NASA considers space station software issues

Susan Voigt, NASA Langley Research Center

Anticipating the major role software will play in the permanently manned US space station scheduled for 1994, a group of National Aeronautics and Space Administration computer specialists organized the Software Working Group to address key issues early in the planning and design stages. This group, with membership from the nine NASA centers and representatives from NASA headquarters, held a workshop in August 1984 to identify software issue of great importance to the space station program.

Subsequent working group efforts have included drafting an overall space station software management plan, developing a space station software lexicon, and hosting the Open Forum on Space Station Software Issues in Huntsville, Alabama, on April 24-25, 1985.

Four panels at the forum were organized around the topics software management, software development environment, languages, and software standards. During the opening session of the forum, four invited experts spoke on the panel topics.

John H. Manley of Computing Technology Transition, Inc., endorsed the NASA software life-cycle framework and software documentation requirements, and recommended more emphasis on product management and on identifying specific people with key responsibilities and authority.

Barry Boehm of TRW discussed his view of the issues surrounding a software development environment, citing arguments for and against a uniform, NASA-furnished, mandated environment. He recommended that NASA coordinate with the Department of Defense’s JSSEE activity.

Victor Basili of University of Maryland discussed the language issues and considerations ranging from special-purpose languages to reusability to multilingual environments. He recommended that criteria for selecting a family of languages for space station be developed based on categorizing the applications and life-cycle phases and delineating the methodologies to be used.

George Tice of Tektronix discussed the value of standards, the potential leverage from other software standards efforts (such as Department of Defense, European Space Agency, and IEEE), and the opportunity for NASA to serve as a pacesetter for the US software industry.

The major conclusions of the forum were:

1. The draft software management plan was a good beginning. However, several specific recommendations were made to enhance the plan. The top-level software managers must have clear decision and control authority. Software should be treated as part of the overall system engineering and integration effort. The focus of software management and acquisition should shift to maintenance and sustaining engineering in order to minimize life-cycle costs.

2. NASA should furnish a uniform, modular software development environment and mandate compatibility for all software acquired or developed for the space station. The environment should be incrementally developed, have a virtual operating system, and support portable software packages.

3. The language Ada should be selected now as the primary source language for space station software, and NASA should begin to address issues related to the effective use of Ada, such as education, a transition strategy, runtime support, and accommodating the use of existing software.

4. The space station program should endorse and support software standards through policy and organizational structure. Standards should be tailored for space station, based upon existing NASA, Department of Defense, IEEE, and ANSI standards.

The software management plan has been revised and soon will be officially adopted and placed under configuration control. Plans for a space station software support environment are underway. The Software Working Group has been designated a formal advisory body to the space station program software managers.

NSF withdraws proposed limits on supercomputer access

Galen Gruman, Assistant Editor

Resistance from researchers has prompted the National Science Foundation to drop provisions denying supercomputer access to visiting researchers from mainland China and Soviet-bloc nations. The disputed provisions were in contracts that formally established supercomputing centers at four universities.

Concerns raised by the US State Department and the US Department of Defense apparently had spurred the NSF to include the restrictions in the contracts with Princeton University, Cornell University, the University of Illinois at Urbana-Champaign, and the University of California at San Diego.

“All references to foreign nationals have been dropped,” said Susan Mars of Cornell’s Theory Center. A compromise dropped the explicit limitations but left the door open for future exclusions. Similar alterations in the restrictions were reported for Princeton, the University of California, and the University of Illinois.

The question of limited access has not yet affected a proposed fifth center to be run jointly by Carnegie-Mellon University, the University of Pittsburgh, and Westinghouse. “We’re negotiating with them over money,” said Michael Levine of Carnegie-Mellon’s physics department. Officially, he said, “the issue has not come up yet.”

The basic issue, however, remains unresolved because the State Department’s technology transfer division is working on a comprehensive policy for all supercomputer access—not just for the NSF-sponsored centers. The review is part of the division’s routine review of high-technology applications for potentially sensitive military and espionage applications, a State Department spokesman said.

“We think they [supercomputers] probably fall in this category,” said Michael Marks, a senior policy analyst for Under
Secretary of State William Schneider, Jr., who is in charge of technology transfer issues. Marks said that the State Department, by working through the NSF, was trying to come up with a policy that satisfies both national security and academic concerns. "We're not try to have a confrontation," he said. "We are not trying to impede access to supercomputers by the academic community... I expect the academic community will be able to live with the policy [that is eventually determined]."

Among the concerns raised at the State Department by supercomputing access were the use of these computers to develop very sophisticated nuclear weapons, antisubmarine warfare, and encryption techniques, Marks said. The Department of Defense fears Soviet-bloc researchers could use the knowledge gained from supercomputer access to help the Soviets build and use supercomputers for military purposes, said Donald J. Goldstein, the principal director of trade secrets at the Office of the Secretary of Defense. The Soviets so far have no supercomputers, he said, and the US wants to preserve its edge in this area.

It is also conceivable that Soviet-bloc researchers might use US supercomputers to process data for the Soviet military if the data were important enough, Goldstein said.

The Chinese were on the restricted list because they are a communist government, Goldstein said. However, relations with the Chinese have improved since the list was drawn up decades ago and their status may change, he indicated. (The week the access issue first became public, President Ronald Reagan signed a nuclear technology exchange agreement with China's president, Li Xiannian.)

Personally, Carnegie-Mellon's Levine said he was upset by the proposed restrictions. "A simple, blanket exclusion of access by foreign nationals from the Warsaw Pact and mainland China creates a contradictory situation for a university to find itself in," he said.

Universities promote research freedom and try to allow the brightest minds to work on areas that interest them and to which they can themselves contribute, he said. Limiting those research areas contradicts the universities' purpose, Levine argued.

The government did not make its case for limiting access in the NSF committee meetings where the issue was first raised, Levine said. "I don't understand what is to be accomplished by these [proposed] restraints."

While supercomputers can greatly speed computation, they do not offer any capability that is not available on smaller machines such as DEC VAX mainframes. A range of computers, from personals to supercomputers, exists that conceivably could be used for research against US interests, Levine said. Those who want to harm US national interests do can find alternatives to supercomputers, he said.

The Department of Defense's Goldstein disagreed. "It's really a matter of degree," he said. Supercomputers are so much faster than conventional large computers that there is cause for concern, he said.

Levine argued that the proposed limits will harm only the US by discouraging research into artificial and unrealistic limits. Before blanket limits are imposed, the government needs "to show that the mechanisms in place aren't working."

Inquiries about the proposed restrictions to the National Science Foundation's Office of Advanced Scientific Computing were referred to his general counsel, Charles Herz. Attempts to reach him were unsuccessful.

ICCP offers certificate

The Institute of Certification of Computer Professionals announced a new certification program for those who have recently graduated with certificates or degrees in computer science and data processing or have equivalent on-the-job experience.

Candidates who pass the new exam will earn the associate computing professional designation. The exam has two parts: a language knowledge portion and a general knowledge portion.

The language part may be taken in Cobol, Fortran, Pascal, C, RPG, or structured Basic. The general knowledge section covers data and file organization, principles and techniques of programming, interaction with hardware and software, interaction with people, quantitative techniques and systems analysis. The two portions may be taken (or retaken) and passed separately.

Compsac schedule announced


The computer software applications conference itself will have four tracks of eight sessions each. The tracks are software quality and reliability, software engineering and management, new software technologies and database systems, and knowledge-based systems and practical applications.


For more information, contact Compsac 85, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439; (312) 972-5585.
**NSF offers science instrument grants**

The National Science Foundation is seeking applications from undergraduate colleges who want to replace, upgrade, or get new instructional scientific equipment. Grants will range from $5000 to $50,000 and will generally cover a two-year period. The colleges must at least match the NSF grants with their own funds.

In the computer field, the NSF’s College Science Instrumentation Program seeks to encourage “interfacing computers with scientific instrumentation and other appropriate uses of current technology in science and engineering instruction.”

**DPMA gives $4800**

In recognizing the importance of workers becoming creative computer users, the Data Processing Management Association’s Educational Foundation has awarded $4800 to Madonna College in Livonia, Michigan.

The award will be used to help develop modules for courses used to teach workers in business the essential knowledge to creatively use computers for information processing and decision making.

Madonna College has a rapidly growing number of undergraduate majors in computer information science and computer science. It is the first liberal arts college in Michigan to require computer literacy of its baccalaureate graduates.

**IEEE adds to database**

The IEEE’s on-line bibliographic database, Finding Your Way, now provides access to VideoLog, an electronic component guide that also includes industry news and electronic mail. The component guide provides component parameters and comparisons, pricing, short-form catalogs, and 14,000 sources.

Finding Your Way became available to IEEE members in May. It offers two searchable databases with references to IEEE courses, meetings, and technical publications. VideoLog was launched at Wescon 84.

**Program seeks applicants**

The IEEE seeks applicants for the 1986-87 term of its Congressional Fellows Program. Those selected will serve fellowships for one year on the personal staff of a US senator or US representative or on the professional staff of a congressional subcommittee.

Two fellowships will be funded. Other positions may become available if additional funding is secured. Fellows will be selected based on technical competence, ability to serve in public affairs, and evidence of serving the IEEE and their profession.

Age, sex, creed, race, ethnic background, and political affiliations are excluded as considerations. However, the fellow must be a US citizen at the time of selection and must have been in the IEEE at member grade or higher for at least four years. The application deadline is March 31, 1986.

For further information, contact W. Thomas Suttle at IEEE, 1111 19th St. NW, Ste. 608, Washington, DC 20036; (202) 785-0017.

The purpose of the fellowships is to contribute to the effective use of scientific and technical knowledge in government, to educate the scientific communities about public policy, and to broaden the perspectives of both the scientific and governmental communities about the value of science-government interaction.

**Tutorial sessions focus on distributed systems**

The Computer Society’s Tutorial Week 1985 seminars focus on distributed computing systems. One of the three tracks, distributed systems software, is given completely to the topic, while four of the five sessions in the reliability and performance track address distributed systems. The third track is architectures and protocols.

The sessions in the distributed systems software track are “Introduction to Computer Networks and Distributed Operating Systems,” “Tools for Developers of Distributed Software Systems,” “Concurrency Control and Reliability in Distributed Database Systems,” “Decentralized Resource Management,” and “Recent Advances in Distributed Database Management.”


Other sessions of interest to software specialists are “Principles of Communications Network Protocols,” “Parallel Processing Networks and Systems,” “Computers for Artificial Intelligence,” and “Performance Analysis of Local Area Networks.”

The tutorials will run from November 18 to November 22. Attendance is limited to 100 people per session. The advance registration deadline is November 8. The per-tutorial fee is $150 for members and $200 for nonmembers. The fee for all- week attendance is $675 for members and $850 for nonmembers. Those who register after November 8 will pay $30 more per session or $100 more for all-week attendance.

More information about the tutorials can be obtained from the Director of Tutorials, IEEE Computer Society, 1730 Massachusetts Ave. NW, Washington, DC 20036-1903; (202) 371-0101.

A block of rooms has been reserved at the Hyatt Regency Crystal City hotel in Arlington, Virginia, under the name Tutorial Week Washington. Rates are $75 for a single bed and $85 for a double bed. Reservations are due October 27. For more information, contact the Hyatt Regency Crystal City, 2700 Jefferson Hwy., Arlington, VA 22202; (703) 486-1234.

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New AI institute opens

The Institute of Artificial Intelligence recently completed its first semester. "With our summer session, we take the first step towards our goal of bringing a business-like approach to educating the experts, who will build practical artificial intelligence products for the civilian and defense industries," said Robert Greenberg, the institute's cofounder.

The Los Angeles, California-based institute holds seminars and courses year-round. The courses are held at the Harvey Mudd campus of the Claremont College in a suburb of Los Angeles.

The PAL foundation, a private charitable fund, provided a $20,000 scholarship fund for the institute's summer session. The scholarships were given to members of educational institutions who had to personally pay all or some of the tuition for institute courses. Awards matched the individuals' contributions up to 40 percent of the full tuition.


Insiders cited most as computer abusers

Contrary to popular belief, more computer crime is committed by people within a company or institution than by hackers. In fact, only two percent of computer crime was committed by outside hackers, according to a survey conducted by the Data Processing Management Association.

Of those surveyed, 21 percent reported computer abuses. Many of the offenders were programmers, systems analysts, machine operators, and data entry clerks. The reasons were varied: "ignorance of proper professional conduct" (27 percent), "misguided playfulness" (26 percent), "personal gain" (25 percent), and "maliciousness or revenge" (22 percent).

Learning graphics: computers as easy as paper

Preliminary findings from a University of Illinois study indicate that students learn graphics concepts on a computer as easily as they do using traditional paper-and-pencil techniques. In fact, students preferred computer-aided design over manual rendering.

The study found that "once the associated system procedures have been mastered, most students can make the same graphic representation faster and better with the micro-based CAD system than with traditional methods."

Two control groups, with 70 students each, were given the same course outline and were asked to complete similar drawing tasks. However, one group learned on drawing boards while the others used CAD software and microcomputers.

"Early in the study it became clear that the comparatively high level of enthusiasm among the CAD group greatly enhanced the learning process," said Michael Pleck, one of the researchers conducting the study in the university's Department of General Engineering.

"Students using CAD have more time to grapple with cognitive problems and develop advanced skills because they are less caught up in repetitive, monotonous manual tasks," he said.

The study at the Urbana-Champaign campus was part of the university's Project Excel, a $12-million, three-year program aimed at enhancing undergraduate education through creative use of advanced computing technologies.

Bulleting board addresses needs of the blind

The Sensory Aids Foundation of Palo Alto, California, has established Blindnet, an electronic bulletin board for those interested in advances in the fields of technology and visual impairment. The foundation is a nonprofit corporation that uses technology to help the disabled enter the job market.

The foundation maintains the software, provides the storage space, and cleans up the database weekly. The database, however, is user-defined. Those using it decide what messages to post and what topics those messages address.

A user might have something to sell, such as a used brailor, or might want to buy some equipment, such as a large-print monitor. Someone might use the board to establish professional or research contacts.

Blind or visually impaired users could access the bulletin board if they have appropriate equipment, such as a braille-producing printer or a speech-based word processor.

The bulletin board can be accessed by calling (415) 323-1062. A toll-free number will be available in October. Copies of the user manual are available from the Sensory Aids Foundation, 399 Sherman Ave., Ste. 12, Palo Alto, CA 94306.
Demise of videotex technologies predicted

Emerging microcomputer image-processing and transmission technologies will alter videotex services as they exist today, predicted International Resource Development, a Norwalk, Connecticut, market research firm. The current technologies are merely "transitional methods," according to a recent IRD report.

Videotex is an interactive, menu-driven database service. Some videotex services, such as the Source, Dow Jones News/Retrieval, and CompuServe, use ASCII to code their data, making them available nationally to anyone with a personal computer and a modem.

Other services, such as Times Mirror's Gateway in suburban Los Angeles, California, and Knight-Ridder's Viewtron in suburban Miami, Florida, use the Canadian-American-French NAPLPS, an algorithmic color-graphics-and-text coding syntax, to transmit signals to and from special decoders. Some services use the World system, based on Britain's Prestel graphics syntax. They too require special decoders.

All offer on-demand information and some interactive services such as stock quotes, library searching, product ordering, and banking.

The IRD report cited the rise of bit-mapping technologies in PC terminal displays and the leap in PC computing power as powering the projected changes in videotex. In fact, Gateway and Viewtron have switched from marketing or renting decoders to promoting PCs bundled with videotex-translation software in their bid to gain subscribers.

Improved output storage and output devices, along with high-speed processors and increased RAM, will erase the barriers separating videotex and integrated communications networks, the report predicted. And as the screen resolution, color capability, and graphics display timing improve in the hardware, similar improvements in the software drivers will occur, the report said.

Already, several firms—including Philips, Matsushita, and Toshiba—have reported optical disk systems using digital compression techniques to reduce the number of bits required to store a page by a factor of 22, the IRD report said.

The report envisioned users downloading data from an on-line database or videotex service through a communications network into the user's PC for processing by the user's software. In fact, one cable firm recently announced the startup of such a service in Denver, Colorado, and Buffalo, New York, using the cable service as the transmission medium.

Such integration of data across software environments will require seamless PC software to allow data flow from one application to another without user intervention. This would be similar to a company downloading budget data from its mainframe into a PC's Lotus 1-2-3 spreadsheet report.

Software seen as key to computer market growth

The computer industry must turn to software to recapture sales momentum and fuel substantial market growth, said Mark Krupka, marketing director at Digital Learning Systems, an OEM software developer.

The computer industry relies on repeat customers for more than half of its annual sales, although only eight percent of the potential marketplace has been penetrated, he said. New hardware will not attract new customers, he said.

"The person who has not yet purchased a personal computer doesn't understand why he should purchase one," Krupka said. Tutorial-like programs that introduce a PC's capabilities is one approach that stores might use. These programs could also supplement, if not largely replace, printed manuals, most of which, he said, are clumsily and confusingly written. And statistics show that less than 20 percent of the users read more than 40 percent of the manuals, he said.

Krupka said the current approach would be like a television showroom with sets displaying the standard color bars. They don't. What they do is show the sets tuned in to actual programs. "How excited should an uninformed user get over a monitor displaying the 'A' prompt or a spreadsheet?" he asked.

However, the industry must do more than improve the sales pitch. Conceptual programs—those that help people think better and more quickly—must be developed, Krupka said. He cited Framework and Reflex as early examples of such programs.

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