By Gordon Bell

WHAT UNIX NEEDS TO SURVIVE IN THE 1990's

The goal for UNIX in the 1990's should be to provide all styles of compatible, fully distributed computers connected via appropriate local and global networks. UNIX would include these dimensions:

Vertical compatibility. All classes of computers—including personal computers, workstations, shared microcomputers, minicomputers, mainframes, and supercomputers—would provide the same program and user interfaces.

Horizontal compatibility. Computers within a class—say, supercomputers and microcomputers—would be compatible with each other even though they came from different manufacturers.

Functional style extensions and compatibility. UNIX is optimized for time-shared, interactive computers for program development and general-purpose use. It should be extended to include compatibility with other styles of computing: scientific/engineering, office and data processing, real time, and transaction processing.

A restructured interface. The UNIX interface must evolve to provide consistency among all applications and to free users from the many manuals and commands that make computing a drudgery. Parc Place Systems, formed by Xerox PARC personnel, offers the Smalltalk environment, which Ardent, AT&T, and Sun Microsystems are offering to dramatically improve UNIX's human interface. Sun and AT&T's new Open Look intuitive user interface is also a step into the 1990's.

Different styles. Each user application requires specific extensions to meet reliability, scheduling, file system, programming model, interface, and other needs. Improved security is essential, since users view secure UNIX as an oxymoron.

Engineering and scientific computing extensions. Computers for this environment are leading the revolution in parallel processing. Extensions have been made for various forms of parallel processing, including micro- and multitasking, so that users can write parallel programs in either a transparent or explicit fashion. Similarly, C (and other languages) must be extended in a uniform fashion to support parallelism.

Now that we understand what's needed for UNIX to succeed, we must also understand the market segmentation that has helped divide UNIX.

The most critical segmentation for UNIX is whether it is fundamentally a shared system, as in the original UNIX, or is a single-user, fully distributed system of workstations or PCs tied together on a local-area network.

Another segmentation is by application. Early computers were split between scientific and commercial lines, and for two decades this distinction disappeared. Two distinct lines of computers, each of which covers a range of prices, have reappeared. The first can be categorized as ordinary, scalar computers for a range of general-purpose use, including mainframes, superminicomputers, minicomputers, workstations, and PCs. The second group is vector supercomputers for scientific and engineering use, comprising supercomputers, minisupercomputers, and graphics supercomputers.

Although UNIX is available in each computer class in some form, the largest or most significant manufacturers in each class offer proprietary operating systems. Furthermore, IBM has announced still another future proprietary interface, Systems Application Architecture (SAA), the availability of which is unknown. Similarly, IBM is trying to provide hardware uniqueness in its PCs through the microchannel architecture and extensions to the latest operating system from Microsoft, PS/2, thereby creating a "code museum."

Probably the most serious flaw in a UNIX vision is the uncertainty over who will take responsibility for its evolution into various alternative computing styles. This evolution is critical to avoid locking the future into the decade of the 1970's.

Initially, UNIX was fine for allowing a raft of startup companies to put together microprocessor-based hardware and use a common operating system. Virtually all these companies have taken little responsibility for UNIX except to take it in its "experimental" form (either from AT&T or Berkeley) and convert it to "industrial strength" by fixing major parts, developing regression test suites, and performing more thorough testing.

AT&T and Sun Microsystems have proclaimed that they will take responsibility for the future evolution and certification of UNIX.

The new AT&T/Sun laboratory headed by Bill Joy has the potential to lead the industry. To achieve success, it needs competitors. Also, it won't provide a single, all-knowing answer to the future of UNIX. For example, the predilection and ideology of Sun to build uni-processors ignores all the extensions we need for parallelism. Scientific supercomputing is likely to be nowhere in sight of such a group. Similarly, one would not expect any coverage of commercial transaction processing.

The laboratory has asked the industry for input, and we must take responsibility and provide it. It's our chance to create a clear vision of UNIX, even if just a little piece is defined, for the 1990's. □

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