

Lawmakers focus on high-performance computing

This year, the US Congress and the White House have focused attention on spurring US development of high-performance computing. In September, the White House's Office of Science and Technology Policy issued a report, *The Federal High-Performance Computing Program*, that describes an interagency R&D plan for state-of-the-art supercomputers, networks, and a supporting infrastructure. The plan is a follow-up to a 1987 report that recommended a five-year effort on high-performance computing.

Earlier in the year, partly based on the findings of the 1987 report, Sen. Albert Gore, Jr., of Tennessee introduced Senate bill 1067, the National High-Performance Computer Technology Act of 1989, "to maintain United States leadership in the field of high-performance computing." Rep. Doug Walgren of Pennsylvania later introduced identical legislation as House bill 3131.

Committee action on both bills is expected this fall, a congressional staff member said. Three hearings were conducted earlier this year.

White House report. "High-performance computing is a vital and strategic technology, exerting strong leverage on the rest of the computer industry and other cutting-edge areas," said D. Allan Bromley, the presidential science adviser, in a transmittal letter accompanying the report. Establishing a national high-speed network to link researchers across the sciences and provide access to supercomputers "could have the same kind of catalytic effect on our society, industries, and universities that the telephone system has had during the 20th century," he said. One reason to single out computing technology for federal aid, the report said, is because the computer industry accounts for 10 percent of the gross national product and for almost 10 percent of all capital investment.

The report urges that the network, once it becomes operational, be transferred to a commercial service. The report predicts this could happen in 1996, although some people have said it could happen as early as 1993 if private companies were contracted to develop the network, a congressional staff member said.

The Office of Science and Technology Policy will help federal agencies encourage high-performance computing, but individual agencies will define their own goals and priorities, the report said. It recommends that existing agencies like the National Science Foundation and the Defense Dept. undertake the efforts, rather than establishing a new agency to handle

software R&D.

Funding for high-performance computing efforts would come from agencies' own budgets. Compared to current spending plans, these efforts would cost \$150 million more than budgeted for the first year, the report said, with the annual cumulative increase rising to \$600 million by the fifth year, resulting in a \$1.1 billion R&D budget. Current federal computing-R&D spending is about \$500 million, it said. President George Bush's budget proposals do not include the additional funds recommended.

The plan covers four major areas:

- Hardware and operating systems. It

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- Software technology and algorithms. It recommends \$660 million in additional funding over five years, \$153 million of which would be spent on "grand challenges." These challenges include 72-hour weather prediction, structural biology, chemical dynamics, ocean circulation, and human-genome mapping. The software research would have special emphasis on parallel programming and networking (including interoperability)

- National research and education network. It recommends \$680 million in additional funding over five years, compared to the current \$250 million. The goal is to have communication rates of 1 Gbps to 3 Gbps to selected research sites and of 45 Mbps to about 1,000 research sites. The first stage would upgrade the Internet trunks to handle rates of 1.5 Mbps.

- Basic research. It recommends \$183 million in additional funding over five years. Goals include attaining a level of 1,000 computer-science PhDs a year by 1995, upgrading 10 computer-science departments to the level of the 10 best departments, and promoting interaction between computer science and engineering.

The plan would reserve 15 percent of the funds in the computing-systems, software-technology, and network programs for basic research.

Congressional bills. The Senate and House high-performance computing bills echo the science policy office's recommendations but also add to it:

- Requiring the National Science Foundation to have a "special emphasis" on the development of artificial-intelligence technologies and applications through joint research programs among government, industry, and academia. But "I think in future bills we'll probably downplay AI," a congressional staffer said.

- Authorizing NSF appropriations of \$400 million over five years to research, develop, and implement the network.

- Authorizing appropriations of \$750 million over five years for high-performance software R&D, \$450 million over five years for high-performance computer systems, and \$150 million over five years to the NSF for basic-research grants to universities and for training programs in computer science and engineering.

(An authorization to appropriate lets money be spent but does not actually appropriate the funds. The bills fall under the jurisdiction of science and commerce committees, which can recommend spending levels, but separate appropriations committees allocate the funds.)

(Because the White House report and congressional bills use different breakdowns, the spending proposals cannot be compared directly. However, the bills appear to authorize slightly less for the network and systems development and slightly more for software R&D.)

- Requiring the NSF to establish clearinghouses to validate and distribute unclassified software developed by federally funded researchers, as well as public-domain software. The clearinghouses would maintain program libraries, help fund researchers to improve and maintain their software, help researchers locate needed software, make the software available through the high-speed network, and promote its commercialization.

- Requiring the National Institute of Standards and Technology to develop purchasing and development standards that encourage interoperability.

- Require the Defense Dept. to change its procurement regulations so contractors may keep the proprietary development tools they created for the projects.

- Requiring the NSF to ensure that the federally funded national supercomputer centers have the most advanced commercially available supercomputers produced by US manufacturers.

- Require the Commerce Dept. to investigate whether US export controls hinder the US supercomputer industry from marketing its computers abroad.