

C A S C



HIGH PERFORMANCE COMPUTING A COMMITMENT TO K-12 EDUCATION

America's high performance computing community is playing a vigorous and creative role in preparing students at every level of education to function and flourish in our technologically advanced society.

With a developing shortage of top level scientists and engineers predicted by the year 2000, a primary emphasis is on identifying and nurturing K-12 students who excel in science and math. A related concern is to have all students leave school with the skills needed to participate in and contribute to an increasingly high-tech national work force.

Academic supercomputing centers and national research labs across the country, with support from appropriate federal agencies, are sponsoring programs to meet these goals. Major efforts are being made to tap groups that are under-represented in high-tech fields such as women, rural Americans and minorities. A proven approach to reaching these students is through programs for their teachers--providing training in classroom applications of new technology and introducing them to the vast resources now available via the Internet for enhancing education in all subjects, not just math and science.

The following are a few examples of the high-tech educational opportunities now available for K-12 teachers and students:

Supercomputer Teacher Enhancement Program (STEP) -- This joint project of the San Diego Supercomputer Center (SDSC) and San Diego State University is aimed at encouraging minority high school students to pursue careers in math and science. Funds from the National Science Foundation (NSF) have enabled a group of 46 teachers from selected high schools to participate in training seminars at SDSC for three consecutive summers. They learn how supercomputing is revolutionizing scientific research, and how to incorporate the latest computational methods, programming language and networking resources into their teaching. They attend follow-up sessions during the school year.

SuperQuest -- Through this NSF-funded program, teams of high school students work with scientific mentors on advanced research projects for three weeks each summer, with continuing work during the school year. The program is a collaboration among NCSA, the Cornell Theory Center, Microelectronics Center of North Carolina (MCNC), Sandia National

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

Labs, and Reed College in Oregon.

Common Knowledge -- The Pittsburgh Supercomputing Center (PSC) leads a national pilot program aimed at institutionalizing new technologies into a K-12 school district. PSC is working with the University of Pittsburgh and the Pittsburgh public schools in using advanced technology to teach writing, visual arts, foreign languages and other subjects, as well as science and math. Putting the district's library resources online, creating an online art gallery, and gaining access to the global services of the Internet are among the goals of this NSF-funded project.

Networking Infrastructure for Education -- The National Center for Supercomputing Applications (NCSA) is working with nine public school districts and a science center in central Illinois to determine the best ways to fully integrate computing and networking into K-12 classrooms and curriculum. NCSA has also developed five interactive simulation programs for science education. These are now being tested in classrooms nationally and internationally. Among these are the "GalaxSee" and Fractal Microscope" programs.

Distance Learning -- NCSA is collaborating with the Mathematics Department of the University of Illinois, Urbana Campus to deliver math and calculus education to students in rural Illinois schools, via the Internet.

The Living Text Book -- Researchers with Syracuse University, member of the Center for Research on Parallel Computation (CRPC), are using high-speed computer networks in a pilot project to provide visualization and multimedia resources for K-12 educators in several New York school districts. The project enables teachers and students to gain access in their own classrooms, via computer, to educational materials that would not otherwise be available to them. Examples include simulations of such scientific phenomena as black holes in space, exploring a tornado forecast model and touring historical or geographic sites.

Adventures in Supercomputing (AiS) -- The Department of Energy funds precollege supercomputing programs aimed at inspiring future computational scientists and engineers. The programs are coordinated by national research labs in five states -- Alabama, Colorado, Iowa, New Mexico and Tennessee. In the Alabama ASPIRE program, for example, students are using the Internet as a tool for project-based research in applied science. They learn to do online research and to model and execute problems related to their projects on supercomputers. The Alabama program targets under-served rural and minority students, building their confidence and interest in continuing their computational studies.

Data Explorer Repository -- The Cornell Theory Center has established the Data Explorer Repository, a set of tutorials and lecture notes on parallel computing that secondary school teachers can access over the Internet.

Summer Institute for Students -- The Ohio Supercomputer Center annually holds a two-week summer program on supercomputing and visualization for 15 talented ninth and tenth grade students. Participants produce team projects, and learn how computing is revolutionizing fields such as chemistry, physics, environmental science, mathematics, industry, and the arts.