

Statement of Work

HIGH PERFORMANCE COMPUTING SYSTEM ARCHITECT ITACS HIGH PERFORMANCE COMPUTING DIVISION

Naval Postgraduate School

1.0 Background/Introduction

The High Performance Computing (HPC) Team in ITACS at NPS provides overall support to students, staff, and researchers engaged in work that requires high-level computational capacity. This includes massively parallel computation (high floating-point-operations per second usually requiring multi-cores/threads), high input/output rates, and/or “big data” / data-analytics workloads. Traditional workloads have typically dealt with the MPI (message passing interface) stack employed on CPUs, but over the past few years, has grown to include GPGPU computing, and more recently, Hadoop computing.

2.0 Scope

To provide support for NPS HPC, including system architecture and engineering expertise to meet NPS demand.

Examples include supporting:

- The HPC high-speed high-performance disk system is capable of up to 5 gigabytes/per second I/O (read and writes). Support is needed for Lustre, ZFS, and other filesystems;
- The HPC tape backup system can archive over 1000 TB of data at a rate of 1.7 TB per hour (the system can scale and expand far beyond that), and needs additional support for continued operations;
- The diverse user base across a number of NPS departments requires that HPC be able to plan and execute for continued growth of the NPS SuperComputer. The cluster currently consists of over 3,000 cores, and over 116,000 GPU cores.
- A Hadoop-based compute cluster (physically linked to the cluster referred to in the preceding bullet);
- The Infiniband interconnect that ties the various compute servers together.

3.0 Tasks

The contractor shall perform the following tasks:

- 3.1** Act as lead architect for NPS HPC systems, including servers, switches, backup systems, and disk arrays, with an emphasis on MPI and Hadoop software stacks.
- 3.2** Install and maintain user applications, system patches and libraries.
- 3.3** Coordinate with other HPC team members to prioritize and accomplish assigned tasks.
- 3.4** Provide and implement recommendations for improved performance, including the evaluation and implementation of emerging technologies.
- 3.5** Implement highly available storage systems using various filesystems including Lustre, ZFS, and ext3/4.
- 3.6** Implement tape archival systems to ensure retention of critical data assets.
- 3.7** Implement system security hardening in accordance with established information assurance policies.
- 3.8** Prepare technical briefings.
- 3.9** Create and maintain online documentation for users, develop and maintain up to date standard operating procedures (SOPs) on the system design and software architecture of HPC systems.
- 3.10** Respond to user requests for assistance: this can range from simple questions such as how to login to a machine and compile a program, to much more complex assistance such as installing specialized software, or assistance with improving the performance of a computer program.
- 3.11** Support the development and refining of scheduling policies for the batch queuing system (currently MOAB / PBS / Torque).
- 3.12** Provide support for Infiniband interconnect.
- 3.13** Provide support for GPU computation.

4.0 Deliverables

The contractor shall be responsible for preparing deliverables in support of the tasks identified in this SOW.

Task	What will be inspected	Acceptable Quality Level (AQL)	Method	Frequency
3.1 - 3.4, 3.8, 3.9	Updates provided at weekly team meetings and via email.	Summary of work completed during month due by COB last day of month.	Personal observation at NPS	Monthly
3.5	Filesystem	Filesystem must be available to end-user. Repairs are made to the system when notified of problems.	Personal observation at NPS	Continuously
3.6	Archive/Backup System	Archive/Backup System must be available to end user. Test system weekly to ensure data can be stored and retrieved.	Personal observation at NPS	Weekly

3.7	Applications, Operating System, and other software, and warranty information	All are in conformance with ITACS IA policies.	Personal observation at NPS and feedback from Advisory Panel	Continuously
3.10, 3.13	Resolution of requests	Use of JIRA system to track requests and prioritize and track so that HPC team can monitor.	Feedback from users	Continuously
3.11	Batch scheduler	Batch scheduler must be functional	Evaluation of batch scheduler functionality	Continuously
3.12	Infiniband interconnect	Interconnect must operate so that all computational nodes can communicate with one another.	Evaluation of interconnect functionality	Continuously

The surveillance method for the deliverables listed above will be personal observation at NPS. If performance falls below the AQL defined above, the Contracting Officer's Representative (COR) shall document the instance(s), coordinate with the Contracting Officer and advise the Contractor. The Contractor will be requested to review the documentation and provide a written response on how performance will be corrected in the future. Re-performance of any work for failure to perform in accordance with the specified AQL or task requirement shall be completed at the Contractor's own expense and at no additional cost to the Government.

5.0 Period of Performance 5-Mar-2016 to 4 Mar 2015.

6.0 Minimum Technical Requirements

Technical Skills:

At least 5 years of recent demonstrable experience with the following:

6.1 Working with the following:

- 6.1.1 Thousand-core order-of-magnitude computer clusters;
- 6.1.2 System administration of Redhat / CentOS Linux operating systems;
- 6.1.3 Lustre filesystem;
- 6.1.4 Infiniband high speed interconnect and related performance monitoring;
- 6.1.5 Tape archival systems;
- 6.1.6 PBS/Torque batch queuing systems;
- 6.1.7 Installation of compilers and application software;
- 6.1.8 License managers;
- 6.1.9 GPGPU-based computers including relevant software

- 6.2 Other necessary skills include the ability to create and deliver presentations to various audiences and the ability to provide written user documentation.
- 6.3 The Contractor shall provide evidence that personnel accessing information systems have the proper and current information assurance certification to perform information assurance functions in accordance with DoD 8570.01M, "Information Assurance Workforce Improvement Program". The Contractor shall meet the applicable information assurance certification requirements, including:
 - 6.3.1 DoD-approved information assurance workforce certifications appropriate for each category and level as listed in the current version of DoD 8570.01--M; and
 - 6.3.2 Appropriate operating system certification for information assurance technical positions as required by DoD 8570.01--M.

Upon request by the Government, the Contractor shall provide documentation supporting the information assurance certification status of personnel performing information assurance functions.

Contractor personnel who do not have the appropriate and current certifications shall be denied access to DoD information systems for the purposes of performing information assurance or cybersecurity functions.

All contractor employees who fill a sensitive IT role that requires privileged access shall meet the background investigation requirements of the designated IT level as set forth in SECNAV M-5510.30, "Department of the Navy Personnel Security Program Manual". Contracts involving NPS IT systems or IT-related duties will incorporate the security requirements specified therein and in accordance with applicable policy and guidance sections of the Defense Federal Acquisition Regulations (DFAR).

7.0 Place of Performance Work is done primarily onsite but offsite work is allowed at discretion of ITACS Director of High Performance Computing.

8.0 Work Week and Hours of Operation:

The Contractor shall provide services during normal working hours excluding federal holidays. Normal working hours are 0800-1700, Monday through Friday, unless requirements dictate otherwise, or upon the discretion of the ITACS Director of High Performance Computing.

Work required on-site at NPS shall be performed by the Contractor, as required.

Following is a list of holidays observed by the Government.

<u>Name of Holiday</u>	<u>Time of Observance</u>
New Year's Day	1 January
Martin Luther King Jr. Day	Third Monday in January
President's Day	Third Monday in February
Memorial Day	Last Monday in May
Independence Day	4 July
Labor Day	First Monday in September
Columbus Day	Second Monday in October
Veteran's Day	11 November
Thanksgiving Day	Fourth Thursday in November
Christmas Day	25 December

If any of the above holidays occur on a Saturday or a Sunday, then such holiday shall be observed by the Contractor in accordance with the practice as observed by the assigned Government employees at the using activity.

9.0 Government Furnished Property The government shall provide appropriate office space, supplies and equipment to perform tasks at NPS. Any Government-provided property and information shall be used for official Government business only. Any applicable documents that are authorized for use in performance of these services shall be provided, in accordance with security and contract terms and conditions.

10.0 Travel Travel for training and attendance at conferences is available to the contractor under the same guidelines that apply to Federal employees.

11.0 Classification Unclassified, with an Information Assurance ITA / Sensitivity Level of "IT-II / Non-critical Sensitive".

12.0 Privacy Act Statement

"Pursuant to Title 5 United States Code 552a(m)(1), the contractor and all employees of the contractor working under this contract are required to comply with the requirements of 5 U.S.C. 552a ("The Privacy Act of 1974")."

13.0 Contractor Identification

In accordance with DFAR 211.106, there shall be a clear distinction between Government employees and service contractor employees. Service contractor employees shall identify themselves as contractor personnel by introducing themselves or being introduced as contractor personnel and displaying distinguishing badges or other visible identification for meetings with Government personnel. In addition, contractor personnel shall appropriately identify themselves as contractor employees in telephone conversations and in formal and informal written correspondence.

14.0 Non-Personal Services Statement

Contractor employees performing services under this order will be controlled, directed, and supervised at all times by management personnel of the contractor. Contractor management will insure that employees properly comply with the performance work standards outlined in the SOW. Contractor employees will perform their duties independent of, and without the supervision of, any Government official or other Defense Contractor. The tasks, duties, and responsibilities set forth in the task order may not be interpreted or implemented in any manner that results in any contractor employee creating or modifying Federal policy, obligating the appropriated funds of the United States Government, overseeing the work of Federal employees, or otherwise violating the prohibitions set forth in Parts 7.5 and 37.1 of the Federal Acquisition Regulation (FAR). The Government will control access to the facility and will perform the inspection and acceptance of the completed work.

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16.0 Transition Plan.

It is essential to the Government that services required under this PWS are performed without interruption. Consequently, it is imperative that transition to full contract performance be accomplished in a well-planned, orderly, and efficient manner. The transition period shall begin 30 days prior to full contract performance as required by the solicitation/contract.

The purpose of this orientation is primarily to:

- Observe work accomplished by current contractor personnel.
- Obtain security clearances.
- Accomplish necessary training of contractor employees.
- Establish workstations.
- Transfer Government Furnished Property.

17.0 Transition Activities.

At the conclusion of any performance period, including option periods or extensions, the services provided under this PWS may be awarded to another contractor. The contractor in place shall be required to assist in the transition activities.

18.0 Data Rights

It is the Government's intent to retain unlimited rights to all software, documentation, and data first produced in performance of the purchase order.