Making an Impact

Images from the Brown and Wofford universities campuses
Undergraduate and graduate students from across the country are granted access to the network’s best systems and researchers.

Besides hosting the most computationally powerful computer resources for scientific research, TeraGrid is also helping to educate the next generation of researchers that will utilize those resources in their search for the scientific breakthroughs of tomorrow.

Initiatives such as the Blue Waters Undergraduate Petascale Education Program (UPEP) and the willingness of TeraGrid Resource Providers (RPs) to provide systems and funding are exposing parallel computing to math and science students, who may have otherwise never heard of this emerging field. Better yet, these students are receiving time on some of the most advanced supercomputing systems in the world, be it Ranger at the Texas Advanced Computing Center (TACC) or Kraken at the National Institute for Computational Sciences (NICS).

Specifically, a total of six classes from Brown University, Tufts University, Wofford College, the University of Colorado, and the University of Tennessee received time on TeraGrid resources along with help from RP staff members Bruce Loftis and Jim Ferguson, and the TeraGrid staff promptly answered our questions at all hours of the day and night,” said Shiflet. For the data structures class, TeraGrid provided student accounts on NICS’s Kraken, and NICS staff members Kwai Wong and Christian Halloy taught the students how to log in, compile, and run codes on the machine. Besides teaching the students the basics of programming, the course introduced students to linked lists and trees for storing and retrieving data.

At the end of the semester, a sophomore in Banks’s class stated that “If there is a class or independent study on supercomputing, I will take it. I have become more interested in the limits of computation, and I am considering research in high performance computing.”

Taken together, these classes represent what could very well be significant steps towards a career in high performance computing for many of tomorrow’s researchers and computational scientists. And with the help of TeraGrid, these first steps are accomplished using some of the world’s leading supercomputing systems with the help of some of the most knowledgeable people in the supercomputing arena.

For example, Leopold Grinberg taught "Introduction to High-Performance Computing: Tools and Algorithms" at Brown University, where he is a Senior Research Associate in Applied Mathematics, and at Tufts University, where he serves as a computer science lecturer. Said Grinberg, “At both schools, the students knew nothing about the field of high performance computing. Furthermore, some of them were new to basic programming and very few of the students had ever used a supercomputer.” Besides a Brown-based system named Oscar and a Tufts-based Linux cluster, the classes were granted access to the third and ninth-fastest systems in the world, NICS’s Kraken and TACC’s Ranger, respectively. “They had all they needed to explore and to learn,” said Grinberg, citing the support from TACC and NICS.

The class began with a basic optimization question and progressed beyond the Message Passing Interface (MPI), an application programming interface (API) specification that allows computers to communicate with one another. “I really wanted to give them the basics that people use in parallel computing and to familiarize them with the concepts used by the Gordon Bell competition finalists,” said Grinberg.

Further south, at Wofford College in Spartanburg, South Carolina, TeraGrid funding resulted in two educational modules used in the school’s Modeling and Simulation and Mathematical Modeling courses. The modules, titled Biofilms: United They Stand, Divided They Colonize and Getting the Edge on the Next Flu Pandemic: We Should’a ‘Node Better were a hit with students, some of whom went on to further their experience in parallel computing.

Take current Wofford student and NICS summer intern, Glenn Hope, for example. Ever since reading The Hunt for Red October as a child and learning that they modeled the flow of water through the submarine’s caterpillar drive on a Cray-2, Hope said he has always wanted to work in supercomputing. “This is my dream job,” said the Wofford senior.

Module co-author and Wofford professor, Angela Shiflet, was likewise pleased with TeraGrid’s support. “The class and I had wonderful support from NCSA, NICS, and the TeraGrid,” she said. “NCSA provided an MPI tutorial, NICS provided its Kraken supercomputer and the expertise of staff members Bruce Loftis and Jim Ferguson, and the TeraGrid staff promptly answered our questions at all hours of the day and night,” said Shiflet.

Finally, at the University of Tennessee, TeraGrid provided accounts and personnel to two classes: David Banks’s Data Structures and Algorithm Analysis, and Jack Dongarra’s Scientific Computing for Engineers.

Relevant links:
- Brown University: http://www.brown.edu/
- Tufts University: http://www.tufts.edu/
- University of Colorado: http://www.colorado.edu/
- University of Tennessee: http://www.utk.edu/
- Wofford College: http://www.wofford.edu/