

Coalition of
Academic
Supercomputing
Centers



HIGHER EDUCATION HOLDS THE KEY TO
HIGH PERFORMANCE COMPUTING

With high performance computing already an essential tool of modern scientific research, the demand for top-notch mathematicians, scientists, and engineers who possess the sophisticated computational skills needed to do this work is far out-pacing the supply.

It is a fundamental goal of the United States' academic supercomputing centers to meet this demand and to ensure that efforts which have become critical to the national interest on many fronts--resulting in breakthrough advances in everything from aerospace and automotive design, to new medical treatments and solutions to serious environmental problems--will not be hampered or grind to a halt.

The centers, frequently with Federal support, provide a broad spectrum of educational, training, and professional development opportunities for talented undergraduates and graduate students to pursue technology-related careers. These range from short-term seminars, tutorials and hands-on workshops to internships, research stipends, collaborative projects, and fellowship programs.

Center expertise and resources are also available to colleges and universities for developing full-fledged degree programs in "computational science"--the new field of study spawned by the ongoing high performance computing revolution. Support is provided to academic institutions offering courses in parallel processing, scientific visualization and mathematical modeling, with center researchers teaching many of the classes and developing curricular materials, including on-line instruction, textbooks, and demonstrations.

The following are some examples:

Research Experience for Undergraduates (REU)--This program, funded by the National Science Foundation (NSF), enables math and science majors to spend several weeks or months a year studying at one of the nation's NSF-supported supercomputing centers. Under the direction of leading researchers, students are assigned significant computational science projects, which frequently benefit a larger research community, and result in publications and presentations at professional meetings. At the San Diego Supercomputer Center (SDSC), for example, one REU student went on to win the top prize in the Westinghouse Science Talent

Alabama Supercomputing Authority
Huntsville, Alabama

Arctic Region Supercomputing Center
Fairbanks, Alaska

Arizona State University
Tempe, Arizona

Center for Advanced Computing Research
Caltech
Pasadena, California

Center for Computational Sciences
Lexington, Kentucky

Center for Computational Sciences
Oak Ridge, Tennessee

Center for Innovative Computer
Applications at Indiana University
Bloomington, Indiana

Center for Research on
Parallel Computation
Houston, Texas

Cornell Theory Center
Ithaca, New York

National Center for
Atmospheric Research
Boulder, Colorado

National Center for Supercomputing
Applications at UIUC
Champaign, Illinois

National Energy Research
Supercomputer Center
Livermore, California

National Supercomputer Center
for Energy and Environment
Las Vegas, Nevada

North Carolina Supercomputing
Center at MCNC
Research Triangle Park, North Carolina

Ohio Supercomputer Center
Columbus, Ohio

Pittsburgh Supercomputing Center
Pittsburgh, Pennsylvania

Purdue University
West Lafayette, Indiana

San Diego Supercomputer Center
San Diego, California

Supercomputer Computations
Research Institute
Tallahassee, Florida

System Network Computer Center
at Louisiana State University
Baton Rouge, Louisiana

Texas A & M University
Supercomputer Center
College Station, Texas

The Pennsylvania State University
University Park, Pennsylvania

University of Florida
Gainesville, Florida

University of Georgia
Athens, Georgia

University of Maryland
College Park, Maryland

University of Texas at Austin
Computation Center
Austin, Texas

University of Utah
Salt Lake City, Utah

University of Wisconsin
Madison, Wisconsin

Search. While at SDSC, another student developed a recognized program to teach the use of the Braillewriter to blind students.

Academic Affiliates Program--Developed in 1988 by National Center for Supercomputing Applications (NCSA), this program has provided training to campus representatives from over 120 colleges and universities so they could in turn provide local support to campus users of the NSF supercomputer centers in their areas. NCSA also offers training classes for faculty, post doctoral students and graduate and undergraduates on research teams to make effective use of high performance computing resources.

Computational Science Degree Programs--Researchers with the NSF-funded Center for Research on Parallel Computation (CRPC) were instrumental in establishing two of the nation's first graduate degree programs in computational science and engineering--at Rice University in 1992 and Syracuse University in 1994. Computational science is a field of growing importance for developing and using high performance computing simulation.

Solar Race Car--The Ohio Supercomputing Center (OSC) invited Ohio State University students to use its resources for designing and building a solar powered race car to enter in the June, 1995 national "Sun Rayce." The "Red Shift" will compete against 40 other university team cars on a course from Indianapolis to Colorado Springs, with the top three winners going to the World Solar Challenge in Australia. Sponsored by General Motors and the U.S. Department of Energy, the project provides unparalleled opportunity for students to address real world aerodynamic and engineering problems.

Digital Dinosaurs--A professor at the University of Texas is using supercomputing technology to expand teaching in the field of paleontology. At the University's High Performance Computing Facility in Austin, data from CAT scans of rare dinosaur fossils is converted computationally to high resolution 3-D images. Students can study the images interactively. Those images can be "sliced" digitally to explore internal anatomical structures--a process important to understanding the evolutionary patterns of early dinosaurs and mammals. Because original specimens are fragile, such work would be impossible without supercomputing technology. Reproducing large collections of rare fossils on CD-ROM for the purposes of research and teaching is a goal of the project.