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A/UX 2.0

Apple Targets the Unix Desktop

By Laure Brown

IT'S BEEN MORE THAN two years since Apple first announced its plans to couple the power of Unix with the ease of the Macintosh user interface. Only now have those plans come to fruition. Although Apple has released two previous versions of Unix, it is this version—A/UX 2.0—that finally sports the familiar, accessible Macintosh interface that users have come to know and love.

However, A/UX's consistency with the Macintosh interface is only a single issue. The very idea of bringing Mac and Unix together carries a number of ramifications—from speculation about the timing and *(continued on page 3)*

• E D I T O R I A L •

The Promise of Open

The Reality of Unix

By Judith S. Hurwitz

A HYPOTHETICAL conversation between an open systems evangelist and a corporate MIS director:

Evangelist: *Open systems will set you free. You will no longer be the prisoner of your vendor. You can give that company the heave-ho if those guys get too cocky and don't do what you want. What's more, there will be standards for everything. Don't worry about the groups fighting for control of those neat standards; they will compete so fiercely that you'll end up with even better technology on top of those standards.*

Corporate Customer: *Boy, that sounds wonderful! Can open systems really do all that? I'm so excited! I think that open systems might be just the answer I've been praying for.*

LATER THAT SAME YEAR. Reality begins to dawn. Our friendly corporate MIS manager is beginning to have some doubts. He has been bombarded with information about open systems and has been approached by many vendors and "standards bodies," and he is more confused than ever. Should he implement IBM's version of Unix or AT&T's System V.4? And what about OSF/1? Maybe NeXT with its Mach operating system is the answer. Or is it Apple's A/UX?

The MIS manager is also confused about user interface. Will Motif or OpenLook emerge as the standard? What about NextStep or the Macintosh? And how can all these Unix systems interconnect with existing LANS and mainframes?

BACK TO REALITY. This little fable is not, in fact, a fable. It reflects the reality of the commercial Unix marketplace. Vendors and organizations like the Open Software Foundation (OSF) and Unix International are actively promoting their own technologies and their own visions of "open" (i.e., my systems are more open than your systems). The competitive pressure to win the hearts and minds of corporate users has heated to such a boiling point that it is having the reverse effect. Users are getting weary. At this year's Executive UniForum Symposium, attendees clearly told vendors and consortia that they did not like the fighting and the competition. They are ready to be told what interface they should use and what operating system they should adopt. They are disgusted by the fact that OSF and Unix International have not merged.

Users are also disturbed because Unix vendors are reluctant to take responsibility for integration and management of the variety of systems that users invariably have in their organizations. Typical commercial Unix customers are yearning for the old days, when their chosen minicomputer or mainframe vendor would handle every aspect of systems management — upward and backward compatibility, one consistent interface, consistent network and systems administration. In the free-for-all Unix environment, users are pretty much left alone to suffer from their own mistakes. That might have worked when the typical Unix user was a die-hard Unix junkie, but it won't be tolerated by commercial users.

Commercial Unix is at a critical juncture. There is too much competition and too much confusion. If commercial Unix is to succeed, vendors and consortia need to put aside their differences and begin to give users confidence in the viability of commercial Unix. Users must speak out loudly and firmly. Money speaks loudly in this industry, and if users begin to tell vendors that they will not purchase systems unless they meet their demands, the vendors will have to respond. In the next few months, *Unix in the Office* will provide a service to commercial users. If you send us the demands you'd like to make of Unix vendors, we'll publish them. Fax us your concerns at (617) 742-1028, send MCI mail to psocg / 357 8843, or contact us via the Internet at hurwitz@dcm1tp.das.net.

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• APPLE •

(continued from page 1) relevance of the current product, to the integration of a proprietary and an open operating system, to the implementation of standards, to architectural coexistence, to networking strategies, to X Window's dominance in the Unix market, right down to the basic philosophic differences between Macintosh and Unix aficionados.

Fortunately, Apple hasn't ignored these issues, although we can't honestly say that all of them have been fully addressed. The company's goal is to make A/UX the Unix desktop platform of choice. A/UX supports almost 200 existing Mac desktop applications, and Apple is riding that fact as a marketing vehicle. Rightly so. Mac applications tend to be the sort of desktop applications that users need (as opposed to the techie applications that pervade Sun or Digital Ultrix workstations). Yet, the proprietary nature of the Mac Toolbox limits the product to a certain degree. In this article, we'll examine both the limitations and the scope of Apple's Unix in terms of its role in the marketplace, technical design, and usability.

A Rocky Road but Worth the Wait

A/UX 2.0 is a solid implementation of Apple's Unix strategy. It is a highly functional and seemingly stable system. It's also more open than you might imagine—with support for X Window and Motif (yes, Motif, although only through a third party), Posix standards, BSD 4.3, NFS, and TCP/IP. Its familiar graphical interface makes the system an ideal standalone processor. Yet, it provides sufficient connections also to make it ideal as a client in a distributed network environment as well.

Most of the challenges Apple faces with A/UX are in overcoming its tarnished image. A/UX has been plagued during its evolution, most notably by its highly-publicized inferior first release. Of course, some of this was self-induced by Apple. A/UX was first announced at UniForum during John Sculley's keynote address—quite a splashy announcement, and one that might best have waited until the product was more mature.

As is the case with most first software releases, the original A/UX was buggy. Developers told us that the system was slow and prone to crashes. In addition, it was difficult for developers to design applications on A/UX because Apple had not yet

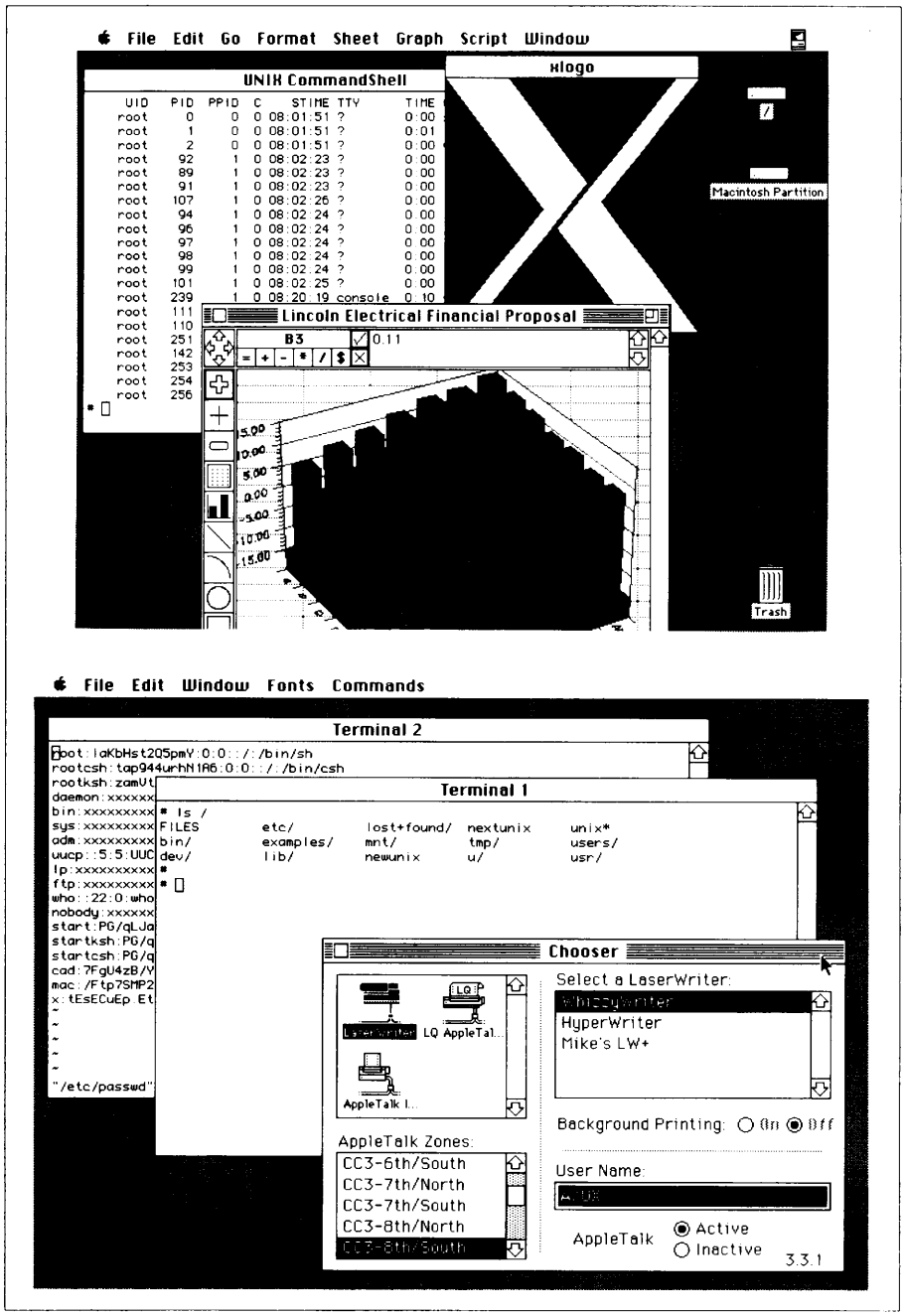

Illustration 1. The faces of A/UX. The bottom screen shot illustrates the Unix system shell interface that marked the previous releases of A/UX. Although applications written to older versions of A/UX had a Mac-like user interface, the system interface was merely a Unix command shell. At the top is A/UX 2.0. Notice the traditional Mac interface. menu items, and trashcan in 2.0. Notice also the backslash in the upper right-hand corner of the screen that lets users know this is A/UX, not Mac OS.

integrated the Mac Toolbox, a set of development resources for programmers creating Mac-conformant applications. Furthermore, A/UX offered only the Unix system shell interface—not exactly accommodating. Needless to say, enthusiasm about the product faded. Had Apple at least filled the public in on the product's timetable, A/UX's first release may have had a better reception. (See Illustration 1.)

THE MERITS OF 1.1. Version 1.1, announced in January 1989, answered many of the complaints of the first version—at least from the developer's perspective. Its biggest advantage was the integration of the Macintosh Toolbox. With the Toolbox in place, developers could create applications that ran both in the A/UX and the Mac OS environments. In addition, 1.1 provided more refined file transfer between Macintosh and A/UX file systems. The product also featured X Window and Posix compliancy, BSD extensions, and support for LocalTalk and HyperCard.

Although this release of A/UX may prove that the company is indeed serious about its Unix platform, the system could definitely use some opening up.

Thereafter, we noted several independent software vendors (ISVs) who ported applications to A/UX and were pleased with its performance. And not just commercial developers such as Claris, in whose best interest it is to port to Apple platforms. Companies such as Informix and WordPerfect have also included A/UX as a target platform.

A QUESTION OF TIMING. Although A/UX was initially released when the industry was ripe for a graphical interface to Unix, it wasn't until the current release that it adopted the Mac interface. In the meantime, X Window's two most popular flavors—Motif and OpenLook—have become the primary contenders in the Unix graphical user interface market. A/UX does support the X Window system, but Apple isn't focusing on it (see "Support for X Window" below). The A/UX credo is one of choice: X is there, but so is the Mac Toolbox, and Apple is obviously championing it. While the Toolbox may have no problem attracting traditional Macintosh ISVs, many Unix application developers might be skeptical about considering yet another graphical user interface. Porting to multiple interfaces is simply too expensive, and the Mac interface cannot be leveraged to other platforms.

Apple in the News. This year's first quarter was a remarkable financial success for Apple. This is especially impressive when you consider the negative publicity Apple received earlier in the year—a 3 percent staff layoff, a shake-up in upper management resulting in the resignation of Senior Vice President and Chief Technical Officer Jean-Louis Gasée, and an A/UX Air Force contract dispute (see "Marketing Focus" below).

More recently, however, delays were reported of the much-anticipated Version 7.0 of the Macintosh operating system, and the announcement of MS-Windows 3.0 may prove to detour Apple's marketing efforts. Apple has already begun lowering prices. Although these troubles have nothing to do with the quality of A/UX, industry perception that a company has problems can weigh heavily in determining the success of its products. Maybe A/UX 2.0 will help reverse that perception. So, too, may new Chief Operating Officer Mike Spindler. Apparently, Spindler has made product timeliness a primary concern and has put into effect a more practical, efficient approach to product development than Apple is used to.

DISSENSION AMONG THE RANKS? It has been rumored that Apple hasn't exactly embraced A/UX wholeheartedly. Friction within the company is understandable when you consider that the fundamental premises of Apple and Unix don't mesh. Apple has always preached the strength of a proprietary, tightly-integrated system architecture, where interface and application functionality are rooted right down to the hardware. Unix, on the other hand, is detached from hardware architectures. The Unix industry, based as it is in engineering and R&D communities, is marked by an enthusiasm for standards and the sharing of ideas and technology.

Apple still considers itself a proprietary system vendor. Although this release of A/UX may prove that the company is indeed serious about its Unix platform, the system could definitely use some opening up (see "A Limited Role" below). There is still some heavy debate at Apple about the precise definition of open systems.

The Strategy

Apple's A/UX strategy is threefold:

- Provide the quintessential graphical user interface (GUI) for the Unix market. Not many users who have used the Mac interface would argue with it. Therefore, the Mac Toolbox provides Mac conventions for A/UX applications. By the same token, not many Unix users would sit still for a user interface that only runs on a single platform. Therefore, Apple provides MacX, a Mac version of the X Window system. Motif is also available (although not directly from Apple; see "A Choice of Window Managers" below).

- Supply multitasking from the A/UX desktop and the ability to mix and match applications from a variety of systems—from Unix, to Mac, to X, to DOS, and, potentially, to OS/2. A/UX supports MultiFinder, which provides cooperative multitasking of all Mac applications—both Mac OS and A/UX. For DOS integration, the Mac uses SoftPC, and

MacX provides access to X. A/UX Macintoshes offer point-and-click access to the Unix, DOS, and Mac file systems.

- Offer complete Unix integration with the Mac environment. This goes beyond just A/UX and Mac integration. We've already touched on a few of the Unix standards A/UX supports (e.g., BSD, NFS, and TCP/IP). At any time, you can open a Unix shell window from the desktop or run a System V or X-based application. The Mac and A/UX environments, however, have been very closely integrated. In fact, any 32-bit shrink-wrapped Mac application can run on A/UX platforms without any reconfiguring.

MARKETING FOCUS. Apple is tailoring A/UX Macintoshes as machines for average users, as opposed to high-end engineering workstations. The company states that it's marketing to federal agencies, higher education, technical organizations, and large corporations. This seems a little broad. Although A/UX has access to a Unix system shell for hackers and graphics capabilities for scientific researchers, its most probable customer candidates are everyday end users who need to participate in a Unix environment or want a higher-powered desktop system than a personal computer.

Although it's still early to measure the success of Apple's attempts to market to typical Unix shops, A/UX has been getting some attention from universities and government agencies. For instance, Brown University's Institute for Research in Information Scholarship (IRIS) has recently developed an interesting product called IRIS Intermedia, a networked hypermedia development system based on A/UX. In a nutshell, Intermedia lets users create and follow interconnected pieces of information across a network. The system uses a hypermedia design for incorporating all these pieces of information—text, graphics, scanned images, and timelines (for chronological events). Since hypermedia was fundamental to the system, and given Apple's parental role in the development of hypermedia, Brown's choice of A/UX was logical. But the users of the system were also a consideration. Intermedia is used by both faculty and students to teach and learn in a broad range of disciplines—not just computer science. (For detailed information about Intermedia, see Vol. 4, No. 10.)

Apple also won a major Air Force contract last August, only to have it disputed seven months later. Apple is still shipping on the contract. With the release of 2.0, the protest may be a wash anyway, since it was based on the fact that the workstations in question included A/UX 1.1, which didn't allow you to reach Macintosh functionality without first leaving the Unix environment. Version 2.0 doesn't have this limitation and can replace A/UX 1.1 on the contracted workstations. Now A/UX has Macintosh functionality, which is what Air Force users were after in the first place.

Whether or not A/UX seeps into mainstream Unix, A/UX may always have a home in distributed architectures. Given their ease of use, A/UX workstations, integrated into a client/server distributed network architecture, may become a potent force in the market. Not that other Unix workstations couldn't play a similar role. But A/UX has the added value of Macintosh applications and the Macintosh interface. Considering the many Mac applications that run on A/UX, the system already has more off-the-shelf applications than other Unix platforms (see Illustration 2).

A Partial List of Macintosh Applications Running under A/UX

Claris CAD	More II
Excel	PowerPoint
HyperCard	SoftPC
MacDraw II	Versa Cad
MacProject II	WingZ
MacWrite II	WordPerfect
Microsoft Word	

Illustration 2. A/UX accommodates close to 200 existing shrink-wrapped Mac applications. This is only a partial list.

Pricing and Availability. A/UX started shipping in June. The software costs from $795 to $995. Considering the additional software A/UX provides (see "Tools" below), this is an aggressive price. You can purchase the system either preinstalled on a Mac II computer or 80MB Mac hard disk or on floppy disks, a CD-ROM disc, or tape. Update tapes, CD-ROM discs, and floppy disks are also available, as well as right-to-copy licenses.

For some customers, some of Apple's optional A/UX products may be necessities (see "System Requirements" below), which, of course, adds to the cost of the system. MacX for A/UX costs $350; the Apple EtherTalk card, $699; and paged memory management unit—PMMU—(needed for the basic Mac II), $499.

Architecture

A/UX is more than just an operating system. Apple has the same architectural theory for A/UX that it has always had for the Mac: No application should exist in a vacuum; desktop functionality should be tied intrinsically to the core of the

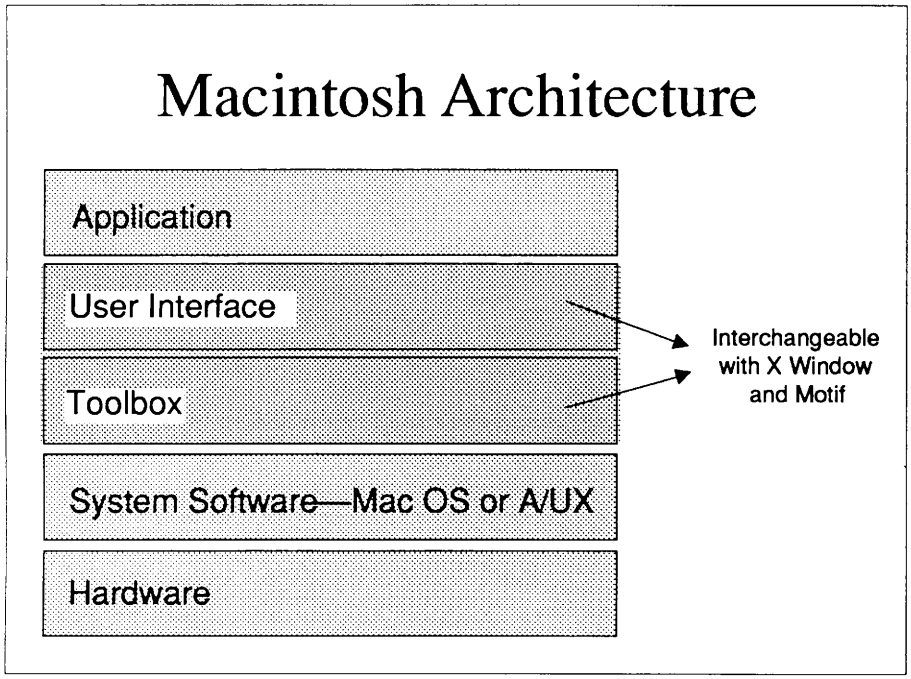

Illustration 3. The Macintosh architecture is the same whether it runs Mac OS or A/UX. As long as the developer uses the Mac Toolbox, the application will maintain the Mac look-and-feel and be interoperable between Mac OS and A/UX. However, Unix developers can also swap the GUI and Toolbox layers and replace them with X and Motif (or, conceivably, any other X-based toolkit).

system. Thus, A/UX, following this theory, consists of five layers: application, user interface, Toolbox, system software, and hardware. (See Illustration 3.)

Yet, Apple offers some flexibility within these layers. The operating system can be either Mac OS or A/UX, and the Mac Toolbox can be swapped for the X Window System and an X toolkit. (No, you can't build an X application with the Mac Toolbox.) Or you can bypass the graphical user interface issue altogether and run a generic System V application from an A/UX window.

The advantage of using Toolbox-conformant applications lies in their integration with the Macintosh system. You can cut and paste from both Mac environments. X applications, on the other hand, merely borrow the Mac window manager for window manipulation and appearance. The disadvantage of using Toolbox-conformant applications is that their binaries won't run on any other Unix systems.

SYSTEM SOFTWARE. A/UX is based on System V.2. We were surprised that Apple hasn't at least upgraded to V.3. Apple explained that V.2 better suits its Motorola architecture, and that it has implemented streams—the most critical component of V.3. Besides, the company is looking into alternative kernels for A/UX. (Apple wouldn't name names, but the Mach kernel springs to mind, mainly because of its affiliations with Steve Jobs and NeXT.) A/UX also features NFS 3.2, support for shared libraries, and a complete set of BSD extensions, including the file system and TCP/IP.

TOOLS. A big improvement of A/UX 2.0 is its support for Finder, the Macintosh graphical desktop shell (a.k.a. desktop manager). A/UX also offers its own mouse-driven editor (which is more user oriented than, say, Berkeley's vi), a dialog-driven Unix command builder, AppleTalk, and tools (e.g., C compiler, debuggers, source code control system) to assist programmers in developing new applications or porting existing software to A/UX. A set of Unix libraries allows C programs to access the functionality of the Macintosh Toolbox, including QuickDraw, which Mac systems use to perform all graphic operations.

For systems administration, A/UX automatically configures to a simple kernel that includes only the necessary devices, rather than a full kernel that often includes more configuration than a system needs. It also features automatic recovery and standard Unix scripts for administrative functions.

DOS INTEGRATION. A third-party vendor has filled the DOS/Mac gap. SoftPC by Insignia Solutions (Sunnyvale, California) integrates DOS in the Mac environment. With it, you can open any number of windows, launch a DOS application, and cut and paste text between Mac, MacX, and DOS applications. SoftPC is similar to other Unix/DOS integrators from companies such as Locus and Phoenix Technologies, though it's perhaps lesser known. It runs as a DOS terminal emulator and provides access from and file integration with the native A/UX environment.

NETWORKING. Connections to the TCP/IP and X.25 worlds have been available from Apple for quite some time. Furthermore, the Mac Communications Toolbox, an optional add-on, eliminates the need for an application to designate a particular communications protocol. Instead, the application invokes one of the Communications Toolbox managers which provide interfaces for specific services (e.g., terminal emulation, file transfer, and resource management). Also, Apple has recently upscaled its AppleTalk services, which A/UX offers for print- and file-sharing (client-only—an AppleTalk server will be available by the year's end). Systems can be integrated into NFS schemes, as well. The user has transparent, point-and-click access to both the local data on the Mac and all the data on the network. Given its basic strength (user interface and existing Mac applications) and Apple's orientation of providing a window into the corporation for individual users, playing the role of the client in the client-server model is the obvious course for Mac.

To that end, Apple has recently developed board-level and

software connectivity solutions for client Macs into the IBM 3270, SLDC, Token-Ring, and APPC environments. It also has a very close relationship with Digital. The two companies are codeveloping a variety of products and tools to enable Mac applications to share information, computing power, and network resources with VMS systems.

A Limited Role. The other model of distributed computing—peer-to-peer networking—holds that the networking architecture should be flexible enough to let workstations run as clients or servers. If you stick strictly with generic Unix, fine; the Mac is as accommodating a peer as the next Unix box. But if you want to leverage the benefits of the Mac in a peer network, forget it. Mac data cannot be accessed by other users on the network. The Mac can initiate a process on another Unix server, but a Unix workstation can't initiate a Mac process.

Apple's vision, on the other hand, is to empower the individual and make the organization more effective by making the individual more productive. Therefore, Apple's implementation thrust is for the Mac predominantly as the client, from which the user can access data anywhere across the network. While we certainly agree that most Macs will act as clients, the architecture should be flexible enough to support the best configuration for the organization. (For a complete analysis of Apple's overall networking strategy, see *Network Monitor*, Vol. 4, No. 6.)

SYSTEM REQUIREMENTS. A/UX doesn't demand any more system resources than do most Unix systems. It runs on all Macintosh II computers and the SE/30. The system requires at least 4MB of memory (for MacX, add another 1MB), an 80MB hard disk, an Ethernet card for Ethernet communications, and a video card.

System Hardware. In March, Apple began shipping a new Mac II that better exploits the power of A/UX than does the rest of the Mac II line. The Macintosh IIfx is a fast machine—much faster than most 386-based PCs and almost twice as fast as its nearest family member, the Mac IIci. It's a 40 MHz Motorola 68030/68882 combination with added cache, twin I/O processors, and a new SCSI/Direct Memory Access controller.

Mac data cannot be accessed by other users on the network. The Mac can initiate a process on another Unix server, but a Unix workstation can't initiate a Mac process.

Judged by its marketing literature, Apple seems more concerned with the advantages the Mac IIfx will bring to Mac OS than those it will bring to A/UX. Still, the computer should compete favorably with low-end Unix workstations. The company is targeting scientific researchers as well as users of financial, animation, and design and engineering applications. Price ranges from $8,969 to $14,466. Upgrades for the Mac II and Mac IIx cost $2,999 (plus additional memory)—a very good price, considering the added performance.

Other than the basic II (with PMMU) and IIfx, Apple has four computers that run A/UX:

- The Mac SE/30. The SE/30 is Apple's highest-performance (16 MHz) compact computer with a 68030/68882 processor, integrated monitor, internal expansion slot, and a 1.4MB floppy disk drive.
- The Mac IIcx. The cx is a 16 MHz 68030/68882 processor with three internal expansion slots for communications (Ethernet and Token-Ring cards) and video. The computer comes with a 1.4MB floppy disk drive, a SCSI port, serial ports, and sound ports.
- The Mac IIx. The Mac IIx is another 16 MHz 68030/68882 machine. It offers the features of the cx, except that it has six NuBus expansion slots and can accommodate a 5.25-inch hard disk drive (i.e., it has a higher storage capacity than the cx or SE/30).
- The Mac IIci. The advantage of the Mac IIci is performance. It runs at 25 MHz instead of 16 MHz. It also has a built-in video circuitry and a built-in connector for an optional cache memory card, as well as the NuBus slots, SCSI port, and serial ports featured in the other models.

Implementation

DESKTOP MANAGEMENT. A/UX offers more desktop management capabilities than most of its conventional Unix counterparts. While either the Motif or OpenLook toolkit may be used to create graphical interfaces for X-based applications, neither addresses desktop management. The A/UX interface, on the other hand, encompasses both the underlying window system and desktop management.

It's probably a good idea to differentiate between the two desktop environments A/UX offers—the Finder environment and the CommandShell environment. Finder, the traditional Macintosh desktop manager, provides graphical, point-and-click access to files, applications, and system utilities. The CommandShell offers the traditional Unix command line interface from within a Finder window.

Finder. Navigating your way around A/UX Finder is basically no different from navigating Mac OS Finder. It has five initial pull-down menus—Apple, File, Edit, View, and Special—and an iconic view of the file system. A/UX sports typical Mac dialog boxes and keyboard shortcuts, check marks that identify active menu item selections, and a drag-and-drop metaphor for moving files and directories.

Finder menus contain all the information most nontechnical users need:

- The Apple menu (which, for those unfamiliar with the Macintosh, is accessed by clicking on the apple in the upper left-hand corner of the screen) contains a list of available desk accessories—handy little applications shipped with every Apple computer: alarm clock, calculator, chooser, control panel, find file, key caps, and scrapbook.

- The File menu includes commands for file manipulation (e.g., Open, Close, Print, Display Privileges, etc.).

- The Edit menu is used to edit or change text in windows. Options include Cut, Paste, Copy, Clear, Select All, and Show Clipboard.

- The View menu offers several options for viewing file and directories. You can view the file system by small icon, icon, name, date, size, or kind (i.e., type).

- The Special menu contains a bunch of miscellaneous commands: Clean Up, Empty Trash, Erase Disk, Restart, Shut Down, and Logout.

As we mentioned, these menus cover most user-related tasks. However, a few functions are missing from the main menus that a user might need. For instance, although you can view file information and privileges, you can't change them from the menus. Furthermore, there is no system-level Help facility, which is especially crucial in an often esoteric environment like Unix.

Customization. The Control Panel in Apple's Desk Accessories offers a broad range of dialog-driven customization options, from specifying the color of icons, background patterns, and alert settings, right down to setting the speed of cursor blinks. A MacTCP Control Panel toggles between network configurations.

CommandShell. As its name implies, the A/UX CommandShell utility provides a menu-driven command shell environment. CommandShell consists of six menus:

- The File menu, which manages the CommandShell window environment. From the File menu, you can choose commands to create, open, close, save, and print shell windows.

- The Edit menu, which contains items for cutting, pasting, copying, and selecting text in a shell window as well as accessing the A/UX command builder.

- The Windows menu, which is used to manipulate the presentation of shell windows. Windows can be tiled (vertically and horizontally), enlarged, hidden, rotated, etc. You can also manipulate active jobs by accessing the A/UX system console from the Windows menu.

- The Fonts menu, which contains a list of available fonts and point sizes that you can use in the shell window.

- The Commands menu, which lets you redraw the screen and gives you a choice of either scrolling through windows or letting the system erase any information that scrolls off the top of the window.

- The Preference menu, which lets you edit some of the properties of a shell window. You can configure system message notifications and set default window parameters (e.g., font and font size) for new and active windows.

Commando. There's been some debate over how much desktop functionality a user needs. Most users spend their time in applications and don't need to run Unix commands. Then again, others do. And users who do need to run Unix commands are not going to find the Unix system shell an inviting environment. Thus, Apple has developed a dialog-driven Unix command builder called Commando.

There are three ways to invoke Commando. You can type "cmdo" followed by the name of the command or type the name of the command and select Commando from the CommandShell Edit menu. However, from a user's perspective, it's

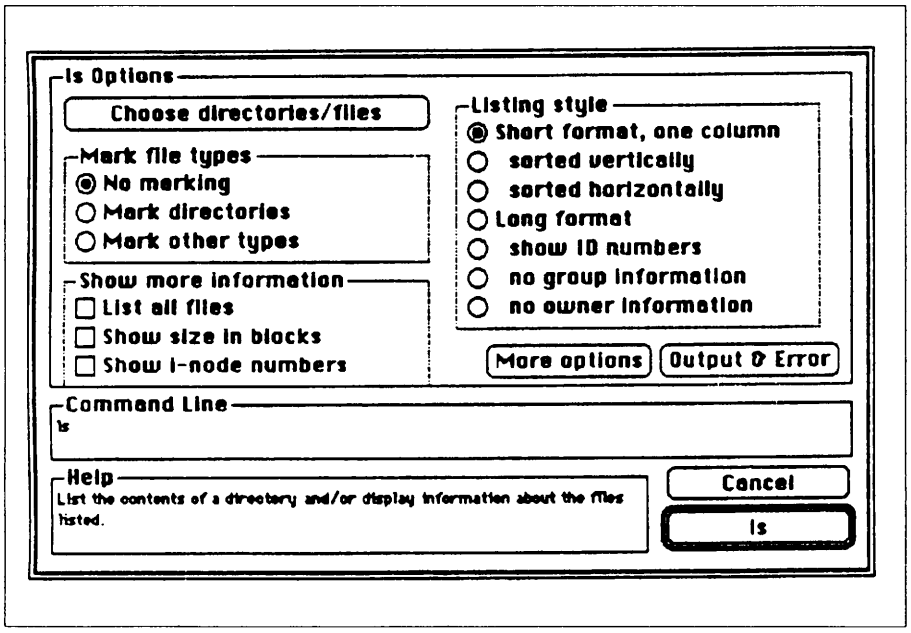

Illustration 4. The Commando dialog box for the "ls" command.

probably most practical to take advantage of a folder (or directory) appropriately called "Useful Commands." Useful Commands contains iconized frequently-used Unix commands, such as apropos, diff, find, grep, and ls. The icon names also include the full name of the command, which is helpful. For instance, "chmod" doesn't mean much to most users, but "change permission" certainly does. The Useful Commands directory contains only a few of the over 500 A/UX commands, but you can add other commands to the folder at will. All that it takes is filling out a simple A/UX dialog box.

When you execute the command by double-clicking on its icon, a Commando dialog box appears and leads you step-by-step through the command. It lists the options associated with the command and bangs out the appropriate command line code. A modest Help window is also available in the dialog box that describes the command and its purpose. (See Illustration 4.)

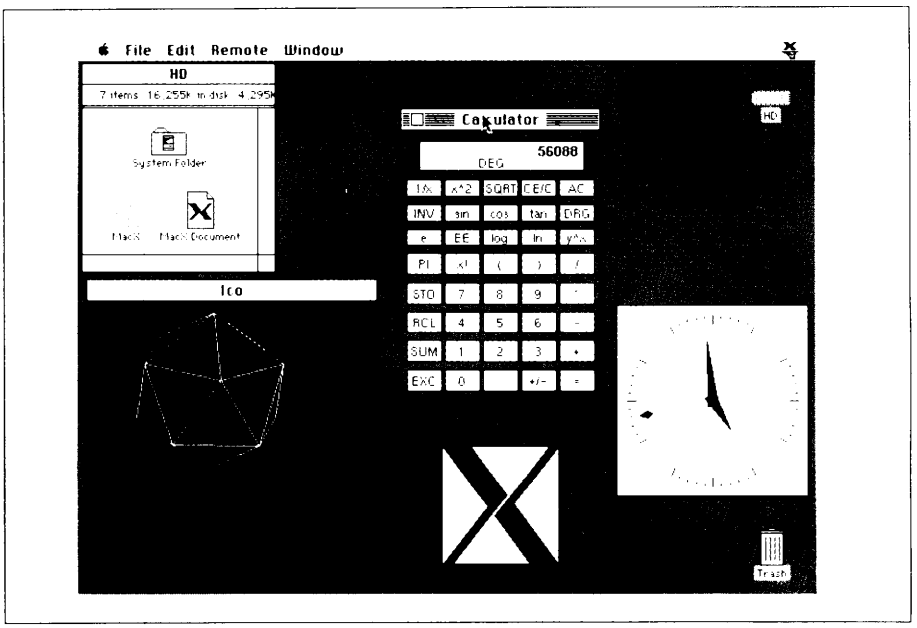

Illustration 5. MacX screen. The edges of the MacX Root Window look much like those of an ordinary Macintosh window. The title bar and the close and size boxes are the Mac standard, while the scroll bars have an extra arrow on each end. Inside the MacX Root window, the interface is entirely X.

TEXT EDITOR. We mentioned earlier that A/UX has its own editor for programmers. The A/UX TextEditor is similar to other Unix system editors, but Apple has added some Mac-like editing functionality. It even has menus and dialog boxes. Menus are available for file manipulation, searching and replacing text, creating markers, and window presentation. Dialog boxes handle things like text formatting and saving a file under a different name.

While the TextEditor is probably suitable for those few end users who might attempt to write Unix scripts, its graphical nature would annoy most programmers. For instance, every time you create a new TextEditor file, up pops a dialog box to specify the name and location for the new file. Unix programmers can't be bothered with such mechanisms. They prefer to just bang on the keyboard. Keyboard bypass would be helpful.

X WINDOW SUPPORT. MacX, a Macintosh operating system implementation of X Window (11.3) software, is an optional product that has been designed to allow the Mac to play in an X environment. Under A/UX, the Mac can become either an X client or display server for an X-compliant application running on a host. (MacX for Mac OS, on the other hand, doesn't come with X libraries, so it can only be a server.) MacX will operate on top of AppleTalk, TCP/IP, and DECnet.

Under the Finder, the Mac can support a number of windows, mixed and matched between Mac and X. The user can cut and paste text between local Mac and X applications via the Mac Clipboard. As with other X implementations, you cannot yet cut and paste graphics between Mac and X applications. X hasn't yet standardized on a common way to represent graphics of multiple applications.

A Choice of Window Managers. Keeping to its Mac model and avoiding the user interface debates associated with X (or perhaps adding to them), Apple has designed MacX windows to look and feel as much like a Mac window as possible. In other words, it uses its own window manager to manipulate windows (e.g., move, size, minimize, close) and to provide window borders (see illustration 5).

However, A/UX doesn't mandate that you use the Mac window manager. To attain window management flexibility, Apple makes a distinction between rooted and rootless modes of MacX. (Well, technically, it's X that makes the distinction.) In the rootless mode, the root X window is made invisible, so what you see in the background is the Macintosh desktop. In other words, the Macintosh window manager is in operation. In the rooted mode of operation, X windows appear inside a Macintosh window. These windows are plain X; conceivably, any X window manager can control them. The two modes are accessible concurrently.

Recently, a third-party developer called Integrated Computer Systems (Cambridge, Massachusetts) has ported Motif to A/UX. Although Apple doesn't provide Motif support itself, it is certainly enthusiastic about the fact that A/UX can indeed support Motif applications. We must admit, though, we're disappointed that Apple wasn't enthusiastic enough about Motif to do the port itself. X comes with a standard window manager called TWM. Motif is the only commercial window

manager currently available for the A/UX environment (other than the Macintosh window manager, that is). However, it's not unreasonable to assume that a third party might come along and port OpenLook to A/UX, as well.

Font Technology. MacX comes with the standard X library of fonts—including Charter, Times, Helvetica, Courier, New Century Schoolbook, and Symbol—and a font manager to manipulate them. MacX can also access the Macintosh screen fonts located in the system file.

What's Left? Apple has actually enhanced its X Window support quite a bit, especially in its integration with the Finder and its flexibility in terms of window management. However, Apple's X environment isn't on a par with the A/UX environment. Although it looks Mac-ish and uses the Mac window manager for window manipulation, MacX doesn't have the performance or desktop management that A/UX offers. Unlike other Unix platforms that have standardized on X, A/UX merely offers X. MacX is a secondary solution. Therefore, it hasn't been fully integrated with the Finder, and it doesn't have access to QuickDraw graphics or to its graphics board accelerator. MacX is not even part of the bundled A/UX product. You have to purchase it separately, as you must Motif.

Maybe its greatest disadvantage, though, is a symptom of a broader problem—Apple's limited role as a network peer. The Mac only makes sense as a server in an X environment. Although you can access any number of X applications, Mac applications cannot be X clients. In other words, other X workstations and terminals cannot reach Mac applications. Granted, Apple is not alone with this problem; most applications cannot work in an X environment. The difference is, however, that other vendors are making an effort to X-ize their applications. For instance, Sun's XView, an OpenLook-based X toolkit, was developed to leverage existing SunView applications for an X environment.

Until now, Apple always seemed to play a wait-and-see game with standards. We're glad that it plans to be more aggressive in adhering to standards.

Futures

A/UX has come a long way since its much-maligned first release, but Apple isn't planning to rest on its laurels now that it has come out with a decent product. Without revealing details of future enhancements, the company has provided the directions A/UX will take in the next few releases. First and foremost, Apple wants to adhere to standards. The company has promised to take a more proactive approach by participating in standards organizations. Until now, Apple always seemed to play a wait-and-see game with standards, and we're glad that it plans to be more aggressive.

Otherwise, Apple is intent on keeping A/UX on an even keel with Mac OS—in terms of both system functionality and communications. Apple claims it needs 12 months to incorporate System 7.0 into A/UX—12 months after 7.0 is released, that is. That's really not a bad turnaround when you consider the work that needs to be done. (See "In Light of Mac OS" below.) Apple also plans further Mac-inization of A/UX, especially in system and network administration. The company would also like to expand the networking side of A/UX (good!) as well as broaden the spectrum of high- and low-end hardware. This, undoubtedly, means a broader spectrum of workstations, since Macintoshes don't make appropriate servers, unless you have an all-Mac network in place.

IN LIGHT OF MAC OS. Mac OS is and ever shall be Apple's premier operating system. Since Apple maintains that Mac OS will continue to shape the future of A/UX, some characteristics of System 7.0 are worth noting:

- 32-bit addressing. Granted, 32-bit addressing is no big deal to Unix users because Unix has had it for some time. However, eventually, it may ensure greater application interoperability between Mac and A/UX applications. Currently, only 32-bit Mac applications will be able to run on either operating system. In the meantime, A/UX includes an optional 24-bit environment that runs Mac applications, but they can't take advantage of virtual memory.

- Database Access Manager. The database access manager provides remote database access through CL/1 communications protocol. CL/1 lets Mac users reach SQL-based databases on Digital and IBM hosts. Such a connection would be ideal for Unix hosts as well, but CL/1 doesn't support Unix machines. Thus, it doesn't seem appropriate for A/UX. The protocol either needs to be enhanced or replaced.

- InterApplication Communication (IAC). Apple's architecture for exchanging commands and data between local and distributed Macintosh applications is a significant development. IAC will allow users to create live links to different applications and automate tasks over AppleTalk networks—as long as the applications have been modified to support the architecture. Ideally, this will become a cross-operating system facility (i.e., across Mac OS and A/UX). Fully integrating IAC services into A/UX may be tricky. However, given that the Mac Toolbox supports both Apple operating systems, Apple's IAC might lend itself easily to transparent links between Mac and A/UX applications.

- Finder 7.0. Apple is expanding Finder to include additional

functionality for desktop management (e.g., grouping desktop items, accessing the desktop directly from applications), configuration (e.g., icon editing, setting system preferences), and system administration (e.g., accessing the Help manager, Help development tools, and system management functions). Also, file sharing will be integrated into Finder, so workstations can share files without relying on a dedicated server.

Conclusion

We're satisfied that A/UX is now a complete operating system in its own right. It doesn't seem to be just a quick-and-dirty solution to let Apple play in a Unix environment, which we feared when the product was first released. Not only has Apple smoothly integrated A/UX into the Finder, it also has a surprisingly convincing story to tell about standards, with support for X Window, TCP/IP, NFS, Posix, FIPS, and BSD extensions.

If only its interface were so open. How ironic that the most notable advantage of A/UX is also its most notable disadvantage. We have few complaints about A/UX other than Apple's decision to keep the interface proprietary. The notion of licensing that interface is intriguing. It could offer Apple huge potential as the de facto graphical user interface. Apple could easily capitalize on the current confusion that the OpenLook/Motif war is causing in the Unix marketplace. As it stands now, A/UX can support other Unix and X-based applications, but other Unix and X-based platforms can't support A/UX applications.

Frankly, we don't foresee Apple changing its stance any time soon. The company doesn't consider opening up its Toolbox a practical business decision. Instead, it is trying to point out the advantages of sticking with the Mac as a front-end machine. And the Mac does have its advantages. It's certainly faster than third-party X-based desktop managers we've seen, and, with the aid of the Mac Toolbox, applications are tightly integrated with the Mac environment.

COMPETITION. A/UX would fare better had it been introduced two years ago with all its pieces in place. In the meantime, its strategic advantage is shrinking. Not only has Windows 3.0 put Apple on the defensive, but other Unix vendors are reaching the desktop. For instance, Sun has recently announced OpenWindows, which includes a DeskSet that has desktop management facilities similar to that of A/UX and that runs only on Sun workstations. Likewise, Hewlett-Packard's VUE (Visual User Environment) fits the bill for HP Unix workstations. Many hardware vendors are licensing sophisticated X-based desktop managers from third parties such as X.desktop from IXI (Cambridge, England) and Looking Glass from Visix Software (Reston, Virginia). Both these products already offer the interapplication communication functionality that Apple intends to unleash with IAC. So does HP's NewWave, which has recently been ported to Unix, with an X version on its way. (Apple claims that IAC will be a more user-oriented system than NewWave. We haven't seen the product yet, but, if this is the case, we look forward to its release.) SCO's OpenDesktop has also debuted as a possible de facto Unix desktop development platform. (For a complete analysis of NewWave Office under Unix, see Vol. 5, No. 4; of OpenDesktop, see Vol. 5, No. 6.)

It's not that these systems actually provide a better interface than the Mac—either in terms of look and feel or of performance. But most do have the advantage of X compliancy. Although Apple is quick to point out the doggedness of X-based desktop managers and interfaces, they are at least network-wise and hardware independent.

The Mac Heritage. A/UX may have an edge because of its Mac heritage. Since it supports the Mac Toolbox, it already supports a number of shrink-wrapped applications. Users can leverage their library of Mac applications and still gain the multitasking networking and communications capabilities of Unix. Powerful stuff. As a client in distributed environments, A/UX is ideal.

The success of A/UX weighs heavily on ISVs. There may always be a place for A/UX in distributed environments that already contain Macintoshes, but we're not talking about that. We're talking about Apple's ability to lure new Unix ISVs to write to A/UX. We suspect that Apple's reputation in the graphical user interface department will lend A/UX some distinction. Apple already has built a reputation on its graphical interface; it's already ironed out the wrinkles in implementing graphical interfaces; and users are already comfortable with it. Apple has come out with a versatile, well-designed, and well-implemented Unix system. We'd hate to see it reduced to a mere stopgap role between the worlds of Unix and Macintosh.

- Next month's *Unix in the Office* feature article focuses on **Transaction Processing.**

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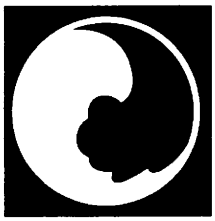

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NEWS ANALYSIS

PRODUCTS • TRENDS • ISSUES • ANALYSIS

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Sun Strikes Back on the Low End

Never known for its reticence in market posturing, Sun Microsystems has fired another salvo in an attempt to win the War of the Words. This time, the targets are those workstation and PC vendors trying to grab part of the low-end workstation market, a market that Sun considers its own.

Over the past year, Sun has found itself on the defensive in a number of areas. One, for example, is the general industry acceptance of Motif over OpenLook and the predominance of DeCorum members' technologies in the OSF (Open Software Foundation) DCE decision, which led Sun president Scott McNealy to say, "OSF stands for *O*ppose *S*un *F*orever."

More important to Sun, however, is the challenge, based on better price/performance, that companies such as Digital, HP/Apollo, Data General, Compaq, IBM, and Apple are giving to Sun's leading position in the workstation market.

Sun's strategy is to continue to proclaim its position as the platform-of-choice for Unix applications development by stressing its strengths from the developers' point of view—the SPARC architecture, Sun's Open Network Computing (ONC) architecture, OpenLook, and the tools to implement each of them (we will look at Sun as a development platform more fully in an upcoming issue).

Recently, Sun took direct aim at its challengers who are claiming significant price/performance advantages on the low end by introducing the industry's first RISC-based workstation for under $5,000. In doing so, Sun not only set a new price point for traditional Unix workstation vendors (to which HP/Apollo quickly responded with its own under-$5,000 workstation), but also made clear its intentions to go directly after the high-end PC market dominated by IBM and Compaq.

Perhaps lost in the War of the Words and the war of the numbers is Sun's conscious effort to move from its base in the technical market into commercial areas. Sun's strategy of working closely with the leading database developers to enhance performance of their products in its servers gives the company a good way to compete both with other Unix vendors and those supplying proprietary solutions.

THE BATTLE FOR THE LOW END. Sun is playing for the desktop by the numbers, and the numbers are impressive. The new SPARCstation SLC, at a list price of $4,995, includes a 20 MHz SPARC processor, built-in 17-inch monitor, floating-point unit, 8MB of memory (expandable to 16MB), Ethernet connection, frame buffer, audio chip, and SCSI interface, with a rating of 12.5 MIPS. There is no internal disk option available, though from 104MB to 2.6GB of external disk storage can be added using the SCSI port.

The SPARCstation SLC is not simply aimed at Sun's traditional workstation rivals. Sun is attempting to go head-to-head with the Intel 386/486 workstations and servers and is even trying to preempt the X terminal market by pricing its workstation to make people think twice about compromising on an X terminal. (It is interesting to speculate on where the X terminal price point might eventually land, as it is squeezed between low-priced workstations and software X display servers added on to current DOS-, OS/2-, and Mac-based desktops.)

The SPARCstation SLC is itself not without compromises. The workstation cannot support any internal disk drives, does not support a color monitor, nor can it be used as a server. For these capabilities, Sun is offering an enhanced version of the SPARCstation/SPARCserver 1 (called the SPARCstation/SPARCserver 1+) which is rated at 15.8 MIPS, with an entry level price for

the workstation set at $8,995.

This raises the question as to whether the under-$5,000 price point represents a real machine or is just another piece of ammunition in the War of the Words. Or, to use a car analogy, is this the entry-level Chevy that will be used to trade up (eventually to a Cadillac), or are we seeing an example of "bait-and-switch?"

NEW DATABASE SERVER. Sun has also introduced two server software products specifically aimed at the commercial database server market. The products—Sun Database Excelerator and SPARCserver Manager—are aimed at increasing the performance, availability, and ease of administration of commercial database solutions. Together, they provide users with features needed to run strategic commercial applications on a Unix platform.

The Database Excelerator is designed to increase both the database server performance and the number of users it can support—Sun estimates peak transactions will increase by up to 50 percent and concurrent users by up to 500 percent. Specific implementations have been developed to work with Informix, Ingres, Oracle, and Sybase (all of whom, not surprisingly, strongly endorse the product), and Sun expects to continue joint development with each of these developers. The product is available on all Sun SPARCservers.

The Sun Database Excelerator is priced at $1,000 for the SPARCserver 1 and 1+, and $5,000 for other SPARCservers. Sun has indicated that it won't license it to the other SPARC suppliers.

The SPARCserver Manager is designed to increase reliability and adminstratability of midrange and high-end servers. The Manager provides disk-mirroring, online backups, and the ability of large data files to span multiple physical disks.

The Manager also includes window-based administration tools to simplify management of servers. The tools monitor hardware configuration and status, run remote diagnostics, manage file systems and mirroring, record and analyze system performance data, and facilitate routine tasks in storage administration. Remote servers are administered via Sun's RPC mechanism.

The SPARCserver Manager is priced at $7,500.

CONCLUSION. While Sun's announcements are significant in terms of lowering the entry price point for RISC and enhanced database servers, their importance seems to be lost in the attack/counterattack mode that Sun (and others) have made the general order of the day. In the long run, this is a losing strategy for both Sun and Unix vendors as a whole group.

Users are getting pretty tired of the War of the Words. The key issues for them are not who has more thousands of applications committed to their architectures or interfaces, whose technology goes into an industry standard, or who has this week's lowest priced workstation. At the recent Executive UniForum Symposium, users made it very clear that they want to—they must—get down to the business of building applications that are robust and that operate over multiple platforms, operating system versions, and architectures. And if they can't do it under Unix, they'll turn elsewhere.

—D. Marshak

•UIMX•

Designing Interfaces for Motif and OpenLook

Visual Edge Software (Montreal, Quebec) is one applications vendor that has waited long enough for the industry to settle on a single X Window toolkit and is developing software that accommodates both Motif and OpenLook. The company's premier product, UIMX, an X Window-based user interface management system (UIMS), includes the widget sets of both toolkits. Thus, developers can design application interfaces that look and feel either like Motif or OpenLook.

THE ROLE OF A UIMS. There is a general misconception within the industry about graphical user interface technology. Often, window systems and toolkits are inaccurately referred to as user interfaces. X Window, Presentation Manager, and MS Windows are window systems, not interfaces. Motif, OpenLook, and the Mac Toolbox are toolkits; they offer a guideline of how applications are to appear and behave, but they, too, are not interfaces.

A UIMS, on the other hand, is a tool for actually creating interfaces for new and existing applications. While developers can design interfaces with the toolkit, it can still be a complex, taxing exercise. A UIMS is a higher-level tool. Instead of working with widgets and gadgets, a UIMS automatically generates interface code as you paint a screen. (FYI: Widgets, are special X windows with I/O capabilities—e.g., scrollbars, dialog boxes, etc. Gadgets are like widgets, except they don't require a window—e.g., labels, push buttons, toggle buttons, etc.) Generating interface code automatically simply cuts down development time.

UIMX. UIMX, like other user interface management systems, has an interactive screen painter. Developers don't have to write window system code; they just have to create links—or callbacks—from the interface component to the application. Thus, the interface is developed separately from the program, which makes it modular and easy to modify. However, the application is running underneath the interface-in-progress for testing and prototyping. UIMX has a C interpreter, which lets you test-drive the interface before it's compiled and bound to the program. Interface components are designed in UIMX to be portable and reusable. The system generates C code, and components are stored in a reusable library, so users of the system can borrow interface functions from other applications—a plug-and-play solution.

An X Interface for Existing Applications. Since interface components are separated from the application code, UIMX lends itself to existing non-X applications. UIMX has a mechanism called "subprocess control" for developers to build graphical interfaces for terminal-based applications without re-architecting or modifying them. Developers specify how to run the applications, and UIMX takes care of starting it and setting up the communication links. All the developer has to do is create the callback and include a text string that the application will understand (i.e., include the keyboard entry that the application would expect in a character-based environment).

Motif and OpenLook. As we said earlier, UIMX comes with a reusable library of components that includes the Motif and OpenLook widget sets. Thus, interface developers can create applications that conform to the style guide of either toolkit—or develop a mixture of the two. We would prefer to be able to pick the appropriate style from a menu and have the system automatically bang out the right style conventions as you paint the screen. Given the fact that UIMX doesn't need to deal with the complexities of multiple window systems, such an implementation doesn't seem out of the question.

Marketing. Visual Edge is selling UIMX mostly to OEMs and large corporate accounts of those OEMs. The company has a number of licensing agreements with significant hardware vendors, including AT&T, Control Data, Data General, Hewlett-Packard, IBM, ICOM Systems, Motorola, Quest, Silicon Graphics, and Tektronix.

STILL UNSETTLING FOR THE USER. Support for both X toolkits is a workable solution for Visual Edge—and for other software vendors who have opted to straddle both Motif and OpenLook. However, there is still no solution for users. While the distinctions between Motif and OpenLook are not all that dramatic, users have made it very clear that they want a single interface. We see no reason why OSF and Unix International can't come to some agreement here. Both toolkits are based on X, so it's not as if architectural or underlying technology stands between them. The toolkits could be merged. In fact, most of the functionality of the two toolkits is the same; it's just look and feel that separates them. In the meantime, the squabble continues and is interfering with both product development and the commercial growth of Unix.

—L. Brown

•IMAGING•

Open Workflo: Filenet Does PCs

Filenet Corporation, one of the pioneers of image processing, is opening up to the world outside its own systems. The company has rearchitected its Workflo image-management software to allow DOS PCs and Unix workstations to participate in Filenet applications.

Filenet targets "case-oriented" imaging applications among insurance carriers, banks, governmental agencies, and the like. In these applications, the standard-sized application forms, letters, and reports associated with an insurance claim, loan request, or some other "case" are collected and tracked from inception to approval to servicing.

Filenet is known for its turnkey optical image-storage subsystems, but the key to its success has been Workflo, which is process-automation software. Workflo allows a user to describe a flow of documents, stored as images as well as text, through an approval process. The software handles scheduling, approval dependencies, and routing. Workflo then delivers the images of relevant documents to the appropriate desktops in an application.

Until now, Workflo was a closed system, requiring users to install Filenet servers and proprietary workstations. With the new generation of Workflo, Filenet is hoping to change this by capitalizing on low-cost clients running standard platforms like DOS/Windows and Unix with Motif or OpenLook.

OPEN WORKFLO ARCHITECTURE. Filenet's goal with its Open Workflo Architecture is to make Workflo's services available across a variety of platforms. To achieve this goal, Filenet has rearchitected Workflo to conform to a client-server architecture that is open to a number of client workstations.

Open Workflo Architecture introduces three innovations to Filenet's core software:

- Users can employ DOS PCs equipped with Windows and new Filenet PC Imaging Software in Filenet systems.
- New Workflo Queue Services components support a range of new client workstations, including Sun and Digital workstations, as well as DOS/Windows PCs.
- The Open Workflo Architecture has an extended API that allows third-party applications to use its image-management services.

KEY COMPONENTS. Open Workflo Architecture has four principal components: the Workflo Queue Services, the Image Access Facility (IAF), the Workflo Procedure Language, and Filenet's application groups. The language and applications will be familiar to current Filenet users, but they'll run on additional workstations.

Workflo Queue Services. Workflo Queue Services is the key to the new architecture. Workflo Queue Services is a routing manager API that allows users to capture the priorities, schedules, and routing of objects—images and text files—across multiple platforms on a network. In concept, it is a table of objects referenced to particular members of a workgroup. Workflo procedures operate against this table in different ways depending on a workgroup member's role in a project.

The Open Workflo Architecture uses a central queue to organize information storage, access, and distribution. Users deposit and fetch "objects" to and from queues, and queues manage delivery of objects to appropriate users as defined in workflows. Developers can define workflows according to a number of criteria, including:

- Objects can be distributed according to priority schemes, including first in-first out, monetary value, age of a document, and load-balancing requirements on a network.
- A Rendezvous feature allows an event—like a distribution of objects—to be triggered by the arrival of a new document in a case.
- Managers can generate reports on how work is being processed from queues.

An alternative to queues is electronic mail, which NCR, AT&T, and other vendors use to transport objects within workflow-automation systems. From the user's perspective, the difference between the two approaches may be minimal—sending an object off to another team member via a queue may look just like sending a mail message. From a developer's standpoint, the difference is between control structures. Queues are a central repository of information about workgroups, priorities, responsibilities, and schedules. In E-mail systems, control is decentralized.

Workflo Procedure Language. In the traditional Filenet system, developers use the Workflo Procedure Language to define the procedures governing documents and data as they move between members of a workgroup. The Workflo language is a scripting language. In the Open Workflo Architecture, Filenet is providing libraries on PC clients that allow developers to access Filenet services using C in addition to the Workflo language.

Applications. Filenet is also porting its applications to Windows and providing an API to integrate third-party applications into its environment. Included in the Windows strategy are Filenet Forms, Image Display, Image Editing, and Host Session Management. The ports will use Windows' Dynamic Data Exchange (DDE) to support linked operations across a network. For example, from the Forms application, a user could cause another application to be loaded and an image to be fetched from disk for display.

A new component called Office Services provides an API to link popular DOS applications (and others) to Filenet services.

CONCLUSION. Image management is a tricky business, posing many technical challenges. To meet these challenges, imaging vendors built on carefully controlled, closed systems. These system architectures supported the growth of companies like Filenet. Filenet sales grew to $83 million last year from $63 million in 1988. The company expects to achieve sales of from $110 to $115 million in 1990.

Unfortunately, the promise isn't as bright as it seems. As the imaging vendors (including old timers Wang and Plexus) open up, they are positioning their environments as the focal points in the overall applications environment. Filenet's client workstations support a variety of information-management functions in addition to those associated with imaging. And the Filenet environment is open to integration with the Lotus 1-2-3s of the world. But is Filenet best equipped to provide a foundation applications environment? Or should that environment be HP's NewWave, IBM's OfficeVision, or another, more general, alternative?

At this point, there is minimal collaboration between the imaging vendors and the purveyors of general office environments. Filenet's reasons for sitting on the sidelines, says Robert L. Castle, vice president of marketing, are both cultural and technical. Filenet applications are highly structured systems, in large part because structuring the movement of big image files is vital to maintaining performance and managing the capacity of the system.

Environments like NewWave, on the other hand, allow a more ad hoc style of computing that could place much more stress on a network, raising costs and bumping up capacity requirements. For example, the current robotic arm technology used in optical jukeboxes can handle about 100 image transactions per hour. Filenet worries that users in an environment allowing ad hoc image access would quickly raise total system demands to thousands of image transactions per hour.

The solution to this dilemma is probably a couple of years away. Until it arrives, imaging appears destined to remain more of a niche application than a general application service.

—J. Rymer

•DUPONT MACBLITZ•

Macintosh Co-Computing and Unix

We've always been intrigued by the possibility inherent in delivering both the Mac OS and Unix in the same environment under the same interface. A/UX 1.0 obviously failed to impress, although Apple has made great gains with A/UX 2.0.

However, another alternative has appeared on the market offered to OEMs by du Pont: MacBlitz.

MacBlitz is a complete co-computing system that adds high-powered Unix processing to the Macintosh environment. MacBlitz consists of a NuBus board along with:

- An Intergraph Clipper RISC processor rated at about 14 MIPS or 3.5 Mflops

- Up to 32MB of RAM
- Separate but integrated I/O subsystem supporting two SCSIs, two serial ports, and Ethernet
- Unix V.3 with X-Window support
- Du Pont FileShare that links the Unix file structure to the Macintosh

The first four items make a reasonably attractive computer/workstation on their own. It's du Pont's FileShare (that provides the integration with the Macintosh user interface) and the Mac OS personal productivity applications that make MacBlitz a highly intriguing solution for high-end applications including imaging and modeling, CAD/CAM, publishing, and research and scientific applications.

At just under $10,000, the price is not cheap. Consider, however, that a MacBlitz-ed Mac can function as an X-application client to other Macs on the network, as long as those Macs have Mac-X or another X server application.

A co-computing solution such as this should be attractive to many. It adds the power of a workstation along with support for higher-end Unix applications, while also seamlessly delivering to the user the personal productivity applications of the Mac world.

(In a skewed sense, this is the type of positioning Microsoft is now trying to achieve with Windows 3 and OS/2 2.0. OS/2 is the platform for complex, mission-critical applications, but it will also run, unchanged, Windows applications. OS/2 for complexity, Windows for personal productivity. Same story, different platforms.)

A/UX is also available for such a solution. However, the additional processing power and memory capability provided with MacBlitz should be cause for proper notice among systems integrators looking for a solution without wanting to pick their way through GUI, OS, and application wars.

—M Millikin

•X/OPEN•

Guaranteeing Higher Standards

X/Open has recently launched an updated branding program that matches the updated X/Open Portability Guide (XPG) specifications. This latest update, XPG3, adds to its previous specification by addressing individual components and operating system software. Basically, X/Open has adopted several de facto standards for its portability guide. One of the major developments of XPG3 is the incorporation of Posix 1003.1 compliance. Other specification enhancements worth noting include:

- Standard interfaces for system utilities and portable shell scripts
- Parts of the International Standards Organization OSI networking model
- Support for the X Window System
- ISAM, a standard access method introduced by Informix Software, providing multiuser access to databases
- Compatible media to transfer data among machines
- Facilities (e.g., shared memory, message queues) for communication and synchronization between processes
- Support for SQL
- Support for Ada

The list goes on and on. Each systems product must undergo at least 5,500 tests to prove XPG3 conformance.

LEVELS OF THE X/OPEN BRAND. X/Open has four levels of compliancy, or brands. The minimal brand is Component level, which guarantees that certain elements of a system adhere to individual elements of the portability guide. The next level is Source, which ensures the source-code portability of the product. A Base level brand reaches down to the operating system, and a Plus brand covers the operating system as well as additional components that enhance application portability.

LEVERAGING THE X/OPEN BRAND. Many significant user organizations—most notably government agencies (in the United States, Italy, Spain, Sweden, the United Kingdom, and West Germany)—are committed to XPG3-conformance. That being the case, vendors are eager to receive an XPG3 brand. X/Open started its XPG3 branding program in early June, and, as we went to press, most of the big Unix vendors had already received brands, including: AT&T, Bull, Digital, Hewlett-Packard, IBM, ICL, Olivetti, Sequent, Siemens, Sun, and Unisys.

However, the X/Open branding is a service for users, not a marketing vehicle for vendors. X/Open's role in the market is essential because it guarantees that all the systems receiving an XPG brand will adhere to the same standards—at least to the standards it covers, that is; the portability guide doesn't cover everything. As opposed to groups such as OSF and Unix International, X/Open isn't promoting its own technologies (e.g. Motif or System V.4) for "open systems." Instead, it promotes the de facto standards that users already depend on. Too much confusion and incompatibility exists in the Unix market (just look at this month's editorial). An XPG brand offers at least a degree of multivendor system uniformity and compatibility. *—L. Brown*

•UI•

Converting ISVs to Unix

As a commercial system, Unix has always stumbled over its lack of shrink-wrapped applications. In an effort to

remedy this situation, Unix International (UI) has put together an ISV program to assist traditional proprietary and DOS developers in migrating applications to System V.4. Good idea.

UI is riding the marketing of the ISV program on the coattails of System V. UI is stressing the advantages of a single operating system that accommodates a number of microprocessor architectures, which saves ISVs development time and money. System V.4 is used by over 80 percent of the Unix systems out there. Therefore, ISVs can move their applications to more platforms than proprietary systems, and they can take advantage of the growing Unix market. (Unix enthusiasts estimate that the Unix market may double in size by 1993—to nearly a quarter of the overall computer market).

UI has already received support from the 88open Consortium (a standards organization for Motorola 88000 architectures), SPARC International, and Intel (for the 386 and 486). These organizations are among the UI members that have agreed to assist ISVs in developing shrink-wrapped Unix software for their architectures.

PROGRAM DETAILS. The ISV program will provide:

- Over 150 worldwide porting centers.
- A large support network of UI members to assist users and developers in migration and support.
- Equipment loans and discounting of hardware of UI members.
- Conferences beginning in September. The conference has a commercial track that explains the strategic benefits of migrating to Unix and a technical track that helps guide ISVs through the migration process.
- A reference and resource handbook.
- Detailed guides to assist ISVs in porting applications from other specific operating systems (e.g., VMS or MVS) as well as from System V derivatives (e.g., AIX, Ultrix).
- Technical training courses from UI member companies.

Program Participation. Any software vendor can participate in the ISV program. The only fee is $150 for the conference; the conference is not required.

CONCLUSION. The ISV program is a proactive measure on UI's part. It could significantly bolster the viability of Unix as a commercial operating system. From UI's perspective, it could rally even more vendors around System V.4. The success of the program depends on how well UI markets it. Unix needs the support of ISVs. We hope that UI will put plenty of energy into the ISV program. —*L. Brown*

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