



PROFESSOR, STUDENT SHARE PRESTIGIOUS AWARD FOR HIGH-PERFORMANCE COMPUTER SIMULATION

A student and faculty member from Old Dominion University's College of Sciences recently shared an award for computer performance enhancement presented at the prestigious international conference Supercomputing '99, held in Portland, Ore., in November.

David Keyes, chair of the mathematics and statistics department, who also holds an adjunct appointment in computer science, and Dinesh Kaushik of Woodridge, Ill., a doctoral candidate in computer science, were part of the Old Dominion-led team that won a special-category Gordon Bell Prize, which recognizes implementations of practical computational simulations that achieve new levels of performance. Other members of the team included two computer scientists at the U.S. Department of Energy's Argonne National Laboratory and a computational aerodynamicist at NASA Langley Research Center.

For their entry in the competition, titled "Achieving High Sustained Performance in an Unstructured Mesh CFD Application," the team simulated the flow of air over an airplane wing using some of the world's fastest computers.

"We showed that good performance on a parallel computer could be obtained for a class of simulations for which it was previously believed to be extremely difficult," said Keyes. "What excited the judges about our work is that what we did is very transferable to other important applications. We are working on general software/hardware technology for solving large-scale partial differential equations."

In presenting their work at the conference, Keyes explained that many scientific codes written for earlier generations of computers can be adapted, with a reasonably small investment of human expertise, to run on parallel computers, following the paradigm the team used.

The ASCI machines, on which all but one of this year's Bell Prize winning entries were run, derive their name from the Department of Energy's Accelerated Strategic Computing Initiative, a research program whose goal is to show that the testing of nuclear weapons may be replaced by computer simulations, Keyes said.

"The scientific support provided by this program is an important component of the Comprehensive Nuclear Test Ban Treaty, which the Senate rejected in its present form earlier this fall," he explained. "It has not yet been convincingly demonstrated to many scientists and policy makers that computational simulations alone can provide enough information to maintain and monitor the nuclear stockpile in the absence of tests. The reliability of such simulations is related to the speed at which they can be carried out. As demonstrated at Supercomputing '99, strong steps in this direction were made during the past year."

Old Dominion is one of 18 universities nationwide participating with the DOE at the level of a \$1 million contract or more in the ASCI research endeavor. Besides Keyes, computer science faculty members Alex Pothén and Linda Stals are intensely involved in the program.

Also at Supercomputing '99, Pothén and one of his students, computer science doctoral candidate David Hysom, of Norfolk, were among the four finalists internationally in two prize categories, Best Paper and Best Student Paper.

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