Big Computers For Big Science

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A visiting neutron scattering scientist at ORNL sends data from her experiment to a San Diego supercomputer for analysis. The calculation results are sent to Argonne National Laboratory, where they are turned into "pictures." These visualizations are sent to a collaborating scientist's workstation at North Carolina State University, one of the core universities of UT-Battelle, which manages ORNL for DOE.

To make their discoveries, scientists must interact with supercomputers to generate, examine, and archive huge datasets. To turn data into insight, this interaction must occur on human time scales, not over days or weeks, but over minutes.

Big science requires big computers that are not just scaled-up desktop personal computers. Big computers are fundamentally different from PCs in their ability to model enormous systems, generate immense volumes of data, and, as a payoff, solve uniquely difficult scientific problems. To put this difference in perspective, next-generation science datasets will approach or exceed a petabyte in size. If one of today's desktop PCs had a disk able to hold a petabyte-sized file, the PC would require over three years to read the file.

The Center for Computational Sciences at ORNL has been tasked by DOE to develop the next generation of scientific networks to address the challenges of large science applications. The techniques developed in Oak Ridge will eventually filter out into the high end of the business world. Just as yesterday's scientific supercomputers have become today's central business and engineering computers, the same transfer will result

in this network, called the DOE UltraScience Net, becoming the core of tomorrow's commercial networks.

Source: ORNL