



The NCCS is Committed to Groundbreaking Science

The National Center for Computational Sciences (NCCS) is committed to achieving scientific breakthroughs that advance our understanding of the universe and the way we live in it. This commitment to “big science” and the center’s ability to collaborate with researchers at each step in the process make the NCCS unique among supercomputing centers, a position highlighted when the NCCS was designated the nation’s Leadership Computing Facility in 2004.

The center’s focus is reflected in the cutting-edge research it hosts. For example, materials scientists have used NCCS supercomputers to solve the most promising model available for high-temperature superconductors. By showing that a purely electronic model successfully describes them, the researchers have enabled a deeper understanding of materials that promise to revolutionize a broad range of fields, from electrical generation to computing.

Other areas of research are equally promising. Climate scientists are working to simulate the global climate and give us information we need to protect the earth for future generations. Fusion researchers are working to harness the process that powers the sun to provide the world a clean, unlimited source of energy. Astrophysicists are approaching an understanding of core-collapse supernovas, stellar cataclysms that provided most of the elements on earth and made our own lives possible. The list goes on.

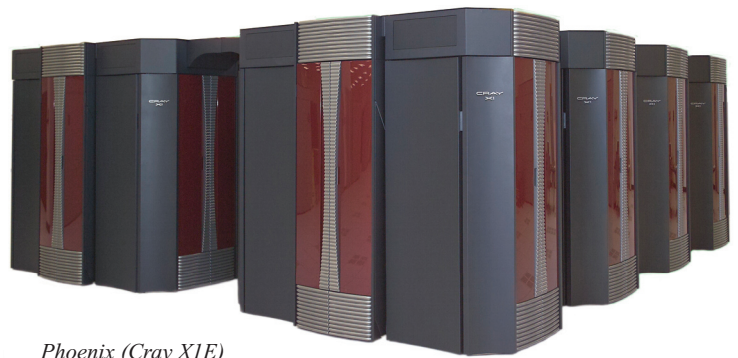
These diverse projects come from academia, industry, and government, but they have two things in common: They promise to transform their fields, and they require enormous computing power. The center’s premier supercomputer, a Cray XT4 known as Jaguar, is among the world’s most powerful systems. It is capable of performing as many as 263 trillion calculations in a single second (263 teraflops), an output that would take a typical home computer more than six months working day and night. The center’s Cray X1E Phoenix supercomputer is a leading vector system capable of more than 18 teraflops. As a vector system it is able to perform multiple operations simultaneously, a process that is more effective for some scientific applications.

These extraordinary systems are made available to relatively few users—only a few dozen teams. In keeping with its mission, the NCCS focuses on high-impact projects that need more computing power than other centers can provide. NCCS users typically receive allocations in the millions of processor hours, allowing them to run the largest simulations ever performed in their fields.

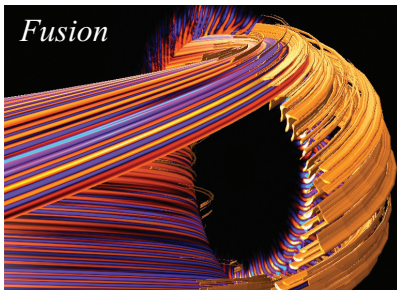
While the systems are breathtaking in themselves, they are only as valuable as the research being performed on them; the success of the NCCS is measured by the success of its users. The center's staff includes research scientists, visualization specialists, and work-flow experts who work closely with users to ensure the success of each project.

As it looks to the future, the NCCS expects to lead the accelerating field of high-performance computing. In this role, the NCCS has placed the world's first order for a petascale computer—capable of 1,000 teraflops—which will go online in late 2008.

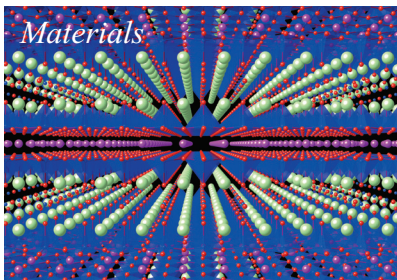
The NCCS's facilities are prepared to move into petascale computing and beyond. As the only large research computing



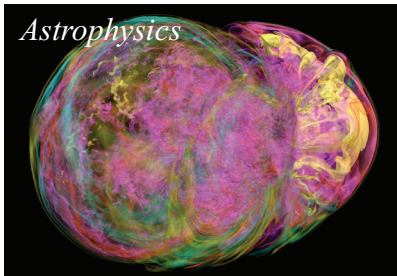
Phoenix (Cray X1E)



Fusion



Materials



Astrophysics

center in the Southeast, the NCCS is tapping into the unique resources of the Tennessee Valley. The building itself, completed in 2003, provides a 40,000-square-foot computer center, more than 8 megawatts of power, and 3,600 tons of cooling capacity. The facility is currently being upgraded to 14 megawatts of power (enough for a city of 10,000 to 15,000 residents) and 5,400 tons of cooling capacity (enough to cool more than 1,000 homes). The center also has unmatched network bandwidth capability, with multiple 10-gigabit connections to all major networks. Researchers located anywhere in the United States can access the NCCS, and the data generated by its computers can be moved to any other site.

The NCCS provides leadership computing for the United States, regardless of the agency or affiliation of the researchers. Look to it for the most ambitious, demanding, and promising computational challenges in the country.

Please visit <http://www.nccs.gov/media-center/highlights/> for new NCCS science highlights.

National Center for Computational Sciences

Located at:

Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN 37831-6161
Phone: 865-241-7202
Fax: 865-241-2850
E-mail: help@nccs.gov
URL: www.nccs.gov

