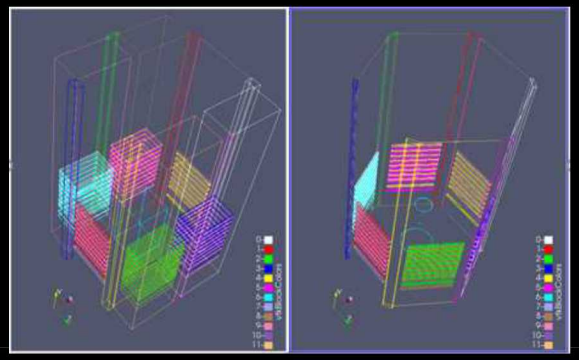
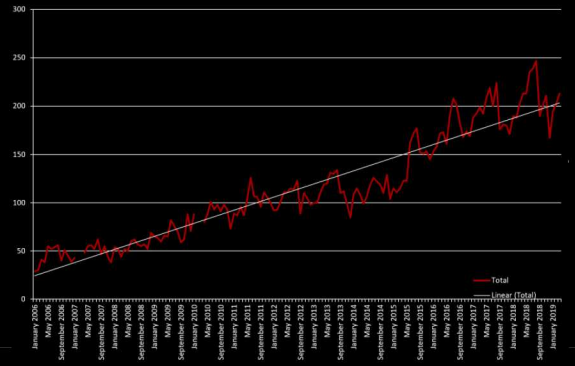
SAND2019-4260C





Sandia Site Report

DOECGF

April 22-25, 2019

Kenneth Moreland Sandia National Laboratories

W. Alan Scott Sandia National Laboratories

CCR Center for Computing Research

Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.
SAND NO. 2012-2910C

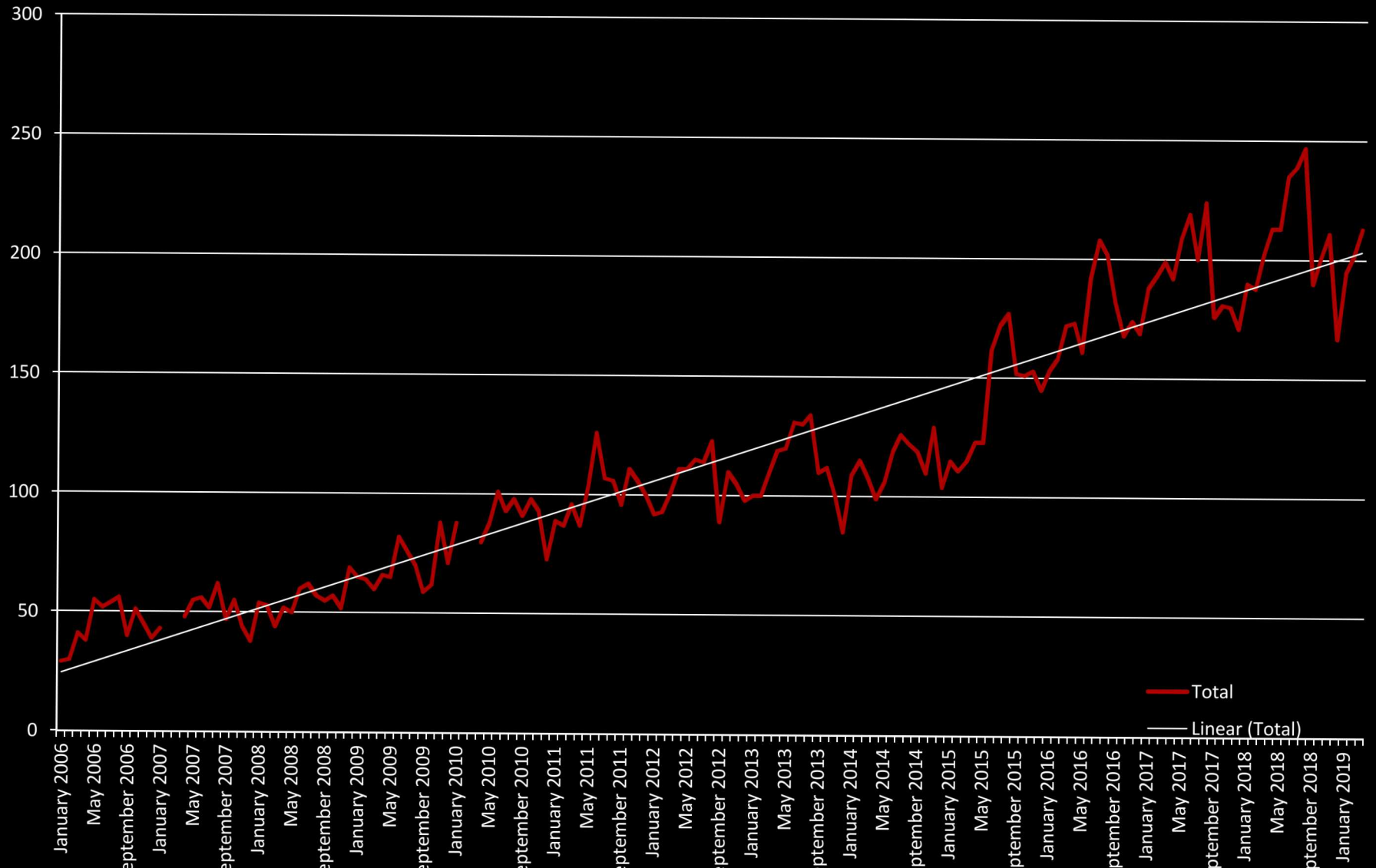
Group mission

- 1461 Mission: Provide innovative, leading-edge scalable analysis and visualization solutions that enable understanding of complex data.
- 9326 Mission: Provide user and application support in Sandia's scientific, high performance computing environment. Support Catalyst, ParaView and EnSight.
- 9327 Mission: Responsible for the design, acquisition, deployment and operations of Sandia’s HPC systems.
- 9328 Mission: Long term data retention and data transfer, and development of new HPC testbeds, user environments and operating systems

Activities - ParaView

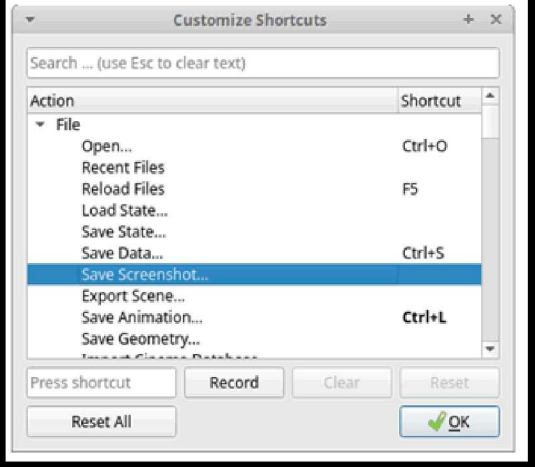
- Help develop, deploy and support ParaView 5.5.2 , 5.6.0
  - Current measured user base ~210 users/month
  - Multiple LANs and HPC clusters.
- Continue to provide user focused feedback and guidance to the ParaView development team.
- Sandia tests all ParaView bug fixes on the Kitware bug tracker.
- ParaView GUI and Python training
  - Taught 5 beginning, 5 advanced and 5 python classes at Sandia.
  - Taught 2 beginning and advanced ParaView classes at LANL
  - Taught 1 beginning and advanced ParaView class at LLNL
  - Maintain SNL tutorials at paraview.org.
- Continue support of the HPC help desk

ParaView at Sandia
Total number of users per month

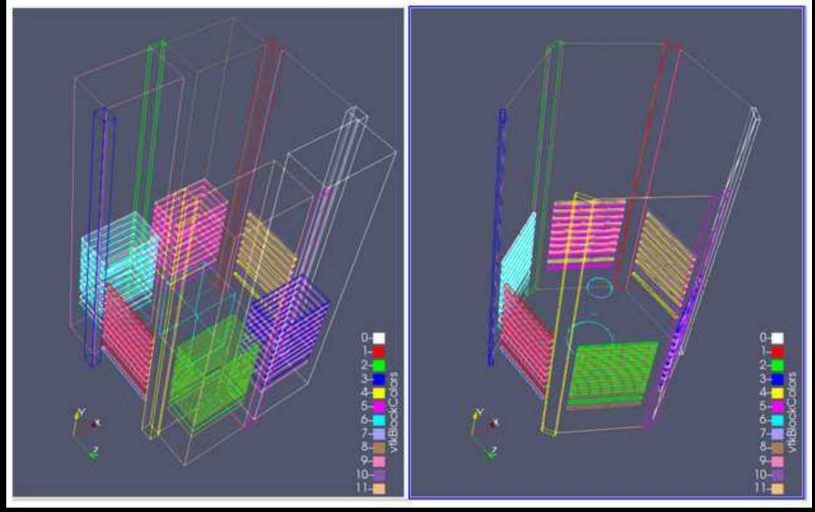


Sandia supported functions

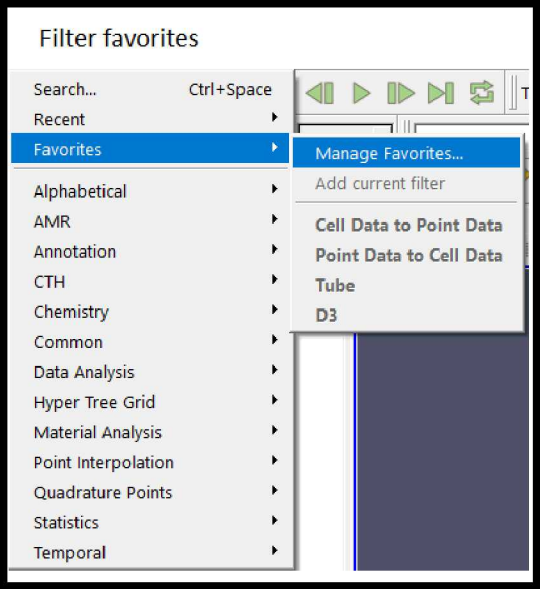
Customize shortcuts



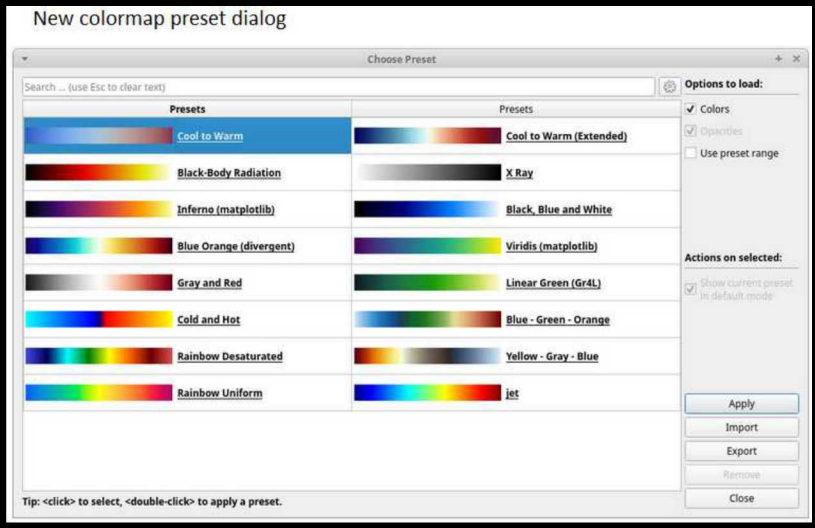
Feature edges representation



Filter favorites



New colormap preset dialog

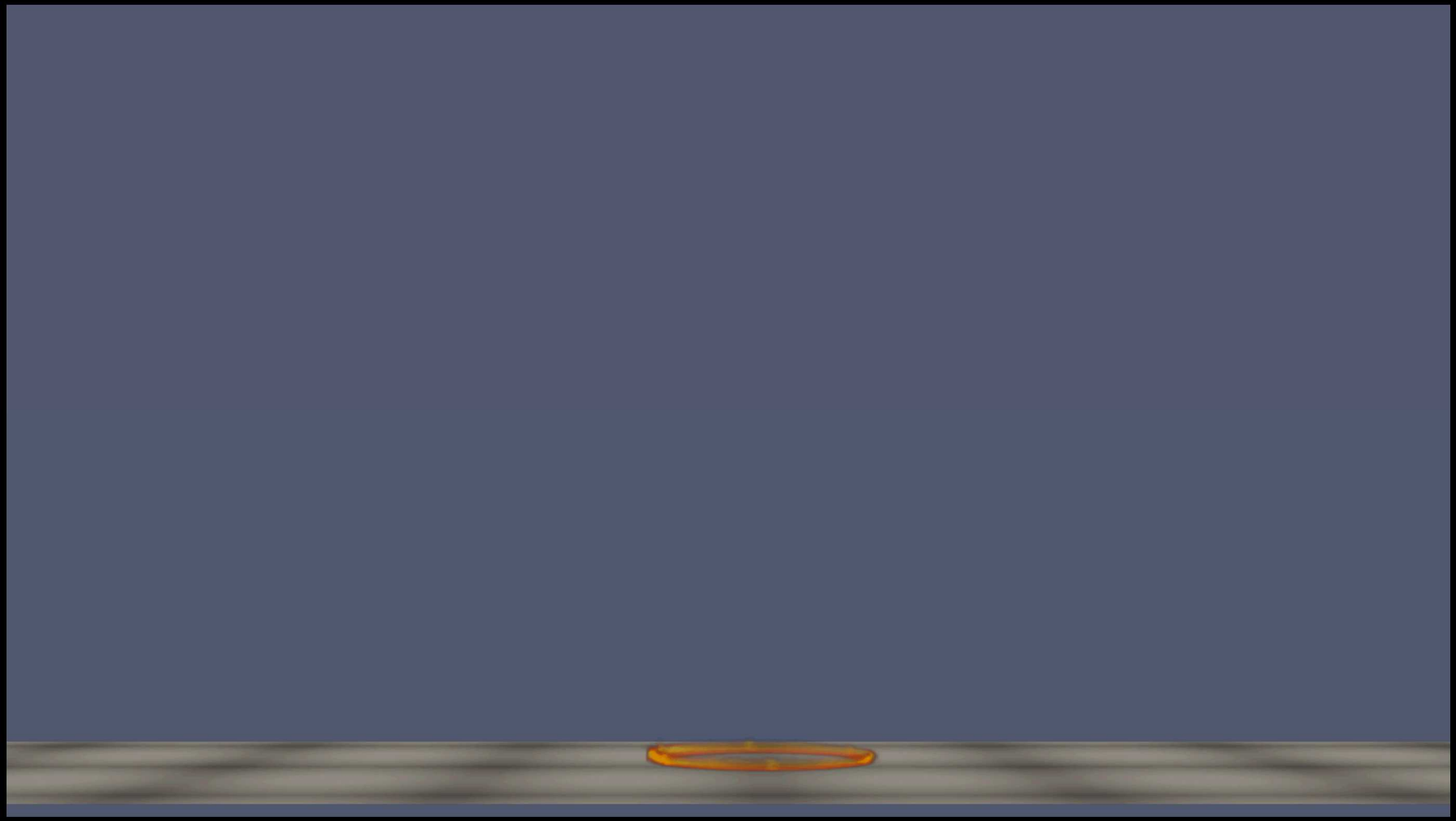


Activities – Catalyst

Sandia National Laboratories

- Continued maintenance and feature additions for Catalyst for Sierra at SNL (mechanics, fluid dynamics, heat transfer)
- Improving/completing integration of Catalyst into Nalu (low-mach fluid dynamics)
- Integrated Catalyst into Sparc (hypersonic fluid dynamics), cgns format support
- Working toward standard integration of Catalyst into IOSS (IOSS is a library of Seacas which is used by Trilinos)
- Work on Catalyst-Enabled coupled codes, e.g. Zapotec (Eulerian mesh fluid dynamic code coupled to Lagrangian mesh mechanics code)
- Supporting Catalyst/Nalu for NREL and Catalyst/Sierra for Army ITL
- Work on using Catalyst for analysis beyond image generation
  - Feature identification and quantification during simulation runs, and exporting non image data products
- Added capability in Catalyst to use python scripts to process existing exodus datasets and then use these same scripts in-situ on future simulation runs.

Large scale reacting methane plume in cross-flow



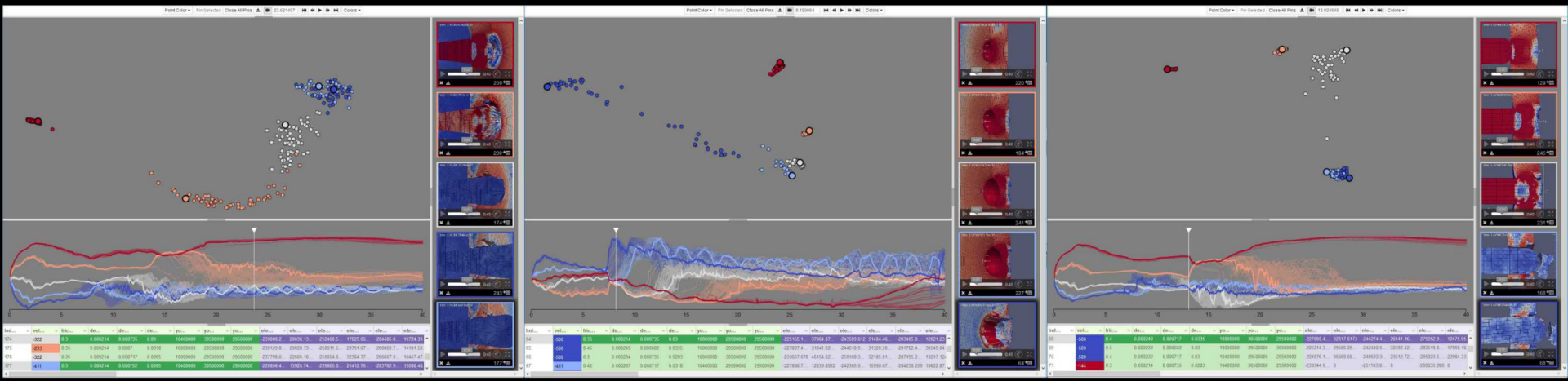
Activities - EnSight

- Deploy and support EnSight
  - Current lab version is 2019R1
  - Multiple LANs and HPC Platforms
  - Current licensed user base is ~295 users
- Main users work in Thermal/Fluids/Aeronautics, Solid Mechanics/Structural Dynamics, and Computational Simulation codes.

Activities - Slycat™

Slycat™ is a web-based system for analysis of large ensembles of high-dimensional data such as that produced by simulations on HPC platforms

- Manx release, Slycat™ v. 2.0.0 (Webpack build) December 5, 2018
  - https://github.com/sandialabs/slycat/releases/tag/v2.0.0
- Working on refactoring & converting client-code to React
- VideoSwarm development continues (Cinema support)



Hardware

- Unclassified
  - Ghost – 740 node (36 core) 1.22 PFlop
  - Skybridge - 1848 nodes (16 core) (64 viz nodes)
    - 600 TFlop, 64 GB ram/node, liquid cooled processors
  - Chama - 1232 nodes (16 core) (32 viz nodes)
  - Serrano – 1122 nodes (36 core)
  - Uno – 201 nodes (16 core)
  - Astra – 2592 nodes (Arm, 28*2 cores)

- Classified
  - Pecos – 1232 nodes (16 core) (32 viz nodes)
  - Jemez – 288 nodes (16 core)
  - Cayenne – 1122 nodes (36 core)
  - Trinity – 9436 Haswell nodes and 9984 Knights Landing nodes

Upcoming year - Production Viz

Sandia National Laboratories

- EnSight
  - Upgrade CGNS reader
- ParaView
  - Rewrite Exodus reader
  - Performance enhancements for volume rendering
  - Statistics refinement
  - Improve CFD tools
- Catalyst
  - Supporting visualization in Large Scale Computing Initiative, targeting runs using at least half the Knights Landing nodes on Trinity