Object-Oriented Particle Systems for Simulation and Visualization on High-Resolution Displays

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Abstract

Over the past few years, researchers in scientific visualization has tried to exploit the potential of clusters of commodity processors to deal with extremely large data sets that must be displayed at a resolution exceeding that of CRT displays. This talk will discuss two aspects of our recent work. The first part will discuss a simple particle system that we have used for both simulation and visualization. Although, particle systems have been used successfully in applications ranging from simulations of physical phenomena, to creation of special effects in the movie industry, to scientific visualization, in practice application programmers usually derive a new code from scratch for each application even though particle systems have a basic object-oriented flavor. We have developed a simple object-oriented particle system that has been implemented in C++ and applied to diverse applications including graphical special effects, including Lennard-Jones fluid simulation, isosurface extraction, and generation of streamlines from flow simulations. The second part of the talk will discuss our efforts to produce images using an experimental heterogeneous cluster connected to a high-resolution frame buffer and our efforts in producing displays for a 50 foot radius dome planetarium driven by 6 projectors. Major participants in this work include Paul Alsing, David Munich, Ge Li, and Jun Zhang.

Keywords: particle systems, visualization, parallel rendering, high-resolution displays