May 13, 2013

RUSSELL TAYLOR - STATEMENT OF WORK: ADDITIONAL TASKS

In the past year staff from Neutron Sciences Directorate (NScD), and Computing and Computational Sciences Directorate (CCSD), working in collaboration with staff from Tessella (R.J. Taylor) have developed a unique capability, called ADARA, for streaming neutron data from the Spallation Neutron Source (SNS) to high performance computing resources located in the National Center for Computational Sciences (NCCS) for real time processing of the neutron data. In the Triennial review of Neutron Sciences Directorate (NScD) by the U.S Dept. of Energy in August 2012 it was recognized that this development was ground-breaking and placed the SNS in a world-leading position for neutron scattering data analysis. It is therefore of great importance to NScD that the ADARA system be deployed across all SNS beam lines in a timely fashion.

In order to perform the real time data processing the Mantid software framework is an integral component of the ADARA project and thus plays a critical role for live data viewing and parallel processing of the neutron data. In order to deploy the ADARA system, and associated Mantid software, as quickly as possible we need a Mantid specialist to work alongside ORNL staff in the deployment.

Task 11: Beam line Deployment of Live Data Processing Software

Testing, deployment and adaptation of the extensions to Mantid, which were developed as part of the ADARA project on the HYSPEC beam line, in order to process live data from other SNS beam lines. The areas of work are as follows;

a) Adaptations (and deployment) to support the next phase of SNS beam lines that will have ADARA deployed on them, SEQUOIA, NOMAD, VISION, TOPAZ.

b) Testing functionality performs as required under real world experimental conditions.

c) Adaptation of graphical user interface elements to provide users with more user friendly methods of utilizing the live data stream, based on user feedback.

d) Ensure that ORNL staff is fully briefed on all aspects of the system.

Task 12: Deployment of Parallel Processing Software

We require the current parallel processing capabilities within Mantid (that have been developed as part of the ADARA project) to be tested and deployed as follows;

a) Deployment and testing of parallel processing on SNS internal cluster.

b) Deployment and testing of parallel processing on NCCS managed cluster, FERMI.

c) Testing and Deployment of high efficiency data I/O operations using the Lustre Parallel File System situated in Building 8600.

d) Ensure that ORNL staff is fully briefed on all aspects of the system.

Task 13: Further Mantid Development

In order to streamline the roll out of ADARA onto beam lines at the SNS, there are areas of the Mantid software development infrastructure that will need optimizing. This includes the following tasks;

a) Refactoring of the code base into more logical components.

b) Improvements to the core data object model (Workspaces).

c) Optimizations of the event data processing pipeline.

d) Ensure that ORNL staff is fully briefed on all aspects of the system.

Deliverables:

The main deliverable for each of the tasks 11, 12 and 13 listed above is the software source code to achieve the specific task within the Mantid Framework. The second deliverable for each task is the appropriate documentation. This documentation should take the form of source code documentation in "Doxygen" and reference pages in the Mantid project wiki that describe, (i) how the software achieves the task, (ii) what, if any, dependencies the software has on other codes and (iii) the interface requirements to the code that would allow it to be interfaced to future code developments.

Acceptance of Software Products:

Work products delivered under this contract shall be developed to software development standards within the guidelines for Mantid development practice to be agreed at the outset of the project. The ORNL Technical Project Officer will signify acceptance of work products by the

approval of invoices raised by the seller. Acceptance of work products created under this contract will not be withheld for issues or errors caused by other Mantid development effort performed under other contracts or collaboration agreements.