

OOKAMI PROJECT APPLICATION

Date: 8 February 2021

Project Title: Energy Exascale Earth System Model (E3SM) Readiness

Usage:

Testbed

Production

Principal Investigator: Philip W Jones

University/Company/Institute: Los Alamos National Laboratory

Mailing address including country:

T-3 MS B216, PO Box 1663

Los Alamos, NM 87545

Phone number: 505-500-2699

Email: pwjones@lanl.gov

Names & Email of initial project users:

Philip Jones: pwjones@lanl.gov

Sarat Sreepathi: sarat@ornl.gov

Noel Keen: ndkeen@lbl.gov

Usage Description:

The Energy Exascale Earth System Model (E3SM) project is tasked with developing and deploying an Earth System Model on exascale platforms as part of both the Exascale Computing Project and Earth and Environmental System Science research in the US Department of Energy's (DOE) Office of Science. While the focus is largely on the DOE exascale platforms, we must also be prepared for alternative paths to exascale and beyond, building performance portability into our software. The A64FX architecture, with higher memory bandwidth and vector capabilities is likely to prove beneficial for our bandwidth-limited application. We plan to use Ookami and this allocation to benchmark current codes, devise optimal implementations and explore the behavior of proposed performance-portable programming models (eg Kokkos, Legion/FleCSI) on this architecture. Our results will be shared with the broader climate and weather modelling community, including NSF-funded efforts, to inform future approaches.

Computational Resources:

Total node hours per year: 10,000

Size (nodes) and duration (hours) for a typical batch job:

1-16 nodes, < 1 hour each

Occasionally a few larger runs for scaling data

Disk space (home, project, scratch):

Home: 2 GB

Project: 1 TB

Scratch: 1 TB

Much of this data is for input datasets. We do not anticipate generating a lot of output data

Personnel Resources: No additional personnel resources needed.

Required software:

Usual compiler and MPI libraries

Preferably with latest OpenMP support (5.0 or later)

Cmake

Several other libraries are required and would be nice to have as modules but we are willing/able to build and maintain ourselves:

I/O libraries: netCDF, pnetCDF, ADIOS

Math libraries: Lapack/BLAS, Trilinos

Programming models: Kokkos

If your research is supported by US federal agencies:

Agency: US Department of Energy

Grant number(s):

No grant numbers. The project is funded by the DOE Office of Science as part of the E3SM project in the Biological and Environmental Research Division, Earth and Environmental System Sciences and as part of the Exascale Computing Project in the Advanced Scientific Computing Research Division.