

VOL. 3, NO. 1

ISSN: 0887-3054

JANUARY 1988

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# UNIX IN THE OFFICE

PRODUCTS • TRENDS • ISSUES • ANALYSIS

## Beyond Unix

### *Creating the Standard Operating Environment*

By Judith S. Hurwitz

**P**ortable Operating System for Computer Environments (Posix) may be one of the most significant standards to emerge in the computer industry. Let's start with a definition: Posix is a family of related operating-system standards. While the IEEE working groups creating the standard are not actually defining an operating system, they are creating standard ways for applications to interact with an operating system. As a result of this standardized interface, applications would not have to be rewritten before being ported to new hardware *(continued on page 3)*

IN THE COMPUTER industry, mythologies abound. We use metaphors to characterize the elusive and use parables to explain the mysterious. We speak of "grass roots computing" to describe the PC phenomenon. We characterize traditional DP'ers as "the priesthood in the glass house." And, we talk about "Mac Attacks."

When we launched this publication two years ago, we chose "Unix in the Office" as the title, knowing full well that "Unix" was symbolic. We didn't think of Unix as an end in itself—we knew office workers didn't care which operating system drove their desktops. Nor did we view Unix as necessarily the most appropriate means towards attaining a Holy Grail of hardware independence. But we knew that Unix stood for something.

Unix was a convenient placeholder while we waited (probably eons) for an industry-standard operating system to evolve. Customers' interest in Unix was symptomatic of a growing restlessness among system purchasers who were no longer comfortable locking themselves into one or two computer vendors and a handful of software suppliers. And Unix offers the path to salvation for computer companies who find themselves slipping from view.

**UNIX, THE LIBERATOR.** Unix symbolizes independence (from system supplier) and abundance (of software). Yet Posix (detailed in this issue) is a more appropriate totem. If the software industry can move to adopt application interface standards, then suppliers who choose to optimize operating system software for particular hardware platforms will not be penalized. At this particular point in history, we are engaged in a confusing, and sometimes bloody, battle over symbols. The famous Air Force procurement—AFCAC 251—caused a major skirmish between AT&T and Digital Equipment Corporation. AT&T won the round.

Digital resents AT&T's dominion over an "industry-standard" operating system and the fact that one competitor gets to decide whether the other contestants are in compliance or not. Since Digital doesn't like the rules of the game (and alienated the

judges in the process), the company withdrew from the bidding. Digital does favor the Posix approach.

**UNIX, THE SALVATION.** For second- and third-tier computer system suppliers, Unix offers a path towards survival. Prime Computer has made it quite clear that, while

it will not abandon its Primos proprietary operating system and the customers who use it, the company is shifting resources and attention towards Unix. Prime wants to become a systems integrator (specializing in mechanical CAD/CAM) adding value to industry-standard processors and software.

Hewlett-Packard has a similar strategy, supporting massive parallel development in MPE and Unix, moving both environments onto its new generation of RISC processors. Data General has no choice other than to espouse Unix aggressively. For any vendor that wants to move beyond its existing customer base and to keep that base from shrinking, Unix offers a powerful alternative.

**UNIX, THE FUTURE?** Unix is now also associated with a major architectural shift in the way computers and software are designed, deployed, and used. We are moving inexorably towards distributed network computing, with applications divided into client and server pieces, with information and applications distributed across networks. Unix is already playing a leading role in the pilgrimage towards distributed network computing. Sun Microsystems is the knight in shining armor leading the way, cutting an ever-broadening swath through the marketplace. Apollo Computer quickly switched horses (from its proprietary Domain operating system to Unix) and is now the standard-bearer for the distributed network computing campaign.

But the shift towards distributed network computing does not require Unix. In fact, this transformation in computing architectures will enable multiple operating systems and processor types to coexist. Programs will be written in such a way that different subsections can be parceled out to run on available processors on the network, taking advantage of specialized capabilities, regardless of operating system constraints. ●

• E D I T O R I A L •

# The Symbolism of Unix

By Patricia B. Seybold

Patricia Seybold's  
Office  
Computing  
Group



Editor-in-Chief PATRICIA B. SEYBOLD

Senior Editor  
MICHAEL D. MILLIKIN

Senior Editor  
JUDITH S. HURWITZ

Staff Writer  
DAVID S. MARSHAK

Sales  
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Customer Service  
DEBORAH A. HAY

Managing Editor RONNI T. MARSHAK

Associate Editors

JUDITH R. DAVIS  
33 Summit Road, Lexington, Massachusetts 02173  
Telephone: (617) 861-3926

DAVID L. TERRIE  
135 Vernon Road, Scituate, Massachusetts 02066  
Telephone: (617) 545-7401

Contributing Editor

GARY J. NUTT  
3450 22nd Street, Boulder, Colorado 80302  
Telephone: (303) 444-0341

148 State Street, Suite 612, Boston, Massachusetts 02109 Telephone: (617) 742-5200 FAX: 1-617-742-1028

## • POSIX •

(continued from page 1) running different operating systems. The goal of these standards is to create a set of facilities that will allow a wide range of existing and potential systems to run on a broad array of hardware. These facilities will range from commands for accessing files to detailed error messages and security controls.

Just as an effort to have one universal language for human interaction—Esperanto—never quite made it, so it is clear that there will never be one operating system that will solve the requirements of all vendors in all markets. While System V Unix has increasingly emerged as a de facto standard within the Unix community, almost all vendors adopting Unix have taken pains to add their own value to the operating system. Even if they have left the kernel intact, many have extended it with a vast array of bells and whistles. For example, IBM has created virtual memory addressing as part of its Unix operating system. In addition, vendors (Digital Equipment Corporation being the most vocal) resist the notion of a competitor controlling the testing for compliance.

Even more significant is the reality that a majority of the best commercial software is written for proprietary operating systems. It is pretty much assured that these operating systems—everything from IBM's VM and MVS and Digital's VMS operating system—are likely to thrive for quite a long time.

How, then, could a standard operating system come into being? To avoid the potential foibles inherent in requiring all systems to look exactly alike, the creators of Posix took a different tack. Instead of trying to change the world to be solely Unix, it would create a facility that could be added to any operating system. This facility would act as interpreter between the applications software and the operating system. This is called an "interface definition." Unlike an operating system, an interface definition sits between the application and the operating system. It includes system calls ranging from the commands typed in by a user to open files to the way a directory is read. In fact, both Posix, and, specifically, the first of the standards to be codified (1003.1), are based on Sections 2 and 3 of the *AT&T Unix System Programmers Manual*.

Here's an example of the significance of Posix. Digital is actively working to make its popular-but-proprietary VMS operating system Posix compliant. For the Digital user, this would open up a new potential for adding a vast array of Unix-based applications software not yet ported to the Digital world. For software developers, porting Unix-based programs to the VAX would be easy, without a lot of time spent rewriting code. For Digital itself, it has even more significance. Simply put, VMS is a powerful operating system written to take advantage of the VAX architecture. Once VMS becomes Posix compliant, not only does it open up Digital's markets to more end-user business, but it further opens the VAX to effectively compete in the lucrative government market. The government market is increasingly requiring Unix and long-term Posix compliance in its systems remote function protocols (RFPs).

## Historical Perspective

Posix has been evolving for the past six years. Back in 1981, /usr/group formed a standards committee to establish a standard for systems that would have the same functionality as AT&T's System V without the restriction of being tied to an AT&T-controlled product. Software vendors such as Microsoft, Charles River Data, and Ryan McFarland, as well as Interactive Systems and Unisoft, joined the standardization effort. Hewlett-Packard (HP) was the first major hardware vendor to join, quickly followed by Digital and IBM. By 1984, /usr/group had adopted a standard as a result of its three-year effort. A year later, the /usr/group Committee merged with the IEEE 1003 Working Group. The intended result was to establish an American National Standards Institute (ANSI) standard. In time, the size of the working group forging this new standard numbered over 200 members. In April 1986, an IEEE Trial-Use Standard for Posix, known as P1003.1, was published. Later in 1986, the IEEE conducted a survey of more than 350 IEEE member corporations

### What's in Posix?

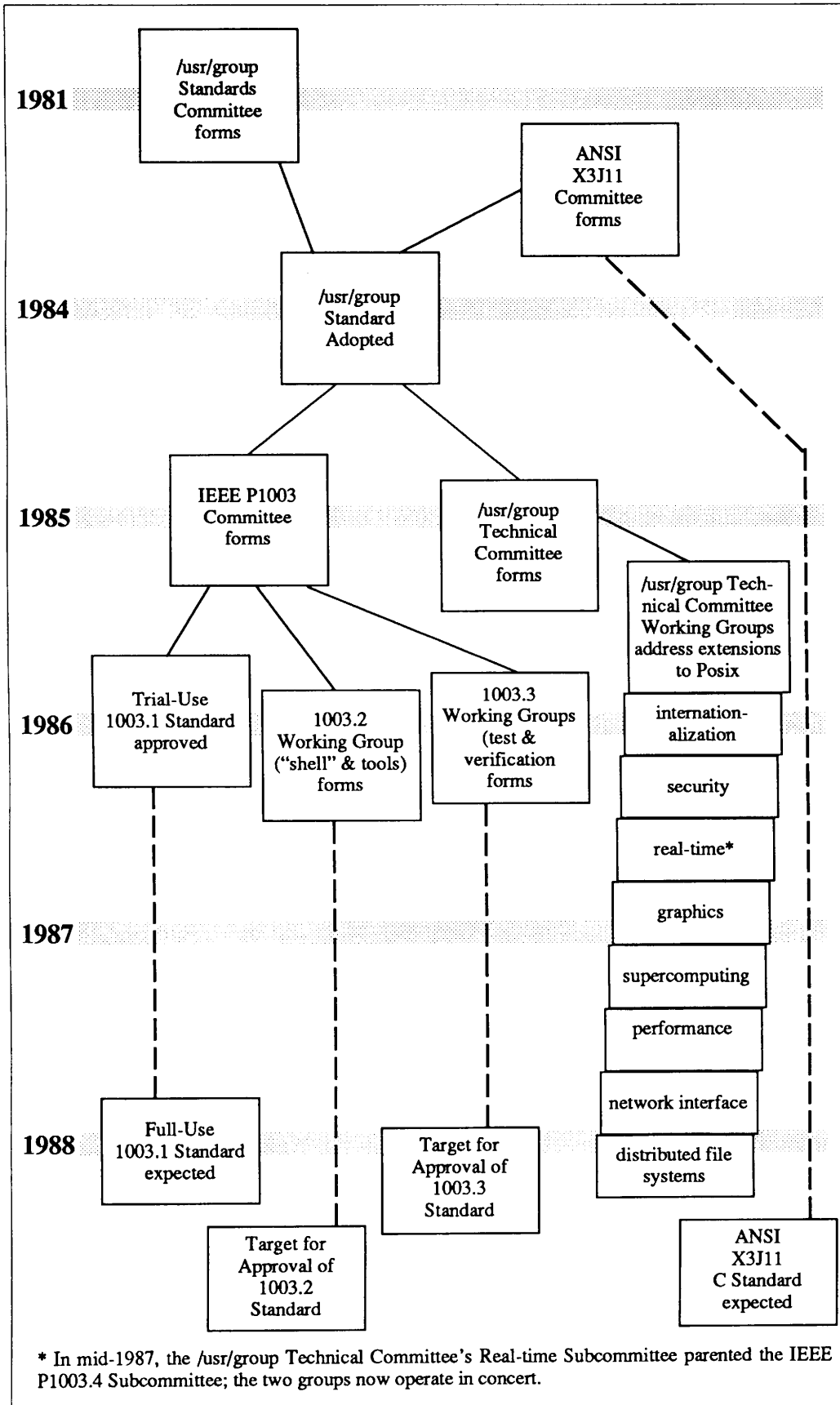
- Library functions
- Operating system interface
- Shells
- Utilities
- C language binding

### What Will Be in Posix?

- Ada binding
- Fortran binding
- Cobol binding
- Security
- Real-time extensions

### What's Not in Posix?

- OS administrative commands
- Systems processes
- Installation configurations
- Operating systems maintenance
- File systems
- Networking commands
- Terminal control
- User interface
- Window managers
- Graphics programs and interfaces
- Text-formatting programs or languages
- Database programs
- Database interface



and institutions. In January 1987, 56 companies submitted written endorsements and "qualified statements of support for Posix." Posix was also endorsed by the National Bureau of Standards (NBS) as the basis for its Federal Information-Processing Standard (FIPS), and X/Open pledged its support of Posix.

## Posix Implications

The broad range of Posix options provides some interesting implications for users. Corporations with investments in proprietary software could remain with a proprietary operating system in which they had already invested applications software development. At the same time, as their systems vendors added Posix compliance, they could gain access to a new range of options. Thus, users would be able to have the best of both worlds: proprietary and standard. Of course, these vendors would first have to commit to support for Posix. As with any standard, no organization can be forced to implement Posix—except by governmental mandate. Eventual compliance will come from the urging of customers and software developers.

In the long term, Posix could have an important impact on the availability of software. First, the possibility of having truly portable applications would be vastly improved. As one independent software vendor (ISV) so aptly points out, 30 ports to different Unix-based hardware platforms, each taking three weeks, still nets almost

The History of the Posix Standard.

two years of work. In a world where most vendors decided to conform to Posix, an ISV could port to those 30 hardware platforms in a matter of weeks. Therefore, many more software products would be available on more platforms. An end-user organization could have the luxury of choosing the best hardware for the organization's needs from the vendor that offered the best added value (e.g., service, technical support, and training). Then the end user could find the software package and have it ported.

How long will users have to wait for this utopia? It is hard to predict precisely when pending standards will actually be approved. Standards bodies are made up of representatives of a variety of vendor organizations. Each vendor has some strong beliefs about how certain functions should be developed and structured. Therefore, creating a standard is an ordeal of compromise and re-compromise. It can take a long time. As a result, all phases of Posix will unwind slowly. It is not surprising that the first phase of Posix has taken almost seven years to reach its current stage: Draft 12 of the proposed standard. If all progresses as planned, the P1003.1 Draft is expected to be adopted by March. Once accepted, it will become an official IEEE and ANSI standard. At this time, Draft 12 is registered as an International Standards Organization (ISO) draft international standard and is undergoing a 90-day trial.

## Portability: At the Core

What does this strange assortment of numbers mean for the end user whose only real concern is that years of applications development not self-destruct if the hardware changes? (See box, this page). At the most fundamental level, the eventual completion of the Posix standard will mean that applications will be portable at the source-code level from one vendor's systems environment to another's. Of course, both vendors would have to adopt the Posix standard.

To understand how this emerging standard will affect the user community in the long term, it is important to understand what is and is not included in Posix.

**P1003.1: OPERATING SYSTEM SERVICES.** The 1003.1 Standard includes the interface to operating system services at the C language source-code level. However, the characteristics of the standard go beyond most language facilities because they include input/output (I/O), memory management, process management, and the operating environment. Those closest to the standard emphasize that Posix concentrates not on implementation but on interface. Therefore, an implementation that conforms to Posix could be based on AT&T Unix System V or on Berkeley Software Distribution (BSD) 4.3. A conforming implementation could be a hosted or virtual machine environment based on some other operating systems. A vendor could add the Posix commands as a layer on top of its proprietary operating system, or commands could actually be integrated into the operating system itself. A third option would be for a vendor to have Posix functions accessible but not directly linked to the

operating system. This is not a new concept in the Unix world. For example, Apollo has a proprietary Unix-like operating system called Aegis that includes a hosted version of Posix. Cray Computer has a version of Unix that runs on top of its traditional operating system.

**What's In It?** What will P1003.1 provide? To start with, it will not include networking, database program design, distributed files, distributed systems, record management or transaction management, windowing, graphics, or user interface. Additional items outside the scope of Posix include such issues as operating system administrative commands, systems processes, installation configuration, and maintenance of the operating system or filing systems. These critical system features are being addressed either by other standards bodies or other parts of Posix that are still in early phases.

Posix itself was partially derived from AT&T's System 3 and is what Hal Jaspersen (chairman of the 1003.2 Committee and technical editor of the 1003.1 Standard) calls a severe subset of System V. However, Posix has incorporated some features of BSD into the standard. For example, job access control, the ability to access a print queue and stop a job, has been adopted from BSD.

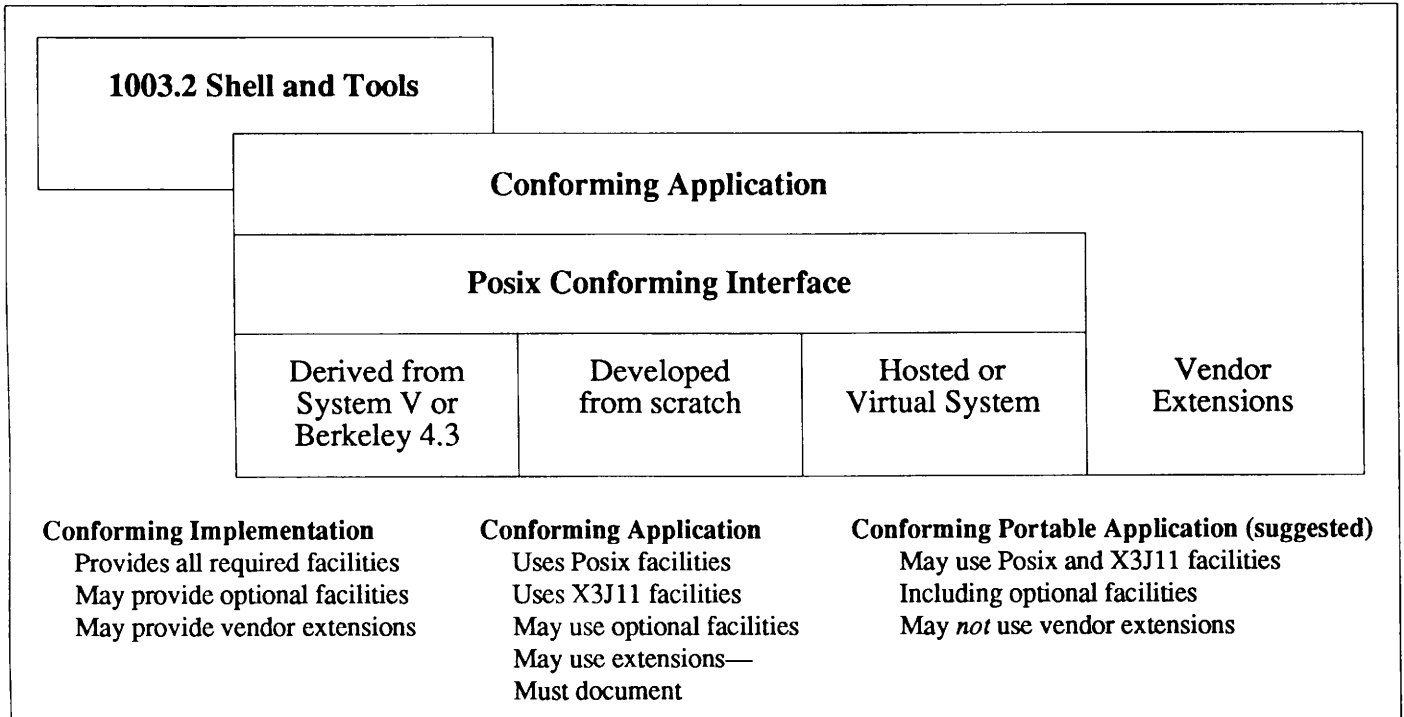
## The Working Groups of Posix

THE POSIX standardization effort consists of a number of working groups, each with a charter to handle a specific area of standardization. Each new level added to the standardization effort is given another level-identifier. Thus far, there are three working groups with draft standards:

- P1003.1 Working Group handles system calls, library functions, and the operating system interface to the C programming language.
- P1003.2 Working Group handles shells and utilities.
- P1003.3 Working Group handles verification suite.

Four additional working groups are at different stages of formation:

- P1003.4 Working Group for real-time extensions.
- P1003.5 Working Group for Ada binding to Posix.
- P1003.6 Working Group for security.
- P1003.7 Working Group will write a reference guide to open systems. This guide will instruct users and vendors where to find references to standards from all the various standards organizations.



*Applications can have different levels of conformance to the Posix standard.*

Posix prescribes a common way for directories to be handled. In the traditional Unix environment, which is actually quite simple, directories are treated as files within a tree structure. Therefore, directories are considered one file. The problem occurs on two fronts when programs try to transverse directories because the programs have to know about the directory structure where the file resides. First, the directory structure as it exists in System V allows any user to see any file as long as the user knows the directory name. Therefore, security could be compromised. On the other hand, a program that does not know the directory name will not be able to find a file. This could cause problems in a networking environment where a Unix system needs to access another operating system (i.e., VM, MVS, or DOS) that does not include the same filing system.

To overcome this problem, the Posix committee set about designing a set of routines for manipulating directories. Posix also leaves open the possibility of adding subroutines to the operating system to add a level of security.

Security is a major issue and the source of major heated debates within the 1003.1 Committee. It cuts right to the heart and soul of Unix. It is no secret that security is not the strong suit of the operating system. In some respects, it was designed that way. Because it began as a research and development tool, security was viewed as a hindrance to creativity and not a major concern. As long as Unix remained in the laboratory, this could be tolerated.

**ENTERING THE COMMERCIAL WORLD.** As soon as Unix put a toe in the commercial world, security suddenly emerged as a major concern. Two examples illustrate this point:

- The password file within System V Unix is easily accessible.
- The existence of a super-user creates a potential security breach. The super-user in the Unix environment has a password that allows access to everything within a system, overriding any security mechanisms.

**DEFINING COMPROMISE.** As in any group that must reach consensus, the Posix committee made compromises. Draft 12 of 1003.1 contains a set of restrictions intended to safeguard the password file and directories from unauthorized tampering. To accomplish this, the committee took its cue from the directory-accessing method used in BSD 4.3., which controls directory access by subroutines. These subroutines can provide information about which users should and should not see a directory, for example. In this way, the subroutine can actually hide a directory from a user's view.

The existence of the super-user has been much more problematic. Long-time Unix gurus protest that the ability to become a super-user is critical for developers who must test software under all circumstances. They bitterly argue that the super-user capability is one of the clear benefits of Unix. Others, especially in the commercial and government arenas, are not so sure. Instead of "super-user," the capability has been called "appropriate privilege." While the distinction may appear subtle, it does differentiate between the all-powerful user and one that has access to certain security areas. As a compromise, the following was written into the P1003.1 draft:

"One of the fundamental security problems with Unix

systems has been that the privilege mechanism is monolithic—a user has either no privileges or all privileges. Thus, a successful ‘Trojan horse’ attack on a privileged process defeats all security provisions. Therefore, the standard allows more granular privilege mechanisms to be defined. For many existing implementations of the Unix system, the presence of the term appropriate privilege in this standard may be understood as a synonym for super-user. However, future systems will undoubtedly emerge where this is not the case, and each discrete controllable action will have appropriate privileges associated with it.”

P1003.1 addresses only the tip of the security iceberg. There are many more critical security requirements that it does not address. This is no accident. Security itself is such a large issue that drafters of the proposed standard wisely left security for a

future working group. In the meantime, AT&T has begun to address the deficiencies of Unix by introducing a B2 (military-level security requirement) version of Unix to meet military standards. In the long term, it is possible that these characteristics will find their way into Posix.

**THE SIMPLIFIED INTERFACE.** Writers of the P1003.1 draft took great care to keep the interface definition simple. The philosophy was that if Posix were, in essence, the lowest common denominator, then more vendors of Unix and non-Unix based systems would adopt it. How was this accomplished? First, variable names retain their upper- and lowercase-letter distinction. The draft standard recommends that only capital letters, underscores, and numbers be used for file names and that the first character be a letter. The standard also recommends that

## The National Bureau of Standards

**T**HE U.S. GOVERNMENT’S attitude towards standards took center stage when the U.S. Air Force sent forth a Request for Proposal (RFP) for billions of dollars in Unix- and, eventually, Posix-based systems. To help in future requisitions, the National Bureau of Standards (NBS) has established The Institute for Computer Technology. Its charter is to increase quality and productivity in the government and private sectors through international standards and guidelines for computer systems and software. Its first task is to advise federal government agencies on the types of systems requirements they should ask for when they request a bid for new computers. At present, the agency is working on the Federal Information-Processing Standard (FIPS) to help simplify the federal procurement procedure. NBS has decided that it will use Posix as a standard. In fact, because of the critical need within the federal government, NBS will not wait for the spec to go through the approval process. It will use the trial standard as the NBS FIPS standard. Why the rush? According to NBS’s Roger Martin, chairman of the P1003.3 Committee of Posix, NBS made a commitment to federal government agencies to have a Posix specification available for use by January 1988. In addition, NBS plans to work closely with X/Open to help it continue to define the full standards environment.

However, for the NBS, Posix is only the first step in the portability issue, according to Martin. “The larger issue is the work that will promote portability. We won’t ever be able to guarantee portability. There are too many issues.” Martin points to the areas that Posix does not yet address, such as databases, graphics, filing systems, and communications. “At the National Bureau of Standards, we refer to Posix as an applications portability architecture, the operating system’s interface. From this perspective, Posix is the answer.” He believes that, for the broader picture, X/Open has the right

idea. “Their goal of addressing all the broad issues is correct. They have been very helpful—their goal of portability is similar to our goal.” NBS is taking a similar approach with FIPS.

In some aspects, FIPS is even broader than X/Open. Its vision incorporates a long list of areas:

- User interface (including X-Window support)
- SQL data query language
- Database management and relational databases
- Graphics Kernel System (GKS) graphics standard
- Standard Graphics Markup Language (SGML) publishing graphics standard
- Document processing
- Office document architecture/office document format (ODA/ODIF) standards for document interchange
- Network File System (NFS) and Network Computing System (NCS) within the network computing environment
- Language support including C, Cobol, Fortran, Ada, and Pascal

In the long term, Martin expects to see the Posix standard move forward along with other ANSI and ISO goals. “We want to see the move to national, international, and federal standards to all be the same standard. In my view, this is well within our grasp,” explains Martin.

## The Players in the Standards Arena

- /usr/group, a non-profit trade association dedicated to the promotion of the Unix operating system. Since its formation in 1980, the group has championed the cause of the Unix operating system as a de facto and, eventually, a de jure operating system standard. Working groups within the organization did the original work on Posix before its working group merged with the IEEE working group. Currently, the Technical Committee is working on a proposed standard for distributed file systems and for a transport mechanism.
- IEEE, a standards organization that has a charter aimed at establishing vendor-sanctioned de jure standards. It covers all computer, electronics, and electrical standards. Its many working groups, staffed by representatives from vendor organizations, write the drafts of proposed standards. These drafts are revised and refined until most of the member organizations agree on how the standard should be worded. Needless to say, certain issues take years to gain the seal of approval.
- CEBEMA, a computer-specific organization that also sponsors working groups on standards in such areas as workstation display, user interface, graphics, language bindings, database query language, etc. The projects covering these areas have the X3 designation. Many of these projects become ANSI-approved standards. The X3H3.6 Group is currently working on a proposed X-Window standard.
- X/Open, an international corporation established to gather de jure standards where they exist and de facto standards where none exist, and to help the international community move toward a common applications environment. To aid this process, X/Open actively participates on various industry standards boards, helping to make de facto standards a reality. Then, to help companies implement these standards, X/Open has incorporated the standards into a series of "portability guides."
- National Bureau of Standards (NBS) is working to help establish these same standards from the U.S. government perspective. It is actively cooperating with groups like the IEEE and X/Open to help come up with a Federal Information-Processing Standard (FIPS).

Other working groups are proceeding on the communications front to establish standards based on the International Standards Organization (ISO) and its proposed seven-layer communications standard. This standard is being considered as a Posix communications standard. Another organization heavily involved in moving standards in the communications arena is the Corporation for Open Systems (COS). It is clear that communications standards contribute a linchpin in the standards arena, and they will be discussed in later issues.

passwords be restricted to 8 bytes and that the maximum number of bytes in a file name be 14. To terminate an action, the "exit" function should be used. P1003.1 also requires that a system be identified by reference to the operating system, node name, release level, version level, and machine.

Another area where Posix is advocating conformity is the initiation of programs. A process primitive details exactly how programs are to run. P1003.1 requires that running a program take two steps. First, a "fork" function is called to produce a new process. Second, the new process calls one of the "execute" functions that actually starts the new program. Another rule states that file locks previously set by the parent process are not inherited by the child process.

Posix attempts to select a single method of Data Interchange Format, a term indicating the methodology used for tape backup of data. However, this is an area of controversy. While the AT&T-supported CPIO format is proposed in P1003.1, some factions among the balloting companies want the BSD-oriented format (TAR) to be approved.

The Posix committee realized that error-handling within the

Unix environment had to be improved to make the standard widely accepted. Therefore, Posix has enhanced the error-handling mechanisms of the traditional Unix environment.

**A CAVEAT.** While the previous discussion implies one cohesive interface definition that could lead to total conformity, some subtleties are part of the standard. There are actually two possible types of implementation: strictly conforming applications and conforming applications. These degrees of conformity are indicated by the wording within the draft proposal. For example, when the word "shall" is used to describe how a function should be worded or performed, any conforming application would have to use it. However, if the term "should" is used, the committee recommends the implementation without forcing it. A third level of option is indicated by the term "may." An optional characteristic allows a vendor to accept or reject the suggestion.

**C LANGUAGE BINDING.** The C programming language plays a key role in the Posix interface. This is logical since Unix is so



closely tied to C. However, the committee plans to create bindings for Ada, Fortran, Cobol, and Pascal to satisfy the needs of a broad range of applications and types of users in the future.

### Future Posix Working Groups: Beyond P1003.1

While the linchpin of Posix is the interface definition, present and future working groups will help shape the standards environment. In addition to P1003.1, two other working groups have created draft standards. P1003.2 encompasses shells and utilities, while P1003.3 concentrates on a test verification suite.

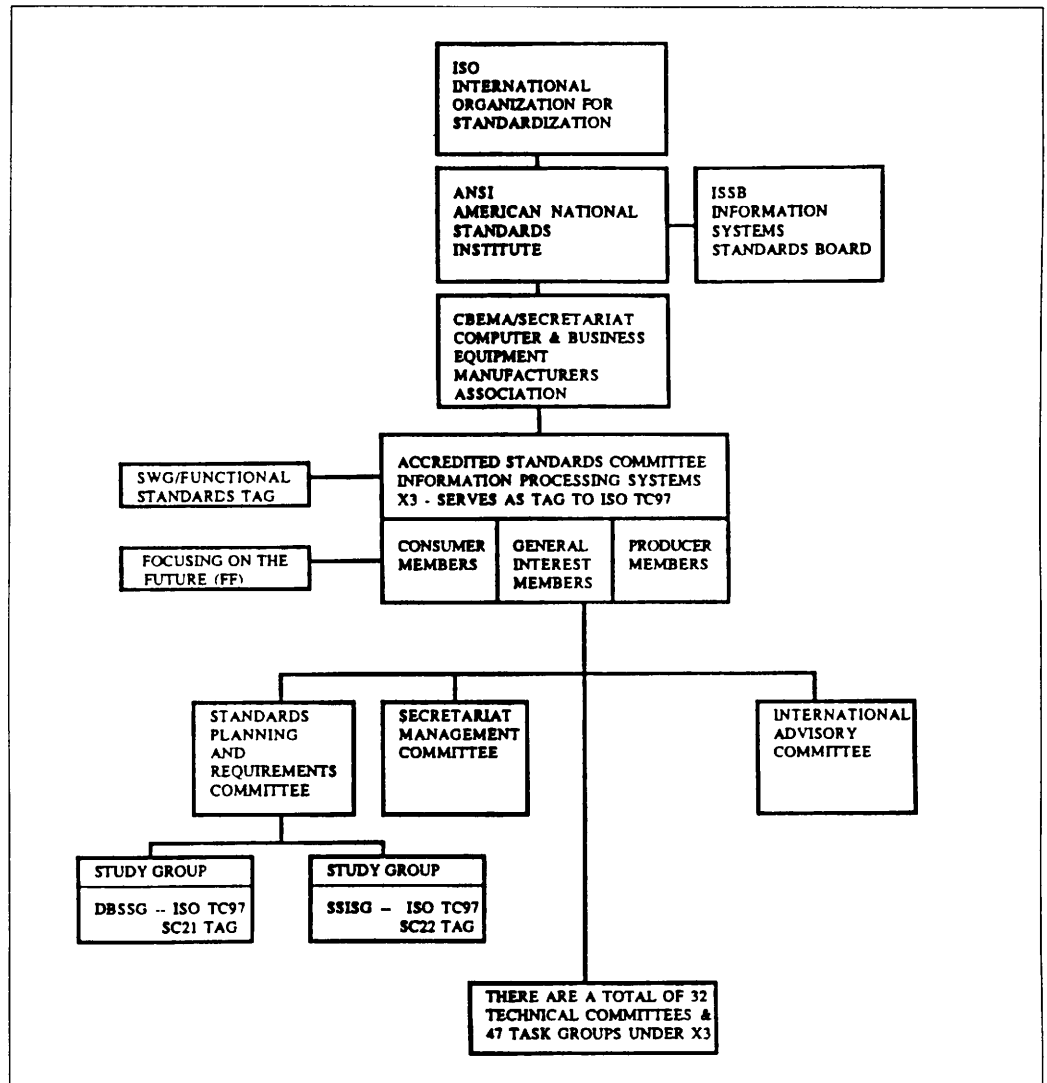
**P1003.2: SHELLS AND TOOLS.** The adoption of a shell command-interpretter is intended to provide a facility for an interface between actual applications and the user. Although this does not include the look and feel of that interface, it provides mechanisms to proceduralize functions for users. Shells, in fact, are skeletons of macros—scripts to build procedures. The Posix standard for shells is based on the popular Bourne Shell, which predominates in AT&T System V. Therefore, when P1003.2 is approved, there will, in essence, be one command language that all systems would use to proceduralize functions for the user.

The draft standard defines a source-code-level interface to shell services and common utility programs for application programs conforming to P1003.1. Source-code-level compatibility means that an applications program would have to be recompiled to operate on another version of Unix. Posix does not intend to develop object-code compatibility. The standard will include utilities that can be called from within applications programs that allow complex data manipulation and other tasks, such as sorting.

**P1003.3: TEST VERIFICATION.** To ensure that systems created on the Posix model

indeed conform to the specification, Posix is in the process of defining a series of conformance tests. When the IEEE was beginning the process of designing tests, several vendors in the business, including HP and AT&T, offered their proprietary testing suites as a basis for the new standard. X/Open offered its VS/X Test Suite. In the end, the IEEE decided that it would use a subset of AT&T's System V Verification Suite (SVVS) as the basis for its own suite. The proposed suite, called Conformance Test Suite (CTS), was modified from AT&T's suite to include some new tests based on Posix characteristics.

**P1003.4: REAL-TIME EXTENSIONS.** Real-time needs of process control and database applications are being addressed in the P1003.4 working group. The work of P1003.4 is based on the first /usr/group Technical Committee subcommittee (The Real-time Subcommittee). For example, Unix has long been criticized for its inability to handle online transaction processing database requirements. Because Unix itself is an old operating system



This chart shows the relationship between ISO, ANSI, CEBEMA, and the X3 standards working groups.

architecture, it was not written to handle the instantaneous response required by newer applications. In many implementations of Unix, this deficiency has been addressed by overlaying real-time features on the operating system. The newly-formed P1003.4 committee will try to define ways for real-time and, therefore, applications like online transaction processing and process control applications to be handled.

#### **P1003.5 WORKING GROUP: ADA BINDING TO POSIX.**

Ada is the Pascal-based language developed for C (Command Control and Communications) applications for the U.S. Army. The intent was to develop a powerful real-time environment for use in such weaponry as "smart bombs." In addition, Ada was conceived as a potential standard programming language for military applications because of its modular programming methodology. While its use has developed slowly over the five years since its development, it is beginning to pick up steam. Adding Ada bindings to Posix should add to its viability in the government and, potentially, in the commercial sector.

**P1003.6 WORKING GROUP: SECURITY.** As the government has begun to view Unix and, ultimately, Posix as its standard operating environment, security becomes an obvious area where improvement is critical. AT&T has already announced that it is on the verge of sending out a new secure version of System V called Release X/MLR. This operating system release, developed by AT&T's Federal Systems Division, will be submitted for a B1 security clearance rating at the beginning of 1988. Within a few years, AT&T intends to obtain the higher level B2 security level. To achieve B2 would require substantial rewriting of the operating system, according to AT&T. It is probable that the IEEE will take its cue from AT&T's work for the Posix implementation of security.

**P1003.7: A REFERENCE GUIDE.** The IEEE committee members realize that if standards are to proliferate among hardware, software, and end-user organizations, information about how to implement them must be available. X/Open has demonstrated that providing reference materials is a powerful tool. Therefore, IEEE plans to undertake a future project of providing a reference directory specifying where vendors and users can go to find information about the myriad of standards being developed and sanctioned. For example, the guide would direct a user to an ANSI standard for a programming language and indicate the number of the standard and where details can be found.

## **Future 1003 Committees**

Other topics being discussed within both \usr\group and the IEEE include some critical areas not yet incorporated into a

working group. Some of these include internationalization, graphics and windows, performance measurement, network interface, distributed file system, and supercomputing.

## **Conclusion**

It is becoming increasingly clear that the day of the captive computer systems user will become a thing of the past. We are slowly moving beyond the notion of a proprietary operating system, where a helpless user is forced to remain tied to one vendor. Standards committees and workgroups, like Posix, are working hard to provide the vehicles to change the current reality. However, the real push to make these standards living documents will come from the end-user community. Indeed, such an effort is no small feat and requires the concerted efforts of many hardware vendors, software developers, and corporate users.

Organizations like X/Open are critical in the formula of making the standards environment a living set of tools that users can easily implement. X/Open is especially critical in an increasingly complex world of standards in that it attempts to point the way to an overall "common applications environment." The strength of a common applications environment is the ability to look at a broad picture that addresses the common needs and concerns of users. As X/Open continues to include more and more critical components, such as user interface, it will become a more valuable resource to users.

So what does it all mean to the corporate user already knee-deep in proprietary hardware and software? Simply put, it provides an answer for the future and a way to safely migrate to standards without fear of losing an increasingly valuable resource—applications programs.

This move towards standards has a down side: It is a very slow process. We believe that several years will pass before the word trickles down to most end-user organizations and even more years before many corporations implement these standards. Despite these timing problems, standards are still worth the wait and the effort. We therefore encourage corporate planners to endorse and select Posix as a standard for future development work. We encourage users to look at the model of the Common Applications Environment created by X/Open. Why? We believe that the work undertaken by the IEEE, \usr\group, CEBEMA, X/Open, the NBS, and others point to a future where standards will be the rule, not the exception. The beauty of an implementation of standards in the form of Posix is that it does not prevent any operating system from having a role within the standards environment. We believe this approach to creating a standard operating system interface will propel the Unix concept into the foreground of interest. Therefore, users must be ready to both advocate and implement this effort. ●

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*Organizations like X/Open are critical in the formula of making the standards environment a living set of tools that users can easily implement.*

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# X/Open

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## *The Common Applications Environment*

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By Judith S. Hurwitz

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**X**/OPEN, AN INCORPORATED consortium of vendors, has a broad vision: a world where commercial applications can be run on any hardware, software, and networked platform worldwide. X/Open's mission is to promulgate the use of standards in the commercial world. X/Open's aim is to develop what it calls "a free and open market" for its members. Thus far, 11 companies have joined the international consortium. The membership roster remains small because of the requirements of membership. First, each member must pay \$250,000. Second, each company must pledge to create systems that conform to the consortium's open systems specifications. While the 11 contributing members are chartered to produce compliant systems, they are also free to develop other open or proprietary systems.

X/Open has an international flavor. A majority of its members are European vendors, including Bull, ICL, Siemens, Olivetti, Philips, Ericsson, and Nixdorf. Other members have extensive business in the European marketplace, including Hewlett-Packard, Digital, AT&T, and Unisys.

**THE PORTABILITY GUIDE.** The realization of the X/Open vision is manifested in its *Portability Guide*. This five-volume reference manual provides members and other interested parties with a how-to for implementing this set of standards. X/Open calls these standards the Common Applications Environment (CAE). Applications software built to the CAE standards will operate across all compliant machines produced by X/Open members.

The CAE will encompass a broad set of standards ranging from a portable operating system to communications standards to standards for user interface, data management, and programming languages. However, X/Open's policy is to adopt standards, not to create them. If no agreed-upon standard exists, it will select a de facto standard and adopt it. It will also find a sanctioned standards body and work with it to ensure that appropriate de facto standards find their way into the standards creation process. For example, X/Open selected AT&T's System V as its operating system, System V Interface Definition (SVID) as its interface definition, and the C language. At the same time, it has worked closely with the IEEE in the Posix standardization effort. Last year, X/Open formally endorsed Posix and has actively participated in the standards effort. In fact, X/Open is an official participant in the Posix committees.

X/Open considers the standards defined within the *Portability Guide* to be an evolving portfolio of practical standards for applications portability. In other words, as new standards are approved by standards bodies, they will be incorporated as part of the *Portability Guide* and, therefore, into the Common Applications Environment. Issue 2 of the *Portability Guide*, published in January 1987, comprises five volumes defining the interfaces currently identified as CAE components. The guide is intended to serve as a desktop guide for "anyone directly concerned with the practical side of software development, namely systems designers, programmers, and consultants."

X/Open hopes that, in the long run, users and software developers will benefit by:

- An ease of portability
- No dependence on a single source for software and, therefore, freedom of choice
- Increased applications software selection
- More security in software investment
- International support for the CAE

In this new environment as seen by X/Open, with a mature CAE, users can mix and match systems from different suppliers, moving applications between machines to meet changing requirements as business grows. X/Open hopes for the day when users will specify the X/Open CAE as a procurement policy for software, hardware systems, and support services throughout their organizations. The *Portability Guide* is intended to be a "shorthand" way of providing all the necessary specifications for "maximum software portability." To ensure that X/Open is meeting the needs of users, it plans to solicit input from users and ISVs, as well as member companies.

How have outside organizations responded to the X/Open vision? It appears that the first converts come from the government sector. This is not surprising, since the tremendous needs for systems and software have led governments to look at standardization as a cost-cutting measure. Government agencies both in Europe and the United States have become early supporters. One of X/Open's recent achievements is the endorsement of the U.S. National Bureau of Standards (NBS) for Computer Sciences and Technology. X/Open will help to assist NBS in defining the needs of users in the federal government. As part of this effort, the two groups will specify systems standards for incorporation into the CAE. In addition, the U.S. Treasury Department has selected X/Open to help it define its needs for a system that will be developed for the Internal Revenue Service (IRS). Later in 1988, the IRS will begin to solicit bids for a \$1.8 billion procurement of systems that will be based on the CAE.

Other endorsements have come from the European community. For example, the Commission of the European Communities and the United Kingdom Central Computer and Telecommunications Agency have endorsed X/Open. These agencies will use the CAE as the basis for their procurements.

The *Portability Guide* itself is a detailed specification—a how-to guide to standards. It is written simply and in straightforward language. The following are some of the highlights detailed in the five volumes:

**Operating System.** X/Open has defined its own version of the interface definition called X/Open System V Specification (XVS). It provides the underlying operating system and forms the

foundation of the CAE. XVS is based upon the AT&T SVID, which is defined in a multivolume publication. In addition, it takes into account the trial use standard published by IEEE and compatibility with existing AT&T System V product.

Areas of the operating system covered within the *Portability Guide* include:

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*The first converts  
to the X/Open vision come  
from the government  
sector.*

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- "Commands and Utilities" broadly corresponds to Volume 2 of SVID. As in the case of Posix 1003.1, system administration is outside of the scope of the CAE. X/Open makes a point of limiting the options defined for many of the

commands because there are just too many of them.

- "XVS Terminal Interfaces," a set of portable interfaces to locally connect asynchronous terminals, broadly corresponds to the AT&T Terminal Interface Extension in Volume 2 of the SVID.
- "XVS Inter-Process Communication" defines the interfaces to shared memory, semaphores, and message-passing. It also includes an interim mechanism to satisfy the immediate requirements of interprocess communication facilities.
- "System Calls and Libraries" corresponds to SVID Volume 1. It includes a definition of interfaces to system calls and library routines.

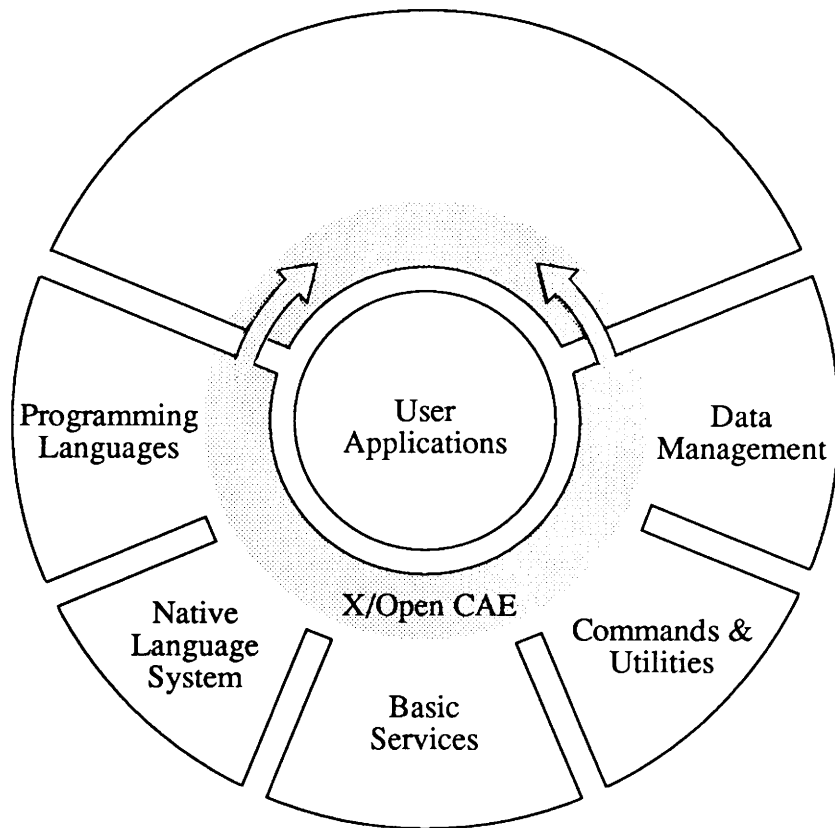
In addition, X/Open has extended SVID in the following areas:

- Increased use of symbolic names to replace numeric constants. This use was begun with SVID but has been expanded in CAE.
- The specification of SVID has been tightened to clarify wording.
- Clerical errors in SVID have been corrected.
- Additional System V.2 functions have been defined. These are functions already in wide use by application developers.

XVS incorporates all the interfaces within the SVID kernel extension set, although a number are defined as optional. XVS defines interfaces in terms of their interface syntax and run-time behavior. As with Posix, the organization is not concerned with methods of implementation.

**Language Support.** X/Open realizes the need to satisfy the

## The X/Open CAE Concept



*The components of the Common Application Environment.*

requirements for such issues as data management, integrated applications, data communication, distributed systems, and the use of high-level languages. Therefore, for example, X/Open is concentrating on the C language as a standard. It is working closely with ANSI on its efforts to produce an international standard for the C language. X/Open's *Portability Guide* attempts to take a real-world attitude to addressing problems of users. For example, it supports a utility called lint that ensures that C source programs conform to portability rules. This is because the existing definition for ANSI C does not support non-portable C language constructs. Other high-level languages will be part of CAE, including Fortran-77 and ISO-Pascal. In addition, the CAE includes the ANSI 1974 Cobol standard. However, that definition has been extended to support interactive operation by addition of "accept" and "display" verbs.

**Native Language System (NLS).** The Native Language System (NLS) is a set of interfaces designed to facilitate the development of applications that can operate within many different languages and cultures. The interface has been derived from the native-language support system developed by Hewlett-Packard. X/

Open added some enhancements to more closely relate the standard to the internationalization proposals of the draft-proposed ANSI standard for the C Programming language. The change allows 8-bit characters to operate within the environment. The 8-bit character set is required for vendors selling in Western European markets.

**The C Language.** X/Open is working closely with ANSI on its C language standards committee, X3J11. The group is represented on the committee by member companies and intends to adopt the standard once it becomes practical.

**Data Management.** A key component in the CAE is data management. X/Open adopted definitions of interfaces for the creation and management of indexed files and for access to relational database systems. It selected the widely used C-ISAM (Indexed Sequential Access Method). In addition, because relational databases are becoming increasingly important, X/Open has standardized on the ANSI-approved SQL (ANS X3.135-1986). However, X/Open has added compliance requirements for both Levels 1 and 2 of the standard.

**Networking and Communications.** X/Open intends to embrace the International Standards Organization (ISO) Open Systems Interface (OSI) Standards Model. This seven-layer model sets a framework for protocol and communications service standards. However, the full set of standards does not yet exist. In the meantime, X/Open has looked to a group formed by 12 European vendors who will create interim communications standards. The European Strategic Programme for Research (ESPRIT) has established the Standards Promotion and Applications group (SPAG) to carry out its mission. Specifically, X/Open has identified two services that support the System V interface: the generalized Inter-Process Communication (IPC) and the Distributed File System.

**Distributed Transaction Processing.** Transaction processing has never been the key strength of the Unix operating system. X/Open realizes that, in order for Unix and the various interface definitions to thrive, interactive transaction processing facilities have to be addressed. Because no standards organizations have yet addressed this issue, X/Open intends to take action to create a standard.

**CONCLUSION.** X/Open has made an excellent start. The CAE is an excellent vehicle to move users and vendors to the vision of a systems approach to standards. We look forward to the next steps in the CAE when X/Open begins to confront issues such as user interface standards and true distributed networking. ●

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- How will distributed computing affect the development of CSCW applications?

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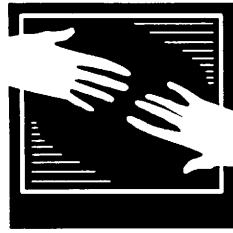
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• CSCW •



## The Proper Forum

**By Ronni T. Marshak**

Our industry thrives on new buzz words, and one of the buzziest of late is groupware. But we prefer the academic/research term Computer-Supported Cooperative Work (CSCW). The trend in corporate society is toward teamwork, group collaboration, and, until recently, there hasn't been a whole lot commercially available on the automation front to support this synergistic style. But new products designed to support just these types of functions are appearing, such as Context from Mentor Graphics (see *Office Computing Report*, Vol. 10, No. 5) and For Comment from Broderbound (see *Office Computing Report*, Vol. 9, No. 12).

**THE EDITORIAL PROCESS.** One of the obvious applications for CSCW is the group authoring and editing process. Most documents circulated in the business environment have been looked over by at least one pair of eyes besides the original author's. Vendors are jumping to offer products that augment this process. Most high-level word processing applications offer (or will soon offer) a redlining feature. This allows an editor (or collaborator) to make suggested changes to a document without disturbing the original. Typically, insertions are displayed in bold-face and deletions are underlined (on color monitors, different colors indicate

insertions and deletions).

Some products go further than simple redlining. They track revisions by author (who suggested which change) and offer revision control (who gets to decide which changes are actually implemented). These features are vital in tracking ownership of the final document. (A familiar example of the value of these features is the story of the airplane that lost its wing midflight. By tracking the revision process of the documentation, the blame was assigned to some poor slob way down the line of command.)

**DOCUFORUM.** Network Technologies International (Ann Arbor, Michigan) offers docuForum, a product that addresses these issues as well as several others: simultaneous editing of a document and the problem of authors working on different word processing software. It also provides extensive revision and document-tracking and library features for boilerplate document assembly (using standard sections of text to create new documents).

The multiuser system allows PC users connected to a Unix or Xenix host to simultaneously revise and redline a single document. The host server manages the document database, controls the multiple sessions, controls document access, and distributes the documents to the individual workstations. All word processing is done on the PC platforms using standard DOS

WP applications. Documents to be reviewed go through the server, and copies are downloaded onto the reviewers' PCs for redlining (see "Word Processing Interface" below). Once an author has put a file in for review, any authorized participant in the forum can access it. When a reviewer returns the document to the server, the proposed changes are all noted in the same document. This means that when you call a file for review after three other reviewers have taken a crack at it, you will be able to read all their comments in the one document.

The file is locked when the original author(s) is(are) working on it.

**System Requirements.** The current implementation of docuForum requires a Unix- or Xenix-based host with PCs as the authors' workstations. The docuForum product includes MS-DOS workstation software, called Forum-link, and host software which works with either Unix System V or 4.2BSD or a 286 or 386 processor running SCO Xenix. A new version of the product that will interface with a Unix-based host word processor and use terminals as workstations will be available in the first half of this year.

**The Forum Structure.** Network Technologies describes docuForum as a library with any number of branches housed in the same building. Each library has its own set of documents and stores all the editions (versions or drafts) of each document. Each branch library is called a forum. Forums are created by the system administrator who, according to the company, is like the head librarian.

Each forum provides the equivalent of a card catalogue: A list of documents in a forum indicates the document titles, the authors, and when a document was written. In addition, revision-tracking information is available that indicates when the document has been reviewed, by whom, how many times. Revision-tracking can be viewed in several ways. For example, one list shows the document and sec-



tion names and indicates if the author has made any revisions or changes (added new sections) since you last reviewed it. Another list indicates who has already seen it and who has not.

Long documents can be divided into sections or segments, like chapters in a book. This concept is actually a bit misleading, because the different sections are in fact different files on the authors' word processors. But docuForum can take these separate files and recognize them as parts of the same document (the author specifies this information).

There is also a useful reference library feature where "live" documents, such as a price catalogue or inventory list, are stored. Any changes to these documents are redlined so that anyone accessing the document will immediately note any new information.

**Who Owns the Document?** Only an author can actually change a document, but one document can have multiple authors as assigned by either the system administrator or the original author. Other collaborators are assigned status as either reviewers or observers. Reviewers may make revision suggestions. Observers have read-only permissions. They may review or print out the document, including suggested changes, but they may not suggest changes (electronically at least).

The author(s) can selectively choose to include or not include revisions, but revision suggestions cannot be deleted. This maintains an excellent audit trail in case of problems (such as when wings fall off airplanes).

**Security.** Participants are given access to the different forums by the system administrator. Within the forum, security status (author, reviewer, observer) is assigned by document or by section of a document. For example, within the Reports forum, an individual may be the author of one document, a reviewer of another document but only an observer of a particular section (such as the financial statements) of that same document, or be denied any access to

the file. In the latter case, the document will not appear on the list of available documents in the forum.

**Types of Revisions.** A reviewer can make two types of revisions: comments and markups. A comment is not an actual change to the document, but a message to the author. For example, "Joe, I think that the new legislation on highway taxes has implications here. Maybe a section should be added to address this."

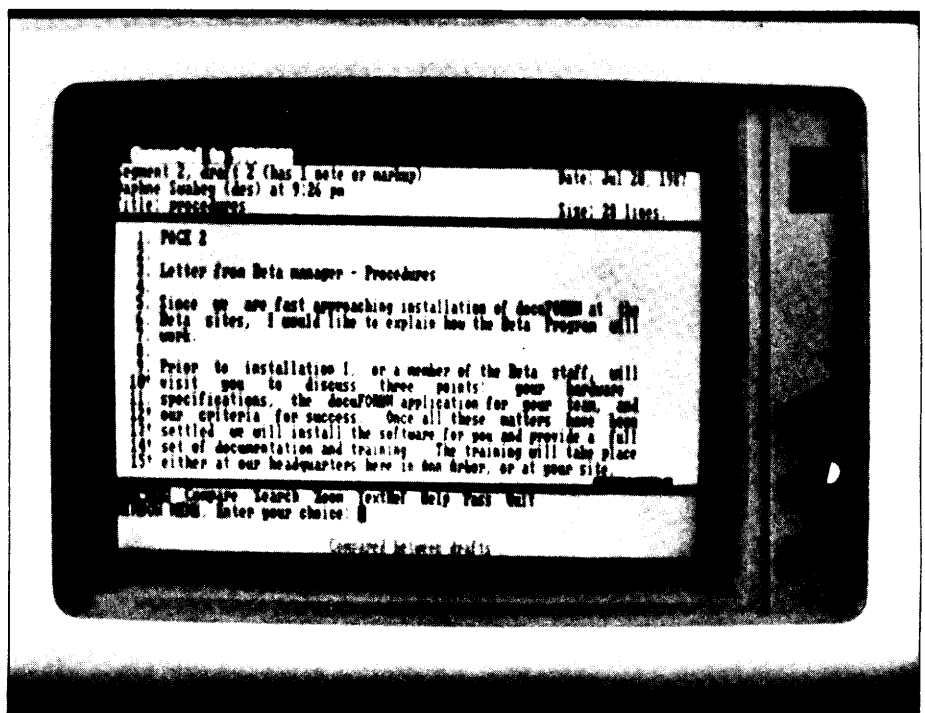
A markup is an actual suggested change to the wording of the file. For example, the statement "The Highway Commission sees its way clear to grant an extension into fiscal 1989" might be changed to "The Highway Commission plans to complete all work within fiscal 1988 in order to take advantage of existing tax implications."

**Word Processing Interface.** As we said, docuForum addresses the problem of different collaborators using different word processing packages. Most revision-tracking or redlining products only work within the same word processing environment. To overcome this,

docuForum creates its own environment which pulls text out of the various word processors so that it can be reviewed.

Let's describe how this works. The primary author is working in WordStar. When a draft of the document (or section of the document) is finished, she lets docuForum know that it is available for review and revision.

A reviewer who uses Word Perfect enters the docuForum environment, pulls up a list of documents available for review, and selects the appropriate file. It is transferred to the docuForum environment. But note that it is transferred *in ASCII form—no formatting is transferred*. The text is displayed in what looks like a line editor; each line of text is numbered and, indeed, is manipulated by line number. The reviewer selects the lines of text he wishes to change. The system then goes off and loads his word processing program (in this case, Word Perfect) and brings up an editing screen with the selected segment of text displayed. The reviewer uses his standard editing tools, with which he is familiar, to manipulate the document. To return the changed



The docuForum environment.

text to the docuForum environment, he exits word processing, saving the file. The change is indicated as a markup which the author, reviewer, or any other reviewer or observer can look at.

**The DocuForum Interface.** We aren't too crazy about the docuForum interface. For one thing, it really looks like a line editor. That gives it an old-fashioned, actually archaic, feel. But, more significantly, everything takes too many steps. You have to confirm practically every action. Even going through a structured tutorial, we got bogged down and impatient. Furthermore, the whole process is a little confusing initially.

**Functionality.** The product provides good revision-tracking and document

history. The security is also very good. And we like the reference library facility to redline constantly changing documents.

But there are limitations other than a less-than-elegant interface. Allowing only ASCII transfer of text is very limiting; the editorial and group writing cycles also involve formatting. And the process is not real-time. Reviewers are working on copies of the document, and therefore comments and markups from other reviewers do not display on their screens until they either exit to their word processor or select a new document in the docuForum environment. We would like to see either a revision pop up on the screen as it is made by another participant in the forum or a screen message indicating that a new revision has been made.

Network Technologies recognizes the desirability of such a feature in a highly interactive editing environment, but it has had no call from customers for such a capability.

**Conclusion.** But docuForum is a good start, and the company informs us that it is looking at OEM situations to help improve the interface problems and functionality. For example, docuForum could be bundled with a single word processor and could be made to take advantage of that package's features and interface.

As the world continues to stress cooperation and team effort, products like docuForum will thrive. For all its warts, the product addresses the sticky issues of CSCW and manages to deal with them all. ●

Patricia Seybold's  
**OFFICE COMPUTING GROUP**

## Consulting Services

**U**NLIKE THEIR COUNTERPARTS at most other industry groups, consultants for Patricia Seybold's OFFICE COMPUTING GROUP are also writers and editors with regular feature articles in the *OFFICE SYSTEMS REPORT* and its sister publications, *UNIX IN THE OFFICE* and *NETWORK MONITOR*.

**A**S WRITERS AND EDITORS, the consultants provide hands-on reviews of significant office systems, investigate the reliability of major systems vendors, and comment on the feasibility of emerging technolo-

gies . . . and all with an eye to the user's demands. This perspective allows consultants to integrate the capabilities of vendors and the needs of users into a coherent vision of the office systems marketplace.

**T**HE CONSULTANTS WHO make up the staff of Patricia Seybold's group are well known and widely respected throughout the industry. Individual staff members bring an average of more than 10 years office information systems experience, much of which includes extensive hands-on systems work.

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User consulting experience ranges from designing user interfaces to the design and implementation of corporate-wide office information systems. They include:

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- strategic planning and trend analysis
- product and vendor analysis
- assessing and recommending vendor training, service and support
- controlling and optimizing end-user and departmental computing
- devising end-user and departmental system strategies
- RFP development and evaluation

### PARTIAL CLIENT LIST:

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Price Waterhouse  
Boston Children's Hospital  
Connecticut General  
Brean Murray Foster

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Wang Laboratories  
Data General  
Hewlett-Packard  
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Apple

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As a direct result of consulting work with users, the OFFICE COMPUTING GROUP brings a unique perspective to its work with vendors. These projects involve research and consulting on a number of assignments that range from product design and assessment to strategic planning and future market definition. Included are:

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- market definition
- competitive analysis
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- assessment of present and future systems
- strategic planning
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- analysis of product documentation, training and other user support offerings

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- Training, service & support

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a seer of grays in a realm of blacks and whites."*

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# NEWS

PRODUCTS • TRENDS • ISSUES • ANALYSIS

# ANALYSIS

## • APPLE COMPUTER •

### A Bite into Unix

Apple Computer's long-awaited Unix operating system, called A/UX, will be officially unveiled at this year's Uniforum. Apple is hoping to come on like gang-busters, showing the Unix community that the Mac II will be a major force. Apple plans to position the Mac II along with A/UX to compete in the fast-paced and highly competitive Unix workstation arena.

While our initial impressions of A/UX are positive, Apple will have its work cut out for it. Wisely, Apple has based its brand of Unix on AT&T System V.2 Version 2 and has included 4.2 extensions as well as parts of 4.3. Part of its long-term strategy will be to migrate its operating system to Posix, which should be relatively easy, given its starting point.

The initial release of the operating system will lack some of the functionality that users will expect. For example, while users will be able to open several applications at a time, only one can be active. This is also a problem with Multifinder, the pseudo-multi-tasking available in the Macintosh operating system. Future releases of A/UX will, however, correct this deficiency.

Apple has stated over and over again that it is now (since its conversion) committed to standards. Therefore, it intends to adopt as many as it can get its hands on. This stance is critical in order to compete in the Unix marketplace, where standards dictate marketing. It also makes sense given the positioning for the Mac II along with A/UX as a "full function workstation." As a result, Apple will implement X-Window. The prototype shown last March at announcement time was based on version 10.4. The new version under development will be based on the more recent Version 11.

Another component critical to competition in the workstation arena is communications, an area where Apple has not taken the world by storm. Again, Apple has looked to established de facto standards including Transmission Control Protocol/Internet Protocol (TCP/IP) (the BDS 4.2 implementation) and Sun's Network File System (NFS). Apple has become a member of the Network Computing Forum, a consortium founded by Apollo with the goal of creating an industry standard based on Apollo's sophisticated distributed networking protocol, Network Computing System (NCS). We think this is a well-thought-out direction. Our principle concern is exactly how long it will take Apple to bring working products to users. We plan to watch Apple's

communications progress with interest.

Apple looks upon its Macintosh user interface as its ace in the hole in the Unix arena. Realizing the need to provide differentiators in a "me-too" standards environment, Apple is counting on the Macintosh user interface to lift it high above the crowd. Initially, Apple will make the Macintosh toolbox available to software developers within the A/UX environment. In this way, third party software packages could be written to run under Unix and could have the look and feel of Macintosh.

Apple's vision extends much more broadly than this. Eventually, Apple plans to provide tight integration between the Macintosh operating environment and the Unix environment. "An A/UX application can be written with the toolbox, and the user won't know that he is working in A/UX. The user doesn't want to be exposed to technology," notes A/UX Product Manager Melissa Broussard. One way that Apple will achieve this integration is by allowing data to be passed between the two environments. Therefore, if one user in an organization chose to work with the Macintosh operating system and another chose Unix, the two would be able to swap files.

While the workstation marketplace is being aggressively targeted, Apple anticipates that its broad market penetration will help it to bring Unix to the

## • I N S I D E •

A/UX Is Coming and Will Link the Macintosh and Unix Environments.  
Page 20

Sun Is Busy Dealing Financially with AT&T and Developmentally with Relational Technology.  
Page 21

Counterpoint Follows Its Vision: To Provide Low-Cost, Modular, and Expandable Unix Systems to OEMs.  
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masses. "We see the potential to grow the Unix market past where it has been. So far, it has been for the sophisticated users. We are hoping to bring the environment to a broad base of users," says Broussard. Apple intends to do this with a long-term strategy of providing a consistent user interface between the two environments. As one approach to this, Apple plans to provide the Mac interface guideline, *Inside Macintosh*, for software developers writing for A/UX. One caveat is that developers will not have to use the toolbox. Therefore, some developers will write for A/UX as though it were a vanilla version of Unix, while others may choose to implement applications with the Macintosh value-added. In short, there will be none of the quality control that has led developers to create a consistent user interface across Mac applications.

In order to compete in the traditional Unix marketplace, Apple intends to have many of the popular Unix software packages ported to A/UX. Therefore, we will not be surprised to find such Unix software standbys as Unixplex, Quadratron, Informix, Oracle, and the like all available for the Mac II. We also expect to see a DOS under Unix capability via a third party (yet unnamed). Realistically, Apple knows it has to play in the hot box and minicomputer arena. Therefore, it intends to view its Mac II as a front end into these other worlds. It has already demonstrated this intention via its planned partnership with Digital. We expect other partners to emerge from within the Unix marketplace.

**CONCLUSION.** We are pleased to see Apple begin to merge the Macintosh user interface with Unix. It is a move in the right direction. We also applaud Apple's decision to create links between the Unix and Macintosh operating environments. This will give the company a leg up on its competitors. We like the thinking that it is applications and portability of these applications that users are interested in. Apple has made it clear that it will rely on value-added resellers (VARs) to port

applications in a variety of horizontal and vertical markets to the A/UX operating environment.

Our enthusiasm over Apple's move into Unix does not erase some of our concerns. Apple has a lot of work to do to make its vision a reality. First—and most obvious—is Apple's lack of in-depth experience in the Unix marketplace. This could be revealed most dramatically in the service and support arena. While Apple has established a brand new support organization, its track record is not strong. Many users who have had to deal with Apple directly for support of the Macintosh operating system have been less than overwhelmed. Therefore, the new internal support group had better be very good and very well staffed. This is especially true if Apple plans to bring Unix to the people.

If, however, Apple does move fast to create a top-notch service organization and is able to implement the required networking, Apple could become a force in the Unix marketplace. It is significant that Apple intends to hide Unix from users. This is contrary to the approach of many Unix vendors. A majority of vendors aren't quite convinced that users really need to be sheltered from this powerful but complex operating system. If Apple's approach works, we expect many more vendors to jump on the bandwagon. Apple's gambit is worth watching very closely. ☉ —J. Hurwitz

• SUN •

## AT&T Invests in Sun

AT&T put its money where its mouth is. At the beginning of January, AT&T announced that it signed an agreement with Sun that could lead to AT&T's holding a 20 percent interest in Sun over the next three years.

This financial agreement follows last year's strategic product alliance

between the two vendors. In that agreement, AT&T licensed Sun's Scalable Processor Architecture (SPARC) Reduced Instruction Set Computers (RISC) technology, and the two companies agreed to converge their Unix operating systems into a standard offering binary compatibility across SPARC platforms.

AT&T and Sun are building the foundation for a powerful, standards-based alternative to the proprietary world of computing. It's a sign of the seriousness of AT&T's intentions to pull this off that the company is buying into Sun.

The deal actually is reminiscent of IBM's purchase of a portion of Intel years ago (which IBM subsequently sold off). The AT&T/Sun deal gives Sun some financial freedom as well as protection from a hostile acquisition.

**THE DETAILS.** AT&T has agreed to purchase, at Sun's option over a three-year period, newly-issued common shares amounting to up to 15 percent of Sun's outstanding common stock. Sun can sell the shares to AT&T in installments at a set premium. AT&T can purchase the remaining five percent of the shares in the open market. At recent trading levels, this bundle translates to a \$300 million deal. If another vendor begins aggressively acquiring blocks of Sun, the 20 percent restriction is off, and AT&T can purchase a larger, take-over-blocking amount. ☉ —M. Millikin

## Sun and Relational Technology Join Forces

Relational Technology (Alameda, California) and Sun Microsystems (Mountain View, California) have announced a joint effort to develop window-based application-development and reporting tools for the workstation computing environment. These tools will take advantage of the workstation's graphics user interface, with its windows and

mouse, to access Relational Technology's Ingres distributed relational database management system (RDBMS). The two companies have set their goals high, asserting that the results of their combined efforts will become an industry standard.

The tools under development will be an enhancement of Sun's current product, SunSimplify, which will be extended to include new tools as well. SunSimplify was originally developed by Sun as an interface to the Unify RDBMS (from Unify Corporation). This graphics-based user interface is very intuitive and Mac-like, allowing the user to create Unify databases and applications with a point-and-click approach. Now Sun and Relational Technology will provide the same type of interface for the Ingres DBMS, which will include the following tools:

- A visual schema (data dictionary) design tool that provides a logical diagram of the design of a database.
- A database-browsing facility that can be used in conjunction with the schema diagrams to navigate easily and to browse through information.
- A visual query tool for building queries without knowing SQL. The results of the queries can provide output to screen forms, reports, graphs, etc. (Relational Technology already uses a visual query language—VQL—in its PC version of Ingres, and we expect VQL to show up in other ports of Ingres in the future.)
- A visual report generator to interactively design reports. (Current report writers tend to be one of the weakest parts of the RDBMS from the perspectives of both the end user and the developer.)
- A system for building customized end-user environments for access to these and other tools.

The objective is to allow the workstation user to design databases and

applications without resorting to programming or to SQL. The tools will also provide a user interface consistent with the advanced capability of today's workstations. In the past, many interface products have been hampered by the need to accommodate dumb terminals as well as bit-mapped workstations, and have thus succumbed to the lowest-common-denominator approach. In contrast, the Sun/Relational Technology efforts will focus specifically on the workstation. And PCs are fast gaining the power to become sophisticated workstations.

The foundation for these tools will be the Ingres fourth generation programming language (4GL) and SunView, Sun's graphics user interface. The tools will also be able to take advantage of Ingres/Star for access to organization-wide distributed databases, including non-Ingres databases. Relational Technology recently announced gateways from Ingres to Digital's RMS and to Ashton-Tate's dBase III (see our news coverage in last month's issue), and the company plans to add others in the future (e.g., IBM's DB2 and SQL/DS).

**OPEN ARCHITECTURE.** Both companies stress their intent to build the tools with an open architecture, making them portable to multiple workstation and database environments. The objective is to enable the user organization to adopt a single user interface and applications development standard across multiple platforms and products.

From Relational Technology's standpoint, 1988 will be "the year of the workstation"; in the past, the company indicated its intent to provide more visual end-user tools for Ingres. After developing the tools jointly with Sun, Relational Technology will port the tools to other Ingres computing environments.

For its part, Sun Microsystems has long maintained a marketing strategy that stresses open architecture. Sun wants to be a leader in developing excellent tools and business solutions, and then make them available to any-

one who wants to participate. The joint agreement with Relational Technology allows Sun to be the first environment to offer these tools for Ingres. We also expect that, with Sun's track record, the user interface will be first-rate.

**AVAILABILITY.** Sun and Relational Technology are now in the development process, and, although no firm dates for actual product introductions are being discussed, the target is mid-1988. Initial products will operate with Ingres in both the Sun/Unix and VAX/VMS environments. Sun will distribute the Sun/Unix version only, while Relational Technology will distribute both products. ☉ —J. Davis

## • COUNTERPOINT •

### Profile: New Backing and New Systems

Counterpoint was formed in 1984 by Pauline Lo Alker and Fred Kiremidjian. Both were part of the founding team of Convergent Technologies. Alker, as marketing vice president for Convergent, was responsible for landing many of that company's largest OEM deals during its heyday. Kiremidjian was director of engineering for the special products group at Convergent, which Pauline later headed.

We find interesting echoes of Convergent Technologies in Counterpoint. Convergent's workstations offered state-of-the-art technology at affordable prices with elegant, high-quality packaging. Counterpoint's systems offer a next-generation approach, stressing multiprocessor architecture (68020s) with dual-ported memory, an industry-standard operating system (Unix System V), support for high-resolution graphics, and equally elegant packaging and modularity.

Convergent had its greatest success selling workstations on an OEM basis

to larger companies—NCR, Raytheon Data Systems, Prime Computer, Sperry—who put their own names on them and integrated them into their own system families. Counterpoint is also selling its multiuser systems to larger companies who, in turn, relabel and add value to them.

Convergent Technologies had a much-talked-about but abortive relationship with AT&T Information Systems. Convergent jointly developed a product for AT&T, but AT&T never put it onto the market. Counterpoint had a similar episode with AT&T, which invested in a product but did not follow through with a commitment to bring it to market.

Similarities aside, Counterpoint seems to have a very clear vision for itself, and, so far, the company's four-year history has remained true to that vision. Counterpoint's mission is to provide low-cost, modular, and expandable Unix systems to OEMs and distributors.

Moreover, the company seeks to take advantage of the increasingly global economy and the increased globally competitive climate by offering large corporations products to bring to those markets without sacrificing their own operational efficiency.

Counterpoint's founders consider strategic alliances critical to business survival in the 1980s as a way to com-

bine the strengths of an innovative entrepreneurial company with the multinational resources and capabilities of giant corporations. Since its inception, the company has cultivated and landed partnerships with a variety of large multinational companies. Alliances have taken the form of investment, joint product development, manufacturing licenses, technology exchanges, and equipment purchases from companies such as AT&T Information Systems, Kyocera Corporation (Japan), British & Commonwealth (United Kingdom), Italtel (Italy), and Multitech Industrial Corporation (Taiwan).

These synergistic, cross-cultural partnerships bore fruit last November when Counterpoint joined forces with one of its larger customers, Multitech Industrial Corporation, and became a wholly-owned subsidiary of Multitech. The Taiwan parent company manufactures and sells Intel-based PCs and portables to large OEMs, sells them through distributors and retail channels in European markets, and sells its own products directly to Chinese-speaking markets. Multitech had been selling Counterpoint's 19K multiuser Unix systems to the Chinese-speaking market but had not been successful in moving those same systems through its channels outside these territories.

Combining forces allows the two

companies to pool resources in product development, combining Multitech's PC expertise with Counterpoint's system savvy. The merger brings Counterpoint from being a troubled start-up to being a \$300 million company. And the partnership is blessed by both companies' other strategic partners. (Multitech has relationships with Unysis, Nixdorf, Siemens, and Textronix, to name a few.) As a wholly-owned subsidiary, Counterpoint retains its current management structure and remains headquartered in San Jose, California.

**NEW PRODUCTS.** In late January, Counterpoint announced two new system families, both of which are being shown at UniForum for the first time. The System 22/22E uses the same multiprocessor architecture as the current system 19K. The 19K uses from one to ten 16.7 megahertz (MHz) 68020 processors and can support up to 128 users. The new 22 also uses one to ten 68020 processors, but these are faster 25 MHz CPUs. It can support from 16 to 192 users.

The new low-end System 15 from Counterpoint is the company's first 80386 (20 MHz) product. It is a single-processor design, capable of supporting from 2 to 33 users. It runs Unix System V.3 as well as a DOS/Unix merge capability from Locus Computing. ●

—P. Seybold



# DEC's Networking Strategy

By David L. Terrie

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