



Terascale Simulation Facility

Ready to house the world's fastest supercomputers.



In fall 2004, Lawrence Livermore National Laboratory will complete construction of the Terascale Simulation Facility (TSF), enabling delivery of the next generation of the Advanced Simulation and Computing (ASC) supercomputers supporting our national security mission.

The TSF will provide a unique simulation environment to generate and assess the enormous amounts of data emerging from the ASC three-dimensional weapons science codes. The United States Department of Energy/National Nuclear Security Administration (NNSA) will use this capability to simulate nuclear weapons safety, performance, and reliability without underground nuclear testing—an essential element of our nation's science-based Stockpile Stewardship Program.

Designed specifically for ASC supercomputers, the 253,000-square-foot TSF is comprised of a two-story computer section and a four-story office tower. The computer section boasts two 24,000-square-foot computer rooms without intervening air handlers or columns. The non-load-bearing wall between the two rooms can be removed to create one large room. Large air handlers on the first floor blow cool air up into the raised floor area of the computer room to cool

the large heat load. The computer section will house multiple generations of ASC-class capability supercomputers. With the ability to install new supercomputers without interrupting the ongoing operation of existing systems, the TSF will provide continuous access to critical computing services around the clock and throughout the year.

ASC Purple, one of the first systems to occupy the TSF, is being developed by IBM Corporation. ASC Purple will be able to operate at an incredible 100 teraops—one trillion floating-point operations per second, equivalent to the combined computing capability of 25,000 high-end personal computers. Unlike a collection of separate personal computers, ASC Purple will be capable of concentrating its entire computing resources on a single problem.

The TSF will also be the home for BlueGene/L, a next-generation massively parallel computing system designed for research and evaluation of advanced architectures for computational science. At a peak compute capability of approximately 360 teraops, BlueGene/L will likely be the fastest supercomputer in the world when it becomes operational in 2005. For a selected but broad class of

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applications of interest to Stockpile Stewardship, BlueGene/L is designed to address some of the most important issues facing high-end systems today: cost of platforms and facilities, single-node performance, and network performance. Being created under a partnership with IBM, BlueGene/L

will deliver nearly 10 times the peak compute speed, in one-fifth the area, using a fraction of the electrical power of comparable supercomputers today.

Between ASC Purple and BlueGene/L, the TSF will house close to one-half a petaops of computing power.

When completed, the facility's computer section will have:

- Air-handling capability of 1,360,000 cubic feet per minute, more than enough to exchange all the air in the Washington Monument every minute
- Chilled water capacity of 6,400 tons, enough cooling for current requirements and future needs

The four-story office tower, scheduled for occupancy in late 2004, will include individual and shared office space for over 250 staff, a visualization theater for classified reviews, small computer rooms with raised floors and conventional cooling, conference rooms and a classroom, research and development areas for visualization and hardware prototyping, and a large conference room with seating for 150 for unclassified meetings.

A new name for the building will be unveiled in late 2004, when the facility is scheduled to open.



The west computer room awaits delivery of the 100-teraops supercomputer ASC Purple.



Multiple 1,200-ton cold-water chillers will provide cooling for the computer environment.

FIFTH GENERATION
ASCI PLATFORM
Asc Purple



TSF
Terascale Simulation Facility

