



LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

DOECGF 2010 Site Report

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DOECGF 2010 Site Report:

Lawrence Livermore National Laboratory

Site Name: Lawrence Livermore National Laboratory

Site Division or Group: Computation: Data Group, Information Management and Graphics Group, CASC

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Mission:

The Data group provides data analysis and visualization support to its customers. This consists primarily of the development and support of VisIt, a data analysis and visualization tool. Support ranges from answering questions about the tool, providing classes on how to use the tool, and performing data analysis and visualization for customers.

The Information Management and Graphics Group supports and develops tools that enhance our ability to access, display, and understand large, complex data sets. Activities include applying visualization software for large scale data exploration; running video production labs on two networks; supporting graphics libraries and tools for end users; maintaining PowerWalls and assorted other displays; and developing software for searching and managing scientific data.

Researchers in the Center for Applied Scientific Computing (CASC) work on various projects including the development of visualization techniques for large scale data exploration that are funded by the ASC program, among others. The researchers also have LDRD projects and collaborations with other lab researchers, academia, and industry.

Past Year's Activities:

The IMG group is located in the Terascale Simulation Facility, home to Dawn, Atlas, BGL, and others, which includes both classified and unclassified visualization theaters, a visualization computer floor and deployment workshop, and video production labs. We continued to provide the traditional graphics group consulting and video production support. We maintained five PowerWalls and many other displays. We deployed a 576-node Opteron/IB cluster with 72 TB of memory providing a visualization production server on our classified network. We continue to support a 128-node Opteron/IB cluster providing a visualization production server for our unclassified systems and an older 256-node Opteron/IB cluster for the classified systems, as well as several smaller clusters to drive the PowerWalls. The visualization production systems includes NFS servers to provide dedicated storage for data analysis and visualization.

The ASC projects have delivered new versions of visualization and scientific data management tools to end users and continue to refine them. VisIt had 4 releases during the past year, ending with VisIt 2.0. We released version 2.4 of Hopper, a Java application for managing and transferring files. This release included a graphical disk usage view which works on all types of connections and an aggregated copy feature for quickly transferring massive datasets quickly and efficiently to HPSS. We continue to use and develop Blockbuster and Telepath. Both the VisIt and IMG teams were engaged in a variety of movie production efforts during the past year in addition to the development tasks.

Information on these tools and efforts can be found on our PPPE web pages <http://www.llnl.gov/icc/sdd/img/infrastructures.shtml> and at the VisIt site: <https://visit.llnl.gov>.

Plans and Priorities:

During the next fiscal year we plan to purchase a new visualization cluster for our unclassified network. We are gathering requirements and evaluating technologies before we make decisions on the next architecture.

We plan no major technology refreshes for our visualization theaters in the next year, although we may switch to smaller, more powerful PowerWall drivers.

We will release new versions of the various in-house tools we support. We will continue to provide consulting and support services in graphics and video production.

Research into visualization techniques continues, funded largely by sources other than the ASC program. The research priorities for next year are topological analysis for scientific computing, particle visualization, data compression, uncertainty quantification, and mentoring students in various areas related to the above.

Funding Source:

The IMG Group is funded by ASC as well as other "institutional" sources. CASC is funded by LDRD, ASC, other LLNL projects, and outside sponsors. The Data group is funded by ASC, SciDAC, Advanced Fuel Cycles Initiative, and other outside sponsors.

Current Hardware Platforms:

Compute servers: See <http://www.llnl.gov/computing/hpc/resources/> for details on the compute servers and storage systems.

Production visualization servers: We have one unclassified and two classified production visualization servers, three classified PowerWalls with dedicated clusters to drive them, and two unclassified PowerWalls with dedicated clusters to drive them.

Graph Linux production cluster: 576 nodes (24 2.0 GHz Opteron (quad-socket, six core Istanbul), 128GB RAM per node), InfiniBand, shared Lustre disk, total of 72 TB memory

Gauss Linux production cluster: 256 nodes (Dual 2.4 GHz Opteron, 12GB RAM), InfiniBand, nVidia Quadro 4500, shared Lustre disk

Prism Linux production cluster: 128 nodes (Dual 2.4 GHz Opteron, 16GB RAM), InfiniBand, nVidia Quadro 5500, shared Lustre disk, dedicated NFS storage for data analysis and visualization

Video production: Our two labs include PCs, Macs, desktop video editors, and assorted recorders, monitors, mixers, and software packages. Visualization developer's lab: Assorted small systems and a 15-panel display driven by multiple Linux clusters.

Desktop systems for visualization consist of diskless and diskfull Linux, Mac and Windows systems, with Linux being the most common followed by Mac and Windows.

Current Software:

VisIt, EnSight, IDL, Tecplot, AVS, assorted other utilities and translators, and Blockbuster. SDM software includes Hopper, Chopper, and tools used in the Green Data Oasis.

Blockbuster: <http://blockbuster.sourceforge.net/>

Hopper: <https://computing.llnl.gov/resources/hopper/>

VisIt: <https://visit.llnl.gov>

Current Staff:

In the Information Management and Graphics Group of Livermore Computing there are 8 people, including three developers working on scientific data management tools. The remaining 5 people provide graphics consulting, support for displays, video production assistance, visualization and analysis support, and visualization hardware architecture planning and procurement. In the DATA group there are 5 people supporting VisIt. In CASC there are 10 visualization researchers, including three post docs. No hiring is planned for the next fiscal year.