DOE Awards Supercomputing Time to UC San Diego, SDSC Researchers

Scientists from San Diego conducting research in computer science, climate, biology, physics, and engineering

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Scientists from the San Diego Supercomputer Center (SDSC) and other parts of the University of California, San Diego - conducting research in computer science, climate, biology, physics, engineering, and earthquake sciences - were awarded supercomputing processor time by the U.S. Department of Energy (DOE) as part of its 2010 Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program.

Planning activities will include the development of a next-generation architectural framework as well as a complete review of the new archival tool's required and desirable functional specifications. Members of the archival community will be consulted during the planning and product development stages.

In total, the DOE's Office of Science awarded a record 1.6 billion processor hours to 69 new and renewed scientific projects. This marks the largest amount of supercomputing time ever allocated in the department's history, and an approximately 80 percent increase in processor hours from last year. Processor hours refer to allocations of time on a supercomputer.

New and renewed projects involving UC San Diego and SDSC researchers who were awarded processing time under the latest INCITE awards include:

Physics: "Verification and Validation of Petascale Simulation of Turbulent Transport in Fusion Plasmas."

Principal Investigator: Patrick Diamond, University of California, San Diego, and Howard Hughes Medical Institute.

Co-Investigators: C.S. Chang, New York University; Stephane Ethier, Princeton Plasma Physics Laboratory; Scott Klasky, Oak Ridge National Laboratory; Zhihong Lin, University of California, Irvine.

The project was awarded 35,000,000 processor hours on Cray XT at Oak Ridge National Laboratory.

Physics: "Validation of Plasma Microturbulence Simulations for Finite-Beta Fusion Experiments."

Principal Investigator: William Nevins, Lawrence Livermore National Laboratory. Co-Investigators: Jeff Candy, General Atomics; William Dorland, University of Maryland; Darin Ernst, Massachusetts Institute of Technology; Greg Hammett, Princeton Plasma Physics Laboratory; Christopher Holland, University of California, San Diego; David Mikkelsen, Princeton Plasma Physics Laboratory; Scott Parker, University of Colorado.

The project was awarded 30,000,000 processor hours on Cray XT at Oak Ridge National Laboratory.

Computer Science: "Performance Evaluation and Analysis Consortium End Station."

Principal Investigator: Patrick Worley, Oak Ridge National Laboratory. Co-Investigators: David H. Bailey, Lawrence Berkeley National Laboratory; Bronis R. de Supinski, Lawrence Livermore National Laboratory; Jack J. Dongarra, University of Tennessee-Knoxville; William D. Gropp, University of Illinois-Urbana-Champaign; Jeffrey K. Hollingsworth, University of Maryland; Robert F. Lucas, University of Southern California; Allen D. Malony, University of Oregon; John Mellor-Crummey, Rice University; Barton P. Miller, University of Wisconsin-Madison; Leonid Oliker, Lawrence Berkeley National Laboratory; Allan Snavely, San Diego Supercomputer Center and University of California, San Diego; Jeffrey S. Vetter, Oak Ridge National Laboratory; Katherine A. Yelick, University of California, Berkeley. The project was awarded 28,000,000 processor hours on Cray XT at Oak Ridge, and IBM Blue Gene/P at Argonne National Laboratory.

Earth Science: "Deterministic Simulations of Large Regional Earthquakes at Frequencies up to 2Hz."

Principal Investigator: Thomas Jordan, Southern California Earthquake Center and University of Southern California.

Co-Investigator: Yifeng Cui, San Diego Supercomputer Center

The project was awarded 27,000,000 processor hours on Cray XT at Argonne National Laboratory.

Engineering: Fluids and Turbulence: "A Petascale Study of Turbulent Mixing in Non-Stratified and Stratified Flows."

Principal Investigator: Pui-kuen Yeung, Georgia Institute of Technology.

Co-Investigators: Diego Donzis, Texas A&M University; Dmitry Pekurovsky, San Diego Supercomputer Center; James Riley, University of Washington.

The project was awarded 20,000,000 processor hours on Cray XT at Oak Ridge National Laboratory.

Biological Sciences: "Simulation and Modeling of Membranes Interactions with Unstructured Proteins and Computational Design of Membrane Channels for Absorption of Specified Ions."

Principal Investigator: Igor Tsigelny, San Diego Supercomputer center and University of California, San Diego

Co-Investigators: Mark Miller, San Diego Supercomputer Center and University of California, San Diego; Co-Investigator Eliezer Masliah, University of California, San Diego.

The project was awarded 5,000,000 processor hours on IBM Blue Gene/P at Argonne National Laboratory.

Biological Sciences: "Interplay of AAA+ Molecular Machines, DNA Repair Enzymes, and Sliding Clamps at the Replication Fork: A Multiscale Approach to Modeling Replisome Assembly and Function.Principal Investigator: Ivaylo Ivanov, University of California, San Diego; and Howard Hughes Medical Institute.

Co-Investigators: John Tainer, Scripps Research Institute and Lawrence Berkeley National Laboratory; Xiaolin Chang, Oak Ridge National Laboratory; J. Andrew McCammon, University of California, San Diego; and Howard Hughes Medical Institute. The project was awarded 4,000,000 processor hours on Cray XT at Oak Ridge National Laboratory.

Climate Research: "Simulation of Global Cloudiness" Principal Investigator: David Randall, Colorado State University. Co-Investigators: Ross Heikes, Colorado State University; John Helly, San Diego Supercomputer Center; Bruce Palmer, Pacific Northwest National Laboratory; Karen Schuchardt, Pacific Northwest National Laboratory. The project was awarded 3,000,000 processor hours on Cray XT at Oak Ridge National Laboratory.

Now in its seventh year, INCITE supports computationally intensive scientific investigations, allowing researchers at national laboratories, universities, and throughout industry to explore a wide range of scientific challenges. By providing scientists access to some of the world's most powerful supercomputers, these awards assist researchers in conducting their studies in weeks or months, as opposed to years or decades. A project receiving one million hours could run on 10,000 processors for 100 hours, or just over four days. Running a one-million-hour project on a dual-processor desktop computer would take more than 57 years, according to the DOE.

"Computation and supercomputing are critical to solving some of our greatest scientific challenges," said DOE Secretary Steven Chu. "This year's INCITE awards reflect the enormous growth in demand for complex modeling and simulation capabilities, which are essential to improving our economic prosperity and global competitiveness."

DOE's Office of Science is the single largest supporter of basic research in the physical sciences for the nation and ensures U.S. leadership across a broad range of scientific disciplines. For more information about the Office of Science, vist www.science.doe.gov.

About SDSC As an organized research unit of UC San Diego, SDSC is a national leader in creating and providing cyberinfrastructure for data-intensive research. Cyberinfrastructure refers to an accessible and integrated network of computer-based resources and expertise, focused on accelerating scientific inquiry and discovery. SDSC recently doubled its size to 160,000 square feet with a new, energy-efficient building and data center extension, and is a founding member of TeraGrid, the nation's largest open-access scientific discovery infrastructure.

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