



EXASCALE
COMPUTING
PROJECT

Documented Kokkos Application Use-Cases

WBS STPM12 Milestone 19

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EXECUTIVE SUMMARY

This report documents the completion of milestone STPM12-19 Documented Kokkos application use-cases. The goal of this milestone was to develop use case examples for common patterns users implement with Kokkos.

This work was performed in the fourth quarter of FY19 and resulted in use case descriptions available in the Kokkos Wiki, with code examples.



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1. INTRODUCTION

While API documentation and Programming Guides are two common types of documents needed to learn Kokkos, there are common programming patterns which have proven to be useful in applications which go beyond the purview of pure Kokkos. Often users will ask for how to do certain things best on the slack channel or in issues. This includes such things as interactions with MPI or interoperability with Fortran. Documenting best practices for such common use cases will help users find answers faster.

2. MILESTONE OVERVIEW

2.1 DESCRIPTION

The goal of the milestone is to identify some common use patterns, and document best practices.

2.2 EXECUTION PLAN

This milestone was executed by collecting common use cases based on application developer experience and common support requests and questions received via Kokkos support platforms, then developing documentation with code examples.

2.3 COMPLETION CRITERIA

The completion criteria is to make the use case description available via the Kokkos website.

3. TECHNICAL WORK SCOPE, APPROACH, RESULTS

Nine common use cases were identified:

- MPI halo exchange
- ScatterView averaging to nodes
- Tightly nested loops
- Using Virtual Functions
- Using complex classes as functors
- Overlapping host and device work
- Tasking
- Fortran interoperability
- SoA and AoSoA with Cabana

About 30 pages of documentation were generated.

4. RESOURCE REQUIREMENTS

The work described herein included contributions from SNL, LANL and ORNL.

SNL: Christian Trott, Dan Sunderland, Dan Ibanez, Nathan Ellingwood, Jeff Miles

LANL: Geoff Womeldorff

ORNL: Damien Lebrun-Grandie, Daniel Arndt

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