

## 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](http://www.hpc.mil)), has three HPC systems planned for decommissioning (see Section III for availability details). The systems are 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:

1. *Gordon* – Cray XC40 with 50,976 Intel Xeon E5-2698v3 compute cores operating at 2.3GHz
2. *Bean* – Cray XC40 with 6,752 Intel Xeon E5-2698v3 compute cores operating at 2.3GHz
3. *Copper* – Cray XE6m system with 460 AMD Interlagos Opteron compute nodes (14,720 compute cores) operating at 2.3 GHz.

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 itself 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 EDT on Wednesday, **30 September 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](mailto:Kevin.P.Newmeyer.civ@mail.mil).

#### II. GENERAL INFORMATION

Proposing organizations' use of these HPC systems should be in support of research, 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. Systems #1 and #2 are located at the Navy DoD Supercomputing Resource Center (Navy DSRC) at Stennis Space Center in Stennis, MS. The systems are approximately five years old, and have been under a maintenance contract while in operation. System #3 is located at the Engineer Research and Development Center DoD Supercomputing Resource Center (ERDC DSRC) in Vicksburg, MS. The system is approximately eight 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 systems 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), HPE Cray, 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 respective DSRC for each system 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 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 are three HPC systems available.

**System 1:** A Cray XC40 (Gordon) consisting of 50,976 total Intel Xeon cores. The system has a computational processing capability of 2,011 TeraFLOPS, with 205 TB of total memory, and approximately 3 PB of attached (formatted) disks. There are 16 cores per socket, 2 sockets per node, and 1,699 compute nodes in the system, including 1,523 standard compute nodes, 8 large memory nodes (256 GB per node), 152 Intel Xeon Phi accelerator nodes, and 16 NVIDIA Tesla K40 GPU accelerator nodes. The cores for 6 login nodes, each with dual processors and 192 GB of memory, are not included in the total core count.

The vast majority of the system (1,523 nodes) is based on the Intel Xeon E5-2698v3 (16-core) Haswell processor chip, and operates at 2.3 GHz. The Xeon Phi accelerator nodes (152) are based on a single Intel Xeon E5-2696v2 (12-core) Ivy Bridge processor, which operates at 2.5 GHz, and provide access to a single Intel Xeon Phi 5120D accelerator. The NVIDIA Tesla K40 accelerator nodes (16) are based on a single Intel Xeon E5-2670v2 (10-core) Ivy Bridge processor, which operates at 2.5 GHz, and provide access to a single NVIDIA Tesla K40 GPU.

The system uses the Lustre file system and a Cray Ares (Dragonfly topology) interconnect.

The system is currently located at the Navy DSRC at Stennis Space Center in Stennis, MS. The system requires approximately 720 square feet of space; consumes, on average, approximately 450 kW, with a max theoretical power draw of approximately 1,000 kW, and a LINPACK max of 750 kW. At average load, the system requires approximately 130 tons of cooling, and would require approximately 215 tons of cooling at max LINPACK load. The compute frames must be water-cooled. The non-compute (storage/peripheral server) frames have rear door heat exchangers that allow for indirect water cooling, but water cooling is not required.

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

Decommission Date: September 30, 2020

Availability: November 1, 2020

The POC is:

Bryan Comstock

Chief Technologist, Navy DSRC

bryan.comstock@navy.mil

**System 2:** A Cray XC40 (Bean) consisting of 6,752 total Intel Xeon cores. The system has a computational processing capability of 268 TeraFLOPS, with 28 TB of total memory, and approximately .6 PB of attached (formatted) disks. There are 16 cores per socket, 2 sockets per node, and 226 compute nodes in the system, including 4 large memory nodes (256 GB per node) and 24 Intel Xeon Phi accelerator nodes. The cores for 4 login nodes, each with dual processors and 192 GB of memory, are not included in the total core count.

The vast majority of the system (198 Nodes) is based on the Intel Xeon E5-2698v3 (16-core) Haswell processor chip, and operates at 2.3 GHz. The Xeon Phi accelerator nodes (24) are based on a single Intel Xeon E5-2696v2 (12-core) Haswell processor, which operates at 2.4 GHz, and provide access to a single Intel Xeon Phi 5120D accelerator.

The system uses the Lustre file system and a Cray Ares (Dragonfly topology) interconnect.

The system is currently located at the Navy DSRC at Stennis Space Center in Stennis, MS. The system requires approximately 325 square feet of space; consumes, on average, approximately 100 kW, with a max theoretical power draw of approximately 210 kW, and a LINPACK max of 160 kW. At average load, the system requires approximately 68 tons of cooling and would require approximately 45 tons of cooling at max LINPACK load. The compute frames must be water-cooled. The non-compute frames have rear door heat exchangers that allow for indirect water cooling, but water cooling is not required.

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

Decommission Date: September 30, 2020

Availability: November 1, 2020

The POC is:

Bryan Comstock

Chief Technologist, Navy DSRC

bryan.comstock@navy.mil

**System 3:** Copper is located in Vicksburg, MS, at the USACE Engineer Research and Development Center. Copper is a Cray XE6 commissioned into production service more than eight years ago. It has been a very stable system over its lifetime, and when compared to other large Cray XE6 systems, needed few equipment repairs to computational nodes or for system service functions.

Copper has the following system configuration attributes:

- 460 compute nodes, 14,270 AMD Interlagos Opteron CPUs, 32 cores per node, running at 2.3 GHz
- 64 GB local memory per node, with approximately 60 GB usable for application execution
- Cray Gemini high speed network interconnects compute and service nodes at 20 GB/sec, bidirectional
- Login and compute nodes provide a modified Linux operating environment, the Cray Linux Environment (CLE), modeled after SLES 11
- Two login nodes, 32 cores per node, running at 2.7 GHz per node, with 128 GB local memory and 10 Gbit Ethernet interfaces for remote access
- Two Lustre file systems with storage volumes of 15 TB and 224 TB

Local memory per node is shared between the 32 available cores. Copper uses a distributed memory architecture, with access to memory resources on remote nodes via protocols such as the Message-Passing Interface (MPI). Nodes communicate with each other to share data using Cray-provided drivers to the Gemini interface to the high-speed network. The network architecture is a Cray 3D Torus, well-documented in the literature.

Copper has used Altair's PBSPro job scheduling software during its production lifetime, but PBSPro is licensed to the High Performance Computing Modernization Program, and may not be available as included software with the system. Cray has also supported MOAB and Platform LSF for job management on the XE6 platform.

Copper is housed in ten cabinets, requiring 172 square feet of floor space. It is cooled using chilled air drawn from below a raised floor, exhausting the heated air through the top of each cabinet at 3,000 cubic feet per minute. Copper uses approximately 50 kW per cabinet, 500 kW for the system. Electrical power is supplied to Copper from a distribution of a three-phase wye, 100 amps at 480/277V per cabinet. Each cabinet weighs 1600 lbs.

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

Projected Decommission Date: 31 July 2020

Availability: 30 September 2020

The POC is:

Blake Rice

ERDC DSRC

blake.b.rice@usace.army.mil

#### IV. 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 Paragraph IV.C.3 below)**. 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](mailto:reutilization@hpc.mil) no later than 5:00 pm, EDT on Wednesday, **30 September 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(s) 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(s).
  - 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 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 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 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.

## **V. PROPOSAL EVALUATION AND SELECTION**

The primary evaluation criteria, of equal importance, are:

1. The impact of the transfer of the HPC equipment on:
  - a. RDT&E or acquisition engineering efforts currently underway that are relevant to the national defense, and/or
  - b. RDT&E or acquisition engineering efforts currently planned that are relevant to the national defense, 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 the national defense.

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.

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

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 organization

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 a system included in this Announcement, or none of the proposals received for a 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.

## **VI. 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.