OOKAMI PROJECT APPLICATION

Date: 10/26/2021

Project Title: Mixed-Precision Runge-Kutta Methods using the A64FX Processor

Usage:

- Testbed

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Usage Description:

We are researching the performance of mixed-precision numerical methods for solving differential equations. Mixed-precision methods are capable of performing computationally intense portions of the solver using a reduced precision that is more computationally efficient while maintaining the accuracy available from high precision data types. Such methods could greatly benefit from the half precision hardware support offered by the A64FX Processor available in Ookami.

The goal of this project is to explore and benchmark the use of half precision in our codes so as to make full use of the A64FX Processor.

References:

- https://arxiv.org/abs/2107.03357

Computational Resources:

- Total node hours per year: 500

- Size (nodes) and duration (hours) for a typical batch job: Only one node will be required for both development and benchmarking. Batch jobs for benchmarking will take approximately 10 hours

- Disk space (home, project, scratch): 4GB

Personnel Resources (assistance in porting/tuning, or training for your users):

Required software:

If your research is supported by US federal agencies:

- Agency:

- Grant number(s):

Production projects:

Production projects should provide an additional 1-2 pages of documentation about how

1. the code has been tuned to perform well on A64FX (ideally including benchmark data comparing performance with other architectures such as x86 or GPUs)

2. it can make effective use of the key A64FX architectural features (notably SVE, the high-bandwidth memory, and NUMA characteristics)

3. it can accomplish the scientific objectives within the available 32 Gbyte memory per node