

June 1994

FOCUS

The Magazine of the North American Data General Users Group



In Focus

5 years of Aviiion

**Family additions: AV 9500
& 4500 servers; AV 450
& 550 workstations**

UniForum & CeBIT news

Plus

Unix Notebook:

DG's marketing blitz

Migration: Finding the way

Kernel-tuning utilities

Deadwood macros

¿Hábla español?

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"Re-engineering was likely to take three years, cost us a fortune and cause real disruption - until we found Transoft's Automated INFOS Migration"

Jim Davis,
Director of Systems and Administration
R J Wallace and Others



Two more satisfied customers -
Jim Davis (left) and Senior Analyst David Heard.

Moving over \$4M of INFOS-based software investment from a proprietary Data General MV9500 system to an Open Systems UNIX-based DG AViiON AV8500 became a surprisingly painless task for R J Wallace, a profitable and fast growing insurance syndicate with Lloyd's of London.

Director Jim Davis, had a clear goal at the \$180M a year firm - to move to an open environment to improve performance, widen vendor choice and at the same time reduce costs: *"..it was clear that rewriting would be too costly and lengthy to be a viable option."*

Rather than abandon the system and start again with a new third party package, Davis looked for some way of migrating the current AOS/VS applications to an open platform.

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AIM successfully converted R J Wallace's proven applications and databases to the new computer system without the need for costly reprogramming and retraining.

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The screenshot shows the Co*STAR software interface. The main window is titled 'EMPLOYEE MASTER FILE' and contains a list of employee data. A dropdown menu for 'State Codes' is open, showing a list of states. A small window titled 'Microsoft Excel - Sheet1 Chart 1' is overlaid on the main window, displaying a pie chart titled 'Available Hours' with four segments labeled 16, 9, 24, and 30. The status bar at the bottom shows '10:10 AM' and '23:68'.

Field	Value
1. Empl code	14
2. Name	Jane Smith
3. Address 1	100 North Main Street
4. Address 2	Apartment 12
5. City	Boston
6. State	MA
7. Zip	
8. Soc Sec #	117-48-4494
10. Phone	
11. Division	4000
12. Department	4855
13. Job class	N
14. Full time	P
15. Insurance	N
16. Work study	N
17. Pension	N
18. Pay type	S
19. Fica exempt?	Y
20. W/H exempt?	N
21. Item exempt	100
22. M	
23. M	
24. R	1
25. R	1
26. A	MA
27. A	
28. E	
29. Add'l fed W/H	
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The Magazine of the North American Data General Users Group

FOCUS ON: 5 YEARS OF AVIION

All grown up

Healthy families have a way of growing and flourishing. That's the way it's been for Data General and its Aviion line of servers and workstations since their introduction in 1989

by Doug Johnson

Family additions

Servers: AV 9500 and 4500; Desktop and Deskside: AV 450 and 550 workstations; and some other siblings as well

I'll have a cluster, please...

Miscellany

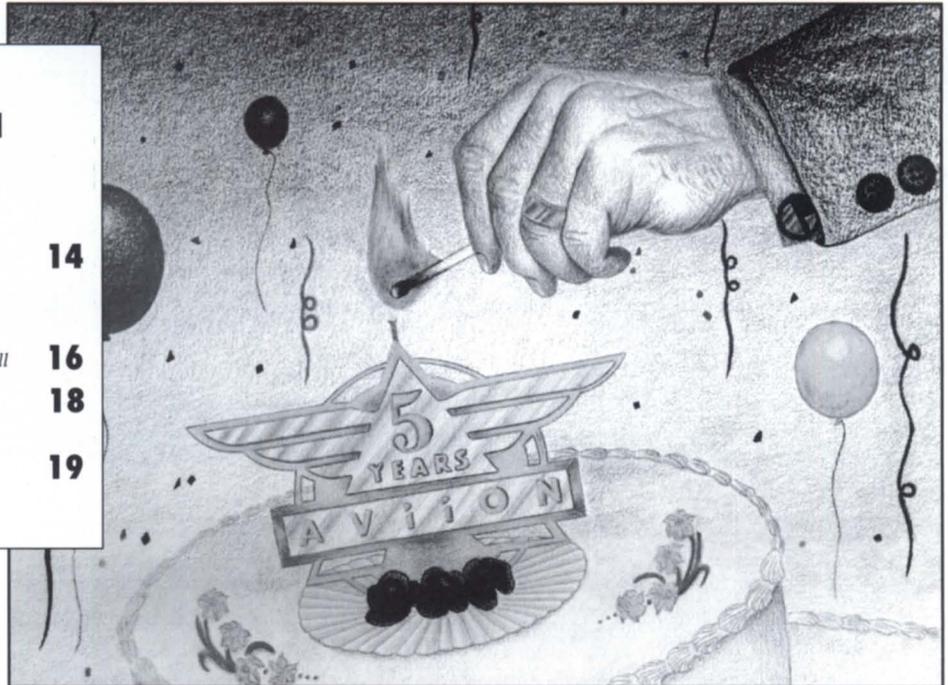
News items from UniForum, CeBIT

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¿Hábla español?

by Doug Johnson

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IN GENERAL

News and notes from the greater Data General community

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UNIX NOTEBOOK

Marketing blitz

After three months of exploring Internet topics, our columnist thought it might be interesting to discuss some more miscellaneous issues. How about: DG's marketing presence, at the recent UniForum show, the arrival of the Motorola PowerPC chip and its implications for the Aviion platform, and DG's solid strategy for automatic processor failover

by David Novy

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MIGRATION

Finding the way

You've got that MV maintenance statement in front of you and you're wondering what you can do to trim costs. Move those Infos applications from AOS/VS and get them up and running on DG/UX

by Murray Bower and Bill Cole

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AVIION PERFORMANCE TUNING

Kernel-tuning utilities

The author continues a series of articles on performance tuning of multi-user system servers. In this installment is a discussion of kernel tuning utilities available for solving some of the most common kernel-related bottlenecks that affect DG/UX overall system performance

by Thomas E. Soukup

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CLI MACRO

Deadwood macros

Is your system plagued with hordes of possibly obsolete or unnecessary macros? The author presents a procedure by which you can get rid of them with a minimum of strain

by William Clark

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PRODUCTS AND SERVICES

The latest products for Data General systems

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DASH items from the Data General Customer Support Center

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Cover design & illustration by John Houser

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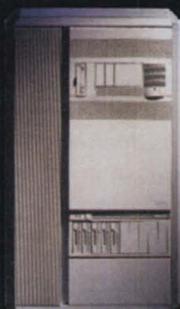
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1. "The CW Guide to Servers," Computerworld, March 22, 1993 and "The CW Guide to Servers and Superservers," Computerworld, January 31, 1994.

2. International Data Corporation, "Data General's Ascent in the UNIX Market," October, 1993

3. "Clash of the Drive Arrays," PC Week, October 11, 1993

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Jan Grossman

Conference traveling

We are approaching NADGUG's fiscal year-end, and it looks as though the group can expect good results again. Many tight controls were implemented during the 1993-94 year that contributed to the successful year. The 1994-95 budget has been approved and will provide the structure for the year's activities.

UK hospitality

In March, NADGUG President Tim Boyer and I traveled to England for the UK Data General User Group annual conference, held in Brighton. It was good to see all our United Kingdom friends and to meet new acquaintances. It intrigues me that NADGUG concerns are echoed across the ocean—MVs are still in use, but many companies are migrating to Unix and Aviiions.

The first day program concentrated on networking topics. British Telecom gave an interesting talk on the future "global highway" that will encompass data, voice, fax, and video on demand. Intelligent networks will provide the network architecture that flows with the appropriate technology. This presentation was followed by a talk on the integration of voice/data/fax through computing, telephony, video conferencing, and home entertainment via the information superhighway. Imagine common worldwide standards by which you can fax a Wordperfect letter directly from your terminal in the U.S. to someone in Australia at the touch of a key.

On the second day we heard about

the disaster-recovery process utilized by a large law firm whose London facilities in four buildings were damaged in a recent bombing. Through the combined efforts of a senior disaster team, offices had been moved to a temporary office site within a week, telephones installed, and a 200-user network in place to support 50 percent of the staff. The firm's MV/9500 came through safely, but many personal computers and the network had been damaged. The presentation emphasized the importance of: 1) good relationships with suppliers; 2) keeping home telephone numbers for all important suppliers, employees and utilities; and 3) having a good disaster-recovery plan in place.

Attending the annual dinner from Data General were Bob Hughes, vice president of worldwide sales, who reported Data General's current state of the union; Bill Zastrow, vice president of office systems, who spoke about the latest in document imaging technology; and Joel Schwartz, vice president of the Aviiion Business Unit. Thank you, UK Data General Users Group, for your hospitality and friendship!

NADGUG 94 in Nashville

Our own NADGUG Board of Governors annual spring meeting took place in mid-April at the Opryland Hotel in Nashville, Tennessee. NADGUG 94 conference attendees are in for a big surprise. Under one roof there are 1,891 rooms, superb restaurants, comfortable lounges, a unique "Cascades" area with an indoor water garden, and more than 315,000 square feet of function space. The Opryland Hotel is truly a luxurious resort setting.

Just a short shuttle ride away are the Opryland Theme Park, the famous Grand Ole Opry, the General Jackson River Boat, and water taxis to go downtown.

Don't miss NADGUG 94, not just for the superb conference program but also to enjoy Nashville's Old and New South charms. See you October 17-20. Δ

Jan Grossman is NADGUG's immediate past president and chairperson of the Planning Committee.

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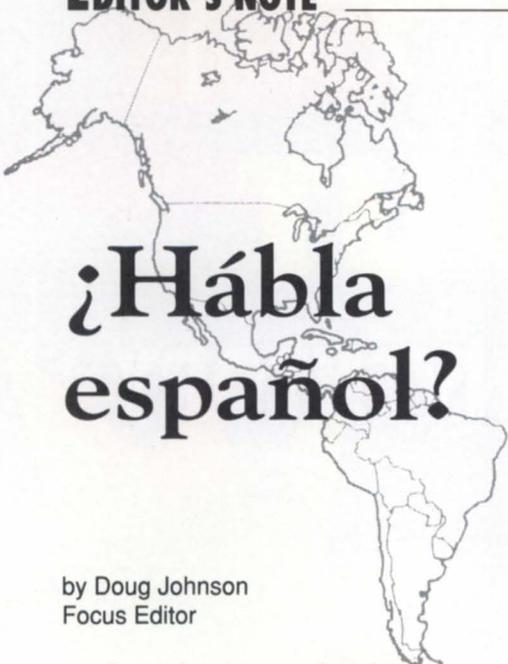
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¿Hábla español?

by Doug Johnson
Focus Editor

It was late into a rather slow Wednesday afternoon last January 19 when the phone rang at work, and I happened to pick it up. A hesitant male voice on the other end asked, "¿Hábla español?"

Yes, I answered, a little. *Sí, hablo es-*

pañol un poquito.

I probably said it too well, though, because the guy then launched (in Spanish) into an entire monologue. He was calling about a subscription to "nodgoog." That's how he pronounced NADGUG. He was calling from Chihuahua in Mexico.

I thought he said he was with Data General in Chihuahua, but he might have been referring to his company as being a Data General site, I wasn't sure. And he asked about a subscription, but maybe he was referring to a *membership*. He didn't say "Focus."

We get calls on occasion from people asking about NADGUG memberships, and we refer them to the organization's intrepid membership coordinator—Michelle Dube at Danieli

& O'Keefe Associates. Just for the record, Turnkey Publishing in Austin, Texas, produces *Focus* magazine; DOK in Sudbury, Massachusetts, keeps track of memberships and subscriptions—and handles the annual conference, orders for the software library, and lots of other various and sundry tasks.

Anyway, my book-learned Spanish is good enough to talk about everyday things when visiting my non-English-speaking *suegra* (mother-in-law) in El Paso, but it wasn't good enough to help this caller very much. Quite simply, I couldn't understand enough of what he was trying to say.

Perhaps it's merely ironic that the North American Free Trade Agreement (NAFTA) took effect at the beginning of this year, and then only a few weeks later I was getting a sobering

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—D.G. Review,
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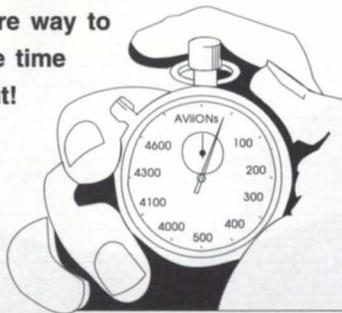
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lesson in the practical realities of business and commerce between neighboring countries that don't share a common language. Just take a moment to look at a map and you can see:

- 1) that Mexico is, in fact, part of North America;
- 2) how deeply into Mexico Texas juts (Mexico isn't just south of Austin; it's also west); and
- 3) the USA shares a 2,000-mile border with Mexico.

Luckily for me, my Mexican caller put another guy on the phone whose accented English was still far more effective than my Spanish. We proceeded to establish that yes, they *were* with Data General in Chihuahua, Mexico; and yes, they wanted a subscription to *Focus*; and yes, I had to refer them to DOK in Massachusetts. So Michelle, you have me to thank for this one in case you got a call about "nodgoog."

Such a small but no less humbling example reminds me of another point about which I haven't spent much time thinking, and maybe I should. Maybe you should think about it, too: Data General makes about half of its revenues each year from foreign sales. About half. Data General's total revenues are about \$1.1 billion each year. About half of that would be more than \$500 million. Isn't that amazing? It should start you to wondering about all those international DG users. Data General's own press announcements mention that there's now an installed base of more than 25,000 Aviions (in just 5 years) valued at about \$1.25 billion.

Those thousands of new Aviion users should join NADGUG and swell the ranks impressively. It is NADGUG's task to invite and recruit them. NADGUG is becoming more international all the time—and that's a good thing, too, because if the organization weren't already doing that, it'd have to. Internationalization is inevitable. Trade agreements like NAFTA, extraordinary growth of the Internet, partnerships and alliances across national boundaries, are just some of the forces driving the headlong evolution of global commerce.



Are your ears burning?

Speaking of NADGUG and opportunities, are your ears burning? Isn't that supposed to happen when you're being talked about?

To be more precise, you would have

(from left) Treasurer Al Devitt, President Tim Boyer, and Vice President Steve Pounds wade through the agenda during the NADGUG spring board meeting last April 16 in Nashville.

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experienced this phenomenon the weekend of April 16, when NADGUG's Board of Governors gathered in Nashville for their mid-year meeting. They were talking all about you, with *you* meaning:

- faithful NADGUG members, how to create more of you, how to get more of you actively involved;

- those of you who get *Focus* through whatever channels, but have yet to become members; and
- those of you (and those you know) who use Data General equipment but who for reasons unfathomable haven't become members; apparently there are a lot of you.

The NADGUG board hopes your ears

were burning, and that you will do something about it: like join up. This is a great time to do so.

The NADGUG 94 conference will be hosted at Nashville's incredibly immense and sumptuous Opryland Hotel. You must see this place to believe it, and even then it will astound you. NADGUG 94, set for October 17-20, is now only four months away, so make your plans.

Info overload, but it was great

In late spring there was a huge BOOM! here at the *Focus* office as an enormous packet of press materials direct from Data General-Westboro landed massively on my desk.

Just the "Included in this announcement kit are:" page was impressive. It summarized releases about Aviion's 5th anniversary and Data General's announcements at the big UniForum show in San Francisco, Aviion clusters, new software partners, PCs, Clariion tape arrays and Clariion for Windows NT. There were software partnerships, strategic distributors, further detailed product info, customer and partner profiles, backgrounders on DG/UX, software partnerships, high availability in the open enterprise, and "The New Data General,"—and even a fun item about the Talking Propellerheads, who entertained the UniForum crowds.

Did you note the international flavor of some of Data General's product announcements and software alliances this spring? A lot of news emanated from the CeBIT '94 exposition in Hannover, Germany. Remember last November the software-alliance announcements out of London? There's definitely a pattern here . . .

The huge DG-UniForum-CeBIT press packet clearly constituted a case of information overload, but I rather enjoyed it. Maybe someday these packets will be distributed via CD-ROM (I need to get one of those), but there's still no substitute for a big, thick, impressive paper stack of *stuff*.

Congratulations to the PR crew at DG for knocking themselves out on this. All those announcements on disk totaled more than 141,000 characters. An icepack for the typists, please. Δ

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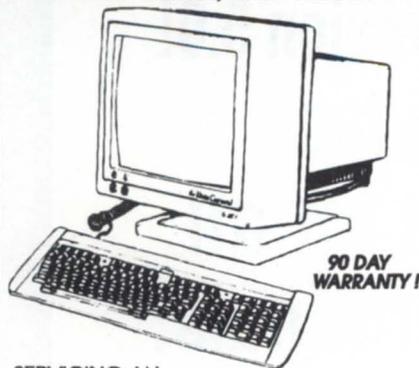
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IN GENERAL

More losses, layoffs at DG

Data General reported that it will lay off between 850 and 1,050 employees by the end of the year, following a net loss of \$48 million for its second quarter of fiscal year 1994. The loss includes a restructuring charge of \$35 million.

Although total revenues for the second quarter (\$282.9 million) increased compared to last year's second quarter (\$267.4 million), they were not enough to offset a sharp decrease in revenue from sales of Data General's proprietary Eclipse MV minicomputer line. Revenues from the sale of proprietary systems represented just 14 percent of the company's total product revenue for the quarter, compared to 29 percent during the same quarter a year ago.

Data General reported strong

growth in revenues from the Unix-based Aviiion product line, as well as increased revenue from the Clariion line of open storage systems.

"While we have made significant progress toward becoming a supplier of open systems products and services, we continue to have a cost structure that is out of line with an open systems business model," said **Ronald L. Skates**, Data General's president and chief executive officer. "We have, therefore, identified additional cost reduction steps which include further worldwide workforce reductions." At the beginning of fiscal year 1994 Data General employed 6,550 people.

The company describes its financial position as "strong" with cash and marketable securities of \$190 million at the

DATA GENERAL CORPORATION Condensed Consolidated Statements of Operations (In millions except per-share amounts)

	QUARTER ENDED		6 MONTHS ENDED	
	3/26/94	3/27/93	3/26/94	3/27/93
Revenues				
Product	\$184.3	\$167.3	\$348.0	\$343.0
Service	98.6	100.1	196.1	204.1
Total revenues	282.9	267.4	544.1	547.1
Costs & expenses				
Cost of product revenues	122.8	102.2	234.4	206.0
Cost of service revenues	63.0	58.1	120.5	117.7
Research & development	22.7	26.0	46.2	51.9
Selling, general, & administrative.....	87.0	85.8	174.1	172.0
Restructuring charge.....	35.0	—	35.0	—
Total costs & expenses	330.5	272.1	610.2	547.6
Loss from operations	(47.6)	(4.7)	(66.1)	(0.5)
Interest income	1.3	2.1	2.8	4.3
Interest expense	3.5	3.6	7.0	7.4
Other income, net	2.3	—	2.3	—
Loss before income taxes	(47.5)	(6.2)	(68.0)	(3.6)
Income tax provision.....	0.5	1.4	1.1	3.2
Net loss	\$(48.0)	\$(7.6)	\$(69.1)	\$(6.8)
Primary & fully diluted net loss per share.....	\$(1.35)	\$(0.22)	\$(1.95)	\$(0.20)
Weighted avg. shares outstanding	35.6	34.3	35.5	34.8

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AV7408 SMD Disk Control	1,000
AV7430-K SCSI-2 Ctrl AV4XXX	1,200
AV7418 VDA 255	2,000
AV7206 Graphics Pkg 8 Bit	1,000
AV7019 32MB ECC Mem Pkg	2,500
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MV2000-2 W/4MB, 21MB Tape	700
MV15/20 Expansion Chassis	700
8MB Add-on Mem For MV2000-2	450
4MB Add-on Mem For MV2000-2	350
8MB Add-on Mem For MV20000	350
16MB Add-on Mem For MV20000	1,000
MV1000 W/4MB, 21MB Tape	750
80038 4MB Add-on Mem-MV1000	600
MV7800 CPU Board	350
MV4/10000 Expansion Chassis	500

COMMUNICATIONS

4626 LAC 32 W/TCB	\$1,500
4623 IAC-24 W/TCB	1,400
4712 LAC 16 RS422	800
4806 LMC-8 MV2000	250
4380 ISC/2 RS232	150
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4610 Term Server RS422	500
CSS/1 Chassis Brown/White	400
4532A ILC W/XCVR RV 18	1,500
IAC-16 or IAC-16/2 W/TCB	150
IAC-8/2 W/TCB	150
IAC/8 W/Modem Ctrl Rev 25	250
4254 DCU 200	150

DISK

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6685-F 1 G/B SCSI Disk	1,500
6796-F 520MB SCSI S/E	New 1,100
6554 662MB SCSI Disk FH	950
6239 592MB Disk Drive	900
6236 354MB Subsystem	300
DG 6328 71MB Disk	350
DG 7908-ZA 520MB HADA	1,700
HRMC-2 737MB Disk Ctrlr	800
Seagate 500MB SCSI Disk HH	500
6621 1.2 G/B Rams Disk S/S	4,500
6443 322MB FH SCSI Disk	500

DISPLAYS

6500 D/216 W/KYBD	\$165
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D/413-A W/KYBD	Used 275
D/217-G W/KYBD	New 325
D/217-A W/KYBD	New 325
D/216+ Green W/KYBD	195
D/216+ W/Barcode	New 250
D/462+ W/KYBD	325
D/210, D/214 W/KYBD	110
D/211, D/215 W/KYBD	135
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IN GENERAL

end of the second quarter, an increase of \$22.2 million from the first quarter.

The book of Oracle

Data General added to its long history of open systems initiatives with **Oracle Corporation** by becoming a charter member of Oracle's Cooperative Services Initiative, which is dedicated to reducing the time, cost, and uncertainty of migrating client-server packages to open systems.

The result of the alliance will be broader, more coordinated efforts between Data General and Oracle to provide legacy applications migration, transitional outsourcing, applications benchmarking, systems management, and training.

Data General will establish several sites—four in the United States and Europe, and two in Asia/Pacific—dedicated to benchmarking and performance tuning, system sizing, configuration, and testing of Oracle Cooperative Applications. These sites are in addition to Data General's existing Oracle Competency Center in Research Triangle Park, North Carolina, and Oracle Benchmarking facilities in Westboro and the United Kingdom.

On the other hand, a chapter in the Oracle/Data General handbook is closing. Oracle announced it will no longer support Eclipse MV users after the end of 1995. Oracle will release Oracle 7 for the MV this summer, bringing MV users up to the current revision of Oracle available on Aviiions, according to **Joe Mettee**, director of product marketing for Data General's Eclipse Business Unit.

Some features will not be available in the MV version, like online documentation and the upgraded SQLnet 2.0 for connecting the data base to other operating systems and networks.

Teamed up to network

Uniplex Integration Systems, Inc., of Irving, Texas, announced the signing of a distribution contract with one of the largest networking distributors worldwide, **Markham Computer Corporation** (MCC) of Ontario, Canada. Under the terms of the agreement, MCC will distribute Uniplex Business Software, onGO, Write/Paint/Draw, and Uniplex Mail.

"The solutions and services that Markham provide are an ideal match with Uniplex products," said **Lynne Boyd**, Uniplex president. "Our most successful area of distribution has been with companies like Markham who specialize in networking and Unix."

According to **Paul Batra**, Markham Computer's executive vice president, the partnership with Uniplex will help round out its offers to Canadian resellers, and offer Uniplex with platforms such as Motorola, Wyse, and **Data General**, which are also distributed by Markham. △

*In General is compiled by **Robin Perry**. Editorial contributions may be sent to: Focus magazine, P.O. Box 200549, Austin, TX 78720; 512/335-2286 phone or 512/335-3083 fax.*

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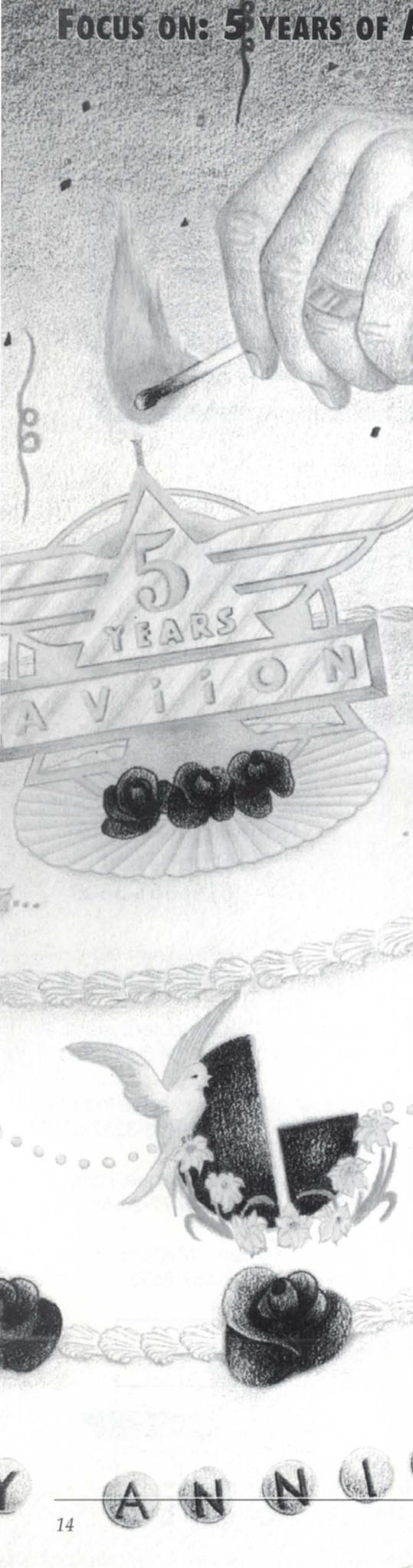
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All grown up

SYNOPSIS

Healthy families have a way of growing and flourishing. That's the way it's been for Data General and its Aviion line of servers and workstations since their introduction in 1989.

In the beginning . . .

San Francisco (UniForum), Feb. 28, 1989—Data General Corporation last night at a press conference here unveiled the first of a family of RISC-based Aviion computer systems, servers, and workstations and outlined its plan for building a distributed, networked computing environment around them . . .

. . . The 88000-based family establishes industry-leading price/performance standards for RISC-based systems. The systems perform at 20 or 40 MIPS or greater and the workstations perform at 17 or 20 MIPS . . .



by Doug Johnson
Focus Editor

"War is in the air because the spoils are so huge," observed *FOR*TUNE magazine about the future of RISC-based computing. That was in early October 1988. Industry analysts were hailing the next wave—the era of network computing. Workstation-based systems would lead the way, they said, and the major players were strapping on the armor and preparing to do battle.

The weapon of choice would be an intriguing manifestation called RISC: reduced instruction set computing. Legendary warriors such as IBM and DEC planned to deploy it. "Virtually all major computer makers (and most microprocessor manufacturers) are either selling RISC designs or racing to bring them to market," noted *FOR*TUNE. "Sun, Apollo, and Hewlett-Packard already sell workstations based on RISC. Other large computer makers, including Unisys and Data General in the U.S. and Nixdorf in Europe, plan to follow suit."

In 1989 Data General joined the fray, introducing its Aviion family of RISC-based workstations and servers, all running on DG's Unix variant, DG/UX, and employing the 88000-series microchip made by Motorola.

Aviion would prove to be Data General's salvation, predicted *FOR*BES magazine in its issue of Nov. 11, 1991. "Unix is the hot operating system of the 1990s. It aims to free customers from proprietary systems and give them the freedom to interconnect different brands of computers and connect the boxes across local and wide area networks."

Commendable goals, those. Since 1989 Data General has spun the ship's wheel and sailed in a new direction in order to pursue them.

Y
A N N I V E R S
HAYSA

FOCUS ON: 5 YEARS OF AVIION

The times since have been anything but easy. Witness spectacular and painful downsizings in personnel over the years (from more than 17,000 employees in 1986 to less than 6,000 in 1994, a process that was ongoing even before Aviion's advent), and frustrating as well as persistent year-end financial loss announcements.

Yearly revenues have remained in the \$1.1 billion range, but now a much smaller, leaner Data General is striding like a determined triathlete to expand its Aviion revenues fast enough to offset the ongoing decline in the AOS/VS-based Eclipse MV minicomputer line. DG's press releases point out that Aviion and other open systems business (including Aviion servers, PCs, storage systems, and open services) now account for 80 percent of the company's product revenues. In 1994, Aviion would be a \$600 million *FORTUNE* 500 company were it to operate by itself.

The Aviion family has grown and flourished. Data General counts an installed customer base of 25,000 systems, valued at more than \$1.25 billion. Aviion growth is the cornerstone of DG's future in the open-systems business. Aviion's success and popularity were touted in a recent report from International Data Corporation, which tabbed the AV line for 1992 as the market-share leader in the United States in medium-scale commercial Unix systems. IDC also noted that Aviion's growth rate in 1991 and 1992 was humming along at more than four times that of the overall Unix midrange market.

Data General has never been one to enjoy lavish attention from industry publications, but *COMPUTERWORLD* magazine's "Buyer's Scorecard" user survey did name the Aviion server line tops in a competitive list that included Hewlett-Packard, DEC, IBM, and Sun Microsystems.

"Aviion is an industry success story by every conceivable measurement, whether it be revenue growth, market acceptance, or technology," said Ronald L. Skates, the company's president and chief executive officer.

"We believe that Aviion is the finest line of servers in the industry, offering the best combination of scalability, high availability and value in enterprise-class systems," said Stephen

Gardner, vice president of Corporate Marketing.

In any case, Aviion celebrates its 5th anniversary this year, and it's an anniversary that tips its hat to the power of transformation. Five years ago Data General was an Eclipse MV minicomputer company. The byword was "proprietary," but a swirling cauldron of forces were in the process of remaking and reorienting the entire computer industry. An ongoing, fundamental shift from proprietary to open systems (in Data General's case from AOS/VS to Unix) was coupled with and fueled by rapidly dropping component costs—ever more powerful and ever cheaper microprocessors. New competitors crowded into an already jam-packed marketplace.

No longer was it good enough merely to make the fastest system. A new focus on software and services forced companies that wanted to succeed in the long run to decide what they themselves did well, and then form alliances and partnerships with other companies to complete the package.

In just half a decade Data General the proprietary-MV-AOS/VS company evolved itself into the Aviion-Unix—"Solutions for the Open Enterprise" company, and with a growing list of software partners.

"Open systems computing presents the best opportunity for enterprises to fully realize the enormous benefits of information technology," said Skates. We believe that our offering—combining high-value technologies and tremendous expertise—provides the best route for open systems customers to succeed."

According to Tom West, DG senior vice president for advanced development, "We're taking building blocks of superior technology and packaging them in a way that brings the greatest advantage to the commercial computer user. We're not obsessed with designing the fastest chip or bus or disk. Our objective is to successfully integrate the latest technology into our product line and do it before our competitors do."

Looking back now with razor-sharp hindsight is fun, to see connections now where before all was chaos: Hey, is it mere coincidence that the Berlin Wall fell later in the same year that Data General introduced Aviion? Hmmmmmm . . . Δ

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7019 32MB AV43/4600 memory	\$2,900
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MV15/20 32MB memory.....	\$2,900
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Family additions

At booth #2441 during last March's UniForum '94 exhibition, Data General celebrated Aviiion's 5th birthday by showing off the new family members: the AV 4500 entry-level server for up to 32 users; the high-end AV 9500 16-way system for up to 1,000 users; and the AV 450 and AV 550 workstations, especially suited as development platforms.

To simulate an authentic enterprise environment Data General's "At Work" demo addressed four important areas:

1) **Enterprise resource management** featured an integrated client-server financial application that included Oracle Financials, Datalogix International's Global Enterprise Manufacturing Management System (GEMMS), Platinum Software's SeQueL to Platinum, and Data General's AV Image software. The demonstration ran on Sybase's relational data base management system (RDBMS) on an Aviiion and Windows NT server. PC and workstation users accessed the data base from both.

2) An **enterprise re-engineering** display highlighted Cincom's Supra Server multimedia data base and previewed multimedia applications for the retail and healthcare industries. A simultaneous demonstration of

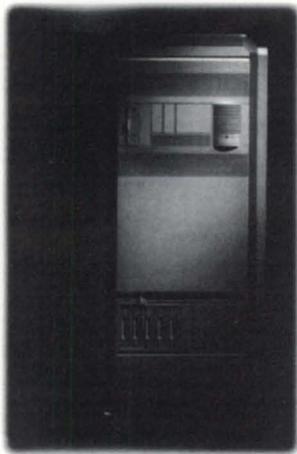
the Forté development environment spotlighted reducing complexities in building client-server applications.

3) A **system infrastructure** display demonstrated Computer Associates' CA-Unicenter for DG/UX's operating system. Features offering a consistent look and feel included integrated systems management functions of security, storage management, workload scheduling, console automation, spool management, performance monitoring, report distribution, and resource accounting.

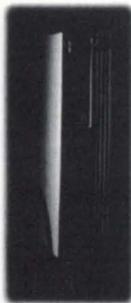
4) Members of Data General's newly announced Systems Integration Business Unit were on hand to discuss **open enterprise implementations**.

AVIION SERVERS FOR THE OPEN ENTERPRISE—FAMILY CHART

	AV 4500	AV 5500	AV 5500	AV 8500	AV 8500	AV 9500					
Processors	1	1	2	2	4	2	4	6	8	12	16
MIPS	80	80	160	180	360	180	360	540	720	1200	1600
Cache	16 KB	256 KB	512 KB	0.5 MB	1 MB	2 MB	4 MB	6 MB	8 MB	108 MB	144 MB
Memory											
Min.	16 MB	32 MB	32 MB	64 MB	64 MB	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB
Max.	256 MB	256 MB	256 MB	2 GB							
VME Options											
VME Slots Internal	N/A	2	2	5	5	5	5	5	5	5	5
VME Slots External	N/A	N/A	N/A	N/A	N/A	8/16	8/16	8/16	8/16	8/16	8/16
Form Factor	N/A	6U									
Packaging	Desktop	Deskside	Deskside	Office	Office	Rack	Rack	Rack	Rack	Rack	Rack
Mass Storage											
Max Internal	2 GB	8 GB	8 GB	10 GB	10 GB	10 GB	10 GB	10 GB	10 GB	10 GB	10 GB
Max External	170 GB	330 GB	330 GB	1.2 TB	1.2 TB	1.9 TB					
Clarion Disk Array	yes										
Optical	yes										
Backup/Load Devices											
CD-ROM	yes	yes	yes	std							
Cartridge	8 mm 525 QIC										
Clarion Tape Array	yes										
Reel-to-Reel 1600/6250	yes										
Communications											
LAN	1-2	1-5	1-5	1-4	1-4	1-8	1-8	1-8	1-8	1-8	1-8
Synchronous	1	1-7	1-7	12	12	36	36	36	36	36	36
Asynchronous	3-64	3-512	3-512	3-1020	3-1020	3-2040	3-2040	3-2040	3-2040	3-2040	3-2040
Parallel Printer	INT	INT	INT	LAN							
Users	5-32	10-65	40-125	50-150	125-300	50-175	150-325	300-425	400-550	500-850	800-1000
High-Availability Features											
Fault-Tolerant Disk Array	yes										
System Failover Capable	yes										
Power											
N+1 Cooling	N/A	N/A	N/A	std							
N+1 Power	N/A	N/A	N/A	N/A	N/A	std	std	std	std	std	std
Uninterruptible Power Supply	option										
Recoverable from:											
CPU Failure	N/A	N/A	N/A	yes							
Memory Failure	N/A	N/A	N/A	yes							
I/O Channel Failure	N/A	N/A	N/A	yes							
VME Channel Failure	N/A	N/A	N/A	N/A	N/A	yes	yes	yes	yes	yes	yes



AV 9500 enterprise server



AV 4500 enterprise server



AV workstations

"Data General is committed to offering the broadest range of open enterprise solutions in the industry," said Stephen Gardner, vice president of DG's corporate marketing. "In just five years since introducing the Aviion, we have forged hundreds of strategic software partnerships encompassing more than 3,000 software applications, which have allowed us to provide tailored solutions to even the largest enterprises."

AV 9500 enterprise server

"We continue to expand our range of offerings at the high and low end of the Aviion family," said Joel Schwartz, vice president of the Data General Aviion Business Unit. "And we are on schedule with our high-end roadmap, which we revealed in June 1993."

The 12- and 16-way AV 9500 servers occupy the top echelon of the Aviion family. The 16-way symmetric multiprocessing (SMP) model can process 1.6 billion instructions per second (1,600 MIPS) and delivers more than 1,000 transactions per second. They are priced from less than \$80,000 for a 2-way SMP system, up to \$400,000 for the 12- and 16-way models.

Aviion server performance is enhanced by the recently released DG/UX 5.4 Release 3, which includes multi-path I/O, I/P address takeover for LAN failover, and Distributed Lock Manager for AV Clusters support. SMP performance is improved by POSIX 1003.4a Threads support.

AV 4500 enterprise server

The AV 4500 server provides a departmental platform for up to 32 users. It supports time-sharing, distributed computing, and data base applica-

tions—from a desktide or desktop package. It's the lowest-priced Data General server, starting at \$9,490. The AV 4500 is targeted at enterprises needing a wide performance range of binary-compatible servers to meet strategic IT requirements. The AV 4500's primary focus is for large networks of distributed servers surrounding a larger enterprise server and storage capability, but the AV 4500 is also suited to end users and resellers seeking to apply advanced computing and storage techniques to smaller enterprises, dedicated departmental applications, and remote offices.

The single-processor AV 4500 server offers an enhanced I/O subsystem featuring fast/wide SCSI-II capability, allowing it to be used with Clariion disk and tape arrays.

AV 450, AV 550 workstations

The new Aviion workstations, AV 450 and AV 550, are binary-compatible with Aviion servers, suiting them as development platforms for open enterprise applications. They are intended for use in information management and retrieval, geographical information systems (GIS), and desktop publishing. The AV 450 is a single-processor system supporting up to 12 GB mass storage. It is available as a single- or dual-processor system, with 256 KB of cache each. Maximum memory capacity is 256 MB ECC memory. The AV 550 supports up to 172 GB mass storage, including Clariion disk and tape arrays.

Pricing for the AV 450 starts at \$11,995 including 520 MB disk, 8-bit color graphics, and a 17-inch monitor. A similarly equipped AV 550 starts at \$14,995. Δ

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I'll have a cluster, please

"Aviiion Clusters" may sound like the latest tasty chocolate-and-peanut candy combination, but really it's an impressively neat way to get independent computer systems to cooperate.

A tightly coupled system is more what we're used to these days. That might be your average screaming-fast Aviiion AV 9500 server. Its 16 processors share memory and run under one operating system that decides what processor does what and when. By contrast a *loosely* coupled system—a **cluster**—consists of a number of independent computer systems that work in tandem in carrying out tasks, even though they don't share memory.

From the end user's perspective, several independent computer systems perform as one—sharing resources, such as disk files—and you get a single image of your data base existing across several systems. If one system fails, the user can continue working because others in the cluster pick up the slack. Clusters also offer advantages for system managers: systems may be taken off-line for maintenance or software upgrades without causing interruptions to users. Clustering improves availability compared with a typical mainframe system—which is online during the day, does batch jobs at night, and may require software changes and maintenance over the weekend.

"We call this ability to continuously access data 'Global Availability'," said Stephen Gardner, DG's vice president of corporate marketing. Sophisticated software is what makes clustering work, and sophisticated software in action was what Data General demonstrated last March at CeBIT in Germany and UniForum in San Francisco. Four Aviiion AV 5500 midrange servers formed an AV cluster by closely integrating Oracle Corporation's "Oracle Parallel Server" software—which itself combines the performance and functionality of the Oracle 7 RDBMS (relational data base management system)—along with the Aviiion Distributed Lock Manager cluster software, local area network (LAN) interconnection software, the Clariion disk array with its dual-ported RAID technology, and the DG/UX operating system's disk-management capabilities.

DG's entire range of Aviiion servers can be used in clustered configurations. Mr. Gardner noted that this capability will expand to as many as eight systems. ▴

Miscellany

SYNOPSIS

News items from UniForum and CeBIT.

New Clariions

A new fast-write cache is available with the midrange Clariion 2000 midrange series (**Model 2200**—\$54,000, 20 GB storage) for very high data throughput, providing response times up to 3,200 I/O requests per second, optimizing performance for RAID-5 applications. The Clariion 1000 low-end series (**Model 1100**—\$19,100, 3 GB storage) is suited for smaller systems, but offers storage-management features of larger models, including write-cache.

The new Clariion Series 4000 **Model 4300** tape array subsystem incorporates the DDS-2 tape drive, there-

by doubling the storage capacity of the prior Series 4000 **Model 4400** array, which used DDS-1 drives. The new 4300 can accommodate up to seven 4 mm DAT drives, each with up to 8 GB of storage capacity using DDS-2 data-compression techniques. The new tape array can be used for unattended backup of data bases as large as 48 GB. Clariion 4300 pricing starts at \$19,000 for a 5-drive unit.

The **Clariion Business Unit** announced support for Windows NT-based servers with its Clariion family of open storage disk arrays.

Clariion systems already work with Unix (IBM RS/6000 and Sun SPARCserver), and Novell Netware platforms in enterprise, departmental, and workgroup environments.

New PCs

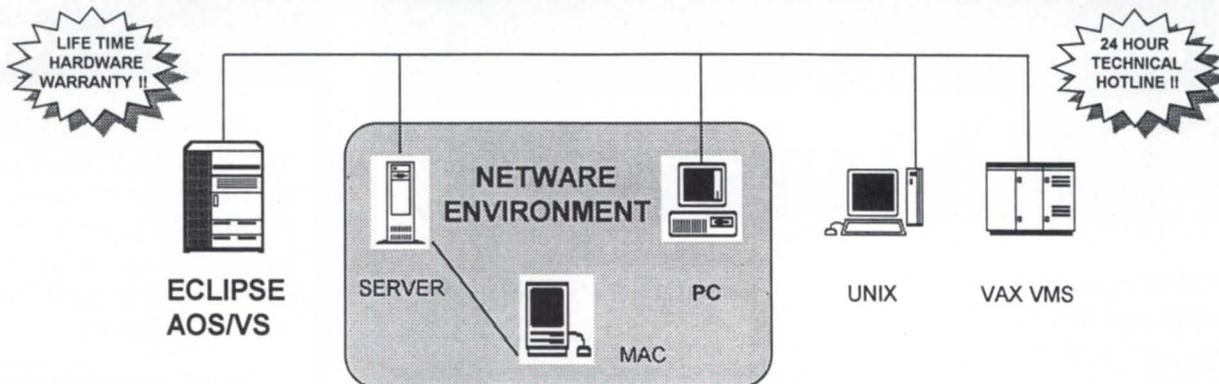
DG unveiled a series of Pentium-based PC systems offering users a choice of operating system support, including Windows NT, Novell Netware, SCO Unix, I/Unix, and MS-Windows. The new **P60/TE2** PC systems support single or dual Pentium processors, up to 192 MB of ECC memory, 16 GB of internal disk storage, dual-port SCSI, and DG's Clariion disk array systems. Prices start at \$8,295 for a 16 MB model; a system ready for Clariion and Novell applications, 16 MB memory and 520 MB hard drive storage is \$11,695.

Alliances & partnerships

DG announced 17 new or enhanced agreements with the following leading software vendors:

Baan International: ISV agreement to promote Triton software application on Aviiion servers.

AOS/VS to NETWARE INTEGRATION



NOVELL Brings NetWare into Open Systems networking with support for industry standard NFS (Network File System) and TCP/IP networking protocols. Your NetWare servers already have the foundation for an enterprise-wide Open Systems integration strategy.

C&C brings AOS/VS into Open Systems networking by providing NFS and TCP/IP networking solutions for AOS/VS systems. You get network terminal access, file transfer, file sharing, backup, printing, electronic mail, and much more. This high performance, cost-effective software will allow you to utilize industry standard protocols.

This Open Systems networking architecture also provides integration from AOS/VS to other systems such as DEC, UNIX, HP, IBM, and many others.



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Computer Associates: DG to market, sell, and support worldwide CA-Unicenter, systems management solution for client-server market.

CSC Healthcare Systems: VAR agreement to provide MHC Managed Healthcare Information System on Aviiion servers.

Datatel: To provide high-performance RISC solutions to higher education institutions.

Expressway Technologies: To make the Expressway Decision Support Query Accelerator product available on Aviiion.

Forte Software: A cross-platform development tool in beta testing on Aviiion.

FourGen Software: ISV relationship to promote FourGen's enterprise client-server financial applications on Aviiion servers.

Lucas Management: Artemis 7000 project-management software available on Aviiion.

MUST Software: Partnership to jointly market Nomad 4GL application tools on Aviiion.

Peterborough Software: Worldwide ISV agreement to bring Open Door human resources product to Aviiion platform.

Platinum Software: To use Aviiion servers in several of Platinum's development centers for developing new modules of SeQueL to Platinum financial application software.

Progress Software: Version 7 application development environment ported to Aviiion.

QStar Technologies: Expanded 3-year OEM relationship to include QStar's hierarchical storage management product, MasterMind.

UniKix Technologies: To distribute the UniKix transaction processing software product in Europe.

VISystems: Commitment to support PL/1-based CICS applications on Aviiion.

The Workstation Group: ISV agreement, ported uni-SPF, uni-REXX, and uni-XEDIT migration products to Aviiion.

Xerox: Worldwide ISV agreement to make Chess software available on Aviiion.

According to Data General, more than 3,000 commercial Unix-based applications have been ported to-date to the Aviiion platform from leading software providers. Another 3,000 are available through Pick on Unix and other Unix rehosting software tools.

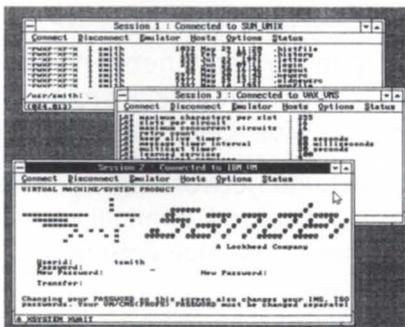
DG has expanded its worldwide position in several key markets with the signing of strategic distribution agreements with a number of companies, including **Avnet, Inc.**, the largest computer reseller in the U.S. Other companies that will resell DG's open systems product line are **Soedarpo Corporation** (Indonesia), **Telita Computer** (Malaysia); **ECsoft** (Norway), and **WM-data** (Sweden). △

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FOCUS MAGAZINE NADGUG's monthly publication is devoted exclusively to users of Data General equipment. FOCUS is full of technical articles, product reviews, user profiles, and announcements of the latest products — no matter what kinds of systems you're running, FOCUS has the information you need!

ANNUAL CONFERENCE AND EXPOSITION NADGUG's Conference and Exposition is part of the largest annual Data General gathering in the world. In conjunction with DG's Sales and Systems Engineers meeting and SOURCE, the annual VAR conference, NADGUG provides Data General users the ultimate forum to confer with everyone who is anyone in the Data General community.

ELECTRONIC BULLETIN BOARDS NADGUG's member bulletin board system is run by Rational Data Systems, with US Robotics modems for service from 1200 to 9600 baud. Dial 415-499-7628 to communicate with other users and to download/upload programs and utilities!

NADGUG members can also access Data General's DASH, or Direct Access for Support Help, Bulletin Board. Dial 800-327-4272 for on-line sign up today!

SOFTWARE LIBRARY NADGUG now has two software collections available for members. Both the AOS/VS and UNIX library tapes are full of programs, utilities, and macros — for any Data General system!

NADGUG MEMBER DIRECTORY The annual directory provides members with a personal guide to users with similar hardware, software, and system needs. This year's directory will present for the first time a Product/Service section.

REQUEST FOR ENHANCEMENT PROCESS Through NADGUG's Special Interest Groups, members have the opportunity to review and prioritize specific product Requests for Enhancements (RFEs). In addition, at NADGUG's annual conference, SIG forums review product enhancements and present them to the development teams with their recommendation for inclusion in the standard product or for follow-up.

REGIONAL AND SPECIAL INTEREST GROUPS RIGs and SIGs are two of the most effective ways that NADGUG promotes the free-flowing interchange of valuable information. RIGs are organized by people who are interested in getting together on special occasions or on a regular basis. SIGs are put together by people who want to share information about common products, technologies, or applications. Join one today!

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David Novy

Marketing blitz

SYNOPSIS

After three months of exploring Internet topics, our columnist thought it might be interesting to discuss some more miscellaneous issues. How about: DG's marketing presence at the recent UniForum show, the arrival of the Motorola PowerPC chip and its implications for the Aviion platform, and DG's solid strategy for automatic processor failover.

Colleagues returning from the UniForum event last March in San Francisco reported that Data General made a tremendous marketing effort. The DG booth was packed most of the time, too.

This marketing blitz could not have come at a better time. Data General is about to launch its 16-processor machine, the Aviion AV 9500, which will hold its own with most mainframes at a fraction of the cost. (A high-performance mainframe can easily cost more than \$5 million). If you combine several 16-processor machines as a distributed server or a replication server, there are very few commercial applications in corporate America that a cluster of such machines cannot handle.

At UniForum Data General was handing out colorful, well-written, and informative information packets about Data General, its product lines, and its third-party software partners. You might ask if your sales representative has a copy of the packet you could borrow. It makes for some very interesting reading.

The Motorola PowerPC arrives

Apple Computer in March began selling its highly anticipated "PowerPC" line of microcomputers. This arrival has implications for Data General users in that the new Apple PC is based on the Motorola PowerPC microprocessor, which many industry watchers believe will eventually replace the

Motorola 88110 microprocessor—the heart of the DG Aviion product line.

It is interesting to observe that the PowerPC is pin-compatible with the MC 88110 and that only about 5 percent of the DG/UX Unix code is processor-dependent. I believe DG is wise not to change processors at this time. The performance of the PowerPC chip is excellent—it uses much less power and it outperforms that Intel Pentium. However, at this time the PowerPC cannot outperform an MC 88110. The server version of the PowerPC chip is not due until late 1994 or early 1995.

At present and as far as Data General is concerned, performance and reliability are more important than using a highly publicized microprocessor—especially when the Motorola 88110 is clearly showing its advantages in the area of symmetric multiprocessing. There may come a day when DG announces it will switch to the PowerPC, but don't look for it until sometime in 1995.

Automatic processor failover

One feature that may be overlooked when purchasing a Unix system is the system's ability to failover automatically to a backup machine in case of a system failure of the primary machine. Data General has one of the best high-availability stories in the industry, and the company includes the automatic processor failover software with the DG/UX software license. The same cannot be said for DG's competitors.

Automatic processor failover is an important aspect of Unix system management. As Unix is used for more and more mission-critical applications, it has reached the point that if certain Unix machines fail, the businesses that depend on them are faced with huge monetary losses. I know of certain Unix systems where just one day's worth of downtime will pay for a complete backup system.

Data General provides three levels of redundancy to help greatly reduce recovery time from system failures.

The first level of high availability is *operator-initiated* failover. System failover involves switching accounts from a system to a backup system after a primary system failure. The failover process ensures that there is no data loss during either the failure or during the switch to the backup system. Applications are restarted on the backup system. If the application supports a transaction monitor, transactions can be restored to the state they were at when the primary system failed.

Operator-initiated failover is the least-complex level of availability to provide. From a hardware standpoint, failover can be provided by means of a dual-ported I/O bus that enables two or more systems to share a set of common disks.

The second level of high availability is *machine-initiated* failover. There are two types: programmable and automatic.

Both types of failover use a *heartbeat* mechanism to communicate between a primary and a backup system. In this type of system a private ethernet is used to connect the primary and secondary machine. If the backup machine does not detect the presence of a "heartbeat signal" from the primary machine at regular intervals, it will begin a set of preprogrammed instructions to determine if the primary machine has really failed. If the backup machine cannot reestablish communication with the secondary machine, it will begin the failover process.

In programmable failover, the user has an API (Application Programming Interface) that is used to write a failover application. The application outlines the steps the backup system should perform to take over the role of the primary system.

In automatic failover, applications registered with the failover monitor are automatically restarted during the failover process.

The third level of high availability is *clustering*, which allows system facilities such as file systems to be shared across multiple computers as one logical resource. Shared facilities include system management, backup, network services, and even computing resources. The Oracle Parallel Server is an example of a clustered system.

The Data General failover system has two distinct advantages compared to its competition. The first is *cost*. Data General includes fault failover software with the operating system. The competition charges for this product, and it is not inexpensive. You can expect to pay about \$20,000 for this software from DG's competitors.

The second advantage for DG is that you can establish a failover system with any two Aviiions. Hewlett-Packard requires that if you want to establish a failover system between two machines, the two machines must have identical chassis. The third-party provider of high-availability software for Sun computers strongly recommends two identical machines.

Now, I am not recommending that you use a Data General Aviiion workstation to backup an AV 9500, but you could if you were willing to accept a huge performance penalty. Such capability is an indication of the foresight DG's people used in the design of the Aviiion platform and the DG/UX operating system. Δ

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

Resources

Data General's Clariion disk and tape arrays help improve the availability of the Aviiion even further. A good resource document for understanding DG's plans for high availability is the booklet:

"Achieving High Availability on Aviiion Systems"
(093-701133-00).

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Finding the way

SYNOPSIS

You've got that MV maintenance statement in front of you and you're wondering what you can do to trim costs. Move those Infos applications from AOS/VS and get them up and running on DG/UX.

by Murray Bower and Bill Cole
Special to Focus

The challenge facing most data-processing shops today is stretching the same dollars further or getting more done with fewer dollars and staying ahead of the competition. That's ever more difficult given the costs associated with staying on a proprietary platform.

The most pressing reason may be financial. Everybody is reducing expenses to the bone. You've got that MV maintenance statement in front of you and you're wondering what you can do to trim costs. The stories abound: monthly maintenance fees of \$5,000, \$8,000, \$10,000—and more. It just doesn't make sense to keep putting money into the MV. But how to stop? Your user base is expanding and you need to move to a "bigger" system, but MVs are *very* expensive compared to the RISC boxes.

Then there's your own financial question: Will I be able to find a job in two or three years if we keep the MV? You've seen the ads. The wave of the future seems to be Unix on some platform. If you make the decision to move to open systems, there are several questions to answer:

- What hardware/software platform?
- Do I want to retain my current applications?
- What's the time-frame for getting started and getting finished?
- How do I want to move?
- What am I willing to pay for this?

What platform?

It may seem that you have a multiplicity of choices, but you'll find that

that's just an illusion. You're looking for the same commercial features and robustness you relied on with AOS/VS. That narrows the choice quickly.

Once you start looking for spooling capabilities, lots of utilities, and a high MTBF (mean time between failures), you'll find that the field has narrowed markedly. Our choice was DG/UX for three reasons: 1) We know it; 2) It has capabilities specifically for data bases; 3) It's fast; and 4) It's reliable.

The major DG/UX feature we use is the *pending write*. You want the assurance that what you wrote to disk actually got out there before you go on to the next operation. Without that assurance your data base isn't going to be very reliable. The lack of a pending write is one reason that most data bases don't use the native Unix filing system and choose to implement their own "raw" disk I/O routines. This feature has been incorporated into DG/UX at our request.

Once you start thinking about moving, you start thinking about the trouble involved in moving your application. Do you really want to carry the baggage of 5 or 10 or more years with you? Wouldn't a nice, shiny, new, off-the-shelf application be so much better? Or do I want to change the technology underlying my application and move to a relational data base?

There's probably some excess baggage in your application, but you know where it is and how to deal with it. If you change your code significantly to deal with a new data base or a new compiler, will you still know your application? Most of us have memorized more lines of code than Shakespeare wrote lines, and unlearning or relearn-

ing them isn't terribly attractive unless you get some major return.

One of the major considerations is time and the resources you must devote during that time. If the application to be moved is large, most transition vendors will quote you a significant amount of time to move—even those who claim to have an automated process.

For instance, one vendor claims to have automated the process of moving to Micro Focus Cobol, but what you really get is a manual telling you how to change your code so that it will work with the new compiler. Well, at least the compiler is automated. This could take a long time if your programs don't conform to the "85" standard.

Other vendors will bring in a staff of experts to help you change the code. What you'll get is the equivalent of the manual. Or maybe they'll point out where to make the changes—at \$100 per hour. Pretty expensive pointers.

And just how long will all this take? If you're keeping the same code and just changing to one of the "standard" ISAM file managers such as C-ISAM, it could be as little as two months, or as long as six months. If you're converting to a full relational model, count on a year to get the prototype done and another year—at least—to get the application done.

How to move

Now that you've got a handle on the time scales, how do you implement it? The choices are: your own staff, a consultant, or contractors. If you choose to do it with your own staff, you've got to consider several things. First, do we

have the time? Are you prepared to let your current application remain as is for as long as it takes to make the move? If not, you'll increase the time to move by at least 100 percent. And then there's the time required to learn the new operating system and new data base. Do you really want to design and implement without knowing much about the system you're moving to? Have you factored in the time to learn? There's every chance you'll wind up re-implementing based on mistakes made the first time around.

Will a consultant be able to understand the subtleties of your application well enough to make the changes? Our experience with a variety of applications is that they all contain subtleties, sometimes in the code, sometimes in the way programs interoperate, sometimes in the way you use the data base, sometimes in the way you've stitched together a variety of products to build your application.

Does the consultant understand your current situation and where you want to go? Does the consultant know enough about the target to recommend something that will suit your application? Does the consultant know enough about the target to re-implement quickly? If you use contractors will you have enough time to direct them? The time to teach them? The time to review their work? Will you have the time to assess the quality of their work?

A company we heard of hired out the migration of its Infos application to a well-known relational product. The work was reviewed and quality was assured. Testing proceeded and all the bugs were worked out. The company was invited in for testing. It took 20 minutes to get the first screen up—but it was the right screen! The project was abandoned after two years and several million dollars. Response time hadn't been a criterion for testing. Maybe it should have been, since most Infos applications get response times in the less-than-one-second range. If you move, what are you looking at for response times?

Another company we know of has an application that requires more than 100 data bases be opened by every program, but they get half-second response times. They'd like to move to

a relational model, but can't for two reasons: first, the response times can't be matched; second, most relational models have a severe restriction on the number of data bases that can be opened at one time.

The last thing on my list is cost. Maybe it's the first thing on your list. If you do this, what's the cost? Can you recover any of it?

Some folks can't stop the world long enough to make the transition because the hidden costs of the transition are too high. The first hidden cost is remaining static for the length of the transition. If your application is important to the company, it needs to be changed. If it's not, who cares if you ever make any changes?

The second hidden cost is loss of

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productivity for users. While they're working around the holes in the old system and trying to learn the new system, they're not doing what they need to do to make the company successful. If you turn the project over to consultants or contractors, you're looking at charges that could get out of hand quickly. Even mediocre contractors can cost \$50 per hour. That's not bad if there's just one, but just one could mean the transition will take forever. So you could end up with several, which really escalates the costs. We suggest a fixed price (with a fixed completion date) or a not-to-exceed price (with a not-to-exceed date) to avoid the unknown or exorbitant costs.

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We chose Acucobol because it supports many of the features you've come to expect in AOS/VS Cobol, as well as the features and utilities you expect in state-of-the-art compilers. It's robust and available on a variety of platforms. We've added full support for Infos, AOS/VS system calls, and Screen Demon calls (SD_MENU, etc.) to ensure compatibility.

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Continued on page 35

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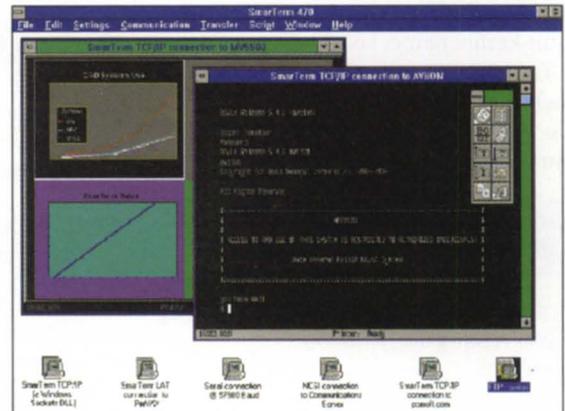


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Kernel tuning utilities

by Thomas E. Soukup
Special to Focus

SYNOPSIS

The author continues a series of articles on performance tuning of multi-user system servers. In this installment is a discussion of kernel tuning utilities available for solving some of the most common kernel-related bottlenecks that affect DG/UX overall system performance.

In a typical multi-user server environment, the percentage of time spent in user space should range from 40 to 80 percent. The percentage of time spent in the system (kernel) space should range from 10 to 40 percent. The percentage of time spent idle should range from 0 to 40 percent of the total CPU time. To investigate CPU usage, use the Unix *sar* command (system activity reporter) with the *-u* switch. If your CPU usage is outside these ranges or your applications are not running as fast as expected, you may need to tune your kernel.

You must determine the booted kernel name to issue certain commands to determine how the kernel has been set up. This will allow you to determine if the kernel is configured correctly and to view the customized changes you have made to the kernel.

First you must to determine the DG/UX kernel name the system is currently running. Many of the following tools will need the DG/UX kernel name of the boot kernel if it is not the DG/UX default kernel name, i.e., *dgux*.

To determine the name of the boot kernel, use the *dg_sysctl* command. For more information refer to the on-line manual pages on *dg_sysctl*.

Figure 1: Identifying the booted kernel name

```
# dg_sysctl
dg_sysctl returns the following
information:
```

```
AUTOBOOT=halt
BOOTPATH=sd(cisc(0),1,0)root:/dgux -3
AUTODUMP=ask
```

From this information you are able to determine that the booted kernel is named *dgux*.

The output of the Unix *sysdef* command lists only customized kernel parameter changes. The default DG/UX kernel parameters, as well as the maximum values that can be used, are listed in Figure 3. Note that these parameters are the defaults for DG/UX revision 5.4.2. For further information, refer to the online manual pages on *sysdef*.

Figure 2: Identifying kernel parameters

```
If the boot kernel name is not dgux, then type
# sysdef /kernel_boot_name | grep [A-Z]
If the boot kernel name is dgux, then type
# sysdef | grep [A-Z]
```

When *sar* indicates that the CPU is spending a large amount of time in system mode, the kernel profiler should be run and the output report examined. The kernel profiler outlines those kernel routines that are being most heavily used. In addition, using the kernel profile can assist you in determining how much time is being spent in device drivers and kernel-based transport systems.

Figure 3: DG/UX 5.4.2 common kernel tunable parameters

This chart has the following format: KERNEL_TUNABLE_PARAMETER (highlighted), a description of the kernel-tunable parameter, the alias name that can be viewed with the Unix crash utility, and the DG/UX 5.4.2 default value for the kernel-tunable parameter.

CPU, PROCESS, AND MEMORY CONFIGURATION VARIABLES:

These configuration variables set CPU-related, process-related and memory-related kernel variables.

NPROC is the maximum number of processes the system can have at any one time.	
cf_sc_max_processes	256
NCPUS is the actual number of processors on the machine. If set to 0 (the default), all available CPUs will be used.	
cf_vp_cpus	0
NVPS is the number of virtual processors available for user processes. If set to 0 (the default), then the number of virtual processors available for user processes will be determined by NPROC and the amount of physical memory in the system. The system will never use more than NPROC virtual processors.	
cf_vp_num_vps	0
MAXSLICE is the maximum time (milliseconds) a user process can run before being suspended.	
cf_vp_time_slice_milliseconds	500
MAXUP is the maximum number of processes that a non-superuser can have in existence at any one time.	
cf_pm_max_processes_per_real_user_id	50
SDESLIM is the default number of descriptors a process is allowed to have at one time.	
cf_cm_soft_descriptor_limit	64
HDESLIM is the maximum number of descriptors a non-superuser process is ever allowed to have at one time. A non-superuser process may change its soft limit up to the value of the hard limit.	
cf_cm_hard_descriptor_limit	64

PERCENTLOCKABLE is the percentage of physical memory available for locking by user processes, provided through the *memcntl(2)* system call. The kernel will automatically round down any reservation requests that would otherwise impinge on memory used for the kernel itself. Note that reserving and then locking large amounts of memory may deadlock the system.

cf_vm_percent_user_lockable_memory 10

MAXPAGEOUTS is the maximum concurrent pageout I/O operations that the system can have pending at one time. A value of zero (the default) tells the system to pick a reasonable value based on the amount of physical memory present on the system. This assumes that the system's effective pageout throughput is relatively balanced with main memory size. A small memory system that pages out to a large number of disk spindles may observe better performance by increasing this value. Conversely, a large memory system that has few spindles effectively used in pageouts may observe better performance by decreasing this value. A reasonable rule of thumb in such cases is to set this variable to a small multiple of (1x to 3x) the number of disk spindles actively involved in pageouts. This excludes disks that are written to less than others, as well as disks written using only raw or unbuffered I/O (which data base management software often uses). Setting this value too high can cause high latencies for other accesses to the disks used in pageouts. Setting this value too low can artificially limit the system's effective pageout throughput, which can increase latencies for memory allocation.

cf_vmc_maximum_active_pageout_operations 0

FILE SYSTEM CONFIGURATION VARIABLES

These configuration variables set various file system parameters.

MAXBUFAGE is the maximum amount of time that modified system data will remain in the buffer caches before being written to stable storage. The default is 60 seconds. Setting the value higher will let data remain in the cache for longer periods without being cleaned, which can result in higher performance. However, because it is not flushed as often, the data may not make it to disk if there is a crash of the system.

cf_fs_max_buffer_age_in_seconds 60

MAXSYSBUFAGE is the maximum amount of time that modified system data will remain in system buffer caches before being written to stable storage. The default is 0, which means that the MAXBUFAGE value is used. MAXSYSBUFAGE, MAXBUFAGE, or MAXBUFAGE will be used instead of this value.

cf_fs_max_system_buffer_age_in_seconds 0

PERCENTBUF is the maximum percentage of physical memory that can be occupied by data files (i.e., non-program files). By default, data files may use as much of physical memory as their usage pattern dictates. There should be no need to configure this variable unless heavy data file usage is hampering system performance by provoking an undesirable amount of other paging. For example, this condition might occur on an NFS server whose physical memory resources are small relative to the amount of file data accessed over a period of several minutes.

cf_vmc_percent_memory_for_data_files 100

PERCENTSYSBUF is the percentage of physical memory that is reserved for system buffers. System buffers hold directory, inode, file index and bitmap data. Using the value 0 does not mean that no buffer space will be allocated; it means that the kernel will automatically select a reasonable value for your system.

cf_bm_percent_memory_for_system_buffers 0

HOGFILESIZE is the maximum number of bytes of physical memory that can be used by a given data file (i.e., non-program file) before that file will be treated unfavorably for physical memory resource allocation. When the system is forced to page data out to meet requests for memory, data files having more than HOGFILESIZE

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bytes buffered are aggressively chosen to be paged out. Thus, you can restrain large files from consuming your free memory pool.

cf_vmc_hog_data_file_size 262144

NFSLOCKUSERLIMIT is the maximum number of remote processes that can hold record locks concurrently.

cf_rm_max_remote_lock_users 512

USERLOCKLIMIT is the maximum number of user locks that a process may hold.

cf_rm_max_nodes_per_process 2048

NFS is the table of file system functions that determines if NFS is present. The default value (&nfs_pkg_function_table_stub) means that NFS is not present; the implied value (&nfs_pkg_function_table_meat) means that NFS is present.

cf_nfs_pkg_procedure_table

STREAMS CONFIGURATION VARIABLES

These configuration variables set various STREAMS parameters:

PERCENTSTR is the maximum percentage of physical memory that can be used for STREAMS buffers.

cf_su_percent_memory_for_streams_buffers 20

NQUEUE is maximum total number of STREAMS queues (STREAMS plus instances of STREAMS modules) that may exist at any one time on the system.

cf_sfm_max_queue_pairs 2048

NMUXLINK is the maximum number of active multiplexors that may exist at any one time on the system.

cf_sfm_max_multiplexor_links 1024

NPIPE is the maximum number of STREAMS pipe devices that may exist at any one time on the system.

cf_sfm_max_pipe_devices 64

NSTREVENT is the maximum number of signal delivery requests (established with the **I_SETSIG** ioctl command) allowed to be enqueued on the signal event list.

cf_sfm_max_active_signal_requests 2048

SEMAPHORE CONFIGURATION VARIABLES

These configuration variables set various semaphore parameters:

SEMNI is the maximum number of unique semaphore sets that may be active at any one time on the system.

cf_ps_max_semaphore_sets 1024

SEMMSL is the maximum number of semaphores that a semaphore set may contain.

cf_ps_max_semaphore_per_set 256

SEMOPM is the maximum number of semaphore operations that can be executed per **semop(2)** system call.

cf_ps_max_semops_per_call 10

SEMVMX is the maximum value a semaphore may have.

cf_ps_max_semaphore_value 32767

SEMUME is the maximum number of undo entries per undo structure.

cf_ps_max_sem_adjust_sets 10

SEMAEM is the adjustment on exit for maximum value. This value is used whenever a semaphore value becomes greater than or equal to the absolute value of **semop(2)**, unless the program has set its own value.

cf_ps_max_sem_adjust_on_exit_value 16384

SEMAPM is the maximum number of processes that can specify semaphore operation with **SEM_UNDO** option.

cf_ps_max_sem_adj_processes 16384

SHARED MEMORY CONFIGURATION VARIABLES

These configuration variables set various shared memory parameters:

SHMMNI is the maximum number of shared memory segments that may exist in the system at any one time.

cf_ps_max_number_of_segments 1024

SHMSEG is the maximum number of shared memory segments that may be attached to a process.

cf_ps_max_attach_per_process 256

SHMMAX is the maximum number of bytes in a shared memory segment.

cf_ps_max_segment_size (4*1024*1024)

SHMMIN is the minimum number of bytes in a shared memory segment.

cf_ps_min_segment_size 1

MESSAGE CONFIGURATION VARIABLES

These configuration variables set various message parameters:

MSGMNI is the maximum number of message queues that may exist in the system at any one time.

cf_ps_max_message_queues 1024

MSGTQL is the maximum number of outstanding messages that may exist in the system at any one time.

cf_ps_max_number_of_messages 1024

MSGMNB is the maximum number of bytes that a message queue may contain.

cf_ps_max_msg_queue_size 4096

MSGMAX is the maximum number of bytes that a message may contain.

cf_ps_max_message_size 2048

PSEUDO-DEVICE UNIT COUNT CONFIGURATION VARIABLES

These configuration variables set the number of units a specified pseudo-device will have.

(No count variables are needed for real devices; any units present are usable.)

PTYCOUNT is the number of pseudo-terminal devices (/dev/tty* and /dev/pty* pairs) that will be created upon system booting.

cf_ts_pty_unit_count 64

Summary

Kernel profilers can be used when investigating system mode (%SYS) time utilization. From performance data collected, you can determine where the most time in the kernel is being spent. After the kernel profile you may want to test different coding or data access schemes, different compilers, or different compilation options. You can profile the kernel during the application's execution to determine if your changes have brought about the desired effect. Δ

Thomas E. Soukup is a member of the Technical Services Group at Data General Corporation in Atlanta, Georgia. He has been active in benchmark performance at Data General Corporation for the past five years, and has also assisted system engineers worldwide with DG/UX performance tuning and monitoring. He may be reached at 404/705-2545. Copyright © 1994 by Data General Corporation. All rights reserved.

For more information

There are many reference manuals available from Data General's Technical and Publication Service (TIPS) to assist you with kernel tuning.

TIPS publishes manuals about the DG/UX Kernel Debugger and Kernel Environment; refer to the DG/UX 5.4.2 manuals:

USING THE DG/UX KERNEL DEBUGGER,
TIPS manual number 093-701075;

and

PROGRAMMING IN THE DG/UX KERNEL ENVIRONMENT,
TIPS manual number 093-701083.

For ordering information, please contact TIPS in the USA at 800/343-8842 or in Canada at 800/668-0712.

Recently, TIPS has published a new manual, **Analyzing DG/UX Performance**, TIPS manual number 093-701129. I highly recommend this technical manual to those interested in system performance. —T.S. Δ

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Deadwood macros

SYNOPSIS

Is your system plagued with hordes of possibly obsolete or unnecessary macros? The author presents a procedure by which you can get rid of them with a minimum of strain.

by William Clark
Special to Focus

Where do all these macros come from, anyway? I ran a

```
WR [!F/C + .CLI]
```

in our ":MACROS" directory, only to find that there were 2,973 macro files! We're a mail-order distributor of computer- and office-related products, currently with 9 Eclipse systems in the United States and Europe, ranging from the MV/3500 to the MV/35000. We are running AOS/VS and AOS/VS II.

Now, obviously the macros problem shouldn't have gotten so out of hand in the first place, but it did. Frustrated with the average delay of about 5 seconds on a filestatus command with a wildcard, I decided to figure out a solution.

The same old problem with AOS/VS is still in AOS/VS II: there is no way to determine the last time a file was actually run. "Date-Last-Accessed" is useless in determining if a file is necessary, because this parameter is updated even when Filestatus touches the file. Also, if you back up a directory, all its files' DLAs are changed. So how could I determine if a macro is necessary to our operation, or if it is an obsolete, one-time file that someone didn't bother to delete? Here's what I came up with:

- 1) I created a subdirectory under ":MACROS", called "MACS"
- 2) I wrote a macro called

"MACROS.DOWN.CLI" (listed below) that would accept a macro-name as an argument, and move it down into MACS, delete it from MACROS, and create a dummy macro with the same name.

3) The dummy macro was created in such a way that when it runs, it will delete itself, promote the original back to macros, delete from MACS, and run the original.

4) Then I ran the command:

```
MACROS.DOWN ([!F/S + .CLI])
```

which moved each macro down to MACS.

I ran the above procedure on all 9 of our MV systems in December 1993 before our year-end process, so that any macros that run only at year end were promoted back to :MACROS, as were any end-of-month macros. After a period of time (perhaps 3 months), any macros left in the MACS subdirectory can be considered unnecessary, dumped to tape, and deleted from the

Figure 1 :MACROS:MACROS.DOWN.CLI

```
move macs %1%
perm %1% off
del %1%
create/m %1%
comment This is a dummy macro. Real macro is in MACS directory.
push
dir :macros
perm %1%
del %1%
dir macs
mov ^ %1%
perm %1% off
del %1%
pop
)
copy/append %1% macros.down.file
```

Figure 2 :MACROS:MACROS.DOWN.FILE

```
%0% %-%
```

Figure 3 :MACROS:BASIC.CLI

```
comment This is a dummy macro. The real macro is in MACS sub-
directory.
push
dir :macros
perm =BASIC.CLI off
del =BASIC.CLI
dir macs
mov ^ =BASIC.CLI
perm = BASIC.CLI off
del =BASIC.CLI
pop
%0% %-%
```

Figure 4 :MACROS:MACS:BASIC.CLI

```
searchlist :udd:[!user], :, :util, :macros, :util:basic
execute bb4
```

system. But before deleting them, I'll run the following command from the :MACROS directory:

```
DELETE/V ((IF [IF MACS: + .CLI]))
```

which will delete the leftover dummy macros. So far, after a few weeks of business as usual, end-of-month and end-of-year, less than half of the macros have moved themselves back to :MACROS.

The nice part is that this procedure is transparent to the process that calls the macro, because the dummy macro has the same name, does the moving and deleting, and then runs the original. Another nice aspect is that I didn't have to look at 3,000 files or even type the filenames.

One problem did arise, however, because we had a couple of Sort/Merge command files with a ".CLI" extension (rather than our ".CMD" convention). When the dummy macro was passed to "SORT.PR", it bombed out. I used our

implementation of the GREP utility to create a list of these command files in MACS, called "cmd.filesnames", and then ran the command

```
MOVE/DELETE :MACROS [cmd.filesnames]
```

The "MACROS.DOWN.CLI" ends with a copy/append command because if you try to put the "%0% %-%" statement into the "create/m section", "macros.down" would appear instead of the pseudo-filename "%0%", and you would not recognize any switches or arguments used at runtime. By using the copy/append technique, the pseudo-filename is not interpreted until runtime. Any arguments will be passed to the original macro after it is moved up. Δ

William Clark is a systems analyst with Global Computer Supplies, a mail-order distributor of computer and office-related products. He may be reached at 11 Harbor Park Drive, Port Washington, NY 11050.

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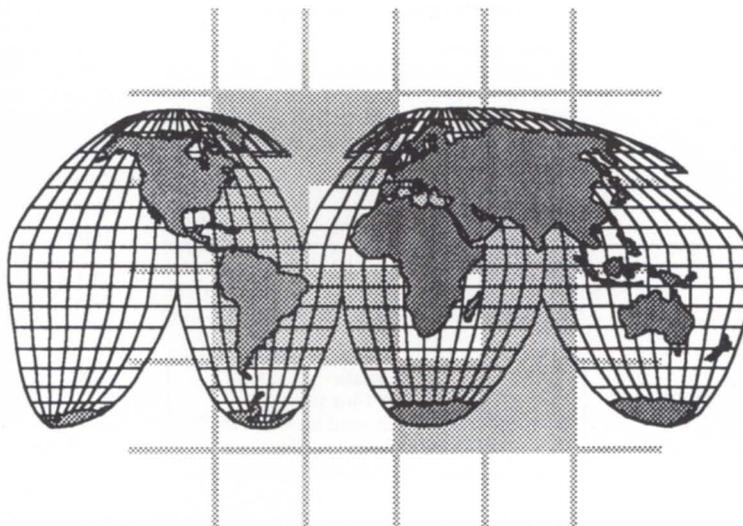
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Postalsoft, Inc., 4439 Mormon Coulee Road, La Crosse, WI 54601-8231; 608/788-8700.

GUI builder

San Francisco, CA—Dialog System Professional from Micro Focus provides a user interface management system and application builder for developers to create graphical user interfaces (GUIs) for Microsoft Windows and IBM OS/2 as well as character-based user interfaces for MS-DOS and OS/2.

It supports the development of new graphical applications using Micro Focus Cobol and can be used to generate graphical front-ends for existing CICS and IMS applications with no additional programming.

Dialog System Professional works with Micro Focus Application-to-Application Interface (AAI) to provide easy connectivity between user workstations and servers, including PCs, Unix, AS/400s, and mainframes, providing simple, easy-to-use access to distributed data and application code.

List price is \$1,250.

Micro Focus, 2465 East Bayshore Road, Palo Alto, CA 94303; 415/856-4161.

Single-logon

Pacheco, CA—A single logon facility from Century Analysis makes it possible for end users to gain access to various mainframe, minicomputer, and LAN-based applications without having to know where the individual applications reside, their passwords, login scripts, or detailed navigation rules.

CAI's facility begins with central network servers that manage encrypted variables used by individual emulators and a workplace customized so it displays only that end user's available applications. Native windowing environments are supported on MS Windows and Unix workstations, with a CAI-provided multisession environment for less capable end user devices (DOS PCs, ASCII terminals).

Century Analysis, Inc., 114 Center Avenue, Pacheco, CA 94553; 510/680-7800.



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with the familiar code and the familiar data structures. △

Murray Bower is vice president of software development with Mac Data, Inc. He has more than 15 years of experience with Data General hardware and software—including AOS/VS, Cobol, and Infos—to run his office supplies business in Australia. **Bill Cole**, vice president of sales and marketing for Datatek, Inc., has more than 19 years of experience with DG hardware and software, including 15 years with DG, the last two of which he was program manager for Infos development, support, and testing.

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FAX: 512/335-3083

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(Outside the U.S and Canada.).....508/443-3330

Electronic bulletin boards

DASH bulletin board (2400 bps modem) 800/DASH-CSC
Data General Customer Support Center800/344-3577

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512/335-2286

Editorial comments, article suggestions.....Doug Johnson
(please send product announcements to the address listed above)

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DASH enhancements

Data General is pleased to announce the following enhancements to DASH:

You now may send mail or forward mail to "nadgug". This is a mailing list of the North American Data General Users Group board members, plus a few others that the NADGUG board felt should be on the same distribution.

The DASH system now contains patches, available for downloading to customers with service contracts listed in DASH. The patches are available at 404/381-3035. Use your DASH ID and password. There is an online help screen that you can view after login.

Briefly, the system will allow you to navigate through a directory tree, and select a patch file for downloading. You will then be asked to select a protocol, either Zmodem or Kermit, for the transfer. If you use Kermit, note that all transfers are initiated by DASH with a *-i* (binary) option, so you must also specify a *-i* when starting Kermit on your system. If you do not, the files will be garbled. Filenames have been made MS-DOS-compatible, and every effort will be made to keep the names unambiguous, but it is incumbent upon you to ensure that the files are applied to the proper systems in the appropriate manner.

Patches and workarounds are created in response to specific problems in particular environments, and may behave unpredictably in other settings. They are provided "as is" and you are cautioned to have made suitable backup and recovery arrangements before using them. Δ

DASH Items...

Category: DG/UX

Swap space ratio

Author: EPHRAIM NUSSBAUM

The DG/UX manuals recommend that swap space be at least 1.5 times physical memory. At present I'm running only 16 MB of memory on my AV 5200. It's probably sufficient for my needs, yet we are about to install an additional 64 MB I may not need at all right now. Does the mere installation of physical memory mean that I must now waste 128 MB of disk for swap space?

It would seem that the more physical memory I have, the LESS swap space I should need. Perhaps the system now will not need to swap at all, yet may insist on my reserving it. Can anyone explain this to me?

Reply by: DG/UX DEVELOPMENT

The swap space ratio is a rule of thumb. DG does not know what types and sizes of applications you intend to run on your system. You should consider that if you upgrade to more memory, you may end up running more applications, which will need more swap space. You can always not increase it and wait for an out-of-swap-space message to appear; at any point you can use *sysadm* to add addition swap area (you can have up to 7 different swap partitions).

If I were you, I'd wait to see if the application load exceeded the amount of swap you need. If you want to be safe, you could add another swap area equal to the amount of memory you are adding.

Category: AOS/VS

Wordperfect 5.0 problem

Author: LOUIS McCUTCHEN

We recently upgraded from

AOS/VS 7.69 to 7.70 (patchkit 41). After doing so, all of our D200 series terminals (D211, D214) would no longer work with Wordperfect 5.0.4. Specifically, the function keys would not work. Changing the terminals from Mark parity to Even, and changing the console lines to 7-bit Even parity would work around the problem. However, with the large number of terminals and ports involved, I was wondering if anyone was aware of a resolution to this.

Reply by: DG CUSTOMER SUPPORT (BRUCE HODGDON)

There was a change made in 7.70 that "fixed" a bug that some programs like Wordperfect took advantage of. Prior to 7.69 when a program issued a binary read and /OFC was turned on, VS would strip the parity bit to check to see if it was a *ctrl-s* or *ctrl-q*. It then put the resulting 7 bits into the ring buffer.

If /OFC was not on, it did put the correct 8 bits into the ring buffer (binary reads should not touch the data). Since Wordperfect does binary reads, they really should be stripping the parity bit (if they don't want it). The workaround on tubes that can support it is to set the tube for 8 bits, no parity (no parity bit so it doesn't need to get stripped). A workaround for tubes that don't support 8-bit is to set the characteristics to 7 bit and 2 stop bits, and leave the tube alone. Since VS thinks there are 2 stop bits, it will strip the parity bit off since it thinks it's a stop bit. Δ

DASH runs on an Aviiion 5200 server located at the Data General Customer Support Center in Norcross, Georgia. The bulletin board is available 24 hours per day, 7 days per week, free of charge. Call 800-DASH-CSC (800/327-4272) for the modem rotary. DASH is also accessible via Internet address 128.222.159.141.



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