

Announcement of Request for DoD HPC Modernization Program HPC Equipment Reutilization Proposals

Department of Defense (DoD) High Performance Computing Modernization Program (HPCMP)

I. INTRODUCTION

As a result of on-going modernization of high-performance computing (HPC) resources, the DoD HPCMP, (www.hpc.mil), has one HPC system planned for decommissioning (see Section III for availability details). The system is available for relocation to a site/organization that can continue to leverage the resources to the benefit of the DoD and/or the nation.

System Summary:

Thunder – SGI ICE X with 3,576 Intel Haswell compute nodes (125,888 cores) operating at 2.3 GHz, plus 178 dual Xeon Phi 7120P accelerated nodes (356 Phi units) and 178 dual Nvidia Tesla K40 GPU accelerated nodes (356 K40 units).

The purpose of this announcement and request for proposals is to inform interested organizations of the specific hardware configuration, and the process for submitting a proposal to be considered for an award to reutilize HPC systems. The HPCMP's policy is to transfer HPC systems to government organizations that demonstrate, through their proposals, the greatest ability to enhance their support of research, development, test, and evaluation in areas of interest to DoD through applications leveraging HPC. In many cases, receiving government organizations perform subsequent property transfers to academia or other contractors performing work for them. The HPCMP does not involve themselves in these subsequent government property transfer and accountability arrangements. This announcement includes:

1. General information including DoD areas of interest (Section II)
2. Specifications and the point-of-contact (POC) for the system being offered (Section III)
3. Proposal submission instructions and eligibility details (Section IV)
4. Proposal evaluation process (Section V)
5. Decision notification process (Section VI)

All proposals must be submitted no later than 5:00 pm EST on 5 June 2020, in accordance with the submission instructions in Section IV. Award announcements are expected to be made shortly thereafter. Please notify us if you have completed the proposal, but need additional time for functions such as organizational approvals. The HPCMP will need to know that it's coming and when.

If you have any questions about the proposal requirements, please contact Dr. Kevin Newmeyer at Kevin.P.Newmeyer.civ@mail.mil.

II. GENERAL INFORMATION

Proposing organizations' use of these HPC systems should be in support of research and development, test and evaluation (RDT&E), and acquisition engineering efforts in areas important to the national defense which are supported by the program offices, laboratories, centers, and educational institutions of the Army, Navy, Air Force, Marine Corps, and other DoD agencies.

There is no cost for the equipment or for transfer of title; however, the receiving organization will be responsible for packaging and transporting the equipment from its present location to the receiving organization, and any subsequent maintenance and operating costs. The system (Thunder) is located at the Air Force Research Laboratory DoD Supercomputing Resource Center (AFRL DSRC) in Dayton, OH. The system is approximately five years old, and has been under a maintenance contract while in operation. Because traditional hardware and software maintenance contracts can be costly on systems of this age, we recommend that non-traditional support models be explored; e.g., a time and materials service contract, and/or reserving a portion of the system for spare parts. Typically, software support contracts are required to keep systems operational.

Note that the system will require extensive computer facilities, cooling, and power (see Section III for details on each system). Also note that it is acceptable for an organization to request the entire system, but plan to install only a significant portion of the original system.

It is highly recommended that an assessment of the infrastructure, operations, and maintenance costs be performed BEFORE submitting a proposal. In the past, these realities sometimes surfaced after the awardees were selected, and further evaluations prolonged the final outcome of the equipment reutilization awards.

For the most part, it will be necessary to establish a software license/maintenance agreement with the original equipment manufacturer (OEM), SGI (now HPE), for continued use of, and/or support for, the software products. Interested organizations should coordinate with the system's POC provided in Section III of this document, as well as contact the OEM vendor for information on obtaining the necessary software licenses and support.

The DSRC for the system (AFRL DSRC) will verify that any hard drives included in the equipment have been overwritten and degaussed, in accordance with Assistant Secretary of Defense Memorandum of 4 June, 2001 entitled "Disposition of Unclassified DoD Computer Hard Drives." Universities and other non-DoD organizations that plan on submitting a proposal through their government representative should consult with the DSRC POC (see Section III) to confirm that the disks will be available for use by the intended party. In some cases DoD does not allow previously used storage media to be transferred to non-DoD parties.

III. AVAILABLE EQUIPMENT

There is one HPC system available.

Thunder: The 115,776 core SGI Altix CB3 HPC system is based on SGI blade technology, with a total 3,216 standard compute nodes. There are four additional large memory nodes with 144 cores, 178 Accelerator nodes with 4,984 host cores, and 178 GPGPU nodes with 4,984 host cores. Discounting the GPGPU performance, the system size in Peak Theoretical terms is 4680 TFlops using the 100% available 125,888 cores. Considering the Intel Xeon chip down-clocking for AVX2 extensions, the practical Peak Theoretical is closer to 3874 TFlops. It occupies 24 M-Racks, 12 cooling tower racks, 6 cooling distribution units, 20 storage racks, 16 Accelerator/GPGPU nodes, and 4 peripheral racks. This system is supported by a 12.4PB (usable) Lustre Parallel File System.

The Thunder System configuration takes advantage of the water-cooled enclosed containment M-Cell that utilizes the Grafton twin blade, which is actually two blades sandwiched together. Each of the blades contains two 18-core Xeon 2.3GHz Haswell-EP processors and 128GB of 2133MHz DDR4 DIMM memory (3.5GB/core). Taking advantage of Intel’s AVX technology, including down-clocking, each node has a peak theoretical rating of 1,094.4 GFlops. System latency is reduced by the advanced architecture of the SGI CB3 system with an Enhanced Hypercube FDR IB Fabric.

The compute HPC Cluster is comprised of 3,576 nodes, balanced with 76 Storage Controllers, connected through an undersubscribed FDR IB Fabric to the HPC Cluster. There are three file systems: /work1 with 36 Storage Controllers, /work2 with 36 Storage Controllers, and /home with 4 Storage Controllers. Each file system contains one Lustre MetaData Unit.

Two IS5600 Storage Controllers are paired with two Lustre OSS nodes in an active/active configuration. Each Lustre MetaData Unit has an IS5600 Storage Controller paired with two Lustre MDS nodes in an active/active configuration.

The graphic below provides node and system details:

Node Configuration					
	Login Nodes		Compute Nodes		
		Standard Memory	Large Memory	GPU Accelerated	Phi Accelerated
Total Cores Nodes	448 16	115,776 3,216	144 4	4,984 178	4,984 178
Operating System	SLES				
Cores/Node	28	36		28 + 2 GPU (2 x 2,880 GPU cores)	28 + 2 Phi (2 x 61 Phi cores)
Core Type	Intel E5-2699v3			Intel E5-2697v3 +NVIDIA Tesla K40M	Intel E5-2697v3 +Intel 7120P
Core Speed	2.3 GHz			2.6 GHz	
Memory/Node	128 GBytes		768 GBytes	128 GBytes +24 GBytes	128 GBytes +16 GBytes
Accessible Memory/Node	126 GBytes		766 GBytes	126 GBytes	126 GBytes +15 GBytes
Memory Model	Shared on node.		Shared on node. Distributed across cluster.		
Interconnect Type	4x FDR InfiniBand		4x FDR InfiniBand; Enhanced LX Hypercube		

The system is currently located at the AFRL DSRC at Wright-Patterson Air Force Base near Dayton OH. The system occupies 1400 square feet of space. Thunder consumes, on average, 1600 kW of power, and has a theoretical peak power of 2016 kW. At average loads, the system requires 450 tons of water cooling, and 0 tons of forced air (plenum) cooling. The file system racks have rear-door heat exchangers that allow for indirect water cooling. SGI ICE X compute racks are enclosed along with dedicated in-row cooling units for removing heat generated by fans, switches, and power supplies. Separate cooling distribution units provide chilled water directly to heat sinks under the blade processors. In general, Thunder operation is room-neutral in regards to its effect on ambient room temperature.

Please direct all software license and other questions to the POC noted below.

Projected Decommission Date: 8 March, 2020

Availability: 1 July 2020

The POC is:
Brian Schafer
AFRL DSRC
brian.schafer@us.af.mil

PROPOSALS

A. Eligibility

Proposals may be submitted by DoD organizations or federal government organizations that conduct or sponsor research and development, test and evaluation, or acquisition engineering efforts in support of DoD initiatives requiring the use of HPC equipment. Proposals from other organizations (such as civilian academic institutions which conduct research of interest to the DoD) cannot be submitted directly to the HPCMP office, but **must be submitted via an individual in a sponsoring DoD organization, with endorsement (see Section VI.C)**. If such a proposal is selected, **title/property will be transferred to the sponsoring DoD organization**, with the understanding that the equipment will be moved to the proposing organization's (e.g., university's) location. The sponsoring DoD organization is responsible for property transfer and/or property management with the third-party.

B. Submission Instructions

All proposals in response to this announcement must be submitted via email to: reutilization@hpc.mil no later than 5:00 pm, EDT on Friday, **June 5, 2020**. Award announcements are expected to be made shortly thereafter. The proposal must be submitted either by (1) a government employee at a DoD or federal government organization identified in the proposal as the individual responsible for the proposal, or (2) when an endorsement by a government organization is necessary, the government individual within the DoD organization that is sponsoring the proposal (see Section IV.D).

The proposal should be submitted in Microsoft Word or Adobe PDF format. When printed one-sided, on 8½ x 11 inch paper, it should be **NO LONGER THAN 5 PAGES, ALL INCLUSIVE**. The font shall be no smaller than 11 point. A cover page (see below) is not included in this five-page limit. Separate attachments are not encouraged.

Acknowledgement of receipt of proposal will be sent by the HPCMP via email within 48 hours of receipt of the proposal.

C. Content

The proposal should contain only non-sensitive, unclassified information that is neither business proprietary, nor procurement sensitive, nor subject to the Privacy Act of 1974.

The HPCMP is primarily interested in the RDT&E efforts performed in direct or indirect support of the DoD by the proposing organization for which the HPC equipment would be used. For this reason, the proposal must adequately describe the purpose and goals of those efforts so that a judgment can be made on how they are relevant to the national defense.

The proposal must include the following:

1. **Cover Page.** The cover page should contain the following information:
 - a. Proposal preparation date
 - b. Description of the system being requested
 - c. The date of this HPCMP announcement: (this date appears on the top right corner of the first page of this announcement)
 - d. HPCMP announcement title: (this title appears on the top of the first page of the announcement)
 - e. Title of the proposal: (a short descriptive title, no more than 60 characters)
 - f. Name and business mailing address of proposing organization
 - g. Name, organizational title, phone number, and email address of individual responsible for preparation of the proposal (i.e., contact information for the proposal POC)
 - h. Name, organizational title, phone number, and email address(es) of responsible individual(s) in the proposing organization to be notified concerning the status of the awards
 - i. If the proposing organization is required to submit an endorsement from its sponsoring DoD organization (for example, a university), include the name, DoD organization, contract number, phone number, and email address(es) of the DoD sponsor
2. **Proposal Body**
 - a. **Abstract.** Include a concise abstract that describes the research, development, test and/or evaluation, or acquisition engineering efforts that will be supported by the HPC equipment.
 - b. **Proposing Organization.** Include a brief description of the mission and organization of the recipient department/division/office/project within the proposing organization.
 - c. **Infrastructure.** Include a brief description of the physical facility, networking, and information technology (IT) support personnel that will support the installation and operation of the HPC equipment. For infrastructure that is in place at the time of proposal preparation, indicate how long it has been in use for this type of support. A budget breakdown is not requested, but the use of sponsoring organization funds, proposing organization funds, and/or funds to be contributed by non-DoD sources for the on-going operations shall be identified. Describe any special circumstances regarding the transfer or installation of the HPC system.
 - d. **Supporting Information.** Describe how the HPC equipment would:

- i. Enhance the ability of the proposing organization to support efforts employing HPC resources currently underway to support areas important to Service/Agency priorities and the national defense (indicate the benefiting DoD sponsor(s), describe the enhancement provided by the HPC equipment to current efforts, and describe its potential impact), and/or
- ii. Improve the ability of the proposing organization to support efforts employing HPC resources currently planned to support areas important to the Service/Agency priorities and national defense (indicate the prospective DoD sponsor(s), describe the improvement provided by the HPC equipment to planned efforts, and describe its potential impact), and/or
- iii. Enable the establishment of new capabilities, or the improvement of current capabilities, by the proposing organization that would support efforts employing HPC resources in areas important to Service/Agency priorities and the national defense (describe how the HPC equipment would enable the establishment or improvement of these capabilities, and describe their potential impact).

Include a concise description of relevant previous experience by the primary Principal Investigator(s), Project Leader(s), or other key personnel that are intended user(s) of the HPC equipment. This will be counted as part of the five-page limit.

3. Endorsement

If a proposing organization is not a DoD organization (for example, a university) and, therefore, cannot directly submit a proposal to the HPCMP, the DoD representative who is responsible for oversight of the contract, cooperative research agreement, or other formal agreement under which the proposing organization conducts RDT&E or acquisition engineering efforts on behalf of the DoD must include an endorsement of the proposal with the submission of the proposal to the HPCMP. This endorsement must include the name, organizational title, official mailing address, email address, and phone number of the sponsoring individual. The contract number of the DoD contract or grant must also be included. The endorsement letter(s) is not included in the five-page proposal limit.

This endorsement should indicate the oversight responsibilities of the sponsoring individual in relation to the proposing organization, and briefly state why the proposed efforts are important to the national defense, and why it is expected that the proposing organization will be successful in using the HPC equipment as proposed. Acknowledgment of property management/transfer responsibilities is also required.

IV. PROPOSAL EVALUATION AND SELECTION

The primary evaluation criteria is:

1. The impact of the transfer of the HPC equipment on achieving the highest Service /Agency priorities:
 - a. RDT&E or acquisition engineering efforts currently underway that are relevant to Service/Agency priority needs, and/or
 - b. RDT&E or acquisition engineering efforts currently planned that are relevant to Service/Agency priority needs, and/or

- c. The establishment of new capabilities, or the enhancement of current capabilities, that would support RDT&E or acquisition engineering efforts that are relevant to Service/Agency priority needs.

Other evaluation criteria, which are of lesser importance than the primary criteria, but of equal importance to each other, are:

2. The relevance and potential contribution to the national defense, and the scientific and technical merits of the efforts that would be supported by the HPC equipment.
3. The past-performance and experience of the proposing organization in performing the RDT&E or acquisition engineering efforts described in the proposal.
4. The experience of the Principal Investigator(s), Project Leader(s), and other key personnel described in the proposal in performing the RDT&E or acquisition engineering efforts described in the proposal.
5. The experience of the IT personnel described in the proposal in operating and supporting HPC equipment.

The order of prioritization of the proposing organizations is:

1. Dedicated HPC Project Investment (DHPI); a program where the HPCMP provides HPC systems to address DoD RDT&E and acquisition engineering requirements. Each year, the HPCMP funds a number of HPC projects that are defined as a two- to three-year mission-critical project that cannot be performed at a DoD HPCMP Supercomputing Resource Center (DSRC) due to special operational requirements (e.g., project classification above SECRET, real-time response, hardware-in-the-loop, embedded implementations, and/or emerging technologies). Where feasible and applicable, the first priority of awarding the reutilized systems detailed in this Announcement will be to fulfill a DHPI request(s).
2. DoD Service Academy or other DoD institution of higher learning
3. DoD laboratory or research facility
4. Non-DoD organization with DoD sponsorship
5. Non-DoD federal government organizations

Proposals will undergo a multi-stage evaluation and selection procedure. First, selected HPCMP personnel will review the proposals received. Second, the HPCMP Chief of Staff will prioritize the proposals, based on the evaluation criteria shown above and the comments received from reviewers. Third, the HPCMP Director and Deputy Director will consider the prioritized proposals and make a selection.

Note that in the event that no proposals are received for the system included in this Announcement, or none of the proposals received for the specific system are selected, the DSRC where the equipment is presently located will excess the HPC equipment in accordance with their Service/Agency property management procedures.

V. NOTIFICATIONS.

Within 7 days of proposal selections, the HPCMP Chief of Staff will notify, via email, all individuals identified on the proposal cover page (and the sponsoring individual, for a proposal submitted via a

sponsor), and the Director of the DSRC where the equipment is located. Within 7 days after notification, the receiving organization will contact the DSRC's Logistical POC to initiate the communications and planning necessary to transfer the HPC equipment. The receiving organization (or the sponsoring organization, for a proposal submitted via a sponsor) is responsible for accomplishing a prompt transfer of the title of the HPC equipment in the appropriate government property accounting system(s).

All organizations submitting proposals that were not selected will be notified via email of non-selection within 7 days of proposal awards.