SAND2017-3547PE

NNSA/CEA Cooperation in Computer Science: Visualization Update

April Update

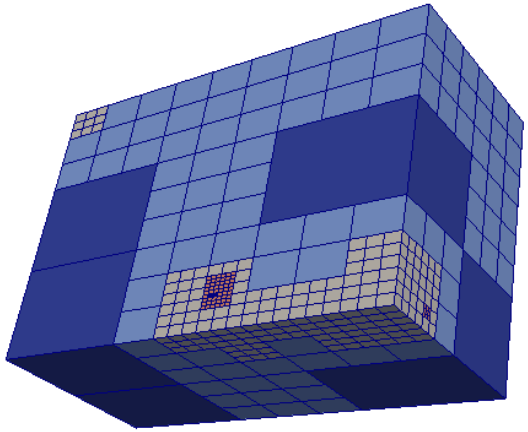
N. Bergeret, E. Brugger, G. Colin de Verdiere, P. Crossno, C. Guilbaud, J. Patchett

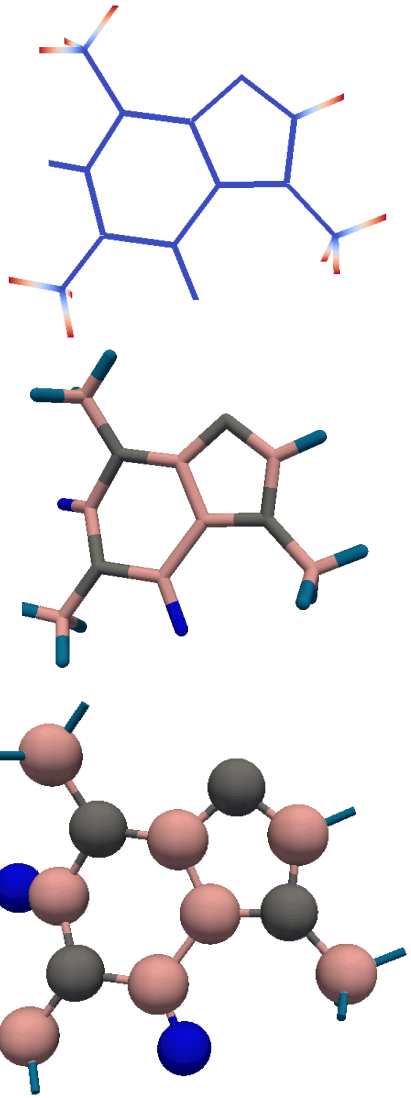
APRIL 19, 2017

www.cea.fr

3.1 PARTNER ON COMMO VTK EEDS

- New ParaView Capabilities
  - New filter « Convert into Molecule » which converts a polygonal mesh into a molecule data
  - New filter « Compute Molecule Bonds » which computes bonds from atoms positions
- New VTK Capabilities
  - new AMR structure
  - new AMR filters
  - in a future VTK
- Regular monthly telecons : 1/10, 2/2, 3/7, 4/11
- Quarterly meeting with Kitware 4/11
- **On track**

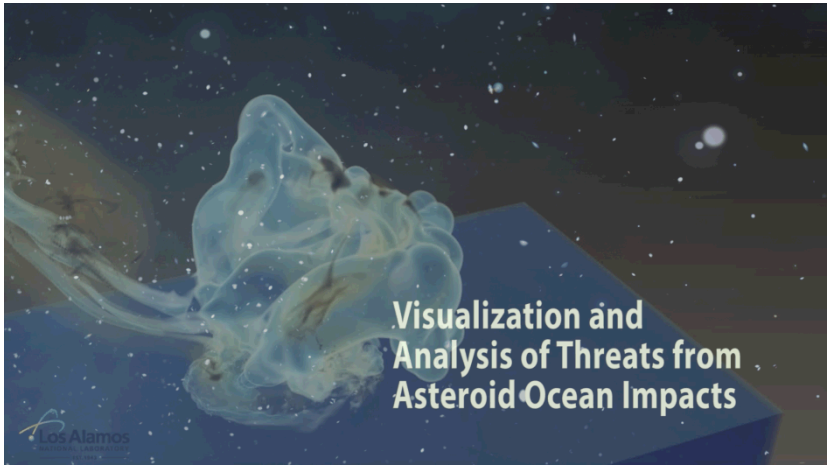




DELIVERABLE 3.9.13 PARTNERING ON COMMON IN SITU NEEDS

- In Situ is regular topic at quarterly coordination meetings
  - Functional use cases and requirements are often developed and fleshed out at these meetings
- ParaView and VisIt Tutorial at SC 2016
- VTK-m Tutorial at Vis 2016
- ParaView Tutorials at Sandia and Los Alamos
- LANL L3 In Situ Milestone completed
  - (LA-UR-16-26987)
  - Deliver In Situ to End Users
  - Production ParaView at LANL
    - Supercomputers
    - Desktops
- More tutorials planned to expose the tool to end users of supercomputing
- Cinema functionality added to ParaView's coprocessing export script functionality.
- Releasing Strawman In Site proxy app as open source in Q4 CY16
- **On track**

SC 2016 Visualization Showcase



http://datascience.dsscale.org/wp-content/uploads/sites/3/2016/09/VisualizationAndAnalysisOfThreatsFromAsteroidOceanImpacts.pdf

The Collaboration between visualization scientists and Physicist Galen Gisler at Los Alamos produced a top 6 Supercomputing 2016 Visualization showcase entry. ParaView Catalyst was the primary enabler of this work.

DELIVERABLE 3.10.6 CONTINUE TO DELIVER SELECT MULTICORE/MANYCORE ALGORITHMS

- All our multicore/manycore efforts are centered on VTK-m
- VTK-m 1.0 released in June 2016
- Have been adding algorithms, rendering capabilities and infrastructure enhancements
- Project has weekly developer conference calls
- Code sprint August 2nd
- Initial deployment in ParaView and VisIt in Q1 CY17
- New VTK-m filter for volume reconstruction for scattered points (November 2016)
- **On track**

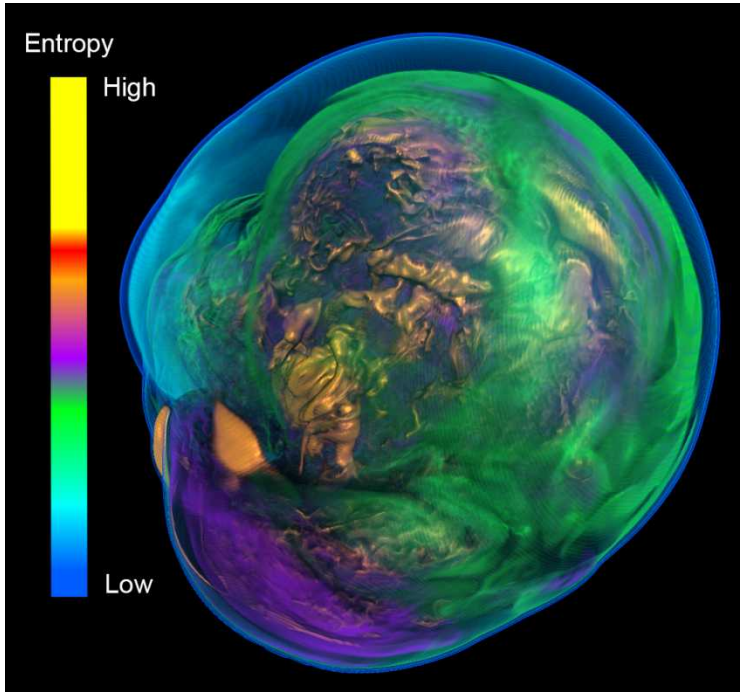
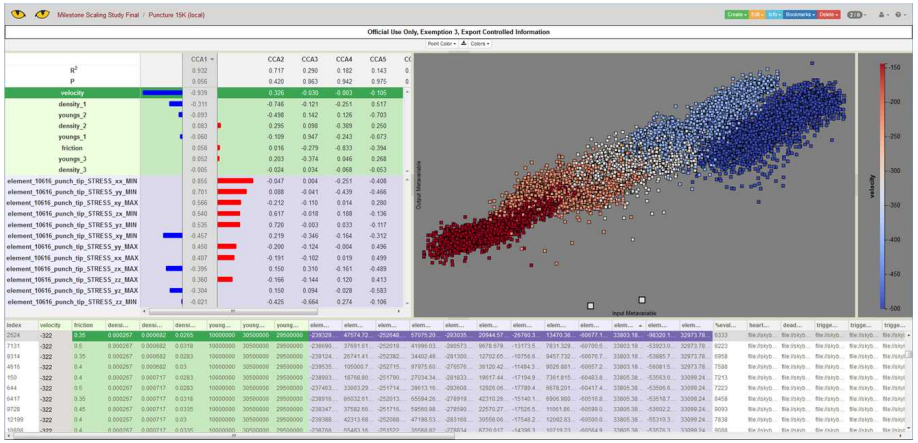


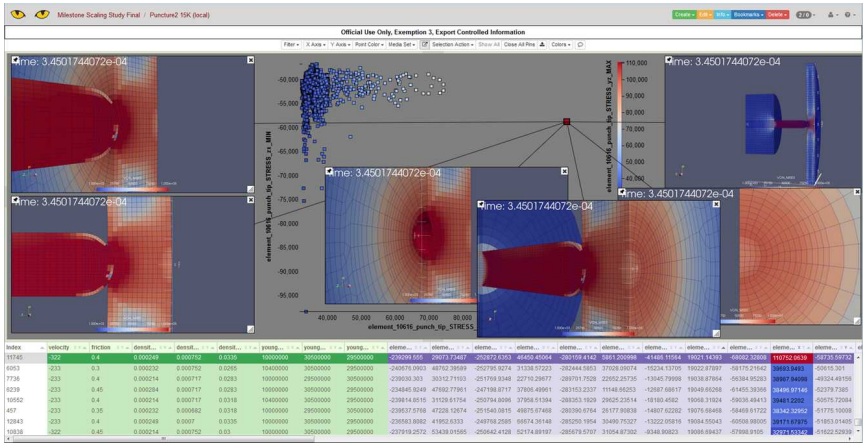
Image from supernova simulation data using a direct volume renderer implemented in VTK-m.

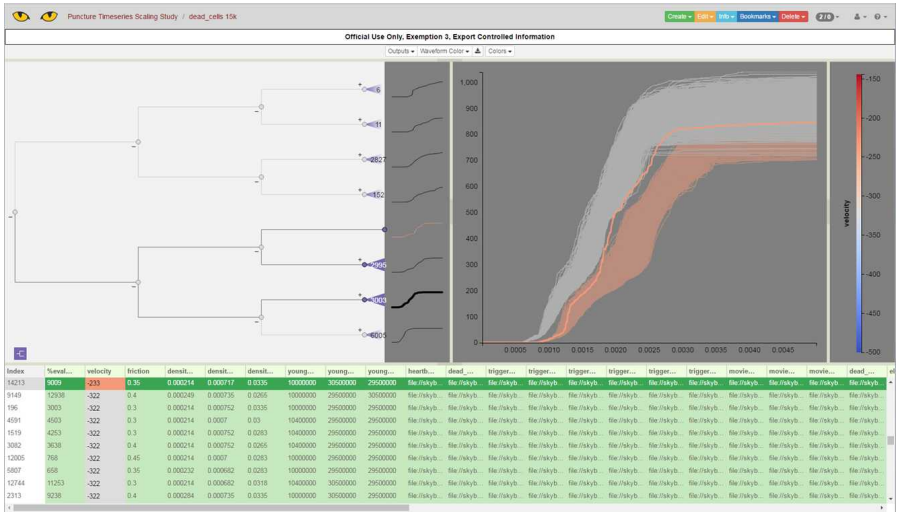
3.10.9 CONTINUE TO RESEARCH ANALYSIS TECHNIQUES AND VISUAL REPRESENTATION FOR ENSEMBLE DATA

- Completed ASC Milestone : Evaluating Slycat™ scaling performance
  - 15K run Sierra/Catalyst ensemble (including images, video, & time series)
  - 3K run Sparta/Catalyst ensemble (no time series)
- Slycat™ beyond Sandia: ARL
  - Refactored authentication
    - Single sign on
    - Username/Password

Sierra/Catalyst 15K Run Ensemble Models

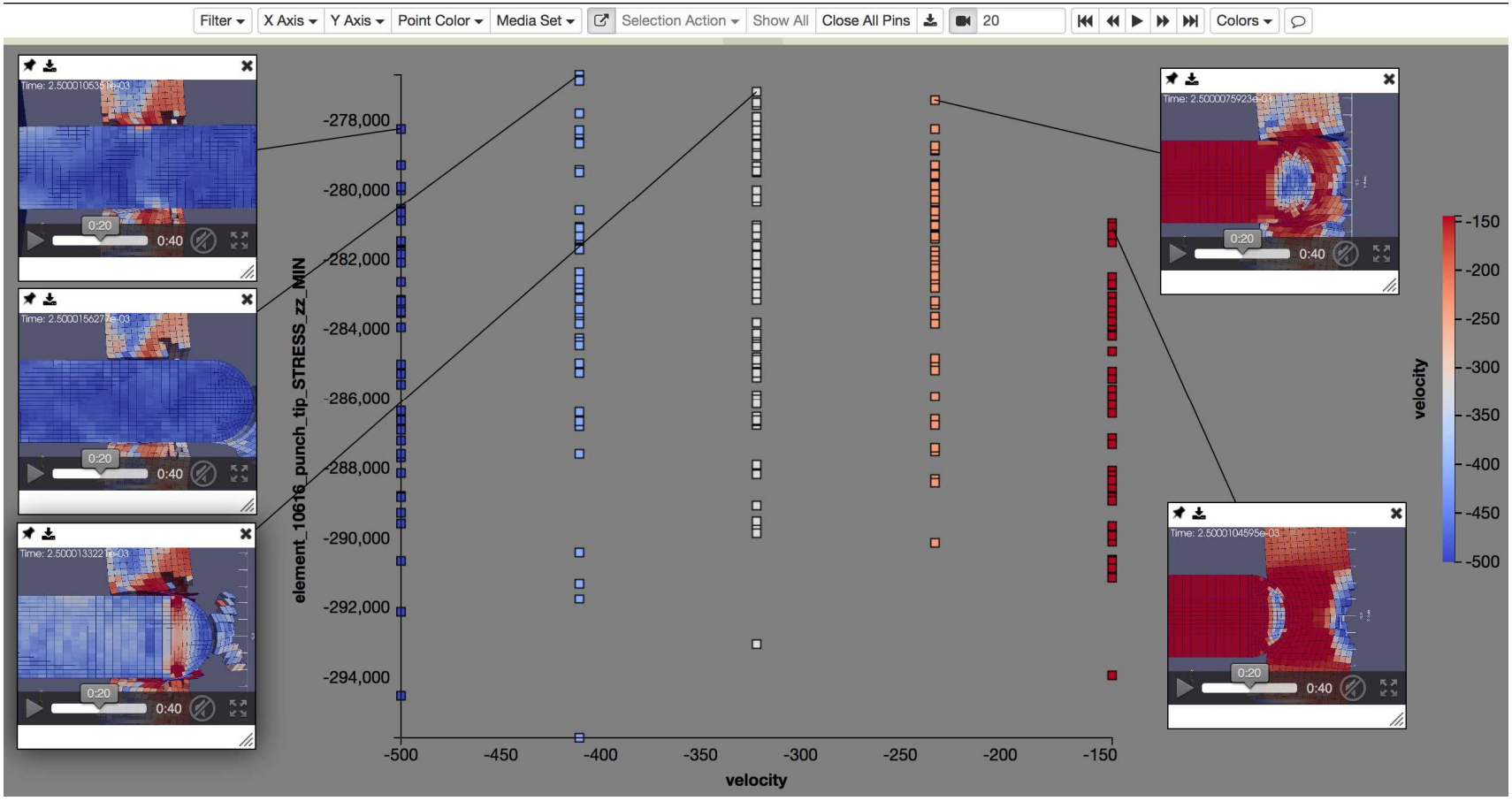






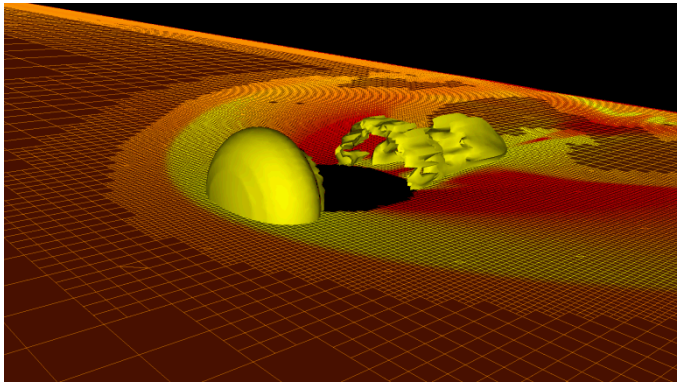
3.10.9 CONTINUE TO RESEARCH ANALYSIS TECHNIQUES AND VISUAL REPRESENTATION FOR ENSEMBLE DATA

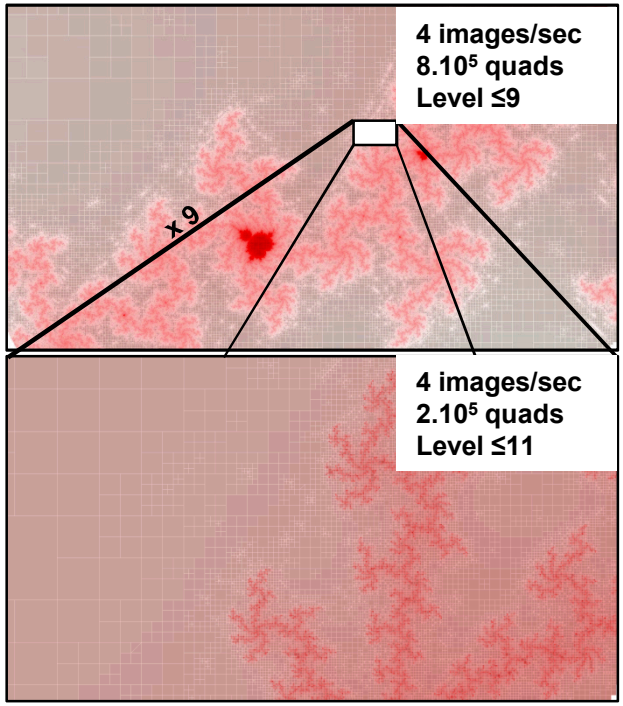
- Video synchronization
- Researching algorithms for video clustering (Slycat™ presentation)
- **On Track**



COLLABORATIVE WORK

- VTK-m
  - LANL / CEA in Los Alamos during 10 days
  - a new VTK-m filter for volume reconstruction for scattered points
  - On track
- AMR
  - LANL / CEA in Los Alamos during 10 days
  - Construction of a ParaView plugin for future VTK AMR features
  - Use of this plugin inside LANL xRage code's *in situ* adaptor
  - On track





LLNL-PRES-692817

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2016-10431 PE

Commissariat à l'énergie atomique et aux énergies alternatives
Centre de Saclay | 91191 Gif-sur-Yvette Cedex
T. +33 (0)1 XX XX XX XX | F. +33 (0)1 XX XX XX XX

DAM
DSSI
SNEC

Etablissement public à caractère industriel et commercial | RCS Paris B 775 685 019