the questions you get asked most frequently by computer people is, "What is an algorasm?"

Dr. Ruth: Oh, my! You're not wasting any time! The clinical definition I most often use to explain it to my patients is that it is the sudden, short-lived moment of pleasure enjoyed by the programmer (and, for all I know, by the computer, too) when, for instance, the final totals on the report are in balance.

However brief the thrill, and no matter how many disappointments lie ahead, one almost always remembers one's first algorasm and treasures the experience. Unfortunately, there are many programmers, especially those working in COBOL or PL/I, who (in spite of years of exposure to the pleasures of the DP profession) never attain this summit.

I tell programmers who come to me with this problem that probably they are trying too hard. They just need to learn to relax and let things come naturally. Learning to relax is something that must be practiced—it's not so simple as just hitting the NEWLINE key! Then, one day it will just happen. For you, it could be after a series of cryptic error messages that almost seem to correct themselves, and you hardly notice what's happening until suddenly: BOOM! You've had your first algorasm. Very nice, don't you think?

Now, it's normal afterward to feel somewhat deflated, and maybe even experience self-doubt and guilt. Don't give in to this. You have just experienced

one of the most wonderful miracles that a programmer can hope for in his or her life: the creation of a living, working program. Someday it might even grow up to be a full-grown system!

GH: Wow, that does sound like something! I have another question: Most of the readers of this column use Business BASIC, which is an interpretive language, as opposed to a compiler. Are their algorasms going to be any different?

Dr. Ruth: Certainly! There are people who claim that using an interpreter to achieve an algorasm is immoral, but these people are usually very conservative about programming in general. I disagree completely with their point of view. Interaction with the computer throughout the entire experience is important for both of you, and is nothing to be ashamed of.

With compilers, you don't properly build up to the algorasm. You work in a sterile environment, only interacting with the computer at the end. You probably have heard the humorous saying about this way of programming: "Compiled, ran, thank you, man." It's the traditional way, I know, but I think we should be open to new ways of doing things.

With Business BASIC, you and the computer can constantly challenge one another to reach new heights. As they learn to communicate their needs to the machine, many programmers describe a feeling of euphoria that builds and builds. The program seemingly comes to life beneath their fingertips; the programmer and the computer come together in existential harmony, and the outside

world is excluded. Nothing can stop the algorasm from being completed.

GH: Sounds pretty awesome. But what about those who criticize Business BASIC as unhealthy and exploitive because it uses too much of the computer's resources?

Dr. Ruth: That's a bunch of, if you will pardon the expression, hogwash. Studies have shown that in most cases, algorasms in BBASIC are not at all dangerous, and no more demanding of the computer than compiler-created algorasms.

GH: . . . and what about the programmers? I hear that they can get three to five times as much out of BBASIC as COBOL. Does this mean they have correspondingly more algorasms? Is this healthy?

Dr. Ruth: (laughing) How can a person have too much pleasure? Algorasms are something that each one of us has an unlimited supply of; there is no way you can "run out" and use them all up.

GH: Do computers have feelings, too?

Dr. Ruth: What do you think microcode is for? More advanced machines even have writable control stores, so they can create their own internal algorasms.

GH: What do you think of the Business BASIC syntax?

Dr. Ruth: Alas, nothing in this world is free! BBASIC syntax is a complex topic; the manual for it is as thick as a phonebook. I'm all in favor of the Syntax Simplification Bill that is being introduced in many state legislatures. I think as long as Business BASIC is around, we will have to be prepared to pay for this sin tax.

GH: Can algorasms happen without computers?

Dr. Ruth: Programmers try this all the time, when the computer is down for preventative maintenance, or the disk drive has blown up, or they are on vacation away from a modem. They sit there for hours, writing code for computers on 8½ inch by 11 inch pads or envelopes or whatever.

GH: That certainly doesn't sound very exciting!

Dr. Ruth: No, it isn't. Then they try to pretend that they are the computer, you know, play both roles, and simulate the operation. This procedure is rarely satisfying. Many programmers (who felt confident about an algorasm that they tried to

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simulate manually) have found to their chagrin later that it was totally unsatisfying to a computer.

GH: Let's talk about a serious topic. I've noticed a mag tape labeled "ADES" hanging around Data General computers more and more these days. What is it? Should we be worried? Are there any preventative steps that can be taken to keep it from spreading to the computer?

Dr. Ruth: ADES tapes first started appearing around DG systems a couple of years ago. If you don't know, ADES stands for "Acquired Deficient Equipment Syndrome." Users with ADES on their systems have reported a wide variety of problems, including loss of memory, slipped disks, and logic failures. It's frequently terminal.

ADES means the equipment isn't working, and that any part of it may have a serious problem. Transplants are a frequent result.

I think we have to be realistic about this: there isn't a DG computer in the world that can avoid all contact with ADES. Sooner or later, it will strike all of them.

GH: Scary stuff indeed. What about AOSophobia?

Dr. Ruth: This is the morbid fear of advanced operating systems. AOSophobia is really not so much of a problem anymore, but there is a new variant. It's called "AOSophobia-VS," and is far more powerful, which causes me great concern. The Freudians have a heyday with this condition, equating the operating system with the role of a tyrannical father figure bent on truncating both program and programmer. Also, they consider the terms "input," "output," "father and son processes," "random access," and "nesting" to have important psychological connotations. They believe that many programmers' ability to experience algorithms is negatively affected by the fear of arbitrary job truncation by the father figure.

GH: Thank you, Dr. Ruth. Do you have any final words you'd like to give to our readers?

Dr. Ruth: Yes: April Fools'! Δ

George Henne, a contributing editor to Focus, has worked with Business BASIC users for nearly a decade. He is the vice president of MAXON Computer Systems, and can be reached at 575 Madison Avenue, Suite 1006, New York, NY 10022; 416/445-4823.

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MANUALS AT-A-GLANCE

Four CEO manuals earn four-star rating

Data General's documentation department deserves a pat on the back for the new "At-A-Glance" manuals it is producing. The authors have simplified even intricate functions in easy-to-read, easy-to-find volumes that show you "everything you ever wanted to know about CEO, but couldn't find."

Four of these manuals are presently available: *CEO at a Glance*, *CEOWrite at a Glance*, *CEO Decision Base Spreadsheet at a Glance*, and the newest, *CEO Manager at a Glance*.

CEO at a Glance

This manual has 13 categories: calculator, calendar, filing, help, list processing, log on/off, mail, printing, reminders/things to do, spelling, telephone, user-defined commands, and word processing. Each section lists functions used in the particular category. For example, if users wanted to confirm or decline a meeting in the calendar, the topic under "Calendar" is "Confirm (or Decline) a Meeting" plus the page number. On this page, users will find steps one through five (with keystrokes highlighted) and a very brief description of where they need to start the keystrokes.

I found the manual confusing at times, due to the use of list processing terms left over from the earlier days of CEO. For example, "primary" and "secondary" are no longer relevant, and merely confuse the reader.

The other minor flaw concerns the help section, which gives an excellent description of how to use the help facility, but fails to tell the user that when going into the on-line manual, the system may not respond as quickly as expected because of the size of the manual it is

accessing. I think this is information that needs to be included.

Following the step-by-step instructions, an index lists functions alphabetically by the action desired. For example, if I wanted to create a things-to-do list, I would go into the index and find the word "create," then the listing below, which is labeled "things-to-do."

I find this logic in documentation very helpful to users who need to know how to do something quickly.

CEOWrite at a Glance

This manual's format is the same as *CEO at a Glance*. It begins with the table of contents, which includes topics such as how to load and use software disks/diskettes, how to access/exit the word processor, simple editing functions, advanced editing, columns, list processing, printing, and CEO Connection.

Data General evidently got the message concerning uniformity of words, because with this manual, they have conventionalized the naming scheme in the list processing section. By opting to use the list document and text-form document descriptions, they have kept confusing terminology from cropping up.

The index is likewise easy to read and understand. Readers must realize, however, that this is not a training manual, but a reference tool. A semi-experienced CEO user could learn many of the special features of software by using this manual, and probably be much more productive within a few hours. Whenever a question arises, having this manual nearby would definitely be an advantage.

Both of these manuals come in loose-leaf binders. This makes it easy to replace substitution sheets, and updates can be made in a timely manner.

CEO Decision Base Spreadsheet at a Glance

Unlike the other two manuals, this

one is a spiral notebook. The concept is the same, however. The subject headings are advanced editing, calculator, commands, editing, formulas, help, labels, printing, table characteristics, and view. There is no index at the end.

The step-by-step instructions are useful for the semi-experienced user, but again remember that this is a reference, not a teaching manual. You need to have some background with spreadsheets before using it.

CEO Office Manager at a Glance

Another handbook with a spiral binder, this is the newest of the manuals. Without having one in front of me, and only using the marketing materials available, I can report its content: CEO user profiles, remote aliases, user directory, holidays, resource calendars, dictionary maintenance, hyphenation exceptions list, printers, CEO queue control, and user applications.

The cost of the manuals ranges from \$25-30 per copy. I recommend that these manuals be given to managers and executives who use CEO and don't or won't take the time to attend classes. All four could serve as an easy fingertip reference, and could save a help desk staff a tremendous amount of time. Heavy CEO users would benefit from having a copy handy, but probably wouldn't need it as much as occasional users.

I'd give these manuals four stars in the ratings war. They are professional as well as easy to use and understand. I wish they'd been available when I was just learning. Δ

Charlene A. Kirian is PC/OA instructor for the Online Computer Library Center, Inc., 6565 Frantz Road, Dublin, OH 43017; 614/764-6435. She also serves as president of NADGUG's OASIS (Office Automation Special Interest Subcommittee).

I'M GLAD YOU ASKED

Questions from clients keep the "column spike" full

You get a potpourri of topics this month, freshly popped off the column spike on my desk. But first, a correction to last month's column:

```
< @C \ machine lang \ assembly lang \ ; > R ; >
```

If you don't understand the correction, then you probably didn't spot the mistake. Don't worry about it.

:TOPIC_1: MV_V.S._MV

Last year one of my larger clients was considering upgrading their MV/8000. They were CEO-based, and a performance audit had shown that their primary limitation was memory. CPU usage was moderate, and the disk load was within the handling capability of the current drive orchard.

Unfortunately, the only way to break the memory bottleneck was to upgrade the processor to a faster processor. But that would leave even more excess CPU than what they had on the MV/8000. Luckily, they had some other systems that were also slightly overloaded, the usual number of fresh victims screaming for access, and a large amount of cash. So they decided to get two MV/10000s to solve the problem.

At about the same time, DG announced the MV/20000 Model 2. What more could you ask for? Twice the oomph, half the floor space of two MV/10000s, right? Hmmmm.

I recommended the two MV/10000s instead of the MV/20000 Mod 2. The logic went like this: an MV/20 Mod 2 is faster than two MV/10s, but two MV/10s contain two copies of AOS/VS, two system caches, two sets of control blocks, two sets of interrupt stacks, two PMGRs, two EXECs, two sets of CEO global servers, etc., etc., etc. Granted, two AOS/VSs, PMGRs, EXECs, and CEO global servers take twice the memory, but at the number of users we were talking about (200+), the extra memory cost per PID would be minor.

Maybe a little analogy will help make my point: Does dropping a second engine into your car double its capability? Not if your bottleneck is the number of seats for passengers.

To my mind, the only situation where an MV/20 Mod 2 would win over two MV/10s would be when the primary bot-

tleneck is user ring CPU consumption. CEO hardly qualifies; it's a heavy user of system calls and server I/O (especially PMGR/LPMGR). At high user counts, it depends heavily on the maximum number of system calls that AOS/VS can process in parallel and the maximum size of the system cache.

Why am I telling you this story? Because one of the problems with clients who take my advice is that they don't often get to experience what life would have been like had they not taken it. Well, last week someone else (not a client) who upgraded to an MV/20 Mod 2 called me and said, "I just got my MV/20 Mod 2, and it's not much faster than my MV/10. What's happening?" His bottleneck prior to the upgrade was system and ring 3 CPU consumption. I tried to get him to call my client and repeat the question, but he wouldn't do it. Rats!

:TOPIC_2: XEQ_V.S._CHAIN

One of the questions I keep getting asked is, "What is the cost of an idle PID? Should I XEQ or CHAIN to CEO?" (Or whatever.)

First, let's dispel a couple of myths. AOS{/VS} has a fairly

***D**oes dropping a second engine into your car
double its capability?
Not if your bottleneck was
the number of seats for passengers*

low per-process system memory overhead—about a page. Also, AOS{/VS} maintains a small "batter's box" of active processes so it doesn't have to waste time scanning blocked processes each time it has to reschedule. This means that the scheduling overhead is unrelated to the blocked PID count.

As it turns out, AOS{/VS} does a very good job of dealing with idle PIDs in general, and with idle CLIs in particular. The reason that idle CLIs get handled better is because there are usually a lot of them, and the bulk of the CLI is shareable code and overlay area, so there is typically only one copy of the code and overlays in memory.

This brings us to one of the big differences between AOS and AOS/VS. As soon as AOS starts to feel a memory pinch, it swaps out the unshared pages associated with idle processes, including some of the system tables that describe the process.

On the other hand, when AOS/VS starts to feel a memory pinch, it first steals as many pages as it can from idle processes,

then it starts to steal from active processes. If it's still feeling the pinch, it starts to swap idle processes, and eventually it starts to swap active processes. The point is that 32-bit virtual systems degrade much more gracefully than 16-bit non-virtual systems. Sixteen-bit systems simply go from no memory contention to in-the-toilet.

There are only three circumstances under which it makes sense to CHAIN to a user program, or to specify it as the initial program in the user's profile: 1) when you're running out of PIDs (typically only on AOS, or pre-rev 6 AOS/VS); 2) when your system security (ACLs) is so sleazy that you're scared to death of wanton DELETE commands; or 3) when the user has absolutely no use whatsoever for the CLI (not even to do simple things like set up a searchlist, or DIR to some other directory before executing a program).

The next time you get worried about the overhead associated with paging and swapping idle processes, ask yourself a question: of the hundreds of thousands of disk accesses your system does every day, how many are to swap or steal pages from idle processes? Consider this: the I/Os required simply to log on and log off exceed the number required to swap a CLI out and back in once (including the page stealing that happened prior to the swap). Now, count the number of batch stream log on/off cycles you do every day and tell me that idle process steals/swaps are expensive. Sure.

The only drawback I know of to idle PIDs is that AOS/VS

won't steal pages from them until the onset of memory contention, even if those pages would be better served supporting the LRU requirements of the active processes. The argument from the developers is that this strategy minimizes unnecessary I/O. Granted. However, I sure would like to see something like a /RIP_ME_OFF switch on XEQ and PROC that would tell AOS/VS, "I'm not expecting to be back for a while, so go ahead and release all my unshared pages and any shared pages with zero use counts."

Several attempts at remedying this by writing programs that momentarily balloon to a huge size to force a short period of contention have been miserable failures. The effect on the other users is about 15 seconds of appalling response time each time the program is run.

TOPIC_3:PAGE_AND_SWAP

Another common question is, "What exactly goes into the :PAGE and :SWAP directories?" (or the :SWAP.SWAP file in the case of AOS).

The files in the :PAGE directory are used to hold the UNSHARED pages stolen from a process. There is no need to write the shared pages to the :PAGE directory since: 1) they are read-only and therefore haven't been modified, and 2) they can be retrieved more economically (in terms of wasted disk space) from the .PR/.OL files, or from wherever they came (e.g., INFOS shared pages from the VOLxx files).

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The files in the :SWAP directory are used to hold the UNSHARED pages remaining after a process has been page-faulted to death and AOS/VS finally throws in the towel and figures that it's cheaper to toss the process out *en masse* than to keep chewing around the edges (page stealing). In the case of AOS, no page stealing occurs, so the entire (thankfully small) unshared part of the process' address space is written to :SWAP.SWAP.

When it comes time to restore a swapped process to memory, the unshared part is retrieved from the :SWAP directory or :SWAP.SWAP file; the shared part is retrieved from the .PR/.OL files, or wherever (shared data files). In the case of AOS, the entire shared area is restored immediately. AOS/VS restores the shared area a page fault at a time.

At AOS/VS VSGEN time, you get to specify or default the :SWAP and :PAGE directory (CPD) sizes (default is 32 bits worth of infinity) and the maximum/default swap file size (default is 126 pages).

The size of the :SWAP and :PAGE directories should be set to something less than the default if you don't want AOS/VS to panic when the size of the swap and page files exceeds the space available on your system disk. This is usually only an issue if you're one of those people with more than a handful of users who puts users' directories on the system disk and specifies unrealistic allocations for them in their profiles, allowing them to fill up the disk.

The swap file size tells AOS/VS how far down to chew on a process before swapping can occur. That means that a process

won't be swapped until page stealing has taken it down to at most 126 pages. If you defaulted this item, all the files in your :SWAP directory will be 258,048 bytes long (126 times 2,048), or less (0 if you've never swapped). The VSGEN variable swap files option allows you to change this value, but I'd recommend against it. The VSGEN option to truncate swap files makes no sense unless you selected a non-default maximum swap file size. But if you did, then it truncates the swap file to the specified default size after the process terminates.

Page file size cannot be specified at VSGEN time: it has to be as big as necessary to hold the process' total unshared space, and in theory that could be over a gigabyte. However, in an effort to conserve disk space, VSGEN allows you to specify that page files will be truncated after use (the default is to truncate to 2,048 pages, or 4 megabytes). Select the defaults.

The reason I recommend against changing default values (except for system cache size!) is simple: Out of every 100 users I see who fiddle with the default values, 99 of them end up shooting themselves in the foot. AOS{/VS} is extremely well optimized for normal size processes (4 megabytes or less on AOS/VS) running on well configured systems (i.e., adequate memory and no swapping of active processes) and over a wide range of conditions (contention/no contention). Anything you do will probably work OK under one specific set of conditions or for one specific process, but won't be optimal under other conditions.

For example, using the clustered page fault option on a system with inadequate memory is suicidal during periods of memory contention. It is far more worthwhile to spend some time studying the "locality of reference" of your large .PR file with an eye toward decreasing its page fault demands. Just use the totally undocumented ?SWST/?KWST system calls (hopefully, DG/DOC is reading this).

:TOPIC_4:WSS

Working set size is another area where the opportunity for inflicting gunshot wounds in your lower extremities exceeds the probability of gain.

This may sound repetitive, but AOS/VS does a wonderful job of managing working sets. Just so you don't think I'm on the payroll, I'll also say that it does an abysmal job of measuring them. More about that later . . .

When AOS/VS starts a process, it initially loads just page zero (the lowest page of the unshared part of the address space), and the page containing the starting address (this can be either shared or unshared). Page faults take care of bringing in the rest of the pages as needed. The exact algorithms used to satisfy the faults and adjust the working set size would fill a column by itself (there goes another scrap of paper back onto the column topic spike), but it does do a much better job than most of the other major systems I'm aware of—especially the ones from our friends in Maynard.

The VSGEN, SPRED, and PREDITOR options for subverting the normal way that AOS/VS handles page faults and working set size are generally useful in only one case that I know of: running 12 megabyte Fortran benchmarks from those few brain-damaged people who still buy computers according to raw CPU power. And even then, these options generally work well only when you're the only user on the system.

Again, you're far better off rearranging the modules in a splattered-across-the-address-space working set than applying sledgehammer approaches like pre-loading all the unshared space at PROC time. No, Virginia, there ain't many Silver Bullets left lying around.

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:PUSH

Speaking of "locality-of-reference" problems, did you know that a library file (.LB) which is built in random order is expected to have an average distance between an external reference and matching entry point equal to half the "length" of the library? Libraries attempting good "locality-of-reference" should have their modules grouped so the average distance is minimized, but when I wrote a program to analyze F77IO.LB, COBOL.LB, and LANG_RT.LB, they all had average distances above 50 percent.

Unfortunately, it seems that most people build libraries by putting the modules in alphabetical order, directory hash code order (because they used [!FILE +.OB] to build it), or using a minimum repetition criterion (to solve backward references optimally). No one seems to build them using a minimum distance, optimum "locality-of-reference" criterion. Maybe I should publish my program spotlighting the offending libraries

:POP

I alluded earlier to a few problems measuring working sets and page fault rates. Here are the gory details.

Item 1: AOS/VS counts two things as page faults: "real" page faults and shared page I/O (?SOPEN/?SPAGE/?RPAGE/?SCLOSE). It does this because they are practically identical events with one exception: shared-page I/O fault rates won't benefit from an increased working set size, so AOS/VS ignores

them when deciding whether to adjust yours. This explains why your favorite INFOS program faults its brains out (both logical and physical) without any change in its WSS. Moral: A program is not suffering page faults that can be remedied by "locality-of-reference" tricks if the working set size isn't growing.

Item 2: The working set size you see using utilities like PED is the count of the total number of pages associated with the process. That includes unshared and shared pages in your program, in the AGENT in ring 3, in INFOS in ring 5, in DBMS in ring 6, etc. The real cost of your process in pages unique to your process (all unshared pages, and only those shared pages not in use by other processes) cannot be determined. It can only be estimated by using tricks like dividing the total memory by the total PID count at the onset of memory contention. Not an easy trick. The real shame is that the layout of the process table in PARU.32.SR seems to indicate that the information is available inside AOS/VS, but there is no way to obtain it via a system call. Moral: WSS is some indication of a process' total memory requirements, but hardly exact. Δ

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HISTORY LESSON

“Useless” history files could be the most valuable data you keep

I enjoyed a lovely beginning to the new year a few weeks ago. Along with all of the usual hassles a new year brings, I found out that the IRS wanted to take a look at our accounts payable system. It didn't worry me much—the code was solid, and I hadn't been doing any embezzling recently. So, last week, these two guys walk into the office and explain what they need. All they want, it seems, are the month-end backup tapes. For every month. Since 1983.

Now, I don't know how many of you keep four years of month-end backups around, but I need three tapes per backup. I wouldn't know where to put 124 reels of tape.

They then explained that they would also need file layouts for all of our AP and vendor files. Then, if I could read in the tapes and write out everything in EBCDIC, they would send the tapes to their headquarters, get their programmers to extract the necessary files, write the programs to get out the information they needed

At this point, rather than throwing up, I made my first intelligent comment of the whole interview. I asked them just what kind of information they needed. The IRS men replied that they wanted to look over the account distributions and vendor purchases for fiscal years 1984 and 1985.

I breathed a sigh of relief. It just so happens that, in addition to being paranoid about backups, I am fanatical about history files. Instead of having to explain why those tapes were reused three years ago, I was able to write the four reports they needed using just my existing files, and hand them to the auditors the next afternoon. It saved them time, saved their programmers time, saved me time—and possibly saved me from *doing* time.

Sure, history files take up a lot of room, but there is really no excuse for not having enough disk space anymore. Back when a Zebra subsystem cost \$25,000 used, those of us with small systems just kept everything on the ol' Phoenix drive and swapped cartridges a lot. Nowadays, you can pick up a 96 MB subsystem for under \$2,000. It may not be the newest, fastest, or flashiest machine on the market, but it works! Besides, new and flashy isn't ICOBOL's style—I still get nervous when I can't see the lights blink on the front of the processor.

Now that all of you Nova 3 users have run out and bought a new drive, what do you do with all of that empty disk space? Put some useless history files on it. All history files start out useless, because when you have only three months of history on disk it's much easier to run over to the file and look up the data. Five years from now, when that invoice has been misfiled in the drawer, and the drawer has been put into a file box, and

the file box is somewhere in the back room along with 300 other file boxes—that's when they become the most valuable files on your disk. Let me give you some examples of what kind of history files we have, how they help our company, and how they've saved my bacon more than once.

Every system I've ever seen uses some kind of accounts receivable (AR) open item file. This is the file that your invoices post to and your cash entries relieve. Once a month or so, this file is purged, and the paid-for items are deleted. Purging your AR open helps speed up your invoice processing, cash posting, aging reports, and so on, so it's a logical and necessary

Nowadays, you can pick up a 96 MB subsystem for under \$2,000. It may not be the newest, fastest, or flashiest machine on the market, but it works!

thing to do—after all, you don't want people sitting around for half an hour waiting for the cash posting program to figure out what's been paid already.

Suppose you want to know when was the last time a particular customer ordered from you. Or suppose you decide that a report on how quickly your customers have been paying would be useful. That's when an AR open history file would come in handy. Our AR open FD is shown in Figure 1.

Figure 1: AR Open FD

```
01 AR-OPEN-RECORD.
  03 AR-OPEN-KEY.
    05 DOCUMENT-CUSTOMER-NUMBER PIC X(6).
    05 DOCUMENT-DATE.
      07 DOCUMENT-YEAR PIC 9(2).
      07 DOCUMENT-MONTH PIC 9(2).
      07 DOCUMENT-DAY PIC 9(2).

    05 DOCUMENT-NUMBER PIC 9(6).
    05 DOCUMENT-TYPE PIC X(1).
    05 DOCUMENT-APPLY-TO-NUMBER PIC 9(6).

    03 DOCUMENT-DUE-DATE PIC 9(6).
    03 DOCUMENT-AMOUNT-1 PIC S9(8)V99 COMP.
    03 DOCUMENT-AMOUNT-2 PIC S9(6)V99 COMP.
    03 DOCUMENT-REFERENCE PIC X(30).
    03 DOCUMENT-SHIP-TO PIC X(30).

  03 FILLER PIC X(18).
```

Our AR history record is identical to our AR open FD, except that the file is named AR-HISTORY-FILE, and the data names begin with HISTORY instead of DOCUMENT.

We have an AR purge program that simply checks if a certain item has been paid for, and, if so, deletes both the open item and the payment. At the same time, we move the AR open file record to the AR history record and write the history record.

POWERHOUSE MEETS DBMS CHALLENGE

The Cognos development team has met the challenge of producing a significant first for the Data General market: a relational solution that also offers coexistence with traditional FMS and integrated office automation.

DBAM and SQL Support

The new release of PowerHouse took shape around two factors. "We recognized the need to augment file system support to include multi-level DBAM," says Hal O'Connell, Cognos Product Development Manager for DG products. "We also realized that support of SQL was important to our customers."

Challenges Overcome

O'Connell says PowerHouse 5.00 was ready

for beta testing about a year following the conceptual stage. "It was a challenging year, to say the least," he says. "The development team had to internally restructure PowerHouse to fit a relational world. The large number of enhancements (over 110) also contributed to a longer than usual development period. In addition to meeting these challenges, we still managed to include a few extras, such as user defineable function keys."

DG Plays Key Role

Data General played a key role in the development of PowerHouse 5.00. "The exchange of technical resources and training, plus Data General's assistance in reviewing and testing 5.00 were invaluable,"



Development of PowerHouse 5.00, spearheaded by Cognos' Senior Product Manager for DG Products, Henry Urion (left), and Development Manager Hal O'Connell, progressed smoothly and on schedule, despite a number of first-time challenges.

says Henry Urion, Senior Product Line Manager for DG products with Cognos. "We are

confident that as a result, we have a product DG users will be very pleased with." ■

POWERHOUSE FINDS HOME WITH MASSACHUSETTS HOUSING

Since 1970, the Massachusetts Housing Finance Agency (MHFA) has financed 60,000 apartments, primarily for low and moderate income families, and has provided low-interest home mortgages to more than 15,000 first-time buyers. In total, the MHFA has channelled over \$2.4 billion into housing in Massachusetts communities.

Powerful, Easy to Use

"The MHFA has been an enthusiastic Data General customer since 1977 when we bought our first in-house DG system," says Christopher Brown, MHFA MIS director.

"We've just upgraded again to our fifth Data General system, an MV/20000."

Integrated Solution

In the spring of 1985, Brown was faced with developing and installing a computerized budget system for the beginning of the Agency's fiscal year, which was just a few months away.

"What really was needed was an integrated budget, purchasing, accounts payable and management reporting capability. With PowerHouse we

were able to design and develop a comprehensive administrative controls system (ACS) on time, within budget, and without hiring additional staff."

Replacement for COBOL

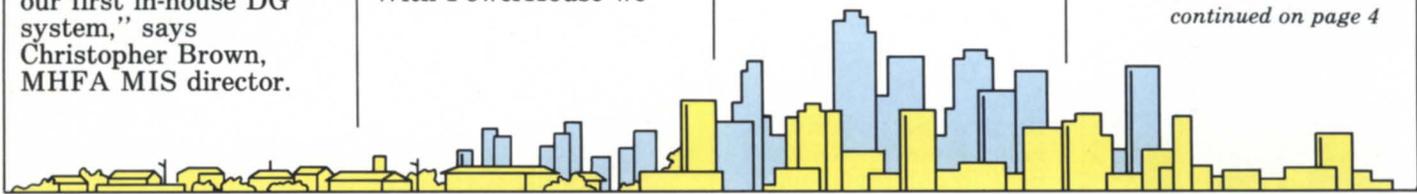
In order to meet the needs of the Agency in the time constraint given, Brown realized that the MHFA's MIS department needed an immediate replacement for COBOL, its traditional development language. "Over the past

four to five years we had looked at COBOL code generators and 4GLs, but found nothing that would satisfy our requirements," he says. "We wanted a product that was not only easy to use, but was comprehensive and practical for use in production systems."

Interface AOS/VS, INFOS

"The timing in finding PowerHouse was perfect," says Brown. "Once PowerHouse was installed, we were able to start development of

continued on page 4



COGNOS APPOINTS NEW PRESIDENT



Tom Csathy, recently appointed Cognos President and Chief Operating Officer.

Cognos recently announced the appointment of a new president and chief operating officer. He is Tom Csathy, former President and CEO of Burroughs Canada.

Csathy, whose background includes 20 years in sales, marketing, systems and finance with

IBM Canada, will be responsible for the day-to-day operations of Cognos.

Long-term Focus

In his position as Chairman and Chief Executive Officer, Michael Potter will focus on long-range directions and the external relationships that have gained importance since Cognos became a public company.

"Cognos has been growing at a rate of more than 50 percent a year," says Potter. "In order to support this kind of growth and pursue our corporate mission, which is to become the number one development software company in the world, it became necessary to focus on the evolution of our management team." ■

HOUSING

(Continued from page 3)

the ACS almost immediately because PowerHouse provides an intelligent interface to AOS/VS and INFOS. Screens, reports and transaction processing capabilities are easily generated in concert with PowerHouse's active data dictionary."

Prototyping Ability

"The prototyping ability of PowerHouse was a

major factor in our meeting our deadlines," says Brown. "PowerHouse's ability to support functional prototypes gave us confidence that our initial efforts would evolve into a real application system. The ACS consists of more than 100 report modules and produces reports which are distributed to all MHFA managers.

PowerHouse Methodology

"With PowerHouse we adopted more than just a tool. We adopted a methodology that underlies the whole product," says Brown. "PowerHouse is well structured, flexible and powerful. It is an important component in our continuing success." ■



NOVA AND ECLIPSE USERS MOVE UP TO POWERHOUSE

With the recent announcement of the MV/7800 by Data General, NOVA and 16-bit ECLIPSE users are now able to sign onto PowerHouse for the first time. Prior to this, the PowerHouse application development environment was available to MV 32-bit family users only.

The MV/7800 offers a special package for NOVA, ECLIPSE S/120 and S/140 sites. A single 15-inch by 15-inch board moves 16-bit users up to the 32-bit world of the

MV family - and into the PowerHouse application development environment.

Wayne Gudbranson, Cognos Marketing Manager for PowerHouse DG Products, says: "For customers currently using languages like COBOL, FORTRAN or BASIC on their 16-bit machines, the MV/7800 offers the first opportunity to make the transition to PowerHouse and to enjoy the benefits of fourth generation productivity." ■



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This file is now over 20 MB long, contains over 120,000 records—and it still doesn't take more than five seconds to access any particular record.

We're keeping history files on production, receivings, tire curing, scrap tires, blemish tires—and that's just off the top of my head. One history file I started keeping a few months ago is a copy of all of our invoices. If you've ever deleted the invoices off of the PASS queue, or have not been able to find a particular invoice in the file, you can appreciate what a help having a history file would be.

When we are printing invoices, I open a line sequential file in a subdirectory with the date of the invoice as the file name—e.g., INV\$012787. When I move a line to the printer to be printed, I move the same line to the file and write it. At the end of the month, I then have about 20 files in a subdirectory that I just FDUMP onto tape. These files contain an exact duplicate of our printed invoices, and if I ever need a copy, I can access the file with my favorite text editor, pull out the invoice I want, and print it.

And then there are my big files. One of my history files keeps a record of each and every tire shipped out of here. The FD is shown in Figure 2.

Figure 2: History File FD

```
FD DAILY-ITEM-SALES-FILE
   LABEL RECORDS ARE STANDARD.

01 DAILY-ITEM-SALES-RECORD.
03 DAILY-ITEM-SALES-KEY.
05 DAILY-ITEM-ITEM-NUMBER          PIC X(12).
05 DAILY-ITEM-PRIMARY-DATE.
07 DAILY-ITEM-PRIMARY-YEAR        PIC 9(2).
07 DAILY-ITEM-PRIMARY-MONTH      PIC 9(2).
07 DAILY-ITEM-PRIMARY-DAY        PIC 9(2).
05 DAILY-ITEM-INVOICE-NUMBER     PIC 9(6) COMP.
05 DAILY-ITEM-SEQUENCE-NUMBER    PIC 9(3) COMP.

03 DAILY-ITEM-ALTERNATE-KEY-1.
05 DAILY-ITEM-CUSTOMER-NUMBER    PIC X(6).
05 DAILY-ITEM-ALTERNATE-DATE.
07 DAILY-ITEM-ALTERNATE-YEAR     PIC 9(2).
07 DAILY-ITEM-ALTERNATE-MONTH   PIC 9(2).
07 DAILY-ITEM-ALTERNATE-DAY     PIC 9(2).
05 DAILY-ITEM-ALTERNATE-INVOICE PIC 9(6) COMP.

03 DAILY-ITEM-ORDER-NUMBER       PIC 9(6) COMP.
03 DAILY-ITEM-SHIPPED-TO-NAME    PIC X(30).
03 DAILY-ITEM-QTY-SHIPPED        PIC S9(6) COMP.
03 DAILY-ITEM-SALES              PIC S9(8) V9(2)V9(2) 9(2)COMP.

03 DAILY-ITEM-COST                PIC S9(8)V9(2) COMP.

03 DAILY-ITEM-CUSTOMER-NAME      PIC X(30).
03 FILLER                        PIC X(4).
```

As you can see, I can bring up just about anything I want from this file. It's set up now so I can inquire by item or by customer. This is the file that I use when the boss wants to know how many of a certain size tire we sold between January 17 and May 23 (or some other obnoxious, non-standard period), or the last time we sold a particular tire, or what a particular customer bought on his last shipment—in other words, all of the information we have about all of the shipments we've ever made.

It's an incredibly useful file with one drawback—the file is more than 70 MB long.

Did I hear someone in the back saying that it's impossible for RDOS to have a 70 MB file? Well, of course it is. Not only is it impossible, it would take forever to access such a file. I've got mine broken down into six smaller files. Here's what I did, and how to trick your computer into thinking that it's all one big happy file.

After I posted all of the shipments for 1986, I took the above

file and replaced each occurrence of DAILY with 1986. I then renamed the .NX and .XD from DAILYITMSL to 1986ITMSL. So I now have six files containing the shipments' information—1982ITMSL, 1983ITMSL, and so on. Here's how to get to the information in a user-transparent manner.

We'll take the simplest of the programs—an inquiry program. In this, all you specify is an item number and a starting date. Now, in a real-life situation, most of the salespeople won't be looking for a shipment in 1982—they'll be looking for a particular tire going to XYZ Company sometime last year. So, in order to avoid a START statement when I know perfectly well that the information I'm looking for won't be in that particular file, I move the starting inquiry date to a field like this:

```
01 WS-DATE.
03 WS-MONTH   PIC 9(2).
03 WS-DAY     PIC 9(2).
03 WS-YEAR    PIC 9(2).
```

Then, the code in my procedure division looks like this:

```
IF WS-YEAR < 83
   PERFORM DISPLAY 1982-ITEMS.
IF WS-YEAR < 84
   PERFORM DISPLAY-1983-ITEMS.
```

and so on. The program will just fall through until it finds the right year to start searching in.

The display sections of the procedure consist of a standard START statement, and then

```
DISPLAY-NEXT-1982-ITEM.
   READ 1982-ITEM-SALES-FILE NEXT RECORD.
   IF 1982-ITEM-SALES-FILE-STATUS = AT-END OR
      1982-ITEM-ITEM-NUMBER > INQUIRED-ITEM-NUMBER
      GO TO DISPLAY-1982-ITEMS-EXIT.
```

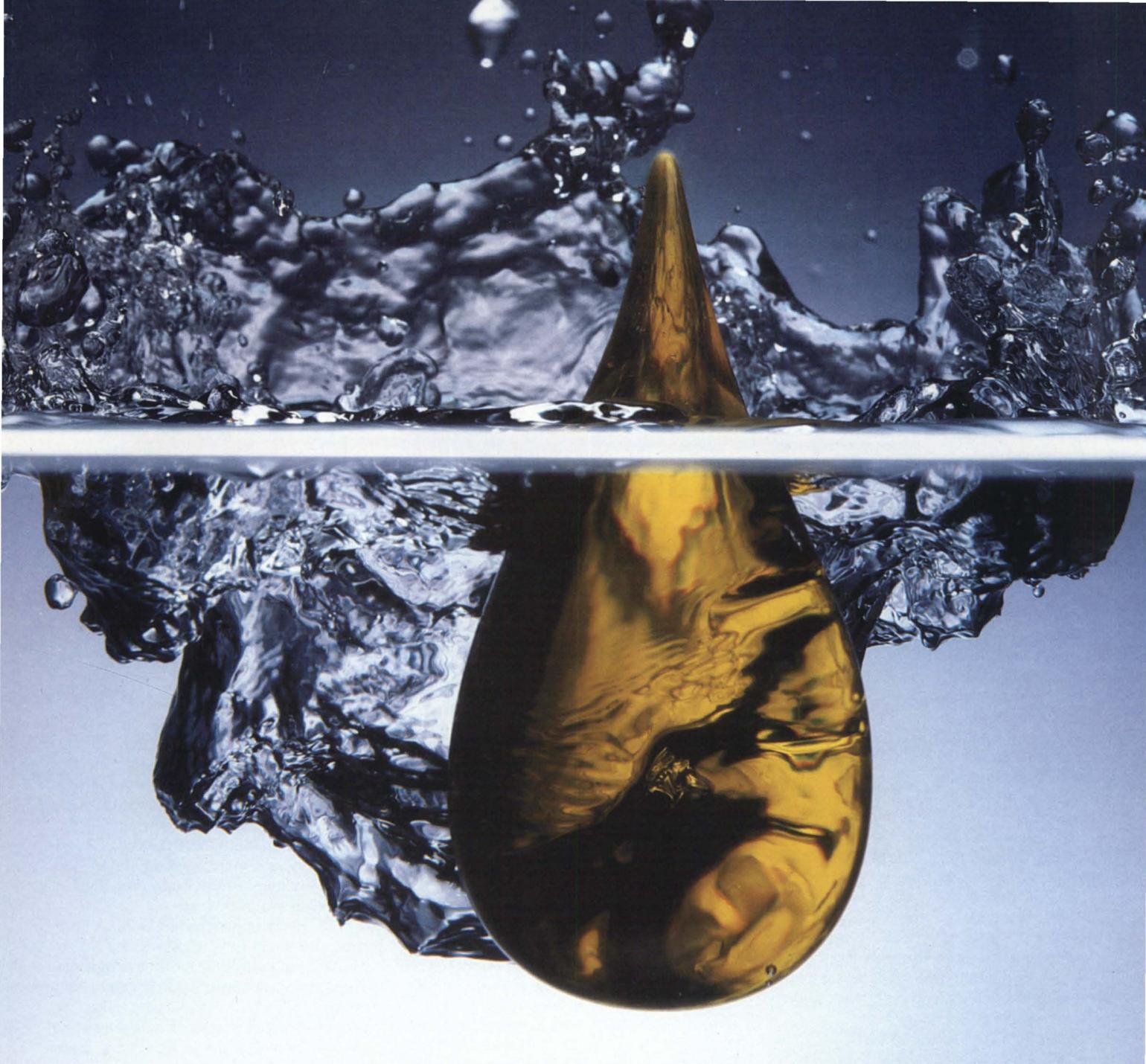
```
MOVE 1982-ITEM-SALES-RECORD TO SAVE-ITEM-RECORD.
PERFORM DISPLAY-ALL-ITEMS-SECTION.
GO TO DISPLAY-NEXT-1982-ITEM.
```

SAVE-ITEM-RECORD is in WORKING-STORAGE and is identical to all of the other records. It's there to eliminate six sections of display code—instead, just move the current record in and one paragraph will handle it. This also makes it easier to add another year when the time comes—I've only got about 30 lines of code that refer to a specific year. The above code makes an inquiry fast (under 2½ seconds), and the code is compact (under 300 lines for the PROCEDURE division).

So, at the end of each year, all I've got to do is add a few lines of code in 9 or 10 programs, re-compile them, and I'm all set. We've got 18 files like this, and I'm planning to add more. There's no good reason that I can't keep going like that forever—or until I run out of disk space.

And speaking of disk space, those last files I showed you are an excellent reason for getting a separate drive just to handle your history files. Five of those six files will *never* be updated—if you're doing full disk backups, you're wasting your time. I put all of my files of that type on another disk, which I back up once a year. Δ

Tim Boyer is EDP manager at Denman Rubber Manufacturing Company, president of the Northern Ohio Data General Users Association, and a contributing editor for Focus Magazine. He may be reached at P.O. Box 951, Warren, OH 44482; 216/898-2711 or on the NAD-GUG bulletin board at 415/924-3652.



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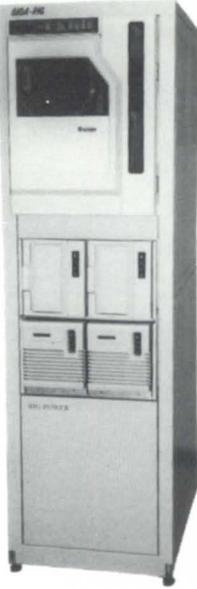
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System Technology signs regional agreement with Zetaco

Houston—System Technology Associates has signed a regional distributorship agreement with Zetaco, Inc., for its line of DG-compatible controllers. STA will provide sales and service for all Zetaco's compatible disk, tape, and communications products in the central and southeast United States.

STA will also market Zetaco-packaged peripheral subsystems, as well as the Giga-Rig, which is an STA custom peripheral subsystem. It combines magnetic tape, disk drives, and an electrical power conditioning option (Rig-Power) in the same enclosure. Occupying six square feet of floor space, the Giga-Rig can house various peripheral combinations such as a tri-density tape drive, four high-capacity disk drives, and a 10 KVA Rig-Power conditioning unit. Customers may choose to power their CPU and other peripheral devices through Rig-Power, which is designed to provide their system to get clean, steady electrical power.



System Technology Associates, 15111 Mintz Lane, Houston, TX 77014; 713/440-8340 (outside of Texas 800/553-5124). Δ

SCIP announces add-in memory for MV systems

Beverly Hills, CA—System Controllers and Interface Products (SCIP) is now shipping their MV410, a 2 MB to 16 MB memory that is a "plug-and-play" emulator of Data General's Universal Memory for use in MV/4000, MV/10000, and Eclipse S/280 processors.

The MV410 memory has reduced power consumption by utilizing "F"

logic and by putting 8 MB or 16 MB on a board with only half the number of chips as its counterparts. Fewer chips and more MBs per board improve reliability, and save slots for other uses.

The MV410 is available in 2 MB, 4 MB, 8 MB, and 16 MB sizes. The starting memory address is selectable in 1 MB boundaries via a five-position, board-edge switch. The starting address/switch setting matrix is silkscreened on the board cover/shield plane for ease of installation and service. Other maintenance convenience features on the MV410 are a board deselect switch that removes the memory from the system, plus two LEDs on the board edge that indicate memory power on and memory selected.

The MV410 single quantity list prices are \$3,950 for 2 MB, \$5,500 for 4 MB, \$9,980 for 8 MB, and \$19,900 for the 16 MB board. VAR, OEM, and volume discounts are available, as well as a 15 percent discount for organizations in the public service sector. Delivery varies from stock to 30 days.

SCIP, 449 S. Beverly Drive #201, Beverly Hills, CA 90212; 213/282-8700. Δ

DG and BASEnet offer tools for automating AEC firms

Albuquerque—Architectural, engineering, and administrative computing capabilities, combined with office space, form a single, low-cost, leased package offered by BASEnet (Business, Architectural, Scientific, and Engineering network). The system is based on Data General Eclipse MV/10000 super minicomputers, DS/7500 engineering workstations, and TEO/3D, (third-generation design and modeling software).

The BASEnet service combines an integrated computer-aided engineering environment in a local area network with training, equipment maintenance, and office space. The heart of the system is the Eclipse MV/10000. Users access the network through DS/7500 intelligent engineering workstations, running windowing software.

Within this windowing environment, users can run Data General's TEO/3D three-dimensional modeling and data base management software and CEO automation software. Users can run a

complete range of architectural and engineering applications provided by a variety of companies including Syscomp, Easinet, and Georgia Tech Research Corporation.

Through the DG TEO/3D system, all disciplines working within a BASEnet building have access to information for all other disciplines. For example, mechanical, electrical, structural information can efficiently be obtained directly from the most current architectural drawings without an architect having to deliver new drawings. Data General's AOS/VS operating system and TEO/3D data base manager provide each user with total security over their data base.

With the BASEnet system, disciplines in different areas of the country can exchange information quickly through microwave relay or land line. The only BASEnet hardware required at the recipient's location is a DG DS/7500 engineering workstation. Δ

ET200 support for WordPerfect Library announced

Fairbanks, AK—Theta Scientific has announced that the ET200 Data General terminal emulator supports WordPerfect's Shell interface for the PC. The Shell is the main component of WordPerfect's Library that provides a menu system and memory management to integrate WordPerfect and other programs.

"PC users connected to Data General computers can now integrate the micro-to-mainframe link with other programs. The communications session can be suspended with a keystroke and other PC programs can be run. Then the session can be returned to exactly where it left off," said Mark Espe, vice president of engineering.

ET200 includes error-checked file transfer and printer management capabilities. ET200 can transfer screen data to the Shell's clipboard for use by other PC programs. It can display either 80 or 132 columns (with appropriate hardware). In addition, the Shell's macro capability can be used with ET200 to automate frequently used commands and procedures.

ET200 is available for most IBM PC-compatible machines and the DEC Rainbow. Pricing is \$150 for a single unit and \$100 for 2-10 units. Corporate licenses are available. Upgrades, including the new manual on diskette, are available free for users of version 2.30 (and versions later

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Theta Scientific, Inc., P.O. Box 84108, Fairbanks, AK 99708; 907/479-4540. Δ

High-speed data collection systems

Montreal, Quebec—Integrad announces a variety of products for high-speed data collection and display of engineering and scientific signals. Primarily used in radar and sonar applications, the three DG-compatible circuits announced are a 24 MHz double-buffered digitizer with signal processing, a high-resolution coordinate conversion circuit (scan converter) and a dual-ported RGB color display controller with two frames (512 x 512 or 1 K x 1 K), pixel masking, pan and scroll.

The circuits can be interconnected for data display without consuming CPU or I/O bandwidth, or they can be used

separately as conventional digitizer or video displays.

Drivers and diagnostics are available now for Nova/Eclipse 16-bit processors and will soon be available for the MV series.

Video boards are priced from \$1,500 (U.S.), digitizers from \$2,500 (U.S.). Custom configurations can be supplied quickly.

Integrad Technologies Inc., 18 Watterson Road, Baie d'Urfe, Quebec H9X 3C2; 514/457-9465 or telex 05-821639. Δ

DG enhances CEO graphics

Westboro—Data General Corporation has enhanced CEO graphics with new DG/Fontstyles software and new business graphics capabilities for CEO Decision Base.

With DG/Fontstyles software, 12 additional presentation-quality typefaces may be used with existing DG graphics pack-

ages such as CEO Drawing Board, Trendview, and Wordview. Users of the enhanced version of CEO Decision Base can create charts from spreadsheets or data tables with one keystroke.

With this enhancement, a single function key selects data from spreadsheets or data tables to create a chart that can be saved in the CEO filing system as Graphics Kernel Metafile (GKM) documents, and then edited using CEO Drawing Board. In addition to spreadsheet and personal data base applications, CEO Decision Base now provides bar, pie, line, x-y (scatter), and surface chart options.

DG/Fontstyles supports six filled and six unfilled font styles, as well as international character sets. The new package provides font capabilities licensed from Bitstream Inc., a Massachusetts vendor of digitized fonts.

DG/Fontstyles is priced at \$550 per license, independent of CPU class. CEO Decision Base software licenses, depending on CPU class, are priced from \$1,800. Both are available immediately. Δ

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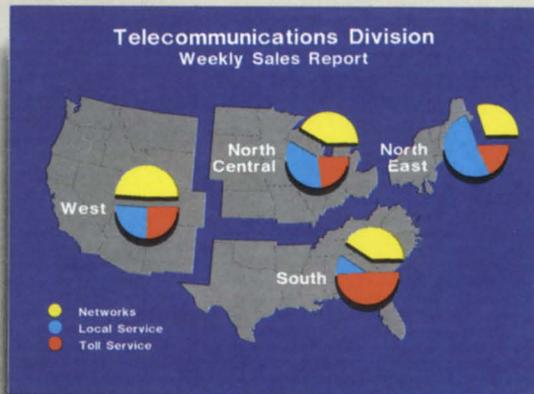
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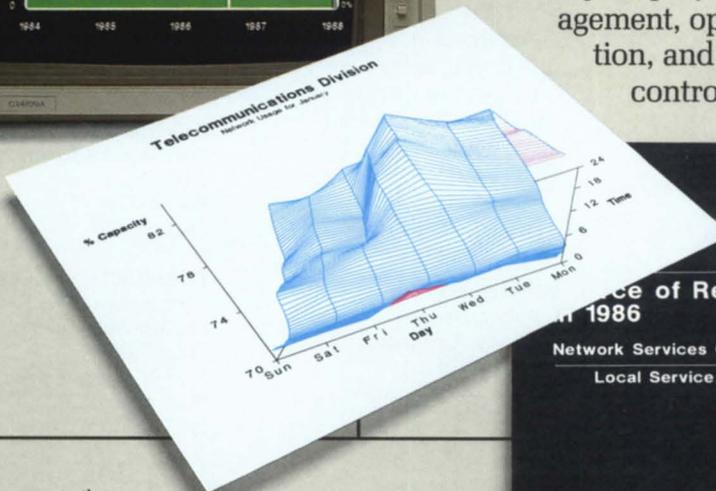
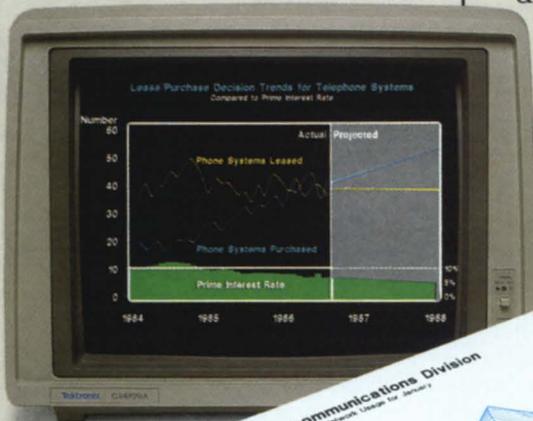
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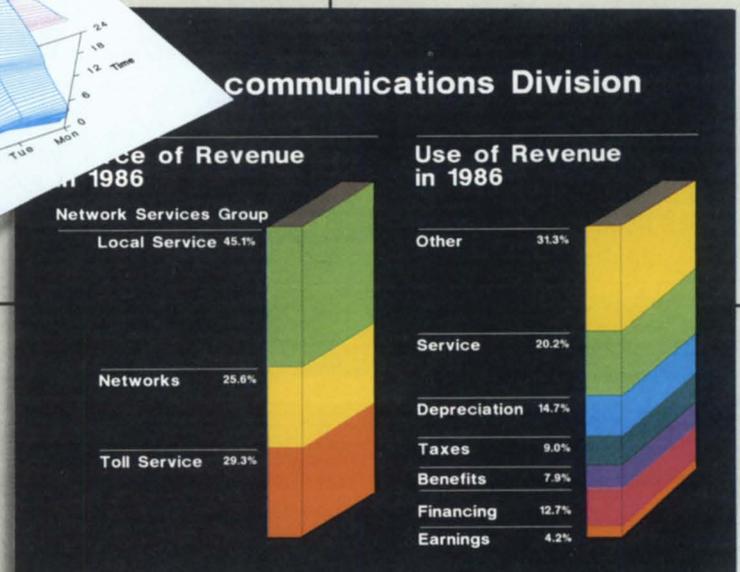


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NADGUG roster

ROSTER

Here is the current roster of the North American Data General Users Group's Executive Board, and of all regional interest groups, special interest groups, and international groups.

If you would like to join a particular group, notify the person listed as the contact. If you do not see a regional group in your area or a special interest group that would serve you, notify the NADGUG staff in Westboro (617/870-7721) about your interest in seeing a new group start up. If you are aware of any changes or updates that should be made to listed contacts, please notify the NADGUG staff.

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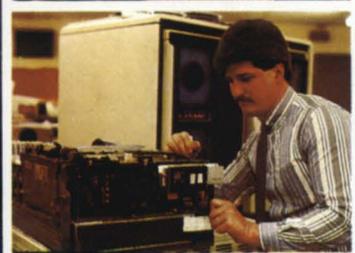
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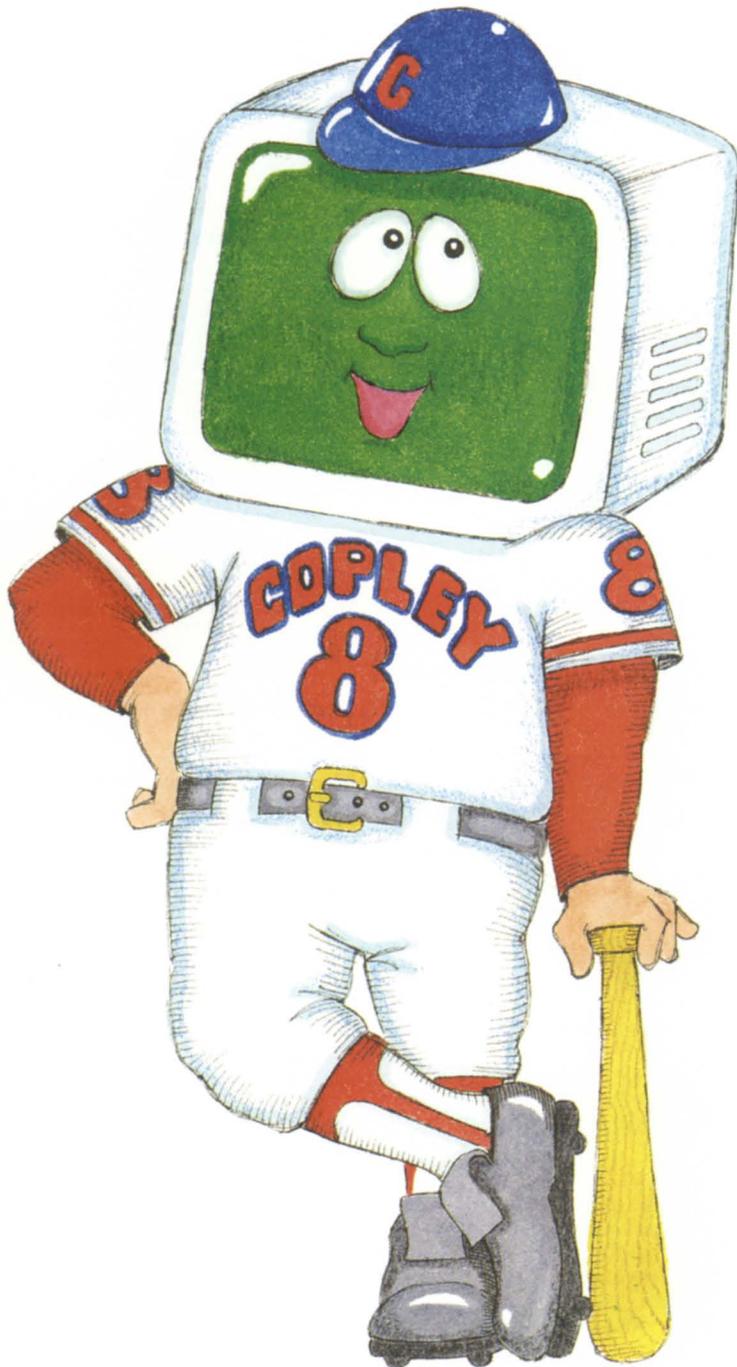
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8631 Mayland Drive
PO Box 31760
Richmond, VA 23294
804/346-1100

Southwest Virginia Data General Users Group

Contact: Betsy Wolfe
Medico Security Locks, Inc.
PO Box 1075
Salem, VA 24153
703/380-5000

WASHINGTON STATE**Inland Empire Data General User Group**

Contact: Ed Stohler
Jensen Byrd Company, Inc.
310-324 Riverside Ave.
Box 3708
Spokane, WA 99220
509/624-1321

Seattle Regional Interest Group

Contact: Helen Von Erichsen
Boeing Commercial Airplane
Company
PO Box 3999, M.S. 47-06
Seattle, WA 98124
206/655-1566

WASHINGTON D.C. AREA & MARYLAND**Potomac Users of Data General Equipment (PUDGE)**

Contact: Jess Brown
Techno-Dynamics, Inc.
PO Box 765
Bowie, MD 20715
301/464-8044
301/390-6331

CANADA

Ontario (see CAN-AM RIG under
New York)

Quebec Area Data General Users Group (QUADGUG)

Contact: Andras Gemes
Gemes Service Informatiques
PO Box 955, Station B
Montreal, Quebec H3B 3K5
514/843-5730

Special Interest Groups**AOS & AOS/VS Special Interest Group**

Contact: David Novy
3M Corporation
Building 260-6A-08 3M Center
St. Paul, MN 55144
612/733-3320

Business BASIC Special Interest Group (BB SIG)

Contact: Mark L. Strickland
Evans Products, paint division
PO Box 4093
Roanoke, VA 24015
703/343-1521

Communications Special Interest Group (COMMSIG)

Contact: Kirk Honold
Sage Foods, Inc.
999 E. Touhy Ave., #200
Des Plaines, IL 60018
312/827-0066

Educators Special Interest Group

Contact: Harold (Skip) Pomeroy
Academic Computing
Roger Williams College
Bristol, RI 02809
401/253-1040, ext. 2170

Federal Special Interest Group

Contact: Emilio Naranjo
Division of Information Resources
Dept. of Labor OIG
Room 55504
200 Constitution Ave. NW
Washington, DC 20210
202/523-2813

INFOS II Users Group

Contact: Tom Duell
Eagle Software, Inc.
PO Box 16
Salina, KS 67402-0016
913/823-7257

IRDOS Users Group

Contact: Dennis Doyle
Bankmatic Systems
Suite 230
12655 Southwest Center
Beaverton, OR 97005
503/643-2446

Law Enforcement Users Special Interest Group

Contact: Nancy Smith
c/o Black Hawk County CJIS
316 E. Fifth St.
Waterloo, IA 50703
319/291-2557

OASIS (Office Automation/CEO Special Interest Group)

Contact: Charlene Kirian
On-Line Computer Library
(OCLC)
6565 Frantz Road
Dublin, OH 43017
614/764-6435

SQL SIG

Scot Love
City of Buffalo Community
Development
428 City Hall
Buffalo, NY 14202
716/855-5061

Petroleum & Chemical Industries SIG (PCISIG)

Contact: T. Douglas Foster
The Williams Company
PO Box 2400
Tulsa, OK 74102
918/588-3953

International Nonaffiliated Groups**Australia Data General Users Group**

Contact: Colin Breen
Data General Users Group
Australia
100 Dorcas St.
South Melbourne, Victoria 3205
Australia

Data General Holland Users Group

Contact: Janneke van den Tol
Data General Nederland B.V.
Laan Van De Helende Meesters 13
1186 AC Amstelveen
Holland

Mexico City Users Group

Contact: Victor M. Ramirez
Cypensa/Data General
Eje Central No. 2
Mezzanine Torre Latinamericana
06007 Mexico, D.F.
905/512-9866

Nippon Data General Users Group

Contact: Shinichi Noda
Nippon Data General Corporation
4-3-13, Toranomom, Minatoku
Tokyo 105 Japan

Portugal Data General Users

Contact: A. Bras Gomes/A. Sendin
Data General Portugal
Cassel Data Computadores e
Sistemas, LDA
Lisbon-Sintra Road
Casal Do Garoto-Estrada
PO Box 1100
Amadora, Portugal

Data General Sweden

Contact: Lennart Johansson
Data General Sweden
Armegatan 38
Box 1290
171 25 Solna
Sweden

Data General United Kingdom Users

Contact: Ivor Coleman
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■
When rev 4.2 of WordPerfect is released this summer, it will include a number of features that were introduced recently in the PC version. According to a source at WordPerfect Corporation, one of the improvements will be in the way text is displayed on-screen. Over the next year or so, the DG version will add features usually associated with desktop publishing. Also due sometime this summer are a "toolkit" to help developers integrate WordPerfect Library with user applications, and a jointly developed product that handles file and electronic mail transfers between DG minicomputers and PCs.

■
By next month, a product should be available to link DG systems to DECNET. Now in beta test at four major sites, the product was introduced to the DG sales force in mid-February. According to the developer, the phones have been ringing ever since. The product will provide for seamless file transfer between DEC and DG systems with no additional software on the DEC side. Users on either system will use the same set of commands and see the data in the format they are accustomed to. The developer is planning to integrate electronic mail functions soon, and is exploring ways to extend the product to connect IBM systems.

■
Data General has announced joint marketing agreements with three companies that develop software for petroleum exploration, refining, and chemical processing.

An agreement with Sierra Geophysics covers an integrated mapping and seismic interpretation system supported with graphics and a data base system. Also covered are packages for prospect generation and development, seismic log analysis and display, geologic well-log interpretation, contour mapping and map editing, and geologic and seismic modeling.

An agreement with Aangstrom Precision Corporation covers software for the acquisition, storage, retrieval, and processing of oil and gas well data. Included are an image processing system designed for potential field analysis, a data base management system with a

geographically oriented data structure, and an interactive mapping system that can generate and display contoured surface and solid three-dimensional graphics, petroleum information, and lease data.

The third agreement, with Keith-Stevens, Inc., covers software designed to help oil, gas, and chemical producers improve productivity and reduce the costs of maintaining their plants and facilities.

■
As reported here last month, McDonnell Douglas plans to phase out support for its DG Unigraphics software and concentrate instead on its DEC customers. After announcing its intentions to Unigraphics users at their meeting in Anaheim in mid-February, the company decided to soften its stance: it has now committed to enhance the DG versions for five years and maintain them for six—while retaining the right to shorten this commitment with a one-year notice.

■ **Big ticket items:**

Globe Information Systems, a turnkey supplier of ticketing systems for colleges, stadiums, and arena operations, recently signed a VAR agreement with DG after a competitive review that included Prime, DEC, Hewlett Packard, Tandem, AT&T, and others. Formerly a Datapoint VAR, Globe has agreed to a two-year purchase of \$4.5 million worth of MV/ systems. One reason cited for selecting DG: the assistance the company provided in converting Globe's Datapoint applications.

Network Computing/HMS Group, with nearly 35 software applications, is a leading supplier of information systems for local governments and utility companies. The company plans to make a \$2 million purchase of MV/ systems in the first year of its new VAR agreement with Data General.

Health Data Sciences Corporation has purchased seven MV/15000 model 10 systems to install at its customer sites in the health care industry. Meanwhile, Global Turnkey, a New Jersey VAR serving the publishing industry, has bought six MV/15000 model 8 systems. The combined value of these purchases is more than \$2.2 million.

■
McIntyre's Mini-Computer Group has added Point 4's products, which include several Nova-compatible CPUs, to the line of computer equipment it sells. Until now, McIntyre's has dealt exclusively in Data General computer products. "Point 4 equipment, like Data General, is a quality, reputable computer line," said Michael C. McIntyre, president. The company will also offer software for the Point 4 systems.

■
3CI, the Colorado-based designer of the InFoCen relational DBMS and 4GL, is going public. Late in February the company filed an S-1 registration statement with the Securities and Exchange Commission for a public offering of common shares. Proceeds of the sale will be used for sales expansion, product enhancement, and working capital. The proposed offering is being managed by Hanifen, Imhoff Inc., of Denver.

Earlier, 3CI had announced the signing of a major contract with TiSoft, Inc., a federal systems integrator based in Fairfax, Virginia. TiSoft will distribute InFoCen as part of its contract to supply the Defense Department with OA and data base applications on MV/ systems.

■
Sincere apologies come from Demos, Inc. The company had announced QSS, a new spreadsheet package for DG Desktop, Eclipse, and MV/ systems, but ran into problems during beta testing. Until the problems can be resolved, Demos is withdrawing QSS from distribution. The announcement added, "In the future, Demos will *not* announce a software package for distribution until all programs have successfully completed beta test and all the documentation is complete and available."

■
When Anita Catron left Focus to go with her family to Salt Lake City, we feared we had lost her from the Data General community. Not so. Anita called recently to say she now works for DMS Systems. She said that selling software is different from selling magazine advertising, but she's happy for the opportunity to stay in touch with NADGUG friends. Δ

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