

An Approach to Exascale Visualization: Interactive Viewing of In-Situ Visualization

Tomoki Yamada^{1*}, Akira Kageyama¹

¹Graduate School of System Informatics, Kobe University

In the coming era of exascale supercomputing, in-situ visualization is an inevitable approach to reduce the output data size. A problem of the in-situ visualization is that it loses interactivity unless a steering method is adopted. In this paper, we propose a new in-situ visualization method for exascale simulations. This method applies a lot of (hopefully millions of) in-situ visualizations at once with (thousands of) different visualizations taken from (thousands of) different cameras. The output in this strategy is not numbers, but movies. Even when a simulation produces one million of movies, the total output data size is only 10 TB when each movie is compressed to 10 MB. It should be noted that the size of 10 TB is rather small in the coming exascale era. The output of million movies will be analyzed as a post-processing in our proposed method. A specially designed movie player will read the million movie files and display a sequence of images in a window. By extracting a proper image sequence from different movie files, we can effectively walk through the visualization objects while the dynamic phenomena are shown in the window. To demonstrate the feasibility of the proposed method, we have performed a dynamo simulation in which 125 in-situ visualizations are applied. The visualization code is hybrid MPI-OpenMP. This calculation was performed on FX-10. We have also developed a movie player that reads hundreds of movie files and play a movie on a PC window. The movie player also has a function to show current position in or around the simulation region. We have confirmed that this method—in-situ visualization with interactive view—is not only feasible, but also practical for visualizations of large-scale simulations.

Keywords: large-scale visualization, in-situ visualization, parallel visualization