



SANDIA NATIONAL LABORATORIES

SNL ADTM

FY20Q3 report for ATDM AD projects to ECP

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Prepared for:

ECP Confluence updates

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Activities

Accomplishments / Milestones Delivered During This Period

Kokkos: The OpenMPTarget Kokkos backend has been demonstrated to work on Intel GPUs (Gen9). Working with various vendors on making progress (Intel, AMD, HPE, NVIDIA).

Kokkos Kernels: 3.1.1 is released.

Kokkos Kernels: Evaluated Kokkos Kernels based solvers on KNL, V100 and ARM. Solver performance looks good.

OS/R: Develop a sustainable framework for ASC application containerization that aligns with the new containers project in ECP but focuses specifically on ATDM needs, including scalability studies, runtime development, and investigation of security models appropriate for ASC applications and workflows.

Next Steps

Kokkos: Provide high quality (production) Kokkos support and consultation for ASC applications and libraries. This activity is continuing activity from previous years

Kokkos: Start developing of enhanced asynchronicity mechanisms for Kokkos execution, including an integration of capabilities such as CUDA graphs.

Kokkos Kernels: Complete conversion of remaining Intrepid2 projection algorithms to Kokkos.

VTK-m: Establish a performance visualization evaluation suite

OS/R: Represent the needs of ASC applications on the OpenMP Language Committee and MPI Forum.

Challenges

Kokkos: HPC Vendor Hardware Risks: Rapidly shifting hardware plans at major HPC vendors is requiring more radical Kokkos backend research and development. This requirement shifted resources from planned major maintenance efforts within existing Kokkos backends. Technical debt is accumulating which makes it harder to maintain Kokkos. Mitigation Plan: Extended collaboration with stake holders at other institutions is an attempt to mitigate this risk by shifting development work outside of Sandia via the partner ECP project.

Outreach and Communication

VTK-m: Sandia's visualization group had a strong presence at the DOE Computer Graphics Forum (virtual meeting this year), including a Sandia site report, two vis presentations (ParaView and VTK-m), a Slycat talk, and an AR/VR talk.

VTK-m: Follow-on from DOE CGF led to several new informal collaborations (also reported for CSSE)

- NVIDIA: To evolve Omiverse platform for HPC Vis. Working with them on VTK/ParaView plugins to enable interoperation of these tools and commercial tools (e.g., Adobe, Houdini, Unity, ...) o
- ANL: Gave tutorial on how to develop high-quality visualizations (i.e., "impactful) from scientific data (ParaView)

