Large-Scale Scientific Visualization

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Abstract

Modern high performance computers have speeds measured in teraflops and handle data set sizes measured in terabytes and petabytes. Although these machines offer enormous potential for solving very large-scale realistic computational problems, their effectiveness will hinge upon the ability of human experts to interact with their simulation results and extract useful information. One of the greatest scientific challenges of the 21st century is to effectively understand and make use of the vast amount of information being produced. Visualization will be among our most most important tools in helping to understand such large-scale information.

Our research at the Scientific Computing and Imaging (SCI) Institute at the University of Utah has focused on innovative, scalable techniques for large-scale 3D visualization. In this talk, I will present state-of-the-art visualization techniques, including scalable visualization algorithms and software, cluster-based visualization methods and innovate visualization techniques applied to problems in computational science, engineering, and medicine. I will conclude with an outline for a future high performance visualization research challenges and opportunities.