March 1993

FOCUS

The Magazine of the North American Data General Users Group

In Focus

Remarkable tools
Desktop productivity
The obvious things

Plus

Staying memory resident
Guarding the gates
Building codes
Infos IIFC, or not to FC?
DG news

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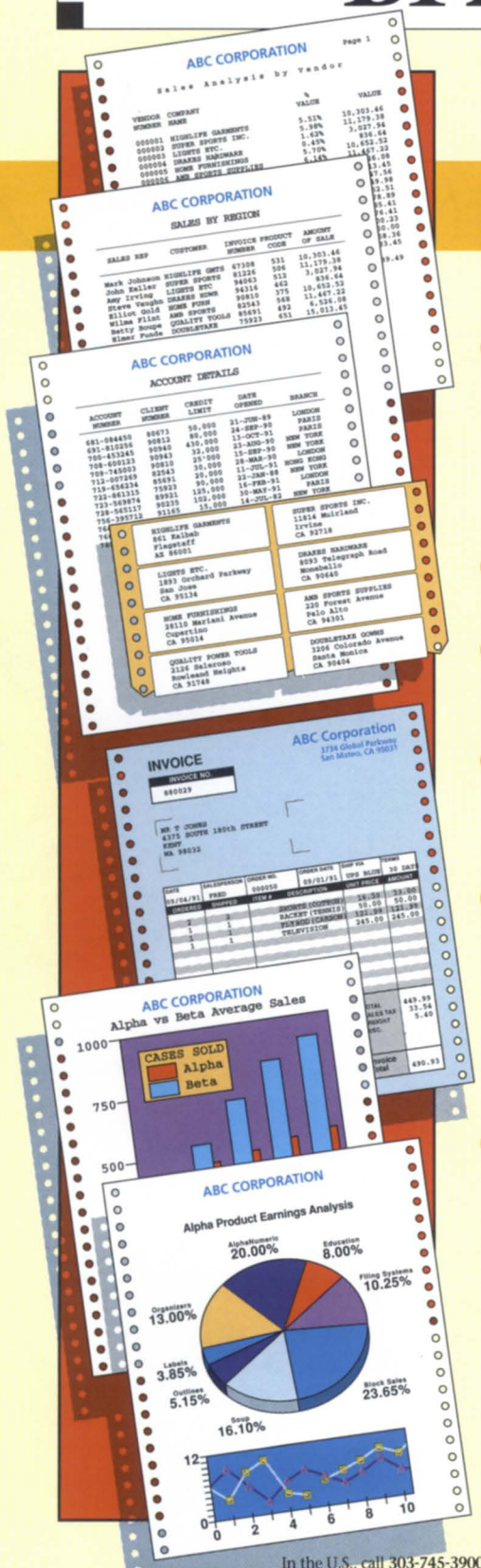

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The Magazine of the North American Data General Users Group

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Cover illustration by Ann Soto

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Frank Perry

NADGUG is for YOU

This article was due about two weeks ago, and the *Focus* editor is breathing down my neck while I type it. Honest, I can feel his breath from 2,500 miles away.

The Board of Directors met last December to do a final review on the Kansas City NADGUG 92 conference, and to spend a second day planning for 1993. Well, true to form, we got weathered out. The "Great Blizzard of 1992" struck on a Friday night, closing down most of central and western Massachusetts and chasing us to the slightly less snowy confines of Boston, where we resumed our meeting while waiting for the airport to be dug out. This seems to be the going track record of the Board—if bad weather can happen, it does.

The 1992 Conference appears to have been a success financially, even though attendance was down somewhat. Our research indicates that the drop in attendance was due mostly to economic cutbacks at many of our member companies.

This brings us to the main focus of this column: **MEMBERSHIP.** Ours seems to be shrinking along with the economy. We are rather stagnant in our recent growth. In fact, we've lost some ground over the past few months.

As membership chairman I have been searching for reasons. One is that we have probably been too successful in achieving some our earlier goals. We have established an excellent rapport with Data General management, and our communication lines regarding software and hardware concerns have never been better. We are being listened to and our concerns are being addressed, so one of the galvanizing issues that unites a user group has been pleasantly resolved. You're welcome. But there are still many reasons for a user group, not the least of which is the education of our members. We hope to fulfill this role with *Focus*, and with the annual conference, scheduled for Atlanta this October.

NADGUG is also striving to meet the changes occurring in the Data General marketplace, and in the data processing environment generally. We have broadened our attention to include open systems, particularly the Aviion, by adding additional tracks to the conference program, and searching out new columnists and contributors to *Focus*. We are trying to grow your organization and to serve the newer segments of the user spectrum, while continuing to support the more established areas. We have accepted a challenge to help Data General users enter the arena, and to help the longer-term users (I don't want to use the word *older*) expand and adapt to the marketplace.

This probably sounds like a sales pitch, and it is. NADGUG membership is one of the best deals you can get. If you are not already a member, you should join now. If you are already a member, do a friend or co-worker a favor and get them to join. Or just send us their names and we will do it for you. Spread the word: NADGUG is for YOU! Just call 800/253-3902 for information on how to join.

I want to hear from anyone who wants to offer ideas, comments, or suggestions about additional benefits we might be able to offer to our membership. Call me at 401/397-3533. Δ

Frank Perry, a NADGUG past president, currently leads the Membership Committee. He's also quite friendly, so don't hesitate to give him a call.

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Contributors
Joseph Cannata, Tony Coor, Robert Howell, Frank Perry

Advertising Manager
Susan de Blanc

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Ann Soto
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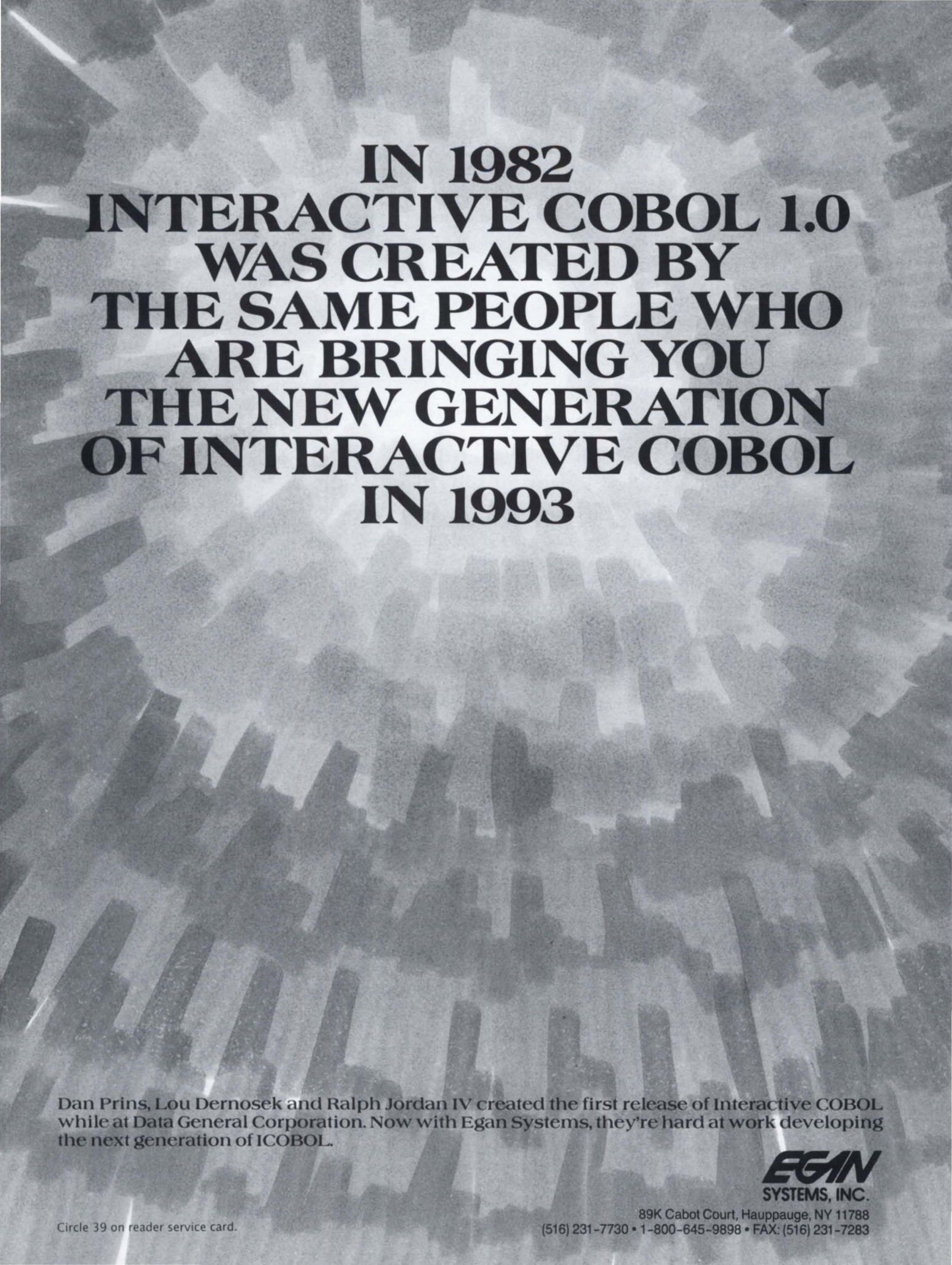
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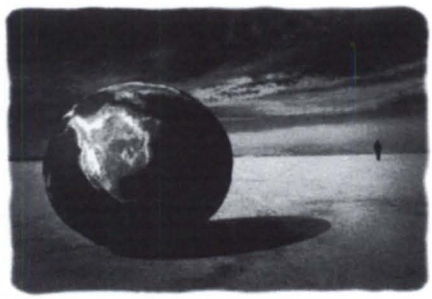
News and notes from the greater DG community

Number crunching

Data General squeezed out an $800,000 profit for the first quarter of Fiscal Year 1993, which ended December 26, 1992. In comparison, Data General reported net income of $4 million for the first quarter of 1992, but ended the year with an overall loss of $63 million (see story below). DG reported continuing growth in Aviion sales. It also began late-quarter shipments of Clariion storage systems for use with Unix-based computers from IBM and Sun Microsystems. The company signed several agreements with distributors to resell Clariion systems, including **Dickens Data Systems,** the largest distributor of Unix-based hardware and software to the IBM customer base.



Data General's annual report cover illustration

DG annual report: a changing world

"Most of us think we live and work in a fast changing world, but few industries have ever experienced the speed of change that is occurring in the computer industry," says Data General President and Chief Executive Officer **Ron Skates**, in the opening to Data General's 1992 Annual Report. The following highlights from the report reveal the state of the corporation during its most recent evolution.

• *Aviion sales were up.* Aviion revenues exceeded $300 million in fiscal 92 compared with more than $200 million in 1991. They exceeded $100 million in 1990, the first full year of shipments.

• *MV sales were down.* Revenue from the Eclipse line decreased 42 percent from fiscal 1991, compared to a 17-percent decrease from fiscal 1990 to fiscal 1991.

• For the year, Data General reported revenues of $1.12 billion and a net loss of $63 million. Fiscal year revenues for 1991 were $1.23 billion with a net income of $86 million. The 1992 loss includes a restructuring charge of $48 million relating to second-quarter layoffs. At the close of fiscal 1992 the number of employees totaled 7,100, a reduction of 1,400 and 3,500 employees from September 28, 1991, and September 29, 1990, respectively, down from a peak of 17,700 in fiscal 1984. Revenues were also affected by the sale in fiscal 1991 of Nippon Data General, the company's Japanese subsidiary, and the weakening Japanese market.

• As reported in *Focus* last month, Data General underwent an internal remodeling. The company was divided into four business units: Aviion; Eclipse; Clariion storage systems; and Solutions, which includes personal computer and special systems operations. Data General plans an aggressive move into the storage systems business.

• Data General purchased the **Customer Service Management Group** division of **HBO & Company**, a multivendor equipment service provider for more than 250 hospitals throughout the United States.

The contract base acquired by CSMG contributed more than $20 million of service revenues in fiscal 1991.

Data General Corporation
Condensed consolidated statements of operations
(in millions, except per-share amounts)

	Quarter ended 12/26/92	12/28/91
Revenues:		
Product	$175.6	$185.5
Service	104.0	109.3
Total revenue	**279.6**	**294.8**
Costs and expenses:		
Cost of product revenues	103.7	99.9
Cost of service revenues	59.6	66.4
Research and development	25.9	27.9
Selling, general and administrative	86.2	95.7
Total costs and expenses	**$275.4**	**$289.9**
Income from operations	4.2	4.9
Interest income	2.2	3.2
Interest expense	3.8	3.6
Income before income taxes	2.6	4.5
Income tax provisions	1.8	0.5
Net income	$0.8	4.0
Net income per share	**0.02**	**0.12**

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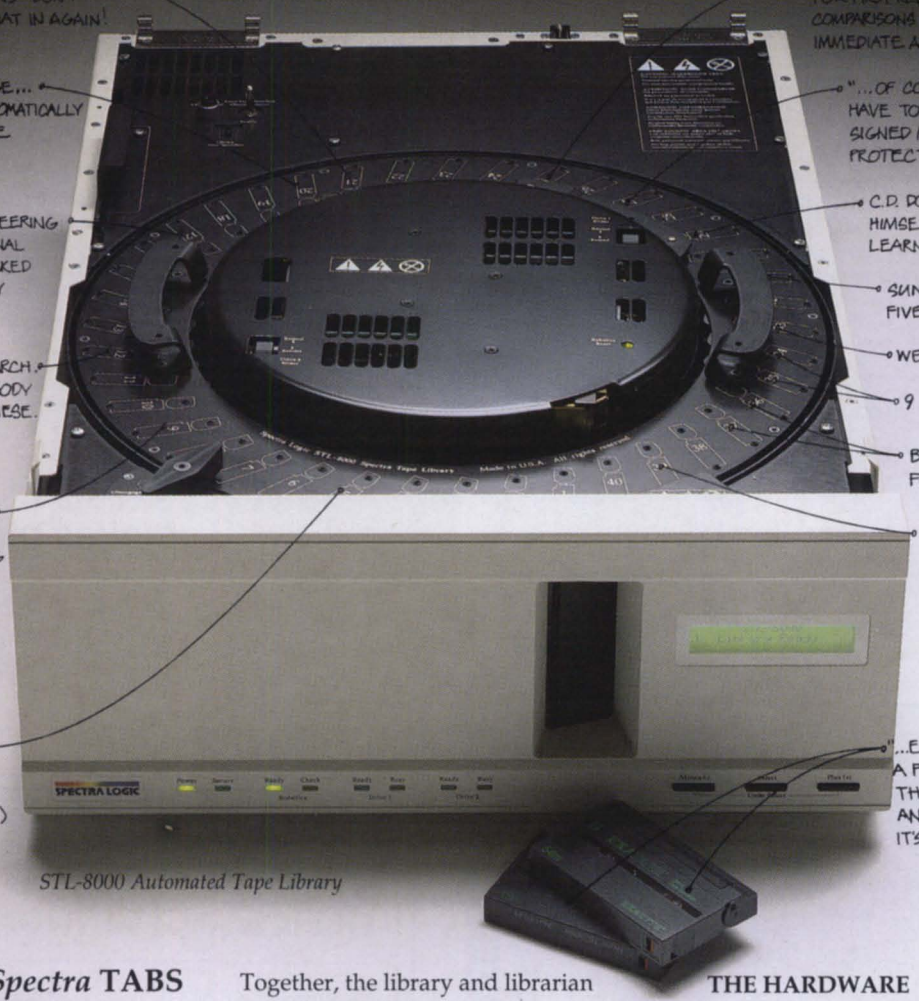

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Alexandria Backup and Archive Librarian

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THE SOFTWARE

Spectra Logic's Alexandria Backup and Archive Librarian is one of the first UNIX backup and archive software packages designed specifically for use in a library environment.

More than a "backup" package, Alexandria manages media and data over heterogeneous networks, tracking files and media elements in the library or in off-line storage.

Alexandria's power is easily accessed through an intuitive X-11 GUI window environment or directly from the shell.

THE HARDWARE

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Alexandria also supports Exabyte's 10i and 120CHS tape libraries, optical libraries from Hewlett-Packard and the Spectra Logic STL-6000: a 20 cartridge, 100 GB, 8mm tape library.

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Aviion eclipses MV

This reporter went to some length trying to extract 1992 sales figures for Aviion versus MV Eclipse, only to be told repeatedly "Data General doesn't break it down that way." At last I was provided with a September 1992 Smith Barney report that estimates revenues as follows. I was told that these figures are "pretty good" approximations. The figures show that 1992 was the year when MV sales finally were "eclipsed" by the Aviion.

Estimated hardware revenue breakdown

$ millions

	1989	1990	1991	1992E	1193E
MV (proprietary)	$803	$595	$502	$279	$240
AV (open)	12	120	215	305	420
PCs/Next	60	70	80	80	80
Clariion	0	0	0	0	20
Total	**$875**	**$785**	**$797**	**$664**	**$760**

Kennedy joins Strobe Data

Jerry D. Kennedy was named vice president of marketing and sales of **Strobe Data, Inc.**, of Bellevue, Washington. West is no stranger to the Data General world. In 1965 he founded the **JD Kennedy Corporation** and became the first representative/reseller of Data General computers on the West Coast. Strobe Data makes the Hawk Co-Processor, a PC add-in card that allows users of 16-bit Data General computers to run their programs on PCs.

Storage Computer makes moves

Storage Computer (Stor Comp), which recently announced its RAID 7 data storage systems for Data General Aviion and MV and other manufactur-

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D/411 W/KYBD	185	D/215 W/BARCODE OPT	175
D/460 W/KYBD	145	D/216+E AMBER	175
D/410 W/KYBD	100	DESKTOP EXP LOGIC	125
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er's computers, continues to expand. Marketing agreements were reached with **Syscom Computer Engineering Company** of Taiwan; **Mazali International Corporation** of Malaysia; and **Infotech Computers** of the Netherlands. Regional offices were opened in Atlanta and Detroit, and in Berghem, the Netherlands. **Ken Sullivan**, formerly of **Sun Microsystems,** was named to the newly created position of director of VAR (value added reseller) sales. Stor Comp is a privately held company based in the United States and Frankfurt, Germany.

SCH to distribute OS/Eye*Node

SCH, a Cincinnati-based software integrator for Unix environments, will distribute OS/Eye*Node.

OS/Eye*Node supplies network, system, and application management for mixed hardware, software, and protocol environments. It was co-developed by **Digital Analysis Corporation** and Data General.

Wild Hare adds technical staff

Nancy Cornelius joined the **Wild Hare Computer Systems'** technical services department. Cornelius will work directly with Wild Hare customers to answer technical questions, and offer technical support to Wild Hare's staff. She is the former vice president of technical services for **Computer Services Corp.** of Boulder, Colorado. In a related change, **Karen Martin**, Wild Hare's senior technical support person, will now devote the majority of her time to Wild Hare's newest service, VS/Cobol Infos migration to open systems. Wild Hare, also of Boulder, develops productivity tools for ICobol and VS/Cobol.

Compiled by Robin Perry. If you have an item for In General, please send it to Robin, c/o Focus Magazine, P.O. Box 200549, Austin, TX 78720; 512/335-2286; Fax: 512/335-3083.

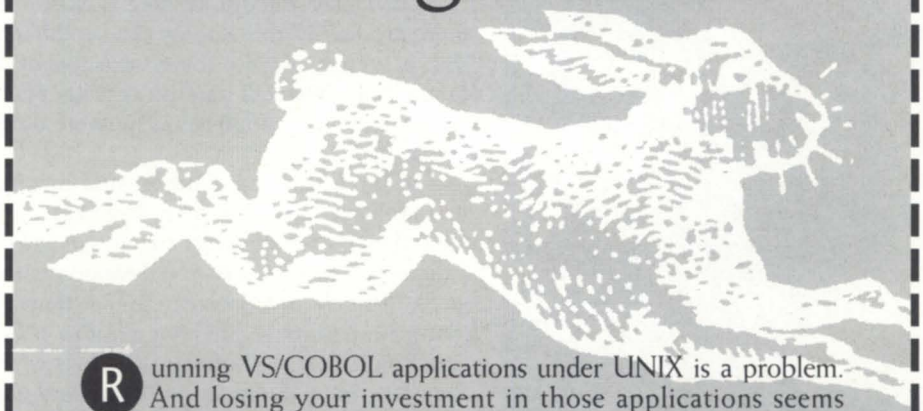
And the winner is . . .

Richard Hyte, a financial analyst for **Shearson Lehman Brothers** in Las Vegas, was the lucky winner of an AV 310 computer system with 150 MB hard drive, 20-inch color monitor, Wordperfect software, and a Canon BJC 800 laser printer. **Wordperfect Corporation** sponsored the contest, which was advertised in several trade and business publications. Entrants were asked to fill out an entry form and indicate which of several leading hardware platforms they would like to win.

Hyte's name was chosen in a random drawing of about 4,000 who registered to win the Aviion system. Δ

VS/COBOL to UNIX

VS/COBOL Applications to UNIX in a Single Bound.



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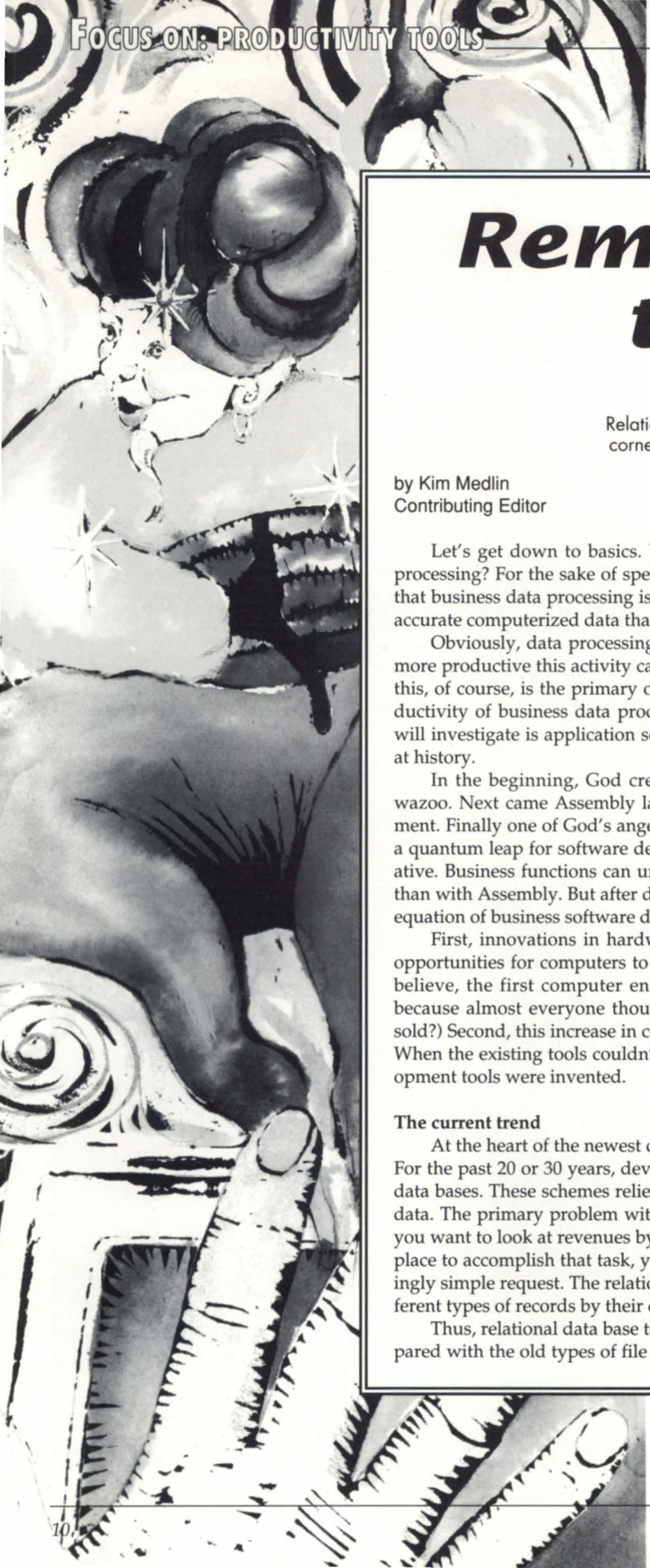


Remarkable tools

SYNOPSIS
Relational data bases and 4GLs have matured into cornerstone tools for software development efforts.

by Kim Medlin
Contributing Editor

Let's get down to basics. What is the fundamental purpose of business data processing? For the sake of specifying common ground for this article, let's assume that business data processing is the activity of entering, maintaining, and managing accurate computerized data that are essential to the success of a business enterprise.

Obviously, data processing is critical in today's high-tech business world. The more productive this activity can be, the more profitable the enterprise will be. And this, of course, is the primary objective of business. This article focuses on the productivity of business data processing. Specifically, the area of data processing we will investigate is application software development. But first let's take a brief look at history.

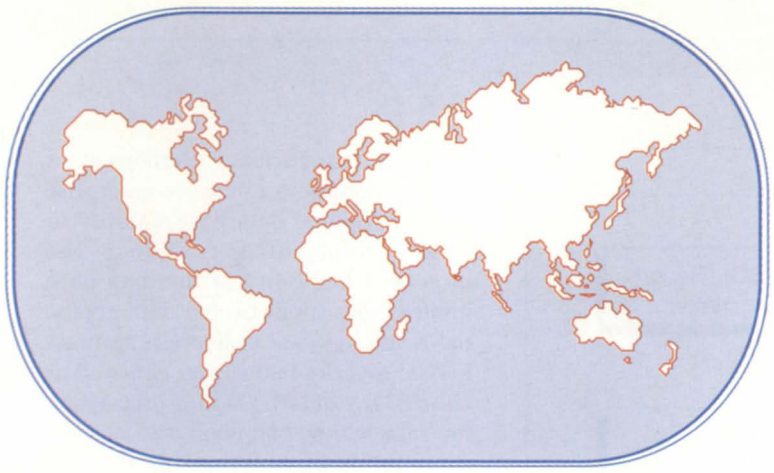
In the beginning, God created machine language. And it was a pain in the wazoo. Next came Assembly language. Still pretty bad, but it was a big improvement. Finally one of God's angels, Grace Hopper, created Cobol, which represented a quantum leap for software development productivity. However, everything's relative. Business functions can unquestionably be developed in less time with Cobol than with Assembly. But after decades of Cobol, several new variables crept into the equation of business software development.

First, innovations in hardware and associated price reductions allowed more opportunities for computers to be utilized than ever thought possible. (Would you believe, the first computer entrepreneurs had trouble finding financial backing because almost everyone thought no more than a few computers would ever be sold?) Second, this increase in computer demand created huge application backlogs. When the existing tools couldn't keep up with the market, fourth-generation development tools were invented.

The current trend

At the heart of the newest development environment is the relational data base. For the past 20 or 30 years, developers have used primarily hierarchical or network data bases. These schemes relied on physical pointers to access the various types of data. The primary problem with pointers is that they are inflexible. For instance, if you want to look at revenues by reverse-order zip code, and there are no pointers in place to accomplish that task, you have a great deal of work ahead to fulfill a seemingly simple request. The relational data base solves this problem by associating different types of records by their common data values.

Thus, relational data base technology offers extraordinary flexibility when compared with the old types of file management. This is extremely valuable to software



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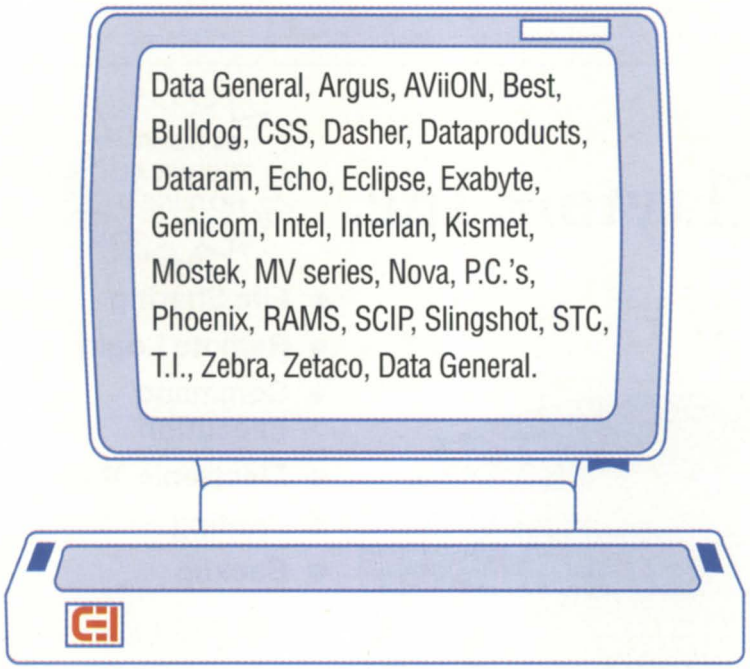

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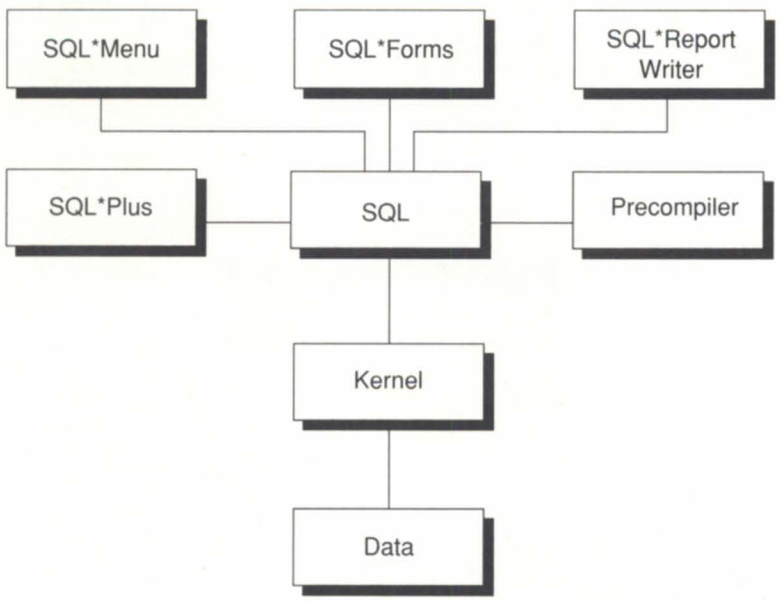
Figure 1: How 4GL tools interact with the SQL data base



development efficiency. Perhaps even more important to a business enterprise is the relational data base's ability to ensure data integrity. Since the increased flexibility of the data base invites more sophisticated data access, the relational data base offers transaction boundaries that ensure either all or none of the data I/Os in a transaction (no matter how complex) are committed to the data base. What this means to real-world applications is that if the system or programs crash unexpectedly, the data are guaranteed to be in a consistent state. This one feature has freed up countless hours of human resources. No longer must teams of programmers hover over an application for hours or days after a system crash. Now *that's* a productivity improvement.

Outstanding tools

As remarkable as relational data bases are, the associated tools are equally impressive. The diagram in Figure 1

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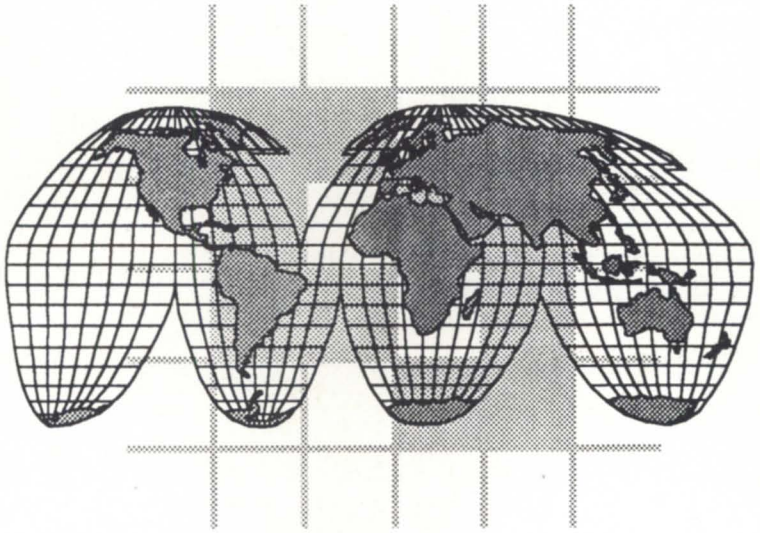

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shows how tools offered by 4GL companies interact with the SQL data base.

Note that tools mentioned are arbitrarily selected from Oracle Corporation. Other RDBMS/4GL (relational data base management systems/fourth-generation language) vendors offer similar tools with virtually identical concepts. Other such vendors include Informix, Ingres, and Sybase.

4GL tools address most levels of programming activity, from end-user interfaces to data base administration, and automate much of the development effort. Take Oracle's suite of tools, for instance.

SQL*Forms is a robust tool that allows developers to create sophisticated interactive processes. It currently runs in block and character modes. Developers knowledgeable in SQL*Forms are already a step ahead in the GUI programming arena because of the event-driven nature of the environment. That is, sections of SQL-like code, called PL/SQL, are activated when certain events occur, such as when a certain key is pressed; when program control enters a field; or after a data base I/O occurs.

In a GUI environment, events might include the pressing of a mouse key or the iconification of a window. In any case, this 4GL tool is poised for use in the bitmapped world.

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SQL*Plus is a tool for data base administrators and programmers. With this tool you can manipulate data structures and issue ad hoc queries. As an example of the productivity introduced by this tool alone, assume you want to increase the length of a field in a record. With hierarchical or network systems you'd be forced to dump the data, modify the field definition in the record, load the data, and then recompile all programs that accessed that field. In

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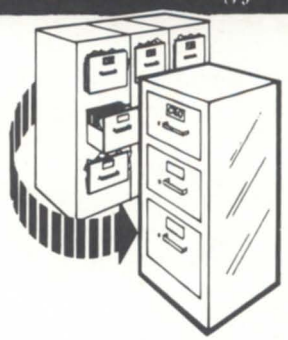

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SQL, you'd simply issue the following command:

```
alter table employee
    modify employee_name char(50);
```

The data wouldn't need to be dumped and loaded, and no programs would need to be recompiled. Every programmer I know would call that a productivity boost!

The SQL precompilers allow you to use your favorite third-generation language, such as Cobol or C, to access the relational data base. This can be most effective in batch update programs that have little or no requirement to interface with the user.

Better performance

I would be remiss without mentioning performance in an article about productivity. After all, if no one is satisfied with performance, it doesn't matter how fast an application can be written. The problem with making claims about the performance of relational data bases is that it is a very relative topic (no pun intended). I have heard people say, "Performance is like the weather. It was given to mankind to have something to complain about." Performance has always been the limiting factor with advanced applications, and it will remain so for the foreseeable future.

With that said I must defend the performance characteristics of relational data bases. To some people, the word *relational* implies "slow." I must admit that this was true with the earliest versions of relational data bases that were used primarily in scientific research environments. It's also true that you get only one chance to make a first impression. So, as with many new and innovative products, SQL suffered with poor performance and an image problem in the early days. However, recent improvements in SQL's performance have been quite impressive. It can now be generally stated that SQL performs at least as well as the earlier hierarchical data bases.

Relational data bases and 4GLs have matured into cornerstone tools for software development efforts. The reasons are varied, but they are rooted in the desire to transform software development into its most efficient form. With these productivity gains come an extra measure of profitability of the business enterprise. This of course is an unrelenting motivation, and it's the same incentive that eventually will lead to the evolution of products beyond RDBMSs and 4GLs. Δ

Kim Medlin is a senior consultant with Data General's Systems Integration Services group in Atlanta, Georgia. Systems Integration Services specializes in custom software design, development, implementation, and consulting. Kim's address is 4170 Ashford Dunwoody Road, Suite 300, Atlanta, GA 30319. He may be reached at 404/705-2653. His e-mail address is klm@atlanta.dg.com.

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Desktop productivity

SYNOPSIS

Want to increase your productivity? Learn to type faster. And take advantage of productivity tools for the Unix office environment that are rapidly approaching parity with those available in other markets.

by David Novy
Contributing Editor

Two of my favorite tools for increasing productivity are "Mavis Beacon Teaches Typing," and Aster*x by Applix, Inc.

Now many of you are probably sporting amused smiles. *Focus* is a magazine probing the edges of what's possible in the computer industry, and this author is talking about computer programs that teach people how to type. But the fact is that no matter how good a mind you have or how powerful a computer system you use, unless the mind and the computer link, all is for naught.

At present, the primary means of linking powerful minds and powerful computers is by means of the standard "QWERTY" typewriter keyboard. Therefore, anything that can improve the transaction speed between the keyboard and computer can greatly increase productivity.

The days when a computer professional gets someone else to do the typing are numbered. My department has been without typing support for almost three years. If I want a memo typed, I do it myself. Also, my company is becoming much less reliant on paper memos. Most memos now are transferred via electronic mail. This system has increased the need for good typing skills even further.

I won't go into great detail regarding Mavis Beacon beyond saying that it is one of the best typing tutors available. It runs on Apple Macintosh, MS-DOS PCs, and the Amiga. It uses artificial intelligence tools to determine your typing weaknesses, then it works relentlessly on helping you improve. The program is merciless, but it can also greatly increase your typing speed *and* let you have some fun while you learn.

The Unix office environment

Aster*x by Applix, Inc., is a set of office productivity tools for the Unix environment. The system consists of a word processor, spreadsheet, graphics, and mail capabilities. It is not currently available for Data General's Aviion family, but it *is* being certified for the 88 Open environment.

One of the product's current strengths is that its word processor is similar to the popular Microsoft Word, and the spreadsheet is similar to Microsoft Excel. One of its future strengths is that Applix has chosen to change from making Aster*x similar to Microsoft to using Microsoft as its paradigm. The next release of Aster*x is planned to have the same functionality as the current releases of Microsoft Word for Windows and Microsoft Excel.

Applix has changed from trying to compete in the Unix office environment to learning to coexist in the real-world office environment. Applix learned from its customers that there is no Unix office environment—there is only the real-world office. If you want to develop a Unix-based product to compete in the real world, you had better base your word processor on either Microsoft Word or Wordperfect, and your spreadsheet on either Microsoft Excel or Lotus 1, 2, 3. Also, you must be able to directly interchange documents with these environments.

Although Aster*x appears to have an exciting tomorrow, even today's version of the application is quite powerful and well-liked by those who use it. As an example, until recently many of my division's engineers were issued workstations or X-terminals for design work, and Macintoshes for word processing and spreadsheets.

Since Aster*x has been made available to them, there are a lot of Macs gathering dust. Some of the engineers have even turned down the opportunity to use the new top-of-the-line Macintosh Quadras. They did not want to be bothered having two terminals in their offices. (It helped also that they were running Aster*x on powerful 50 MIPS workstations with big 19-inch monitors, too).

Easy document conversion

If your documents consist primarily of alphanumeric text, there is little difference between using Microsoft Word and Aster*x. Documents convert between the environments readily. It is in the preparation of sophisticated documents that Aster*x exhibits some weaknesses compared to Microsoft Word, and where conversions are not

quite as simple.

At present, Aster*x cannot do tables as well as Microsoft Word. Aster*x offers the ability to merge spreadsheets into Aster*x word-processing documents. Using the Aster*x spreadsheet capability you can build something resembling a table. However, spreadsheet cells are not the same as word-processing tables. One of the major differences is that you cannot put shaded borders around Aster*x spreadsheet cells. Another weakness is the spell-check function. The Aster*x spell-checker cannot work from a point in the document to the end of the document—you must check the entire document or a only specific section. If your large document is divided into many sections, this can become quite tedious.

Although Aster*x cannot do tables, it has one strength compared to Microsoft Word that makes it invaluable when you're working in a Unix environment—Aster*x has the ability to quickly import X-Windows bitmaps. This gives new meaning to WYSIWYG (What You See Is What You Get).

I recently completed a 160-page training manual using Aster*x. It was able to capture an X-Windows screen using the Unix *xwd* command, and within one minute it would be part of my Aster*x document. Because I needed to import more than 40 screens into my documents, I can only begin to imagine how much time this saved. I also used the Aster*x graphics function to prepare simple charts. It was not as powerful as the dedicated desktop publishing packages with which I am familiar, but it was more than adequate.

Printing from Aster*x is straightforward. Output is Postscript-compatible. You can send the output to a Postscript printer or to a disk file.

There is one point that should be noted when using bitmap files in Aster*x. The document files can get extremely large. The final size of the training manual I wrote was 9 MB. An interesting observation: the size of the document itself was larger than its Postscript print file (8 MB).

Aster*x is licensed concurrently. It uses a floating network license system. That means that Aster*x can be loaded on as many workstations as you want, but only one machine needs to be maintained as a server. Maintenance fees are 15 percent of the purchase price per year. This entitles you to telephone support and automatic upgrades.

Aster*x is a good example indicating that productivity tools for the Unix office environment are rapidly approaching parity with those available in the PC or Macintosh market. In the case where you want to use X-Windows bitmap files in your documents, Aster*x is preferred. 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.

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The obvious things

SYNOPSIS
The best and greatest productivity tool is your own intelligence.

by Doug Johnson
Focus staff

Face it, you'll never get down to three-hour workdays. Toiling and struggling still await most of us for the rest of conceivable time. And computer systems will be right there with you as you strive to get ever more done and evolve ever upward to ever greater *productivity*, whatever that is.

According to Webster's, being *productive* means being effective in bringing something about; or yielding or furnishing results, benefits, or profits. To the average computer-wielding individual, productivity probably means at its most fundamental level: doing more, period; getting more from the same effort; or doing more with less.

It's not just my imagination: there *are* conflicting messages out there in the careeningly chaotic computer industry. On the one hand, you can flip through the trade magazines of your choice—*Focus* (we hope), *Computerworld*, *Unix World*, whatever—and scan a wealth of productivity tools promoted for MVs, Aviions, PCs, and everything else. Squeeze and sculpt data with unprecedented power and versatility. Run 8 terminals at once with a dozen rapidly developed applications accessing 50 data bases and producing 250 reports tracking 1,000 separate projects worked on by 10,000 people e-mailing and scheduling each other 28,000 times every day all around the world. You'll never miss anything, because your computer system knows to find, notify, remind, retrieve, and highlight.

On the down side, various glum commentators are issuing forth thusly: *Despite legions of dollars invested in computer systems and technology the past couple of decades, workers today aren't really any more productive than they used to be with manual typewriters and pencils.*

It makes you want to pitch your system out a 10th-floor window and stop off on the way home to pick up a stack of "Big Chief" tablets, a leaky fountain pen, and maybe an abacus. So what's the answer? I have a hard time accepting that there hasn't been progress in these areas, that with computers we *are* more productive.

But one thing perhaps is forgotten in the swirling proliferation of ever more powerful systems, dazzling software products, and dizzying technological advances: People are still people—fallible, limited, mortal. How do we, the masters, keep up with our creations? Don't forget the obvious things.

David Novy in his article about Unix tools (pg.15) makes a point so serenely simple it rings like a bell. Repeat it as your mantra: *Learn to type better.* Get ideas into the system faster; help it amplify your intelligence, as God intended it to do.

- *Improve your writing.* The future offers distributed computing networks with workgroups depending on organized and easily accessed information. Improved typing means greater writing volume, but what you produce must be clear and effective.
- *Become a faster reader.* Others with improved typing and writing skills will fill your screen with more and better information. Get ready.
- *Become a better decisionmaker.* There's more to produce and process, but you must know what's important. You decide on what tasks to unleash your powerful computer system.

Given the near-magical capabilities of today's systems and software, a productive person can go on to achieve wonders. But unproductive people will use the tool unproductively. Hardware grows more powerful and software smarter, but remember what's been the real objective all along: getting people to work together. Δ

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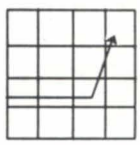

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The latest products for DG systems

Data base migration

Westboro—Data General Corporation announced that PI/open, a data base management and applications development system from Vmark Software, Inc., of Framingham, Massachusetts, has been ported to DG's Aviion family of Unix-based systems and servers.

PI/open provides Aviion users with the ability to develop applications more easily and quickly. It also allows users of Prime Information-based applications—such as municipal management, education administration, and distribution programs—to migrate easily to Aviion systems without conversion. PI/open is object-code-compatible with Prime Information programs, which are installed on an estimated 6,000 Prime 50 series minicomputers.

Porting PI/open to Aviion systems makes it easier for users of Prime systems to economize and migrate to Unix-based open systems through DG's scalable Aviion systems family.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4096.

Circle 53 on reader service card.

Unix fax software

Santa Ana, CA—V-Systems, Inc., announced Fxserver 2.0, an integratable computer fax system now available for the Data General Aviion family.

Fxserver is designed to be easily integrated with any software application in the same way as the Unix line printing utility, performing its job much the same as the *lp* spooler. Applications that print directly to *lp* may be configured to use a remote printer interface, which automatically handles routing of the fax transmission to the server. This design structure allows developers to customize their systems with fax capabilities and enables the end user to fax directly from existing applications.

Version 2.0 enhancements include group requests, VGA viewing capability, class II modem support, a menu-driven interface, automatic cover sheet generation, and fax printing support for Postscript and Epson printers.

Fxserver schedules fax transmissions and manages fax receipts. Functions include file conversions, directory management, scheduling, and fax activity logging. Customized cover pages can be created using company logos, personal signatures, and optional memos. ASCII and image files can be combined in any document to be faxed. Group broadcasts can be faxed with individual cover sheets, with users informed when their fax transmissions have been completed. Fxserver notifies users of inbound transmissions, stores all inbound fax images to the Unix file system, and optionally routes images to other users or printers depending on identification given by the sending fax machine.

Pricing for the Aviion version is $1,495. Other V-Systems products include Fxvision ($795), which enables users to view, send, receive, print, archive, and manage fax documents using pulldown menus, option lists, and standard defaults; and Fxscript ($395), which allows users to fax Postscript documents directly from applications supporting the page description language such as Framemaker, Wordperfect, Lotus 1-2-3, and Corel Draw.

V-Systems, Inc., 39 Brookhollow Drive, Santa Ana, CA 92705; 714/545-6442.

Circle 55 on reader service card.

CAI-Net

Pacheco, CA—Century Analysis, Inc., (CAI) announced CAI-Net for Data General's Aviion processor. CAI-Net is

Continued on page 39

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Brian Johnson

Staying memory resident

SYNOPSIS

BJ walks you through the procedures and pitfalls of writing an example Cobol program to handle a read-only, memory-resident data base.

:MRDB:EXAMPLE

A couple of times over the past few months I've talked about the point at which a heavily accessed data base should be kept in memory versus being stored in an indexed disk file, due to the massive amount of RAM memory now available on most systems. This month I'm going to show you a real-life example, and in the process point out a few of the pitfalls involved for those of you who use Cobol to do this trick.

The example program I'm going to use was developed as a learning tool for a client of mine, so it's not a real piece of application software. However, it should suffice to show you how a typical read-only memory resident data base is done.

The Cobol source code for the example program is shown in Figure 1. The Cobol source code for the subroutine to read the data base into memory is shown in Figure 2. The macro to compile and link is shown in Figure 3. The complete package, including the raw and predigested data table files and all necessary macros to compile, link and run the example, is available on the :SYSMGR BBS as item SMLOGS:SML9303.

:MRDB:EXAMPLE:SPEC

The example problem involves using a read-only, memory-resident data base to find a city name and state abbreviation given a ZIPCODE. The data base is composed of about 43,000 records and consumes approximately 1.3 MB. The goals are: 1) zero disk I/O to access the data; and 2) all users of the data base, regardless of .PR file, will share the same single copy of the data base in memory.

The first step was to get some ZIPCODE data to use. I didn't have any handy, so I did like any other data-hungry

Figure 1: MRDB.COB

```
* Memory-Resident DataBase example.
IDENTIFICATION DIVISION.
PROGRAM-ID. MRDB.
AUTHOR.                 BJ.

ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SPECIAL-NAMES.
        SWITCH "V" ON STATUS IS VERBOSE.

DATA DIVISION.
WORKING-STORAGE SECTION.
77 AC0                          PIC S9(9) COMP.
77 AC1                          PIC S9(9) COMP.
77 AC2                          PIC S9(9) COMP.
77 AREACODE             PIC X(3).
77 BASE-CPU             PIC 999999V999 COMP.
77 CITY-NAME            PIC X(24).
77 COB-RUNTM                    PIC S9(4) COMP VALUE 24.
77 CPU-SECS             PIC 9.999.
77 HI-PATHNAME                  PIC X(32) VALUE "ZIPCODE.HI.SDT".
77 HI-ZIPCODE                   PIC 9(5) COMP.
01 HI-ZIPCODE-TABLE EXTERNAL.
 05 HI-ZIPCODES          PIC 9(9) COMP.
 05 HI-ZIPCODE-DATA
        OCCURS 1 TO 32767 TIMES
                DEPENDING ON HI-ZIPCODES,
        ASCENDING KEY IS HI-ZIPCODE-VALUE,
        INDEXED BY J.
 10 HI-ZIPCODE-VALUE            PIC 9(5) COMP.
 10 HI-AREACODE-VALUE           PIC X(3).
 10 HI-CITY-NAME-VALUE  PIC X(24).
 10 HI-STATE-ABBR-VALUE         PIC X(2).
77 IER                          PIC S9(9) COMP.
77 LO-PATHNAME                  PIC X(32) VALUE "ZIPCODE.LO.SDT".
01 LO-ZIPCODE-TABLE EXTERNAL.
 05 LO-ZIPCODES          PIC 9(9) COMP.
 05 LO-ZIPCODE-DATA
        OCCURS 1 TO 32767 TIMES
                DEPENDING ON LO-ZIPCODES,
        ASCENDING KEY IS LO-ZIPCODE-VALUE,
        INDEXED BY I.
 10 LO-ZIPCODE-VALUE            PIC 9(5) COMP.
 10 LO-AREACODE-VALUE           PIC X(3).
 10 LO-CITY-NAME-VALUE PIC X(24).
 10 LO-STATE-ABBR-VALUE         PIC X(2).
01 RUNTM-PKT.
 05 FILLER               PIC X(4).
 05 GRCH                         PIC 999999V999 COMP.
 05 FILLER               PIC X(8).
77 SEARCHES              PIC 9(9) COMP VALUE ZERO.
77 STATE-ABBR                   PIC X(2).
77 ZIPCODE               PIC 9(5) COMP.

PROCEDURE DIVISION.

LOAD-TABLES.
        CALL "LSDT" USING LO-PATHNAME, LO-ZIPCODES, IER.
        IF IER NOT = ZERO THEN
                DISPLAY "LSDT error: ", IER,
                STOP RUN.
        DISPLAY LO-ZIPCODES, " low ZIPCODEs".

        CALL "LSDT" USING HI-PATHNAME, HI-ZIPCODES, IER.
        IF IER NOT = ZERO THEN
                DISPLAY "LSDT error: ", IER,
                STOP RUN.
        DISPLAY HI-ZIPCODES, " high ZIPCODEs".

        MOVE HI-ZIPCODE-VALUE(HI-ZIPCODES) TO HI-ZIPCODE.
* Get the CPU consumed prior to testing lookups.
        MOVE -1 TO AC0, MOVE ZERO TO AC1.
        CALL "?CBADDR" USING RUNTM-PKT, AC2.
        CALL "?CBSYS" USING COB-RUNTM, AC0, AC1, AC2, IER.
        MOVE GRCH TO BASE-CPU.

SEARCH-TABLE.
        PERFORM LOOKUP-CITY-BY-ZIP
                VARYING ZIPCODE FROM 1 BY 100
                        UNTIL ZIPCODE = 99001.
```

person would do and dialed into Compuserve. In a few minutes I located a data base of city names, state abbreviations, and telephone area codes (not needed, but what the hell), indexed by ZIPCODE. The file was organized as quoted ASCII text strings using commas as field delimiters, so the next step was to use SORT as a filter to remove the quotes, commas, and trailing blanks, and sort the records into ZIPCODE order. For some reason it came sorted in order by telephone area code. Then a BicCU (Disposable C Utility) took care of converting the sorted text file to an image of the working storage table needed by the Cobol program. This presented a few minor problems. The first one was that the PIC 9(5) COMP integer data item used for ZIPCODE values occupies 3 bytes, and C only has 2- and 4-byte integers. The second one was that C uses NUL-delimited strings, and Cobol uses space-filled strings. Both problems were relatively trivial to handle.

The final result of this effort was a file named ZIPCODE.SDT (SDT standing for Shared Data Table).

:MRDB:E.G.:COBOL

The next order of business was to write the Cobol example program itself. The program needs to get the shared data table into memory and then do a few lookups to make sure it works. The program is relatively straightforward, but here's a description of the tricky bits.

The first tricky bit is how to force a working storage data item to be located in shared memory instead of unshared (the

```
            MOVE -1 TO AC0, MOVE ZERO TO AC1.
            CALL "?CBADDR" USING RUNTM-PKT, AC2.
            CALL "?CBSYS" USING COB-RUNTM, AC0, AC1, AC2, IER.
            COMPUTE CPU-SECS = (GRCH - BASE-CPU) / SEARCHES.
        DISPLAY SEARCHES, " lookups".
        DISPLAY CPU-SECS, " CPU seconds per lookup".
        STOP RUN.

LOOKUP-CITY-BY-ZIP.
        ADD 1 TO SEARCHES.
        IF ZIPCODE < 50000 THEN
                PERFORM LOOKUP-LO-ZIP
        ELSE
                PERFORM LOOKUP-HI-ZIP.
        IF VERBOSE THEN DISPLAY ZIPCODE, " is ",
                                CITY-NAME, " ",
                                STATE-ABBR, " ",
                                AREACODE.

LOOKUP-LO-ZIP.
        SEARCH ALL LO-ZIPCODE-DATA
                AT END
                        MOVE "???" TO AREACODE,
                        MOVE "UNKNOWN" TO CITY-NAME,
                        MOVE "??" TO STATE-ABBR,
                WHEN LO-ZIPCODE-VALUE(I) = ZIPCODE
                        MOVE LO-AREACODE-VALUE(I) TO AREACODE,
                        MOVE LO-CITY-NAME-VALUE(I) TO CITY-NAME,
                        MOVE LO-STATE-ABBR-VALUE(I) TO STATE-ABBR.

LOOKUP-HI-ZIP.
        SEARCH ALL HI-ZIPCODE-DATA
                AT END
                        MOVE "???" TO AREACODE,
                        MOVE "UNKNOWN" TO CITY-NAME,
                        MOVE "??" TO STATE-ABBR,
                WHEN HI-ZIPCODE-VALUE(J) = ZIPCODE
                        MOVE HI-AREACODE-VALUE(J) TO AREACODE,
                        MOVE HI-CITY-NAME-VALUE(J) TO CITY-NAME,
                        MOVE HI-STATE-ABBR-VALUE(J) TO STATE-ABBR.
```


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Figure 2: LSDT.COB

```
* Load a Shared Data Table.
IDENTIFICATION DIVISION.
PROGRAM-ID.                 LSDT.
AUTHOR.                     BJ.

ENVIRONMENT DIVISION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77 AC0                      PIC S9(9) COMP.
77 AC1                      PIC S9(9) COMP.
77 AC2                      PIC S9(9) COMP.
77 BLOCKS                                    PIC S9(9) COMP.
77 BLOCKS-LEFT                               PIC S9(9) COMP.
77 COB-FSTAT                                 PIC S9(4) COMP VALUE 63.
77 COB-SOPEN                                 PIC S9(4) COMP VALUE 51.
77 COB-SPAGE                                 PIC S9(4) COMP VALUE 48.
77 CROCK                                     PIC S9(10) COMP.
77 DELIMITED-PATH           PIC X(256).
01 FSTAT-PKT.
 05 FILLER                  PIC X(34).
 05 SEFM                                     PIC S9(9) COMP.
 05 FILLER                  PIC X(12).
77 IER                      PIC S9(9) COMP.
77 PAGES                                     PIC S9(9) COMP.
77 SPAGE-CHANNEL            PIC S9(9) COMP.
01 SPAGE-PKT.
 05 PSTI                    PIC S9(4) COMP.
 05 FILLER                  PIC S9(4) COMP.
 05 PCAD                                     PIC S9(9) COMP.
 05 PRNH                                     PIC S9(9) COMP.
 05 PRCL                                     PIC S9(4) COMP.
 05 FILLER                  PIC S9(4) COMP.

LINKAGE SECTION.
77 PATHNAME                                  PIC X(256).
77 SHARED-PAGE                               PIC X(1).
77 ERROR-CODE                                PIC S9(9) COMP.

PROCEDURE DIVISION USING PATHNAME,
                                            SHARED-PAGE,
                                            ERROR-CODE.

LOAD-SHARED-TABLE.
        MOVE PATHNAME TO DELIMITED-PATH.
        INSPECT DELIMITED-PATH
            REPLACING FIRST " " BY LOW-VALUE.
* Get the file extent.
        CALL "?CBBADDR" USING DELIMITED-PATH, AC0.
        MOVE ZERO TO AC1.
        CALL "?CBADDR" USING FSTAT-PKT, AC2.
        CALL "?CBSYS" USING COB-FSTAT, AC0, AC1, AC2, IER.
        IF IER NOT = ZERO THEN GO TO RETURN-TO-CALLER.
* Compute the number of pages/blocks involved.
        COMPUTE PAGES = SEFM / 2048.
        COMPUTE BLOCKS = PAGES * 4.
* Open the file for read-only shared page input.
        CALL "?CBBADDR" USING DELIMITED-PATH, AC0.
        MOVE -1 TO AC1, MOVE ZERO TO AC2.
        CALL "?CBSYS" USING COB-SOPEN, AC0, AC1, AC2, IER.
        IF IER NOT = ZERO THEN GO TO RETURN-TO-CALLER.
        MOVE AC1 TO SPAGE-CHANNEL.
* Read the pages.
        MOVE LOW-VALUES TO SPAGE-PKT.
        CALL "?CBADDR" USING SHARED-PAGE, PCAD.
        PERFORM READ-PAGES UNTIL PRNH = BLOCKS OR IER NOT = 0.
* Return the error code.
RETURN-TO-CALLER.
        MOVE IER TO ERROR-CODE.
        EXIT PROGRAM.

READ-PAGES.
* Read 256 blocks, or whatever remains, at a time.
        COMPUTE BLOCKS-LEFT = BLOCKS - PRNH.
        IF BLOCKS-LEFT < 256 THEN
            MOVE BLOCKS-LEFT TO PSTI
        ELSE
            MOVE 256 TO PSTI.
        MOVE ZERO TO AC0, MOVE SPAGE-CHANNEL TO AC1.
        CALL "?CBADDR" USING SPAGE-PKT, AC2.
        CALL "?CBSYS" USING COB-SPAGE, AC0, AC1, AC2, IER.
* Update the page address and starting block no.
* Use CROCK to avoid truncation (addresses are 9.8 digits).
        MOVE PCAD TO CROCK.
        COMPUTE CROCK = CROCK + (PSTI * 256).
        MOVE CROCK TO PCAD.
        ADD PSTI TO PRNH.
```

Figure 3: MRDB.MAKE.CLI

```
Cobol (MRDB,LSDT)
CLINK/INFOS=DUMMY/MTOP=64 MRDB LSDT &
<LO,HI>-ZIPCODE-TABLE/ALIGN=10/SHARED
```

default). The Cobol manual provides the answer in the form of the IS EXTERNAL phrase. Specifying IS EXTERNAL on a data item causes the compiler to "publish" the name of the item for use by the LINKer. In turn, the LINKer allows you to override the default storage class for any published item by specifying item-name/SHARED in the LINK command line. Also, because we're going to be doing shared-page I/O, we have to force the table to be aligned on a page boundary. This is accomplished by specifying item-name/ALIGN=10 in the LINK command line.

The next tricky bit is that the default memory allocation for a .PR file is only 1 MB, and we're planning on slurping up a table that's bigger than a megabyte, so we need to specify a nondefault memory allocation size using the /MTOP switch. Once you exceed 1 MB there's relatively little additional overhead for specifying 4, 8, 16, or whatever number of megabytes, so I went whole-hog and used /MTOP=64.

The next tricky bit involves slurping the table into memory. This requires the use of (Gasp!) system calls. Yeah, I know, but it's unavoidable. In simple terms, the procedure involves determining the size of the table file in pages (via ?FSTAT), opening the table file for shared I/O (via ?SOPEN), and then reading all of the pages into the shared table space (via repeated ?SPAGEs). For the sake of minimizing system overhead the pages are read in 64 pages at a time. One thing to pay attention to in the code is the use of the data item CROCK to update the shared page address in the ?SPAGE packet. When doing arithmetic on a PIC 9(n) data item, Cobol always truncates the result to "n" digits. Ring 7 addresses are 4 bytes long, but when expressed as a decimal number they exceed the 9-digit maximum that Cobol can fit into a 4-byte number. For example, the base address of ring 7 in decimal is 1,879,048,192. Luckily, Cobol does not truncate when moving a 10-digit COMP item to a 9-digit COMP item, so I update the address using the 10-digit CROCK item and then MOVE the result back to the 9-digit data item (PCAD) in the packet. Yeah, I know it's tacky, but the only alternative would have been to write an assembly language subroutine to do the ?SPAGEs.

The next tricky bit involves the way Cobol implements the SEARCH verb. By default, the SEARCH verb simply searches the table sequentially. For San Francisco this is a disaster; our ZIPCODEs all begin with 941, which means that we'd be searching through 90 percent of the 43,000 table entries to get to the "941xx" codes every time. No thanks.

Luckily, according to the Cobol Release Notice there's a patch available for COBDRIVER, which converts the code generated for SEARCH verbs from a linear search to a binary search, with a couple of reasonable restrictions (see AV_CO_xyz_DRV.01 for all the gory details, where x.yz is your Cobol rev). The two main restrictions are that the table must be in sorted order by whatever data item is mentioned in the KEY IS phrase, and there cannot be any duplicate keys

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(although an obvious work-around exists for the latter restriction). Okay, so obviously we gotta patch COBDRIVER in order for this scheme to work efficiently.

At this point things looked pretty good. The ratio of the CPU consumption between the unpatched and patched versions for the case of my 43,000 ZIPCODE table should be on the order of 22,500:15, or about 1500:1, and that's pretty significant. The huge disparity is because the average number of probes for a binary search is approximately log base 2 of N, where N is the number of table entries. Obviously, the average number of probes for a linear search is N/2.

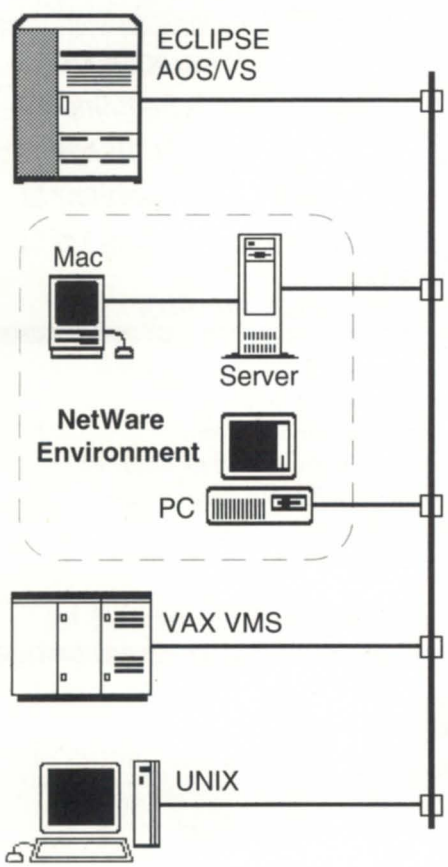
Then I started debugging the program.

:MRDB:SEARCH:OOPS

A small problem. The SEARCH sentence failed to find anything. Here's where knowing how to use DEBUG and knowing assembly language can save days of work and lots of frustration. While using DEBUG to scan through the in-line code generated for the SEARCH looking for places to put breakpoints, I noticed a couple of instructions that didn't look kosher. I recompiled the program with the /CODE switch and printed out the listing of the generated code. Eureka! It turns out that whoever designed the generated code used 16-bit words to store the current low and high subscript range for the search. Worse yet, when loading the values into the MV's 32-bit registers the code failed to zero the high order word of the register. As a result, the SEARCH verb only works on arrays of 32,767 or fewer entries. Had they zeroed the high order word of the registers it would have worked on arrays of 65,535 or fewer entries. Better, but still restrictive. So, the next order of business was to dial into 1-800-DASH-CSC and submit an RFE. I didn't submit an STR because technically it's not a bug. The patch states that it changes the SEARCH verb to match the functionality of AOS Cobol. Yes, that's good old 16-bit AOS.

So, what to do? Wait for the RFE to get implemented? I don't plan to live that long, so the obvious work-around was to split the table up into as many subtables of 32,767 or fewer elements as necessary, and then check the target ZIPCODE to figure out which table to search. Ugly, but not very difficult. In the case of my 43,000 ZIPCODEs, an obvious scheme was to store all the ZIPCODEs up to 49999 in one table, and the ones from 50000 up in a second table. I grabbed SORT again and used it to break ZIPCODE.SDT into ZIPCODE.LO.SDT and ZIPCODE.HI.SDT.

The final bit of work involved adding some logic to the program to count the number of searches and report the average CPU time per SEARCH. On my MV/4000 the results were 0.004 seconds for the binary search and 1.336 seconds for the sequential search, or a ratio of about 335:1 versus the 750:1 that



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the theory predicts (not 1500:1 'cuz each subtable is half the size of the original table). Not as good as predicted, but not too shabby. The difference may be because completely different code is generated for the binary search case compared to the sequential case, and the floating-point instruction content of the two cases is significantly different.

So what's the cost? Well, I've gotta make sure that I always have the 1.3 MB of memory available that the memory resident tables require. Not too painful considering the tremendous gain in processing speed over a disk-based solution.

:MRDB:POSTSCRIPT

A common situation with tables like the one used here is that occasionally you want to search the table by a key other than the one by which it's sorted. In our case you might want to look up a ZIPCODE given a city name. Once the patch is installed, all SEARCHes are binary ones and require a sorted key. Woulda been nice if the Cobol compiler guys had left the sequential search logic in for those cases where you do SEARCH id-1 instead of SEARCH ALL id-1, but they didn't.

The solution is tacky, as usual, but not unreasonable. Just write a subroutine to do the alternate search and compile the subroutine using a version of Cobol with an unpatched COBDRIVER file. Don't forget to add IS EXTERNAL to the table declarations in the subroutine. In fact, you can just put the table declarations in a COPY file and COPY it into both source files. In the case of the subroutine compiled with the unpatched COBDRIVER, Cobol will conveniently ignore the ASCENDING KEY IS phrase.

:WASHI:UPDATE

Back in my January column I talked about some performance problems related to Cobol on WASHI-based MVs. Someone called from the Cobol group to let me know that in the case of the IS NUMERIC syntax, a replacement object module, is available for the Cobol library routine involved. However, there's something to be on the lookout for; if you get a replacement module make sure that its creation date is later than June 1992. Otherwise you'll hit a bug when testing even byte-length numeric items. Δ

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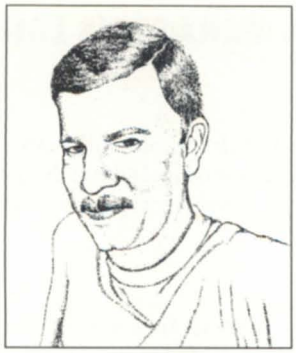

Tim Boyer

Guarding the gates

SYNOPSIS

If system security is easy and manageable, you stand a better chance of keeping intruders out of yours. Guardian offers a wealth of features to shore up your password defenses and shut out hacking miscreants.

You've read, of course, about hackers and the havoc they can wreak on a system. But what if you're running AOS/VS? You're safe from them, right? That's what I thought, until I found a file on a bulletin board describing how to break into an Australian MV/8000. I posted it on the RDS bulletin board a couple of months ago. Luckily, most of the information was wrong, but it made me stop and think—there are people out there who will try to break into *anything*.

AOS/VS has a reasonably tight security system, but that isn't how most break into a system anyway. When was the last time you changed your password? I think my boss changed his once in 1988. How easy is your password to guess? Is it written on a little slip of paper above your monitor, or taped to the bottom of your keyboard? Is it one word? Is it a *Star Trek* character? If your username is "Tim," and your password is "Timothy," you're already in trouble. It's these kinds of potentially disastrous situations that Guardian from Datalynx, Inc., was designed to help eliminate.

Guardian's design philosophy is that the easier it is for a system manager to control user profiles, the greater the likelihood that an effective security plan will be adhered to. It's just like doing backups—if it's easy to do, they'll get done every night. When they're a pain, they'll get skipped occasionally, and you know when you'll lose your disk drive, don't you?

Under the Guardian system, the initial program executed when you log onto the system is GUARD_USR.PR. This program performs such functions as checking the console to be certain the login is allowed, validating the time window, and checking the password expiration date. If you pass all of the checks, you are transparently passed along to the initial user program.

These validations are set up in one of the included programs, GUARDIAN.PR. This program is a direct replacement for PREDITOR, the AOS/VS profile editor. With some improvements, of course. Instead of line-by-line entry, Guardian has a full screen profile editor and lets you choose which line to change. This screen is what PREDITOR would look like if you could see it all at once.

Well, almost a direct replacement. When you go to enter or change the user's password, Guardian will ask, "Do you wish to have the system generate a password for you?" If you answer yes, the program will generate a two-word password based on its password dictionary. This makes certain that the password isn't the name of your first-born child.

The dictionary is completely maintainable. You can add or delete words, and display or print the dictionary. You

can choose which words to allow, and which to put into the invalid password list. The invalid password list is an interesting feature. It contains such entries as DEFAULT, PASSWORD, DATAGENERAL, OPERATOR, and KLINGON, and won't allow any password based on these. Try to use one, and you get the message, "Password fails validation test." Try to use an old password, and Guardian knows it, too—no switching back and forth between two passwords, either. You get an "Attempt to reuse an old password" message.

Once a secure password is selected, you can make sure that it's not kept forever. In Guardian you can set the password life field to force the user to change it after a set number of days, or after a certain date. If you'd like to set up a temporary user on the system, you may specify a profile expiration date. After this date the user will be inactivated, and login attempt will fail.

> How easy is your password to guess? Is it written on a little slip of paper above your monitor, or taped to the bottom of your keyboard? Is it one word? Is it a *Star Trek* character?

So for an incredible amount of password security, you'd first set the user profile's "Change password" to "N". This disables the CTRL-L method of password changing on the fly. Then, the only way for a user to change passwords would be to use the supplied NEW_PASSWORD macro. This macro can be used to force a machine-generated password, but even if you let employees choose their own, it will check for invalid words and repeated passwords. If you're really, *really* paranoid, you can even set it up so that no one but you can change any password, even if they've expired. This is known as the "burn before reading" security level.

As well as a password expiration date, Guardian provides for a login time window, day window, console selection, and maximum sessions. Using the date and time windows, you can specify that, for instance, a shop floor terminal may be logged onto from 7 a.m. to 5:30 p.m., Monday through Friday. The control of this option is fine enough that you can choose what to do when the time has expired, from allowing a user who logged on before the expiration to continue working, to warning the user every minute, to warning the miscreant and then kicking that unauthorized user off the system. Got a bunch of weird holidays at your plant? No problem. Just edit the file GUARDIAN.HOLIDAYS.

Console selection is a feature that I'd enforce strictly. Our company has a couple of wanderers—employees who never seem to be logged in at their own desks. Instead, they'll home in on any likely looking terminal, log in, look up a record, and leave. You can usually discover these creatures by typing "?". They'll be logged in with the same name at three or four different terminals. Well, not with Guardian. You can specify which terminals a user profile can use, or which terminals the user *can't* use. And you can set the maximum number of simultaneous logins in both batch and interactive mode. If this number is exceeded, the system will kick the user off with an appropriate error message.

If you're running AOS/VS 7.70 or VS II 2.20, you can take advantage of EXEC's new custom logon feature. Custom logon allows you to write your own programs to handle user validation, user greetings, and other routines normally handled by EXEC. The people at Datalynx have written their own Guardian custom logon, which enables them to gather information and maintain password control that would be impossible under EXEC. The Guardian custom logon displays a banner with "AOS/VS 7.70.00.00 / Guardian 3.22" on it, your last successful login date, last attempted login, password expiration date, access window close time, and number of invalid login attempts

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since your last successful login. If you bring the system up and this last number is 20, you've got problems.

Using this option, Guardian can maintain an "Invalid Login Attempts" flag. This would set the maximum number of consecutive logins by a user before that user profile would become invalidated. The advantage, of course, would be that you could freeze out the username without killing off the port. In conjunction with this, the Guardian screen will display a "Failed Login Attempts" field.

Guardian's custom logon implements a rather unique method of both foiling hackers and allowing passwords on even the noisiest lines. The time that the system waits between password requests will double with each unsuccessful attempt. After the first try, this will be somewhere around 0.1 seconds. By the time the eighth try comes around, the wait will be 25.6 seconds, and so on until the attempts limit is reached. If you've set no login attempts limit but have the invalid logins set, the system will keep accepting and ignoring passwords for a username, rejecting them and doubling the time interval each try. This will keep a hacker busy all day long.

Guardian includes a number of reports to help you track user activity. The basic report is a complete profile list, including date created, date last modified, last login, user privileges, and so on. Other reports tell you who has modem or superuser privileges, whose password is ready to or has expired, whose profile has been inactive for a certain number of days, and so on. I discovered a user still active that had quit in 1990, as well as a number of people set up as superuser when I first installed the system that definitely shouldn't have that right.

One of the slicker reports is the password validation report. This checks each user's password against a number of criteria to be sure that it's an unobvious password. The program looks for such obvious passwords as the user's name, a string of six identical characters, or an entry in the invalid password dictionary. I found one user whose password was "XXXXXX", and another with "CHANGE".

Also included are a number of batch utilities designed, once again, to make password maintenance a little less of a chore. You can force all of the users to change their passwords, in case of a security breach, change a certain field in multiple profiles, create multiple profiles, and more.

Product info

Guardian rev 3.22 is available from Datalynx, Inc., 6659 Convoy Court, San Diego, CA 92111; 619/560-8112. The price for any single CPU is $1,100, with a small multi-CPU surcharge.

In addition to the AOS/VS and VS II versions, there's a Guardian version for the Aviion. In the next revision, Guardian will work with TCP/IP. This will mean that you can use the Guardian system as a front end on your Eclipse to allow access to your Aviion, and it will keep the passwords current between the machines.

The bottom line is that Guardian lived up to all of my expectations. Look, let's face it—system security is a real pain, at best. The only time you'll have no complaints from your users is if your security stinks. Otherwise, your users won't be able to log on at certain times, or on certain terminals, or they'll constantly forget their passwords. I'd love to have a system with no passwords, ACLs all set at "+ OWARE", and give everyone superuser, superprocess, and system manager privileges. It would sure make my life easier if I could trust the whole world.

Unfortunately, I can't. As I've said before, I'm paranoid about certain system functions, and this is one of them. If you're concerned about your system security, and especially if you're hooked up to a modem, take a look at Guardian. Remember, sometimes even paranoids have real enemies. Δ

Tim Boyer is EDP Manager at Denman Tire Corporation. He may be reached at 400 Diehl South Road, Leavittsburg, OH 44430; phone 216/898-2711, fax 216/898-5256, or on the NADGUG bulletin board at 415/924-3652, or on the CSC bulletin board at 800/DASH-CSC.

Building codes

SYNOPSIS

The author continues a discussion begun last month about data base design ("Designing relationally"). This article will address data base normalization and entity relationships.

by Robert Howell
Special to Focus

Last month we defined a relational data base, looked at some terminology used with relational data bases, and considered how to get the end user involved in the design process. This time we will discuss the actual logical design of our data base. What we discuss will be applicable to any data base system or programming language, and that's the whole point—that you can design a relational data base using any data base software or programming language.

Once you talk to the end users and determine what they want, it's time to begin putting something down on paper. But you need some design rules before you begin designing. An architect designing a house starts with a fixed set of design rules. You must, for example, take into account the laws of physics, as well as the laws of the municipality (building codes). Then there are the tastes and desires of your employer, for whom the house is being built.

You can draw any kind of building on paper, but if gravity says it won't stay up, it won't. The same applies to data base design. The first set of rules the data base designer must take into account are those of the data base software and the programming language being used. Obviously, you must work within the limitations of what you have. If your data base does not allow alternate keys, you cannot use alternate keys, no matter what you design on paper. This may be a good time to consider upgrading to a more powerful data base manager if you can't live without some feature, or if you can't program around it.

The next set of rules are restrictions you place upon yourself. Building codes exist for the safety of those using the building, and because they have been proven over time as minimum design standards that produce a good building. There is no direct analogy in data base design for building codes, but the closest we can come to them are the self-imposed rules that have proven over time to be effective design standards.

After consulting with the end user, you've decided your data base will need to store open orders, inventory items, customer names, and addresses. Assume for now that the data base allows unlimited indices and has three types of data: Character (C), Numeric (N), and Date (D). Keep in mind that this is a logical design, so you need not be concerned about field sizes and the like. Figure 1 shows a first draft of the data base.

Well, everything we need to store is there, but this data base has prob-

Figure 1: Data base, first draft

```
ORDER_NUMBER                N
ORDER_DATE                  D
CUSTOMER_NAME               C
BILL_TO_ADDRESS_1           C
BILL_TO_ADDRESS_2           C
BILL_TO_CITY                C
BILL_TO_STATE               C
BILL _TO_ZIP                N
CUSTOMER_PHONE_NO           N
SHIP_TO_ADDRESS_1           C
SHIP_TO_ADDRESS_2           C
SHIP_TO_CITY                C
SHIP_TO_STATE               C
SHIP_TO_ZIP                 N
TERMS                       C
SALESMAN                    C
SHIP_VIA                    C
ORDER_STATUS                C
DATE_SHIPPED                D
LINE_ITEMS OCCURS 20 TIMES.
    LINE_NO                 N
    ITEM_DESCRIPTION        C
    ITEM_PRICE              N
    QTY_ORDERED             N
    QTY_SHIPPED             N
```

Record Keys: Primary ORDER_NUMBER must be unique.Secondary CUSTOMER_NAME allowing duplicates.

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lems. Let's look at the first rule of data normalization.

1. Eliminate all repeating groups

This means there can be no arrays of repeating data items within a single table. That's correct; no arrays. For most Cobol programmers this means eliminating the beloved "OCCURS N TIMES" clause within a record definition. This is one of the most controversial and most discussed subjects when relational data are brought up. To the relational purist, a repeating group represents a one-to-many relationship, and should be so represented in the data base design. "Besides," they say, "it is cumbersome and untidy to write code to scan arrays."

To the pragmatist it is relational overkill to create separate tables for every two-, three-, or four-item occurrence within a record. This becomes especially important when there are a fixed number of occurrences. We must then write code to ensure that no more than the allowed number of rows are written to the table. This is equally as cumbersome as writing code to scan arrays. So this is one of the times when I advocate breaking the rules, but *only* in the following case: If the repeating item has a fixed number of occurrences, and the item is not an aggregate (group item composed of several sub-items of different types), then I advocate using an array. In all other cases it usually pays to create another table for the repeating items. The benefits to this are that the number of rows are unlimited, and that most relational data base software will automatically maintain the one-to-many relationship.

Figure 2: New line-item table

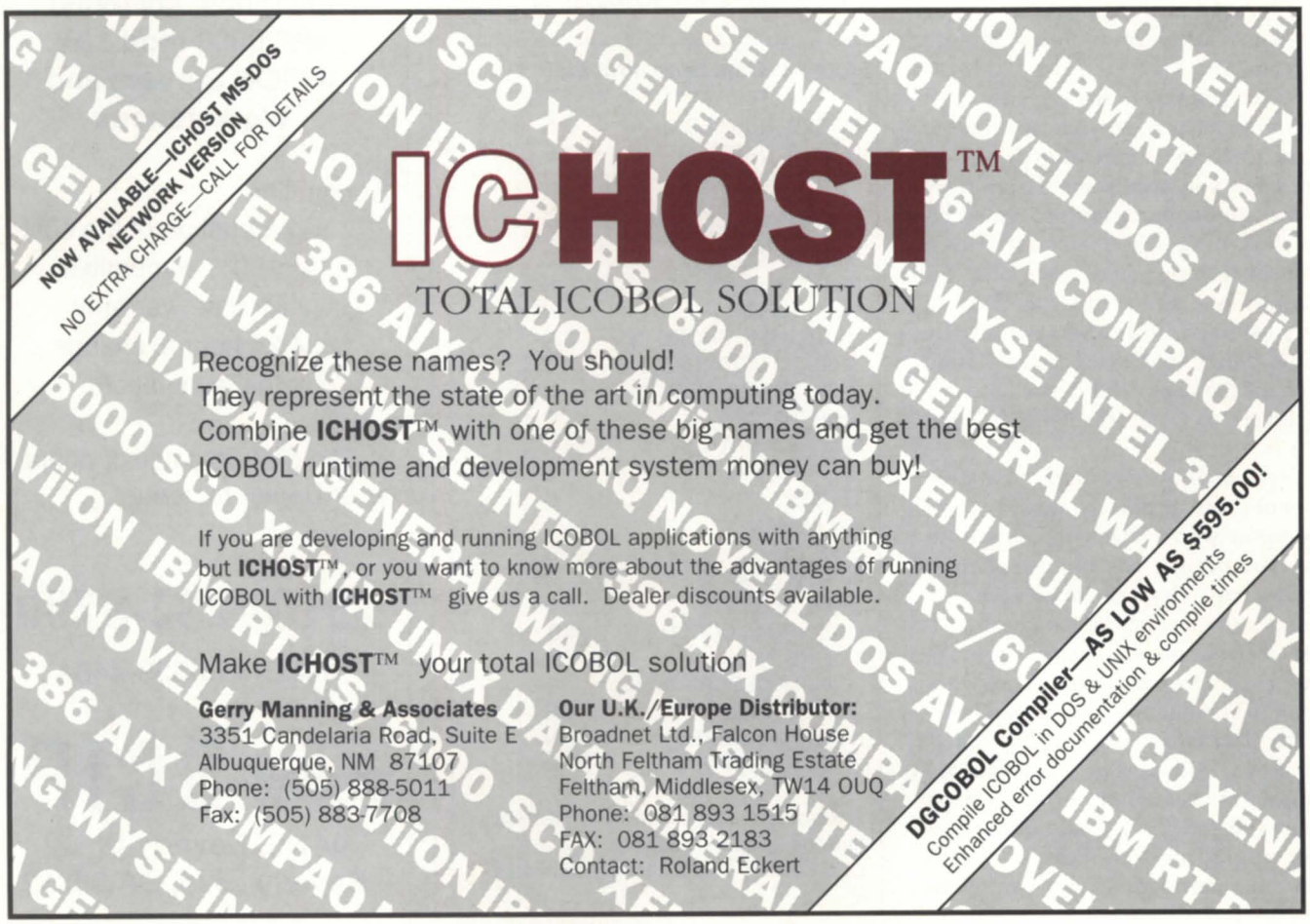
ORDER_NUMBER	N	Key
ITEM_NO	N	Key
ITEM_DESCRIPTION	C	
ITEM_PRICE	N	
QTY_ORDERED	N	
QTY_SHIPPED	N	

Getting back to our sample data base, we can see that the line-item array represents a one-to-many relationship. It is an aggregate group, and while it is now represented as a fixed number of occurrences, it would be better if it were open-ended. This is *not* one of those cases where you should break the rules. Figure 2 shows the new line-item table.

Note that the key to this table is composed of "ORDER_NUMBER" and "ITEM_NO" together. This is called a multi-part key. It defines our one-to-many relationship. There are many ITEM_NOs on each order, comprising line items. ORDER_NUMBER is called the linking entity or link.

It is what identifies the line items with the order header. The ITEM_NO is the repeating or varying entity. It changes as ORDER_NUMBER remains constant (within each ORDER_NUMBER).

Now let's look at the next rule of data normalization:



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2. Eliminate redundant data. Data should only appear in one place.

Here is another rule that aches to be broken. One problem that relational data bases seem always to ignore is time. They are always diagrammed as though there will never be any changes that affect the data. Of course we know this is almost never the case. The theory behind this sounds good enough, though. If we store any piece of data once, and those data are related to other data, then if the piece of data changes, the change is immediately available to the rest of the data base.

Let's consider our line-item table. The way it is now, if we change the item description for a given item we would not see the item description change for all line items that referenced the item. If we create an item table with the description and price on it, and eliminate them from the line-item table, then any change to an item's description or price would be available immediately to all applications that reference that item. The new tables are shown in Figure 3.

The "ITEM_NO" is the linking entity in this relationship, but this time it is a many-to-one relationship. There are many line items for each item. This would satisfy the relational purists, but in this case I can think of some reasons to break the rules. Foremost: the passage of time. If we omit price from the line-item table, we must then assume that the item's price will *never* change.

Here's why. Suppose you order 10 widgets on February 1. The price is $10 per widget. The order totals $100. Fine, you agree to the deal. But when the invoice arrives you discover that you have been charged $110. Did the widget company make a mistake? Were you ripped off?

No! You're the victim of a relational purist. You see, the data base designer at Acme Widgets thought it would not be good to have redundant data. The data base reflects the theoretically correct design above, which conforms to second normal form. But the designer didn't account for the passage of time.

Your order wasn't picked, packed, and shipped out the door the instant the clerk hit the enter key. At the same time you were calling in the order, there was a price change being entered in inventory control. Between the time you placed the order and the time the invoice was printed, the price went up from $10 to $11. One way to handle this situation could be by making a rule that

Figure 3: Creating an item table

Order Line Item Table;		
ORDER_NUMBER	N	Key
ITEM_NO	N	Key
QTY_ORDERED	N	
QTY_SHIPPED	N	
Item Table;		
ITEM_NO	N	Key
ITEM_DESCRIPTION	C	
ITEM_PRICE	N	

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price changes only be done in batch mode at night. As long as the invoice was printed on the same day the order was placed, no problem. But this is an online system. We don't want to rely on nighttime batch jobs anymore—that's why we went relational, isn't it? Besides, even with the batch solution, we lose our audit trail. Suppose six months from now, Acme is audited. If we don't include the price in the line-item record, we have no idea what the value of that order was. The price of the widget may have changed five times since the order was invoiced.

In this case, I advocate breaking the second normal form rule and reverting to the original line-item table design. This makes ITEM_PRICE redundant data since it is stored on both the line-item and inventory item tables. I will make one change. I will remove the description column from the line-item table. This way, if I change an item's description, it is immediately available on all orders. We will keep the inventory item table also. This way you can update prices without affecting the existing line items. You also avoid what's called a delete anomaly, which occurs when the last line item containing a specific inventory item is deleted. If we omitted the inventory table, we would have no record the item ever existed! Figure 4 shows the final forms of these two tables.

There is one more area to looked at in order for our data base to conform to second normal form: customer information. As is, the operator would enter billing and shipping addresses each time a given customer orders from Acme Widgets. This means each order would repeat the customer data. This is really what second normal form aims to avoid. It is untidy, to say the least. At worst it opens up all sorts of opportunities for error—the operator must type the name and address each time. We have a marginal reporting mechanism if we wish to see order activity by customer. We must create a customer table to avoid these problems. This way, customer data are entered only once. If they change, all orders will reflect the change. Our new customer table is shown in Figure 5 (page 33).

Notice we have made a new column called "CUSTOMER_NUMBER". It will identify each customer. We will also create an alternate key on "CUSTOMER_NAME" so we can do name lookups. Note that this is *not* a multipart key. This is two separate indices,

Figure 4: Final form

Order Line Item Table;		
ORDER_NUMBER	N	Key
ITEM_NO	N	Key
ITEM_PRICE	N	
QTY_ORDERED	N	
QTY_SHIPPED	N	
Item Table;		
ITEM_NO	N	Key
ITEM_DESCRIPTION	C	
ITEM_PRICE	N	

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one on number, the other on name. If we really wanted to get fancy, we would separate the ship-to addresses into a separate table keyed by CUSTOMER_NUMBER, and a new column called "SHIP_TO_NUMBER". This would facilitate customers who have multiple shipping addresses. In real life, this would be a necessity, but you can assume for now that each customer has only one shipping address. And by separating the customer data to its own table, we also satisfy the third normal form:

3. Eliminate columns that are not descriptive of the table's key.

The original table described orders. Its key was ORDER_NUMBER. According to third normal form, the only data on that table should relate to orders. An order number identifies an order, not a customer. Therefore we removed the customer's data to their own table, keyed by "CUSTOMER_NUMBER". This identifies a customer. It is okay (and necessary) to include the CUSTOMER_NUMBER column in the order table because it is part of the description of the order number. It tells us that this unique order number belongs to this unique customer. Here is the new order table (Figure 6).

I hope I have been able to convey some understanding of the process data base designers go through when creating a new application. This was by no means an attempt to cover every aspect of data base design, and it barely scratches the surface of relational data base theory. For everyday, real-life business application design, this should be a good foundation on which to build. Δ

Figure 5: Customer table

CUSTOMER_NUMBER	N	Key 1
CUSTOMER_NAME	C	Key 2
BILL_TO_ADDRESS_1	C	
BILL_TO_ADDRESS_2	C	
BILL_TO_CITY	C	
BILL_TO_STATE	C	
BILL_TO_ZIP	N	
CUSTOMER_PHONE_NO	N	
SHIP_TO_ADDRESS1	C	
SHIP_TO_ADDRESS2	C	
SHIP_TO_CITY	C	
SHIP_TO_STATE	C	
SHIP_TO_ZIP	N	

Figure 6: New order table

ORDER_NUMBER	N	Key
ORDER_DATE	D	
CUSTOMER_NUMBER	N	
TERMS	C	
SALESMAN	C	
SHIP_VIA	C	
ORDER_STATUS	C	
DATE_SHIPPED	D	

Robert Howell is senior programmer analyst with the Medical Society of the State of New York. He has been involved in data base design and programming on Data General AOS/VS-Infos systems for more than eight years.

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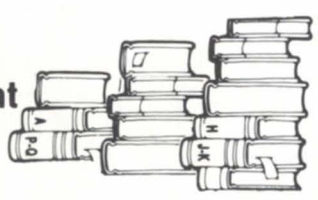

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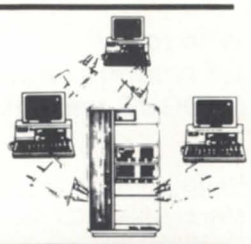

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Infos IIFC, or not to FC?

SYNOPSIS
Infos II customers now have a choice of two products.

by Joseph Cannata
and Tony Coor

Last October at the NADGUG conference in Kansas City, Data General announced a new revision of Infos II, and a new product called Infos IIFC (fast checkpoint). Infos IIFC will have a separate model number and a separate license. There will be no charge for any Infos II customer wanting to switch.

The reason for this option is simple. The change from the standard "load and go" Infos II product, introduced as revision 6.00, was unexpected by some Infos II customers. They became accustomed to simply overlaying current revisions with the latest release and restarting their application. They were comfortable with the performance, and felt the added tunability provided by Infos II revision 6.00 was unnecessary.

Still, there were others who welcomed this change. Their environments needed a method to scale the Infos II product with their application and system demands. This design provided just what these customers needed. So a decision was made to repackage what would have been Infos II revision 6.10 as Infos IIFC revision 1.10, and offer two products.

Traditional Infos II

For those wanting to continue with "load and go" Infos II, there is the traditional product, which provides the customary level of support and enhancements. Development will continue on this product, and where applicable, new features and enhancements will be included in both versions.

The newest revision of Infos II is 5.20, which does not require any tuning or additional work. It contains the same set of new utilities and operator commands available in Infos IIFC.

Infos IIFC

Infos IIFC divorces itself from the AOS/VS (II) memory manager. A redesigned buffer manager uses ?RDB/?WRB system calls instead of the ?SPAGE call to improve input-output performance. However, this performance improvement may use additional CPU time.

The system manager can set up the memory management parameters by altering startup switch settings within a file contained in the :INFOS directory called INFOS_SWITCHES.CLI.

In Infos II revision 6.00, the number of Infos II files that could be checkpointed and flushed simultaneously increased from 1 to 12. This was accomplished by creating 12 checkpoint and 12 flush tasks that could work independently of each other.

In revision 1.10 of Infos IIFC, the number of tasks for each of these is a configurable value in a range of 1 to 23. Combined, they cannot exceed 23. This implies as few as one flush task and up to 22 concurrent checkpoint tasks. Depending on the frequency and number of files you're checkpointing, this can significantly improve performance.

Tests have shown that checkpoints are 3 to 10 times faster with the new buffer manager design. Actual performance is directly related to how sparsely the differential files are modified. The greater the occurrence of contiguously modified data, the faster the transfer. This feature will not be available in traditional Infos II.

In traditional Infos II with differential file mode, differential files are deleted and recreated at the end of the checkpoint process. In Infos II revision 6.00, the differential files were preserved and overwritten. This method was faster than doing a delete and recreate. However, this meant that the DVOL size would keep growing after checkpoints.

In Infos IIFC 1.10, a new IFILE option has been created to allow truncation of differential volumes after checkpoint completion. This new file mode is called "Delete Volume" mode (DV), and is in addition to the other differential file modes. Setting DV mode along with any of the other differential file modes will cause the DVOLs to be trun-

cated to just the critical regions needed for Infos IIFC processing.

Common features

You liked DDUMP, and you raved about DUMP_2. Now they're merged in one utility called DDUMP_2.

DDUMP_2 combines the best of DDUMP with its multivolume tape set, and overcomes the 2 GB limit. It should be noted that DDUMP_2 is not compatible with either DDUMP or DUMP_2.

DDUMP_2 allows for the usual /ARCHIVE or /INCREMENTAL dumping of pages, but now you can perform other tasks not previously supported in DDUMP, including dumping multiple Infos II files in the same archive session using filename templates. Another feature is the capability to make several copies of the backup, using the /COPIES-n switch. This allows for multiple copies to be created, each containing the same archive date/time stamp, which is critical should problems arise in reading one of the archives later during restoration.

A switch, /OVERRIDE, allows for dumping data bases left open during a crash. A /POSITION switch is supported to display the dumpfile location of each file dumped.

DLOAD_2 offers additional functionality as well. The /BADBLOCKS switch reports the location of tape blocks that DDUMP_2 skipped. A cross-reference of the last file in each volume with the first file in the next is as easy as using the /CROSS switch. DDUMP_2/DLOAD_2 will work with labeled or unlabeled tapes and support large block sizes.

Another utility new to the Infos II world is IVERIFY_2, which allows selection of a dump format for pages displayed during the verification process. Using the /DUMPFORMAT switch, you can ask for data to be displayed in octal, decimal, or hexidecimal format. A /BRIEF option will report only uncorrectable errors, and runtime statistics can be displayed with the /STATUS switch.

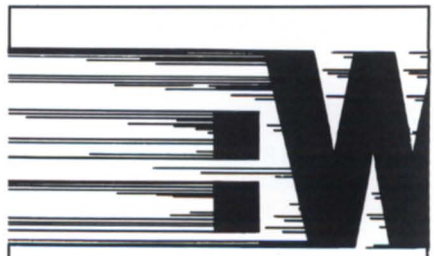
IVERIFY_2 is a user-selectable level of verification. In the past, a standard mode Infos II file could force you to endure long IVERIFY sessions that either closed the file or told you about serious errors. In either case, substantial time had to be spent, and the result could have been an Infos II file you could no longer access. IVERIFY_2 changes that with its five levels of verification. Choosing the verification level is achieved using the /VLEVEL switch, where the value passed is from 0 to 4.

/VLEVEL=0 verifies that all CPDs are present and checks the UDAs. It also tests for the presence of differential volumes if applicable. /VLEVEL=1 includes all checks done with /VLEVEL=0, and verifies page headers and page space. It also looks to see if all keys point to data base pages where there are data records. /VLEVEL=2 includes prior level checks, and goes into space management if applicable. /VLEVEL=3 checks levels 0-2 and tests indirect records. /VLEVEL=4 checks everything, and is analogous to the present version of IVERIFY including use counts. This level of verification is sometimes referred to as a full-paranoia check.

Recent tests have shown that IVERIFY_2 at /VLEVEL=4 is about 50 percent faster than IVERIFY. Actual performance will vary based on CPU speed and the number of Infos II file options selected. In any event, you'll see a gain in verification speed even if you don't choose to do quick checks.

It should be noted that although there is the ability to do partial checking of Infos II files, it does *not* mean that potential problems will go away. Running IVERIFY_2 at /VLEVEL=0 is a quick way to close a file not in differential mode. It can also be a quick route to trouble if you choose to ignore problems that other /VLEVELs had previously indicated. Because a problem is no longer reported when running at a lower level of verification, this does not imply that successful repairs have been made to the file. Don't be led into a sense of false security by thinking that "no error message" equals "no problem," with any level less than /VLEVEL=4.

At some point, full checking of every Infos II and Infos IIFC file should be done, otherwise the error never detected will be the one that appears at the least desirable time—like at month-end. Consider carefully the ramifications of repeatedly doing "quick" verifications.



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Another new feature in both products is the ability to trace partial and data record locks. A new operator command, CONTROL @INFOS LOCKS, will allow you to see who has what locked. There are three switches, /PID, /FILE, and ?ALL, which allow information to be displayed for a PID, file, or both. Also, the operator command CONTROL @INFOS USERS now includes open Infos II or Infos IIFC file information. With a /FILE switch, this command will display the path to each file the PID has opened. Without the /FILE switch, PIDs with opened files will appear with an "*"—indicating that it has at least one file open.

Monitoring performance

When Infos II revision 6.00 came out, a performance monitor was provided to relay key Infos II and AOS/VS (II) memory statistics. It was invoked by disabling a console and issuing a CONTROL @INFOS MONITOR/START @CONxxx (the disabled line), or by sending this information to a listfile to be reviewed later. The monitor displays useful information for the ES, small and large page files such as reads, writes, opens, hash, and LRU collisions. It also reports lock information and AOS/VS (II) memory parameters such as the number of free pages, LRU pages, and swaps. The Infos II request rate is reported as current, average, and peak.

This performance monitor is helpful to those Infos II revision 5.01 and 5.10 customers preparing to switch to Infos IIFC. Additional files have been provided on the Infos IIFC media for each of these revisions along with documentation on how to use this version of the monitor.

A decision or a dilemma? NOT!

Now Infos II customers have a choice of two products. The traditional "load and go" Infos II is as viable as ever. With the new utilities and operator commands, it continues to be a strong product. If you're satisfied with the current level of performance, and uncomfortable with undertaking the steps necessary for tuning Infos IIFC, then continue using traditional Infos II.

But if scalability and improved checkpoint performance are sufficiently important, Infos IIFC is the right choice. You can specify memory utilization and improve I/O performance by changing switches at startup. Whatever you choose, you'll be getting an improved Infos II product that more closely meets your needs. Δ

Joseph Cannata is a systems training specialist, Educational Services, with Data General Corporation. He may be reached at the Atlanta Education Center, 4170 Ashford Dunwoody Rd., Suite 300, Atlanta, GA 30319, 404/705-2562. Tony Coor is an Infos developer at Data General's Research Triangle Park, NC, location.

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Century Analysis, Inc., 114 Center Avenue, Pacheco, CA 94549; 510/680-7800.

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Archive support

Germantown, MD—Version 2.01 of the Archive Interface Module (AIM) from Data Bank Associates, Inc., is one of the first third-party products that supports the new extended features of the CEO File Server Agent. AIM is unaffected by the new CEO user password access.

Under CEO 3.30 with extended features, a user may share access to drawers without giving owner privileges. Since only "owners" are permitted by CEO to "archive" or "restore" documents, AIM has been updated to perform the additional checks for ownership. The release also includes a comprehensive Survey 2 module, which gives a statistical breakdown of document utilization based on the creator of the document, rather than the owner of the drawer.

AIM has three-tier pricing for low-end, medium, and high-end systems with discounts available for educational and governmental organizations.

Version 2.10 of Arc for the Data General offers functional enhancements for ARC and Arcmerge. The systems can now automatically create up to 46,656 unique PC names for those Data General filenames that do not conform to the limited PC naming convention. Wherever required, a PC-style name is provided for the DG filename. The arrangement keeps the DG version of Arc fully compliant with the PC version. ARC libraries can be moved to and from both environments without concern for file conversion.

Because of its release of Arc for Aviion Unix systems, Data Bank Associates, Inc., has removed the low-level Unix source code that was shipped previously with Arc releases. The Aviion version will be offered as a single-user (workstation) version for a list price of $395, or a multi-user version for $1,195.

The ARC program for DG computers lists for $995 per system, regardless of size, and includes Arc, Arctape, Arcmerge, and one PC version of Arc.

Version 1.60 of Turbotran (Xmodem/Ymodem protocol) and The Smart Connection for Data General systems provides enhancements for file transfer and software flow control error handling. The Smart Connection and a number of other utilities are bundled with Turbotran.

The new Turbotran also introduces the "server" mode of operation, under which Turbotran can act as a slave on a designated console line. It is able to either receive its commands through the console line, through a "script" file, or from another console line. Pricing for Turbotran is $595 per DT system, regardless of model of size CPU.

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

Circle 52 on reader service card.

VS/Cobol migration

Boulder, CO—Wild Hare Computer Systems, Inc., announced a VS/Cobol migration service that moves VS/Cobol applications and Infos data bases to open systems. Now Data General users previously "locked in" to Infos can expand to new environments while avoiding costly and time-consuming "brute force" redevelopment.

The migration services makes Data General's proprietary DBAM files, which are incompatible with all other systems (including DG's own Aviion), compatible with more than 60 platforms and 18 operating systems using Wild Hare's Choice! runtime system and Axis Cobol compiler. MS-DOS and all flavors of Unix, including DG/UX, are just a few of the operating systems now available to VS/Cobol users.

Wild Hare translates Infos DBAM file structures into a portable, industry standard ISAM format. All of the Infos files' existing capabilities are fully replicated as part of this process.

Wild Hare Computer Systems, Inc., P.O. Box 3581, Boulder, CO 80307; 303/530-2221.

Circle 56 on reader service card.

Image file conversion

Santa Monica, CA—Bäcchus, Inc., announced Image Agent, an integrated image-conversion tool for Nextstep Release 3.0.

With Image Agent, Next users can simply drag and drop non-native image files directly into graphic applications, such as Pasteup, Concurrence, Create, and have the images instantly appear. Image Agent transparently performs the image conversion as if it were part of the actual application in use. Image files from PCs, Macintoshes, and Sun workstations can be imported over a network into Nextstep applications.

For those requiring more image-conversion options Bäcchus also offers Pixel Magician, its advanced application. Pixel Magician provides mass conversion, precise scaling, variable aspect ratios and image resolutions, alpha channel support, dithering, color quantization, and flexible output options.

Supported formats include: JPEG (JFIF), DCX, PICT (raster only), Targa, PCX, Windows BMP, Sun raster, GIF, IFF/ILBM, Macpaint, XBM, XWD, and MTV. Image Agent is included free with Pixel Magician ($299) or can be purchased separately for $99.

Bäcchus, Inc., 2210 Wilshire Blvd., Suite 330, Santa Monica, CA 90403; 310/820-9145. Δ

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DASH Items...

Category: AOS/VS

Author: Michael Besosa
Subject: ***nwlp***

We're running Portable Netware 1.4 on an Aviion 5225 running DG/UX 5.4.2. We also have a number of native Netware 3.11 servers supporting print queues. We can't seem to get the *nwlp* utility to work. Any attempt to print a file using *nwlp* produces the message, "NCPAttachToServer failed with 900ff. Detach from file server failed with 90030." This same message is produced no matter which queue or server we specify, and whether or not we specify a username and password explicitly, or allow *nwlp* to default to GUEST.

Reply by: Wiley N. Johnson

I am not sure if this will help, but Netware for Aviion systems through rev 1.4 does not support real PSERVERS. The next revision (rev 2.0, now shipping) does support real honest-to-goodness PSERVERS.

Reply by: Michael Besosa

I'll check out rev 2.0. Still, *nwlp* is supposed to submit print jobs to other servers, so it seems unlikely that's the problem.

Category: Languages

Author: James R. Conners
Subject: **Cobol .OB lengths**

Does anyone have an explanation (plausible or otherwise) for differences in the length of .OB files from one machine to another? The same source produces different .OB lengths between an MV/7800XP and an MV/9500. Both machines run the same version of AOS/VS (7.68), and both machines have the save compiler version (3.31).

Reply by: DG Customer Support

I would check the libraries and object modules in the Cobol, LANG_RT, and URT32.LB. I suspect one or more of these files differ on these two machines. For example, look at the size and creation date of COBOL.LB, LAN_RT.LB, CFALT.OB, FFALT.OB, etc. For a real test, on machine #1 create a test directory and MOVE all the Cobol software, LAN_RT software, and your source code into the directory. Kill your searchlist and compile the program. Now dump this directory to tape and load it on machine #2. On machine #2, kill your searchlist and compile in this test directory. The object modules should be the same length.

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

Bits and bytes...

Infos data record compression

From: Robert Green

I have been trying to speed up the runtimes of some Infos-based programs, and as there was a great deal of wasted space, I recreated the data base with data record compression. I ran the program and found that both elapsed and CPU time dropped significantly (by over half). This I find puzzling, as Data General says that data record compression will make file access quicker but there is an overhead—presumably CPU (source Infos manual). The file came down to one-sixth of its original size, so is reduction in reads overcoming an increase in CPU? Am I missing something here?

From: Walter Mosscrop

Robert, if you did an IVERIFY on the original file, you might want to check for the number of indirect records—if it's a high percentage of records (above 10 percent), that could be the reason. Also, if you weren't using space management before, the reduction in size of the data base may be because you're reclaiming "lost" space, not because the records are being compressed. I say this because Infos cannot always compress the records—especially long ones where unused space is at the end. To summarize, the reduction in CPU may be because you're reading fewer pages, not because of the record compression.

From: Robert Green

The file is one that gets created daily. Users only write to it and background processes rewrite it, changing only a one-byte tag. There are no deletes and the only record length is 1,536 bytes. But I know that a large percentage of the records in this file use only 100 bytes or so, null/space filling the rest. So indirection and space management do not come into the picture. Is it fair to say that the CPU usage reduction caused by the decrease in the number of reads (1/6) outweighs the CPU gain caused by enabling space management?

From: Walter Mosscrop

As far as I know, space management causes no overhead for reading records, only writing or deleting them. I suspect the improvement in performance is because of your large record size. Assuming that you were previously using the default (2 K) database page size and no record compression, then Infos was able to only get one record per page (records cannot span pages). Now that you have record compression on, and the average record contains 100 bytes of data with the rest compressable, you're probably getting 15 to 20 records per page. Since Infos has to read far fewer pages, this is probably the main reason for the decrease in CPU time. Δ

Do you have an answer, comment, or question? Call the NADGUG/Rational Data System electronic bulletin board, available to all NADGUG members. The phone number is 415/499-7628. There are no fees other than telephone charges.

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