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SDAV Progress Report

Sandia National Laboratories

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U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

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VTK-m Update

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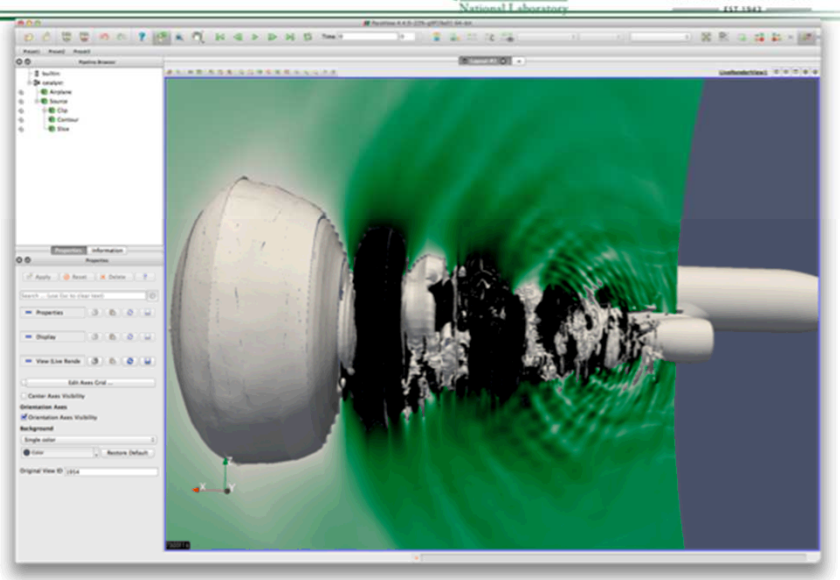
- Design of “filter” interface (Rob Maynard)
- Start rendering interface (Jeremy Meredith, Dave Pugmire, Matt Larsen)
- Preparation for 1.0 release
  - Add install build targets
  - Improve optimization flags (including KNL)
  - Many other fixes preparing for version 1.0 release
- Progress on User’s Guide (now at ~180 pages)
- Progress on integrating VTK-m with VisIt (Eric Brugger)

Live Demonstration of In Situ Visualization on Accelerator Processors

Sandia National Laboratories · Kitware · Oak Ridge National Laboratory · Los Alamos National Laboratory



Objective

- Scientific discovery using 100 petascale to exascale supercomputers requires integrated visualization solutions on new computational hardware.
- Multiple technologies to be implemented and integrated.

Technology

- ParaView: existing HPC visualization infrastructure leveraging VTK over large MPI jobs with user interaction.
- Catalyst: in situ coupling of ParaView to simulations.
- VTK-m: toolkit for the development and distribution of visualization algorithms on multicore and accelerators.
- PyFR: CFD simulation running on 256 GPU devices of Oak Ridge's Titan supercomputer to analyze the turbulence behind a new serrated jet engine nozzle.

Impact

- A demonstration at SC 2015 shows the integration of these 4 key technologies for a live analysis of the simulation.
  - Top right: The pockets of air in the jet wake reduce noise.
  - Direct right: A live interactive visualization of a large simulation running on Titan viewed and controlled on the show floor in Austin.
- The entire process from simulation to analysis to rendering happens locally on the GPUs without memory transfer.
  - As increasing limitations in network, power, and storage limit the movement of data, sharing resources is critical for effective analysis.

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Other Activities

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- Presented “Why We Use Bad Color Maps and What You Can Do About It” at HVEI 2016 (part of Electronic Imaging 2016)
- Participated in Vis panel for ECP