Volume One, Number 2 April/May 1985

THE Business Unix™ JOURNAL

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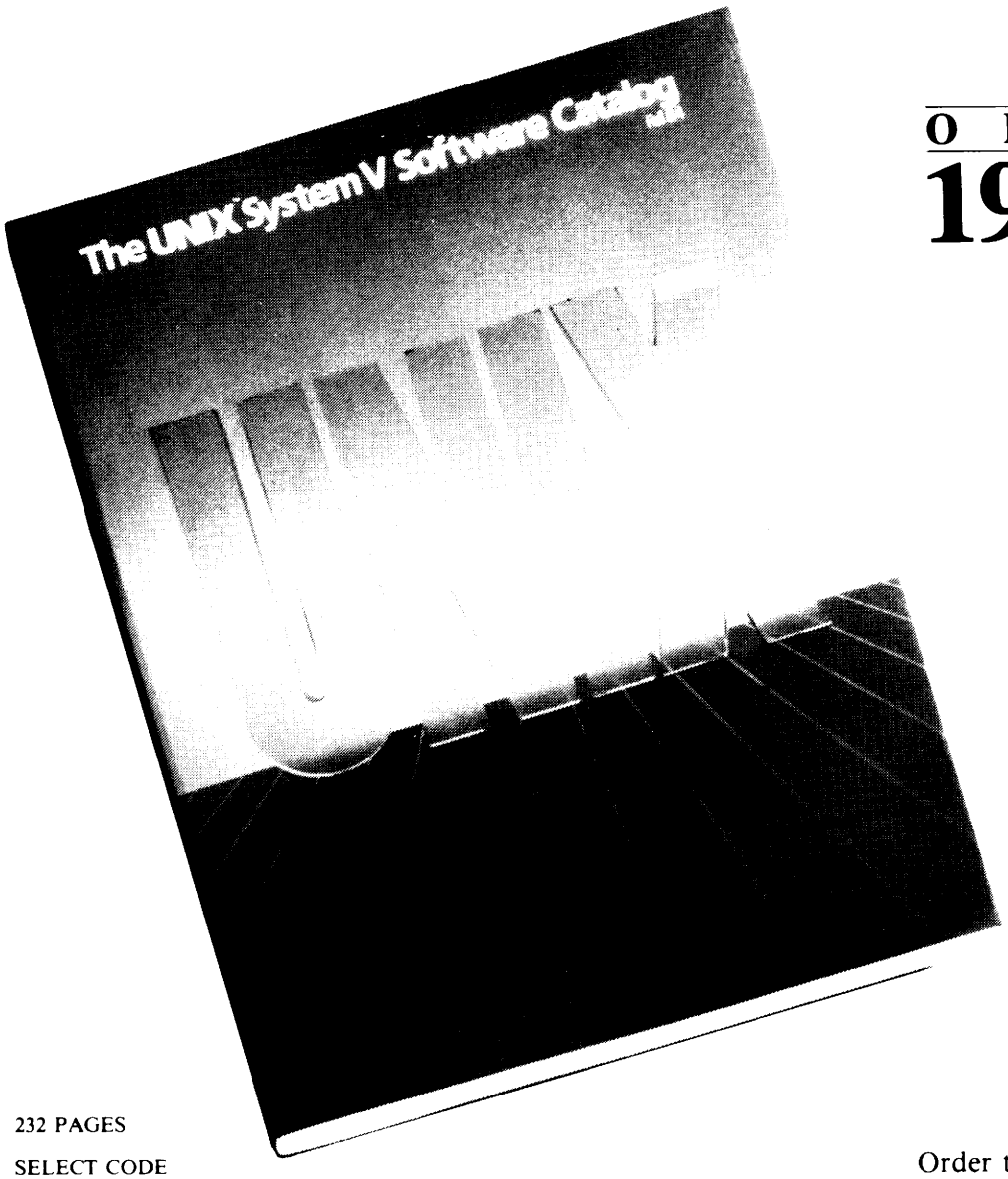

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BUSINESS UNIX
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Publisher and Editor:
Paul C. Copeland
Consulting Editor:
Mark Peters
Design and Production:
Michael A. Scott Associates
Oakland, California
Art Direction:
Art Weller
Oakland, California
Photography:
Scott Globus
Palo Alto, California
Marketing:
Whittle Agency Incorporated
San Ramon, California

Advertising Representatives:

Jules E. Thompson, Inc.
1290 Howard Avenue, Suite 303
Burlingame, CA 94010
(415) 348-8222 - Northern Calif.
(303) 595-9299 - Colorado
(713) 731-2605 - Texas
(312) 726-6047 - Illinois

Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90274
(213) 378-8361 - Southern California
(213) 772-0933 - New York
(617) 720-1888 - Massachusetts

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Letters, gripes, corrections... ***Business Unix*** wants to hear from you. Feedback is crucial to our publishing effort. Tell us what you like about our content, and what you don't like. Let us know how we can improve our coverage. Most of all, if you are operating software or hardware that others might like to know about—including both positive and negative feedback—send us a letter or give us a call at the address below. We want to open lines of communication with vendors, users, and other parties involved with applications issues for Unix based systems.

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The Business Unix Journal is looking for authors. Topics of interest include case studies of end user applications, software and hardware product reviews, book reviews, market research articles, and other pieces of interest to all segments of the Unix systems community, including computer vendors, software developers, VARs, and end users. No topic is too narrow for consideration; ***Business Unix*** is especially interested in case studies of vertical market applications, as well as reports on custom applications. If you have solved a problem, developed an application, or otherwise have Unix related experience that may be of interest to others, ***Business Unix*** would like to hear from you.

Paul Copeland, Editor
The Business Unix Journal
P.O. Box 1065
Lafayette, CA 94549
415-284-1610

OUT IN THE COLD
A User's Complaint

[What this note from a reader says about ***nroff****, is also true about other utilities on some Unix systems (i.e.,* ***uucp, lpr, termcap*** *entries, even* ***mail****; the list goes on and on). We have heard similar stories from users of several different manufacturers' systems, so it seems to be a fairly widespread problem. We can only hope these problems will soon be purely of historical interest.—Ed.]*

Originally I wanted to use **nroff** and the macro packages without making modifications. When I tried to perform complicated tasks, I ran into many problems, including bugs in the macro package, drivers that didn't fully support my printer, and drivers that caused floating point errors (on any text file—indicating they had not been tested). One night I worked until 6 a.m. fixing the document formatting package because I had a production schedule to meet. I have called [the system manufacturer] to get assistance. They don't know much about **nroff** and don't care to find out. I doubt they are worse than other manufacturers. They claim that [the software company] does not provide support either. The macros, I was informed, are provided without support. Wonderful—Brown Paper Bag Take It Or Leave It Software, Inc.! Either I become self-sufficient or die. The sad part is that you can get a lot from the available tools if they are set up properly and you have support. In my darker moments I pray for an IBM to run these turkeys out of the trade.

—Name withheld.

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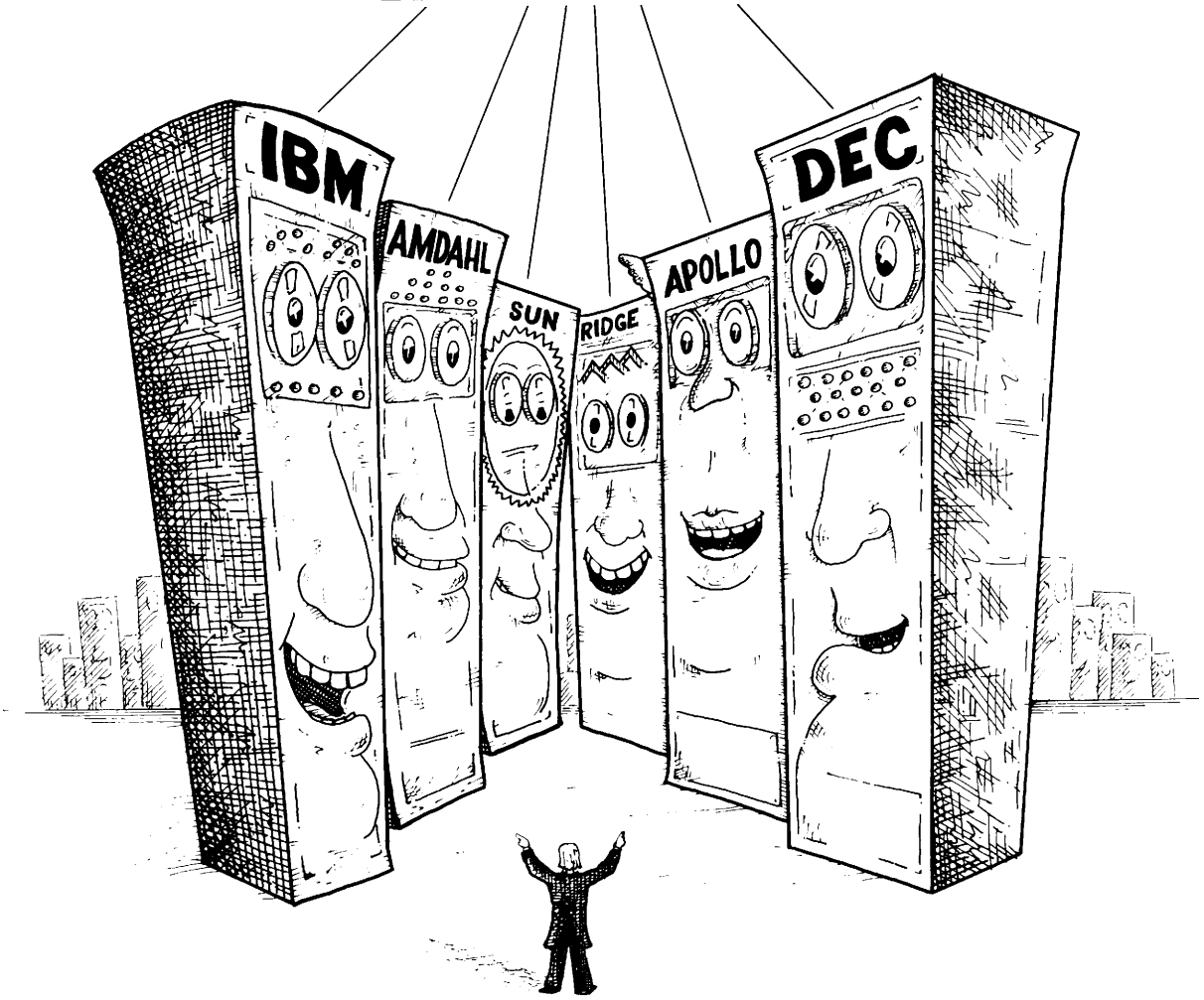

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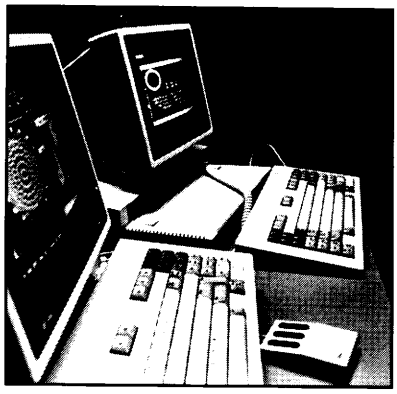

ON THE COVER:

On March 26, AT&T rolled out the UNIX PC, the long awaited PC 7300. ***Business Unix Journal*** attended a hands-on demonstration. We think both new users and old Unix hands will like the new machine. AT&T's Jack Scanlon called it "civilized" Unix System V. The company may have a winner here if it can get this gem moving in the distribution channels. More about the UNIX PC in future issues. Photograph by Scott Globus.

THE WORD OF ALAN HALD

Last January at UniForum some of us heard the following story:

A devout man is trapped on his roof in a great flood during a terrible rain storm. Some people in a row boat appear out of the storm and call to him, "Get in the boat! We will save you!" But he refuses their help, saying he has faith in his Lord to save him. Now, however, the waters are rising quickly, lapping about his ankles as he clutches to the chimney on the very peak of the roof. Just then another row boat appears out of the blustering storm, but again he refuses to be rescued, putting his faith in his Lord to save him instead. At that very instant, a helicopter appears out of the clouds overhead and a rope descends towards the unfortunate fellow, now standing on the top of his chimney in the rising waters. From a bull-horn in the helicopter, a voice commands "Take the rope! We will save you!" But he shouts back, "No, I have faith in my Lord to save me!" Too late—the waters rush over him and he is swept away by the flood and drowned. Afterwards, in Heaven, he asks why the Lord allowed him to drown in spite of his unshakable faith.

In reply the Lord says, "Dummy—I sent you two row boats and a helicopter, what were you expecting?"

With this story, Alan Hald, founder and Chairman of MicroAge Computer Stores, began his presentation at one of the UniForum conference sessions. The point Hald was making is that, threatened by shifts in traditional markets, many companies in computer-related businesses may find that "Unix is the helicopter." One need only have the presence of mind to grab the rope.

Hald's discussion pertained specifically to retail distribution of computer products, but much of what he had to say also bears directly on the strategic position of Unix systems across the whole price/performance spectrum. Surveying the retail computer market, one finds a great deal of anguish and uncertainty as heavy competition and a lull in consumer demand result in deep price discounting and predictions of a shakeout at the retail level. To survive, retailers must adopt new strategies, just as many firms in the Unix systems market must do the same as shifts occur in our industry.

The large manufacturers have arrived for the "Elephant's Ball."

The depth of Alan Hald's experience with the microcomputer industry lends particular credence to his perspectives. MicroAge began in 1976 as one of the first computer stores in the United States. Now MicroAge is a major franchise network with 175 franchises granted in North America and a projected growth to over 600 stores by the end of 1987. Moreover, MicroAge is unique among retail operations in that it has emphasized sales of multiuser Unix systems for over three years, primarily with the Xenix based Altos product line (MicroAge is heavy in the MS-DOS arena too, of course). Because of his experience in the marketplace, when Alan Hald speaks, people pay attention.

Some of what Hald had to say in his talk is self-evident, but still worth recognizing for its strategic significance. Hald reminded the audience that universal standards have consistently been the keys to growth in the computer industry. He also maintained that multiuser systems are preferable to LANs as a solution for a broad class of business applications. These two factors, standardization and multiuser capabilities, are the distinguishing characteristics that pull the market towards a Unix solution.

Hald pointed to some familiar examples of standards. The RS-232 interface standard, such as it is, has been fundamental to the development of a huge peripherals market. Language standards, such as COBOL and BASIC, have been so successful at establishing an enormous body of software that these languages seem to persist against all attempts at eradication. But standards do change over time. The CP/M standard, while still well established, has relinquished leadership to an MS-DOS standard. Now Unix is unquestionably on the ascendancy as a standard for multiuser systems. The reasons that standards are so important, according to Hald, are that they promote innovation, investment, and interdependence. In short, standards remove the major sources of risk to both producers and consumers—obsolescence and incompatibility.

As for LANs, Hald made two

points. First, there are no LAN standards, or to put it another way, there are too many LAN standards (although industry analysts believe IBM may eventually create a LAN standard—presto!). Second, while LANs may be great for communications—that is, for moving data between machines—they are not as well suited to data processing tasks per se. The shared database or the multiuser integrated application, such as an accounting system, are more often successfully implemented on multiuser computers. For delivering the next generation of business data processing applications, LANs have a long way to go to catch up with what Unix systems can offer already.

Regarding the PC retail market, what we are hearing now is that only the large merchandisers can achieve the volume-buying required to compete in a discount pricing environment. The smaller independent stores must specialize to survive, producing a greater value-added component in each sale. The required shift is away from merchandising boxes in volume and towards "selling solutions." In this milieu, MicroAge seeks to define itself as a network of "office automation systems stores," in contrast to the currently prevalent retail PC stores. Its objective with this posture is to focus on high margin sales, as opposed to strictly low margin, high volume products. Attaining that objective means providing solutions to relatively complex problems. Hald sees these "high gross" opportunities in vertical market applications, as well as in sophisticated office automation systems for both voice and data processing.

The Unix market has all along been a relatively high-margin, low-volume industry, oriented to providing specialized solutions to complex problems, so Hald's views should ring familiar. Now however, some new elements have come into the picture. For one thing, the large manufacturers have arrived for the "Elephant's Ball," a dance between IBM and AT&T attended by a few other titans that dwarf most of the other players in the Unix systems market. Another factor, though not new, is finally taking hold in earnest: Unix based supermicros are redefining traditional minicomputer vertical market niches, attracting a host of established VARS and software developers to the Unix systems camp. Finally, even some PC retailers are positioned to "go Unix," as MicroAge already has.

All this is happening at an apparently opportune time too, because the single-user PC buying spree seems to have matured to the point that many business end users may now be ready for more sophisticated approaches to computer applications. From several quarters, the signs are unmistakable; a shift is definitely occurring, and it will affect the Unix systems supermicro/minicomputer market just as surely as MicroAge sees it affecting the PC retail industry—we have the word of Alan Hald on this.

MicroAge, while a good bet to survive at the Elephant's Ball, has two new problems to solve: First, what to do now that the foundations of its strategic position have been revealed by ***The Business Unix Journal***, and second, finding a new lead-in joke for Alan Held's speeches.

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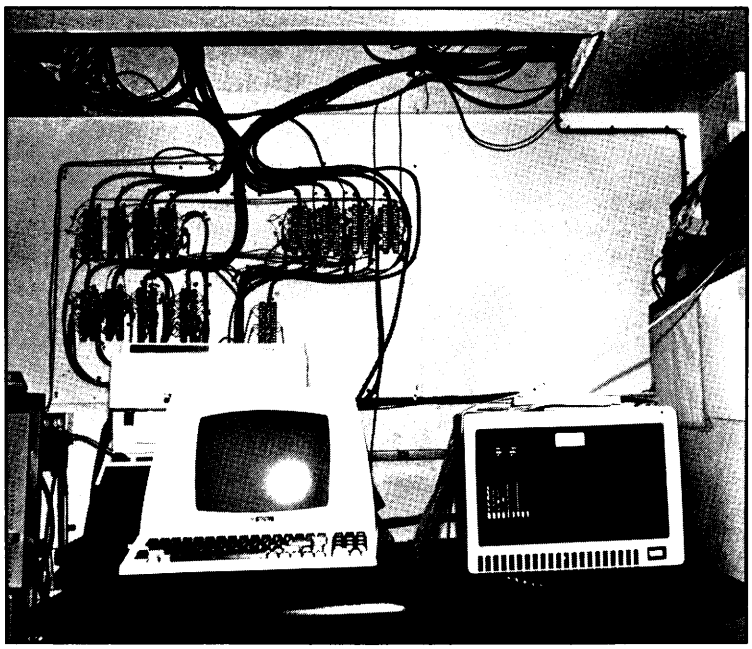

Scott Globus

SCIENTIFIC AMERICA

About The Photographs . . .

The series of photographs appearing in this issue, and the preceding issue, were done by Scott Globus, a scientist-photographer with a vision and a mission. These photographs, on the theme of Unix systems at work, are part of a larger project that Globus is pursuing to develop a book of photographs depicting scientific and technical environments of all types. To this end, Globus has recently been visiting electronics and computer companies in the San Francisco Bay area. Where many of us see "just another computer," Scott Globus sees modern technology in transition—and an opportunity to visually document that technology in its natural setting, be it the factory floor, the laboratory, or the office.

The book in progress, with the working title *Scientific America*, began as an anthropology project while Globus was a student at MIT. His objective was to produce a visual description of laboratory life through photographs made informally in the university's laboratories. At the culmination of his MIT project, sixty photographs were displayed in the main corridor and several campus libraries. After graduating in physics from MIT, Globus resolved to continue and expand the project. From his location in Silicon Valley, he is currently focusing on computer related technology. Globus envisions that the book will eventually encompass a broad spectrum of scientific and technology settings, in addition to computer related pictures. His plans call for photography work in Austin, Texas, and at NASA facilities in Florida, as well as further photography on the East Coast in Boston and Princeton.

Globus is currently writing grant proposals and seeking a publisher, with the expectation of completing the first volume before the end of 1987. In the end, the book should appeal to a wide audience of photographers, historians of science and technology, scientists, engineers, and anyone interested in the people and organizations producing new technologies and making scientific advances.

In the past few months, Globus has photographed everyday activities in technical and scientific work environments at several dozen Bay Area laboratories and companies. ***The Business Unix Journal*** is pleased to put in print a few of his photographs that relate to a Unix systems theme. In the preceding issue, we ran photographs taken at TelAccount, a San Rafael, California, firm that has developed a Unix based telephone accounting system. This issue includes photographs taken at Santa Cruz Operation, a Unix and Xenix software firm in Santa Cruz, California, as well as photographs taken at B.A.S.I.S., a Berkeley based company engaged in Unix timesharing, consulting, and hardware/software sales.

Any of our readers who would like to have their premises photographed as part of this documentary project can contact Scott Globus at 13208 East Sunset Drive, Los Altos Hills, CA 94022. Phone: (415) 949-2366. To the extent that resulting photographs relate to Unix systems, they may initially be published in the pages of this journal.

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INFORMATION RETRIEVAL SOFTWARE

[Information retrieval (IR) software is relatively new in the end-user marketplace, although it has been under development and in use for some time in mainframe research environments. Some observers predict rapid market growth for IR software. This article introduces IR concepts and several existing Unix based IR packages.]

Full Text Search Systems

by Paul Copeland

Our increasingly specialized society constantly produces new written material in every field of science, commerce, and government. Thousands of technical and academic journals are published regularly, as well as that many more general interest newspapers and magazines. In addition, businesses steadily generate documents of every sort, from product manuals to correspondence. Information retrieval (IR) software has been developed specifically for locating and retrieving documents from this growing accumulation of text data. And with so much information now being produced in machine readable form, the interest in IR systems seems likely to increase significantly. Indeed, some observers predict that IR applications will become a major new category of software, in a league with data base systems and word processing. Now, for the first time, IR packages are emerging from corporate and research mainframe environments and becoming available on Unix systems for a wide range of potential applications.

Several powerful database management systems, relational and otherwise, are now available for Unix systems. However, the use of traditional DBMS packages for storage and retrieval of variable length documents has its limitations. This is so because free-form text files are incompatible with such basic structures as fields and records, as commonly understood in DBMS terminology. Information retrieval systems, on the other hand, are specifically designed for "full text" search on large databases of textual information.

■ Applications

Information retrieval systems are intended for use in any application involving either large documents and/or large numbers of documents. The classic application is providing research librarians with access to bibliographic abstracts. From the development of bibliographic research systems, a whole industry has emerged to provide subscribers with online access to large research databases (see the sidebar for a discussion of online database services).

Now that IR systems are available on smaller computers, a whole range of business and office functions have become potential IR applications. IR software can provide a highly efficient method for accessing business documents. It can also be used as a utility in conjunction with word processing systems. Among the types of documents that can be accessed with information retrieval systems are memos and letters,

research reports, legal case histories, product documentation, customer records, personnel records, and many other types of textual material. Increasingly, text is entered with a word processing system or otherwise generated on a computer system. Since in many cases the text storage already exists, it is the role of IR systems to provide a full-text access method for searching and retrieving documents from office or corporate file systems.

■ IR Systems For Unix

Several software developers have introduced advanced information retrieval packages for Unix systems. BRS, in Latham, New York, provides a Unix IR software product called **BRS/Search**. BRS/Search is based on the firm's experience as one of the largest vendors of online dial-up database services. Another company, Fulcrum Technologies of Ottawa, Canada, provides an IR system called **Ful/Text** to Unix resellers. Ful/Text is a software component designed for integration with other applications such as word processing and office automation systems. Cucumber Information Systems in Rockville, Maryland, markets **SIRE**. Originally developed as an experimental information retrieval system at Syracuse University in New York, SIRE is now supported commercially for both MS-DOS and Unix environments (see the related report on SIRE in this issue).

The Officesmith is a package of office automation development tools centered around a document storage and retrieval system. While The Officesmith is not primarily an information retrieval package, it does nonetheless include an option for full-text search as one method of document retrieval.

■ Characteristics of IR Software

Information retrieval products are termed "full text" retrieval systems because specific documents within a database of documents can be located on the basis of any set of words that occur anywhere in the database. IR search mechanisms are much more comprehensive than string-in-line searches (as with **grep**, the Unix pattern matching command). IR systems are designed for use with large text databases, as much as several megabytes or more in size. The fundamental characteristic of IR systems is that users can locate any document, letter, memo, report, abstract, or similar textual material on the basis of *any* word or words (whether adjacent or not) contained in the target document(s). As a simple example, with a database of resumes a personnel manager could enter the words "marketing," "manager," and "software" to retrieve all of the resumes containing those three words.

IR systems provide the user with search aids for locating relevant documents based on only partial knowledge of a document's contents. Rather than saying "find this particular document," the user can say "find documents about this subject." The ability to locate a document without knowing in advance the exact nature of the contents is perhaps the preeminent design objective of advanced IR systems. After all, a less sophisticated filing and indexing scheme than an IR system would suffice if users could be expected to always know precisely which documents they are seeking.

Typically, IR systems operate by indexing every word in each of the documents that comprise a text database. The index, together with

A whole range of business and office functions are potential IR applications.

In addition, several Unix office automation packages include information retrieval subsystems, applying IR capabilities in conjunction with word processing and document storage functions. Quadratron Systems of Encino, California, recently announced *Q-FILE*, an information retrieval package. Quadratron plans to offer Q-FILE in two forms: as a stand-alone system under their menu system (Q-MENU) and as an add-on option for their word processing software (Q-ONE).

Officesmiths, Inc., in Ottawa, Ontario, has developed a product called "The Officesmith" that includes some information retrieval features.

FACTS IN BRIEF

Unix Information Retrieval Systems

BRS/Search:
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Suggested retail prices start at $1,000 for PC/IX systems. For supermicro Unix systems (Fortune, NCR, Plexus, 3B2, etc.) the suggested retail price is $3,000. Prices for BRS/Search on large VAX systems are in the $30,000 to $40,000 range. BRS/Search for a mainframe MVS system is priced at $90,000.

Ful/Text:
Fulcrum Technologies Inc.
331 Cooper Street
Ottawa, Canada K2P 0G5
Phone: (613) *238-1761*

There is no set retail price for Ful/Text, since Fulcrum only markets the product to resellers and system integrators. Fulcrum expects Ful/Text to be bundled with other applications, so prices will depend on the value added by resellers. A representative retail price for a stand-alone version of Ful/Text might be on the order of $2,500, according to Fulcrum.

SIRE:
KNM, Incorporated
Bethesda, Maryland

Distributor:
Cucumber Information Systems
5611 Kraft Drive
Rockville, MD 20852
Phone: (301) *984-3539*

Cucumber Information System's retail price for SIRE on Unix systems is $2,500, configured for a text database of up to 64,000 documents. A separate article about SIRE begins on page 14 of this issue.

other overhead files, can take up additional disk storage space amounting to about 50% of that occupied by the original text—SIRE, BRS, and Fulcrum all claim about this much storage overhead. A document, once indexed and associated with the text database, is accessible to users via IR search and retrieval routines. User queries are initiated by providing the IR search routine with a series of relevant words that are likely to be found in documents of interest. These "search words" may appear anywhere in the sought after documents. The IR system then rapidly locates—due to the preindexed structure—all documents that fit the search specification. At this point the user can read the retrieved documents online or print them offline.

In practice, the user's search criteria may be either too broad, resulting in too many retrieved documents, or too restrictive, resulting in too few documents—or none at all—retrieved from the database. The user is then able to repeat the process, adjusting the search criteria so as to finally zero in on the desired document or group of documents. For example, a law office could use IR software to retrieve all briefs relating to a particular type of case by searching with the words "software" and "liability".

These are the basic characteristics common to current full-text IR systems. Each vendor's IR product implements the operations in different ways, providing unique approaches to the design of the user interface as well as other refinements. IR systems normally have Boolean and other types of search operators. For example, one can specify that retrieved documents should contain one or more of the search words (Boolean "OR"), or that retrieved documents should contain all of the search words (Boolean "AND"). Some IR systems also provide facilities for root word expansion and wild-card operators (e.g. "micro*" would match both microcomputer and microprocessor). Finally, IR systems often possess some analog to the concept of "fields," in common with traditional DBMS packages. With IR systems, fields are segments of text, or in some cases simply paragraphs. A database of bibliographic abstracts might contain "fields" for author, publisher, and subject, as well as the text of the abstract. This would allow, for example, document searches that only searched author fields in the database.

A PARALLEL EVOLUTION:

Information Retrieval Systems and Research Databases

Information retrieval (IR) software has been evolving since at least the mid-sixties, particularly for use by research librarians working with large numbers of bibliographic abstracts. The conceptual development of IR software stems partly from the interest that librarians have long had in finding better approaches to indexing and cataloging. Bibliographic research systems have evolved into publicly available online databases containing enormous amounts of information collected from sources such as scientific journals, magazine articles, and legal decisions. Although not all online databases today deliver true "full text" search and retrieval capabilities, full-text IR software technology is becoming increasingly prevalent for textual databases.

The most extensive online services are provided by vendors that offer access to several distinct databases covering such fields as science, medicine, law, and business. These vendors usually deliver information drawn from other sources, such as technical journals. One prominent online database vendor is BRS (Bibliographic Retrieval Service), which also provides the BRS/Search IR software product described in the accompanying article. Other leading online vendors with large database offerings include DIALOG, a subsidiary of Lockheed Corporation, and Mead Data Central. Mead provides two well publicized services: LEXIS, a vast online law library with research material dating from the last century; and NEXIS, a full-text repository for the *New York Times* and dozens of other daily newspapers. Such huge databases are presently available only as dial-up services to central database sites — although laserdisk technology now makes it technically feasible to distribute portions of these databases for inhouse use, for example in medical offices or law libraries.

Large research databases are still fairly expensive to access, being directed to the needs and budgets of research specialists in business and academic organizations. Some of these systems are also quite difficult for a novice to use effectively, since they assume the user is already experienced in online search techniques. IR systems now appearing for Unix office automation applications stem directly from technology that has been used for years with large research databases. The good news is that these systems combine that technical experience with a large measure of concern for the human interface requirements of occasional users in office environments.

■ Fulcrum Ful/Text

Fulcrum Technologies in Ottawa, Canada, has developed a Unix based information retrieval system called Ful/Text. Fulcrum is marketing this product exclusively to OEMs, VARs, and systems integrators. Company representatives told ***Business Unix*** they are *not* making end user retail sales. Ful/Text is designed for customized "seamless integration" into specific end user applications packages produced by other develop-

ers. Integration facilities of Ful/Text include callable C functions, as well as parameter files that can be modified to customize the user interface.

Fulcrum is a young company, formed in late 1983. Ful/Text was introduced at the June 1984 USENIX conference in Salt Lake City. According to Fulcrum, Ful/Text is based on years of experience with mainframe retrieval systems. Fulcrum's R&D arm developed the IR software for the Westlaw law library database (Westlaw, from West Publishing Company in St. Paul, Minnesota, provides a huge online law library similar to Mead Data's LEXIS service).

At the Dallas UniForum exhibit in January, Fulcrum had the full text of the Bible online to demonstrate Ful/Text (one of Fulcrum's competitors quipped that the truly religious would not require an IR system for the Bible). The Ful/Text demonstration was running on a Unix based Motorola/Four Phase system, with the Bible database using approximately five megabytes of storage. Representatives were showing off Ful/Text's user interface for search queries and its speed of retrieval operations on the Bible database.

In Ful/Text terminology, a text database is called a "document collection." The documents can have any format and size, and are, in fact, Unix files. For example, the Bible document collection demonstrated at UniForum included 1189 documents, since each chapter was entered as a separate Unix file. The system maintains a "catalog" of the documents (files) that make up a document collection, and the catalog entry for each file contains a "profile" of the document. Each profile consists of system data, such as the Unix pathname, as well as optional user supplied information about the document, such as author, subject, and date. Separate databases can be maintained in separate document collections, that is, personnel records in one collection, general correspondence in another, and so on.

The Ful/Text user specifies a search with a combination of words likely to be found in any document of interest. The program provides a number of built-in features for specifying searches, including Boolean combinations (and, or, not) and wildcard expansion of word roots. Given a list of words to search for, Ful/Text searches the document collection and comes up with a list of documents that fit the search criteria. Any document on the list can then immediately be displayed, with the search words highlighted for reference. The user can at any time choose to print out a document or go back and broaden or narrow the search criteria to adjust the scope of the search.

Since Ful/Text is marketed exclusively as a product for volume OEM contracts, it is likely to be bundled with other applications and layered under different front-end user interfaces. For that reason, it may be hard to identify Ful/Text in particular implementations. For example, one of Fulcrum's OEM contracts is with CPT Corporation. Fulcrum's IR software is a component in CPT's recently announced Office Dialogue System, a multiuser word processing system based on a Convergent Technologies Megaframe Unix system.

Fulcrom had the full text of the Bible online.

■ BRS/Search

BRS/Search is an IR software system from BRS (Bibliographic Retrieval Service). BRS operates a large online database system for subscribers, with extensive materials on a variety of topics, including information categories for business/financial, medical, scientific/technical, reference, education, and social sciences. Drawing on the development and application experience gained with its online service, BRS now provides BRS/Search as a commercial software product for a range of computers, from mainframe MVS systems down to IBM-PC/IX Unix systems, plus Unix ports for Amdahl, Altos, AT&T 3Bx, Fortune, NCR, Plexus, VAX 4.2BSD, and others. According to BRS, there are currently about 20 mainframe installations of BRS/Search, as well as about 100 mini/micro installations. The company appears to be gearing up its considerable corporate resources for sales and support of BRS/Search in a big way.

BRS/Search was demonstrated at the January UniForum show in Dallas. The demo was running on an IBM-PC/IX Unix system with a one gigabyte laserdisk storage subsystem (that's 1,000 megabytes!). The database on this configuration consisted of the entire 24 volumes of the Grolier Encyclopedia. The 8 million word encyclopedia occupied 52 megabytes. (The entire database actually occupied a total of 75 megabytes, counting the indexes and other overhead requirements). Working with this database, BRS/Search could precisely locate any word, down to the position within a sentence, in no more than two or three seconds.

BRS/Search includes a number of user interface refinements. According to BRS, authorized users can add, modify, or delete database documents online during a search session. A formatting feature allows users to predefine output formats for printing. Based on BRS's long experience with online service subscribers, BRS /Search provides both an elaborate query language and, for the novice or casual user, a menu environment. Output can be redirected as well as queued for offline printing, and search strategies can be saved for later execution (in the sense of a command file). A search session can even be interrupted, and continued at a later time. Document search capabilities include the usual Boolean operators (and, or, not), plus operators to specify that the search words be located together in the same paragraph (SAME), same sentence (WITH), or adjacent to each other (ADJ).

■ The Outlook

The capabilities and concepts associated with information retrieval software are relatively new. This is database software—but not in the sense that we are most accustomed to thinking about database systems. As software developers and end users begin to grasp the application potentials, and as mass storage peripherals continue to increase in capacity, it seems safe to predict that IR software will become increasingly prevalent. Since IR software is here now for Unix systems of all sizes, the Unix environment is likely to be a proving ground for the development and market acceptance of IR applications.

SIRE

A PIONEER IN INFORMATION RETRIEVAL

*[In this article, **Business Unix** presents a detailed look at SIRE, one of several information retrieval (IR) systems now available for Unix based computers. For an overview of other Unix IR products as well as more background on information retrieval concepts, see the article beginning on page 10.]*

By Paul Copeland

SIRE is an information retrieval (IR) software system for searching and retrieving text documents from a text database. Applications of SIRE in the office environment include accessing such textual information as office files, correspondence, legal briefs, reports, and other types of documents.

■ From Lab To Market

SIRE evolved from an experimental system developed in the mid-seventies at Syracuse University. That system was written in SAIL for a DEC-10 mainframe. The current SIRE is written in C and runs on a variety of Unix systems as well as on PC/MS-DOS micros. The name SIRE was originally derived from the initials of "Syracuse Information Retrieval Experiment." It is now a trademark of KNM, Inc., a Bethesda, Maryland, software company that developed the current commercial version of SIRE. KNM's three principals are prominent Ph.Ds in the information retrieval field: Matthew Koll, Terry Noreault, and Michael McGill, whose initials form the letters of KNM. Several interesting features implemented in the current SIRE system are based on the research work of these three.

Current Unix implementations of SIRE include VAX 4.2BSD, Motorola (System V), PC/IX, and Codata (Version 7). Other Unix ports will be forthcoming. KNM's SIRE package was first released commercially in early 1984. Present installations include a VAX system at the National Library of Medicine, a pilot project on a Codata also at the National Library of Medicine, an MS-DOS system in a Philadelphia law firm, and several other MS-DOS systems. In addition, Data Research Associates of St. Louis, Missouri, has incorporated SIRE in its vertical market library automation system. Cucumber Information Systems of Rockville, Maryland, distributes SIRE to end users for MS-DOS and Unix systems.

■ SIRE At Work

Business Unix was able to try out SIRE with a sample document database at the January UniForum conference in Dallas. The SIRE demonstration was running on a Motorola EXORmacs computer (68000 CPU, Unix System V). The 40,000 word database included 741 abstracts (documents) of energy research reports from the National Technical Information System (NTIS).

As one example of a document search, we entered: "ATOMIC SAFETY RADIATION" (SIRE does not make upper/lower case distinctions; we use all capitals here for illustration purposes). In a couple of seconds, SIRE indicated that 163 documents had been retrieved in response to our query. These were documents that contained one or more of the three search words.

A user starts SIRE with the command "sire <database name>," where specifying the name of a document database allows SIRE to accommodate databases on different subjects. Since SIRE is almost always in "search mode," anything entered on SIRE's command line will normally be interpreted as a query specification for document searching. Because of this uncomplicated syntax and the small number of commands, it is easy to begin using SIRE.

A document database is created, and expanded, with SIRE utilities that add text files (documents) to the database. A database consists of one large source file containing the original text, plus associated index files for the database. The index is, in effect, a dictionary of words that occur in the database, with pointers back to their location in the source text. In operation, SIRE searches the index for words in the user's search list. The dictionary/index for the database is shortened in two respects. First, it does not contain certain common words—most articles and prepositions, for example. Second, the dictionary contains only root words. For instance, "file," "filing," and "files" are all maintained in the database index under the same word root.

Given a list of search words (a query) on the command line, SIRE searches the database and locates the documents that contain those search words. The user can then scroll through the retrieved documents and optionally save temporary disk copies for later printing. Search words are

highlighted in the retrieved documents as they are displayed. SIRE also allows the user to refine the scope of a search—when too many documents are initially located —or expand the scope if too few documents are found.

■ Searching With SIRE

SIRE provides a range of tools for specifying what documents it should locate during a search. The simplest method is to enter a list of search words. SIRE then retrieves documents that contain any one or more of the words in the search list. That is to say, a Boolean OR of the search words is assumed. For example, the query "ATOMIC SAFETY" retrieves the same documents as the query "ATOMIC OR SAFETY." Additional methods are provided for specifying more complex document searches. The following examples illustrate alternative search queries, each of which would retrieve a different subset of documents on the same subject:

```
ATOMIC AND SAFETY AND RADIATION
ATOMIC AND SAFETY NOT RADIATION
ATOMIC AND (SAFETY OR RADIATION)
ATOMIC ADJ SAFETY
```

The first query, with two ANDs, finds only documents that contain all three of the search words. The next example finds documents that contain the word "atomic" and the word "safety," but not the word "radiation." The third example retrieves documents from the database that contain either the combination "atomic" and "safety" or the combination "atomic" and "radiation" (or both combinations). This illustrates the use of parentheses grouping. The final example shows the use of ADJ, the adjacency operator. This form of the query would locate only documents that contain the words "atomic" and "safety" adjacent to each other. A variety of other combinations are possible for combining the words in a query.

SIRE has several special search features. One of these is referred to as the "document-as-query" feature. This allows a user to include the contents of an entire document in a query, in effect saying, "Find documents like this one." The algorithm employed involves generating a query from a subset of the document's "significant" words. For example, the query

```
ATOMIC AND D233
```

would search for documents that contain "atomic," and are "similar" to document number 233 (documents are assigned numbers sequentially in the database).

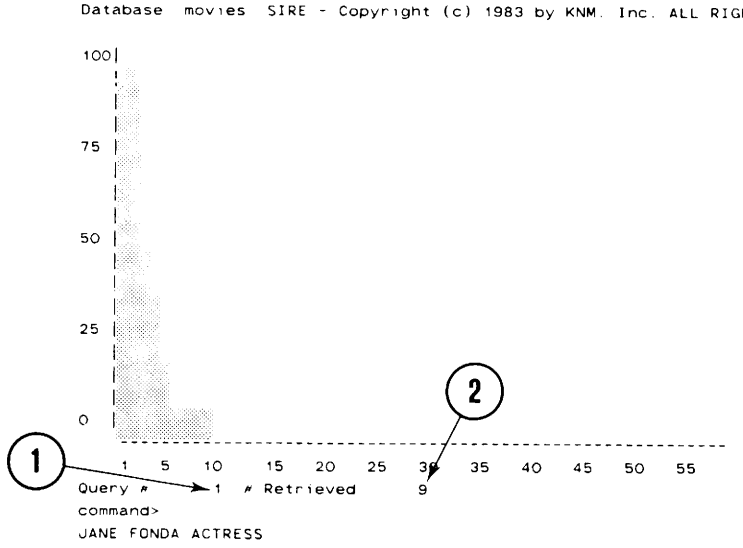
Another search feature allows the reusing and combining of previous queries, under the assumption that a session's queries cover a sequence of related searches. For example, the query

```
Q8 AND SAFETY NOT Q11
```

would retrieve all the documents found previously by this session's eighth query, providing they contained the word "safety," but would exclude those documents that were found by query number 11. Many other combinations are possible.

The default automatic combination of the words in a query with the boolean OR operator gives SIRE a very easy to use, natural language interface. This makes the system productive with very little user training. The more sophisticated user can make use of the AND, ADJ and NOT operators, along with the document as query feature. SIRE also has two wildcard operators for use in queries, the asterisk (*) for truncation and the question mark (?) for single character replacement. For example, "photo*" matches photography and phototypesetting, while "m?cro" matches micro as well as macro.

FIGURE 1—This bar chart shows the "relevance ranking" of documents retrieved by a SIRE search. The measure of relevance is along the vertical axis; the horizontal axis shows the number of documents. The query for this chart appears at the bottom of the display: "JANE FONDA ACTRESS." The first arrow points to the query number, indicating that this is the first query in the current SIRE session. The second arrow shows the nine documents satisfying the query were located. Note that this query will retrieve every document with the word "actress," whether or not those documents also contain the words "Jane" or "Fonda."



■ Powerful Command Features

Certain of SIRE's features are meant to provide sophisticated document search tools for the experienced user. Three of SIRE's advanced commands are described here:

BAR—Displays a bar chart (see Figure 1) of the "relevance ranking" for documents retrieved by the most recent search. This relevance ranking is one of SIRE's more innovative features. In practice, many documents are often retrieved in response to a search query. Relevance ranking is intended to help the user determine which documents are probably most closely related to the subject of the search. The ranking algorithm weighs: (1) how often a query word appears in the database as a whole—a very common word would be less significant for evaluating relevance—and (2) how frequently a query word appears in a retrieved document—a retrieved document with more of the search words is presumably more relevant.

EXPAND word—Presents a list of words that are "related" in the document database to the given "word." The SIRE literature refers to the EXPAND feature as a

"statistical thesaurus." The words found by an EXPAND operation are not synonyms in the usual sense of a thesaurus. Instead, they are words that statistically occur most often along with the "expanded" word. Because the words in the list relate to the same subject matter as the word that is "expanded," these words may be useful for additional document searches.

PAST—Lists previously issued queries during the current SIRE session. This can be useful for recalling which searches were already performed. In addition, previous queries can be reused and combined with new queries, as described earlier under Searching With SIRE.

■ SIRE in Perspective

The commercial implementation of SIRE is relatively new. With only a few end user UNIX sites at this point, it is difficult to obtain references from experienced users of SIRE. Although ***Business Unix*** used SIRE on a demonstration system, we did not undertake an extensive, independent review or test under likely real-world conditions.

That said, SIRE appears to share the basic performance characteristics and features of other Unix based IR systems now on the market. In addition, SIRE has several advanced search features, including document relevance ranking, statistical thesaurus (the EXPAND command), the document-as-query feature, and other innovative capabilities.

On the critical side, SIRE's integration with the Unix environment appears quite primitive. There are no facilities for redirecting the output of retrieved documents, and there are no facilities for passing retrieved documents through a text formatting filter before output to the terminal or printer. SIRE is not able to work directly with Unix text files until they are first prepared with SIRE's identifying codes and copied into SIRE's text database. In addition, SIRE as presently provided may not work well in an environment where the document database is dynamic, that is, where documents are frequently being added to the database or modified within the database.

SIRE is available as a standalone product for end user sales, quantity one, and is worth looking into if you have a potential IR application. The developer, KNM, expects that in addition to end user sales, SIRE will be licensed to OEMs for integration into specific applications packages. ✉

TELEVIDEO PORTABLE TERMINAL
A Termcap Entry

[Peter Black contributed the termcap entry shown here in response to our request for submissions in the last issue, wherein ***Business Unix*** *printed a termcap entry for the TRS-80 Model 100 portable computer. If our readers send in more termcap entries for portable computers and other terminals for which termcap entries may not be commonly available, we will print those too. — Ed.]*

By Peter Black
Peter Black Real Estate Co., Inc.
Sequim, Washington

TeleVideo makes a very nice portable terminal with a built-in modem, either 300 or 300/1200 baud. We use it in our real estate business to access our Model 16A, soon to be 6000A, Radio Shack Computer (the 6000 is Tandy's recent upgrade of the older 68000 based Model 16 computer). We have our multiple listing service online using Unify's DBMS. Figure A shows the termcap entry for the portable terminal (tvipt). The terminal works well with Unify and **vi**, and fairly well with Multiplan. The only problem is TeleVideo's choice of ^H for the left arrow key; it conflicts with the backspace key, which overrides it in Multiplan.

The special function keys (F keys) are programmable and we have programmed F1 and F2 to be ^A and ^B. This follows the way the console works and is required for Unify. Radio Shack has introduced several new termcap entries and two of them are included in our termcap entry for the tvipt. They are PN and PS, enable and disable transparent printing. Some of the others have to do with changing the cursor mode. As you can see in Figure A, you may have to make this addition to several termcap files. (Software developers who write software that requires a special termcap should know better!)

When a user logs in, TRS-XENIX uses the corresponding entry in **/etc/ttytype** to identify the terminal type, unless overridden by the user's **.profile** file or the user. We now have to use an RS232 switch to change from a hardwired terminal to the auto-answer modem because we don't have enough RS232 ports. When we use the tvipt in the field, we have to inform TRS-XENIX that we are using a tvipt, not a dt100 (Tandy's ASCII terminal). To do this, the first thing the user must do is execute the shell script, **remote**, shown in Figure B. One enters ". remote" to make the change permanent until logging off. The use of the period before remote causes the command to be executed without creating a new process. ✉

Figure A*—Termcap entry for the TeleVideo portable terminal:*

```
Include in:
        /etc/termcap
        /usr/mp/termcap
        /appl/unify/lib/termcap
v1|tvipt|TVI Personal Terminal: \
        :PN=^R:PS=^T:al=\EE:am:bs:cd=\EY:ce=\ET:cl=^Z:cm=\E=%+ %+ : \
        :co#80:dl=\ER:do=^J:ho=^^:kO=^A:k1=^B:kb=^H:kd=^J:kh=^^:kl=^H: \
        :kr=^L:ku=^K:li#24:nd=^L:se=\EF:sg#0:so=\EG1@A\EH:ue=\EF:ug#0: \
        :up=^K:us=\EG1B@\EH:
```

Figure B*—The remote shell script:*

```
.
:    -rwxr-xr-x 1 root 23 Nov 28 06:39 /bin/remote
.
TERM=tvipt;export TERM
```

The Unix Toolshed

A Shell Script for Interactive Data Entry

[Ray Swartz commences his regular feature, The Unix Toolshed with a system of shell scripts for interactive data entry—a logical place to begin the series—Ed.]

by Ray Swartz

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Welcome to the Toolshed, a guide to using Unix tools to help make everyday business tasks easier to do.

The goal of this column is to provide working shell programs (called "scripts") that readers can customize to fit their specific needs. Even though each application will be described, designed, listed, and demonstrated, this column is not intended as a tutorial on Unix. In writing this column, I will assume that the reader has a working knowledge of the Unix system and at least some experience with the Bourne Shell. Should you be a newcomer to Unix, please keep reading. The ideas presented here will provide a good point of departure for further excursions into the land of Unix.

Most of the examples presented in this column will be programmed using the Bourne Shell. This is so for two reasons. First, virtually all Unix Systems provide the Bourne Shell. Second, when it comes to shell programming, the author prefers the Bourne Shell (herein called simply "the Shell").

■ Getting What You Need

An important activity for most of us is getting the information we need to do our jobs and then verifying that the data is complete and accurate. One major advantage multiuser computers have over single-user PCs is that a multiuser system allows people to share, update, locate, and transfer information easily and quickly. In fact, many times the problems of obtaining and verifying information are exacerbated by trying to solve these multiuser problems with single-user computers.

It is this kind of shared-information environment that can benefit greatly from the Unix system. By utilizing the file system, data can be stored in preassigned directories, thereby providing appropriate access to those who need it. The standard Unix tools can then be used to extract, format, print, sort, and manipulate the available information in virtually any way required.

While Unix doesn't contain a special tool for adding and verifying data entry records, we can easily create an interactive data entry system with prompts and input verification using only standard Unix tools. In addition, we can format the information and store it wherever we want.

■ Step 1—Design The Application

Before writing our data entry program, which we will call **input**, we must design what it will do. Since we are trying to provide a simple, useful data entry system, we must first define the user interface. In our case, we want the program to be *interactive*, allow for *error correction*, and be *responsive* to the user. By interactive, we mean that the program prompts for the information to enter and waits until the user types the data and presses RETURN.

There are several ways to correct errors on a computer. In this case, besides the in-line editing features of Unix, we want the program to display the record entered and query the user "Is This Correct? (y/n)." If a mistake has been made, the user will be able to reenter it correctly by answering "N" (or "n"). A "Y" (or "y") saves the record and continues the program. While this provides minimal error correction, it is a useful safety valve that will help keep our data "clean." In reality, each application will have its own special characteristics that undoubtedly will require program customization. Because of this, it is important that our design be easy to change.

Finally, we want the application to be responsive to the user. This means that the system must react in an obvious way. For example, if the user enters a "T" (the character next to a Y) to answer the "Is This Correct? (y/n)" prompt, the program should

Ray Swartz received an M.B.A. degree from the University of California, Berkeley, School of Business. It was at UC Berkeley that he first began working with Unix systems. Currently, Ray is a visiting lecturer in the Computer and Information Sciences Department at the University of California, Santa Cruz. He is also Chairman of the 1986 Modeling and Simulation on Microcomputers Conference that will be held in January 1986.

In addition, Ray Swartz is the founder of Berkeley Decision/Systems (BD/S), Santa Cruz, California. BD/S offers C and Unix seminars and books, as well as custom programming services. BD/S has designed and programmed geologic simulations, business applications, Unix tools, and computer models. For more information about BD/S seminars or other services call (408) 458-0500.

(gently) reject this and wait for a correct reply. In addition, after each record is entered, the system should ask if another entry is to be made. This provides a simple exit mechanism and allows the user to feel in control of the program.

Suppose the information to be entered is a customer list and a data record includes the following information:

1. First name
2. Last name
3. Company name
4. Street address
5. City
6. State
7. Zipcode
8. Phone number

We use separate lines for first and last name, because it is much easier to sort a file on an individual field.

Displaying prompts and reading input are simple to do. The Bourne Shell contains two "built-in" commands, one handles printing, the other reading:

echo — Print what is listed.
read — Store the string entered in the listed variable.

This means the following commands will prompt and read an input record:

```
echo
echo -n "1. First Name: "
read first
echo -n "2. Last Name: "
read last
echo -n "3. Company Name: "
read cmpy
echo -n "4. Street Address: "
read addr
echo -n "5. City: "
read city
echo -n "6. State: "
read state
echo -n "7. Zipcode: "
read zip
echo -n "8. Phone Number: "
read phnbr
```

The "-n" option tells **echo** not to print a NEWLINE after printing the string. This leaves the cursor at the end of the prompt. Your system may do this in another way. Note the first **echo**—it prints a blank line for clarity.

Once an address is entered, we want to save the information in a file (we will leave correcting it to a bit later). Since Unix prefers records on a single line, we will separate each field by a "~"and print them all on one line. For example, if data about the author was entered, the file entry saved would look like the record in Figure 1a. Note that "~~" would signify an empty field.

The same **echo** command can be used to print either to a file or to the screen. Let's assume the storage file is "/data/cust." Also, we want to append these entries to the existing file (versus creating the file anew each time). This is done by using the Shell's redirection append facility signified by ">>." The command to write the entry to the file is shown in Figure 1b. Note that the string stored in a variable is referenced by prefixing the variable name with a $ (dollar sign).

■ Extending the Prototype

Using the ideas developed so far, we can create a prototype data entry script that prompts for information, reads it in, and stores it in a file. However, our design calls for much more. Specifically, we have not yet

Figure 1a) *A sample customer data record:*

```
Ray~Swartz~BD/S, Inc.~P.O. Box 2528~Santa Cruz~CA~95063~(408) 458-0500
```

Figure 1b) *Saving a record in the file /data/cust:*

```
echo $first~$last~$cmpy~$addr~$city~$state~$zip~$phnbr >>/data/cust
```

Figure 1c) *The script for* **another**:

```
while :
do
  echo
  echo -n "Enter another Entry? (y/n): "
read answer
case $answer in
  [Yy]) exit 0 ;;
  [Nn]) exit 1 ;;
  *)  echo
      echo "Please enter Y or N only." ;;
  esac
done
```

Figure 1d) *The* **verify** *Shell script:*

```
while :
do
  echo
for line in "$@"
do
  echo $line
done
echo
echo -n "Is this correct? (y/n): "
read answer
case $answer in
  [Yy]) exit 0 ;;
  [Nn]) exit 1 ;;
  *) echo; echo "Please enter Y or N only."
esac
done
```

Figure 1e) *Using the* **verify** *command:*

```
if verify "$first" "$last" "$cmpy" "$addr" "$city" "$state" "$zip" "$phnbr"
then
  echo $first~$last~$cmpy~$addr~$city~$state~$zip~$phnbr >>/data/cust
else
  echo
  echo "Reenter entire name and address"
  continue
fi
```

Figure 2) *The final* **input** *script:*

```
while :
do
  echo
  echo -n "1. First Name: "
  read first
  echo -n "2. Last Name: "
  read last
  echo -n "3. Company Name: "
  read cmpy
  echo -n "4. Street Address: "
  read addr
  echo -n "5. City: "
  read city
  echo -n "6. State: "
  read state
  echo -n "7. Zipcode: "
  read zip
  echo -n "8. Phone Number: "
  read phnbr
  if verify "$first" "$last" "$cmpy" "$addr" "$city" "$state" "$zip" "$phnbr"
  then
    echo $first~$last~$cmpy~$addr~$city~$state~$zip~$phnbr >>/data/cust
  else
    echo
    echo "Reenter entire name and address"
    continue
  fi
  if another
  then
    continue
  else
    break
  fi
done
```

provided a method to continue entering additional records. The prototype script, as it stands, would have to be "run" again for each customer record. This is an unacceptable burden to the user. The problem is easily solved since the Shell contains looping constructs that will allow us to have the application continually ask for more entries.

As expected, the Shell's rules for controlling loops are different than those of most other programming languages, even though the **while** command has a familiar structure. The format is:

```
while COMMAND
do
   <code for data entry and storage>
done
```

The Shell will loop as long as COMMAND terminates successfully. COMMAND is executed before each iteration of the loop. COMMAND is successful if the return code (from an **exit** statement) is 0, representing TRUE, else the COMMAND is unsuccessful and the looping stops. In our application, there is no command we want to execute as we loop. However, we can use the ":" which performs no action and always evaluates to TRUE. The looping Shell script then has the format:

```
while :
do
   <code for data entry and storage>
done
```

We have now solved one problem but introduced another: this script will not stop! Recall that our design called for the system to query the user before going on to the next entry. We will use the prompt

```
Enter another Entry? (y/n):
```

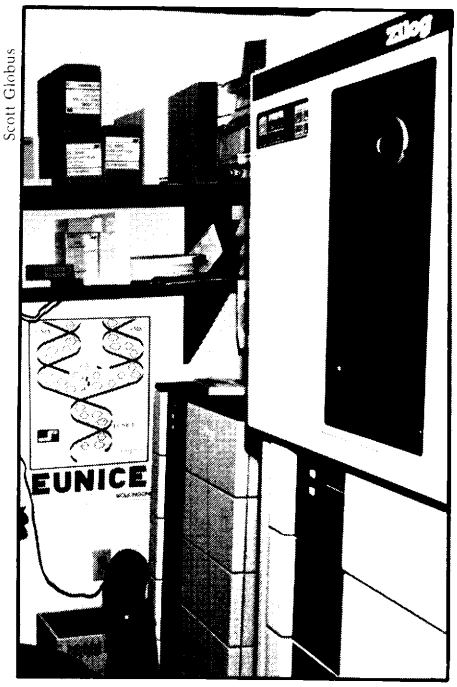
to allow the user to quit or continue.

What is the appropriate way to implement this? We could include code to do this as part of the above script. However, it is a common programming practice to use this kind of prompt to control an application. Thus, we will create a separate script to perform only this task. The script will be named **another** (actually the name of the file it is stored in), and it will repeatedly prompt until either "N," "n," "Y," or "y" is entered. Should an invalid response be made, **another** will print

```
Please enter Y or N only.
```

and reprompt.

The **another** script, shown in Figure 1c, can be integrated into the data entry script by taking advantage of the Shell's success/fail logic. If the user wants to enter another record, **another** will "succeed" by returning 0, otherwise it "fails" by returning 1. This allows us to end the loop if



Scott Globus

another fails and to keep looping if **another** succeeds. This can be done with the Shell if-then-else structure and the **break** and **continue** commands. **Break** unconditionally ends a loop by jumping to the statement following the loop's **done** statement. **Continue** tells the Shell to skip the rest of the loop and perform another iteration. In the Shell language this would appear as follows:

```
if another
then
   continue
else
   break
fi
```

The **case** command in the **another** script executes the appropriate commands listed after the option matching the value read into the variable "answer." Note that [Yy] tells **case** to select this section if either "Y" or "y" is entered, and that "*" labels the default clause. The **input** Shell script developed so far now appears as:

```
while :
do
   <code for data entry and storage>
   if another
   then
      continue
   else
      break
   fi
done
```

Before we can run this script, we must first tell Unix to change the execution mode of the file **input**. The **chmod** command does this as follows:

```
chmod u+x input
or
chmod +x input
```

If these don't work, consult your system's documentation on the **chmod** command. Note that we also need to change the execution mode for the **another** script, since **input** uses **another**. This is done the same way it is for **input**.

As an example, let's suppose we have entered the **input** script, made it executable, and are now ready to enter a name and address. In this illustration, I will use my own name and address:

```
$ input
1. First Name: Ray
2. Last Name: Swartz
3. Company Name: BD/S, Inc.
4. Street Address: P.O. Box 2528
5. City: Santa Cruz
6. State: CA
7. Zipcode: 95063
8. Phone Number: (408) 458-0500
Enter another Entry (y/n)? n
$
```

■ Correcting Mistakes

One problem with interactive applications is that data entry mistakes can easily get included into our file. Aside from the line editing features of the Shell, our script so far allows for no error correction. This needs to be fixed.

A straightforward solution is to have the user verify the data entered BEFORE it is appended to the /data/cust file. The simplest way to verify data is to ask:

```
Is this correct? (y/n):
```

If the user answers "Y" (or "y"), the record is saved. If "N" (or "n") is

continued on page 22

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TWO BOOKS O

Phil Hughes of Specialized Systems Consultants (SSC) in Seattle, has had over 40 articles published in computer and electronic magazines. He is a co-author of SSC's popular Unix and C pocket references and is active in SSC's Unix training programs and consulting projects.

Reviewed by Phil Hughes
Specialized Systems Consultants
P.O. Box 7, Northgate Station
Seattle, WA 98125-0007

There have been a lot of books written on the C language in the last couple of years. Here is a review of two of the newer ones, both quite good and very different. *A Book on C* is the product of two people—computer science professors I expect—at the University of California, Santa Cruz. The book looks like a college text on C and a good one at that. It assumes that you have access to a UNIX system and shows you the UNIX system commands to perform the functions discussed. For example, it talks about the visual editor (vi), the C compiler (cc), and the program checker (lint), all in the first few pages.

The book starts with an excellent tutorial to show you what can be done with C. Each idea is introduced, illustrated with an example, and explained with what is called a dissection. The dissection for each example examines what every line does and why. The tutorial ends with a summary and a short set of exercises to reinforce what you have learned. By the end of the tutorial you may not be a C expert, but you should have a good feel for what can be done and what more you want to learn about the subject.

The next section is a short introduction to Backus-Naur Form (BNF) and the concepts of language syntax. Don't let it scare you off. The presentation is not formal and is well applied in later sections to teach new language concepts. This section of the book ends with an excellent summary and a set of exercises that tie the concepts to the real world.

The remainder of the book consists of a number of chapters, each with an introduction followed by sections on specific concepts. The concept in each section is explained and an example is presented and then dissected. The chapters end with a summary and lots of exercises.

The book covers new C features such as the void and enumeration data types, and structure assignments. This is the first book I have seen that covers these concepts.

The examples given are usually a useful program or function. Sort routines, word counters, and routines that print the bit representation of an integer are typical. Also, there are references to such notables as Knuth and Hoare as creators of algorithms that are expressed in C.

How to use the preprocessor is a concept that has been ignored in some books on C. The information on the preprocessor is somewhat brief, but I can't find anything missing.

The latter parts of the book present a lot of information on binary trees and list processing. This is both useful and a good way to drill the ideas of pointers in C into the minds of nonpointer-oriented programmers.

The final chapter talks about input/output and the Unix environment. Many of the standard library functions are presented with a decent explanation of what they do.

One of my complaints about the book is that they picked a program style that is not the one I use. It has to do with the indenting of braces. I like the idea of pairing braces by having the mates appear in the same column; Kelley and Pohl use the format presented in Kernighan and Ritchie's *The C Programming Language*. What they have used is not wrong and probably is the most common. It's just that they didn't pick my favorite. One other complaint is that exercises refer back to example programs by name. It would have been much easier on the reader if such references included a page or section number.

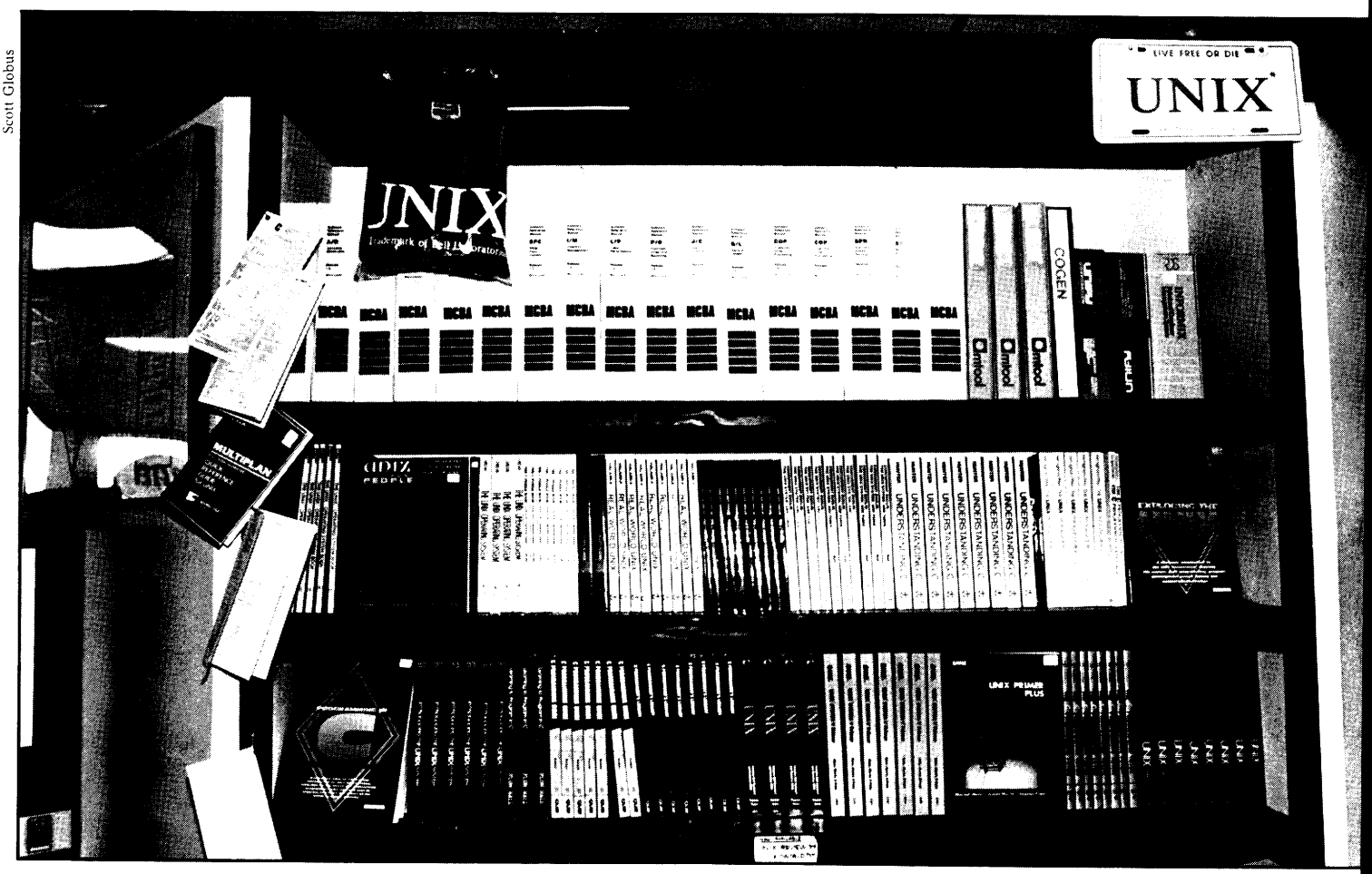
Neither of these problems de-

N C

A Book on C
By Al Kelley and Ira Pohl
Benjamin/Cummings Publishing
Menlo Park, Calif.
Softcover, 362 pp, $21.95

C Programming Guidelines
By Thomas Plum
Plum Hall, Cardiff, New Jersey
Softcover, 145 pp, $25.00

Scott Globus



tracts from the technical quality of the book. If I were teaching a class on C to college students, I would not hesitate to use this book as a text. I also feel that the book could be used by a knowledgeable hobbyist or professional to learn the C language.

■ C Programming Guidelines

Plum's book is designed for a different audience. It is actually a set of guidelines for writing portable, maintainable C code.

In 1980 I was in charge of software development for a small company. The project we were about to start was the first in C for both myself and the company. I was in the position of having to come up with standards for file names, variable names, internal documentation, and all the other things related to doing something for the first time. I invested a lot of time and made a few bad decisions. Plum's book is exactly what I wish I had had. It offers ways to set up your programming project so that multiple programmers can communicate and you can maintain the resulting software.

The book is written in the format of Unix manual pages and is divided into six sections. The first four sections deal with data and variables, operators, control statements, and functions and other modules. The book talks about writing macros that do what you want, and about all the funny things that C does to you—like side effects. For example, a section on side effects in the chapter on operators discusses the order in which the side effects occur in statement evaluation.

Chapter 5 covers general standards that address such issues as nonportable features, code reviews, and defensive programming. The last chapter is an appendix on features of various C compilers. I worked on a project that required the code to function with both the UNIX and Whitesmith's C compilers. This appendix alone made the book a good investment for me.

In summary, Plum's book is designed to be a tool for organizing a programming project. It does a good job of pointing out the things that must be considered and presents reasonable standards. In 1980, I would have been happy to hand a bunch of these books to the project members; I could have avoided inventing my own standards. I suspect things would have worked out better as well. ✉

continued from page 19
typed, the user is told to reenter the entire record again. We will employ this method with one modification—we will first redisplay the data lines entered. Given the above example, after entry the script would print:

```
Ray
Swartz
BD/S, Inc.
P.O. Box 2528
Santa Cruz CA 95063
(408) 458-0500
Is this correct? (y/n):
```

This lets the user see what the computer read versus what the user believes was entered.

Like the **another** script, input verification is so common a task that we will write a general tool to do this. The tool, illustrated in Figure 1d, will be called **verify** and, like **another**, will succeed if "Y" (or "y") is entered and fail if the user responds with "N" (or "n"). If neither answer is given, the program will list the data lines again and reprompt. In order for **verify** to list the data entered, we must send the variables holding this information as arguments to **verify**. We can implement **verify** in the **input** script by using an if-then-else statement, as shown in Figure 1e. If **verify** succeeds, we append the record to the data file. If **verify** fails, we instruct the user to reenter this customer's information and **continue**. Note that the arguments sent to **verify** are enclosed in quotes. This is done to ensure that the Shell doesn't process the data lines into Shell arguments by separating them at each blank space. The double quotes prevent this.

The **while** loop forces **verify** to loop until a "Y," "y," "N," or "n" is entered. We used a new command, the **for** loop, in this script. The **for** loop performs the enclosed commands once for each argument listed. In this case we use the arguments passed in (this is what $@ means). By enclosing the $@ in double quotes, we tell the Shell again not to process the arguments, but to hand them to **verify** as they were sent. Thus, the **for** loop is what prints the data lines entered. The rest of the script is straightforward. Also, before we can use **verify**, we must make it executable with **chmod**. Putting it all together, the final input script is shown in Figure 2.

■ Some Good News and Some Bad

These Shell scripts have some meaningful limitations and should not be used for every data entry requirement. First of all, because these scripts are so easy to use, they are also easily misused. Since Unix views data files as a sequence of characters, the larger the file becomes, the longer any processing will take. Thus, these scripts should only be used for small files. Obviously, "small" depends on what kind of system you have.

In addition, the error correcting provided is minimal. If the application is one that involves many complex entries, where errors are frequent, the reentry of mistaken data can become burdensome and reduce productivity. Further, the script provides no screen formatting and minimal data formatting. These can become a problem as the data entry needs become more sophisticated.

In spite of these serious drawbacks, there are some distinct advantages to using Shell scripts to do mundane tasks. First, they are quick and easy to write. Especially once you know how! In addition, they provide a simple template that can be changed to match the data and the person doing the data entry. Further, they achieve a user interface that is interactive, easy to use, and somewhat forgiving of mistakes.

All in all, such a data entry system is just another tool available to Unix users. As a result, it should be treated like any other tool—applied to the jobs it can help with and not used when a better solution exists for the task at hand. ◙

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INSTRUCTOR
Ray Swartz brings to this seminar years of teaching, programming, and UNIX experience. Ray has taught classes on a number of computer-related topics and written numerous articles on C and UNIX. Ray holds an M.B.A. from UC Berkeley. It was at UC Berkeley that he gained experience working on and with UNIX.

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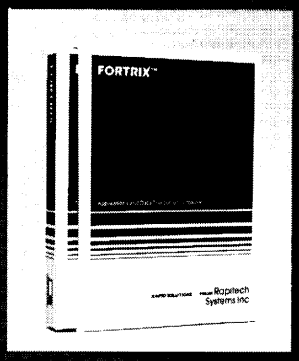

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LATICORP INTRODUCES LATITUDE

Integrated Word Processing Spreadsheet

by Paul Copeland

LatiCorp of San Francisco has released a new integrated spreadsheet/word-processing system called LATITUDE. IBM markets LATITUDE on the PC/IX under the name Interactive Executive (IX) Integrated WORD/MATH. LatiCorp's executive vice-president, Paul Miller, demonstrated LATITUDE for ***Business Unix*** in early January. The system has some intriguing and powerful features for working with documents that include spreadsheet data.

LatiCorp, previously named Horizon Software Systems, has in the past marketed two other office automation software packages, a spreadsheet system and a word processing system. The integrated LATITUDE package, however, is a completely new product with new spreadsheet and word processing modules. The new spreadsheet portion of LATITUDE, called the Tabulator, provides full spreadsheet capabilities within a word processing document.

LATITUDE has three screen regions, referred to as panels: a command (menu) panel in the top portion of the screen, the main text and spreadsheet panel in the middle, and a prompt panel on the bottom line of the screen. When the cursor is located in the text portion of a document, the system displays the word processing commands in the command panel. When the cursor is moved into a table (spreadsheet) portion of a document, the command panel switches automatically to the Tabulator spreadsheet commands. Thus, LATITUDE changes between functioning as a word processor and a spreadsheet system depending on where the cursor is located within the document.

The what-you-see-is-what-you-get word processing module includes editing commands, cursor movement commands, text formatting commands, and cut and paste commands. In addition, LATITUDE includes an "abbreviate" command that allows the user to create a table of abbreviations for frequently used words and phrases. The user can then use a word processing "unabbreviate" command to expand abbreviated items to their full spelling during text entry.

The Tabulator is designed for spreadsheets up to 20 columns wide by 100 rows deep. It has the usual spreadsheet commands for entering formulas and values, as well as commands for inserting, moving, and deleting whole columns and rows. Built-in functions include sum, absolute value, average, square root, internal rate of return, net present value, table lookups, logical AND, OR, NOT, and several others. Other features include spanning column headings across multiple columns, protecting cells, and loading external spreadsheet tables. Although the Tabulator does not have a huge spreadsheet capacity, it is rich in spreadsheet features. With the Tabulator, LATITUDE provides a powerful environment for preparing documents that include a mixture of text and financial data.

LatiCorp plans to add a database system and a three-dimensional spreadsheet facility to LATITUDE in the future. The current version is available for PC/IX under the name IX Integrated WORD/MATH, as mentioned above. LATITUDE is also available now for the PC under Venix, the DEC PRO/380 (Venix), VAX/Ultrix, Altos, 3B2, Intel (Xenix), and other Unix and Xenix systems. For more information contact LatiCorp at 185 Berry Street, Suite 4820, China Basin Building, San Francisco, CA 94107. Phone: (415) 543-1199.

Crow's Nest

Walter Zintz presents a wider view of Unix and business applications from his ***Crow's Nest*** *column. Mr. Zintz is the Executive Director of Uni-Ops, a Unix users group. You can write to him at P.O. Box 27097, Concord, CA 94527-0097.*

by Walter Zintz

It's nice to be starting a brand new column in an almost brand new journal. Even nicer, this is my first Unix column for readers who are already involved with Unix and dedicated to its use in business environments. After all, why else would you be reading ***The Business Unix Journal?***

My job is to give a wider view of Unix and business applications. ***Crow's Nest*** will cover a lot of items that don't have an obvious connection to Unix in business until you think about them for a moment. I'll also look into trends in Unix occasionally, and be a little technical when the situation warrants.

What qualifies me to write a maverick column like ***Crow's Nest?*** Well, since November of 1982 I've been Contributing Editor for Unix at *Hardcopy*. I'm on the Editorial Review Board at *Unix Review*, and I was the original Senior Editor of *Unix/World*. In March of 1981 I founded Uni-Ops as a gadfly Unix users group, and I've been its Executive Director ever since. Over the years Uni-Ops has acquired members on every continent but Antarctica, held annual Unix conference weeks that pulled in hundreds of users from as far away as France and Japan, and still had time to help KCSM-TV produce a Unix episode of *The Computer Chronicles*.

■ At UniForum

The two big Unix user conventions in Dallas last January, UniForum and Usenix, were good places to gauge the current mood of Unix sellers and buyers.

The best news is that one war is about over. Last year's furious contention about whether System V would triumph over 4.2 BSD, or vice versa, was gone this January. Except for one vendor handing out posters of a 4.2 space cruiser blasting the AT&T globe to small pieces, the talk among both users and vendors was a wistful hope that these two Unix versions might be brought back together again someday. Quite likely they will be, but indirectly. The Berkeley campus is no longer doing major Unix development work, and AT&T's list of upcoming features for new releases of System V is starting to look much like a synopsis of 4.2. Both factions were saying nothing against the idea that a neutral standardization committee might go through the two versions selecting standard names for operationally identical commands, etcetera. But for the present, 4.2 continues as the favorite on big machines and for scientific and engineering applications, while System V holds its lead on micros and for business use.

The software being promoted at both conferences had a new flavor. The big push was behind office automation packages and components; next in line were graphics packages. In these areas and throughout the software arena, things looked more like finished products than raw parts.

■ Graphics Interface

Adobe Systems had to be the leading trailblazer with their graphics language. Although the company was launched to market a product, they seem to be doing at least as well at generating talk of a *de facto* standard for describing images.

Adobe's product, PostScript, is intended as a simple but complete way to tell any raster output device about any two-dimensional image. It's general enough to deal equally well with type, geometric user-drawn figures and digitized photographs; powerful enough to be usable as a general programming language. The specific enhancement Adobe was announcing at UniForum was translator software to turn **troff** files into PostScript files; Sun Microsystems supports this concept to the point they sent Bill Joy and another Vice President to Adobe's press conference to talk it up. Adobe prefers to have PostScript's device-independent output converted to device-specific output by a small computer embedded within the individual output device; Apple Computer's new LaserWriter has electronics built in that take PostScript as their only input, and the same is true of a newly announced series of video typesetters from Mergenthaler, the company that makes the typesetters most of America's major newspapers use. People in computing and in graphic arts are already starting to talk about the PostScript language description becoming the standard interface between graphics programs and raster-scan output devices.

■ Training Directory

How many organizations would you think are offering Unix training right now? I have catalogs or flyers

from more than 40 of them, listing live courses, videotape and videodisk productions, and even computer driven interactive courseware. On a panel at UniForum I opined there must be better than 50 sources in all, and promptly was bowled over by several people from the audience who together knew of several dozen sources I'd never run across.

My comeback was a bit of news no one there expected: Eli Nielsen was even then doing the research on a book to sort out the Unix training confusion. His *Unix Education and Training Directory* is to be a roundup of all the suppliers in this field, the courses they offer and the instructors they use. He shouldn't have any trouble tracking down these suppliers working from my list, the new names that surfaced at the UniForum panel, and other names he gets from people in the field.

Eli has chosen to do three separate but thoroughly cross-referenced sections in his book: suppliers, courses, and instructors. In all three sections, each listing will have the statistical facts plus a brief text description. These descriptions will be supplied by the vendors because the book is to be entirely nonjudgemental. Eli hopes his book will bring the reader to the point where he's ready to enroll in the right course, or at least narrow down the field to a handful of possibilities. To this end, the questionnaire he's using asks 23 individual questions. The first edition of *Unix Education and Training Directory* should be in print late this spring, tentatively priced at $10 a copy.

And who is Eli Nielsen? He's a veteran programmer specializing in agricultural applications, who recently picked up the C language and the Unix programming environment out of books. Right now he's engaged in a programming project with Ray Jones, publisher of *Unix Applications Software Directory*. Between reflecting on his frustrating experience learning C and Unix without much help, and seeing how well his partner's directory has been doing, Eli decided to do a directory of his own. You can contact him in care of Onager Publishing, 6451 Standridge Court, San Jose, CA 95123.

■ Bookshelf

The most improved book on Unix displayed at UniForum clearly was Mark Sobell's *A Practical Guide to the Unix System*, published by Benjamin Cummings. From the day it was first published in 1984 this book had the best chapters on the Unix shells I've found, but it was full of minor errors that made it a trial rather than an aid in learning to use Unix. Mark listened closely to the critics, though, and the second edition has corrections where mistakes used to be. His book is now the one I'd recommend to a new user who expected to be working most often with one of the shells. To keep his book accurate, Mark has arranged with his publisher that he will do the typesetting using **troff**.

Unfortunately, the second edition isn't marked as such. To be sure a copy is actually the new edition, look at the bottom of page 33. If you find a footnote there that begins "The **a**, **c**, and **i** commands . . ." you're holding the revised edition. Incidentally, Mark is about ready to publish another revision of this book that will deal exclusively with System V Unix.

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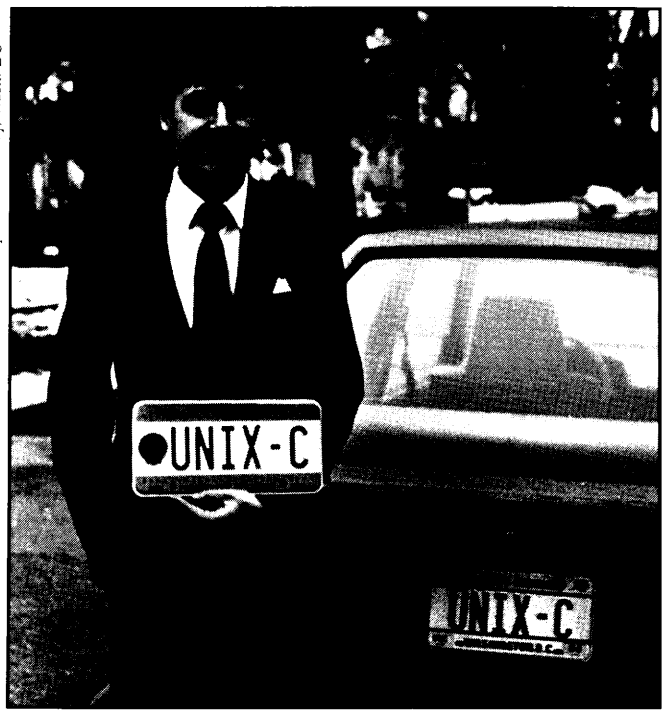

John Capozzi of C Associates, a Washington, D.C., technical recruiting firm, sent us this photo of his personalized license plates. In addition to the regular plate on the car, Capozzi is holding a commemorative Presidential Inaugural license plate he obtained for temporary use this year. If anyone out there can top this, send us your picture too!

SYSTEM V INDUSTRY DEVELOPMENTS

- Announcements from IBM, Microsoft -

As we go to press, the market is still waiting for AT&T's PC 7300, and for Xenix on the PC/AT. Neither system is yet available for end-users, although a number of software developers have received early shipments of both products. Meanwhile, a series of announcements by AT&T, IBM, and Microsoft all point to a gathering momentum for the Unix systems industry and System V in particular. Two recent announcements are especially significant. First, at the Dallas UniForum trade show in January, Microsoft and AT&T charted a course for future compatibility between Xenix and Unix System V. Then in February, IBM released IX/370, a System V implementation under VM for mainframes. In addition, a number of other newsworthy announcements related to System V have been made recently, including news that Amdahl and AT&T will maintain Unix System V compatibility for Amdahl's UTS mainframe operating system. In other System V related news, AT&T announced that Unisoft Systems, a leader in porting of the Unix System, will assist in the development of a verification test software package to validate derivatives of Unix System V.

■ Microsoft Xenix V

In the January announcement, Microsoft affirmed its plans to provide a System V version of Xenix, while AT&T announced it intends to offer Xenix System V on its PC 6300 computer. Microsoft will implement the new Xenix V in conformance with AT&T's "System V Interface Definition" standards document. In addition, Microsoft's new Xenix implementation was designated as the pilot Unix system for AT&T's new System V Verification Service. As a result, it is expected that Microsoft's Xenix V will be the first "verified" System V product for a non-AT&T microcomputer. AT&T announced that, following verification of Xenix V, it plans to offer a version of the product for its PC 6300 (8086 based) computer.

■ IX/370—IBM's Mainframe System V

The significance of IBM's endorsement of Unix System V has been debated by industry analysts, but the fact remains that at last IBM is fully supporting AT&T's standard on its mainframe computers. Interactive Executive 370 (IX/370) runs as a guest under VM and requires a Series/1 minicomputer as a front-end terminal server. IX/370 is expected to replace VM/IX, an earlier mainframe Unix system under VM that was never announced as a fully supported IBM product. IBM watchers had varying interpretations of IBM's motivations for releasing the IX/370 product. Some analysts saw the move as a reaction to market pressures such as the requirement for Unix on some large government contracts. The introduction of IX/370 also represents a competitive bid to match Amdahl's mainframe Unix offerings. Mainframe software vendors generally were not excited by the availability of Unix under VM and were not rushing to develop new Unix based products. In a related development, IBM reportedly has established an internal Unix task force to provide long range strategic planning and marketing support for IBM implementations of Unix System V. IBM's Unix offerings now include CPIX on the Series/1 (Version 7 Unix), PC/IX (System III), Xenix on the PC/AT, and both VM/IX and IX/370 on mainframes.

THE CONTINUING SAGA OF AT&T's SOFTWARE CATALOGS

Correction and Amplification:

In the last issue, ***Business Unix*** incorrectly reported that *The AT&T Computer Software Guide* would be primarily a directory of MS-DOS software. Richard Leavitt, AT&T's software catalog manager, told us that the Software Guide will include listings on about 300 software packages for the Unix based 3B computers, versus about 190 listings for the MS-DOS based PC 6300. That will make the Software Guide primarily a Unix software directory for AT&T's computers, contrary to our original report. AT&T expects the Software Guide to be published by mid-April and says it will be distributed in bookstores nationwide. Internally, AT&T has an online Electronic Software Catalog (ESC) database to provide the latest information on software to AT&T's sales force. Future editions of the Software Guide, expected biannually, will draw on the ESC system.

Meanwhile, *The Unix System V Software Catalog*, AT&T's other software directory, was on display at AT&T's UniForum booth in late January. The System V Catalog differs from the Software Guide, mentioned above, in that it covers software for non-AT&T, as well as AT&T, Unix based computers. Cucumber Bookshop, a mail order Unix bookstore in Rockville, Maryland, told ***Business Unix*** that the System V Catalog was actually in stock as of early March, though we had still not received a copy as this issue of ***Business Unix*** went to press.

Both of these directories are being published by Reston Publishing for national distribution in bookstores. In addition, the System V software catalog can be ordered directly from the AT&T Customer Information Center in Indianapolis at 800-432-6600.

MICROAGE HOSTS SOLUTIONS '85 SYMPOSIUM

MicroAge Computer Stores, Inc., held its third annual convention, named Solutions '85, in Tempe Arizona from February 23 through February 28. Nearly 1,000 MicroAge franchise owners, computer hardware and software vendors, and MicroAge staff members attended a series of

meetings on strategic marketing issues for the multiuser retail market. Speakers included David Jackson, president and founder of Altos Computer Systems, Steve Ballmer, vice-president of Systems Software at Microsoft, John Boyd, vice-president of Computer Systems Sales for AT&T IS, and officials from Wang, H-P, and IBM.

During the event, MicroAge announced a plan to develop MCS-TV, a private television network that will broadcast via satellite from MicroAge headquarters in Tempe to franchise stores throughout North America. The purpose of the planned network is to provide the stores with training programs as well as presentations from hardware and software vendors. MicroAge hopes this technology will enable it to improve the quality and quantity of training and support for MicroAge stores.

In 1976, founders Alan Hald and Jeff McKeever opened one of the first computer stores in the United States. The MicroAge franchise network has been a leader in retail sales of Unix systems for three years, and continues to emphasize its expertise in the multiuser area. Currently, about 80% of the MicroAge stores carry Altos systems. Some locations carry AT&T 3B computers as well. The MicroAge franchise network grew from 60 stores in January 1984 to 175 stores in January 1985. The company projects over 600 stores will be in operation before the end of 1987.

DUAL

The staff at Dual Systems has compiled a Filesystem Reference Manual for the UNIX™ operating system, both Version 7 and System V. The manual contains three listings of the files distributed on computers using the UNIX operating system. The first is a complete alphabetical listing of all the files, providing pathname, description, origin, and file group. The second listing divides all the files into thirteen application groups such as mail, program development and text processing. The third listing divides the files into six groups based on the originator (e.g., Bell Laboratories, Berkeley enhancements, etc.).

Every user of the UNIX operating system would profit by having one of these books. The drawing showing the hierarchical interrelation of the various files is a great aid in finding one's way around the UNIX operating system. Price is $35.00 in single quantity. Please contact our sales department to order.

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Industry Profile

SSC

Keeping in Touch With The Unix Systems Industry

With so many Fortune 500 firms promoting Unix based product lines, it is easy to forget that commercial acceptance of Unix was pioneered by small firms which foresaw the potential—even while some market analysts were still predicting that Unix systems would never have a significant impact. Specialized Systems Consultants (SSC) in Seattle, Washington, is one such early participant in the Unix systems market.

Phil Hughes of SSC has been working with C and Unix systems for over five years. It was the January 1983 USENIX and /usr/group conference in San Diego that convinced him of a blossoming market for Unix products. Phil and his associate, Ira Chayut, concluded there was a need for a pocket reference card on C. So

they produced their first pocket reference, and were surprised by the almost overwhelming demand. Though SSC had engaged in electronics and computer consulting since 1968, it was the C reference card that launched the company firmly into the Unix industry. Early customers for the C reference card suggested that SSC produce a pocket reference for the C Library as well. By November 1983, SSC had produced three more pocket reference guides: the C Library Reference (16 pages), the VI Reference (8 sides folded), and the System III Command Summary (32 pages).

Typeset and printed on sturdy white card stock, the design of SSC's pocket references demonstrates a concern for accuracy and utility. All of the references measure 3½ by 8½ inches. Some are produced as folded cards, while the longer references are published as small booklets. Prices range from $2.50 to $6.00 each in single quantities. Several Unix computer manufacturers supply SSC's cards with their systems. In addition to the original four references, SSC now also publishes a System V Command Summary (48 pages), a BSD 4.2 Command Summary (48 pages), a Xenix Command Summary (32 pages), and a Fortran 77 Reference (10 sided card).

Over time, the heavyweights have moved in on SSC's turf. Other companies are now also publishing reference cards, including some computer manufacturers that produce their own. While SSC's cards continue to sell at a brisk rate, the firm is now offering other Unix products and services as well. In addition to consulting on engineering and commercial computer projects, SSC conducts a series of Unix seminars and training courses, from four-hour Unix overview seminars, to week-long C programming workshops.

SSC has also taken on a leadership role among Seattle area Unix users. Irene Pasternack, a partner in SSC, is chairman of the Seattle/Unix Group, a local user association. Irene is currently writing an introductory level Unix book with a working title of "The People's Guide to Unix." Phil Hughes is an established technical writer too, having contributed over 40 articles to computer and electronics magazines (see his book review elsewhere in this issue of ***Business Unix***). With its ongoing active involvement in seminars, training, reference guides, books, and user groups, SSC is sure to maintain the prominent position in the Unix industry that it pioneered early on.

SCC can be reached at P.O. Box 7, Seattle Washington, 98125-0007, Phone (206) 367-UNIX.

UNIX LIBRARY BITES THE DUST

Business Unix previously reported (in the February/March issue) that The UNIX Library, a Digital Research (DRI) and AT&T joint venture, seemed to be keeping something newsworthy under wraps. We were expecting a big announcement at a press conference scheduled for the Dallas UniForum trade show in January. What actually happened was quite unexpected. the press conference was canceled and The UNIX Library quietly folded its tent.

The UNIX Library originally planned to market Unix applications software developed by independent software firms. The organization was intended as a vehicle to stimulate

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Unix software development. According to information from a knowledgeable insider and published reports, The Unix Library faced misgivings by developers about divulging proprietary products to an organization under the joint control of DRI and AT&T. In addition, applications submitted to The UNIX Library had to be ported to new, and in some cases unannounced, computer systems made by AT&T's competitors. To maintain credibility with OEMs and software developers, The Unix Library needed to spin off as a separate company. Apparently, the organization tried to obtain venture capital funding that would have allowed it to operate independently of DRI and AT&T. These funding efforts were unsuccessful, however, and the project was disbanded instead.

USENIX HEADS FOR PORTLAND

The 1985 Summer USENIX Technical Conference is scheduled for June 11-14 at the Portland Marriott in Portland, Oregon. The summer conference, marking the tenth anniversary of the USENIX Association, is expected to be the largest of the two USENIX conferences this year. The USENIX Conference Office is projecting an attendance in the 1500-1800 range. The conference will provide a commercial exhibit area in addition to technical sessions on a range of current Unix and C research and development topics. For additional information contact:

USENIX Conference Office
P.O. Box 385
Sunset Beach, CA 90742
(213) 592-1381 (213) 592-3243

A MIRROR IN DALLAS

- Impressions From UniForum -

From January 21 to 25, Unix users and vendors from around the world converged on the new Infomart exhibit hall in Dallas to attend the largest ever Unix trade show and conference. According to /usr/group, the show's sponsor, 16,200 attendees were on hand for the four days at the Lowes Anatole Hotel. There were 215 exhibitors covering 300,000 square feet of exhibit space in the nearby Infomart. UniForum 1985 demonstrated that interest in Unix remains high. The success of the show and conferences seemed to mirror the growth of the Unix-related industry. The USENIX Winter Technical Conference was held concurrently in Dallas from January 23 to January 25. Over 1,200 people attended the USENIX technical sessions.

The big story of the show was probably the official announcement from both AT&T and Microsoft regarding the development of System V based Xenix, thus bringing together two great strands of the Unix standard. IBM's exhibit was split between the PC/IX group and the Xenix group. The PC/IX section was unmistakably smaller. The Wollongong Group, a Unix systems software company in Palo Alto, California, set up an IP/TCP network among companies exhibiting at UniForum. The exhibit floor network included 65 systems from 21 vendors, including Gould, Pyramid, Imagen, Masscomp, Data General, Cadmus, and others. Wollongong representatives said they were able to install the UniForum network in only two days. IBM's PC/AT seemed in evidence everywhere as a demonstration system for software, perhaps heralding the shape of things to come in the marketplace. Sun Microsystems workstations also were used widely on the exhibit floor to demonstrate office automation software as well as engineering applications.

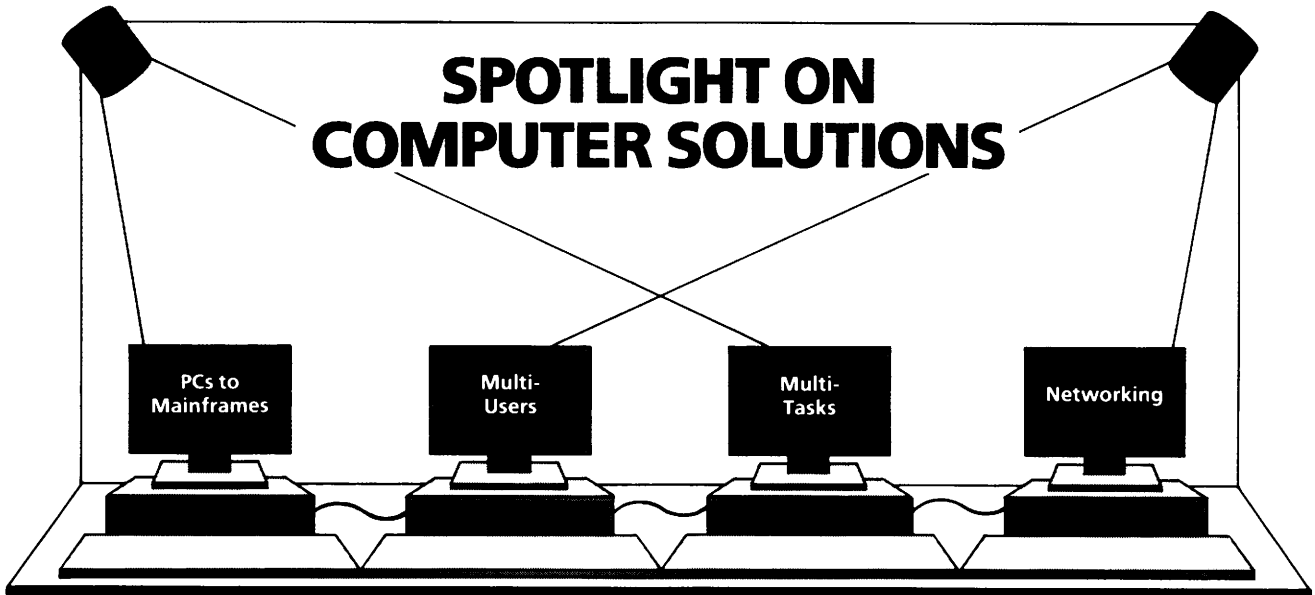
■ More Toes In the Water

A number of established mini and microcomputer firms that only recently joined the Unix systems market were in evidence at UniForum, either displaying new computers or announcing new systems in conjunction with the show. Alpha Microsystems of Irvine, California, displayed its new System V based 68010 computer, called the AM-1100E. Alpha Micro has been an established manufacturer of 16-bit multiuser computers since 1977. Morrow, another established computer manufacturer, announced several third-party software agreements for its new Tricep Unix based computer system, including the availability of the RDS's Informix DBMS package. Cromemco of Mountain View, California, a true pioneer in the microcomputer field, introduced a line of System V based computers at UniForum. CompuPro, another established manufacturer of multiuser micros, announced the availability of Unisoft's UniPlus+ (System V) for CompuPro's System 816/E, a 68000, S100 bus computer.

Business Unix came away from UniForum with a sense that the Unix market is generating momentum. Now that the PC/AT is available with Xenix (to developers), many MS-DOS software firms are apparently looking seriously at the Unix market. At the same time, vertical market applications that have been well established on non-Unix multiuser systems—such as computers from Alpha Micro, Cromemco, and CompuPro—are now being ported to the Unix environment. Although most of this activity appears tentative—like having one foot in the water—the tension is now clearly bringing many of these established firms to the point of action. Few holdouts from the Unix standard still remain among firms marketing multiuser vertical market applications.

■ Coming Up

Next year's UniForum conference is already scheduled for February 4-7, 1986, in Anaheim, California. Lizabeth Reilly, /usr/group executive director, told us that 70 percent of the UniForum 1985 exhibitors are already signed up for the 1986 event. ✉



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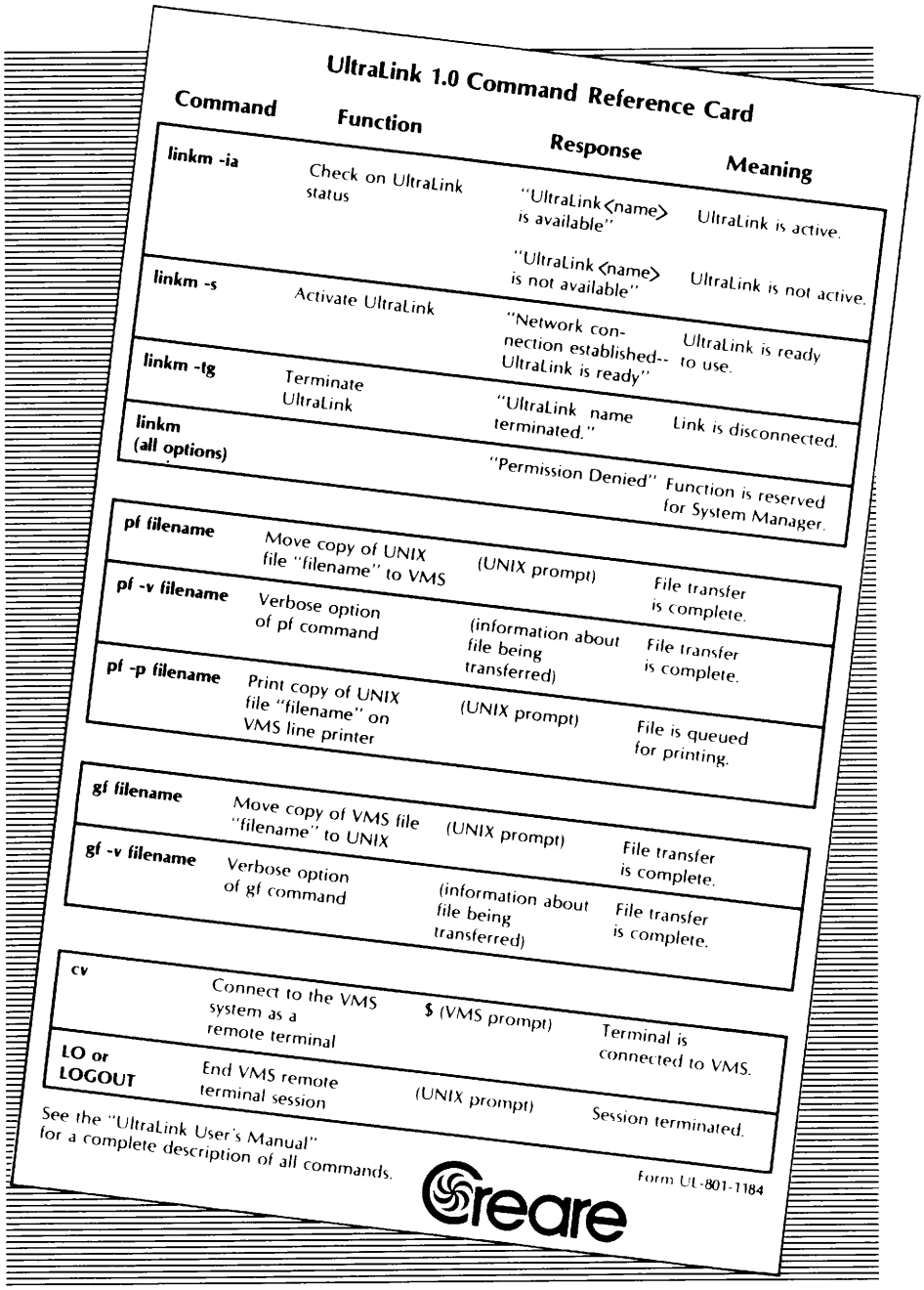
ULTRALINK — VMS TO UNIX COMMUNICATIONS FIFTEEN NEW UNIX PORTS

Creare Incorporated's UltraLink Unix to VAX/VMS communications software is now available for fifteen additional Unix systems. The system uses a CRC error correcting protocol to link as many as eight Unix users to a VMS system over a single asynchronous RS-232 line (or modem). With UltraLink, Unix users can transfer files in both directions or conduct remote VMS terminal sessions. ***Business Unix*** previously reported (February/March 1985) that UltraLink was available for MASSCOMP, Pyramid, Sun-2, and VAX/Ultrix. Creare's new UltraLink implementations include: AT&T 3B series, Apollo, Burroughs XE series, Cadmus, Callan Unistar Series, Charles River Universe 68 series, Convergent Technologies Megaframe and Miniframe, Dec Micro Vax, Gould PowerSeries and PowerNodes, Harris Station 10 and 20, Hewlett-Packard 9000 series, NCR Tower, Plexus, Perkin Elmer 3200 series, and Zilog System 8000 computers.

UltraLink is priced from $700 to $1,100 per node. At least two nodes are required to establish a Unix to VMS link. For additional information about UltraLink contact Creare Inc., P.0. Box 71, Hanover, NH 03755. Phone: (603) 643-3800.



UltraLink 1.0 Command Reference Card

Command	Function	Response	Meaning
linkm -ia	Check on UltraLink status	"UltraLink <name> is available"	UltraLink is active.
		"UltraLink <name> is not available"	UltraLink is not active.
linkm -s	Activate UltraLink	"Network connection established-- UltraLink is ready"	UltraLink is ready to use.
linkm -tg	Terminate UltraLink	"UltraLink name terminated."	Link is disconnected.
linkm (all options)		"Permission Denied"	Function is reserved for System Manager.
pf filename	Move copy of UNIX file "filename" to VMS	(UNIX prompt)	File transfer is complete.
pf -v filename	Verbose option of pf command	(information about file being transferred)	File transfer is complete.
pf -p filename	Print copy of UNIX file "filename" on VMS line printer	(UNIX prompt)	File is queued for printing.
gf filename	Move copy of VMS file "filename" to UNIX	(UNIX prompt)	File transfer is complete.
gf -v filename	Verbose option of gf command	(information about file being transferred)	File transfer is complete.
cv	Connect to the VMS system as a remote terminal	$ (VMS prompt)	Terminal is connected to VMS.
LO or LOGOUT	End VMS remote terminal session	(UNIX prompt)	Session terminated.

See the "UltraLink User's Manual" for a complete description of all commands.

Form UL-801-1184

Creare

SMART C DEVELOPMENT ENVIRONMENT

AGS Computers, Inc., is expected to introduce Smart-C on April 22 and demonstrate the software product at Unix Systems Expo/85 in San Francisco, April 24-26, 1985. AGS Computers describes Smart-C as a precompilation development environment compatible with all popular existing C compilers. Smart-C consists of three primary components: an editor, an interpreter, and a parser. The Syntax Editor and Interactive Interpreter are said to work in close association, providing a programmer with an intelligent development environment. Smart-C uses a window feature to display source code along with values for variables and expressions. According to AGS, the user can display values and breakpoints in one window while interpreting a section of the source code in another window. For more information, contact AGS Computers, Inc., at 1139 Spruce Drive, Mountainside, NJ 07092. Phone: (201) 654-4321.

MORE APPGEN PORTS

Software Express has announced distribution agreements for its APPGEN products with AT&T, Fortune, and NBI. The company also announced that APPGEN has been ported to

NOW THAT THE PC FAD IS OVER, IT'S TIME TO GET DOWN TO BUSINESS.

Like hordes of locusts, the PC swept the business community. Corporations bought them like electronic calculators by the thousands to improve the productivity of their executives. Portables were carried home from the office every evening and on trips. Computerization was even affordable to the small business for the first time. Programmers put their unique genius to work to develop some of the best software ever written. Productivity tools like word processing, electronic spread sheets, data base management and accounting was placed into the hands of new computer users. Productivity improved for everyone. From the CEO . . . to his staff . . . to the salesman . . . to his secretary. Forecasts for continued PC growth were nothing but highly optimistic. One at every desk. One in every home. What happened?

"Networking won't solve the multiuser problem either economically or functionally."

Like the first crust of any marketplace it saturated quickly. Those that are the first to buy almost anything new and promising, bought. There are no more computer hackers and hobbyists to sell to. They all have one. Applications for the home that made any sense didn't develop. Corporations found that they needed PCs to "talk" to each other. That solution is distant because networking won't solve the problem either economically or functionally. Most available networking does nothing more than messenger floppies around. The small business found that as soon as its first PC was operational and productive, a second one was needed to satisfy demand usage. The PC, with all its promises, turned out to be a dead end for the business environment. The PC and clones just haven't been the godsend for business that was predicted. Why?

The PC is a personal computer. Just that. Not a business computer. That's because PCs are single user computers with single user software. Good for one person but not good enough for a whole company. Even if the company is two people.

Every computerized business has someone entering information while someone else is looking up information. That's two users. And every business has more than two users who need access to the computer. That's a multiuser computer environment.

"The small business needs a second PC as soon as the first one is working."

It's now hard to justify PCs in a business environment. A multiuser computer capable of supporting up to five users is available for the price of a single IBM PC XT. It has more storage and a business oriented operating system. Supermicros are available that have the power of minicomputers without the accompanying price tag. Ten unconnected PCs, sitting around worth about $50,000, doesn't make sense when for much less you can get a lot more computing power in a supermicro that accommodates 20 or more users. But don't let even that price tag scare you. On a per user basis, multiuser computers cost about $1500 less than a PC. New users can be added for less than $600 with a dumb terminal. And they're upgradable.

"A six port multiuser computer is now available for the price of a single IBM PC XT . . . microcomputer systems cost $1500 less per user than multiple PCs."

Multiuser computers communicate with each other. They share the same data base, software and peripherals. They have sophisticated business features such as record locking, user accounting privilege levels and system security. They are business oriented and priced well within the reach of the first time computer user.

But what about all the PCs already in place? Don't ask the PC manufacturer for a solution. They're concentrating on selling more single user systems. The real solution is to get started with a true multiuser computer in the first place. With multiuser business computers now in the same price range as a PC, it doesn't cost any more to make the first step the right step.

The PC has seeded the next wave. It's here now. Supermicro multiuser computers that can support up to 32 users. If you don't believe it just look at the new product introductions from IBM, DEC and AT&T, let alone the smaller companies like Altos, Plexus and IBC. Big system features for every end user. Software for every conceivable specialized business application. That's not the end of it. New challenges are there for everyone. Opportunities abound. Software companies are already applying their talents to multiuser operating systems, disk conversion and even more powerful and productive software. Companies are shifting their emphasis to provide multiuser system enhancements as they did for the PC. Value added resellers and specialist dealers will give the end user the support that's been terribly lacking from department store retailers. It's a great day for someone who needs a multiuser computer. And everyone does.

"Multiuser computers share everything . . . they have business features such as record locking, user accounting, privilege levels and system security."

Thanks PC! You've whetted the appetite of a large new business environment for computerization. One that is bigger, more demanding, and more sophisticated than we've ever seen before. There's no turning back now. You were a fad, but now it's time to get down to business . . . multiuser business.

Randy L. Rogers

Randy L. Rogers
President and CEO
IBC/Integrated Business Computers
Manufacturer of Multiuser Computers
Chatsworth, California.

XENIX III for both the IBM PC/AT and the new Tandy 6000 computer. Also, Software Express is porting APPGEN to Amdahl's mainframe Unix systems under UTS. The company says APPGEN products are now available on over fifty different systems.

According to Software Express, the APPGEN Application Development Environment provides interactive, nonprocedural facilities for developing integrated applications. APPGEN includes screen and report creation tools, a relational DBMS, and automatic documentation facilities. Software Express also offers nine APPGEN applications packages: General Ledger, Accounts Payable, Payroll, Accounts Receivable, Inventory/Order Entry, Fixed Assets, Job Cost, Professional Time Reporting, and Accountant's Client Writeup.

Retail prices for the APPGEN Development Environment are $3,000 for single user systems, $6,000 for multiuser systems up to 16 users, and $12,000 for multiuser systems up to 64 users. Prices for the APPGEN Runtime Environment package, without the development facilities, run from $600 to $2,500. APPGEN accounting and vertical application packages are priced from $600 to $3,500. For more information about APPGEN products, contact Software Express at 2925 Briarpark Drive, 7th Floor, Houston, TX 77042. Phone: (800) 231-0062.

BUSINESS GRAPHICS SOFTWARE FROM PACIFIC BASIN GRAPHICS

PBG 200 Business Graphics from Pacific Basin Graphics in San Francisco, is a menu driven program that produces presentation quality graphics on a variety of monochrome and color terminals, pen plotters, and matrix printers. The chart types include pie charts (with options for exploding pieces), simple vertical and horizontal bar charts, stacked, clustered, above and below the line bars, 3-D bar graphs, line graphs, scatter plots, and organization charts. The user can specify labels, titles, hatching patterns, and color (if available on the output device).

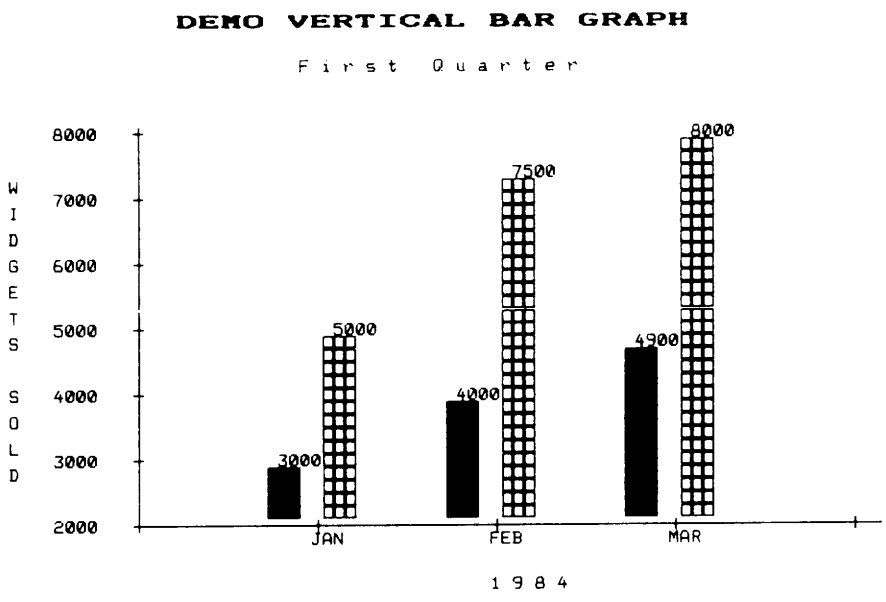
Source data for the graphics displays can be entered at the keyboard or accessed from a file. Data file formats supported by PBG 200 Business Graphics include SYLK (Multiplan), ISIS (Integrated Software Information Standard), and comma or tab delimited ASCII files.

Output devices for the system include graphics terminals, pen plotters, and dot matrix printers. PBG 200 Business Graphics includes a set of device drivers for supported families of output devices. According to Pacific Basin Graphics, currently supported devices include C.Itoh terminals, DEC VTlxx and VT24x terminals, Televideo terminals, H-P pen plotters, Strobe 100 digital plotters, DEC LA50/LA100 /LXY12/LXY22 dot matrix printers, Epson and Okidata dot matrix printers, and many others.

The PBG 200 Business Graphics system has been available on Unix systems for a year and a half. A predecessor CP/M version has been available for three years. The program operates under System III, System V, 4.2BSD, Xenix, Regulus, and Ultrix. PBG 200 Business Graphics is distriuted by Unix system manufacturers and OEMs. Pacific Basin Graphics' suggested retail price is $750. Volume discounts are available for OEMs and dealers. For more information contact Pacific Basin Graphics at 750 York Street, San Francisco, CA 94110. Phone: (415) 824-4910.

BUSINESS GRAPHICS FOR CHARACTER MODE TERMINALS

High Tech Business Graphics software produces horizontal and vertical bar graphs, line graphs, and "cake" charts on character mode (not bit-mapped) terminals. The system also produces pie charts on plotter devices. High Tech Marketing, Inc., of Burbank, California, demonstrated the package at the January UniForum conference in Dallas. The menu driven program allows the user to specify



This bar graph was produced by the High Tech Business Graphics software package on an Okidata 93 dot matrix printer.

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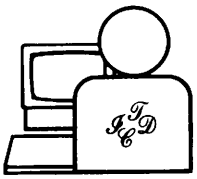

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titles and subtitles for each axis, enter data for a graph, and specify the type of graph to be produced. High Tech Business Graphics unique "cake" graphs are rectangular representations of the information normally depicted in round pie charts. In other words, instead of sectors of a circular area, we get a rectangular area divided into proportional-size segments. Cake graphs thus provide a solution to the problems of displaying pie charts on low resolution character mode terminals.

The High Tech Business Graphics system can read ISIS (Integrated Software Information Standard) Unix files and SYLK format (Multiplan) files. Peter Glickman, president of High Tech Marketing, told ***Business Unix*** that the program's newest feature, called the Intelligent Multiplan Interface, will allow users to store all the titles and data for graphs directly in a Multiplan spreadsheet. The package is written in C and currently runs on the following systems: Altos, Fortune, Intel, Tandy/Radio Shack, Convergent Technologies, IBM PC/XT Xenix (from Santa Cruz Operation), and IBM PC/AT Xenix. Other ports are expected soon. A few of the many terminals supported are DEC VT100, Televideo 910/914/950, Wyse 50/75, Altos terminals, and the TRS-16 console terminal. Supported printers include the Diablo 630, Epson dot matrix printers, NEC letter quality printers, Okidata dot matrix printers, and others. Currently supported plotters include the Amdek Amplot II, HP 7475/7470, and others.

The suggested retail price for High Tech Business Graphics is $395 for single user systems and $595 for multiuser systems. Quantity discounts are available. High Tech Marketing expects Altos to adopt the package under its private label software program. For more information contact High Tech Marketing at 715 E. Cypress Avenue, Suite A, Burbank, CA 91501. Phone: (818) 841-6093.

TANGO — MS-DOS and UNIX

Computerized Office Services Incorporated (COSI) has renamed its PC-to-Unix communications software. Tango, formerly named Communique, provides communications

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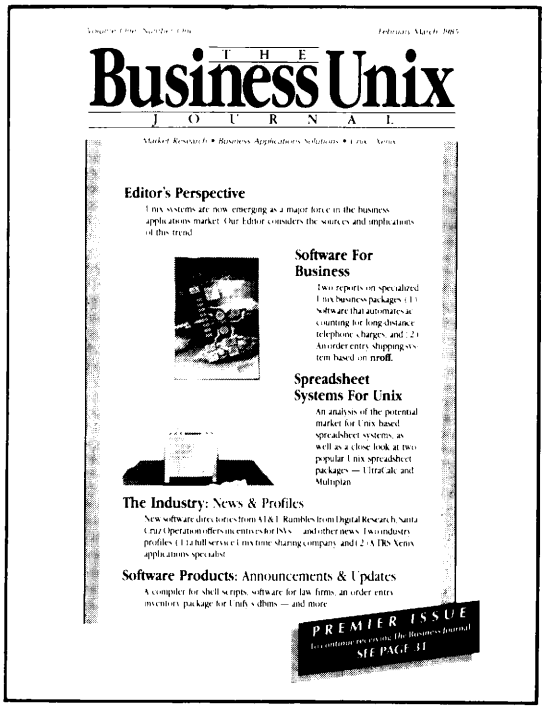
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capabilities tailored to the Unix environment for IBM PC and compatible microcomputers. Tango provides terminal emulation on the PC for DEC VT-52, DEC VT-100, IBM 3101, and Tektronix 4010 terminals at transmission rates of 300 to 9600 baud.

Tango includes a set of MS-DOS commands, as well as a set of Unix system commands. Tango's MS-DOS commands provide for sending and receiving command strings and files between PCs and host Unix (or non-Unix) systems. In addition, Tango's Unix based command utilities allow the PC user to invoke MS-DOS commands on the PC while conversing with the Unix host, thus providing access to both environments at the same time. When a Unix-invoked MS-DOS command terminates, the user is returned to Tango and the Unix session. Tango Unix commands can be combined in shell scripts. For example, users can create Unix shell scripts to automatically execute MS-DOS programs on the PC, or scripts to transfer files between a Unix system and a PC.

Tango is priced at $195.00 for the PC, plus $295.00 for the Tango Unix utilities. For more information about Tango, contact COSI at 313 North First Street, Ann Arbor, MI 48103. Phone: (313) 665-8778.

/UNIX/MACINTOSH ??

Touchstone Software Corporation is now shipping MacLine, a new Macintosh networking software package that operates in conjunction with Touchstone's other network products, PCworks and UniHost. With MacLine, a Macintosh user can transfer files to and from Unix systems and MS-DOS based PCs, exchange mail with other network users, and access remote printers and disks. MacLine also provides terminal emulation for the Macintosh on a host Unix system (or other host). Touchstone's PCworks MS-DOS software provides capabilities similar to MacLine for IBM PC compatible computers.

In conjunction with UniHost software on a Unix system, MacLine provides for file transfers between a Unix system and the Macintosh, using an error correcting packet transmission protocol. In addition, the UniHost software interface also processes electronic mail from the Macintosh or PC on the Unix system and provides remote printing facilities on the Unix system for Macintosh or PC files.

Business Unix spoke with Gary Babcock at B.A.S.I.S. in Berkeley, California, for a report on PCworks, MacLine's sister product. B.A.S.I.S. is a distributor for PCworks. Babcock told us that he has been using PCworks on his PC at home for some time to access and transfer files with his company's Unix timesharing Zilog computers. B.A.S.I.S. has found PCworks to be consistently reliable according to Babcock.

Prices for Touchstone's network products are $145 for MacLine, $195 for PCworks, and $295 for UniHost. For more information contact Touchstone Software Corporation at 909 Electric Avenue, Suite 207, Seal Beach, CA 90740. Phone: (213) 598-7746.

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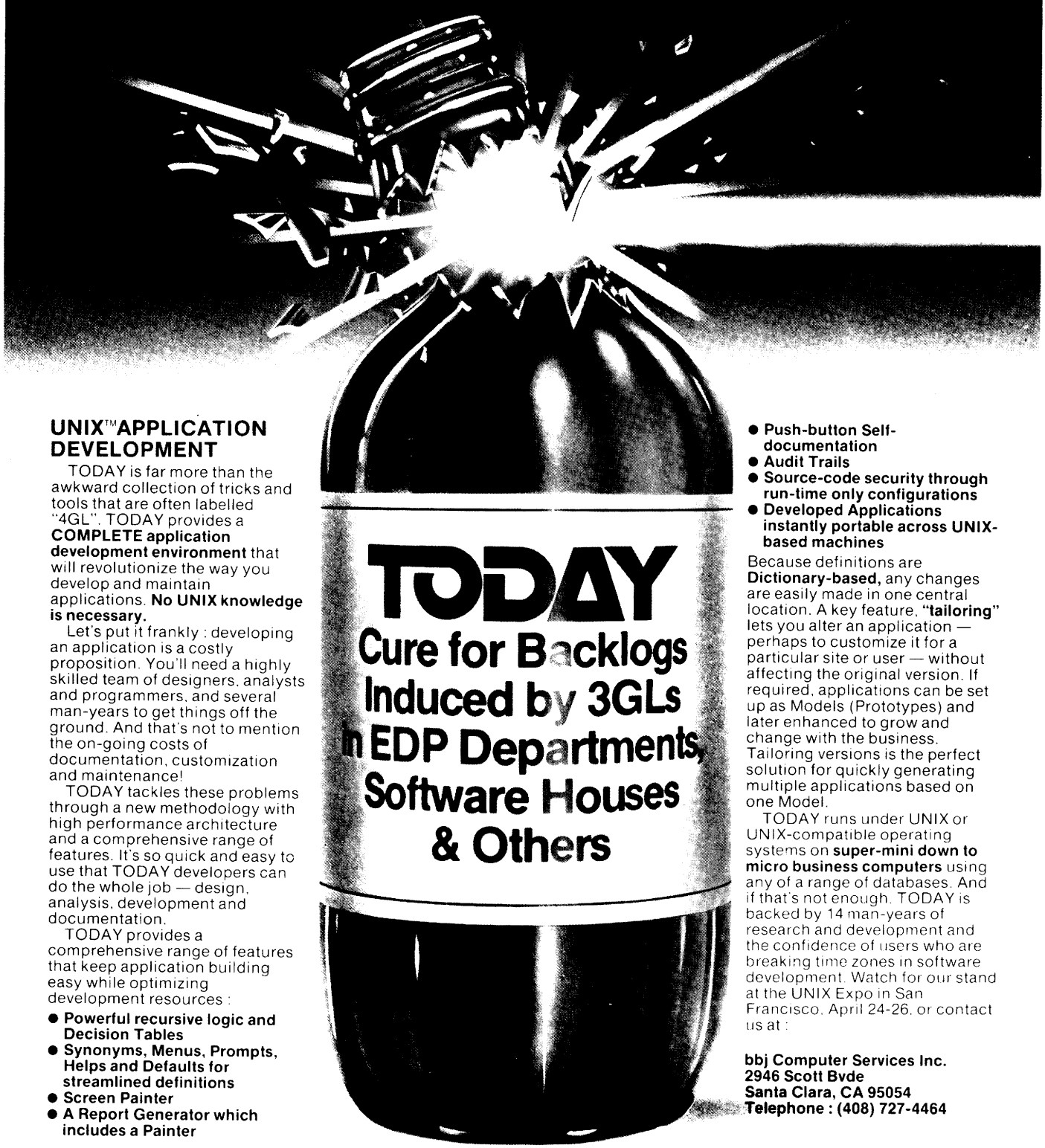

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