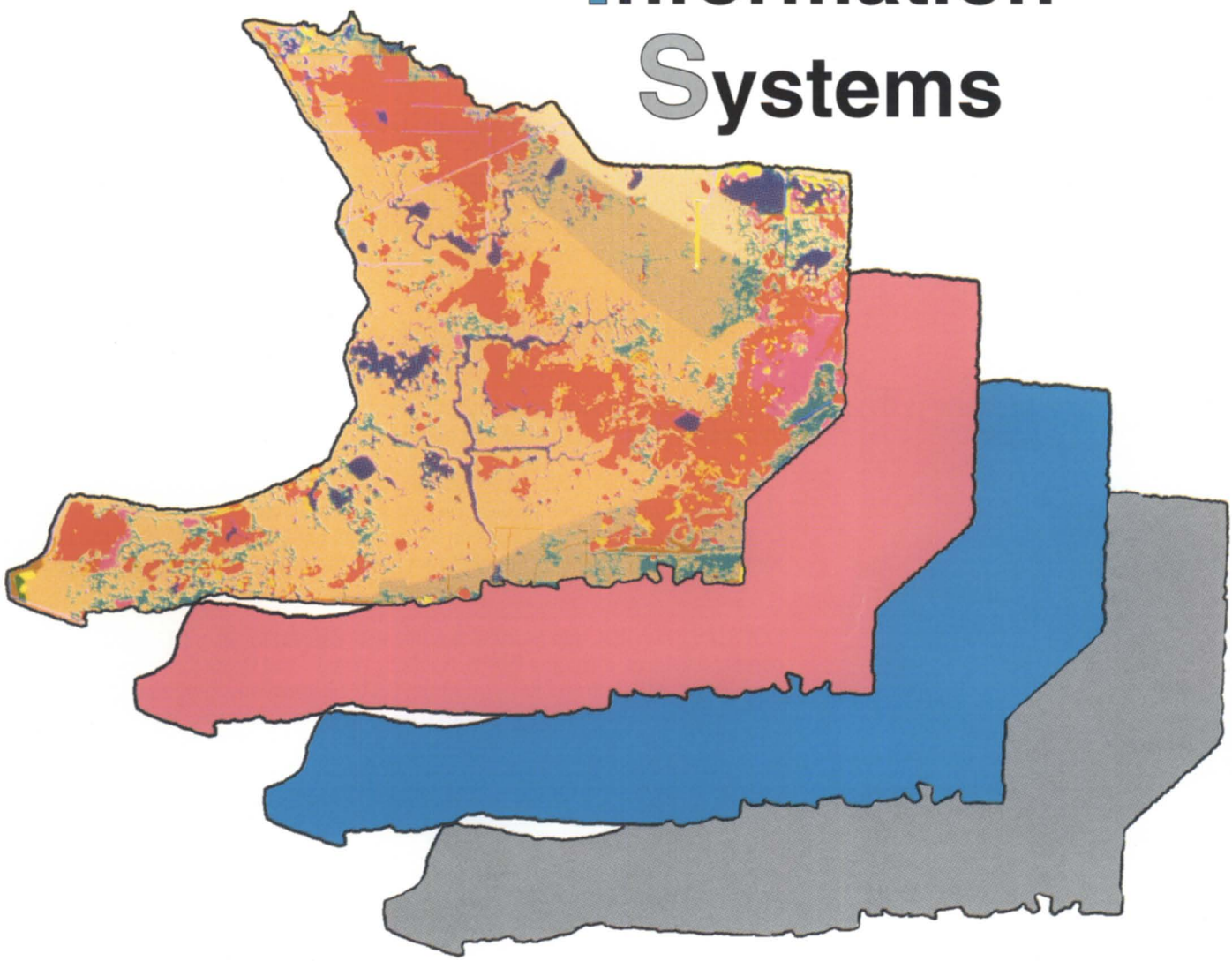
February 1992

FOCUS

The Magazine of the North American Data General Users Group

Graphic Information Systems



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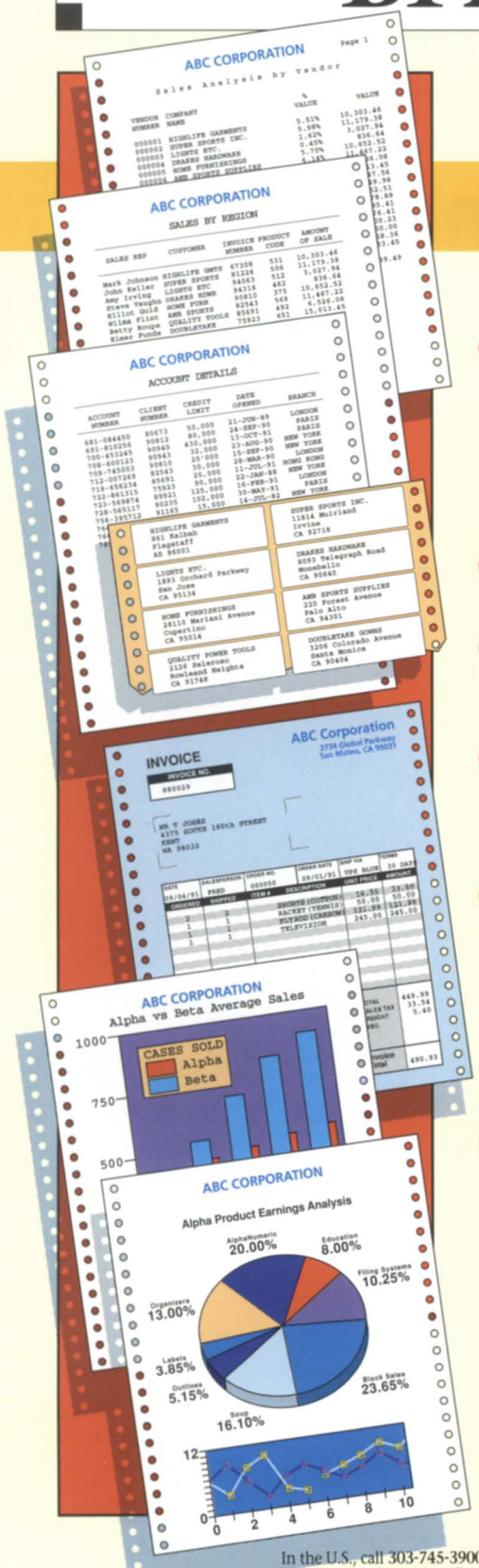

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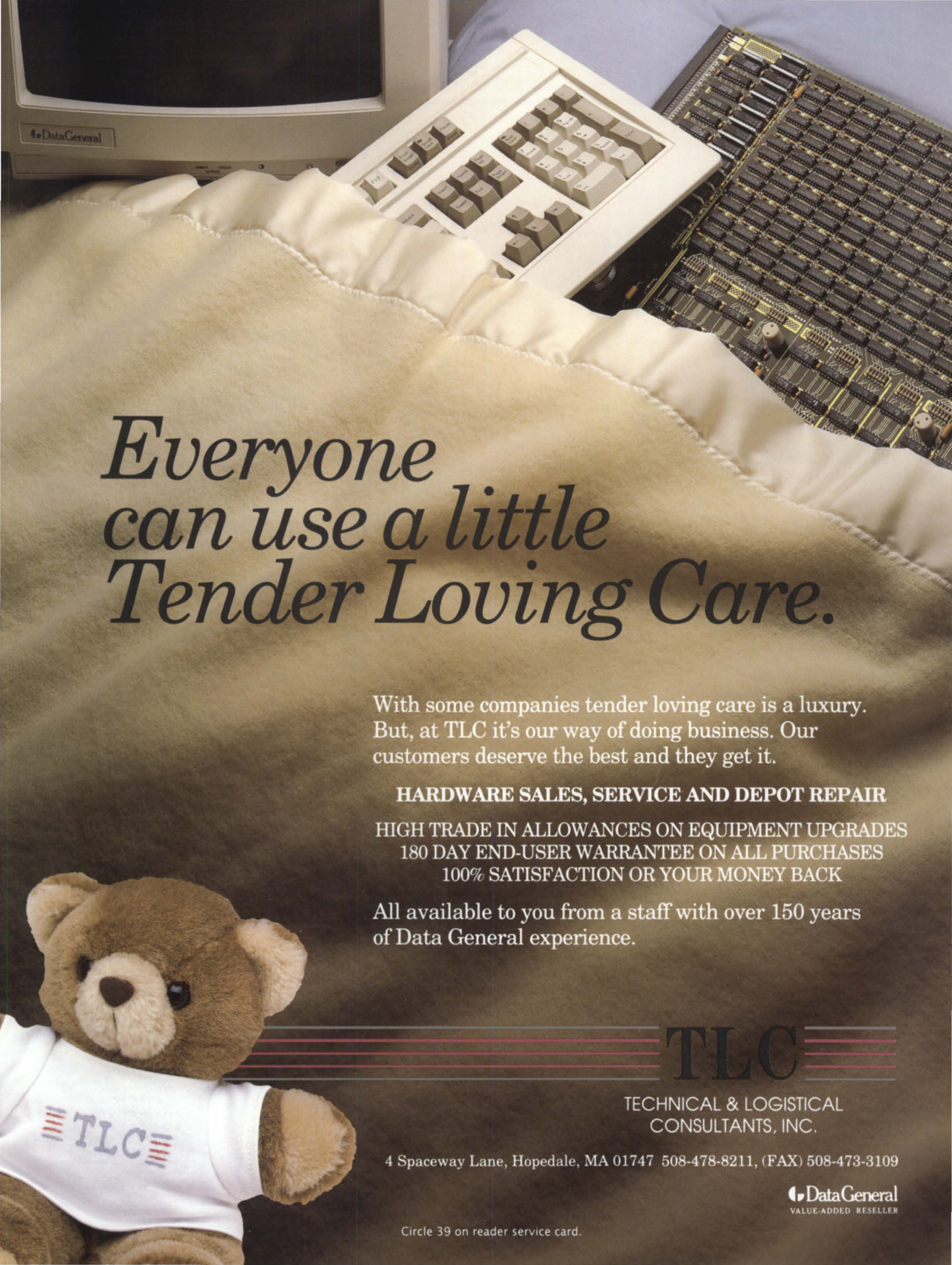

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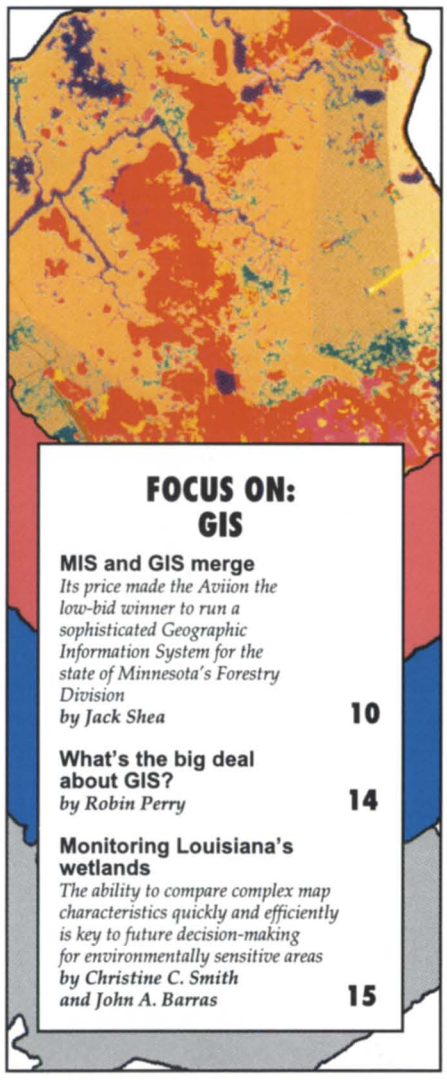

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About the cover: ***The primary image on our cover is a land loss/gain map of the Cameron-Creole Watershed produced by the Louisiana DNR's Coastal Management Division using Erdas graphic information software (GIS). Digital maps from three decades were overlaid to derive this land cover change map showing land loss and gain in areas larger than six acres. The red indicates land loss from 1956 to 1978; pink from 1978 to 1984; chartreuse from 1978 to 1984. The blue areas are water, aquatic vegetation, and canals. Cover design by Casey Hunter.***

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Dennis Doyle

How you can enhance DG software

In the first quarter of 1992 our user group will take on a positive, consultative role to assist Data General in processing Requests for Enhancements (RFEs). This will be the second major cooperative effort between our group and Data General. It came about as a result of Data General's challenge at our 1990 Seattle conference for NADGUG to participate in the corporate decision-making process on some key issues.

This next joint venture is a natural outgrowth of last year's successful collective effort to aid in the development and/or modification of policy to mitigate the growing Software Trouble Report (STR) volume (see "Resolving STRs," *Focus*, Nov. 91, page 8). A portion of submitted STRs are truly Requests for Enhancements. These are routed to development teams to join other requests proposed by users, marketing, and internal sources.

The collection point for RFEs will remain the same within the DG organization. Each inquiry will be sent on its normal journey through the organization, but will also be routed to our user group. We will record each request, and send it to the appropriate Special Interest Group (SIG) chair. The SIG group, with guidance from its chairperson, will review and rank the incoming RFEs. This will be done in a timely fashion, to mesh with software product release cycles whenever possible. Data General developers assured me that a substantial group of highly ranked enhancement ideas will be included in major software package updates.

What does this mean for you and for our user group? It means as much as our SIGs choose to make of it. Submit your RFEs in a detailed format. Work actively with the SIG that reviews it. Let the SIG chair and other members of the SIG know your position and the "why fors" behind the proposal. Help the SIG look over all the requests. Participate in the ranking process. This is your chance to have a direct, substantial effect on your company's needs.

User group involvement in the RFE process is vital. It demonstrates another critical area where NADGUG can work for you and your company. As you discuss our group with coworkers, management, and other businesses in your area, ask them to join us in helping change the way we all do business. Encourage them to become a member and to participate!

Other notes

Please keep letting us know how we are doing. If there is a problem, a suggestion, or an issue, let us know. Feedback is essential to change and growth. On page 44 in this month's *Focus*, there is an article concerning DG's new telesales group. Let us know what you think of the concept; or if you have been contacted, what was your impression of the interaction? Thank you for your comments. Δ

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The Magazine of the North American Data General Users Group

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Contributing Editors
Tim Boyer, Brian Johnson, Doug Kaye, Kim Medlin, David Novy

Contributors
John A. Barras, Dennis Doyle, Cliff Izer, Nancy Miller, Jack Shea, Christine C. Smith

Advertising Manager
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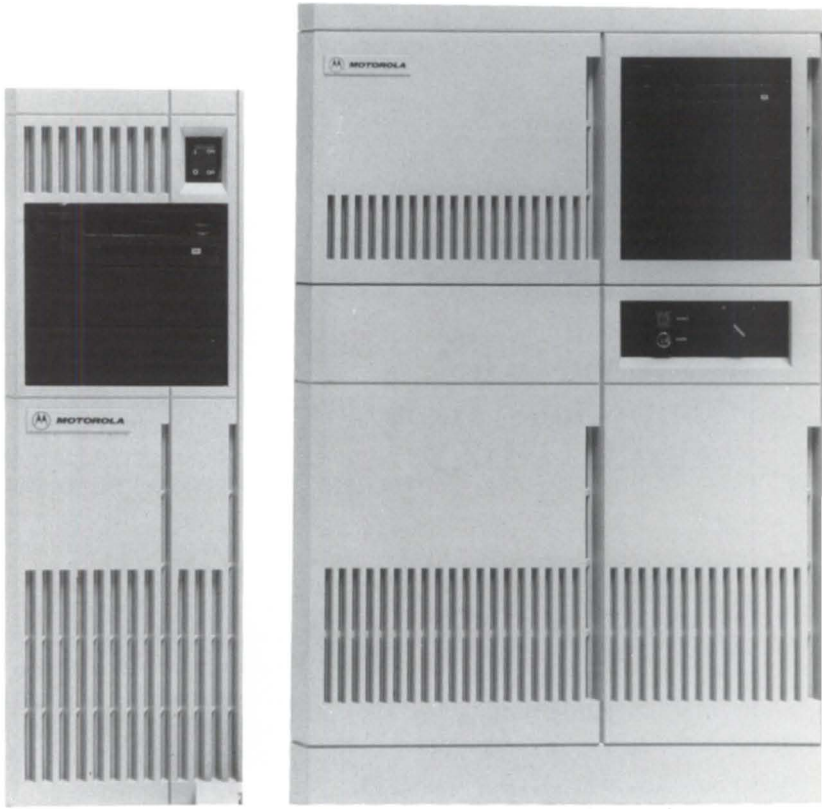

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The Little Nova Engine That Could

We at Strobe Data were charmed by your November article on DG's Nova computers. We take exception, however, to the picture painted of the Nova as some moribund trilobytic relic, a quaint treasure brought back from some high school geology field trip.

The Nova architecture is alive and serving this country well, not creakily chunking away in a dusty corner, but, (for example) fighting with the troops of Desert Storm. Nova systems launched cruise missles from Navy warships, flew helicopter missions, ran radar installations, and performed minesweeper duty.

Nova architecture systems served as valiantly on the home front, testing and qualifying many of the boards and ICs that made Desert Storm the electronic prime-time miracle we marveled at on CNN.

Although Data General has abandoned the trusty Nova and gone on to "greener" pastures on the open (systems) range, the real legacy of DG engineering took the form of a simple, efficient, RISC computer with a real-time multitasking operating system, a standard that not only refuses to die, but continues to find new adherents!

Unlike DG, Strobe Data's management recognized the PC and its commodity priced peripherals as an opportunity, and in 1985 Strobe Data set out a design goal to create a complete Nova clone from a PC and an add-in board, so that any operating system or user software running on the Nova would, unchanged, execute as fast on our clone, the Falcon/PC system. In 1986 we met our goal. Today we continue to enhance our line of Nova clones.

The newest Nova/Eclipse, introduced in 1990, is the Hawk Co-Processor with 2 MB of memory, and firmware FPU with a hardware FPU option. An optional interface to the board's standard Nova data bus allows digital signals to be processed with no change in user software, at speeds rivaling the S280. This RISC architecture Nova clone executes Nova RISC instructions or Eclipse CISC instructions, merely by changing a few characters in a DOS-based ASCII file!

The Little Nova Engine That Could now runs both RDOS and AOS in native mode. Even better, still basically a DOS PC product, it has leapfrogged into the contemporary world of PC networking and Windows.

So, don't ask the DG marketing folks where the "Nova" is. How do they know? Their job is selling Aviions into the Unix tributary of the vast new technology river. To find the Nova, fellas, look in the DOS/Windows main channel.

And now that it is socially acceptable to suggest that perhaps that soulful "new" machine, the MV, may join its 16-bit brothers in DG's archive file, we might just give some thought to what it might take to . . . Hmmmmm. An MV/10000 under Windows? Naahh! Not a big enough market. But hey, DG, how's about an MV co-processor for the Aviion?

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Meanderings of an MIS manager

From one digithead to another: this diary captures the essence of NADGUG's 1991 conference in Denver

by Nancy J. Miller
Special to Focus

Sept. 9

Typical Monday at CIC—staff is running 50 in a 45 mph zone, and I feel as if I'm speeding at 75. Time for an interesting task. As I flip through the mail, out pops my NADGUG '91 Conference registration. Forms get completed and check requests sent to accounting. On it I note the six "must attend" sessions and three others that look like they will be interesting.

Nov. 16

3 A.M.: My plane to Denver leaves in seven hours. This is as appropriate a time as any to do laundry and start packing.

10 A.M.: As I get comfortable in my plane seat (not an easy task after lugging my three heavy suitcases from the car; room to pack conference stuff, of course), I realize the passenger to my right is a fellow attendee. Connecting flights to Denver tripped this pleasant surprise. We chat about people, sessions of interest, responsibilities at work, and I admit what sites of interest are on my agenda to see in the city. The flight was delayed one hour total because of snow.

1 P.M.: Hotel check-in smooth. The bellhop is thankful for the weight lifting fitness program after he looks at my bags.

9 P.M.: Quick RIG/SIG executive board meeting. The first 30 minutes are spent sharing hugs, handshakes, and greetings with people with whom you converse with on the phone all year long. It's wonderful to be surrounded by "digitheads" in action who, too, constantly hear, "I don't care what it takes. Just have it running next week, and no overtime." The meeting covered where the group will be in a year, and what actions need to be taken.

Nov. 17

A.M.: NADGUG's annual executive board meeting. As reports proceed, it is apparent that we experienced a tough reorganizing and financial year. The best news is we made it. I guess professional organizations are not exempt from the rightsizing that every other business experienced. Steve Baxter, Data General vice president of corporate marketing, dropped in late in the afternoon to answer questions. His talk brought no surprises. DG is alive and well.

P.M.: To thank the board for its hard work, DG treated us to dinner at this "steak house." It was a huge barn with decor of chopped-off neckties, wooden dance floor, country band, and huge steaks. The fun people did a train down the slide. Parents were grabbing their kids to clear the path in fear of our own locomotive derailing. I never did master the two-step, although my partner had the patience of a saint and, I'm pretty sure, feet of steel.

Should I be thankful I've just been informed of a task I should be doing but that will require a lot of work? Ask me in May, when I finish

Nov. 18

A.M.: Denver's mint beckoned us. We decided it would fit the requirement of historical sightseeing. I got to press my very own coin.

P.M.: It's kickoff time. DG, VAR, and NADGUG attendees gather to enter the ballroom. The doors opened and we were treated to music and an amazing media presentation. DG has gone to great effort and is rewarded with a motivated crowd. The keynote speaker, Alan Parisse, discusses yesterday, today, tomorrow, with examples that we all experience. General consensus is approval and we were ready to fix our own worlds, or at least add improvement. At close, we were led to the huge exhibition hall. Vendors galore and an impressive setup by DG are in sight. I scurry to talk to two vendors I spotted on my master list. Later that evening we walked back to the hotel in four inches of fresh snow, carrying our first bags of souvenirs. Let the sessions begin—we're ready.

Nov. 19

The morning began early at the speaker/host briefing. Quick intro guidelines are given and we disperse to the first session. Attendance is quite high in each session, with several people ducking in for handouts because they have to be in another session. My second session isn't at all what I expected, but raised some questions before missed. Should I be thankful I've just been informed of a task I should be doing but that will require a lot of work? Ask me in May, when I finish. Quick lunch, then back to afternoon sessions.

The SIG meeting capturing my interest is rescheduled. Five of us missed the posted notice and chatted anyway. Finally, my big chance to lend some programming guidance to another person. It seemed as though I was also tapping in on someone else's knowledge. Now the role is beginning to reverse. This is my favorite part of conference attendance: networking.

Nov. 20

The morning is split between a session and hard-hitting of the exhibition hall. This is the best time for me to gather vendor information. I require visuals to capture and keep my attention. The time just never seems to materialize when reps

phone me at the office. The conference provided uninterrupted time to explore. The afternoon required duty at the NADGUG booth and one more session to attend.

The evening is filled with our annual banquet. Dinner was good, but the chocolate dessert got my vote of approval. An award was given to NADGUG's now past president, Frank Perry. What a hard worker and dedicated person he is. Tough act to follow, new pres Dennis Doyle. I wish you well. The entertainment was provided by DG's own Propeller Heads. Numerous songs had been "rewritten" to fit a DG salesperson's life. See, it's not so bad to be officebound. I ducked out once to relay the answer to a hardware problem at the office. Okay—I admit I went straight to DG heavyweights for help with the recurring problem. Thanks to Bryan Scoggins. The evening closed with me realizing only one more day remained. Both disappointment of the end and excitement of returning to my own pillow at home encompassed me.

Nov. 21

The morning was spent gathering information and further sources on interfacing telecommunications and data bases on the MV. Left message on new bulletin board sponsored by Data General. Make note to check in December. The final hours of the conference include the closing of the exhibition hall and all the drawings of door prizes. I didn't win the Walkabout, so I guess it was good I bought all those souvenir sweatshirts to fill my suitcase. As I begin to sort through my stuff at the hotel, I think over all the information I've gathered this week. It will be easy to justify the expense of this conference, and once again the benefits of attendance will be realized throughout the next year.

Nov. 22

Safe at home again. *Deja vu*. Laundry at 3 a.m. again for this weekend's jaunt and, yes, the plane was delayed for snow. The calendar is marked NADGUG 92, October 12-15. Δ

Nancy Miller is MIS director for CIC Enterprises in Indianapolis. She is also the assistant chair of the NADGUG Conference Committee and past president of Data General Users of Indiana (DGUI).

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MIS and GIS merge on Aviion

by Jack Shea
Special to Focus

SYNOPSIS

Its price made the Aviion the low-bid winner to run a sophisticated Geographic Information System for the state of Minnesota's Forestry Division. Then came performance tests.

Forest managers in Minnesota face a complex task in managing public forest lands. The general public places many (and often competing) demands on the forest. Recreation, timber production, watershed protection—all are products of the forest. In order to manage forests efficiently and meet these demands, foresters use Geographic Information Systems (GIS).

GIS specialist Brad Kincaid uses digitizer to enter map into GIS data base.

A GIS stores both maps and descriptive data about an area in a data base. What distinguishes GIS is the ability to analyze spatial relations. Predicting the spread of forest fires, locating new campgrounds, and identifying tree stands at risk for disease infestation are only a few examples of how foresters can use GIS.

When the Forestry Division of the Minnesota Department of Natural Resources (DNR) first acquired GIS in 1985, it developed system specifications around a need to maintain vegetation maps and descriptive tabular data for 5.4 million acres of state-owned land. The division began digitizing maps and building the GIS data base using ARC/Info software. Vegetation, roads, water, land ownership boundaries—some 90 attributes were entered into a tabular data base for more than 180,000 different sites.

The costliest and most time-consuming part of building a GIS is data entry. The Division of Forestry relied on its own staff for digitizing and map production. In terms of the map portion of the GIS, the division was losing ground to field work. By 1988 a backlog of work was increasing. A Prime 2250 minicomputer purchased in 1985 needed upgrading or replacement in order to handle the workload; but upgrade or replace with what?

Planning for new systems

In 1988, the Division of Forestry began a year-long planning effort that addressed its GIS needs in terms of overall information management. The IS (information systems) plan involved representatives from all units and all levels of the state organization. In addition to its GIS center, Forestry was operating a Texas Instruments minicomputer and staffing an MIS office in St. Paul, 200 miles from the GIS office. Forty of the division's field offices had microcomputers. Among its major recommendations, the information systems plan called for merging the MIS and GIS staffs into one unit and replacing two existing minicomputers with RISC workstations.

Forestry contracted the Land Management Information Center (LMIC) at the Minnesota State Planning Agency to pro-

vide technical support in acquiring new computer workstations. LMIC has been involved with GIS since the 1970s, and the staff there had previous experience with equipment purchases. As part of the contract, LMIC also helped Forestry prepare GIS benchmark tests to evaluate the workstations.

Evaluating price and performance

Armed with a Request for Purchase and confident in its GIS benchmarks, DNR Forestry set out to acquire RISC workstation technology. Like many government agencies, the DNR awards purchase contracts to the lowest competitive bid. In this case, "competitive" hardware must support the current version of ARC/Info, and work with Forestry's Cobol applications, which currently run on a TI 990 computer.

On the basis of low price, Data General was awarded the contract for Forestry's first Aviion 4120 workstation. Judy Merrick, DG's representative at the State of Minnesota, first contacted Forestry staff during the IS planning project. She became familiar with the organization at that time, and initiated what developed into a long-term cooperative relationship between Data General and DNR.

Figure 1: GIS benchmark test results

GIS operation	Prime 9955-II	DG410
Buffer	**Seconds/%**	**Seconds/%**
CPU	554/.34	191/1.0
Elapsed	912/.36	331/1.0
Grid		
CPU	145/.16	42/1.0
Elapsed	255/.36	91/1.0
Intersect		
CPU	446/.35	157/1.0
Elapsed	634/.35	225/1.0
Arcplot		
CPU	706/.28	201/1.0
Elapsed	1205/.28	336/1.0

Data General was one of several vendors responding to Forestry's workstation RFP. The bid was awarded based on price alone, but the division needed to evaluate the equipment on price/performance criteria. The Aviion's performance was found to be even better than the price. The results of Forestry's performance tests exceeded even the most optimistic expectations. Figure 1 shows the results of the GIS benchmark that compared the Aviion with a Prime 9955-II super minicomputer.

GIS typically involves CPU-intensive processing, especially in performing spatial calculations on map data. Forestry selected four functions for its benchmark tests. In these benchmarks, the Aviion was between three and four times faster than the Prime. Compared to similar processing on Forestry's Prime 2250, the Aviion was roughly 50 to 60 times faster (system limitations prevented running the

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identical benchmark on the smaller Prime computer).

Forestry also tested its Cobol applications on the Aviion. The goal was to migrate current applications as they exist, resisting the powerful urge to make minor "improvements" while changing equipment platforms. Because Forestry has 20 field offices accessing these applications daily, the division needed to ensure minimal disruption of service. Once again in Cobol environments, the Aviion proved its price/performance value.

The Forestry staff knows GIS and MIS, but Unix, X-terminals, and networks were new, unfamiliar technologies. The 1980s brought microcomputers, but Forestry staff recognize that networks will be key to systems in the 90s. GIS equipment must support these networks. Data General provided introductory Unix, network and systems administration training. During testing, Forestry used DG-HELPS phone support. The division also relied heavily on DG's system engineers in Minneapolis, who provided answers, ideas, and strong technical support to the division's installation and testing effort.

Fine-tuning the configuration

DNR Forestry is a field organization, and part of its information system strategy is to decentralize systems; put the data as close to the field forester as possible, and provide the tools to access the data. In the division's first purchase, it acquired one workstation in order to test the capacity and performance of this new technology. Based on this test, Forestry planned to refine its specifications and acquire additional equipment for four regional offices, and a workstation server for the central office in St. Paul. Determining the configuration of these systems involved the cooperation of DG and the ESRI (Environmental Systems Research Institute).

Data General provided a technician and equipment to compare different memory and processor configurations under varying GIS workloads. Figure 2 shows some of the results of these tests. During these tests, Forestry learned that a second processor produced significant performance improvement, particularly in a multiuser environment. Adding memory beyond 32 MB, on the other hand, did not significantly improve performance.

During its discussions with ESRI, Forestry staff discovered the advantages of having a dedicated CPU for digitizing. Digitizing involves some very CPU-intensive processing that could degrade the performance of a shared processor. Because the division will have up to 50 users on its headquarters server, GIS should not be allowed to degrade those users' applications. As a result of discussions with ESRI and DG, Forestry's headquarters digitizer uses a "dataless" single-processor Aviion 410 that is networked to a 5220 server.

Project status

By December 1991, Forestry had installed two regional GIS centers (Aviion 4120, digitizer, and plotter) and the headquarters installation (Aviion 5220, digi-

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tizer, Aviion 410, plotter). Installation included loading systems software, ARC/Info, applications programs, and data files. The division also installed its headquarters system on a LAN connected to an IBM RS/6000. Two additional regional installations will be completed in 1992.

Introducing Unix workstations has required Forestry systems staff to learn new skills, and a new operating system. The speed of the equipment also revises work planning. GIS programs that used to be run in a batch mode overnight now run in several minutes. Cobol programs compile in less than one minute. Old work habits have to change to stay in synch with the technology.

Is DNR satisfied with its choice of the Aviion? Forestry is more than satisfied. The equipment performs beyond all expectations. Support received from Data General sales and engineering staff throughout the project has been outstanding. Δ

Figure 2: Comparative Arcplot* execution times (in seconds)

1 Processor

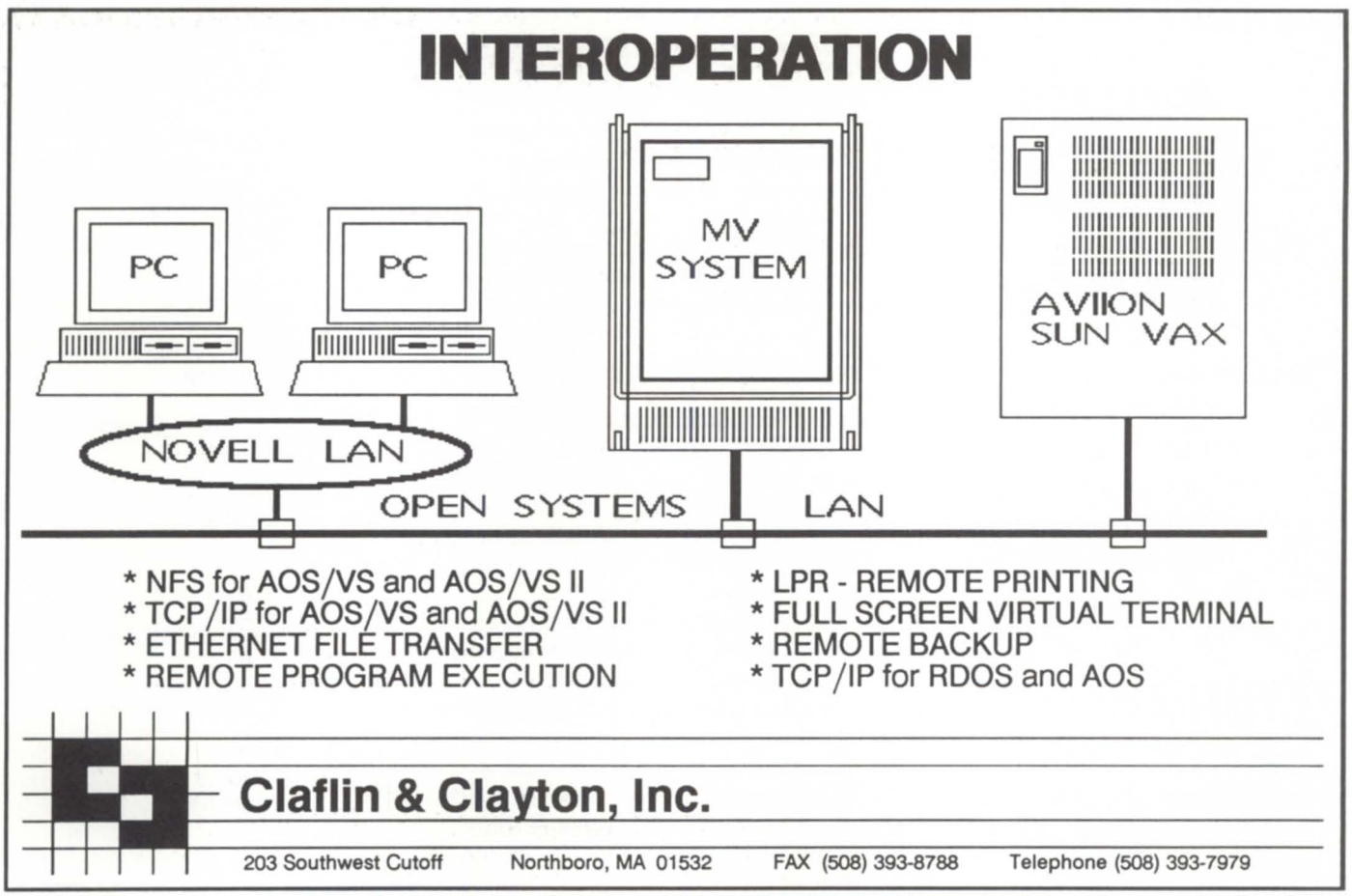
24 MB memory		64 MB memory	
1 user Arcplot	4 users Arcplot	1 user Arcplot	4 users Arcplot
398	1895	376	1691

2 Processors

24 MB memory		64 MB memory	
1 user Arcplot	4 users Arcplot	1 user Arcplot	4 users Arcplot
394	1106	344	978

* ARC/Info function to generate plot file. Test plot included 12,000 polygons with extensive shading.

Jack Shea is supervisor of the Forestry Information Systems office in the Minnesota Department of Natural Resources. He has previously worked as a systems analyst in the DNR and at the University of Minnesota. He first became involved with geographic information systems more than 15 years ago while a graduate student at the University of Minnesota.



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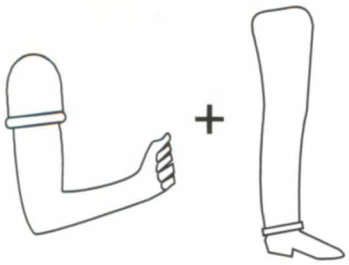

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What's the big deal about GIS?

by Robin Perry
Focus staff

You've probably seen pictures produced using a graphic information system (GIS), like the image of the southern Louisiana coast on this month's cover of *Focus*. But GIS is much more than a pretty face—or a pretty map, for that matter.

According to the Environmental Systems Research Institute, GIS is "a system of hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modeling, and display of spatially referenced data for solving complex planning and management problems." Put simply, GIS makes sense of large amounts of data.

GIS can be used for almost any purpose that relates to geography: determining land suitability for housing; drawing legislative districts; determining travel times from fire stations; locating utility networks; or tracing the migratory paths of Wisconsin's wild turkeys. The possibilities are nearly endless. Consider the vast amount of data stored by various government entities, and you can appreciate the potential for GIS.

In fact, the federal government's use of GIS will grow 22 percent per year over the next few years, according to a report from Input, Inc., a Virginia research firm. Of 110 federal agencies surveyed, 95 said that they now use or plan to install GIS systems. State and local governments will spend nearly as much on GIS as the federal government (again, according to Input). Commodity pricing of new computer systems is one reason for the anticipated rapid growth of GIS in the government.

Data General is pursuing the GIS market niche. While it had a small presence in the GIS world for many years, DG recently revamped its approach. Instead of focusing on its own GIS products, DG is teaming its Aviion workstations and servers with established GIS software vendors. The following is a listing of third-party software solutions for the Aviion computer family. Δ

Application	Vendor	Segment
Cedra System	Cedra Corp. 65 West Broad St. Rochester, NY 14614 716/232-6998	Civil Engineering
Terramodel	Plus III Software, Inc. One Dunwoody Park Suite 250 Atlanta, GA 30338 800/235-4972	Civil Engineering
Geoserver Moss	Autometric, Inc. 165 S. Union Blvd. Suite 902 Lakewood, CO 80228-2214 303/989-6377	GIS
Infocad	Digital Matrix Services 3191 Coral Way Suite 900 Miami, FL 33145 305/445-6100	GIS
Interactive Surface Modeling	Dynamic Graphics, Inc. 1015 Atlantic Av. Alameda, CA 94501 415/522-0700	Surface modeling
Erdas	Erdas, Inc. 2801 Buford Hwy. Suite 300 Atlanta, GA 30329 404/248-9000	Remote sensing/ image processing
Arc/Info	Environmental Systems Research Institute, Inc. 380 New York St. Redlands, CA 92373 714/793-2853	GIS
Genamap	Genasys II, Inc. 2629 Redwing Rd. Suite 330 Ft. Collins, CO 80526 303/226-3283	GIS
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Monitoring Louisiana's wetlands

by Christine C. Smith
and John A. Barras
Special to Focus

SYNOPSIS

GIS and image processing software, along with Data General's Aviion platform, provide powerful and versatile tools for analyzing historical geographic data. The ability to compare complex map characteristics quickly and efficiently is the key to future decision-making for environmentally sensitive coastal zones and wetlands.

Wetlands are one of Louisiana's most treasured resources. The state contains 40 percent of all wetlands in the continental United States. To protect this natural area, the Louisiana Department of Natural Resources (DNR) uses a geographic information system (GIS) to track land loss and habitat change over time. A GIS allows analysts to efficiently update, retrieve, analyze, and produce spatial data in tabular or graphic form. Maps, aerial photographs, satellite images, and permit records are entered into the system to determine changes in land use and land cover, vegetative health, and the impact of proposed activities within coastal zones.

Image processing and Aviion

The Louisiana DNR's Coastal Management Division (CMD) is one of several state and federal agencies responsible for managing coastal wetlands. The CMD uses GIS and image processing software from Erdas, Inc., on a Data General Aviion workstation and an MV/10000 minicomputer. Erdas, Inc., developed its original GIS and image processing software in 1978 on a Data General MV family system. The software was ported recently to the Aviion workstation to take advantage of the speed and efficiency offered by these desktop computers.

The CMD chose the Aviion after testing the software on many Unix workstations. A system easy to use and maintain was needed, and which offered the power to perform many CPU-intensive operations quickly. The Aviion provides a multiprocessing architecture that allows the CMD to perform multiple GIS tasks simultaneously.

Louisiana's shifting coastal zone requires regular and detailed trend analysis. The CMD uses GIS in obtaining habitat change statistics for individual wetland management plans within its coastal data base. A wetland restoration plan is designed to increase or encourage marsh growth within a specified area using a variety of management techniques. These areas range in size from a few hundred to hundreds of thousands of acres. The most common techniques regulate the normal hydrologic regime within a plan using a system of weirs, dams, pumps, and levees to encourage marsh growth, while balancing other uses such as fisheries, waterfowl habitat production, trapping, and hunting.

Restoration plans also include sediment diversions, shoreline stabilization projects, and the planting of native marsh grasses. Because plans rely generally on hydrologic management (raising or lowering water levels), most plans are bounded by levees or some other physical feature that controls the local hydrology. Virtually all areas require a wetland trend analysis to determine where loss has occurred and how much, so that these areas may be protected in the future.

Compiling data

The CMD developed vegetative land cover maps for 1956, 1978, and 1984 providing complete coverage of Louisiana's coastal zone. The CMD and the Energy Division GIS Lab jointly developed integrated, multi-date wetland change maps (1956/1978, 1978/1984, 1956/1984, and 1984/1986) for the coastal zone. Information from these maps is used in regulatory decision-making.

A study of this proportion requires a great deal of data on many factors affecting wetland evolution. The 1956 and 1978 data sets were compiled using photointerpretation techniques on a 1:24,000 U.S. Geological Survey (USGS) quadrangle map base. Data were digitized and converted to a MOSS vector format (MOSS is a public-domain vector software package). While still in vector format, original images were coded for more than 130 vegetative land-cover categories. Categories were aggregated to 15 land-cover types, including water, marsh, swamp, and forest.

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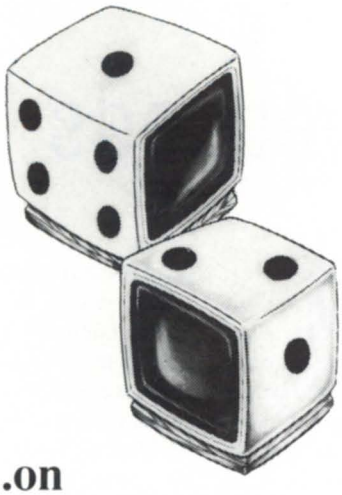

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Vector wetland change analyses for areas larger than 10,000 acres simply took too long to complete using a vector-based GIS. The 7.5-minute vector habitat maps were rasterized in MOSS and converted to Erdas. The habitat maps were then "mosaicked" to form a coastwide base for regional wetland trend analysis. The software allowed CMD to perform wetland trend analyses on a coastwide, rather than a site-specific, basis. Raster GIS software is more efficient at performing this type of regional analysis, allowing the Louisiana DNR to perform other types of regional analyses not feasible with a vector system.

Landsat Thematic Mapper satellite data for 1984 were gathered for the entire coastal zone. Data for 1986 were gathered for the coastal zone's southeastern section. Data for each year were compared with those of later years to assess land and habitat change. Wetland managers consider this information a valuable tool.

In determining wetland change trends, plan boundaries were digitized in Infocad and converted to Erdas. Land-cover data for 1956, 1978, and 1984 were then extracted for the restoration plan. Wetland change trends were produced by comparing 1956 data to 1978 data, and 1978 to 1984, using the GIS programs.

Landsat TM data for 1984 and 1986 were classified by delineating specific categories in a map or image. Samples of each desired category were identified based on field work, aerial photographs, or other ancillary data. The software "looks" for areas in the image possessing the same properties as the samples. The classified image can then be analyzed to determine the number of acres in each class, and compared with classified images from other years to determine changes in land use and cover. The system allows analysts to overlay multiple images for visual and statistical comparisons.

A classified image often contains more classes than analysts need. To create habitat change maps, original wetland classifications were simplified to a land-cover classification system consisting of 16 habitat categories. These maps helped determine habitat changes for the entire area: from 1956 to 1978, and from 1978 to 1984. Wetland-change analyses from 1984 to 1990 were done for selected restoration plans. The change maps show shoreline erosion, marsh deterioration, and the addition of oilfield location canals. A similar procedure was used to produce vegetation change maps showing changes in marsh type, forest, or swamp over the 22-year period.

A plethora of maps

The system assists in addressing wetland restoration plan siting and management by providing land-cover and wetland-change maps and statistics to county, state, federal, and private agencies. Finished products include digital and hardcopy maps, tabular statistics, and color slides. The system also generates land-loss density maps, which pinpoint areas losing land in excess of a user-specified base value. By using a roving window, areas were identified that did not meet the threshold. Using an image processing function called "filtering" eliminated land-loss values below a certain size, thereby creating a map of problem areas. This same method can also create land-gain maps.

Producing a land-and-water interface density map employed similar techniques. The roving window scans shorelines, assigning higher density values to shorelines of greater complexity. A complex shoreline may consist of many small ponds and meandering channels. Plan managers consider these sites valuable because they provide habitats for certain species. Habitat-diversity maps are generated using similar techniques, giving analysts a picture of the areas with the highest habitat complexity.

With geographic information on habitats and land use/land cover change dating back 26 years, the CMD's wetland management data base provides a solid foundation for future management decisions concerning Louisiana's coastal plain. Future plans include classifying Landsat TM imagery from 1988 for southeastern Louisiana. The CMD will move all GIS applications off of the MV/10000 and onto the new Aviion system for continued wetland trend analyses using updated data sets. The new Aviion system's speed and power enables researchers at CMD to perform analyses of Louisiana's wetlands more efficiently. Δ

Christine C. Smith is a technical writer for Erdas, Inc., in Atlanta, Georgia, and John A. Barras is an Internal Management Consultant II for the Louisiana Department of Natural Resources in Baton Rouge, Louisiana.

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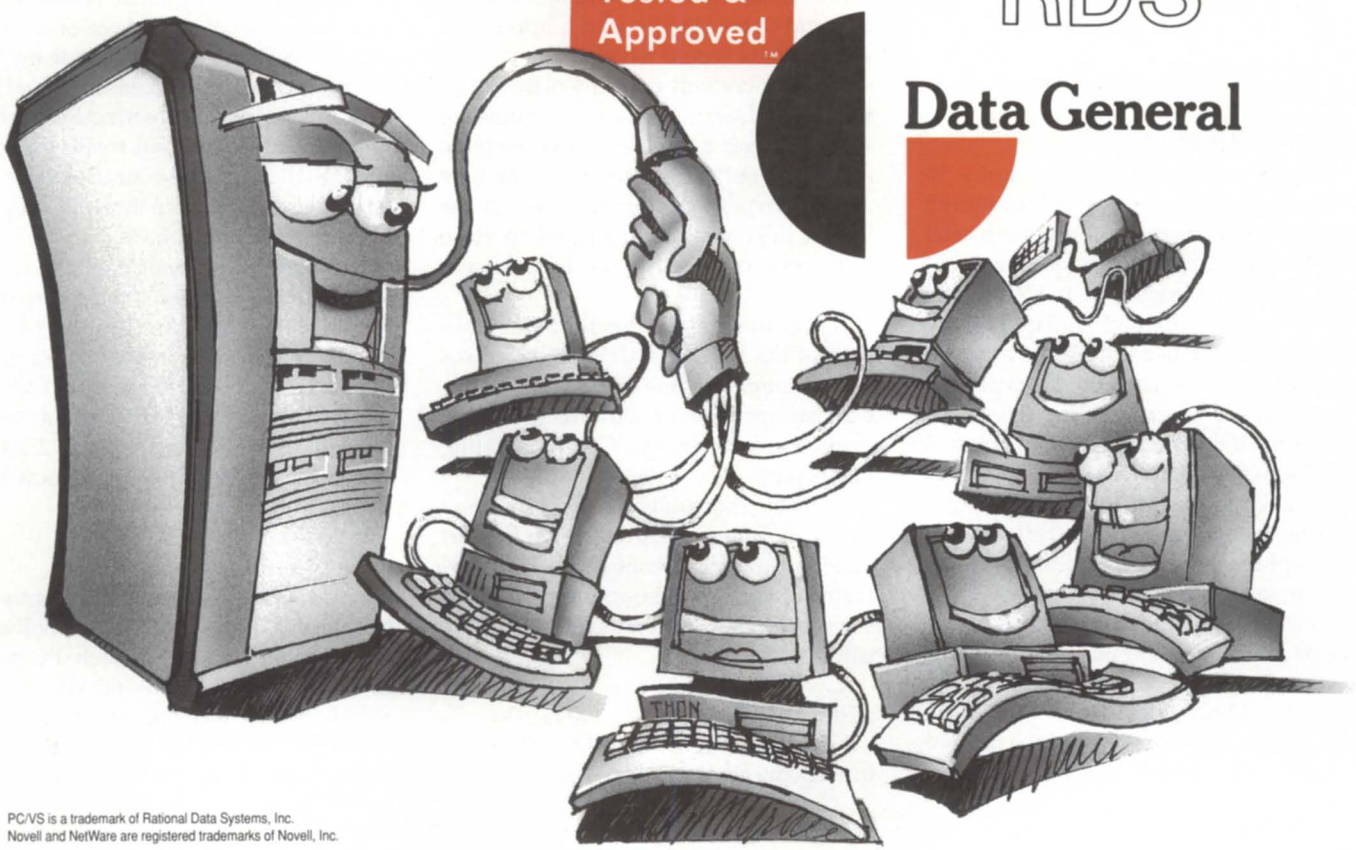

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Brian Johnson

Here's variety for you...

SYNOPSIS

Unix schizophrenia, Sleaze Tour glory, pay-as-you-update software, truly crazy stuff from the trade rags, and a burning question for the "style over substance" 90s: Now really, are fancy user interfaces an aid to productivity, or are they just fun to look at?

:SCHIZOPHRENIA_91

At last year's NADGUG Conference '90 in Seattle I made a point of peeking into all the Unix sessions and doing a rough head count. The numbers were quite low. At this year's Conference '91 in Denver the numbers were a lot higher. Based on my informal session head counts I'd estimate that about 25 percent of the attendees were Unix or bisexual (Unix and AOS/VS) users. If this keeps up, we're going to need separate conferences.

To a large extent, the schizophrenia among attendees merely reflects the schizophrenia at Data General. The push is on to sell flashy new X Windows-based Unix stuff, while the MV cash cow keeps the paychecks from bouncing.

:CONFERENCE_TRIVIA

In past years I've developed the habit of buying the latest book from Dr. Hunter S. Thompson to read on the way to/from the NADGUG conference. For the benefit of those keeping score, this year's selection was "Songs of the Doomed" (subtitle: "More Notes on the Death of the American Dream"). B+.

The Sleaze Tour set a record of sorts this year; everybody who started the tour finished it. That means either that the tour was lame, or that only the truly hard core showed up for it. I vote for the latter. I think a few potential attendees might have been put off by the recommended minimum cash requirement ($100), although my feeling is that it did a good job of eliminating some lightweights and allowed those of us who did show up to descend to the depths a bit quicker than we normally would have.

Due to incredibly poor city planning by the City of Denver, the sleazatoriums are scattered over a large area and we were able to hit only three of them in the time allotted (would have been four but the local Christians had managed to close down one of them by the time we got there).

A note of thanks is due the Sales Manager of the Diamond Cabaret, who was good enough to come over to the Conference and provide us with free passes to avoid the cover charge. Good marketing on his part.

Anyway, those of you from the Kansas City area can commence research for next year's conference pronto, and start forwarding your evaluation forms to me at the coordinates shown at the end of the column.

:DISCLAIMER

I'm not a fan of reading about PC topics in magazines that are supposed to be aimed at DG users, but this month I'm going to bend that rule a bit for the sake of surveying the current state of the art in User Interfaces. The question is, "Are fancy user interfaces an aid to productivity, or are they just fun to look at?"

:GREAT_LEAP_FORWARD:PROLOGUE

For several years now I've had a PC on my desk just for use when dialing out to client sites, or when visiting the NADGUG BBS. Recently, I also started using it for research into the nature of Things To Come.

A little over a year ago I upgraded it from a PC/XT to a 4 MB 386SX16, and installed both Unix and MS-DOS. About six months ago I installed Windows 3.0. Last week I took advantage of a dandy offer by Wordperfect to upgrade my MS-DOS Wordperfect 5.1 license to a dual MS-DOS/Windows Wordperfect license for a measly $80. The upgrade retails for about $100, but Egghead Discount Software was having a sale, and even threw in a copy of Grammatik for an extra $20.

So, what's it all mean? Well, this month marks the first column I've produced using a state-of-the-art graphics-based windowing word processor with a grammar checker, as opposed to my old scheme of just banging the text into my trusty copy of AOS/VS Wordperfect 4.2. At the end of the column I'll let you know how things worked out.

:NEAT_IDEA

Wordperfect Corporation recently introduced a new approach to Software Subscription Service for their PC-based products. You can call and sign up for automatic shipment of new interim releases (i.e., updates in DG parlance). The cost is charged to your credit card when

the diskettes are shipped, and the price is extremely reasonable: $1.50 per diskette for 360 KB diskettes, plus a couple of bucks for shipping/handling. I called Microsoft and asked if the same kind of thing is available for MS-DOS and/or Windows. Nope. Too bad.

Pay-as-you-update seems to me to be a fair and reasonable way to handle SSS, although clearly there are problems when it comes to applying the same strategy to minicomputer software. Most companies can't pay by credit card (although the Federal Government can, oddly enough), and prefer to use purchase orders instead (which cost a lot more to process at both ends), and most companies need to budget their maintenance/support expenses in advance. The nice thing about running my own small business is that I don't have to complain about policies; I get to set them.

:NEW_PRODUCTS

Two different people told me at NADGUG that they are on the verge of announcing products patterned after the Infos global checkpoint server that I described in my July '91 column. When I get more details I'll pass them on.

And no, they did not offer me a royalty deal. Maybe I should quit publishing product ideas . . . .

:LESSON_LEARNED

Last month I was working on a program to build library files (.LBs) in an optimum order so that minimum duplicate entries were required to avoid forward references. The alternative is to waste MIPS using library.LB/MULTIPLE in LINK commands. Anyway, I received a harsh lesson about testing software using trivial cases, and I think it's worth repeating the experience here.

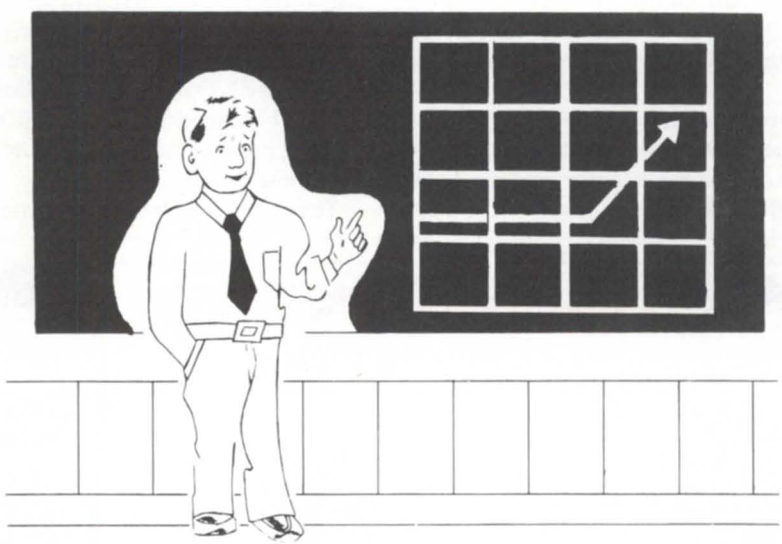
I used a library composed of about 30 object files to debug the program. Everything worked nicely and the runtime was little more than the time required to read the .OB files and create a data base in memory of .ENTs and .EXTs. Even the final optimization passes took only a few seconds.

After finishing the program I mentioned it to a few people, and someone from Oracle said that they'd like to try it because they were having problems with DG's library builder that comes with their Source Code Control System product. Apparently, the DG utility has a limitation on the maximum number of .OB files that is somewhat less than the 670 that Oracle was trying to feed it.

As near as I could figure, my program was limited only by the system-imposed limit on maximum command line length and the amount of memory required for my data bases. I had taken great pains to dynamically allocate all data base memory and to minimize the memory required for the various data structures. For example, my little test library of 59 .OBs with 166 symbols had needed to allocate 17 KB for its data bases.

All the data bases were arranged as linked lists (queues) making heavy use of DG C's hardware-based queue functions. This implied sequential searches of queues, albeit hardware assisted; but the perfor-

Look Sharp!



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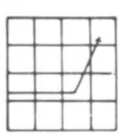

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mance of the test library seemed to indicate that this wasn't a big problem.

When Oracle tried the program they uncovered a minor bug, but I also noticed that the CPU consumption was now prodigious. In fact, toward the end of reading the object files when the symbol table was approaching its maximum size, the program was generating only one disk I/O every 10 seconds. For Oracle's 670 .OBs consisting of 4,900 symbols and consuming a half-megabyte of data base space, the CPU time consumed was more than 20 minutes on their MV/15-20.

Based on the tests at Oracle, my initial assumptions about using queues were seriously flawed. I wrote a quickie program to create stripped down copies of Oracle's .OB files (only .TITLEs, .ENTs, and .EXTs) and transferred them back to my trusty MV/4 for some serious redesign.

The program uses three main data bases: a queue of .OB records, one per .OB file, a queue of reference records, one per .ENT and .EXT, and a queue of symbol names, one per unique symbol.

A histogram of the program on my system showed that the bulk of the CPU consumption during the .OB file reading phase was involved with looking up symbols by name in the symbol data base. Thank God for the AOS/VS histogram facility.

Luckily, I have an AVL tree package in my bag of in-house C library routines, so the first step was to replace the symbol queue with an AVL tree. That was painless and had such a dramatic effect on symbol lookup CPU consumption that a subsequent histogram showed the new bottleneck during the .OB reading pass to be the C library I/O functions. Digging back into my in-house C library, I found the xopen/xread/xwrite functions that are call-compatible with C's fopen/fread/fwrite functions, but go straight to the AGENT for I/O services. That eliminated the new bottleneck and resulted in the .OB reading pass becoming I/O limited from beginning to end.

The result: the Oracle .OBs can now be processed in less than a minute of CPU time, or about 20 times quicker. The redesign had no effect on the optimization pass, which had previously accounted for less than 10 seconds of CPU, and the additional memory consumption for the AVL tree nodes was slight; the nodes are only two bytes larger than the queue element they replaced.

The moral: stick with small test cases during debugging, but always do a final performance evaluation pass using the biggest workload that the program will ever be called upon to do, preferably on the slowest system in the shop. Beware of data structure designs whose access characteristics are linear—or worse, as a function of the input. And finally, learn how to use the AOS/VS program histogram facility; it's worth its weight in gold. See the HISTO.DOC file in :UTIL.

:RAG_PICKINGS

This month I'm starting a regular feature based on whatever truly crazy stuff I've seen in the previous month's trade

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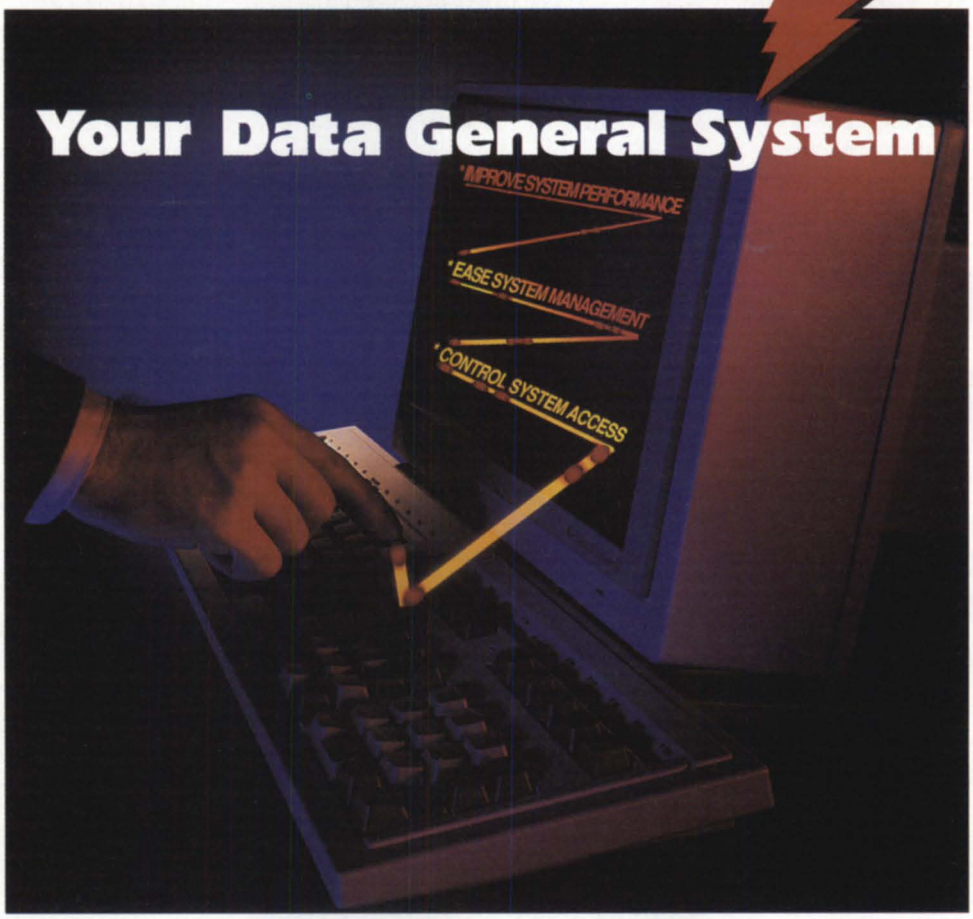

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rags. By exercising an incredible amount of self control I'm just going to present the data without comment. Here's the first installment (last month's entire column was installment 0).

Unix Today!, Nov. 25, 1991: Mitch Wagner published the results of a survey of Unix system administrators regarding which way they wanted to see the industry go in simplifying the task of system management. The upshot of the survey is that most respondents said to kiss off the fancy AI/expert/object-oriented tools in favor of "basic things (such) as installing software, adding new users, and making backups available in a standard form across platforms." A Morgan Stanley research associate was quoted as saying, "The current state of Unix system administration is a nightmare, and in many cases is a mixture of lore, logic, and witchcraft."

Unix Today!, Nov. 25, 1991: Bruce Hunter, *Unix Today!*'s resident columnist on systems administration, devoted his column to a discussion of how frail most suppliers' statd and lockd daemons are, and how the failure of any statd/lockd daemon on any node requires that the server be rebooted. The last paragraph of his column advises:

"The more application software you allow to be installed and run on your file servers, the more difficult these applications will be to maintain and the more poorly they will serve your users."

Computer Systems News, Nov. 18, 1991: the headline on an article about the recent IBM reorganization is "IBM REORGANIZATION TO EMPOWER DESKTOP."

:GREAT_LEAP_FORWARD:EPILOGUE

If the Nineties are characterized by any slogan, it oughta be "Style over Substance". I just spent an agonizingly long couple of hours using Wordperfect for Windows to produce this column. I'd estimate that it took nearly twice as long as it normally does.

Dazzling? Yep.
Flashy? Yep.
Entertaining? Yep.
Fast? Nope.
Higher productivity? Hardly.

Don't get me wrong, Wordperfect for Windows is one of the finest pieces of Windows software I've seen (even better than Microsoft's own Word for Windows product), and WYSIWYG is wonderful. But I'm very grateful that the folks at Wordperfect were kind enough to let me keep my MS-DOS Wordperfect license. Between Windows and Wordperfect for Windows, the competition for every MIPS available from my poor little 386SX16 was fierce.

I have a shareware utility for Windows called SYSGRAPH that displays CPU usage in a little icon at the bottom of the screen. SYSGRAPH reported around 15 percent idle while I just sat in Wordperfect for Windows and did nothing. So much for being able to accomplish much else at the same time with Windows' multitasking capability.

Starting Wordperfect for Windows from the Program Manager menu takes about 30 seconds (70 seconds at 8 MHz). Starting

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MS-DOS Wordperfect 5.1 from an MS-DOS prompt takes four seconds. Retrieving this column took 12 seconds under Windows and 2 seconds under MS-DOS.

Printing this column in Wordperfect for Windows resulted in 30 seconds of dead keyboard time (unlike MS-DOS Wordperfect, you can't continue until Wordperfect has finished formatting the document). AOS/VS and MS-DOS Wordperfect both returned control to me less than a second after I selected Full Document. At least ALT-ESC worked so that I could switch to playing Solitaire during the time it took for the print job setup to finish.

On the plus side, anything having to do with document layout is a breeze under Wordperfect for Windows, even compared to MS-DOS Wordperfect 5.1. The combination of WYSIWYG, being able to see the tab stops on the ruler at all times and add/remove/change tabs with the mouse is wonderful.

Now, before you start arguing that I probably didn't have this or that optimized, let me reassure you that I was using a fast 1 MB shareware disk cache (Hyperdisk—I recommend it highly), the fastest 1 MB VGA card on the market (Speedstar), the latest release of Windows (3.0a), and dual 19 ms. hard disks: one for MS-DOS and my document, and one with both Windows and Wordperfect on it. The fact that the 8 MHz startup time was almost exactly double the 16 MHz startup time implies that the primary difference is CPU consumption.

Personally, I found the grammar checker to be handy, but quite time-consuming and not nearly as good as a human proofreader. I made about 20 changes based on its advice. Grammatik complained a lot about my over-use of passive voice, long sentences (like this one), single sentence paragraphs, and it reported quite a few false errors simply because it can't possibly parse sentences correctly 100 percent of the time. Unfortunately, I picked a bad column to test Grammatik on; it went nuts trying to figure out the ends of sentences what with all the periods it found in the .TITLEs, .ENTs, and .EXTs.

So what did I learn from all of this? Three things: keystroke commands are much faster than mousing around, the only thing that outpaces the availability of faster CPUs is the ability of the product programmers to consume increased MIPS, and if productivity is your goal then forsake the picturesque human interfaces.

Next month it's back to good old AOS/VS Wordperfect 4.2, perhaps with a quick trip through the grammar checker when I'm all done, if I can't find a human around to proofread the column for me. Δ

BJ is the president of B.J.Inc., a San Francisco based consultancy specializing in system auditing, system management, and performance analysis. :SYSMGR is a division of B.J.Inc. BJ can be reached at 109 Minna St., Suite 215, San Francisco, CA 94105, 415/550-1444 (voice) or 415/550-1072 (fax). The :SYSMGR bulletin board number is 415/391-6531 (300/1200/2400 with optional MNP class 5, CHAR/605X/CHARLEN=8/PARITY=NONE/AUTOBAUD) or 415/550-1454 (voice).

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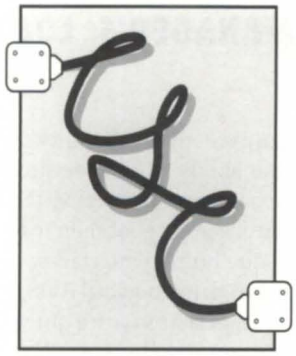

Who ya gonna call?

SYNOPSIS

DG's Customer Service Operations Center is the first point of contact for service.

by Cliff Izer
Special to Focus

Data General's Customer Support Center in Norcross, Georgia, may be an invisible aspect of your daily operation, but for our customers it is the most significant asset behind the sale of every Data General Product and Service contract. The CSC's sole mission is the timely and effective resolution of problems, which for the customer translates into improved system availability. Open 24 hours a day and 365 days a year, the CSC over the past two years handled more than 2.5 million calls from customers, VARs (value-added resellers), and Data General field personnel.

The focus of this particular article is on the first point of contact for the CSC, the Customer Service Operations Center. While many companies use a computerized voice system to provide customer service assistance, Data General executive management made a conscious decision to provide personal attention to each DG customer call.

Call handling and routing

The customer service representative initially asks contract customers to provide basic nontechnical information: contact number, verification of address and telephone number, system type, the failing device or product, and a brief description of the service request. This is an important process because it ensures that our support resources are prepared with the appropriate tools and know-how, and where to reach you. If a noncontract customer wishes to use these services, a similar profile is created for time and material assistance.

Using the latest technology—Aviion workstations linked through servers to an MV/40000—the customer service representative performs call handling and routing for customers, as well as capturing comprehensive reporting and call tracking information. Our Autopage System automatically dispatches field engineers and other Data General resources to customer sites. The Autopage System determines the primary and alternate engineers, and issues pages immediately upon receipt and in 15-minute intervals.

Following the initial call handling, our system allows the customer service representative to route the call based on contract/system type and the failing device or product. An automatically generated call reference number follows the call to resolution.

Service requests may be routed to four possible areas: hardware, software, field support, and all others. After initial call handling, all software and internal hardware supported contracts are placed in a support groups queue for the system or product specialist. These queues, displayed on monitors in every support engineer's work area, list open calls in the order received, along with all pertinent call information. Specialists may transfer calls to other departments if a problem is determined to be other than what the customer originally reported.

The customer service representative also oversees paging actions and escalation of service requests, processing call and time reporting activity for more than 650 field engineers. Using a sophisticated field activity collection and tracking system, the representative records an engineer's real-time location and collects service call activity for use by other Data General corporate resources.

The call flow process is designed to be simple, yet complete enough to handle the wide variety of Data General's service offerings. We continuously assess our support levels, utilizing various tools, and adjusting processes to meet our customers' needs.

If you have questions about this process, please call me or one of the Customer Service Operations Center managers, at 800/DG-HELPS. Δ

Cliff Izer, an 11-year Data General veteran, is manager of support operations for the United States Services Division. He has 25 years of experience in the computer industry, and has held various positions in field support, sales, and service.

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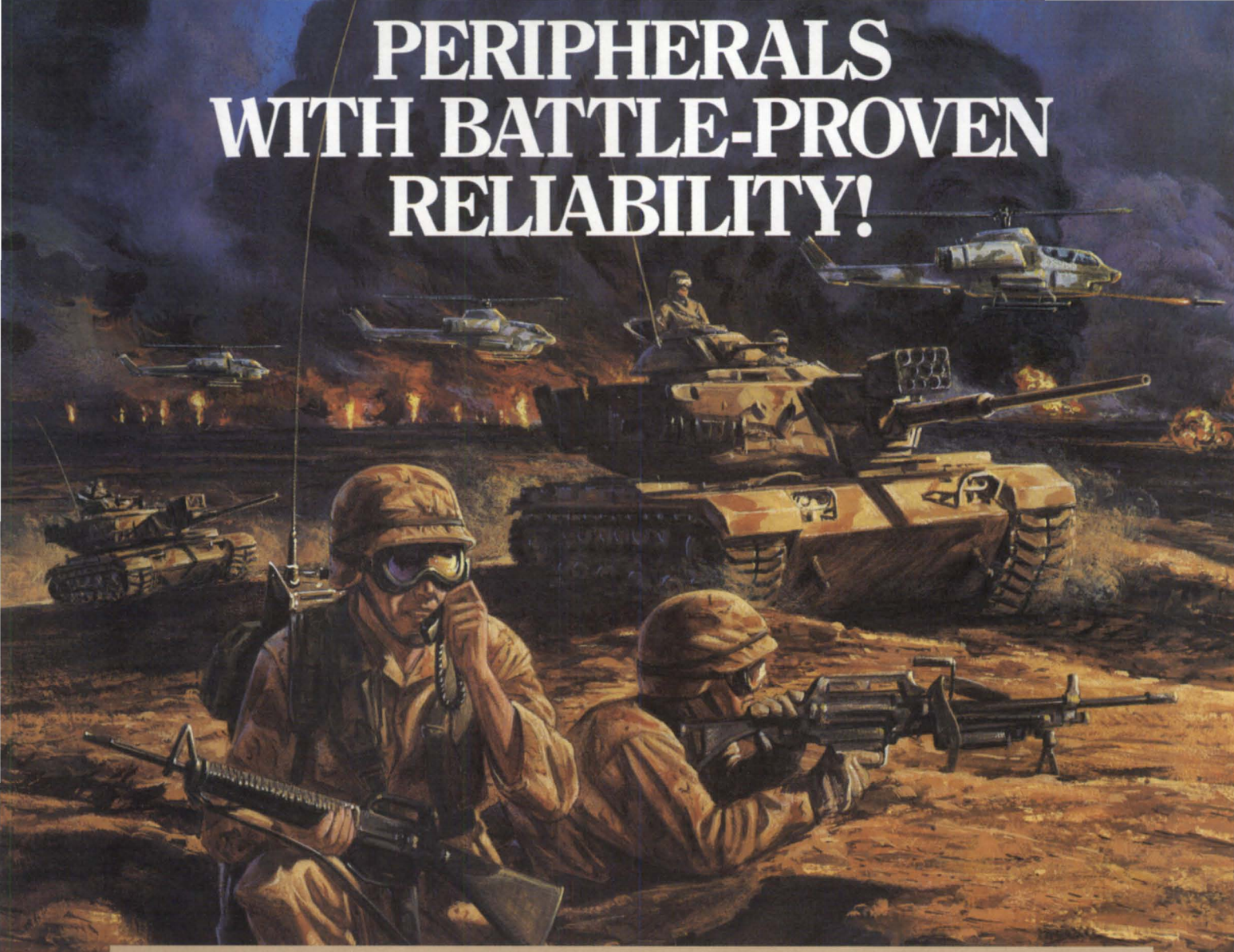

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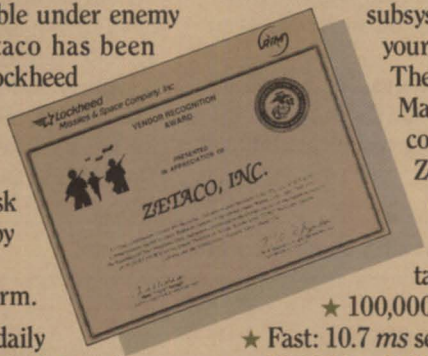

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Kim Medlin

Building a case for CASE

SYNOPSIS

"Give me one good reason to change my ways and use computer aided software engineering tools," you might say. Well, read on, because the author gives you three.

If you were going to have a house custom built, how would you want the contractor to tell you about the finished product?

A) With a three-inch-thick, typeset manual that includes a detailed description of the house in narrative form?

or

B) With a complete set of blueprints showing all exterior and interior views of the house?

A picture *is* worth a thousand words. And in the case of your custom house, pictures may save you thousands of dollars because they so easily and adequately convey information.

The same truth applies to RAD (rapid application development). Here at Data General's Solution Services, our primary mission is to write custom software for Data General customers. We have learned over the years that the traditional system specifications—those wordy, dense documents—can often be replaced with easy-to-comprehend illustrations of system functions. The illustrations are developed with modern methods using CASE tools (computer aided software engineering). The word "CASE" is used both to describe a structured methodology for specifying a system and to refer to computerized tools that help automate the method.

Structured methodology

For many reasons, analyzing and designing a software application is a complex effort:

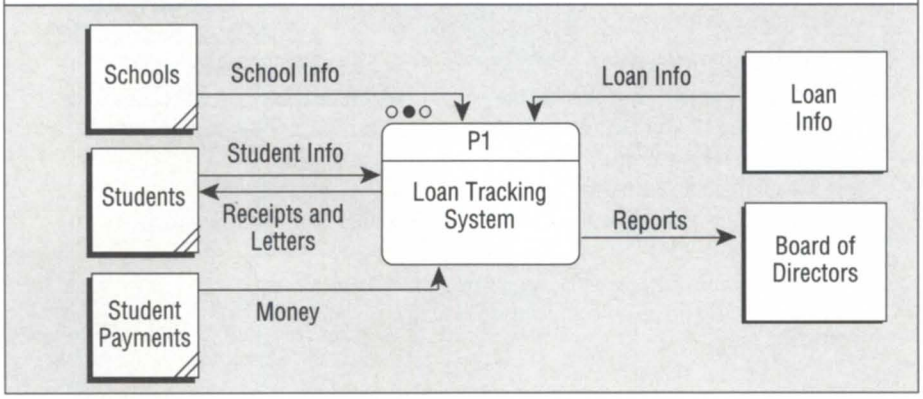
- The analysis process is, by definition, indefinite. So much so that there is gray area even in determining when the job is complete.
- The analyst can become overwhelmed with detail. One can quickly lose the forest for the trees.
- Interpersonal relationships between designers can be trying or, at worst, even hostile.
- Narrative-based analysis is difficult to deal with because of the sheer bulk of the material and differing technical abilities of various readers.

Some people would propose prototyping as a solution to these problems. Yes, modern development tools can unquestionably shorten programming efforts. However, prototyping without the foundation provided by structured analysis is too open-ended to adequately reduce the risk introduced, which should be of primary concern to all parties involved. In other words, by using prototyping and omitting the analysis phase, it is too easy to go off on a tangent and not realize it until it is too late.

How to get there from here

The analysis phase is essential because it reduces risk and provides order to an otherwise unwieldy task. The primary benefit of structured analysis methodology is that it divides the system into manageable components that can be dealt with relatively independently of each other. The primary means of dividing a system into its basic components is by using the Data Flow Diagram (DFD) and its side-

Figure 1: Loan tracking system context diagram



kick, the Entity-Relationship Diagram (ERD). Let's consider the Gane-Sarson methodology, which is popularly used in business applications. (For the sake of brevity, I'll touch only on the highlights with a slant toward real-world utilization. Sources for the following discussion include *Structured Systems Analysis: tools and techniques*, by Chris Gane and Trish Sarson; and *Structured Analysis and System Specification* by Tom DeMarco.

Gane-Sarson DFDs are a series of diagrams containing only four primary symbols. Squares represent "externals," or the source or destination of data residing outside the scope of an application. Arrows indicate data flow between two other symbols (data in motion). "Process" boxes (rounded rectangles) show data processing modules (data being transformed). And open-ended rectangles indicate "data stores," or data at rest, such as in a SQL table or a data file. In addition, the CASE tool automatically numbers the Process and Data Store indicators.

DFDs provide a "top down" approach to analysis. The first DFD drawn in the analysis phase, the context diagram, contains one process box that represents the entire application to be defined. The second diagram is an explosion (or decomposition) of the top-level process into its major components. Each one of those processes is again decomposed into further refined detail. Each process is exploded into smaller, easier to manage, subprocesses. You know you've reached the lowest level of decomposition when a process box represents a single computer program. You can, and should, verify the diagram's accuracy by beginning at the lowest-level processes and working your way back up the structure, making sure all data flows, data stores, and externals accurately represent the system being defined. This method of validation completes the cycle and represents why structured analysis is sometimes referred to as a "top down and bottom up" method.

For each lowest-level process box there exists a description, or primitive, of that program. Each primitive describes its corresponding lowest-level process. You create the primitives manually, using narrative English and/or pseudo code. During the design phase, each primitive becomes a program specification that will be used by a programmer. In this way, both programmers and users can determine how the system is constructed by examining the DFDs. Low-level detail, needed by software developers, is found in the primitives.

As a real-world example, Figure 1 shows the context diagram for the Loan Tracking System, the application described in my December 1991 *Focus* article (that application will be used in this and subsequent articles for purposes of explanation). Notice some refinements in the symbology. Some of the externals have slash marks in the lower-right corners. This represents "multiple external" (the application will actually deal with more than one school, but only one board of directors). Also notice the three circles above the Process box. This symbol indicates that the process is decomposed in another diagram.

Figure 2 shows the decomposition DFD

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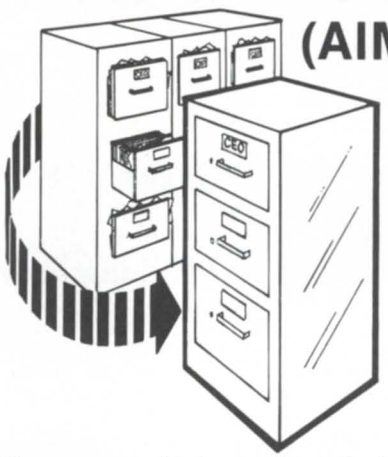

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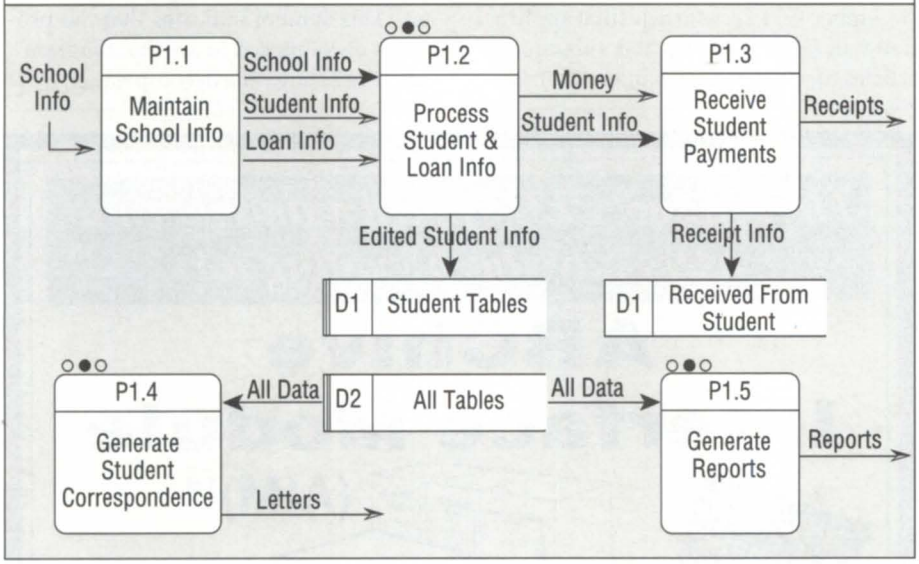
of the context diagram. The Process labeling is a continuation from the context diagram: The parent process is indicated by "P.1" and the suffixes (.1, .2, .3, etc.) indicate processes in this DFD. This numbering scheme is used continuously. For instance, the processes in the decomposed DFD of P1.2 would be labeled P1.2.1, P1.2.2, etc. Each data flow introduced in the context diagram can be recognized by the two-toned arrow heads. Also, Data Stores are introduced at this level. Data Stores D1 and D2 represent "multiple data stores" ("Student Tables" represents a related group of tables). It is also important to recognize that P1.1 and P1.3 will not be decomposed (they do not have the three circles above them). Therefore, these processes have been defined at their lowest level; they are individual computer programs. As such, a primitive is produced for each of them.

Figure 2: Loan tracking system major components



Don't let me give you the impression that this is an activity performed in a vacuum. Quite the contrary, it is very much an interactive and iterative process performed in conjunction with the user(s).

What about the data base?

DFDs provide a means of understanding how the pieces of the application jigsaw puzzle fit together. The primitives provide specific details for individual programs. That takes care of the application

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programs, but what about the data those programs will use?

The data base structure is represented with the Entity-Relationship Diagram (ERD), which is started generally as soon as a few DFDs begin to take shape. The symbols used in ERDs are even simpler than those of DFDs. Rounded rectangles represent SQL tables or files, also called entities. Lines define relationships between two entities. And "TV antennas," drawn at the ends of the Relationship lines, show cardinality, defining what type of relationship exists between two entities (e.g., one-to-many, one-to-one, etc.).

Figure 3 (page 30) shows a real-world example of an ERD. This ERD represents the data utilized in the Loan Tracking System. Following one path through the data base structure, the ERD can be read from top to bottom something like this: "Each school may have many students defined for it. Each student has at least one student loan. Each student loan may be distributed to schools in multiple payments." In reverse order, one might say, "For each payment made to a school, there will be one and only one associated student loan," and so on.

Practical structured analysis

Structured analysis is nothing new. The Gane-Sarson text was originally published in 1979. So you might wonder why the methods haven't been widely used for many years. The reason lies in the fact that structured methods are an interactive and iterative process. Many versions of the DFDs must be created before you "get it right." Manually redrawing many diagrams repeatedly is a time-consuming and tedious task, so much so that most people who knew of the methods decided not to use them for that exact reason. Modern CASE tools alleviate that problem by automating the process of redrawing diagrams.

A good CASE tool is also easy to use. The tool used to create the DFDs and ERDs in this article is a product called System Architect (Popkin Software Systems, Inc.; 212/571-3434), which uses a WYSIWYG user interface. We run it on a Data General DASHER/386 under Microsoft Windows 3.0. After learning the ropes, its use becomes quite intuitive.

You may be saying, "Give me one good reason to change my ways and use CASE." I'll give you three *big* reasons. First of all, CASE takes the guesswork out of analysis. With the structured methods of CASE, you know where to start, what to do along the way, and you even know when you're finished! CASE provides an orderly and structured methodology to an inherently difficult, tedious, and indefinite process.

Reason number two (and this is a real biggie) is that CASE provides an effective means of communication between the various parties involved in the task of analysis. I have seen beautifully written narrative specifications that no one read because the bulk of the document was overwhelming. However, anyone can read DFDs; therefore, they usually do. The symbology is simple and the method is straightforward. We've worked with many non-technical users who warm up to DFDs very quickly. In fact, they usually

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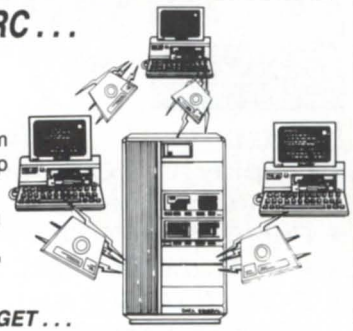

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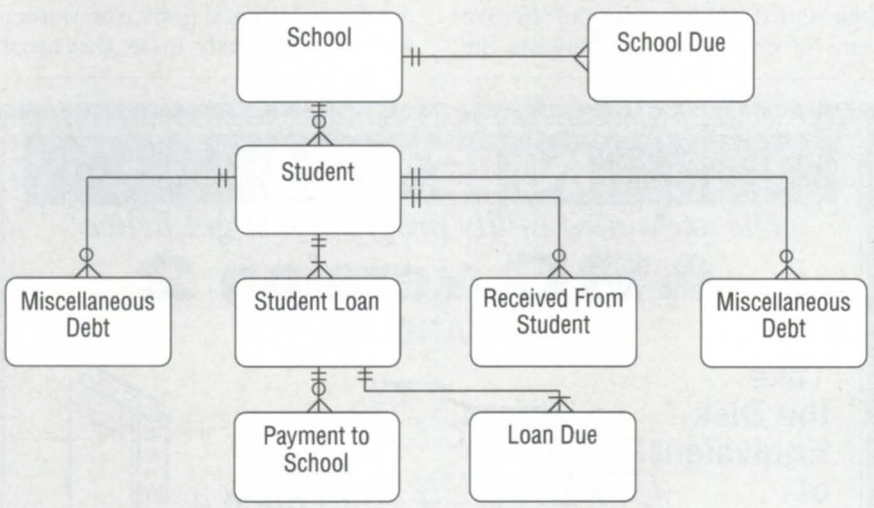
aren't really participants in the analysis process until we start drawing DFDs. At that moment, communication barriers break down and we truly begin working as a team.

Third, if you want a really practical reason, CASE saves money. The timeframe for completing the analysis phase may not be shortened with CASE tools, but the tools allow you to do a better job. This is important because bugs are much less expensive to fix in the design phase than they are later in the development life cycle. The time and expense saved from having fewer design bugs is quite significant.

Figure 3: Loan tracking system entity-relationship diagram



What next?

In my next article, we'll see how the DFDs and ERD are used in the task of actually building the Loan Tracking System. We'll use a Fourth Generation Language (4GL) to quickly generate critical application functions in record time. Δ

Kim Medlin is a senior consultant with Data General's Solution Services group in Atlanta, Georgia. Solution Services specializes in custom software design, development, implementation, and consulting. Medlin's address is 3617 Parkway Lane, Norcross, GA 30092. He may be reached at 404/448-6072, extension 2007.

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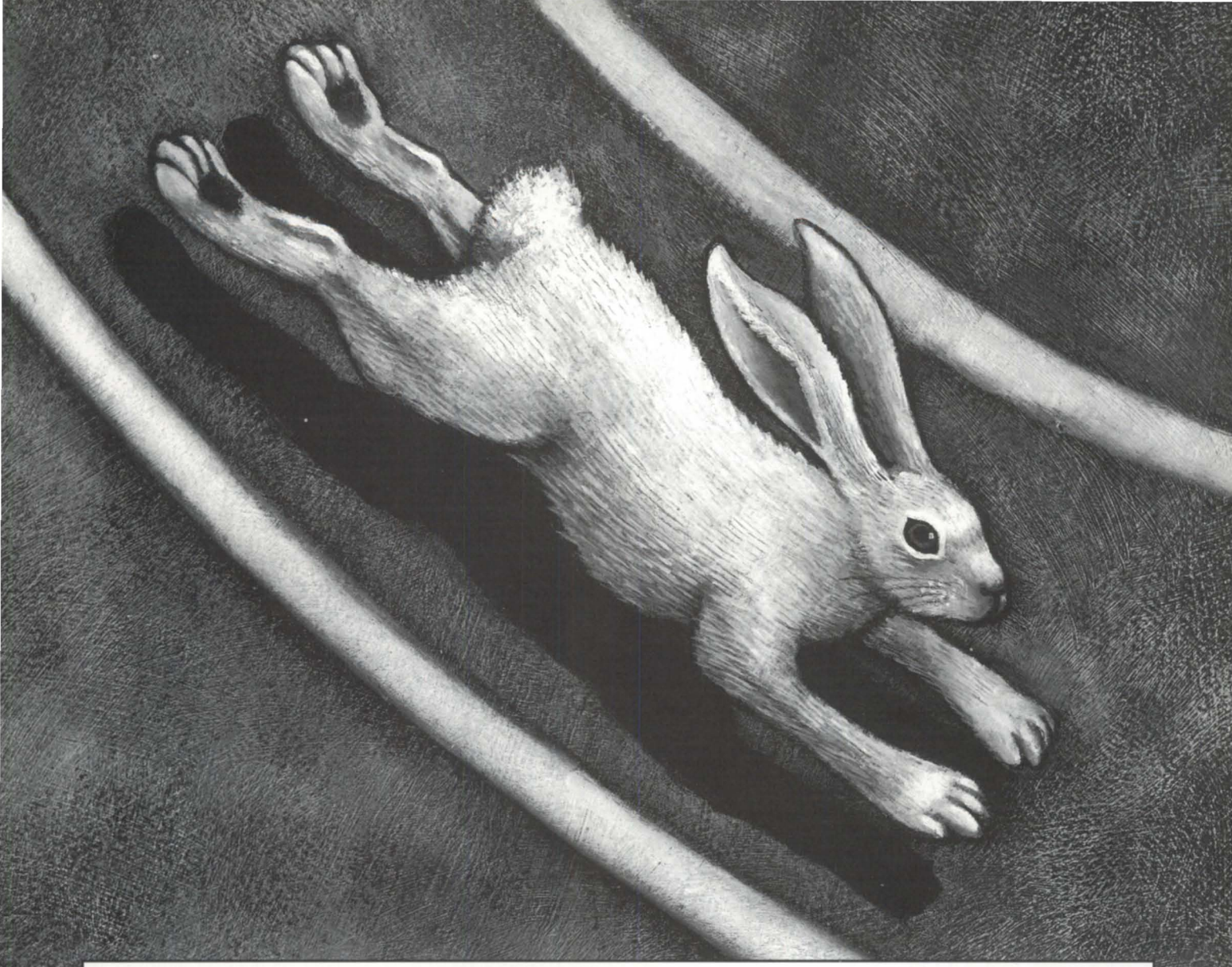

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Tim Boyer

Inside ICobol again

SYNOPSIS

ICobol is becoming one of Data General's most popular languages, and it's constantly being improved upon. DG promises an ambitious revision schedule, including a slew of enhancements in version 1.80.

Time for my annual NADGUG conference article. I just got back from Denver and the second combined conference. As expected, this one was bigger and better than ever. The ICobol Roundtable this year was a real eye-opener.

To begin with, the ICobol group recapped the past year's accomplishments. ICobol 1.60 for DOS and AOS/VS were released in March 1991, 1.70 for Unix in August, and 1.70 for AOS/VS should be out early in 1992 (it's deep in beta test now). Rev 1.70 will include new verbs such as STRING, UNSTRING, and SEARCH, color and intensity support, READ with TIMEOUT, and new START constructs. The START verb, especially, will fulfill some long-standing wish lists. You will be able to START <, <=, NOT >, FIRST, and LAST.

For those of us who remember being stuck on ICOS 4.20 for what seems like an eternity, this is quite a revision schedule. It should slow down soon. After all, there's a fine line to be drawn between releasing new revisions too often, necessitating an upgrade every few months, and releasing them not frequently enough, and falling behind. ICobol is leaning towards the former, and I hope that I don't get struck by lightning for wishing that there's a hiatus soon—just so I can catch my breath between beta tests. The future revision schedule is approximately one per year.

But if you think that this schedule is ambitious, wait until you see ICobol 1.80. I regret the decision not to tape record these sessions anymore, and I hope that I didn't miss anything important, but I can scribble only so fast.

Rev 1.80 enhancements

To begin with, 1.80 is scheduled for *simultaneous* release. Now that the product has been rewritten in C, it's possible to avoid the headaches associated with having two or three current versions of the product on the different operating systems. Rev 1.80 is scheduled for beta test in the first quarter of 1992, with release on DG/UX, AOS/VS, 386/ix, and DOS in the second quarter.

ICobol 1.80 will be fully ANSI '85 intermediate level compliant. This means that your code will *really* be standard now, instead of mostly standard. Beyond that, I know of at least one vendor that was not developing products for ICobol specifically because it wasn't ANSI '85. That should change now, and I'm sure he wasn't alone.

Also in 1.80 will be pop-up windows and hot key functionality. Of course, those of us using Screen Demon have had this for years—but, on the other hand, some of you have resisted out of the fear that your programs would then become non-portable. Worry no more. As an aside, I've had people deride the use of windows as mere fluff—some kind of kludge thrown on top of a well-running program just because the user thinks that it looks "sexy." If you use windowing only for that reason, you're abusing a good concept. I use windowing in programs that used to be multi-screen, such as my customer master file. Instead of redisplaying the first screen again, with the concomitant reading and displaying information from associated files, I simply do one CALL, and the original screen is redisplayed. Much more efficient, both from a coding standpoint and a system resource standpoint. Besides, it looks sexy.

On the MS-DOS front, there will be a Windows version for 1.80. This will be a single-user version only, with the runtime rewritten as a Windows application, and the utilities running under DOS.

Now, I've claimed to be a dinosaur more than once in this column—this is being written in Wordstar and CRTEDIT. But I'll admit to more than a passing familiarity with Windows, and I'm just not sure that I see the reason for a Windows version of ICobol. After all, on a 386, ICobol can currently run as a DOS application in windowed mode. Regardless of the machine, Alt-Esc will switch tasks. I was under the impression that the primary advantage to rewriting a program for Windows was the ability to use Microsoft's prewritten printer drivers and fonts, rather than writing your own. Unless ICobol is going to start

supporting Postscript printers or give us the ability to choose screen fonts (now *that* might be interesting; something like 03 LINE 1 COL 10 BLINK BELL TIMES_ROMAN 24_POINT UNDERLINED ITALIC "Main Menu".), I just don't see the advantage to the user in a Windows version.

Data General says that Windows' memory manager will allow for an easy port of the runtime system to the Windows platform, which is the main reason that a simultaneous release of 1.80 is possible. So there's no great advantage to the user community at this time (unless, you're running a 286—in which case you shouldn't be using Windows anyway!). But anything that speeds up a release is a good thing, and there's certainly nothing wrong with a true Windows-based runtime.

By far, the most interesting development promised for 1.80 is for the Unix world. The Distributed ICobol Minisam Server (DIMS—we gotta have a contest for a better acronym) will allow complete, transparent access to Minisam at the application and utility level. A Unix machine would view another Unix machine as a file system to be mounted, and could access any Minisam file across the machines as if it were local.

The system would require TCP/IP and NFS, and would be completely transparent to existing applications—unless, of course, you hardcoded your pathnames (shame on you!). All of the ICobol applications and tools will be able to use the facility—REORG, for example—and you'll be able to do record-level locking.

Hmmm . . . if you can do it with TCP/IP across two Unix machines, why couldn't it be done across *anything* capable of running TCP/IP? Looks like something to ask for in 1.90.

Whew! Lots to be accomplished in one revision, less than half a year out from the prior revision. Is this the direction you want ICobol to go? It's the direction *I* want it to. And I've got a say in the future of ICobol—because I attended the NADGUG conference, where the developers came to hear what we wanted. If ICobol isn't filling your needs, better be in Kansas City in 1992 to say so. If it is, better attend to make sure *your* interests are represented.

ICobol SIG news

The ICobol Special Interest Group has also accomplished a lot this year. Well, actually Data General and NADGUG did all of the work, but we'll take credit for it.

If you haven't seen a copy of the ICobol newsletter, please drop a note to Dennis Doyle or me. The good ICobol folks at Research Triangle Park are hoping to get a new one out twice a year or so, and it's full of information that you should have. It's available to anyone, but while you're at it, you might as well become a dues-paying member of the ICobol SIG. (Currently, dues are set at $0, but we're anticipating a 10 percent increase next year). Drop me a line, or put a note on the bulletin board.

And speaking of bulletin boards—DG has opened a new board at its Atlanta customer support center, called DASH. The basic board is open to anyone, and they've set the user's fee to be the same as the ICobol dues—zilch. You don't even have to pay for the phone call; just dial 800-DASH-CSC. Those of us at the conference could sign up on the spot. If you weren't there, just dial in and sign up over the phone.

One of the reasons that we want you on the bulletin board is to start turning in enhancement requests to the ICobol SIG. Data

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General has decided that the users' community is the best group to decide which RFEs should be implemented, and has enlisted the SIG to help prioritize requests. The exact method for getting us together to do that hasn't been decided yet, but I assume we'll rely heavily on bulletin boards and our annual meeting at the NADGUG conference. So here's another reason to attend. If you have an RFE that you *really* want to get through, bring a couple of friends.

ICobol in open systems

In one of the more interesting ICobol sessions that I've heard in years, Cecelia Chen, development manager for ICobol on all of its platforms, gave a session entitled, "ICobol in the Open Systems world." Some of the statements she made surely would have been condemned as heretical a few years ago. Things like "competition is good for the user."

She stated that, unlike many products that claim to be open but aren't quite there yet, ICobol is already an open system product. It's available on multiple hardware platforms, under multiple operating systems, by multiple vendors, and it integrates with third-party products. While DG is emphasizing multiuser servers, Envyr and Wild Hare are offering binary compatible runtime systems and compilers on many other systems.

This level of compatibility is just beginning to be explored by other vendors. That the code from a program I developed under RDOS can run under AOS/VS or Unix without recompilation is unprecedented. Adding stability to the situation is the fact that there are three competing ICobol vendors, and the conversion from one to another is minimal or nonexistent.

This makes the transition from a proprietary system to a commodity priced RISC system no more than a change of operating system. Now, if only someone would write a CLI32 shell for me, I'd switch to Unix tomorrow!

In addition to stability, an ICobol product from three different vendors adds just a bit of competition, something I'm heartily in favor of. In fact, I'm probably understating the competition. There were no fewer than five different Cobol compilers represented at the conference. Microfocus and Acucobol, while not truly binary compatible, have an ICobol switch on their compiler that will take your code and compile it with little conversion.

So there, in a nutshell, was the conference for me. ICobol is becoming one of the most popular languages that DG has, and it's constantly being improved upon. Thanks to NADGUG and the ICobol Special Interest Group, we're going to have a say in the direction that ICobol is being taken, and in which enhancements will be implemented. I can't wait to see what Kansas City has in store. Δ

Tim Boyer is EDP Manager at Denman Tire Corporation. He may be reached at P.O. Box 951, Warren, OH 44482, 216/898-2711 or on the NADGUG bulletin board at 415/924-3652.

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A complete listing of the NADGUG software library

ACK • Updated version 1.70. Terminal emulator/file transfer program for both AOS/VS and AOS machines. 365 blocks.

Big Brother • Automatic log-off program written in Fortran 77. Donated by the U.S. Forest Service. 169 blocks.

B.J.'s BBS contributions • About 20 items, including various programs, documentation, and macros. Some of the more interesting items include the :SYSMGR benchmark suite, a continuous incremental backup, a cleanup file maintenance program, a program to find strings in files, and a type-backward program. 6,761 blocks.

C compiler • Shareware product from Benchmark Products. Subset of ANSI standard C. Shareware version has a few features disabled, but is otherwise functional. 935 blocks.

CRTEDIT • The old RDOS screen editor ported over to VS. 49 blocks.

DBCHECK • Checks the open status of an Infos file and examines the checkpointing status of a file. 187 blocks.

DUMPLOAD • A Macintosh program to dump and load AOS/VS-compatible dumps on a Macintosh. 137 blocks.

ERP • A process-termination program developed by NASA and modified by Manville. In Fortran 77. 454 blocks.

FILEMNGR • With this new version, you can move, copy, delete, view, and perform several other options faster. This is distributed as shareware. If you try it and continue to use it, you are requested to pay a registration fee. From Kim Geiger. 654 blocks.

Focus • Selected *Focus* magazine articles including a SYSLOG filtering program, a macro to copy to two tape drives at once, a Cobol screen generator, and a collection of articles by John Grant. 1,774 blocks.

FTNCVT • A Fortran 5 to Fortran 77 translator. 232 blocks.

Games • A collection from various places. Enjoy. 19,216 blocks.

IMSLUTIL • A collection of CLI macros, Cobol routines, and assembly routines callable from Cobol. By IMSL of Houston. 4,893 blocks.

JAG_UTIL • JAG_UTIL by John Grant consists of several programs: Filecount, Userspace, Scan, Glossary, Laminate, and Qhelp. 4,325 blocks.

Kermit • A file-transfer protocol developed at Columbia University. 9,697 blocks.

Logout • Another auto log-out system. 178 blocks.

Look • Used to view text files, Look allows you to move forward and backward in a file. Donated by Data General. 202 blocks.

Macros • A collection of macros from various sources. 441 blocks.

MENUDIR • An initial user menu that can chain to other applications and features a password-control system. From the Fed SIG. 486 blocks.

Misc Kerm • An expanded version of AOS Kerm, this now includes other versions of Kermit including DG/One Kermit. 6,709 blocks.

MS-DOS • A VS program that lets you read and write MS-DOS diskettes on an MV system with a 5.25-inch floppy disk drive. 984 blocks.

Notify and Prior • Two contributions from Concept Automation. Notify tells you when a process has terminated. Prior lists the priorities of processes. 162 blocks.

RDOS Kermit • Now available. You must request the Kermit tape (rather than the library tape) to get RDOS Kermit.

Softrans • A file-transfer protocol written in Fortran 77 used to communicate with proprietary PC communications packages. 462 blocks.

Spell • Checks the spelling of a word or spell-checks documents. Submitted by Richard Kouzes. 5,108 blocks.

TEX • Version 2.26a is now available. TEX (Terminal Emulator with Xmodem) is a terminal-emulation program written by David Down. He has revised the TEX software to include a command language. TEX is distributed as shareware. At the end of 30 days, either remove it from your system or send the author a $45 fee. 463 blocks.

VT100KER • VT100 emulator from John Grant. 1,043 blocks.

Xfer • A tape-conversion utility. 607 blocks. Δ

All NADGUG members interested in receiving the NADGUG software collection should direct their requests to:

Michelle M. Dube
NADGUG Association Manager
c/o Danieli & O'Keefe
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490 Boston Post Road
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Please include your membership number, a ship-to address, the type of media you require, and payment of $30 to cover the cost of the media, shipping, and handling. The library is available on either MV/2000-style 20 MB cartridge or 1,200-foot reel-to-reel tape. Please allow 3 to 4 weeks for parcel post delivery. Software contributions should be sent to the above address.

For information regarding non-standard library distribution, please call 800/253-3902 (continental U.S. only) or 508/443-3330.

Bits and bytes from the bulletin board

Yakity ACK

From: Rick Marnell

A new version (rev 2.03) of ACK is in the COMSIG area. New features include a setup file, an expanded dialing directory, TTY terminal emulation, the ability to use emulations built in to your terminal, and the ability to specify multiple files or templates when sending with Ymodem protocol (see ACK203.RN for a complete list of enhancements). Filename is ACKE203.DMP.

From: Joseph Edens

I have snagged ACK 2.03, but I seem to be having a problem with the outgoing calls. I have the @CON set-up and the phone number to dial. When I select to dial, I can hear the modem go to a dial tone, then the tones for the phone number (very quickly, I might add), and then a pause for a while. Eventually, the "if you would like to make a call . . ." bit from Ma Bell comes up. I've tried putting pauses in the number, but to no avail. Is there a particular way the @CON needs to be configured?

From: Rick Marnell

Sounds like the number you're calling might be the problem, or your modem isn't dialing all the digits. Try dialing a number manually—when in the on-line state, enter ATE1<CR> then ATDTxxxxxxx<CR> (where xxxxxx is the number). The ATDT command should echo back to you on your screen. If it's garbled, try reducing your port speed a notch (4800 or 2400) and try again. I occasionally have trouble getting my modem to take the dial string the first time, probably because it's a quick burst of data to the modem. Another thing to try is turning output character masking on or off. In any case, I would dial out manually first until that works, then use the dialing directory. The port settings I use are 4800-N-8-1. Also try increasing register S11 to delay longer between dial tones—ATS11=150<CR>.

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Do-it-yourself template

From: Kim Blackwell

Does anyone know if there are any other companies besides Data General that sell IBM enhanced keyboard templates for CEO (for PCs)?

From: Joseph Edens

No, but if you have an example, you could order blank templates and do them yourself. I've seen the blank ones in several supply catalogs.

Setting a D450 printer port

From: John Meyer

I am trying to get a printer working on the slave port on a D450 terminal, but can't seem to get the parity and/or word length right. (The D450 user manual is, of course, not anywhere to be found.)

From: Walter Mosscrop

According to my D400/D450 manual, the printer port is 7 data bits, even parity, one stop bit.

Extracting ACL-related info

From: Matt Koch

I am trying to track ACL changes through SYSLOG. Does anyone know of a way/utility to extract only ACL related info (i.e., who changed it, tried to change it, and what file is the target)? Using the REPORT program, I get a report that is so large it is unusable. Any help would be appreciated.

From: Brian Pencak

Two possibilities: 1) VS-II rev 2.10, being released soon, will allow bit-masking, which may help you; 2) DMS has a product called RAS, which I think allows some bitmasking. I hope that these ideas solve your problem.

ASCII-to-EBCDIC utility

From: Steve Williams

Does anybody know of a utility under UX that will perform the ASCII-to-EBCDIC function that SORT did under AOS/VS? We created a direct credit tape in our payables system, and the system is now moving from the MV to the Aviion. Bank accepts only EBCDIC format.

From: Ephraim Nussbaum

Check out the manual page for the Unix command *dd*. It has an option to convert ASCII to EBCDIC, or vice versa. Δ

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

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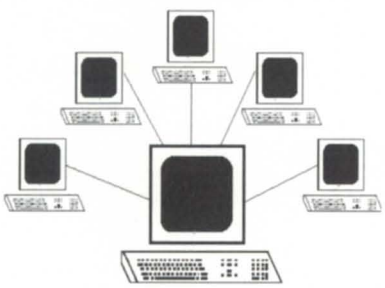

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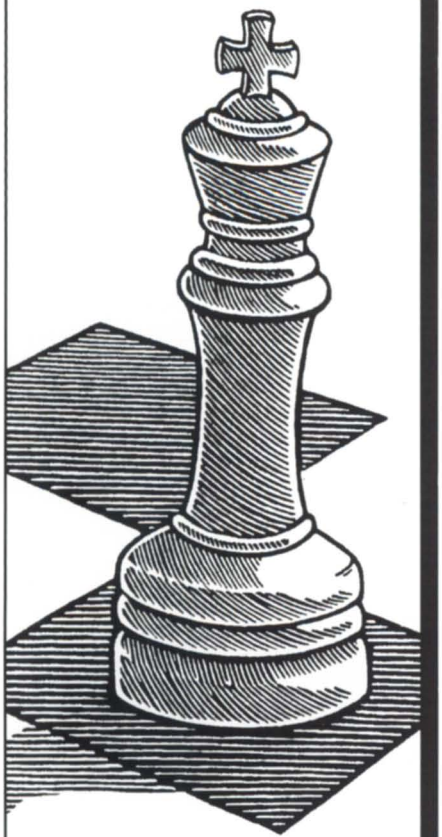

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The latest products for DG systems

Windows connection to DG host systems

Mount Carmel, CT—Cambridge Computer Corporation announced Vxconnect, a new product that connects Microsoft Windows-based personal computers to Data General host systems. Vxconnect emulates Dasher D100/D200/D400 series asynchronous display terminals.

Vxconnect features include: script processing; user-programmable and selectable command keys; color attribute mapping; print spooling to any printer; print redirection; support for Dynamic Data Exchange; an application program interface; support for Data General graphics commands including all color requirements; copy/paste information between host sessions and Windows documents; and Windows Help, which provides online assistance to the most common functions.

Vxconnect's scripting capabilities allow users to build a Windows front-end for Data General host applications. All of Vxconnect's functions—setting of communications parameters, operating a modem, selecting the terminal type, logging onto a host, performing a file transfer or quitting the applications—are accessible via the Cambridge Scriptprocessor.

Vxconnect's Commandkeys allow user-selected keys and color icons to be programmed for frequently used commands, host functions, or to execute scripts. Commandkeys can be mapped to any key on the PC. Vxconnect operates on any IBM-compatible personal computer with an 80x86 processor, 1 MB of memory, and Microsoft Windows 3.0 or later. It is priced at $295.

Cambridge Computer Corporation, 80 Mount Sanford Road, Mount Carmel, CT 06518; 203/288-6004.

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Erdas GIS image-processing software available on Aviion

Atlanta, GA—Erdas, Inc., and Data General announced Revision 7.5 of Erdas's geographic information system (GIS) and image-processing software for the DG Aviion workstation.

Workstation Erdas on the Aviion platform allows GIS and image-processing professionals in forestry, urban and regional planning, oil and mineral exploration, natural resource management, geosciences, academia, and defense to use Erdas integrated software on hardware that delivers up to 39 MIPS on a single processor, and the ability to upgrade to a multiprocessor system that delivers 117 MIPS (quad processor system).

The Erdas geoprocessing package assists analysts with aerial photographs, satellite images, hardcopy maps, and tabular data, all within a single system. Raster processing allows users to combine, enhance, and manipulate data layers for a variety of applications. Erdas software integrates GIS and image processing to provide image enhancement, classification, geometric correction, GIS analysis with GISMO, and scaled hardcopy. Terrain analysis capabilities include the ability to create slope, aspect, and relief maps, as well as three-dimensional perspective views.

Workstation Erdas is complemented by comprehensive documentation that includes the Erdas Field Guide, a reference

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Hare Writer from Wild Hare

Boulder, CO—A SQL-based report writer for the ICobol environment, titled "Hare Writer," is available from Wild Hare Computer Systems, Inc.

Created specifically for ICobol users and combining advanced SQL technology with standard DG ICobol ISAM structures, Hare Writer gives users compatibility with current programs and data while providing convenient access to user data. Announced at Data General's Source '91 conference, Hare Writer is priced from $750 to $19,500 depending on system type.

Wild Hare Computer Systems, Inc., P.O. Box 3581, Boulder, CO 80307; 303/442-0324.

Circle 54 on reader service card.

Backup on a board

Salt Lake City, UT—DMS Systems, Inc., and Hiperstor, Inc., announce intentions to provide a backup option with the Hiperstor DGMS-SC family of disk and tape drive controller subsystems for Data General's MV family. The option will provide a board-level backup of disks to tape drives in the subsystem.

The DGMS-SC controller subsystem offers fast data transfers without controller bottleneck, and with little or no impact on the main processor. Dual channels support more than 500 I/Os per second, and supports up to 14 SCSI disk and/or tape devices per controller.

DMS Systems, Inc., 1111 Brickyard Road, Salt Lake City, UT 84106; 801/484-3333.

Circle 52 on reader service card.

Unix-based C application development

Washington, DC—Centerline Software (formerly Saber Software) announced that Codecenter (formerly Saber-C), an advanced software programming environment for developing Unix-based C applications, is now available for Data General Aviion servers and workstations. DG value-added resellers (VARs) and independent software vendors (ISVs) will use Codecenter to develop networking and telecommunications applications.

Codecenter version 3.0.3 runs under DG/UX 5.4 and 4.3x on Aviion systems. It is list priced at $2,995 in the United States, the price including the first year of support and maintenance.

Centerline Software, Inc., 10 Fawcett Street, Cambridge, MA 02136-1110; 617/498-3000. Δ

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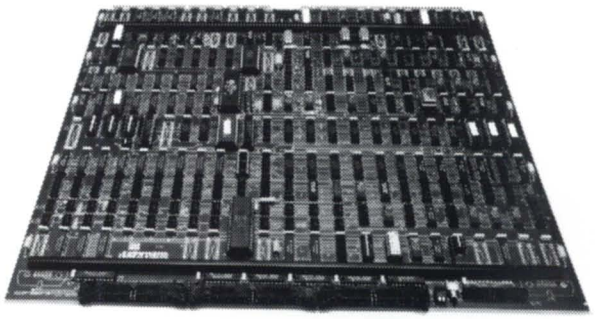

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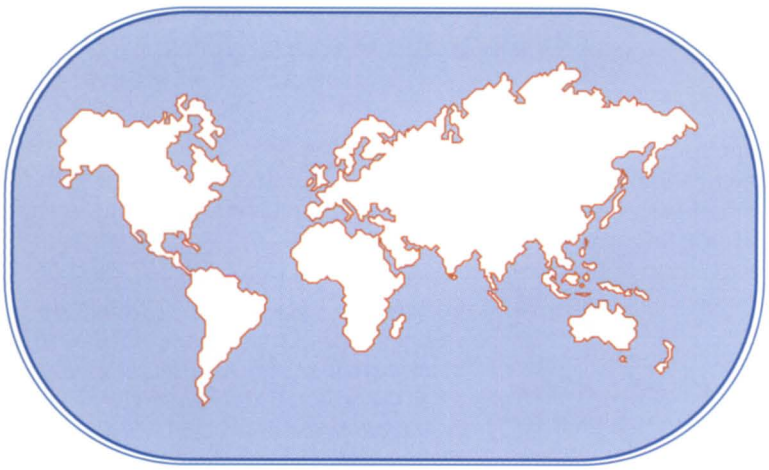

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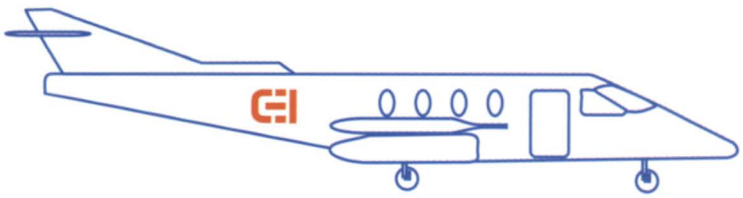

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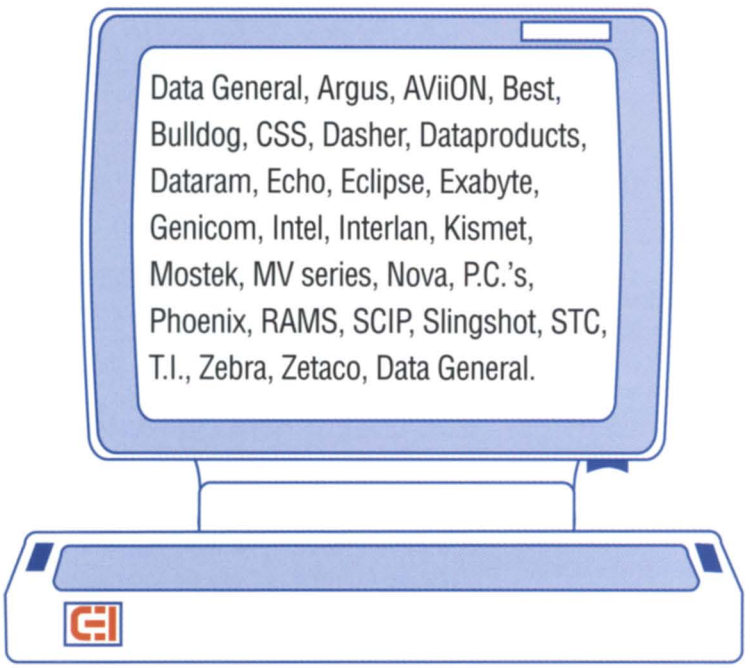

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Data Specific

"Inside and out" account teams

Data General formed an **Installed Base Telesales Group** to serve the existing North American customer base. This group is made up of inside telesales representatives who will work together with local field sales representatives as account teams. As part of the program, Data General created a field engineering referral program to help resolve customer issues. These field engineers will report customer needs to the Installed Base team.

Through the program, Data General expects to increase its contact with thousands of customers, according to **Angelo Guadagno**, vice president, Americas Sales and Service. "Many of our customers felt they were not getting enough attention and service from their local sales representatives, and were experiencing significant sales rep turnaround due to company restructuring. These account teams and the field referral program will enable us to be much more responsive to customer needs by providing an extra level of support," Guadagno said.

Telesales representatives will be available from 8:30 a.m. to 5 p.m. local time Monday through Friday. In addition to handling customer inquiries, problems, and purchases, the representatives will call on customers to inform them about new products and promotions. If you don't want to wait for a call from DG, you can reach your telesales representative at 1-800/DATA-GEN.

Richman forms consulting firm

Herbert J. Richman formed **Southgate Consulting**, a new venture specializing in providing small companies and start-ups with marketing expertise, general management advice, and financial assistance.

Richman, 56, who took early retirement from Data General last fall, was a cofounder and 23-year veteran of the company. He was instrumental in arranging for the original financing for Data General and for recruiting key executives, including current President **Ronald. L. Skates**. At Data General, Richman was most recently executive vice president, international sales and service, and vice chair of the company's board of directors.

Southgate Consulting will provide marketing and management services from locations in Boston and West Palm Beach, Florida.

Test drive a Walkabout

Data General is offering no risk 60-day "test drives" of its Walkabout/320 notebook computer. You'll get 30 percent off the price of the Walkabout if you decide to keep it. Contact your local sales office or **DG Direct** at 800/343-8842 for more information.

DG assembly plant in Thailand sold

Data General sold its Thailand manufacturing operation for approximately $10 million to a group of investors including **Sondhi Limthongkul** and **International Engineering Company Ltd.** The manufacturing operation, based in Bangkok and opened in 1987, is responsible for Data General terminal and PC assembly. The new owners will continue to manufacture products for DG, under the name of **DGT Company Ltd.**

DG/UX rev 5.4 classes

Data General's Educational Services group is offering training courses for DG/UX rev 5.4. The purpose of the class is to introduce those people already familiar with DG/UX rev 4.3 with the enhancements of 5.4. The three-day seminar will be taught in Boston, February 18-20. To enroll, call 800/343-8842.

Discounts for Wang users

Wang computer users are being enticed to switch to Data General. Through the end of March, Data General offers a 40 percent discount on AV 5240, AV 6240, AV 7000, or AV 8000 series servers when customers trade in a Wang VS, OIS, or 2200 system. Δ

Alliances

ProVAR

New DG value-added reseller **ProVAR, Incorporated**, of Baltimore, distributes MCBS Classic Accounting software, and provides turnkey solutions to distribution and manufacturing markets. ProVAR has over 350 installations concentrated in the mid-eastern region of the United States. MCBA Classic is a Unix-based set of fully integrated software packages written in Cobol and running on Aviion servers.

Dashers, POS, and Rock 'n' Roll

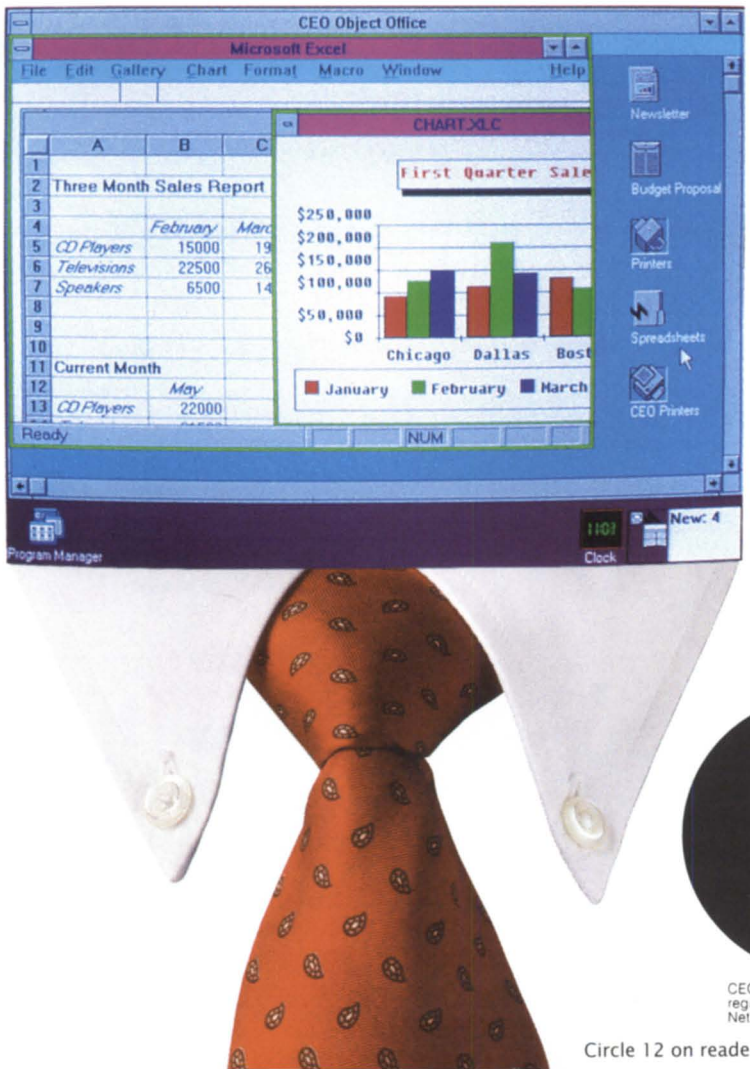
More than 300 Dasher PCs will be installed in audio stores across the nation to monitor record, compact disk, and tape sales. The information will help *Billboard* magazine compile its weekly list of the most popular songs in America. **Soundscan**, the firm that collects and tabulates data for *Billboard* magazine, is leasing the PCs, along with point of sale (POS) equipment, and software from **Young Systems Limited**, a Data General value-added reseller. Δ

RIG/SIG gigs

MARCH

March 5-6
Data General Users Group (United Kingdom) annual conference
Location: Metropole Hotel, NEC, Birmingham
Contact: Sheila O'Reilly, DGUG Administrator, 081-847 3206.

Meet the ultimate office worker!



New CEO Object Office software!

Office automation has taken a quantum leap forward with CEO Object Office software. CEO Object Office delivers the rich functionality of CEO software to LAN-based PCs–while integrating MS-DOS applications into a common user environment.

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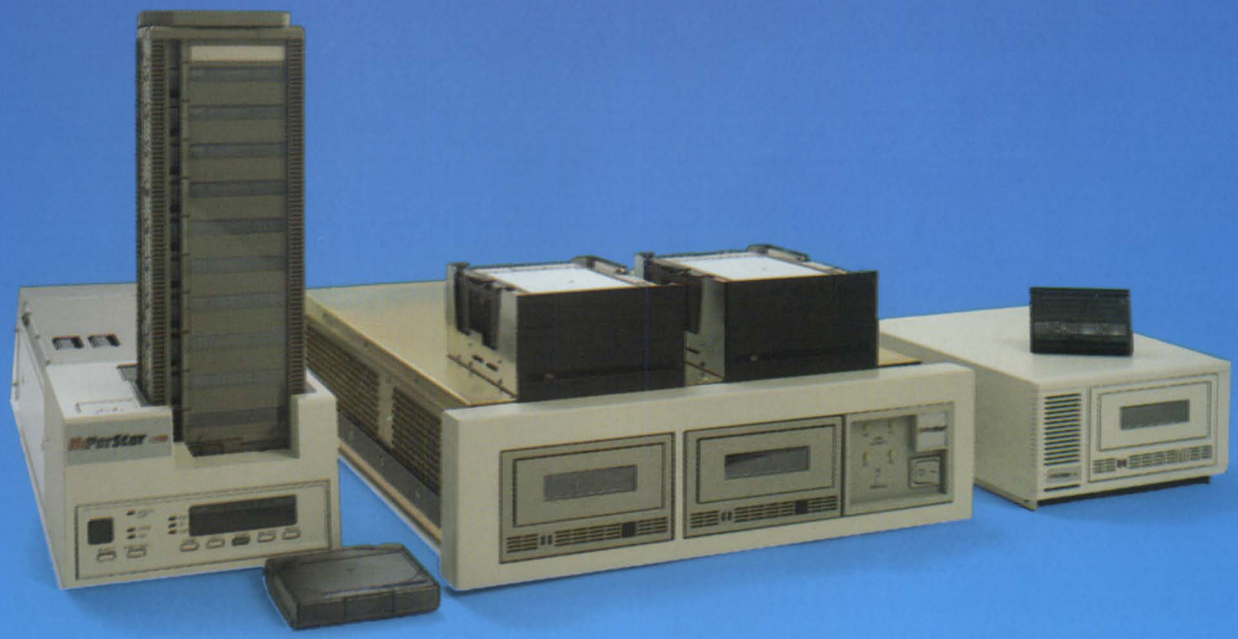

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- MV/18000
- MV/20000

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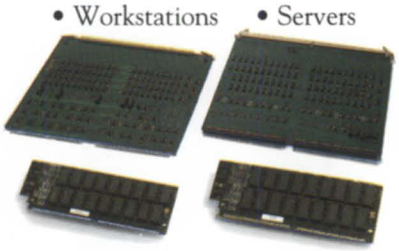
- Servers



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