Training Insights

A training class being held at TACC’s facilities in Austin, Texas.
As a TeraGrid resource provider, the Texas Advanced Computing Center (TACC) provides as many as 40 in-person training classes per year, teaching a range of courses — from introductory Linux and the programming basics of Fortran and C and code optimization, to visualization and data analysis — for students, researchers, and professionals. These free classes are offered to help potential new and existing users to acquire the high performance computing (HPC) and computational science skills required to apply advanced computing in science, technology, education and mathematics (STEM) fields.

Following each training session, TACC collects data from the participants, based on a standard survey created by the TeraGrid Education, Outreach and Training (EOT) group, to evaluate the effectiveness of the training programs. Analysis of the data identified meaningful trends concerning how and at what rate the training classes are taken, and how TeraGrid can grow the size, diversity, and competency of the HPC user community.

Based on surveys collected from more than 200 training participants in 2009 and 2010, TACC has distilled four key findings from the data:

• The variety of disciplines represented by attendees is growing, particularly in visualization courses.

TACC’s Summer Supercomputing Institute and parallel computing training courses attracted researchers from the most common disciplines in HPC, such as engineering, physics, chemistry, and computer science, with a few additional attendees from biological sciences and other social sciences.

Scientific visualization training courses in particular attracted researchers and students from non-traditional fields, including education, psychology, linguistics, architecture and geography. It is clear that these communities are beginning to recognize the potential for visualization and data analysis in their fields.

• An increasing number of participants are women and underrepresented students and faculty from Minority Serving Institutions (MSIs).

TACC’s online training offerings attracted a greater number of participants from MSIs, compared to in-person training. The percentage of women in TACC’s training classes has steadily grown to 24% of in-person training participants. Female participants were concentrated in HPC programming classes such as C, C++ and Fortran, Linux and Unix for HPC, and scientific visualization.

• Graduate students comprise 47% of training class participants.

The majority of graduate students taking TACC training classes are in engineering fields. Most graduate students coming into the classes described themselves as having “no experience” or “not proficient” in advanced computing. Thirty percent of the graduate students were female.

While undergraduate and graduate students comprise approximately half (52%) of the participants, TACC’s training courses are attractive to a broad spectrum of the community, from staff and researchers to local industrial participants.

• In-person recommendations are an important means for participants to learn about training classes.

When asked, “How did you hear about this training session,” 47% of participants reported learning about a training event by email, while personal recommendations accounted for 33% of respondents’ information. This combination may indicate that awareness and application of TeraGrid resources has deeply penetrated the STEM community.

Summary:

Underlying these key findings is the high quality of the training classes and instruction. Participants rated the quality of the classes and instructors as “above average” and “excellent” more than 80% of the time, and many said they would recommend the courses they took to a colleague. Mark Jack, Associate Professor of Physics at Florida A&M University, said, “The Supercomputing Institute offered at TACC has been particularly useful. The institute provided my students with in-depth knowledge about HPC resources to advance our research.”

Bill Reinhardt, Professor at the University of Washington, said, “The lectures and one-on-one consulting at the TACC training workshop were all excellent, and I was able to make a great deal of progress on my research project.”

Based on continuing evaluations, TeraGrid resource providers will be tasked with producing new types of training classes that focus on how to represent and analyze scientific and informational data using powerful visualization resources. It is crucial that future training courses be designed for plenty of hands-on interaction, and that they be continually reviewed and updated to stay current with the technology.

Visualization classes have the greatest potential to attract more diverse disciplines and demographics, as well as to increase the overall number of participants. As an intuitive process of discovery that also brings HPC to bear on the fundamental components of any investigation, visualization training is a popular and growing area of advanced computing.

While this sample pool includes just over 200 responses, the additional TeraGrid resource providers will continue to glean valuable information from training surveys, including new topics that may be required, frequency of training, and alternative ways to promote courses to the high performance computing community.

Relevant link: Texas Advanced Computing Center: http://www.tacc.utexas.edu