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PATRICIA SEYBOLD'S

UNIX IN THE OFFICE

Solbourne Computer

A New Model for Innovation

By Laure B. Rowan

WHEN YOU THINK of Solbourne Computer, you probably think, "Oh, yeah—Sun clones." It's a reasonable reaction; Solbourne does indeed manufacture and market a line of processors based on Sun's Scalable Processor Architecture (SPARC) RISC chip. In some ways, Solbourne is reminiscent of Compaq in the early days of the PC clone market. Solbourne is capitalizing on Sun's generally available technology and stressing compatibility with Sun machines.

But the company deserves more recognition. Solbourne has distinguished itself considerably *(continued on page 3)*

• E D I T O R I A L •

The Application Model for the '90s

Customization Makes the Application

By Judith S. Hurwitz

THE CONCEPT OF what constitutes an application is changing. In the coming decade, we will think of applications differently. First, word processors, spreadsheets, or database packages are not applications. If not applications, what are they? They are utility software. The applications are, in fact, the customized products based on these utilities. Therefore, the applications become the complex reports, the spreadsheet programs, the customized templates from a word processor. A good example of where we are headed is HyperCard—the utility software available on the Macintosh. An entire industry has developed to sell HyperCard stacks based on this foundation. Therefore, the real application is the HyperCard stack, not HyperCard itself. In other words, the base application or utility is the tool used to create an application.

What are the implications of this change in focus? Primarily, vendors hoping to meet users' needs will have to make their utility software as open as possible. They will have to be aware of how users will apply their tools to meet internal requirements. The open systems revolution is partly due to the fact that users no longer trust vendors to conceive of, design, and deliver a complete solution. Therefore, over the past 10 years, users have purchased a vast array of technologies, and they now require tools to be available across all of these platforms. Users will not be satisfied for long with utilities that restrict their flexibility. Therefore, database vendors have to stop trying to lock their customers into their tools and services. Word processing vendors have to make customization easy and intuitive. Spreadsheet vendors have to start thinking multimedia. In general all independent software suppliers will have to consider how easy it will be for their customers to customize applications with the help of their tools.

This will indeed be a challenge to vendors that expect a customer to view an applications environment from their perspective. This concept will have to be turned on its ear. Vendors will have to focus on producing tools and utilities that make customization easier for both programmers and end users. Users will have the responsibility for expressing their requirements to vendors so that products include facilities that get the job done.

Traditional Unix and the now fashionable open systems vendors could be in a strong position as this new paradigm unfolds. Unix's traditional strength has been as a development environment that transcends platforms. The challenge, then, will be to provide tools that are intuitive and geared to users—as well as to sophisticated developers.

It is encouraging when a host of software developers freely license their development tools to the rest of the industry. But that is only the beginning. There are still too few tools available because vendors do not perceive that that's where the money is. Traditionally, hardware vendors have given away these gems in order to push hardware. This tradition has to change if small and smart software companies are to be encouraged to sell sophisticated tools. We will only succeed with this new customized applications reality when conventional wisdom states that hardware is indeed the commodity and software is where the money can be made. This change will ensure that users and developers alike have access to the best customization tools. If this trend continues, then open systems will be a positive force for the user community. ◐

PATRICIA SEYBOLD'S
UNIX IN THE OFFICE

Editor-in-Chief
Judith S. Hurwitz
MCI: 3538836@mci.com
Internet: hurwitz@dcm1tp.das.net

Analysts and Editors
LAURE B. ROWAN
JUDITH R. DAVIS
DAVID S. MARSHAK
RONNI T. MARSHAK
MICHAEL D. MILLIKIN
JOHN R. RYMER

Managing Editor
DOUGLAS A. FREEMAN

News Editor
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Art Director
LAURINDA PHAKOS

Publisher
PATRICIA B. SEYBOLD

Sales Director
RICHARD ALLSBROOK JR.

Circulation Manager
DEBORAH A. HAY

Customer Service Manager
DONALD K. BAILLARGEON

Patricia Seybold's Office Computing Group 148 State Street, Suite 612, Boston, Massachusetts 02109
Telephone: (617) 742-5200 FAX: (617) 742-1028 MCI: psocg / 312 2583
Internet: psocg@dcm1sg.das.net TELEX: 6503122583

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• SOLBOURNE •

(continued from page 1) by enhancing SPARC, especially with software—although it's made some worthwhile hardware contributions, too. In fact, when you talk to Solbourne representatives about hardware issues, the conversation turns almost immediately to software. Processor design is one thing, but what system software comes with the machine? How robust is the operating system? How many commercially available applications will run on the machine? How sophisticated is the development environment? Is the hardware designed to meet the demands of the operating system?

With these questions in mind, Solbourne developed several technologies on top of Sun's basic platform to substantially enhance its performance and to make it a more sophisticated environment. Among them:

Solbourne developed several technologies on top of Sun's basic platform to substantially enhance its performance and to make it a more sophisticated environment.

- A symmetric multiprocessing (SMP) operating system that is binary compatible with SunOS
- A 64-bit SPARC version of the SPARC chip
- A flexible, toolkit-independent, X Window-based development environment, including the PEX 3-D graphics extension
- A multiprocessor hardware architecture with a 64-bit system bus

Solbourne was an early implementer of SMP, and its operating system is probably its best-known software development. The company recognized early on the performance advantages of a multiprocessing operating system—especially when dealing with distributed environments and complex, compute-intensive applications like imaging or transaction processing. Solbourne is one of a handful of Unix vendors currently offering SMP. (Among the others: Pyramid, Corollary, Acer, Sequent, Data General, Arix, Hewlett-Packard, and, most recently, Digital Equipment.)

Still, the trend toward multiprocessing under Unix is a strong one these days. The industry's most influential organizations are campaigning heartily for the evolution of Unix to support multiprocessing. Both the Open Software Foundation (OSF) and Unix International (UI) have organized special interest workgroups to catalyze the development of multiprocessing Unix. OSF has gone so far as to adopt Mach—a research operating system built from scratch for parallel processing and multiprocessing. The Posix group has set up a committee to form a portability standard for multithreaded platforms. And the Unix Software Lab (USL) has announced that it will be adding threads to the standard System V.4 kernel. USL's first multiprocessing extensions are supposed to appear next year, although a full implementation won't be complete until 1992. Once these extensions are implemented, we expect many Unix vendors to adopt them. (For a complete description and analysis of multiprocessing under Unix, see Vol. 5, No. 2.)

Sun doesn't foresee a multiprocessing version of SunOS until 1992, giving Solbourne a chance to lure those who need the power and efficiency of an SMP multiprocessor but who cling to Sun because of its large application base—and because they already have so many Sun computers in-house. In fact, when we talked to Solbourne customers, Sun compatibility was stressed over and again as a motivating factor in their Solbourne purchases. "Why buy a Sun," one customer pointed out, "when a Solbourne beats it in price/performance and still runs my applications pretty cleanly? I don't have to change my existing investment."

We hope Solbourne's price/performance advantage will gain more attention now that it has come out with a 64-bit SPARC chip. This puts Solbourne distinctly at the leading edge of RISC chip technology. Notice that we said "RISC chip technology", not just SPARC chip technology. Other RISC designs—IBM's RS/6000, MIPS Computer's R series (adopted by Digital), Intel's i860, Motorola's 88000 (adopted by a handful of vendors, including Data General), and Hewlett-Packard's HP-PA—are 32-bit implementations, although we do expect them all to reach 64 bits at some point. In the meantime, Solbourne's chip reaches 40 MIPS and 20 MFLOPS with a 40 MHz clock speed. Impressive numbers. Solbourne admits that these are only peak-performance figures. The chip is currenly used only in Solbourne's uniprocessor and runs at 25.5 MIPS.

Innovation on Borrowed Technology

Solbourne's first workstation line appeared just last year, and the company itself is only four years old, which may make you wonder how it came up with so many technical advances so quickly. Solbourne has taken an interesting approach to innovation. Rather than pouring time and money into building systems from scratch, Solbourne licensed technology from Sun, thereby freeing up its development staff to focus on specific enhancements. It leapfrogged over base platform development and went straight to work on what it correctly sensed were important market directions, namely: multiprocessing, improved price/performance, and sophisticated graphical user interface technology.

At a time when the computer industry is more concerned with standardization than ever, Solbourne's seems the competitive model to watch. Solbourne is evidence that you certainly can innovate on existing, widely adopted technology; that you can react quickly to market trends; that standards can, in fact, be as advantageous to vendors as they are to users.

CHALLENGING SUN'S STRATEGY. Sun has always left most of its developments open and licensable, the purpose being to saturate the market with its technology until it all becomes a de facto standard, as its Network File System (NFS) has. From Sun's perspective, the more clones out there, the better; clones simply validate its efforts.

But, when we look at the way Solbourne has leveraged Sun's technology, we can't help but doubt Sun's endeavors. Solbourne's model is a challenge to Sun's strategy. It makes you realize that a clone manufacturer has the potential to beat Sun at its own game. Solbourne has licensed a good deal more from Sun than just SPARC; it also has SunOS, NFS, Open Network Computing (ONC), NeWS, and SunView, as well as a few Sun graphics products. Thus, Sun has, in effect, paid for much of Solbourne's development costs, while Solbourne has implemented sophisticated multiprocessors that beat Sun's originals in terms of price/performance. If Solbourne keeps up this trend, its workstations could eventually outsell Sun's. "Could" is the operative word here. Currently, Solbourne doesn't come close to Sun's market share. However, that could change. Just because Sun invented the technology doesn't guarantee it first place. Its licensing strategy invites clone-makers to direct competition and forces Sun to carry a burden of rapid innovation. If Sun slips, companies like Solbourne will be quick to take advantage.

Over 50 percent of Solbourne is owned by Matsushita Electronic Industrial Company; we can't help but notice a Japanese flavor to the Solbourne model of business.

Some Background

Solbourne was founded four years ago by Douglas MacGregor (who, incidentally, was the principal designer of the Motorola 68020 chip). Over 50 percent of Solbourne is owned by Matsushita Electronic Industrial Company, which you probably know better as Panasonic, Technics, and Quasar. Matsushita granted MacGregor both an initial $11.75 million R&D investment in 1986, and then another $38.9 million in start-up funding for the company.

The financial relationship between the two organizations is ideal for Solbourne. On one hand, it has the deep-pocketed backing of a major international electronics company that provides access to the Japanese and Asian markets. On the other, it's a small startup that can spot and respond quickly to market directions.

But Solbourne considers Matsushita more of a partner than a financier. Matsushita lends Solbourne the advantage of its reputable engineering expertise, and the two companies have already worked together on development projects, one of which resulted in the 64-bit SPARC chip. Moreover, we can't help but notice a Japanese flavor to the Solbourne model we described above. The Japanese are known for taking existing technology and making it better, cheaper, and/or faster, and Solbourne is very much in keeping with this tradition. With the exception of the 64-bit SPARC chip, not one of its features is, in itself, unique. Rather it's the collection and implementation of features that make Solbourne's offering so compelling.

Solbourne currently employs over 300 people, most of whom are situated at its worldwide headquarters in Longmont, Colorado.

CORPORATE GOALS. Solbourne actually reached its primary goal earlier this year when it came out with a 25.5 MIPS workstation for under $10,000. Cost and performance are the company's motivating factors, and its long-term plan is to simultaneously decrease prices and increase MIPS. Solbourne feels that its strongest potential lies in the low-end desktop market—especially during the next few years. We agree. The market is ripe for 100 MIPS desktops—the cheaper the better.

Solbourne also stresses its commitment to standards—at least those sanctioned by Unix International. The company actually mimics Sun in regard to standards. So, for instance, since Sun is migrating to System V.4 (SVR4), Solbourne is, too. Likewise, it plans to stay with ONC rather than incorporate the OSF's Distributed Computing Environment (DCE) selections (unless, of course, Sun surprises us all and adopts them itself).

Solbourne's fidelity to Sun seems short-sighted. At the moment, Sun has cornered the Unix workstation market. This year, it will have sold approximately 170,000 workstations. That's more than the next three competitors combined. (Hewlett-Packard is a distant second, with an estimated 75,000.) But we seriously doubt that Sun will be able to keep up such a ratio when other major vendors have begun offering such promising RISC platforms. Solbourne is putting all its eggs in Sun's basket, and that's risky (no pun intended).

RELATIONSHIP WITH SUN. Doug MacGregor describes Solbourne's relationship with Sun as "cooperative, collaborative, yet competitive." In a way, Solbourne legitimizes Sun's efforts to push its technology as de facto standards. Solbourne is a champion for Sun's SPARC chip, and is certainly broadening the SPARC market. Furthermore, as we've pointed out, Solbourne has made SPARC the first RISC design to reach 64 bits.

On the other hand, Solbourne competes head-to-head with Sun's SPARCstation line. Solbourne already has made more than $50 million in reseller commitments both in the United States and overseas. And for good reason. Solbourne claims that its processors are ahead of their Sun counterparts in price/performance by as much as 20 percent. Solbourne's technical advantages and multiprocessing architecture are also attracting would-be Sun customers. For instance, Nexgen, a computer company out of San Jose, California, is using Solbourne com-

puters for modeling and CASE applications. Nexgen's Director of Software, Ashok Jain, pointed primarily to multiprocessing as the deciding factor in his Solbourne purchases: "We have over 35 gigabytes of online data, so we needed systems with a lot of memory and disk space. But the scalability and power of muliprocessing were the main reason for buying Solbournes. We simply need to run more than one job at a time."

Marketing Strategy

Solbourne is promoting its processors as powerful yet affordable computers and is specifically targeting the engineering and manufacturing markets. As we said earlier, this competes head-to-head with Sun—and the other RISC vendors as well.

Solbourne claims to have a superior service and support strategy—a claim that was substantiated each time we talked to a Solbourne customer.

Considering how hot the RISC market is, Solbourne has its work cut out to distinguish itself. Think for a minute about the big names vying for RISC contention: IBM, Digital, Hewlett-Packard, Data General, Sun. It may be hard for Solbourne to make its mark. We weren't just being glib in our earlier reference to Solbourne's reputation as a mere Sun clone. Solbourne's developments are noteworthy, but the company will have to be aggressive in getting that message across. Moreover, Solbourne will have to keep on its toes. Other vendors are not far behind the company's current technology.

At first, we thought Solbourne might have a real door-opener with its new low-end offering, which starts at $8,995. But, by now, most of the big-name RISC product lines have broken the $10,000 barrier. (We couldn't have said that a few months ago; it's amazing how quickly things change in this market.) On the other hand, Solbourne's low-end machine features the 64-bit chip, which makes it not only the sole 64-bit RISC workstation for under $10,000, but the sole 64-bit RISC workstation, period. Solbourne is correctly promoting this fact in its marketing campaign.

Another sell for Solbourne is the number of commercial applications it supports. Solbourne computers can run SPARC applications and give them the power of a multiprocessing architecture—an advantage other SPARC implementers cannot claim. Although there are over 2,100 SPARC applications in Sun's catalogue, Solbourne customers claim that some go a little buggy on a Solbourne. Solbourne, meanwhile, is counting on SPARC applications compatibility because of their very volume. Thus, Solbourne has put together a verification program for SPARC applications, and 500 of them have passed cleanly.

The fly in the ointment is Sun itself. Sun runs all 2,100 of those applications, and it also has name recognition. In addition, Sun recently announced a $4,995 SPARCstation. Talk about a door-opener. Again, Solbourne is stressing its technical strengths as well as its price/performance marks to make a dent in Sun's market share.

DISTRIBUTION CHANNELS. Although it has relied almost solely on direct sales to market its processors up until now, Solbourne plans to make better use of third-party and OEM channels. Apparently, Solbourne thought it made more sense to sell its predominantly server product line directly, and the company set sales offices in San Jose, Chicago, Boston, Denver, Syracuse, Minneapolis, Dallas, Washington D.C., and Los Angeles. But its newest workstation was designed to be much more user installable and maintainable than its previous offerings, making it more appropriate for alternative distribution channels.

SERVICE AND SUPPORT. Solbourne claims to have a superior service and support strategy—a claim that was substantiated each time we talked to a Solbourne customer. Users noted the expertise of the company's support staff as well as its quick response to their problems. Each product comes with a one-year, on-site, extended warranty that includes parts, labor, installation, training, and access to its user response center. For optional software products, Solbourne offers phone support and software updates. Comparatively speaking, the length and breadth of Solbourne's service coverage is very good. Most manufacturers offer 90 days or less.

One convenience mentioned by more than one customer is that the workstation software comes preinstalled. Furthermore, a member of the support staff finishes the installation job and solves any problems that come up after the system arrives. Nice touches—especially on a Unix platform, where installation can be a painstaking process.

Hardware Architecture

Solbourne has an assortment of hardware platforms, ranging from X terminals to high-end servers, that can be transparently mixed and matched with Sun computers across a network, and programs written for SPARCstations will also run on Solbournes.

As concerned as Solbourne is with SPARC compatibility, it is also concerned with performance. The company has progressed nicely here so far. Its current second generation of SPARC computers just about doubles the performance ratios of its first generation. In other words, Solbourne doubled its price/performance in a year. That's a good pace, and one that it should continue if it wants to stay competitive in the RISC market.

Until recently, Solbourne played in the mid- to high-end market with multiprocessor servers and workstations (in addition to X terminals). Solbourne's first product line, introduced in January 1989, was the Series4. The line was modeled after the Sun4 and contained two workstations and three servers, with MIPS ranging from 17 to 30. Late last year, however, Solbourne released its second product line—the Series5—which completely blew away the Series4 in terms of price/performance. The

company, therefore, dropped the Series4 line. (Series4 users can upgrade to a Series5—or future generations—simply by swapping CPU boards.) It rounded out its product offering in October by introducing the S4000, a low-end uniprocessor SPARC workstation. So, aside from its original Series4 line, Solbourne has four product families out in the market:

- X Display Stations, both color and monochrome, which have been OEM'd from NCD.
- Series5 multiprocessor workstations and servers, Solbourne's premiere product line. The series includes two workstations and three servers and ranges from 22 to 65 MIPS.
- Series5E/900 Server, the so-called "Enterprise Server." It can hold up to 8 CPUs, each running at 31 MIPS, and can support as many as 150 users.
- S4000 Workstation, a uniprocessor that features the 64-bit SPARC chip.

We've already told you that Solbourne uses most of Sun's technology as its platform base. But Solbourne's specific developments better leverage SPARC for multiprocessing as well as for multimedia applications, and these deserve discussion. (See Illustration 1.)

64-BIT BUS ARCHITECTURE. Many RISC designs are abandoning 32-bit architectures because they're simply not fast enough. Solbourne is no exception. Its multiprocessors are based on a 64-bit "Kbus" architecture that transfers data among memory, the operating system, and processors at a rate of 128 Mbps. That's fast enough to take on several processors at once—at least eight, according to Solbourne. The Kbus is a backplane bus for processing and memory. The Kbus board has a floating point processor (33 MHz or 40 MHz, depending on the model) with integer units and a 128KB physical cache.

For I/O, Solbourne includes a 7-slot VMEbus. Other systems use the VMEbus, and its 25 Mbps performance is adequate but not terribly impressive. We've noticed some vendors putting a lot of development time into very fast I/O buses—and so they should. An I/O bus needs to keep up with fast processors and multiple CPUs; otherwise, it invites bottlenecks. A well-designed I/O bus running double the speed of the VMEbus can really improve performance.

(We should point out that the Kbus is used by Solbourne's multiprocessors—not the S4000 uniprocessor, which has its own 64-bit architecture. See "Hardware Line," page 8.)

64-BIT SPARC. We talked earlier about Solbourne's desire to milk the low-end RISC market, and the new 64-bit SPARC chip is an attempt to do just that. The chip has certainly given Solbourne some commercial attention. But, more to the point, Solbourne asserts that it was designed and optimized for low-cost workstations. For instance, it has a higher level of integration than the chips Solbourne uses for its other processors, tying together the CPU, floating point, memory management, and cache right in the chip. Furthermore, it only runs on the S4000.

Solbourne worked with Matsushita on the MN10501 chip design (it carries the Panasonic brand name). It rates at 40 MIPS and 20 MFLOPS. The chip is a CMOS implementation with one million transistors and an integral floating point unit that operates in parallel with an integer unit. Data pathways of 64 bits and a 40 MHz clock speed offer a substantial performance boost, as does the reduction of the clock's per load/store instructions, which, Solbourne claims, can make up to 15 to 20 percent of a given program.

Since the chip has such a different design and purpose from its other implementations, customers will probably not be upgrading to the MN10501. The boards of the S4000 are different from the boards of the Series4, Series5, or Series5E. However, it's quite feasible that Solbourne will upgrade the chips of its

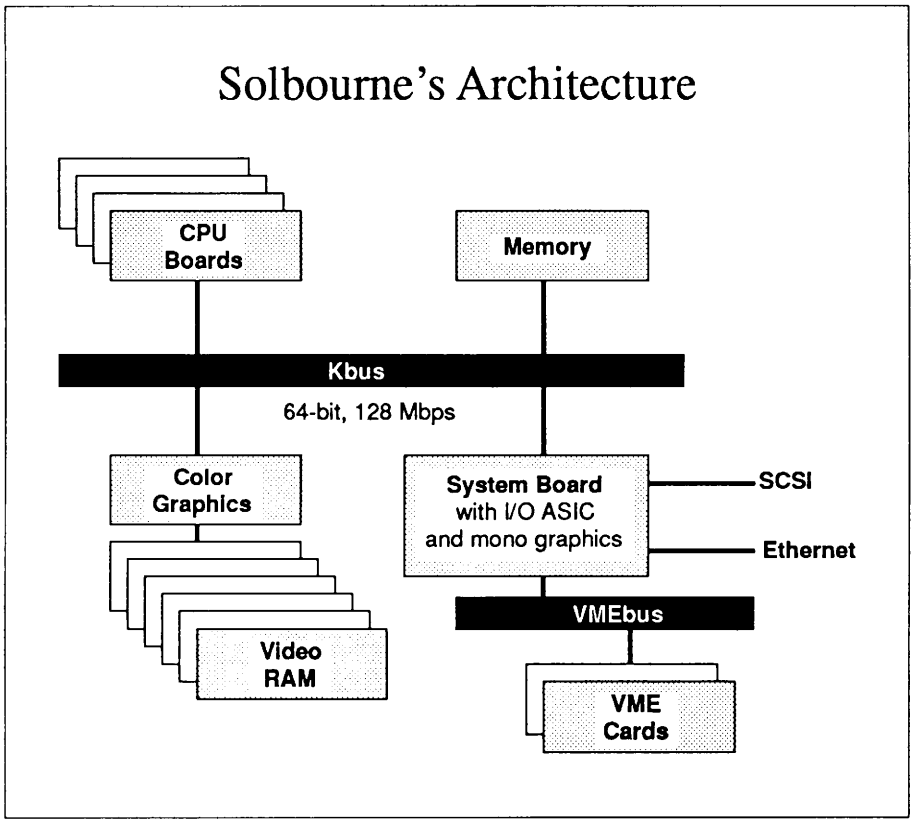


Illustration 1. Solbourne's multiprocessor hardware architecture.

multiprocessors when more appropriate 64-bit SPARC implementations become available. (No word from Solbourne on whether or not it would develop such an implementation itself.)

MEMORY. One of the hardware distinctions between Sun and Solbourne is Solbourne's use of Error Correction Circuitry (ECC) memory for its high-end server products, which detects and often corrects double-bit errors. Sun uses parity-checking, which can only detect single-bit errors. Essentially, ECC memory makes a system more reliable—especially in large-memory configurations.

GRAPHICS. If Solbourne's goal is to capture engineers and developers, high-performance graphics are a must. Not only has the company developed an intriguing X software environment, the added performance of multiprocessing is well-suited for graphical and multimedia applications. The color displays and X terminals offer 256 of 16 million colors with a minimum of 1152-by-900 pixels.

The S4000 has more advanced graphics features than the rest of Solbourne's product line, boasting support for PEX (PHIGS Extension to the X Window System), a 3-D graphics API that has been sanctioned by both the X Consortium and ANSI/ISO. The S4000 also has the advantage of Solbourne's Graphics Accelerator (SGA), which has a library of X, PEX, and Pixrects graphics primitives that write directly to the graphics hardware, and it thereby offloads the system CPU, which speeds up performance. Developers working with PEX and 3-D might be interested in the optional Z-buffer board, which accelerates hidden surface removal (i.e., erasing the back lines of, say, a cube or a cylinder). 3-D modeling is an expensive, compute-intensive process, and accelerator boards are essential for those that deal with 3-D extensively.

System Software

Solbourne has put together a credible hardware architecture, and the company has definitely matched its hardware design

SOLBOURNE WORKSTATIONS

	S4000	Series5/500	Series5/600
MIPS Performance*	25.5	22	22
Floating Point*	1.7 MFLOPS	3.4 MFLOPS	3.4
SPECmark**	12	16	16
Clock Speed	33 MHz	33 MHz	33 MHz
Workgroup Size	1-2	1-4	1-16
CPUs	1	2 Max.	4 Max.
Main Memory	8MB	16MB	16MB
Cache*	8KB	128KB	128KB
Bus Width	64 bit	64 bit	64 bit
System Bus Slots	3	5	7
I/O Bus Slots	3	7	7
Internal DiskInterface	400MB Max SCSI	327MB-1.3GB SCSI	327MB-2.6GB SCSI
Base Configuration	8MB, diskless 19" monochrome display	1 CPU, 16MB, 19" monochrome display	1 CPU, 16MB, 19" monochrome display
Base Price	$8,995	$17,390	$38,300

SOLBOURNE SERVERS

	Series5/530	Series5/670	Series5/800	Series5E/900
MIPS Performance*	22 MIPS	22 MIPS	22 MIPS	31 MIPS
Floating Point*	3.4 MFLOPS	3.4 MFLOPS	3.4 MFLOPS	4
SPECmarks**	16	16	16	19
Clock Speed	33MHz	33MHz	33MHz	40MHZ
CPUs	2 Max.	2 Max.	4 Max.	8 Max.
Workgroup Size	1-4	1-16	1-40	1-150
Main Memory	16Mb	16MB	16MB	32MB
Cache	128KB	128KB	128KB	128KB
Bus Width	64 bit	64 bits	64 bits	64 bits
System Bus Slots	5	7	7	11
I/O Bus Slots	7	7	7	7
Internal Disk	327MB-1.3GB	327MB-2.6GB	830MB-16.6GB	860MB-27.5GB
Interface	SCSI	SCSI	SMD	IPI
Base Configuration	1 CPU, 16MB	1 CPU, 16MB	1 CPU, 16MB, SMD disk	1 CPU, 32MB, IPI disk control.
Base Price	$14,900	$35,900	$63,900	$89,900

* Per CPU ** Based on uniprocessor configuration Source: Solbourne Computer

Illustration 2. Solbourne's SPARC product line.

Hardware Line

We've been talking a lot about Solbourne's hardware architecture and system software, but very little about individual hardware models. Aside from the X terminals, Solbourne has three computer lines: the Series5, the Series5E/900, and the S4000. Series5 is Solbourne's main product line, and it contains two multiprocessor workstations and three multiprocessor servers. The Series5E/900 is strictly a server, but a much more powerful one than any of the Series5 servers. Conversely, the S4000 is a low-end workstation, and, unlike its Solbourne relatives, it's a uniprocessor with a 64-bit SPARC chip.

Below is a description of each product line:

X DISPLAY STATIONS. Solbourne's line of X terminals includes three models: XDS16, XDS17c, and XDS19.

- XDS16 is a 16-inch monochrome display station based on the Motorola 68000 chip, and it can be configured with up to 4.5MB of memory.
- XDS17c is a 17-inch color display station that supports 256 colors from a palette of over 16 million. It is based on the 68020 chip, comes with two graphics engines, and is configurable to 8MB of memory.
- XDS19 is a 19-inch monochrome display station, also with a 68020 chip and up to 8MB of memory.

SERIES5. The Series5 is Solbourne's answer to Sun's SPARCstation line. All are multiprocessors with at least two CPUs. Main memory on each machine begins at 16MB, but can be expanded to 256MB, and MIPS can reach as high as 65. These computers use the Cypress CY7C601 32-bit SPARC chip, which runs at 33 MHz. Among the general features of the Series5: ECC memory; the Kbus architecture; a physical 128KB cache and high-speed cache control; display monitors (19-inch monochrome or 16- or 19-inch color with 1152-by-900 pixel resolution); the system software—operating system, compilers, networking (NFS, Ethernet, etc.); and user interface software (SunView, X Window, the Solbourne window manager, NeWS). The workstations also include graphics facilities and PC emulation.

The Series5 includes:

- The 5/500 Desktop Workstation, with up to two 22-MIPS processors for a combined 40-MIPS and 6.1-MFLOPS performance.
- The 5/530 Workgroup Server, which, like the 5/500, can host two 22-MIPS processors for up to 40 MIPS of processing power.
- The 5/600 Deskside Workstation, which can house four 22-MIPS processors instead of two. That adds up to 65-MIPS and 10 MFLOPS.
- The 5/670 Departmental Server is the server counterpart to

with its software environment. Again, Solbourne started out with some of Sun's base technology: the Sun operating system, user interface technology (SunView and NeWS), networking software (ONC as well as TCP/IP and Ethernet), and graphics software (Sun CGI and SunCore). Then it figured out how to improve upon it, starting out by converting the operating system to support multiprocessing. It also added some really productive features to the X development environment, as well as toolkit independence—and, given the stormy graphical user interface climate, this is a salient point.

SMP. Solbourne's SMP operating system, OS/SMP, is a multiprocessing version of SunOS. Essentially, Solbourne has implemented a multithreaded kernel so that multiple CPUs can execute shared kernel code concurrently.

There are various approaches to multiprocessing, and Solbourne originally chose a master/slave MP implementation—sort of halfway between asymmetric and full symmetric multiprocessing, where one processor assigns tasks to the other processors. It's now a full symmetric implementation, and all CPUs are equal. The design depends on load-balancing and shared memory.

The standard Unix kernel doesn't easily adapt itself to symmetrical multiprocessing. A number of operating system features and utilities need tweaking before they'll allow multiple jobs to run simultaneously. Solbourne has modified a few SunOS utilities to support parallel tasks:

- The Unix domain sockets allow pipe operations to run concurrently on multiple processors. The object here is speed. In a typical uniprocessor design, a lot of time is wasted waiting for suspended processes and buffer complications. With multiprocessing, a process can run on a CPU; there is less need for suspended processes and buffers at all.
- A parallelized Sun *make* utility, or *pmake*. *Make* is used to

the 5/600 workstation, holding up to four processors for 65 MIPS and 10 MFLOPS.

- The 5/800 Network server matches the 5/670 in performance; its four processors generate 65 MIPS and rate at 10 MFLOPS. Its four Store Module Device (SMD) subsystems each contain as much as 4.2GB for a total of 16.6GB.

5E/900. Last July, Solbourne introduced its Enterprise Server, the first of the Series5E line. This is a powerful machine. It's based on a 40 MHz version of the Cypress SPARC CPU and a 40 MHz floating point coprocessor, and the Kbus has been extended to 11 slots. Its rackmount configuration supports eight processors, each running at 31 MIPS and 4 MFLOPS. The 5E/900 also features an Intelligent Peripheral Interface (IPI) subsystem, which can hold up to 32 disk drives. Essentially, the IPI subsystem lets microprocessors take care of I/O, leaving the main CPU free to handle more intensive jobs. It also caches often-used data, which also prevents the primary CPU from being nagged.

Main Memory is 32MB, but it can be expanded all the way to 1,152MB. That's a lot of memory. And storage? The 5E/900 can hold 27.5GB. Solbourne estimates that the server can hold up to 150 users, depending on configuration.

The 5E/900 has the same standard features that mark the Series5 servers: ECC memory, Kbus architecture, 128KB cache, and system software. Price ranges: A 32MB 5E/901 with a single CPU and IPI disk costs $89,900, while a high-end 256MB 5E/908 with eight CPUs and 16 IPI disks costs $605,800.

S4000. At the other end of the spectrum from the 5E/900 sits the S4000, Solbourne's newest product and the first to feature the new 64-bit SPARC chip. We've already mentioned that the new model helps fill Solbourne's low-end gap. Prices for the product line start at $8,995.

ECC memory for the S4000 starts at 8MB and can be expanded to 104KB. The machine uses the same system software as the other Solbourne workstations. It also comes with 16- or 19-inch monochrome or color monitors and offers three graphics options: a color frame buffer, a monochrome frame buffer, or accelerated color graphics. A base color configuration with 8MB memory and color monitor is $11,495. For a 40MB color configuration with a 200MB hard disk and SGA with a Z-buffer board, the cost is $32,000.

Architectural Differences. The S4000 is quite distinct from the other Solbourne offerings. Yes, it's scaled down—although its performance metrics are good for a low-end machine: 25.5 MIPS and 1.7 MFLOPS. But it is a uniprocessor and has a different architecture. Since the Kbus was designed specifically to support multiprocessor architectures, it didn't make sense to put it into a uniprocessor. Instead, the S4000 features a proprietary 64-bit system bus that was built to take on the performance demands of the 64-bit chip. It also includes Sun's SBus with three expansion slots and has up to two SCSI disk drives.

perform multiple compiles and links. In Solbourne's version, those multiple compiles and links run in parallel on different processors. Again, the issue is speed. In a simple scenario, if you have 10 compiles to do and 10 CPUs, each CPU can handle each compile, thus cutting processing time by a factor of 10.

Solbourne's hardware structure also plays a critical role in the functionality of OS/SMP. Its multiprocessors were designed to let all CPUs perform simultaneously within the kernel. Also, the CPUs share a single version of the operating system, so adding or removing processors doesn't affect the kernel. The machines also feature physical caches, which help guarantee consistency in a multiprocessor environment. And, of course, the 64-bit system bus offers a wider data path to keep multiple processes moving steadily.

USER INTERFACE TECHNOLOGY. A few vendors have bridged the whole GUI issue by developing user interface toolkits that support both Motif and OpenLook. Solbourne is among them. Its Object Interface (OI) Library offers developers a single programing interface for both Motif and OpenLook (or, conceivably, any other X-based toolkit). Solbourne is licensing OI; its first licensee was AT&T.

Applications are written using objects in an OI class library. OI has a generic object model: Each OI object is linked to both an OpenLook and a Motif counterpart (see Illustration 3). Thus, developers only write to that generic OI API, and the application objects are bound to either OpenLook or Motif instantiations at run-time (i.e., they become either OpenLook or Motif at run-time)

To accommodate both OpenLook and Motif, Solbourne had to fudge a few object translations. OI is actually a combination of the functionality of the two toolkits. Therefore, it is a superset of the objects that you'll find in either OpenLook or Motif alone. If an OpenLook object, for instance, has no obvious Motif

counterpart, OI extends the Motif look and feel by using one of its superset objects. Still, we think that Solbourne has taken the right tack by supplying a superset rather than a subset of OpenLook/Motif functionality. We've seen other toolkit-independent solutions suffer the lowest-common-denominator syndrome, where too much functionality gets lost in translating applications from one user interface to the next.

Built on C++. Although OI uses X as its underlying window system, its object library is based on C++ rather than C, which is what most X toolkits use. (Solbourne has its own version of AT&T's C++, which translates into C source code for use with OS/SMP.) C++ makes for a more robust object environment—more logical and pliable. OI, for instance, features dynamic reparenting, which, essentially, lets subobjects be reused by different object parents—even parents that have been destroyed. This is a very useful function. If, for example, you build a menu object containing submenus (such as Index, Commands, Functions, Templates, etc.), and later decide to trash it, the submenus can live in an "orphanage" for use later.

The X Window Development Environment. Solbourne's X environment was generated with the OI Library, and it contains a number of X applications. Solbourne has its own window manager that can be configured to emulate Motif's or OpenLook's (as well as TWM, the standard window manager that comes with X). It also has a smattering of desktop accessories, such as a mail tool, a Unix news reader, a directory browser, a calendar, and a window debug tool.

But a few other features are particularly valuable:

- Virtual Desktop, which makes the X root window larger than the physical limits of the display. Once the root window is expanded, you can scroll through it and can put together a "rooms" type of environment, where groups of related windows can be moved into their own area on the expanded desktop. Or you can make use of "sticky" windows—windows that don't move as the Virtual Desktop is scrolled. Sticky windows are handy for moving to a different area or room without leaving a preexisting environment, or if you want to keep a standard environment (e.g., a clock, a mail notifier, etc.) visible at all times.

- Hypertext Help. We spent some time looking at the OI Help system, and we were duly impressed. Each Help item includes additional menu items for reaching extra information—subtopics or related topics. But a few elements of the Help system are particularly useful. One is its degree of context sensitivity. If you have Help running in a visible window, you can watch the Help window change according to what you're doing. Another is that the sample objects within a Help item are real objects—not just bit-mapped representations. For instance, the scrollbar Help item includes a sample scrollbar that actually scrolls. Very nicely implemented. Very sophisticated. (See Illustration 4.)

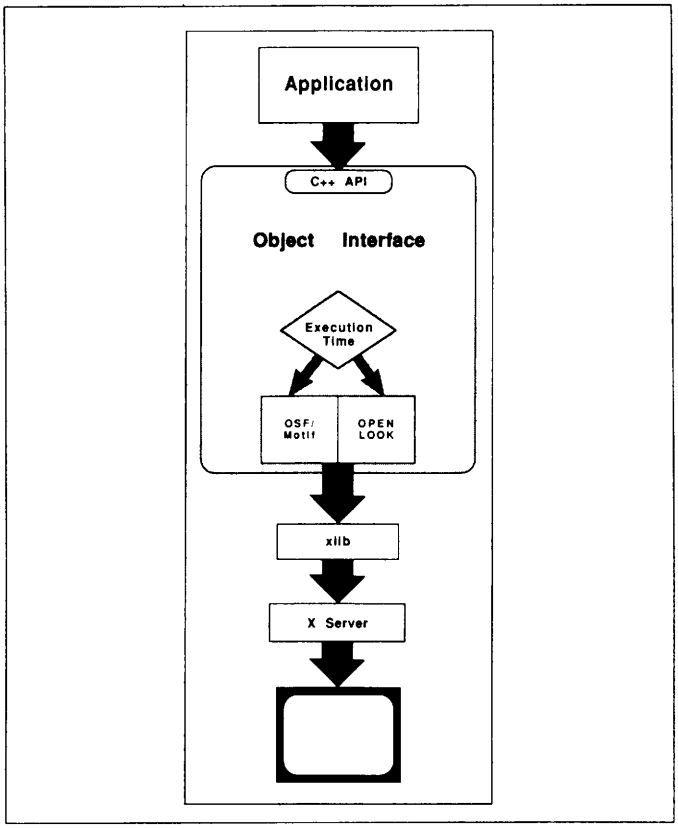


Illustration 3. Solbourne's OI Library has a generic object model, and, at run-time, the objects are bound to either OpenLook or Motif instantiations.

- A symbolic debugger, providing point-and-click kernel debug support for networked and multiprocessing applications.

One thing you won't find on a Solbourne computer is a desktop manager (à la OpenWindows, Looking Glass, or MacFinder, for example). In a way, this is in keeping with Solbourne's target customers of engineers and developers. Frankly, we don't know many Unix developers who want their utilities hidden behind a graphical user interface (which is what a desktop manager does). On the other hand, more and more commercial users are getting interested in these so-called "engineering workstations." Solbourne assured us that it doesn't want to neglect these potential commercial customers. In fact, its most recent workstation offering was designed for a lower-tech user than its other products. Ideally, Solbourne would like its workstation to be "easy enough for the desktop of a shipping clerk." It might start by adding a desktop management component.

NETWORKING. It seems that Solbourne's primary goal for its networking scheme is to adhere to Sun's networking scheme. Networking is one piece of Sun technology that Solbourne has licensed but hasn't touched. Solbourne does add to the network environment its multiprocessing architecture, which is really

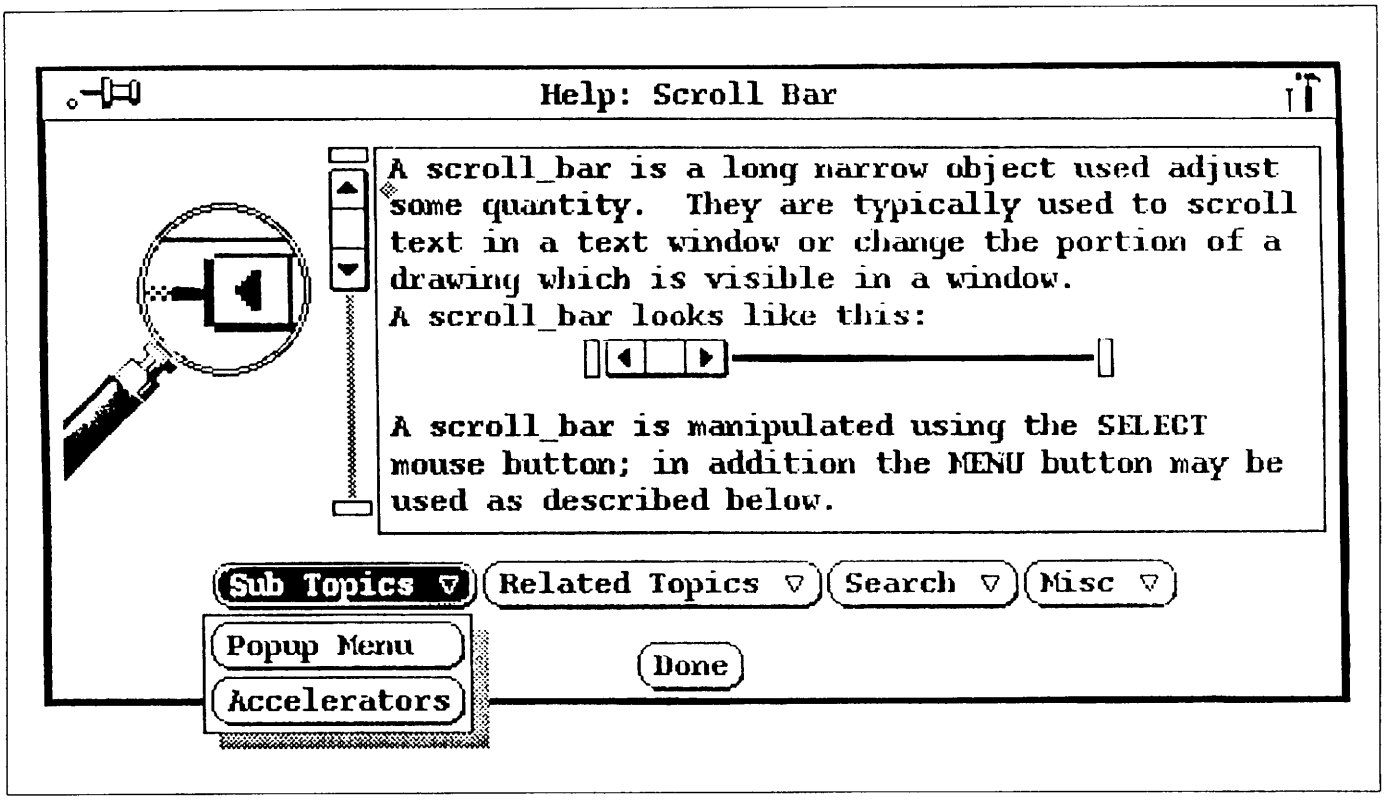


Illustration 4. A screen shot of Solbourne's Hypertext Help system. The sample illustration of the scrollbar is a live object; it actually scrolls.

ideal for distributed computing. Extra processors are clearly advantageous for Solbourne as a compute server in a distributed environment.

However, as we said earlier, Solbourne is putting a lot of faith in Sun's ability to forge a networking standard. OSF's DCE selections have been well-received, and, although Sun is in the midst of rebuilding ONC, the current ONC basket of products doesn't match the scope of OSF's offering.

Futures

Solbourne is rather tight-lipped when it comes to discussing company directions. While it does plan on a new generation of processors—the Series6—it wouldn't give us any hints at what kind of performance to expect or an estimated time of arrival. Likewise, the company implied that it may expand the S4000 workstation line to include server and lower-cost machines (we hope that means an under-$5,000 machine), but again, no details.

We did talk a bit about Solbourne's software—especially its operating system in light of the new multiprocessing extensions announced by USL. Solbourne plans to migrate to SVR4 and to adopt the extensions if they do indeed become standard. It doesn't foresee much trouble with the extensions, because OS/SMP added no system calls or extensions of its own that would cause incompatibility.

Comments

Our interest in Solbourne stems more from its strategic model than anything else. Solbourne is doing many things right: eliminating a great deal of development time and money by adopting an established and readily available base platform; focusing on specific market directions; and distinguishing itself with leading-edge technology like multiprocessing, speedy chip design, and flexible user interface technology.

A company like Solbourne could do very well or it could hobble. Its success depends largely on Sun. As long as Sun maintains its status, Solbourne can continue to finesse Sun's developments. Solbourne has a lot of opportunity here. Sun seems to be in the cumbersome position of trying to do it all, and it may have trouble keeping up, much less keeping ahead. Solbourne, on the other hand, is borrowing as much technology as it can, thereby affording itself the flexibility to develop leading-edge enhancements.

However, if the RISC market continues to spawn a number of different competitive architectures, Solbourne stands less of a chance. Solbourne is banking on SPARC to be the single prominent player, and there's a real danger in that.

TOWARDS SYSTEM CUSTOMIZATION. We alluded earlier to a Japanese flair to the way Solbourne is doing business. In some

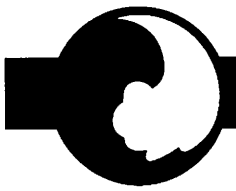
ways, we see in Solbourne the potential for a level of customization that Japanese auto makers are beginning to reach. Mazda engineers, for instance, actually recorded exhaust sounds of classic sports cars—trying over 100 combinations—to fine-tune the engine sound of the Miata.

While the computer industry has yet to approach a comparable level of customization, some vendors are at least zeroing in on precise technology developments necessary to a distinct audience. In Solbourne's case, the audience is made up of engineers and developers who have an installed base of Sun computers and applications, but who are working with robust applications that demand multiprocessing.

Still, computers are, by-and-large, general purpose machines. Yet, few users need a system that does it all—from communication, to number-crunching, to graphics. Ideally, systems would be designed and optimized for specific purposes, yet interoperable. Your network manager, for instance, may need a specialized communication machine. A graphic artist may want a machine with an extra-wide screen and stylus.

Although such systems may not be looming on the horizon, intermediate system developments are. Consider, for instance, specialized network servers (e.g., for printing, imaging, faxing, database retrieval, number-crunching, etc.) that can be mixed and matched as users need them. Or low-cost custom chips (e.g., protocol, inference engine, and operating system chips). This is the kind of progress we anticipate within the next few years, because it is attention to such pockets of technology that will differentiate vendors in an era of standardization. ☯

The title of next month's *Unix in the Office* is "Multimedia: Opening Up the Multimedia World."
For reprint information on articles appearing in this issue, please contact Richard Allsbrook at (617) 742-5200.



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Workgroup Technologies Manages Relationships

Workgroup Technologies (Waltham, Massachusetts) offers a document management system that adds a new twist to the common elements of managing your files (version control, security, archiving): maintaining relationships among documents.

Relationships among documents? Well, consider, for example, a law firm that has based several of its arguments on a decision made in the state superior court. Years later, that decision is reversed. Workgroup's Configuration Management System (CMS) can identify all the documents related to this case, thus ensuring that they can be easily located and updated with the current ruling.

RELATIONAL UNDERPINNINGS. When we first looked at CMS, we resonated to the associations (relationships) capabilities (described below) and to the database-enabled structure of the product. CMS runs on any Sun 3 or SunSparc system and is based on the Oracle relational database management system (RDBMS). CMS doesn't actually store the files within the Oracle database. Rather, a record containing specific information is kept in the RDBMS. The record maintains a pointer to the actual location of the file on the network. For each new version, only the deltas (changes) are stored. If a version of a document is copied into a different directory location, a pointer is actually set up to the original document in the original location.

ASSOCIATIONS. *Associations* allow you to specify relationships between files in the system. There are two types of associations:

- Hierarchical, a basic parent/child (or children) relationship. For example, a table of contents of a book could be considered a parent document, and all the chapter files could be children of that parent.

- Coupled, an explicit link to any other file(s) on the network. For example, you could couple all documents that reference Coca Cola. Then, when the word comes down that Coke is now called Coke Classic and will be marketed in a new manner, and you want to change it in your corporate brochure copy, you could get a list of any documents associated with that brochure copy. You must manually go in and change the references, but at least you know which documents are affected by the change.

Different from Hypertext. Many products offer hypertext links—the ability to create information webs by dynamically linking specific points in various documents. Associations are very different. Hypertext links are designed to allow easy movement from a reference in one document to a specific reference in another file. The links usually have a predetermined path—clicking on one reference takes you to the next referenced document, etc. Associations, on the other hand, are not used for moving among references, but for managing the relationships.

CMS FUNCTIONALITY. Many standard document management features are available through CMS, including:

- Document check out/check in. This facilitates version control and maintains an audit trail of document access. It also ensures that only one user will be editing a specific document at any one time.

- Attribute control. Each file has associated attributes, which are actually

fields in an Oracle database. Attributes are associated with a class of documents (subdirectory) and are defined by the customer. Documents may be searched by attribute—a criteria search.

- Reports. Workgroup provides 10 predefined reports based on attributes and documents status. Users can create their own reports by saving and naming criteria searches. For example, a criteria search can look for any document with the character string of "memo" in its file name, "acme project" in its description, and a last access date after October 1, 1990. This search can be saved as "Recent Acme Memos" and added to the reports list.

- Associations. (Described above.)

E-MAIL INTEGRATION. One of the advantages to the CMS system is its integration with the Unix Simple Mail Transfer Protocol (SMTP) and with X.400 for non-SunView users. Notification triggers can be associated with a document to let you know that this file has been modified. So if Janine changes an attribute in the document, your E-mail icon beeps, and you open your mail to discover a message from Janine saying, "Acme Memo has been checked out to Janine."

PRICING AND AVAILABILITY. Workgroup is selling CMS directly to large customers and is working with VARs to approach other customers. The product sells for $24,500, which allows access by up to 16 simultaneous users—typically about a 100-node network. The price includes a run-time version of Oracle. If you already have Oracle installed, $4,000 is taken off the sales price.

SYSTEM ARCHITECTURE. At present, CMS only runs on a Sun system, any Sun machine from a 3LC up running Sun OS 4.X or greater. Any machine on the network can participate in CMS, though that integration is via VT 100 (or VT 220) emulation.

USER INTERFACE. A well-designed, color bit-mapped interface is only available on Sun workstations. Any other system uses a monochrome character-based interface that attempts to replicate the bit-mapped interface.

We were a bit surprised to find that Workgroup's customers don't all plan to run primarily on Sun workstations. Currently, CMS is sold largely to engineering and technical publication installations. The users spend most of their time in their CAD systems or their documentation systems. And CMS is separate from the other applications. You enter the CMS environment to get or put back a document, but you work on the file in your native environment with your graphical applications.

We were a bit surprised to find that Workgroup's customers don't all plan to run primarily on Sun workstations.

Still, we see much potential for CMS in the commercial world, where Windows and the Mac have significantly raised the ante on interface issues. Terminal emulation, even X terminal emulation, is not enough.

NEXT RELEASE. The current version of CMS as we have described it is 2.9, which was released in October of this year. A major release, 3.0, is scheduled for April 1991. Some of the new features of this release will include:

- A port to OpenLook, including a user desktop that will make the system even easier for nontechnical end users.

- Enhanced criteria searches, including "or" statements.

- Document-level and project-level tracking. *Document-level* tracking is the implied associations among hierarchically linked (parent and child) files. The children files to a parent document may reside across multiple classes. *Project-level* tracking refers to the explicit associating of peer documents or files to a project name.

- Viewer capabilities. The ability to view a document without launching the source application.

DATABASE SUPPORT. CMS runs on Oracle, which is great if you either haven't chosen an RDBMS or if you already have Oracle installed. But what about those customers who have standardized on Informix or Sybase?

Workgroup plans to provide an intermediary interface to all the popular SQL databases. In response to customer demand, Informix will most likely be the next database supported, with others following as soon as demand warrants. No specific time frame was given for this interface.

NEW PLATFORMS. Workgroup is also considering moving off the Sun-only bandwagon and making CMS available on other Unix platforms. In fact, the company has reorganized to separate CMS out of the standard Sun VAR activities, thus avoiding any conflict of interest. The first target platform is the desktop 386 market. Others will follow pending customer demand. Again, no specific time frame was given.

CONCLUSION. There are many products that manage documents, but we haven't come upon others that maintain relationships among files. Once CMS 3.0 becomes available, with its viewer, desktop, and project-tracking capabilities, CMS will rival document manage-

ment products that require dedicated "librarians" to run the system. But any end user can work in CMS. An administrator is needed only for traditional administrative functions.

Workgroup's challenge is to grab the market before compound document and object management becomes widely available. It has a reasonably large window of opportunity, but it needs visibility and a broader platform base to really penetrate the commercial market. Still, for the very real problem of keeping track of the interrelationships of your files, CMS offers an affordable and usable solution today. (For a complete evaluation of CMS, see *The Office Computing Report*, Vol. 13, No. 12.) —*R. Marshak*

• IBM •

New RS/6000: Speed Plus Power at the High End

For the first time since IBM announced its new RISC family, the company has added a new member to the RS/6000 family. The new Model 550 can be configured either as a workstation or as a server, and it is aimed at both the scientific/engineering as well as the commercial market. The price/performance of the machine is at least on a par with the competition. The Model 550 has a MIPS rating of 56 (23.0 MFLOPS). The entry level version of the 550 comes with 64MB of memory (expandable to 512MB) and is priced at $130,000. Comparatively, Digital's high-end RISC system, the DECsystem 5500, is rated at 28 MIPS and sells for $63,000. So, in terms of price/performance, IBM and Digital are in the same ballpark.

IBM, which will deliver the new model next March, was anxious to announce it to demonstrate the power of its RISC architecture. We have had some reservations about expandability, but this new model proves that IBM's RISC is a powerful design. Because of its multichip implementation and concurrent execution of instructions, the RS/6000 is able to continue to boost its power.

Another plus for the new machine is its first-time use of the 4MB memory chips, which allows the Model 550's memory capacity to be expanded to 512MB. The former high-end machine, the model 540, could be expanded to only 256MB.

As traditionally loyal IBM customers implement Unix, they feel safer with Big Blue.

The 550 is also a 41Mhz processor. The 540 is based on a 30Mhz clock speed. The fact that IBM has been able to rev up clock speed so dramatically is a demonstration of the potential of this architecture.

CONCLUSION. IBM's new family is earning good marks in the user community. IBM had initially planned to make this platform its technical computing environment, but has found it must reposition the RS/6000 more broadly. While two-thirds of the sales are finding their way into technical shops, an increasing number of commercial customers are beginning to consider the RS/6000 seriously for their commercial applications environment.

Therefore, IBM is beginning to reposition its commercial development environment for AIX as well as SAA. For example, IBM recently announced that the AD/Cycle repository environment would be available for AIX as well as SAA. Clearly, the RS/6000 has the type of power required for a demanding Computer Assisted Systems Environment (CASE) for which the AD/Cycle is geared.

Another reason that IBM may be more comfortable with the RS/6000 as a commercial entity is the current health of the AS/400 family. With these machines gaining in small and medium-sized organizations, the fierce competition between the two groups has lessened. At the same time, large IBM mainframe shops that are considering "open systems" and Unix are beginning to pilot the RS/6000. As these traditionally loyal IBM customers implement Unix, they feel safer with Big Blue. They also find it easier to convince their managements to try IBM Unix. —*J. Hurwitz*

• HP •

Opening Up OpenView

Hewlett-Packard (HP) has taken a large step toward making the management of open systems more "open" by announcing that it will introduce a version of OpenView that will run on Sun workstations. In addition, HP has indicated that it is entering a bilateral relationship with IBM to assure cross-system management capabilities between the vendors' systems, with some of the HP/IBM technology being co-submitted to the Open Software Foundation (OSF) for the Distributed Management Environment (DME) request for technology.

The announcements are a component of HP's three-part focus for OpenView:

- Hardware independence for OpenView

- Increased integration of network, systems, and instrumentation management

- Addition of new support services

HARDWARE INDEPENDENCE. The Sun platform is the third for OpenView, following the HP 9000 and Intel 386/486 (running DOS and Windows 3.0). Likely platforms for future release include the IBM RS/6000, SCO Unix, and OS/2. The HP OpenView Network Management Server software for Sun workstations is expected to be available in the second half of 1991, and it is priced at $30,000, with end-user software for Sun workstations priced at $7,000.

HP is also pushing protocol independence, initially supporting Simple Network Management Protocol (SNMP) and CMIP over TCP/IP (CMOT) for TCP/IP networks and promising Common Management Information Protocol (CMIP) support for OSI networks in the future.

By making OpenView hardware protocol independent, HP is trying to create a de facto industry-standard management environment for multivendor networks. At the same time, HP is seeking de jure status for OpenView with its submission in response to OSF's DME request. The fact that at least part of this submission is in concert with IBM seems to indicate that HP is trying to gather forces against the other likely candidate for the basis of DME—Digital's Enterprise Management Architecture (EMA).

INTEGRATION. HP is positioning OpenView as an integrated platform for managing LANs and WANs, as well as embedded systems (instrumentation management)—this is HP, after all. The new announcements enable the following types of integration:

- Automatic integration of current HP 9000 applications with HP OpenView Network Management Server.

- Access to Management Information Base (MIB) extensions. Using nonstandard MIB variables, users can access nonstandard devices. HP has used this feature to integrate its LANProbe diagnostic software and Novell's LANtern products into OpenView.

- SNMP integration with LANProbe and HP Apollo workstations.

SUPPORT SERVICES. HP also announced the HP Technical Consulting Program to help users develop object-oriented, network management applications based on OpenView. The program consists of a combination of services and training.

HP has made OpenView a keystone of its strategy for the future and is continuing to enhance and more completely define it.

CONCLUSION. HP has made OpenView a keystone of its strategy for the future and is continuing to enhance and more completely define it. The agreement with IBM will help HP convince users of OpenView's viability, but may be more important in convincing third-party developers of network management products that OpenView is a primary platform to build upon. And, if a large part of the OpenView architecture and technology is adopted by OSF, then all of HP's efforts may bring a multifold payoff.

—D. Marshak

•OLTP•

An Ally for Tuxedo

AT&T's Unix Software Labs (USL) recently endorsed Ally from Unisys as the 4GL of choice for Tuxedo, a transaction monitor for databases. USL released Tuxedo 4.0 in February 1989, and AT&T has since been trying to push it as a Unix industry standard. The partnership with Unisys can only help those efforts.

Tuxedo itself doesn't have a 4GL tool, and apparently Tuxedo customers have been clamoring for one for some time now. Ally is a 4GL tool for Unix workstations—not mainframes—and it was designed for lighter online transaction processing (OLTP) transactions (as opposed to, say, airline reservations or banking TP applications). USL considers the Ally tool a sophisticated, robust product. All programming is done at the 4GL level, obviating the need for C code. It was also designed to be database independent. The product uses the X/Open transaction database standard, XA, for which several major DBMSs have promised support. (Sybase is the major exception. It is obviously promoting its own Transact SQL as a Unix transaction monitor standard.) However, that doesn't preclude Ally from dealing with non-XA databases. Unisys decided to integrate Ally with Tuxedo about a year and a half ago as part of its Open/OLTP campaign.

JOINT OEM MARKETING. The actual marketer of the integrated product will be Ally Software, a subsidiary of Unisys. (The original developer of the Ally tool, Foundation Systems, was acquired by Sperry in 1986, and has since become Ally Software.) USL will provide its OEM sales leads to Ally Software, and the two organizations will

participate in joint marketing activities such as trade shows, promotions, etc. USL will continue marketing Tuxedo source code to OEMs, but Ally Software will pick up direct sales, marketing Tuxedo binaries to end-user customers.

The initial marketing will be targeted at hardware manufacturers that have already committed to Tuxedo—besides Unisys, that is. Ally Software is trying to develop an identity of its own—apart from Unisys—to avoid channel conflicts. Both USL and Ally Software believe that OEM sales will drive direct sales. The exception here is Sun. Sun doesn't OEM much software, so Ally Software will market Tuxedo on SPARC machines for Sun customers.

COMMENTS. USL's relationship with Unisys and Ally Software could turn out to be a considerable boon for Tuxedo. Unisys has put together a solid, standard, integrated OLTP strategy. And Ally is very useful for building transaction-oriented database applications. In fact, none of Unisys's OLTP competitors have a similar 4GL tool. That's why USL's choice of Ally is so noteworthy. Because of its database independence, Tuxedo is already considered an open technology. Ally could prove to be the missing element that catalyzes Tuxedo as the de facto transaction monitor standard. (For more details on OLTP, Tuxedo, and Unisys's strategy, see Vol. 5, No. 8.)

—L. Rowan

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