SDSC SAN DIEGO SUPERCOMPUTER CENTER

UCSD-Led Partnership Wins Important Competition to Revolutionize National High Performance Computing

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SAN DIEGO, Calif. - March 28, 1997 - The partnership led by the University of California, San Diego (UCSD), is one of two winners selected in the National Science Foundation's (NSF) Partnerships for Advanced Computational Infrastructure (PACI) competition. As a result, UCSD will begin negotiating an agreement with NSF for a five-year grant. UCSD's partnership--the National Partnership for Advanced Computational Infrastructure (NPACI)--teams 37 of the nation's leading academic and research institutions (see Attachment A [/News Items/attachmentA]) to revolutionize the computational infrastructure available to the nation's scientists and engineers.

The NPACI program, building on the combined strengths of the San Diego Supercomputer Center (SDSC) and partner organizations, will promote the development of software infrastructure to link computers, data servers, archival storage systems, etc., to enable easier use of the aggregate computing power. Further, it will team applications scientists and computer scientists to support dramatic scientific advances in a wide range of disciplines through development and application of new computer software and hardware techniques that lead to continuing improvements in computers' functionality and performance. NPACI investigators are located in 18 states from coast to coast. Many hold senior positions on their respective faculties, in professional societies, and on national advisory committees, including the High Performance Computing and Communications, Information Technology, and Next Generation Internet Advisory Committee recently appointed by President Clinton.

The right for UCSD to negotiate the terms of its award came yesterday at a meeting of the National Science Board, the oversight advisory board for the NSF, which formally approved NSF's funding recommendations for the PACI program. The other winning partnership is the National Computational Science Alliance (Alliance), led by the University of Illinois, Urbana-Champaign, which builds on the foundation of the National Center for Supercomputing Applications. The awards are for five years with the possibility of a five-year extension. Funding is slated to begin October 1, 1997.

"NPACI has assembled the most knowledgeable people in computational and computer science," said Sidney Karin, director of NPACI and founding director of SDSC. "Together with the Alliance, we will build a coordinated, national infrastructure that will provide unprecedented computational capabilities for the nation's researchers. This is a rare opportunity to have a profound impact on scientific progress."

The planned infrastructure will be used to tackle currently intractable scientific and engineering problems, such as designing a complex drug to have a specific effect, for example, binding to a certain site on a molecule to activate (or deactivate) a particular biochemical process. The NPACI project will spur development by computer vendors and support competitiveness in industry more generally with higher performance computing and communications services than have been available to date. And it will support the educational community by developing electronic environments for long-distance collaboration and supplying more efficient delivery mechanisms for electronic information

collaboration and supplying more efficient delivery mechanisms for electronic information.

"This is an exciting opportunity to support collaboration among academia, industry, and government to advance high performance computing," said UCSD Chancellor Robert C. Dynes. "We are proud to have assembled such a high-caliber group for this project. Through sharing of ideas and expertise, the NPACI partnership will guide the nation in innovation and discovery based on computational methods."

"With this NSF award from the PACI program, California continues as the wellspring and leader of technology innovation in the development of computers and computer graphics systems," said Pete Wilson, Governor of California. "This ensures that the State can continue to support its dominant computer industry and enhance its technology growth well into the 21st century."

Over the next several years, NPACI will create a national "metacomputing" environment, which will consist of geographically separated, heterogeneous, high performance computers, data servers, archival storage, and visualization systems linked together by high-speed networks so that their aggregate power may be applied to research problems that cannot be studied any other way. This environment will be extended to support "data-intensive computing." To that end, infrastructure will be developed to enable--for the first time--the analysis of multiple terabyte-sized data collections. The data include simulation output, data derived from remote-sensing systems and laboratory instrumentation, and data in distributed, discipline-specific databases. (A terabyte is equal to one trillion bytes.)

NPACI partner sites will participate in deployment of computing and data resources, technology and applications development, and education/outreach activities; many will participate in all three areas. Development work will focus on "thrust areas" to motivate, guide, and validate the evolution of the infrastructure. As areas poised for scientific discovery and technology development, NPACI initially will focus on Molecular Science, Neuroscience, Earth Systems Science, and Engineering. Three technology areas will be pursued that are central to creating the planned metacomputing environment: Adaptable, Scalable Tools/Environments, Data-intensive Computing, and Interaction Environments. "We expect this list of thrust areas to evolve," said Karin, "with thrusts added and deleted as the work progresses, technologies develop, and new computational needs become manifest."

Each thrust area will be comprised of a multidisciplinary team of applications scientists, computer scientists, and technology developers from multiple partner sites. Projects will leverage ongoing, separately funded research projects to ensure rapid deployment and robustness of the resulting infrastructure. This focused approach, consistently validated at SDSC, has led to greater progress overall in infrastructure development and has benefited the broadest array of disciplines.

Moreover, this approach is designed to break down many barriers--those that traditionally have separated applications and computer scientists as well as those that have separated computational scientists in different disciplines. Therefore, it will encourage more multidisciplinary activities to address increasingly complex problems. As a result, NPACI will create a professional cadre of multidisciplinary experts to focus infrastructure development on the specific needs of scientific applications.

NPACI will also integrate computational science and engineering education, building on successful education and outreach efforts within the partnership. Particular emphasis will be placed on outreach to minorities, women, and new groups such as the social sciences,

ecology, and museum collections communities. And NPACI will pursue collaborative projects to advance computing technology with computer vendors and other sectors of US industry, including the natural resources and automotive industries.

Collectively, NPACI will provide researchers with general access to high-end computers and data servers, and support vigorous early use of experimental architectures. A teraflops-scale production system is planned to be installed at SDSC. (A teraflops-scale system is one that can perform one trillion computations per second.) SDSC will become an operating unit of UCSD. Some aspects of SDSC's activities will be subcontracted to General Atomics, which has operated SDSC with great distinction for the last 11 years.

Mid-range systems will be installed at the University of Texas and the University of Michigan. Initially, experimental architectures will be located at California Institute of Technology (Caltech), UC Berkeley, and SDSC.

To support data-intensive computing, NPACI will implement a petabyte-sized archival storage system at SDSC. (A petabyte is equal to one billion megabytes.) Distributed caches will be made available at 10 other sites: Caltech, the University of Texas, the University of Michigan, UC Berkeley, UC Davis, UCLA, UC Santa Barbara, the University of Houston, the University of Maryland, and Washington University. Network connections, initially at speeds up to 622 megabits per second, will link the major resource partners.

Besides directing NPACI, Karin will serve as director of SDSC. He will be assisted by Peter Arzberger, executive director of NPACI, and Wayne Pfeiffer, executive director of SDSC. Karin will also chair the NPACI Executive Committee (see Attachment B [/News Items/attachmentB]), which will be the primary decision-making body for the partnership.

For more information, please consult the executive summary of the NPACI proposal on the World Wide Web at http://cacse.ucsd.edu/npaci.html.

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