The Challenge 2000 Kickoff

As the leaves start to turn and the temperatures become brisk, it is time once again for the Fall Supercomputing Challenge Kickoff. The Challenge Kickoff Conference is traditionally held in October at the Glorieta Conference Center near Pecos. This year the Challenge is celebrating its 11th year.

The dates for this year's Kickoff are October 29 – 31. The Kickoff is a two-day affair for participants, since there are two sessions. Students who have to travel more than 100 miles attend on Sunday and Monday, October 29th and 30th; those who are closer to Glorieta come for the second session on Monday and Tuesday, October 30th and 31st. There is an overlapping Keynote Session and joint lunch on Monday, October 30th. Former Challenge participants, long-time Challenge supporters, and friends of the Challenge join Challenge participants for the Keynote session and lunch.

At least one member of each registered team and a teacher need to come to Glorieta. The Kickoff includes an overnight stay, workshops and seminars on computational science and mathematical modeling, project planning meetings with scientists, and computer lab sessions to practice research and programming skills.

Plans for the Kickoff begin with a registration period that closes Friday, September 29. New Mexico Technet Challenge staff organizes housing and meals and arranges for computers to be set up and networked at the Glorieta Conference Center.

Meanwhile, the Los Alamos Challenge staff are developing curricula, preparing password authorizations for the teams, and finding teachers from the Labs, businesses, colleges and universities, and from the pool of outstanding former Challenge winners.

Teams may come from urban areas like Albuquerque, Santa Fe, Los Alamos and Las Cruces; from medium sized communities like Clovis, Portales, Farmington, Gallup, Roswell, Silver City, Las Vegas, and Alamogordo; and from smaller communities like Santa Rosa, Shiprock, Hobbs, Bloomfield, Springer, Tularosa, Truth or Consequences, and Artesia. There might even be teams from schools in very small and very rural communities like Roy, Zuni, Ramah, Quemado, Lovington, and Clayton. Students from rural communities as well as urban centers have been winners in past contests.

Team mentors will join students, their teachers, and the Kickoff teaching staff at Glorieta. The mentors are scientists from businesses, the national labs, and the universities who join up with teams to help them plan and implement their projects. These professionals provide the expertise that the schools may not be able offer because of the complexity of the topics. We hope ***your*** mentor will be at Glorieta for at least part of the Kickoff conference to get to know you and to help you design the project.

The first activity at the Kickoff is checking in and getting room assignments. You will meet students from all parts of the state, and in all grade levels. Next you will be given your dial-in

account and password information, your LANL computer account and password package, and have your picture taken for security purposes at Awards Day. You will also be given a Challenge handbook and your schedule of assigned classes.

Kickoff Classes

Instructors from the sponsoring national laboratories, private industry, and universities will provide training so participants can access the network and computers, learn about supercomputers and how to work with them, get some ideas about how to approach their projects, and find out more information about participating in the Challenge. There will be instruction for newcomers to the Challenge as well as for those with experience.

The curriculum for the Challenge is rigorous. During electronic registration students select a beginning, intermediate or advanced curricular track, appropriate to their skill level and interest. First year teams will attend classes on UNIX, C++, Teamwork, and Project Development. Project Development includes research skills, mathematical modeling, and computational solutions.

More advanced students attend similar classes but with more sophisticated content. Their project development class has a unit on parallel processing to prepare them for designing models that require supercomputing power for their solutions. The elective curricula at Glorieta includes Introduction to HTML, Power Point, Java scripting, concept mapping, and UNIX and programming lab time.

At the close of the session, Challenge participants will have demonstrated to the lab hosts that they are clear about logging into the computers, uploading files, and communicating via e-mail with Challenge staff and each other.

Typical Beginning Courses:

100 Overview of the Challenge (1 hour)
110 Teamwork (1 hour)
120 Project Development (1 hour)
125 Project Development Lab (1 hour)
130 Unix (1 hour)
140 C++ (1 hour)
145 C++ Lab (1 hour)

Typical Intermediate Courses:

100 Overview of the Challenge (1 hour
110 Teamwork (1 hour)
120 Project Development (1 hour)
125 Project Development Lab (1 hour)
200 Advanced C++ I (1 hour)

205 Advanced C++ Lab (1 hour)
210 Advanced C++ II (1 hour)

Typical Advanced Courses:

100 Overview of the Challenge (1 hour)
110 Teamwork (1 hour)
120 Project Development (1 hour)
125 Project Development Lab (1 hour)
300 Parallel Programming Concepts for Scientific Modeling (1 hour)
310 Message Passing Interface (MPI) Programming (2 hours)

Descriptions of the Courses:

100 Introduction to the Challenge, 1 hour

Topics: Challenge objectives, timeline, and requirements. Includes participants responsibilities, security issues (AUP), how to get help, judging criteria, and awards.

110 Teamwork, 1 hour

Topics: Divide & conquer, communication, abilities/strengths of members, cooperation, give & take, meeting deadlines. This is one area that the students always remember about the Challenge, how it requires teamwork!

120 Project Development, 2 hours

Topics: Project definition, how to research, mathematical models, and abstract refinement with a scientist. Includes how to recognize a computational problem.

125 Project Development Lab (1 hour)

130 UNIX, 1 hour

Topics: login, ls, cp, rm, mkdir, cd, pico, vi, pine, logout, cc, CC, f77, bbs, .forward. This will be a 15 minute overview of Unix followed by 35 minutes of lab exercises.

140 C++ Programming Lecture, 1 hour

Topics: An introduction to programming including an overview of the C++ language, comments, variables, arithmetic operations, conditional statements, loops, basic input-output, formatting, special symbols, functions, and other elements of programming structure. Followed by a lab.

145 C++ Lab, 1 hour

Topics: Edit and compile a simple program (code given), attempt to alter program to make it more complex.

200 Advanced C++ Programming Lecture, 1 hours

Topics: The first hour of Advanced C++ will include the material from 140 (C++ Programming Lecture), with additional topics to include functions (more in depth), arrays, and structures.

205 Advanced C++ Lab (1 hour)

Topics: This lab will include the assignment from 140 (C++ Lab), with an additional assignment on arrays (and another possibly on functions).

210 Advanced C++ II (1 hour)

Topics: An in-depth analysis of pre-written C++ code implementing functions, structures, and classes.

300 Parallel Programming Concepts for Scientific Modeling, 1 hour

Topics: Introduction to building parallel scientific computer models. How to choose a particular parallel method to fit the science as well as human effort consideration. Emphasis is on learning the concept "information" propagation. Knowledge of a programming language is a prerequisite, but no previous parallel computing required.

310 Message Passing Interface (MPI) Programming, 2 hours

Topics: Communications paradigms--blocking and non-blocking, point-to-point, and collective communications. Emphasis will be on C/C++ language binding. Learn how to run programs on the Pi machine. Modify existing parallel codes.

Electives:

150 Introduction to Profiler, 1 hour

Topics: Profiler is a survey/evaluation software which points the user to tutorials on the topics where the user showed weaknesses. It also lets the user find “experts” in the community.

160 HTML, 1 hour

Topics: Show students how to develop simple web pages and complete their HTML abstract (30 minutes), show students how to develop a presentation using PowerPoint (20 minutes).

170 Abstract Submission, 1 hour

Topics: Computers will be available for abstract checking and submission.

180 Java Programming, 1 hour

Topics: Introduction to Java Programming.

190 How to Include Visualization in Your Project, 1 hour

Typical Teacher Electives

T1 Introduction to Profiler, 1 hour

Topics: Profiler is a survey/evaluation software which points the user to tutorials on the topics where the user showed weaknesses. It also lets the user find "experts" in the community.

T2 Using Assessment to Guide and Motivate Project Development, 2 hours

Topics: Assessment of Project-based learning, comparison of project-based vs content-based curriculum. Overview of Rubrics (Description of rubrics, Resource sites for rubric development). Use of rubrics in assessing project milestones: team self-assessment, course evaluation, peer Evaluation. Example rubrics for computational science project milestones. Example application of assessment to actual student project.

T3 Introduction to Mathematical Modeling, 2 hours

Topics: This session will provide participants with a general understanding of what a mathematical model is, how mathematical models are derived, and the key role that mathematical modeling plays in computational science. Some simple examples of traffic flow and population dynamics will be presented.