LARGE SCALE PROBLEM SOLVING USING AUTOMATIC CODE GENERATION AND DISTRIBUTED VISUALIZATION

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Abstract. The advent of the Petascale era, provides a great opportunity as well as a great challenge for computational science and engineering. Large scale scientific applications need to scale to unprecedented numbers of processing cores and adapt to multi-core architectures with complex memory and network hierarchies in order to fully leverage the computational resources available. The ever growing output data from large scale scientific applications need to be either moved or processed efficiently for analysis and visualizations. In addressing these issues, we develop a set of tools which generate highly efficient parallel codes from mathematical abstractions and free domain experts from lower level parallel programming. Using the distributed visualization methods, we propose a remotely visualization system that enables interactive visualization for large datasets with a high-speed optical grid. The specific application scenario shown in the poster is the numerical modeling of the gravitational waves produced by binary black hole systems. Using a machine generated code, we simulate two orbiting binary black holes and extract the emitting gravitational waves from the system. We then visualize the gravitational waves using a remote visualization cluster.

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