Data Analysis and Visualization Environments for Large Scale Simulation as presented by Constantine Pavlakos

Christopher E. Davis - chris2d@cs.unm.edu
University of New Mexico
Computer Science Colloquia Spring 2004

February 29, 2004

Abstract

Sandia National Laboratories has been researching data analysis and visualization through several approaches. They have been research partners on several large open source projects as well as commercial and classified projects. Current research is centered around cluster solutions based largely on consumer hardware.

Constantine Pavlakos outlined the historical research and the motivating problems behind the modern visualization efforts underway at SNL. The basic problem is that the data produced by large scale simulations is far too large to be handled sloppily. The data sets Mr. Pavlakos presented as examples were often on the order of half a petabyte in size.

To address many of the issues associated with data sets of this scale Sandia has pursued cluster based solutions. I have a personal interest in this solution, and have experimented with the power wall that the UNM CS department maintains. I was surprised to hear that Sandia had not profiled their cluster extensively. Ye Cong recently presented her thesis work specifically on cluster based graphics solutions and their inherent network performance reliance. Her findings seemed to indicate that clusters on the scale that Sandia has are extremely network constrained, much less clusters the size that Sandia purposes for their "Red Storm" system(128+ visualization nodes).

In addition to the technical issues I had with the presentation, I felt that this project was not necessarily a wise expenditure of government money. The technology that Mr. Pavlakos' group is researching has been available to the public for quite some time now. When he was asked how much effort and money they spent on artistic input and understandable display, his answer was poor - "not enough". It shows he has interest in the subject, but I believe his project would be a bigger success if he championed the cause. Edward Tufte went as far as saying a poor visualization is worse than none at all.[2] Mr. Constantine and his group need to pay more attention to what they are showing people in their visualizations and how they show them.

In conclusion, although I feel their research is valuable, Mr. Constantine did not present a compelling argument for why it is valuable. I would appreciate seeing more scientific visualization presentations throughout this semester.

References

[1] Sandia National Labs Visualization and Exploration Projects Homepage. Sandia National Labs (2004). http://www.cs.sandia.gov/VIS/projects.html

[2] E. Tufte (1983). "The Visual Display of Quantitative Information". Graphics Press: Cheshire, Connecticut