OOKAMI PROJECT APPLICATION

Date: August 20, 2021

Project Title: rustyshmem

Usage:

- Testbed

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Usage Description:

This is a Stony Brook CSE 523/524 special project.

National labs, government departments, and others with mission critical software needs, have used languages like C and C++ for years with parallel programming libraries like MPI and OpenSHMEM. The security pitfalls of C-based languages are well known.

This project explores the Rust language, which provides extra type- and memory-safety guarantees, and looks to see how it can be integrated with existing parallel libraries, particularly OpenSHMEM, to use Rust on High Performance Computing clusters efficiently without compromising Rust's safety guarantees for end-users.

Reference:

- `https://www.rust-lang.org/`
- `http://www.openshmem.org/`

Computational Resources:

- Total node hours per year: estimate 1000
- Size (nodes) and duration (hours) : generally small proof-of-concept runs (a few nodes)
- Disk space (home, project, scratch): 40GB, 4TB, 4TB

Personnel Resources:

None extra anticipated.

Required software:

Fairly self-contained. Open-MPI or similar OpenSHMEM implementation, which is already installed. Rust and ecosystem can be self-installed.

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