

Launching a national program for scientific computing

The news story on page 61 reports that the National Science Foundation is launching a program to promote and coordinate the use of the nation's advanced scientific computing resources. NSF has also established the Advisory Committee on Advanced Scientific Computing Resources to assist in planning and implementation of this initiative. NSF is taking these steps in recognition of the fact that advances in computer technology and applications have made the computer an essential basic research component in virtually all disciplines of science and engineering. Computers control experiments, analyze data, model complex behavior of the apparatus and perform calculations that allow the testing of theories of extraordinary complexity.

The latest generation of advanced scientific computers makes possible accurate theoretical modeling of large many-body systems, such as fluids or plasmas, and the solution of strongly nonlinear equations, as one encounters in general relativity and quantum chromodynamics. Indeed, the potential impact of advanced computing on future science and engineering research is of such magnitude that many scientists and engineers now predict a transition from the two broad methodologies of experiment and theory to three, the third being computational and information science.

In the US, much of the important research that could be done using advanced computing capabilities is being held back by lack of access to appropriate resources. The problem is especially serious in the universities, where, with few exceptions, scientists and engineers simply do not have access to the most advanced computers. The irony is that some of the few advanced computing resources available in this country, including three on university campuses, sit idle much of the time. The barriers are partly a lack of familiarity with this capability and partly the way computing costs are recovered.

At its initial meeting, the NSF advisory committee stressed that a major goal of the NSF initiative should be to promote cooperation and exchange of resources among all members of the scientific and engineering community by:

- ▶ Establishing a national network for all disciplines of science and engineering, beginning with the university community supported by the NSF, but including as rapidly as possible the full scientific and engineering community.
- ▶ Developing closer ties between universities and computer vendors, with careful attention paid to striking

a balance between academic freedom and proprietary concerns.

- ▶ Establishing interdisciplinary groups at universities, bringing together scientists, engineers and others to collaborate on common computational problems, share software and software development and build a common equipment base for their research.

It is clear that support for such an ambitious national program must come from all sources. However, a bold NSF initiative with threshold funding should do much to promote a synergism with far greater consequences than NSF funding alone could possibly achieve.

The first step in the initiative, which is budgeted at \$6 million in FY 84, is to provide access to currently available advanced computer resources for NSF-supported scientists and engineers whose work depends critically on large-scale computer capability. The advisory committee is assisting in the selection of organizations to provide the services and in the establishment of an adequate initial network. An Office of Advanced Scientific Computing has been formed within the NSF to handle all aspects of the Advanced Scientific Computing initiative.

The budget request for the NSF initiatives in FY 85 is \$20 million. While this falls far short of the perceived need, it will provide a long overdue startup. The advisory committee is in the process of making recommendations on the distribution of funds among various categories, including national advanced computing service centers, a national science and engineering network, local access to the network and other local facilities, interdisciplinary scientific computing centers, new technology demonstration and development sites and software productivity.

The NSF will be soliciting proposals from the science and engineering research community for projects having to do with the advanced computing initiative. The proof that advanced computing and information science can stand alongside experiment and theory as a third scientific methodology will come from fundamentally new discoveries and insights. The NSF initiative is an important and long-awaited first step. It is vital to the success of this effort that the response from the community be imaginative and bold.

NEAL LANE

Chairman

NSF Advisory Committee on

Advanced Scientific Computing Resources