Date: August 19, 2018

To: Rajeev Thakur

cc: PI, Jeremiah Wilke; PM, Robert Clay

From: Jeremiah Wilke, 2.3.1/SNL ATDM PMR

Milestone Deliverable — 2.3.1.04.16

Milestone Due Date: 06/30/2018

Milestone Completion Date: 08/20/2018

Description of Milestone:
The DARMA many-task framework provides asynchronous communication and load balancing functionality. This functionality is embedded in standard , modern C++ through the use of the template wrapper classes similar to futures. DARMA codes previously could not interoperate with Kokkos or OpenMP since each runtime assumed sole ownership of thread resources. The most recent version now allows for the use of Kokkos/OpenMP within DARMA tasks, allowing for better performance through thread-level parallelism or use of accelerators.

Completion Proof of the Milestone:
A report has been prepared to document the progress made in defining new C++ abstractions and implementing the underlying runtime support. Additionally, the DARMA runtime library has been made available through the github repository at `https://github.com/DARMA-tasking/darma-futures`. The main application driver, a particle-in-cell mini-app, is included in that distribution.

Tasks to Complete the Milestone:
This milestone completed the following tasks:

- Work with Kokkos team to provide Kokkos functions for allocating thread pools to DARMA runtime

- Implement Kokkos or OpenMP parallelization for the move kernel of the particle-in-cell mini-app

- Run performance tests on Mutrino/Trinity platform

Person(s) Responsible for Completing the Milestone:

- Jeremiah Wilke, Sandia National Labs

- David Hollman, Sandia National Labs

- Aram Markosyan, Sandia National Labs

- Giulio Borghesi, Sandia National Labs

- Jonathan Lifflander, Sandia National Labs