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U.S. AND COMPANIES SET CAMPUS CENTERS FOR SUPERCOMPUTERS

By David E. Sanger, Special To the New York Times

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The National Science Foundation said today that it would spend $200 million to create supercomputer centers at four of the nation's leading universities. The move is the broadest Federal effort yet to promote research using advanced computer technology.

Federal officials said the primary motive for the five-year program was a ''desperate, overwhelming need'' among academics for access to supercomputers that could help solve a wide range of basic research problems.

Some also said it constituted an American version of Japan's Super- Speed Project, a joint effort of government and industry to build the next generation of high-speed computers.

While they vary in design, supercomputers are generally used to solve problems that could take years on conventional mainframe computers. Most of the machines, which cost in excess of $10 million each, are used by the Defense Department, intelligence agencies and national laboratories. Only a handful are available to academic and industrial researchers.

''If this gets off the ground, I suspect it will be very difficult for the Japanese to keep up,'' said Kenneth G. Wilson, the Nobel laureate in physics who will be in charge of the new National Advanced Scientific Computing Centers at Cornell University in Ithaca, N.Y.

The other centers will be at Princeton University in New Jersey, where it will be run by a consortium of several other Ivy League universities; the University of Illinois, widely considered at the forefront of supercomputer research, and the University of California at San Diego, where 18 universities are joining the effort.

The project announced today, the largest supercomputer effort in the United States outside of the military, marks an unusual collaboration between the federally financed National Science Foundation, universities and private industry. Corporations, along with state governments, are expected to match the $200 million ''seed money,'' as foundation officials called it, and underwrite joint research projects at the universities that will give private industry access to the machines.

I.B.M. Involvement

First among the donors is the International Business Machines Corporation, which said today that it would spend $30 million, in equipment and employess, to support an effort at Cornell to construct a supercomputer 40 times faster than the fastest machine now commercially available. The Exxon Corporation, the American Telephone and Telegraph Company and the Lockheed Corporation will participate in the center in Princeton.

University officials insisted that they would control access to the machines and said Federal funds would be used only to promote basic research, not proprietary products for industry. But the project still appeared to raise questions about the changing nature of corporate-university relationships. Both the software and the designs for new types of supercomputers expected to emerge from the project will likely spur intense competition

among companies sponsoring the work.

''It is clear that supercomputers are becoming the most important tool today in science and engineering,'' said Erich Bloch, a former I.B.M. scientist who is director of the National Science Foundation. ''But our own researchers don't have access to the computing power they need.''

Indeed, in recent years academic researchers have complained that without access to the supercomputers they would be unable to attack some of the most pressing problems of particle physics, biotechnology, aerodynamics and automobile design. Larry Smarr, the University of Illinois astrophysicist who will direct the supercomputer center there, said he has been forced to travel to Munich regularly to gain access to a supercomputer that could aid in the study of black holes.

'Facilities Have Fallen Behind'

''This country goes to sleep every once in a while,'' he said. ''The technology has raced ahead, but our own facilities have fallen behind.''

What prompted Congress last year to allocate $40 million for the first year of the supercomputer project, over the objections of some in the Reagan Administration, had as much to do with industrial competitiveness as the quality of academic research. Numerous corporations noted that Japan has made its supercomputers widely available to industry, and said the machines have cut some industrial design processes by 90 percent.

Three of the four computers used in the project will come from the American leaders in supercomputers: Cray Research and the Control Data Corporation.

The project of greatest interest today to the industry, however, is the collaboration between Cornell and I.B.M. Supercomputers are virtually the only types of computers that I.B.M. does not currently manufacture.

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