Master's Thesis Defense

Scientific Visualization of Galaxy Behavior Using Grid Architecture

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Scientists have recently begun to realize how important computers can be to their studies, with immense projects arising out of their ambitious simulations and observations. Data collection has grown to the point where some projects cannot be stored locally and need a distributed repository. Complex models and simulations have begun to team together to further the knowledge that can be obtained from the raw data that is analyzed. These simulations can be completed with the help of supercomputers, but these resources are expensive and, since a researcher must schedule time on a supercomputer, not immediately available. Grid computing can ease these problems by creating a virtual organization of connected resources, which can either be storage locations or processing centers. Numerous examples of this ideology can be found throughout many research areas including biology, astronomy, and genetic algorithms, among others. This work takes a look at one of the many computationally heavy simulations that can be found, the approximation of how objects in a galaxy interact with each other. This simulation provides significant amounts of data directly correlated to how many objects are included in the galaxy, which does not get presented in an user-friendly format. The goal of this thesis project was to add a visualization component to this simulation and to distribute it across a grid system.
