

# **Proposal Evaluation and Proposal Preparation Instructions**

**OLCF-6 RFP WS963667983, Attachment E**

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**Proposal Evaluation and Proposal Preparation Instructions**  
**Version Change Control Table**

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## A. PROPOSAL FORMAT

Offerors must submit ONE electronic copy of their entire proposal to the UT-Battelle Procurement Officer as indicated in the OLCF-6 RFP Cover Letter. Printed proposals are not required. Submission of a proposal by electronic media will be considered to be a certification that the media is virus free. All proposals should be prepared using an 8-1/2 by 11 in. paper format and a minimum font size of 11 points. "Page limit" is defined as consecutively numbered pages. Page limits for each proposal volume are stated in Table 1. Electronic copies of the complete proposal must be in Microsoft Office 2007 or later (Word, Excel, PowerPoint, Project). They may be set to read-only.

The Offeror's proposal must have a cover letter that identifies the offeror's name and address, solicitation number and title, the name(s), title(s), email address(es), and telephone number(s) of the individuals in offeror's organization who have commitment authority on behalf of the offeror and will be responsible for contractual negotiations and administration of any resultant subcontracts.

If the Offeror's proposal contains export-controlled information, the electronic title of the document shall include "export controlled" and the document shall be marked accordingly. In addition, the Offeror shall identify what the export control levels or classifications of the information being provided. Offeror shall encrypt any export-controlled files prior to transmission to Company.

The rest of the Offeror's proposal submission should be structured in accordance with Table 1.

- Proposal volumes should NOT be consolidated; each volume should be a separate file. Electronic folders should include the Offeror's company name.
- Electronic file titles should identify the Offeror's company name, corresponding volume number, and description.
  - E.g., ACME Volume 1 OLCF-6 Build Technical Proposal.docx  
ACME Volume 2 Business Proposal.docx
- Electronic files up to 25MB can be received via UT-Battelle's email system. Files may be zipped and compressed.
  - If the compressed files are larger than 25 MB, please contact the OLCF-6 procurement officer for alternate options to transfer the file(s).

**Table 1: OLCF-6 Proposal Format**

<b>VOLUME—SECTION NUMBER</b>
<p><b>Volume 1 OLCF-6 Build Technical Proposal (200-page limit total)</b></p> <p>Section 1. Introduction  Section 2. High Level System Requirements  Section 3. Benchmarks  Section 4. I/O Subsystem  Section 5. High Performance Interconnect  Section 6. System Management  Section 7. User Environment  Section 8. Tools  Section 9. Security  Section 10. Facilities  Section 11. Project Management  Section 12. Non-Recurring Engineering (NRE)  Section 13. Maintenance and Support</p>
<p><b>Volume 2 Supplier Attributes (40-page limit total)</b></p>
<p><b>Volume 3 OLCF-6 Non-Recurring Engineering (NRE) Technical Proposal (50-page limit total)</b></p> <p>Section 1. Overview  Section 2. Specific NRE Activities and Objectives  Section 3. Impacts of NRE on OLCF-6 System  Section 4. Project Management  Section 5. Subcontracting  Section 6. Other Research &amp; Development</p>
<p><b>Volume 4 OLCF-6 Build and NRE Price Proposal (no page limit)</b></p> <p>Section 1. NRE Fixed-Price  Section 2. Build – OLCF-6 System Fixed-Prices  Section 3. Build – Technical Option Fixed-Prices  Section 4. Lower-Tier Subcontractor Prices  Section 5. Milestone Payment Schedule</p>
<p><b>Volume 5 Other Documents (no page limit)</b></p> <p>Section 1. Royalty Information  Section 2. Small Business Subcontracting Plans for the Proposed NRE  Section 3. Software Branding and Licenses, If Applicable  Section 4. System Warranty Information  Section 5. Representations and Certifications  Section 6. EEO Pre-Award Clearance Request Form  Section 7. Safety-Related Requirements</p>
<p><b>Volume 6 Offeror Financial Information (no page limit)</b></p>
<p><b>Volume 7 Performance of the System (no page limit)</b></p> <p>Section 1. Benchmarks, Makefiles, Scripts, and Output Results  Section 2. OLCF-6 Benchmark Results Spreadsheet  Section 3. Scaling benchmark results to OLCF-6 Report  Section 4. OLCF-6 Summary Matrices Spreadsheet</p>

## **B. OLCF-6 BUILD TECHNICAL PROPOSAL (VOLUME 1)**

### **B.1 Guidance for Offerors**

The Company has structured the requirements in the OLCF-6 Technical Requirements Document (TRD) with the objective of allowing Offerors to propose a wide range of solutions, including an on-premises system or an off-premises system. Specific guidance for preparing responses to each of these scenarios is given below.

Offerors are encouraged to provide at least two proposals, each one with a different processor partner. The primary proposal should be complete as described in this document, and the second proposal needs to highlight differences for the second processor partner's processor(s), node design, system specifications. Any requirements that are the same as the primary proposal can simply state that (e.g., "See other proposal"). The Offeror should provide separate price proposals for each proposal.

All Offerors must respond to the Mandatory Requirements in the TRD Section 2 (2.1.1.1 System Description and 2.1.2.1 High-Level Software Model) and the Mandatory Options in Section 4 (4.1.1 Parallel File System and 4.2.1 AI-Optimized Storage) at a minimum to be considered responsive. All other requirements are graded TR-1/2/3 to indicate the importance to the Company. Offerors should respond to as many requirements and options as are applicable to the proposal and are practicable but should not feel obligated to respond to all.

In Section 13 of the TRD, the Company requires maintenance for the first five years post-acceptance with options for maintenance in years 6 and 7. If offeror is bidding a service for which maintenance is included in the service price, describe the maintenance as requested in the requirements and indicate in the separate Price Proposal that the cost is included. For extended maintenance in years 6 and 7, describe the maintenance in this document and indicate in the Price Proposal what the service price would be in those years.

#### **B.1.a Guidance for On-Premises Proposals**

ORNL has two data center location options of similar size and power delivery capability (30-40 MW). The requirements of the TRD Section 10: Facilities are common to both locations. TRD Appendix C: Facility Integration provides additional information about the locations.

For on-premises infrastructure-as-a-service (IAAS) proposals, indicate as part of the High-Level Software Model response the level of service that you are proposing and how you will provide software (e.g., base operating system, programming environment, workload manager, storage) to the Company to deploy on the system.

#### **B.1.b Guidance for Off-Premises Proposals**

The Company intends for the language in these Technical Requirements to be inclusive of off-premises system proposals. If proposing an off-premises solution, the requirements of the TRD Section 10: Facilities do not apply and require no response.

The Company expects as much detail in the System Description regarding processors, nodes, interconnect, and storage as would be provided in an On-Premises proposal. As part of the High-Level Software Model response, indicate the level of service that you are proposing and how you will provide

software (e.g., base operating system, programming environment, workload manager, storage) to the Company to deploy on the system.

Any proposals for data centers deployed outside of ORNL’s Designated Data Centers will require the Company to pay 9.75% sales tax on top of the system service price. This additional cost will be included in Total Cost of Ownership estimates during proposal evaluation.

## B.2 Preparing the Technical Proposal

The Offeror will modify the TRD to become the **Volume 1 OLCF-6 Build Technical Proposal (Tech Proposal)**. In the Tech Proposal, the Offeror will describe the proposed OLCF-6 compute and storage system(s). This should be written in the form of an integrated narrative **and should include a point-by-point response to the requirements contained in the TRD with the same numbering scheme**. If selected, the Offeror’s Tech Proposal will form the basis of the Statement of Work (SOW).

The response text must be formatted using an 11-point or larger font. The requirement text must be included but may be formatted with a smaller font (but no smaller than 6 point). The requirement text may be optionally shaded to distinguish it from the response. See example in Table 2 below.

**Table 2: Example of a requirement and a response. The requirement is formatted in 6-point and the response is formatted in 11-point. The requirement may be shaded to help distinguish it from the response although it is not required.**

### 2.1.1.4 High Bandwidth Memory Capacity

<small>The Offeror will describe the aggregate HBM capacity within the system. It is highly desirable to have more HBM capacity than Frontier has (i.e., greater than 4.6 PiB of HBM2e). Priority: TR-3</small>
The proposed ACME system will provide 8.0 PiB of HBM.

**The Offeror should not incorporate any responses in Section 1 - Introduction.** The Offeror may omit the Section 1 content from the Tech Proposal (i.e., to free up pages if needed), but the **Offeror must retain the Section 1 header to preserve the document’s numbering**. Each section should start on a new page. The Company will provide a template TRD formatted appropriately for the Offeror’s use.

Each (mandatory or target) requirement response should include a detailed discussion of **how** the requirement will be met (or exceeded), as well as a discussion of any Offeror-identified additional performance features included in the technical solution. See Section B.3 below for a description of requirement types.

**Note, if a numbered item does not have a requirement level (i.e., MR, MO, TR-, TO), it does not require a response.** For example, *2.1.1.2 System Performance* is a forward reference to the Benchmarking section. Another example is *4.2 AI-Optimized Storage* explains the targeted workload and does not need a response.

**The Company will assess the technical appropriateness or viability of the proposed response to each requirement. The Offeror should not respond simply with “Offeror understands and accepts this requirement” or “Offeror Complies” type of content-free response.** Responses should be direct, explicit, concise, self-contained, and understandable by technically sophisticated reviewers. Broad discussions and marketing hype should be avoided.

For any technical option (TO) or target requirement (TR-1, TR-2, or TR-3) that will not be offered or met, the Offeror should include an explicit statement to that effect. See Table 3 for an example.



**Table 3: Example of a requirement that will not be provided.**

**2.2.1.5 Mid-Life Upgrades**

The Offeror should describe and separately price any options for upgrading the proposed OLCF-6 system over its five-year lifetime. Priority: TO
The proposed ACME system will not provide mid-life upgrades.

**B.3 DESCRIPTION OF REQUIREMENT CATEGORIES**

Mandatory Requirements (MRs) and Mandatory Options (MOs) in the OLCF-6 Build TRD are essential requirements, and an Offeror must satisfactorily propose all MRs and MOs to have its proposal considered responsive.

Technical Options (designated TO) in the TRD are features, components, performance characteristics, or upgrades that are important to the Company but that will not result in a nonresponsive determination if omitted from a proposal. Technical Options add value to a proposal. TO responses will be considered as part of the proposal evaluation process; however, the Company may or may not elect to include TOs in the resulting subcontract(s). Each proposed TO should appear as a separately identifiable item in the OLCF-6 Build Technical Proposal (Volume 1) and OLCF-6 Build and NRE Price Proposal (Volume 5). TOs may also affect the Company’ perspective of the ideal OLCF-6 system(s), depending on future budget considerations.

Target Requirements (designated TR-1, TR-2, or TR-3), identified throughout the TRD, are features, components, performance characteristics, or other properties that are important to the Company but that will not result in a nonresponsive determination if omitted from a proposal. Target Requirements add value to a proposal and are prioritized by dash number. TR-1 is most desirable to the Company, while TR-2 is more desirable than TR-3. MRs, MOs, TOs, TRs, and additional features proposed by the selected Offeror(s), and of value to the Company, will be included in a final negotiated SOW(s) and incorporated within the resulting subcontract(s).

It should be noted that verb forms such as “will,” “will provide,” or “will include,” are used generally throughout the TRD to list describe desired outcomes and not mandatory requirements.

**B.4 – Tech Proposal SECTION 2: HIGH-LEVEL SYSTEM REQUIREMENTS**

The Offeror’s OLCF-6 Build Technical Proposal response (Volume 1, Section 2) should contain a complete summary of the proposed hardware and software systems sufficient to allow the Company to assess the value of the proposed system. This section should provide an overview of what will be delivered including major functional and performance capabilities. Details on what information should be included for each of these items are listed in the following subsections.

**B.4.a 2.1 System Architecture Requirements**

This section is for the compute system only (storage is covered in TRD Section 4) and is divided into Hardware (2.1.1) and Software (2.1.2) sub-sections. Each sub-section has one Mandatory Requirement (MR) (2.1.1.1 System Description and 2.1.2.1 High Level Software Model) in addition to several Target Requirements. The Mandatory Requirements are to describe the system. Failure to respond to the two mandatory requirements will prevent the Company from assessing the proposal and it will be disqualified. The two MRs should span as many pages as needed.

The system description should include information on all rack types (e.g., compute, storage, management, CDUs) including dimensions, total weight, weight per square foot, power (wall plate, estimated peak, estimated nominal, and idle), and examples of how to arrange rows of racks.

#### **B.4.b 2.2 Requested Options**

The Company requests various options in Section 2.2 to assist the Company to adjust the system size, the mixture of resources, access to early hardware, test systems, etc. The options should be clearly described in this section while the pricing should only be included in the Price Proposal.

##### **B.4.b.i 2.2.1 Hardware and 2.2.2 Software Options**

Section 2.2.1 Hardware Options requests various options to scale the system resources. Section 2.2.2 Software Options requests Linaro Forge and support for the scheduler. While this RFP does not delineate TO levels, items 2.2.1.1 through 2.2.1.4, 2.2.1.6, 2.2.2.1, and 2.2.2.2 are necessary to provide the Company with the ability to adjust the system to meet budget goals. Items 2.2.1.7 through 2.2.1.12 provide additional capabilities that enhance the overall value of the proposal.

Regarding *2.2.1.5 Mid-Life Upgrades*, the Company does not expect to have additional budget available to perform a mid-life upgrade. This option is intended to allow an Offeror to propose a no-cost upgrade in capabilities during the life of the system.

The Offeror should provide details on options for scaling the total size of the system. These details should discuss whether scaling the system requires changes to the system other than the number of compute nodes. The details should also include any limitations on the scaling, such as, only certain multiples of compute nodes or any upper or lower limit on the number of compute nodes. Overall, the Offeror should provide sufficient details such that the Company can assess the performance and, combined with related information in the OLCF-6 Price Schedule spreadsheet, cost implications of the scaling choices.

##### **B.4.b.ii 2.2.3 Early Access Technology**

To allow development of software before the final hardware and software are available, the Company requests options to deploy previous generation hardware and software. The Offeror's response should describe the hardware and software options and whether the hardware will be deployed at the Company's facilities or elsewhere. The description in the response should provide the capability to scale the system (e.g., additional racks) and the Price Proposal should include the proposed system price and prices for any scaling options.

##### **B.4.b.iii 2.2.4 Test and Development Systems**

Test and Development Systems (TDS) should have the same hardware and software configuration as the final OLCF-6 system. TDS systems allow the Company to perform software development isolated from the production OLCF-6 system as well as test the latest drops of software and firmware before deploying to the production system. The description in the response should provide the capability to scale the system (e.g., additional racks) and the Price Proposal should include the proposed system price and prices for any scaling options.

#### **B.5 – Tech Proposal SECTION 3: BENCHMARKS**

The Offeror's OLCF-6 Build Technical Proposal (Volume 1, Section 3) should contain completed performance summary tables in 3.5.1 and 3.5.2. The *3.5.1 Application Benchmark Table* should include

columns with the *Ported* and *Optimized* results. The rest of the content can be omitted from Section 3. Detailed benchmarking results will be reported (without page limits) in Volume 7. See Section H below for proposal preparation instructions on what should be reported in Volume 7 of the Offeror's proposal.

#### **B.6 – Tech Proposal SECTION 4: INPUT/OUTPUT SUBSYSTEM**

For OLCF-6, the Company is looking to satisfy two different workloads: traditional, bulk-synchronous, write-optimized, modeling/simulation workloads and newer, random-read-optimized AI workloads. In the Tech Proposal, Section 4 is broken into two sub-sections: 4.1 Parallel File System (PFS) and 4.2 AI-Optimized Storage (AOS). Each sub-section has one Mandatory Option (MO) (4.1.1 Parallel File System and 4.2.1 AI-Optimized Storage) in addition to several Target Requirements. The Mandatory Options are to describe the two storage sub-systems. Failure to respond to the two mandatory options will prevent the Company from assessing the proposal and it will be disqualified. The two MOs should span as many pages as needed.

The PFS is the primary file system for all users and jobs and will provide most of the storage (e.g., 90x the total system HBM memory). The AOS is meant to be a per-job read-cache (i.e., the data set is copied from PFS to the AOS at the job start and then deleted at the end of the job). The Company is targeting a much smaller capacity (e.g., 2x the total system HBM memory). If the Offeror feels that a single solution can satisfy both use cases, then note that in the response. Alternately, if the Offeror has multiple technology options available and is not sure which is best, the Offeror may propose multiple options for the PFS, AOS, or both. **The Offeror should complete the PFS and/or AOS section for each proposed option.** In this case if the Offeror's proposal is selected, the Offeror will work with the Company to assess the technology options to make a late-binding decision at the Technology Decision Point.<sup>1</sup>

The Offeror should provide details on options for scaling the total size of each proposed storage sub-system. These options should allow scaling of a Scalable Storage Unit (SSU) as well as to scale metadata and data separately, to scale capacity and bandwidth separately. Overall, the Offeror should provide sufficient details such that the Company can assess the performance and, combined with related information in the OLCF-6 Price Schedule spreadsheet, cost implications of the scaling choices.

Within the proposal, the Offeror should indicate which interconnect technologies are currently supported and are planned to be supported in this timeframe. The proposal's hardware and software description in 4.1.1 and 4.2.1 should include what software needs to be installed on clients (i.e., compute nodes). The proposal should indicate which Enterprise Linux distributions are supported.

The Offeror's proposal should define a solution compatible with the requirements in Section 10: Facilities.

#### **B.7 – Tech Proposal SECTION 5: HIGH PERFORMANCE INTERCONNECT**

DOE Office of Science computing facilities have different missions. As part of the Leadership Computing Facility, OLCF-6 needs to serve applications running on the full system. Section 5 should provide a complete description of the proposed system interconnect including topology, high-level routing description, per-node and total injection bandwidth, total global and/or bisection bandwidth, projected all-to-all bandwidth for the full system and more. This section also includes the software necessary to access and manage the interconnect.

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<sup>1</sup> The Technology Decision Point is described in the Technical Requirements document, section 11.4.

### **B.8 – Tech Proposal SECTION 10: FACILITIES REQUIREMENTS**

The Offeror’s OLCF-6 Build Technical Proposal (Volume 1, Section 10) should contain a detailed point-by-point response to requirements. Include detailed information about projected power loads that will be present based on the proposed systems, not projected “fully configured” estimates. Give the basis for the estimates. In other words, are these theoretical estimates or are they based on component or full rack measurements? If estimates are provided, indicate how and when these estimates will be improved over time.

The Offeror should provide a suggested floor plan including all subsystems (e.g., compute, management, storage, and networking). The floor plan will include a diagram of asset placement, floor-loading information, under-floor clearance requirements (if appropriate), and placement and type of required electrical outlets. Provide weight estimates and quantity for each type of rack in the system.

The estimated total amount of power in kilowatts (kW) required should be provided, including any subsystems (e.g., I/O cabinets, disks, cabling, and external networking), and the power required for each rack type and the number of those racks in the system. The plan should also include the estimated total amount of cooling in British Thermal Units (BTU) or Tons AC required for each of the systems proposed and the cooling required for each rack type and the number of those racks in the system. List any other facilities requirements.

### **B.9 – Tech Proposal SECTION 13: MAINTENANCE AND SUPPORT**

This section should describe in detail the proposed hardware and software maintenance strategies throughout the life of the OLCF-6 Build subcontract. Include the level of service the Offeror intends to provide at various points during the OLCF-6 Build subcontract period (i.e., system build, system installation, acceptance testing, capability period, and general availability period). Specific roles and responsibilities for the Company, Offeror, and lower-tier subcontractor personnel should be delineated. Identify the number of full-time maintenance personnel dedicated to servicing the systems as well as their level of experience on the equipment and software being provided, their training, and other relevant qualifications. Include problem escalation procedures and the process for generating, tracking, and closing trouble tickets. Identify the job category level of the analysts to be provided as well as the company’s job description of that job category. The Company will provide office space for on-site support personnel and storage space for spare parts. Specific elements of the spare parts cache should be itemized. A failed hardware return mechanism and parts cache refresh policy should be discussed. Software maintenance procedures should be delineated.

## **C. SUPPLIER ATTRIBUTES (VOLUME 2)**

Provide the following background information on active or completed contracts during the past four (4) years that the Offeror considers the most comparable to the complexity of this RFP in terms of providing high-end computing systems and working with high-end customers and partners to advance the high-end computing state of the art: contract number; contract type; contract value; contract effective date and term; place of performance; client contacts (include the name and phone number of contractual contact and the name and phone number of technical contact); and similarities to OLCF-6 requirements. The Offeror is encouraged to include a self-assessment of its performance on these projects, including what went well and, more importantly, what did not. Every computer-related project has significant problems to resolve, so a credible response will not say “everything went fine.” The Company is very interested in how the Offeror’s organization overcame difficulty and ultimately became successful in the face of adversity, not that they avoided obstacles in the first place. The Offeror may discuss these challenges in the context of a lessons learned scenario.

Discuss the manufacturing and testing facilities of the Offeror’s company. Discuss the expertise and skill level of the Offeror’s key personnel who will work on this project as described in Section 11 of the TRD. Key personnel submittals must utilize the resume format in Appendix A.

The Offeror’s financial information is considered a Supplier Attribute. However, the Offeror should submit financial information in Volume 6, Offeror Financial Information.

If a proposal is submitted by a consortium led by an integrating subcontractor (as opposed to the primary original equipment manufacturer), refer to **I.2.c.iii** Supplier Attributes for consortium-related information.

The Offeror should provide information on the history of its company with, and the capabilities to engage in, an open-source development partnership and meeting the goals set out in the TRD. This information should include the willingness of the Offeror to participate in the open-source development, with other partners, of key missing technology components.

The Offeror should describe any use of subcontracting or third parties for major software, hardware components, or services and associated areas of risk and risk mitigation. The Offeror must specifically identify all key lower-tier subcontractors, partners, third parties, etc., by name and not by an ambiguous TBD-type references. If working with open-source software communities includes subcontracts for deliverables, these should be described. The Offeror should also include a description of how the Offeror’s organization intends to integrate the subcontractor’s product or services to achieve OLCF-6 goals. The Offeror should describe any previous experience with the proposed third-party subcontractors and the experience that the proposed third-party subcontractors had on projects for similar equipment or services as being provided under the anticipated OLCF-6 Build subcontract. The Offeror must include proof of demonstrated experience and past performance for all proposed subcontractors and a commitment from integrated subcontractors to participate in the work.

## **D. NRE TECHNICAL PROPOSAL (VOLUME 3)**

The Offeror will submit Non-Recurring Engineering (NRE) Technical Proposal in support of the OLCF-6 effort. At the minimum, the NRE Technical Proposal for the compute system will include a Center of Excellence (COE). The Offeror's OLCF-6 NRE Technical Proposal may also indicate the areas, if any, where the Offeror's OLCF-6 Build Technical Proposal depends on the proposed OLCF-6 NRE activities. Lastly, the NRE Technical Proposal may include work packages that enhance the overall system value beyond that of the base, proposed system.

### **D.1 – SECTION 1. OVERVIEW**

This section should provide the high-level context for the NRE (also known as Research and Development) proposed in the subsequent sections. The Offeror should identify the gaps between the Offeror's Plan of Record (POR) roadmap and those prerequisites to meet or exceed OLCF-6 target requirements. For the purposes of this NRE proposal, these gaps should be beyond the scope of, or accelerations of, the Offeror's existing product roadmap and NRE incorporated in the build/delivery activities of the OLCF-6 Build subcontract. However, the Offeror should assume in the OLCF-6 Build proposal that this NRE proposal is also selected and write an integrated OLCF-6 Build response that includes end results of both efforts funded under separate subcontracts (one OLCF-6 Build and one OLCF-6 NRE). In other words, the Offeror should assume the results of all proposed NRE activities in the Build proposal and should clearly identify the impact of not funding each proposed NRE activity. The Offeror should identify the specific details of the NRE activities that must be funded to ensure that this NRE proposal is successful. If one NRE activity depends on another NRE activity, the Offeror must state these dependencies. The Offeror should also make clear how this NRE proposal reduces the schedule or performance risk associated with the proposed OLCF-6 configuration, timescale, and budget; e.g., reduces performance or schedule risks. As such, this proposal should integrate into the Offeror's overall OLCF-6 Build risk plan in the response to the TRD Section 11.

### **D.2 – SECTION 2. SPECIFIC NRE OBJECTIVES AND ACTIVITIES**

This section should list the specific proposed NRE objectives and activities in support of the OLCF-6 design, productization, test, and scaling. NRE milestones should be identified, and a milestone schedule defined that allows for a phased delivery. Milestones should be of sufficient granularity to facilitate down selecting among proposed activities in case annual appropriated funding levels require reductions. These activities should be split into four major categories, if applicable:

- Center of Excellence to support DOE application porting and performance;
- Hardware;
- Software; and
- System testing and scaling

The Offeror should include in the NRE proposal a Center of Excellence (COE) task that consists of semi-annual milestones to support the Company in porting and tuning key DOE applications for the OLCF-6 system. The COE activity is a TO. Offeror remains responsible for all work regardless of offeror's use of lower-tier subcontractors. Support will be required from the successful Offeror (i.e., the prime subcontractor) and all its key advanced technology providers (e.g., processor vendors). Activities will require the support of experts in the areas of application porting and performance optimization. These experts will work with Company personnel on porting and tuning of key applications, which may include some of the OLCF-6 benchmarks or full applications—to be determined during contract negotiation—for

the target architecture. The COE is a key activity that will help ensure that the DOE applications are able to run on the OLCF-6 system once acceptance has occurred.

The COE task will be run as its own project, with a coordinator/project manager overseeing and coordinating. Co-location of staff at the Company's site is desirable but not necessary. Base support is required from the date of subcontract execution through two (2) years after final acceptance. Company may negotiate an extended period of performance or options for such an extension. This activity must reflect all terms and conditions of NRE activities including price sharing.<sup>2</sup>

This section must be a detailed Offeror-prepared SOW that describes the activities in sufficient detail to the price proposed. This section should identify proposed deliverable items. The Company does not anticipate delivery of hardware or software resulting from NRE activities. However, the Offeror should propose monthly and quarterly reviews and the delivery of specific architectural and/or software functionality and API descriptions or other reports that document the work performed and results achieved. The delivery of this functionality may be phased and should be captured in proposed milestones, which must provide measurable criteria by which the progress and successful completion of the NRE activities can be assessed. Prototype hardware for testing at the Offeror's site that supports the Build Technical Decision Point (i.e., Go/No-Go decision) is strongly desired. The Company anticipates an assessment of such hardware will support the conversion of target requirements in the OLCF-6 Build subcontract to performance requirements following a successful Technical Decision Point. For more information on the OLCF-6 decision process, see Section I.

### **D.3 – SECTION 3. IMPACT OF NRE ON OLCF-6 SYSTEM**

This section should indicate the direct impact of the proposed NRE activities and milestones on the OLCF-6 system. This impact may include schedule improvements, productization, improving system qualities such as the system interconnect, RAS or MTABF, and performance of DOE applications. If the major impact is risk reduction, then Offeror should explain what risks are addressed and how the risks are reduced.

### **D.4 – SECTION 4. PROJECT MANAGEMENT**

This section should describe how the NRE project will be managed and how the results will be integrated into the deliverables of the OLCF-6 Build subcontract. If managed separately from the OLCF-6 Build subcontract, the Offeror should describe the NRE proposed project management structure and team.

The Offeror should describe the major phases of the NRE project and any proposed reviews and decision dates. The Offeror should include a table in four parts (corresponding to the four major categories in Section 2) with each line in the table providing a deliverable title with dates and paragraph description but not payments.

After reading Sections 1, 2, and 4 of the NRE proposal, the Company should be able to understand exactly what is proposed and the corresponding delivery/completion schedule. After reading Section 3, the Company should be able to understand the full impact of this NRE proposal on the OLCF-6 system and risk plan.

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<sup>2</sup> See the Cover Letter for a description of the Class Advance Waiver and price sharing.

#### **D.5 – SECTION 5. SUBCONTRACTING**

This section should describe any use of subcontracting or third parties for major software, hardware components, or services and associated areas of risk and risk mitigation. The Offeror must specifically identify all key lower-tier subcontractors, partners, third parties, etc., by name and not by an ambiguous TBD-type references. If working with open-source software communities includes subcontracts for deliverables, these should be described. The Offeror should also include a description of how the Offeror’s organization intends to integrate the subcontractor’s product or services to achieve OLCF-6 goals. The Offeror should describe any previous experience with the proposed third-party subcontractors and the experience that the proposed third-party subcontractors had on projects for similar equipment or services as being provided under the anticipated OLCF-6 Build subcontract. The Offeror must include proof of demonstrated experience and past performance for all proposed subcontractors and a commitment from integrated subcontractors to participate in the work.

#### **D.6 – SECTION 6. OTHER RESEARCH & DEVELOPMENT**

Offeror must describe any Government-funded research & development (R&D) being performed that relates to, or could have an impact or effect on, the proposed NRE. At a minimum, this section must describe the relationship to the proposed NRE of any DOE programs such as FastForward 1 and 2, DesignForward 1 and 2, and PathForward R&D that the Offeror has performed. The Offeror must describe the dependencies and risks between its current Government-funded R&D and the proposed NRE. The discussion of dependencies and risks must include technology, schedule, and funding.



## **E. OLCF-6 BUILD AND NRE PRICE PROPOSAL (VOLUME 4)**

### **E.1 – SECTION 1. NRE FIXED-PRICE**

Offeror must identify the proposed total firm fixed-price corresponding with its OLCF-6 NRE Technical Proposal. Offeror must provide a firm fixed-price for each proposed NRE milestone, and the total firm fixed-price must be the sum of the firm fixed-prices of the proposed NRE milestones. The Offeror must include a basis of estimate (BOE) for its proposed total, firm fixed-price. The BOE should include, at a minimum, an estimate of materials, labor categories, labor hours by category, fully burdened hourly labor rates by category to perform each proposed NRE activity, and milestone commensurate with the value to be received. The BOE should also identify proposed material, travel, or other expenses to perform each proposed NRE activity/task. The Offeror should include a projected funding expenditure profile by Government fiscal year (October–September) for each proposed NRE activity/task.

If the Offeror chooses to take advantage of the approved class advance patent waiver from DOE, the BOE must include a 40% price-share. The price-share value must be identified per milestone and as a total across all milestones.

The Company does not anticipate a need for Certified Cost or Pricing Data (as defined at FAR Part 15); however, the Company reserves the right to request submission of Certified Cost or Pricing Data from the selected Offeror(s) if necessary.

### **E.2 – SECTION 2. BUILD – OLCF-6 SYSTEM FIXED-PRICES**

The Offeror must provide a firm fixed-price for the system offered. The Offeror must fully complete the price schedule contained in the **System Fixed-Price** tab of the **OLCF-6 Price Schedule** spreadsheet, as described herein, and include the completed price schedule in Section 2 of the OLCF-6 Build and NRE Price Proposal. Modifications to the spreadsheet may be made as necessary and should be highlighted.

**An entry must be made for each line item.** If the price of a line item is being offered at “No Charge” to the Company, insert **NC** for that entry. If a line item cannot be separately priced, insert **NSP** for that entry. If an item is not offered, insert **N/A** for that entry.

The Offeror should include a narrative that clearly describes the offerings on each tab and should indicate which row on that tab to which the note corresponds.

#### **E.2.a System Fixed-Price**

Only edit cells with a white background. The system price must include all software and software license pricing, unless explicitly noted. The total of the Compute System, Storage, and NRE should be \$500,000,000. The firm, fixed-price should also include all delivery and installation pricing. The Company does not anticipate a need for Certified Cost or Pricing Data (as defined at FAR Part 15); however, the Company reserve the right to request submission of Certified Cost or Pricing Data from the selected Offeror(s) if necessary.

For a cloud proposal, the total of the Compute System, Storage, and NRE can exceed \$500,000,000 if the service price includes financing and/or power. If a cloud Offeror chooses to propose an on-premises and an off-premises proposal, duplicate the System Fixed-Price tab. Indicate which tab is on-prem and which tab is off-prem.

### E.2.b Mandatory Option - Parallel File System

On this tab, provide option price for the PFS, PFS maintenance, add a rack, remove a rack, add a CDU, remove a CDU, add a multi-rack group (i.e., N racks and a CDU), remove a multi-rack group, increase/decrease SSD capacity, and increase/decrease HDD capacity. The Offeror may add additional options as needed.

### E.2.c Mandatory Option - AI-Optimized Storage

On this tab, provide option price for the AOS, PFS maintenance, add a rack, remove a rack, add a CDU, remove a CDU, add a multi-rack group (i.e., N racks and a CDU), remove a multi-rack group, and increase/decrease SSD capacity. The Offeror may add additional options as needed.

### E.2.d Commodity Price Risk Sharing

DOE computing facilities use long lead-time procurements to allow time for NRE to enhance the system as well as time for the COE to prepare codes. Projecting pricing years in advance is challenging and the system will contain commodity components that are subject to volatile pricing. The Offeror may choose to request price risk sharing as part of their proposal. The Offeror enters their best estimate of what each commodity's value will be when the Offeror will need to purchase it to build the system.

On the Price Risk Share tab, the Offeror can list commodity items (e.g., HBM, DDR, SSDs, HDDs). Each item must describe the commodity, the price per unit, the total units in the system, and a simple description that includes the unit type. The Offeror should use base-2 values for memory (i.e., GiB, TiB, PiB for HBM, DDR, etc.) and base-10 values for storage media (i.e., GB, TB, PB for SSD, HDD, etc.). See Table 4 for an example.

**Table 4: Example of Price Risk Share for two commodities**

Commodity	Projected Price/Unit	Total Units	Description
HBM	\$ 25.00	8,388,608	GiB, HBM2e, 8-high stacks
NVMe SSD	\$ 0.05	720,000,000	GB, TLC flash, M.3

At the Technical Decision Point, the Offeror must show the Company proof of cost (e.g., invoices from the supplier) for each commodity. If the price is higher, the Company may choose to pay the difference or may choose to reduce the system size or rebalance the resources within the system. If the price is lower, the Company may choose to use the difference to pay towards the system, enlarge the system, or execute more options. See Table 5 for an example of calculating the Price Risk Share.

**Table 5: Calculating Price Risk Share at Technical Decision Point**

Commodity	Projected Price/Unit	Actual Price/Unit	Total Units	Savings/ (Shortfall)
HBM	\$ 25.00	\$ 26.50	8,388,608	\$ (12,582,912.00)
NVMe SSD	\$ 0.05	\$ 0.04	720,000,000	\$ 7,200,000.00

In the above example, HBM would cost \$12.6M more and SSDs would cost \$7.2M less. In this example, the Company would need to pay \$5.4M more to maintain the system as proposed.

**E.3 – SECTION 3. BUILD – TECHNICAL OPTION FIXED-PRICES**

Offeror is encouraged to fully complete the Optional Pricing tabs contained in the OLCF-6 Price Schedule spreadsheet for the TOs. The narrative in the Tech Proposal should provide enough information for the Company’s staff to assess the value of the options.

The Offeror may include additional options that it thinks would be of interest to the Company and should create a new tab for each additional option. Offeror-defined options must include relevant technical, business, and price information in the appropriate proposal volume.

**E.3.a Option – Scale System Size**

On this tab, provide option prices to add a rack, remove a rack, add a CDU, remove a CDU, add a multi-rack group (i.e., N racks and a CDU), and remove a multi-rack group. The Offeror may add additional options as needed.

**E.3.b Option – Processor Memory**

On this tab, enter the node type/processor type, the price to increase/decrease memory, and a description of the change including the scaling unit. See Table 6 for an example to increase/decrease the compute node’s CPU memory.

**Table 6: Processor Memory option example**

Item	Price	Description
Increase Compute Node/CPU	\$ 655,360.00	Per rack price to double the CPU memory from 512 GiB/node to 1024 GiB/node, 65,536 GiBs
Decrease Compute Node/CPU	\$ 327,680.00	Per rack price to half the CPU memory from 512 GiB/node to 256 GiB/node, 32,768 GiBs

**E.3.c Option – Interconnect**

On this tab, enter options to increase/decrease the high-performance interconnect. The sheet has examples for changing injection bandwidth and global bandwidth. The Offeror may add additional options as needed.

**E.3.d Option – Maintenance**

The five-year compute system maintenance is either included in the system price or is priced just below it on the System Fixed-Price tab. The Maintenance tab is for options for sixth year and seventh year maintenance.

For a cloud provider, the price is for the system service price for years six and seven. If the price includes any changes in the service, describe the changes in the Technical Proposal item 2.2.1.4.

**E.3.e Option – Mid-Life Upgrades**

The Company does not expect to have additional budget available to pay for a mid-life upgrade. This option is intended to allow an Offeror to propose a no-cost upgrade in capabilities during the life of the system.

**E.3.f Option - Deinstallation**

Enter the cost to disassemble and remove the system after decommissioning. If this is included in the system price, enter NC.

**E.3.g Option – CPU-Only Nodes**

To fulfill its leadership role that includes full-system jobs, OLCF prefers a homogeneous system (i.e., one type of compute node throughout the system). Since OLCF-3, Titan, the compute node has been heterogeneous (i.e., the single node type has used accelerators). That said, OLCF has also provided a separate analysis cluster connected over InfiniBand.

This option will provide one or more racks of CPU-only nodes to provide the analysis capability. The price should be per rack. If the rack requires a different CDU than the compute nodes, include the CDU price and the number of racks that the CDU can support.

**E.3.h Option – Dual-Homed, CPU-Only Nodes**

This option is similar to the above option except that the nodes also provide an Ethernet NIC to allow connecting to the Company’s Ethernet fabric. The price should be per rack. If the rack requires a different CDU than the compute nodes, include the CDU price and the number of racks that the CDU can support.

**E.3.i Option – Visualization Nodes**

If the compute node processors do not provide native rendering support, this option will provide one or more rack of nodes with accelerated processors with native rendering support. The price should be per rack. If the rack requires a different CDU than the compute nodes, include the CDU price and the number of racks that the CDU can support.

**E.3.j Option – Node-Local Storage**

If offered, add a price per node type.

**E.3.k Option – Other Architectures**

If offered, this option will provide per-rack pricing for interesting architectures. If the rack requires a different CDU than the compute nodes, include the CDU price and the number of racks that the CDU can support.

**E.3.l Option – Linaro Forge**

Enter the license price for 5-years.

**E.3.m Option – Workload Manager Support**

Enter the price for a 5-year support contract with the workload manager subcontractor.

### **E.3.n Option – Early Access**

Enter pricing for the Base System, additional racks, and additional CDU if needed. Add additional line items as needed. The Base System should be an independent system with compute nodes and management node(s).

### **E.3.o Option – Test and Development System**

Enter pricing for the Base System, additional racks, and additional CDU if needed. The Base System should be an independent system with compute nodes and management node(s).

### **E.3.p Option – Analysts**

Enter per-year prices for Systems Programmer and Application Analyst.

## **E.4 – SECTION 4. LOWER-TIER SUBCONTRACTOR PRICE INFORMATION**

If the Offeror is proposing to use lower-tier subcontractors, price information for each subcontractor shall be furnished in the same format and level of detail as prescribed for the prime Offeror.

## **E.5 – SECTION 5. MILESTONE PAYMENT SCHEDULE**

The Company understands that this Request for Proposal represents a large financial commitment from the Offeror and its sub-contractors. The Company is interested in understanding what payment models make sense for the Offeror. The Company provides two mechanisms to pass funding to the Offeror.

### **E.5.a Milestone Payments**

The Company has budgeted up to \$100,000,000 for optional, refundable milestone payments. These payments may be used by the Offeror to support cash flow on a schedule proposed by the Offeror in the proposal. The Government will require the Company to verify that an equivalent value of materiel has been procured and is in possession of the Offeror before a milestone payment can be made.

If the contract is terminated, any milestone payment(s) must be refunded by the Offeror to the Company.

The Company may choose to apply milestone payments to settle one or more acceptances or reduce the amount to be lease-financed.

The actual amount available for refundable milestone payments is subject to annual budgets for government fiscal years 2024-2028. The \$100M target is based on current budget assumptions and is subject to change.

### **E.5.b Notice of Acceptance**

The Company issues a Notification of Acceptance (NOA) when a mutually agreed upon acceptance milestone has been achieved. With the issuance of the NOA, the Company makes payment (either directly or by starting a lease), title transfers to the Company (or Lease Company if leasing) if the Company is buying the system<sup>3</sup>, and the Company begins productive use of the accepted portion of the system. With

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<sup>3</sup> For a cloud services contract, title remains with the service provider.

payment, title transfer, and productive use of the system, accounting rules should allow the Offeror to claim revenue.

Traditionally, the Company would issue an NOA after the delivery, installation, bring up, and final acceptance testing of the entire machine. For both OLCF-4 and OLCF-5, the Company and the respective sellers agreed to multiple, partial acceptances.

The company sends NOAs for accepted NRE milestones and they are not refundable.

### **E.5.c Milestone Payment Schedule**

The Offeror must provide a “proposed Milestone Payment Schedule according to the Government Fiscal Year (GFY) that matches the delivery milestones identified in the OLCF-6 Build Technical Proposal (Volume 1). The Offeror must provide a proposed Milestone Payment Schedule according to the GFY that matches the delivery milestones identified in the OLCF-6 NRE Technical Proposal (Volume 3). See Section D.2 in this document for details.

The Offeror should propose a schedule with one or more acceptance targets. If proposing more than one acceptance target, the schedule should include a final acceptance milestone valued at no less than 10% of the system (compute and storage) price that demonstrates the full system capabilities.

If the Offeror wants to use refundable milestone payments, include those as well. See Table 7 for an example set of milestones if the Technical Decision Point is in GFY26 Q3.

**Table 7: Example Milestone Payment Schedule**

Milestone	Year/Quarter	Description	Value	Refundable?
1	GFY25 Q1	COE	\$1M	No
2	GFY26 Q1	COE	\$1M	No
3	GFY26 Q3	Offset cost of initial orders	\$70M	Yes
4	GFY27 Q1	COE	\$1M	No
5	GFY27 Q3	PFS and AOS operational	\$40M	No
6	GFY27 Q4	First half of compute racks operational	\$188M	No
7	GFY28 Q1	COE	\$1M	No
8	GFY28 Q1	Second half of compute racks operational	\$188M	No
9	GFY28 Q2	Full system scaling acceptance	\$50M	No

The above example shows \$470M for compute, storage, and COE (no other NRE). Not shown, but implied, is the remaining \$30M for maintenance. The refundable milestone payment will be used to offset acceptance milestones to reduce the amount that the Company will need to lease from \$470M to \$400M.

In this example, title to all hardware has transferred to the Company from the Offeror with milestone 8. The 9<sup>th</sup> milestone demonstrates that the full system meets the performance criteria as proposed and is not tied to any transfer of title.

If the proposal is for a service (i.e., a cloud offering), the payment schedule should include COE, NRE if proposed, any refundable milestone payments if proposed, and the system service payments (e.g., monthly, quarterly, annually). The Offeror should indicate if the service payments are in advance or in arrears.

## **F. OTHER DOCUMENTS (VOLUME 5)**

### **F.1 – SECTION 1: ROYALTY INFORMATION**

If a proposal in response to this solicitation contains costs or charges for royalties or license fees totaling more than \$250, the following information should be included in the response relating to each separate item of royalty or license fee: name and address of licensor; date of license agreement; patent numbers, patent application serial numbers, or other basis on which the royalty is payable; brief description, including any part or model numbers of each item or component on which the royalty is payable; percentage or dollar rate of royalty per unit; unit price of item; number of units; and total dollar amount of royalties.

In addition, if specifically requested by the UT-Battelle Procurement Officer before award, the Offeror should furnish a copy of the current license agreement and an identification of applicable claims of specific patents or other basis upon which the royalty may be payable.

### **F.2 – SECTION 2: SMALL BUSINESS SUBCONTRACTING PLAN**

This applies to the NRE awards, and not to the machine build awards. Unless the Offeror is a small business, or the total value of the offer is less than \$700,000, the successful Offeror must provide a Small Business Subcontracting Plan, which includes the anticipated total subcontracting amount and the percentage goals and amounts for all the various small business categories. Refer to the RFP's *SMALL BUSINESS SUBCONTRACTING PLAN* clause referenced in the Model Small Business Subcontracting Plan for additional information. The approved plan will be made a part of any resulting subcontract(s). The proposed Small Business Subcontracting Plan shall fully meet the requirements of FAR 52.219-9 or the ORNL *Small Business Subcontracting Plan Form (BSD-CS-2129)*. A copy of this form can be found here: <https://contracts.ornl.gov/special-articles-and-forms/>. Annual small business reporting will be required via the Electronic Subcontracting Reporting System (<http://www.esrs.gov>).

Failure to agree on an acceptable subcontracting plan will likely render the Offeror ineligible for award of a subcontract.

### **F.3 – SECTION 3: SOFTWARE BRANDING AND LICENSING**

The Offeror should submit licensing policies for *all* categories of software (compilers, libraries, application development tools, etc.) that will be provided under any resulting subcontract. Identify all third-party software. Include policies for cluster-wide right-to-use licenses for an unlimited number of users for all software that will be delivered under any resulting subcontract. Include any required software license or maintenance agreement as well as any licensing requirements for source code. The following conditions must be incorporated in any resulting license agreement or maintenance agreement:

- The laws of the state of Tennessee will apply.
- The right of assignment and any associated license agreement is a requirement.
- Right of assignment of any agreement to DOE for assignment to any succeeding prime contractor to UT-Battelle.

An Offeror's proposal may be eliminated from consideration for award in the event the Offeror and the Company cannot mutually agree to the terms and conditions contained in any software license or



maintenance agreement.

#### **F.4 – SECTION 4: SYSTEM WARRANTY INFORMATION**

The Offeror must provide warranty information for all Offeror-provided items as well as any third-party subcontracted items.

#### **F.5 – SECTION 5: REPRESENTATIONS AND CERTIFICATIONS**

The Offeror must complete, sign, and submit separate Representations and Certifications Forms for the NRE and build subcontract. A copy of the Representation and Certification form template is included as an attachment to the RFP.

#### **F.6 – SECTION 6: EEO PRE-AWARD CLEARANCE REQUEST FORM**

The Offeror shall submit a copy of the *EEO Pre-award Clearance Request form (BSD-CS-2046)* with items 3, 4, 8, and 9 completed. A copy of this form can be found here: <https://contracts.ornl.gov/special-articles-and-forms/>. (Prospective awardees of subcontracts of \$10 million or more are subject to pre-award compliance evaluations by the Office of Federal Contract Compliance Programs (OFCCP), unless within the preceding 24 months OFCCP has conducted an evaluation and found the prospective awardee to be in compliance with Executive Order 11246.)

#### **F.7 – SECTION 7: SAFETY-RELATED REQUIREMENTS**

Environmental, safety, and health requirements specific to ORNL are incorporated into the draft subcontract(s), terms and conditions, provisions, or attachments.

## **G. OFFEROR FINANCIAL INFORMATION (VOLUME 6)**

To assist the Company in assessing the financial capability of the Offeror, the Offeror must demonstrate that their financial condition is suitable for an award. The Offeror may submit any or all of the following.

- Audited and certified balance sheets and profit and loss statements for the Offeror's company for the last six completed financial quarters, including interim statements for the current quarter.
- Copies of Form 10-K filed with the Securities and Exchange Commission for the past 2 fiscal years, plus any 10-Q Forms filed since the last Form 10-K.
- Affirmative assurance, such as endorsements from financial institutions, that the company has sufficient funds necessary to perform the work.
- The percentage of the performing organization's estimated total revenue during the period of performance the proposed subcontracts will represent.
- The distribution of the last complete fiscal year's sales volume among commercial business, US Government prime contracts, and subcontracts under US Government prime contracts.
- Any other relevant and useful information about the financial health of the company that will assist the Company in assessing the financial capability of the Offeror.

## H. PERFORMANCE OF THE SYSTEM (VOLUME 7)

The benchmark programs described in the TRD Section 3 will be executed by the Offeror to measure the execution characteristics and compiler capabilities of the proposed OLCF-6 system and to project the performance of the platform. The benchmarks are divided into two categories, application benchmarks and micro-benchmarks.

The OLCF-6 benchmark suite has been developed to capture the programming models, programming languages, numerical motifs, fields of science, and other modalities of investigation expected to make up the bulk (e.g., more than 80% of all the consumed time on the platform) of the usage upon deployment. The micro-benchmarks, listed in the TRD Section 3.5.2, are intended to measure specific system resources of interest (i.e., memory bandwidth, memory latency, GEMM performance, and MPI all-to-all performance).

The OLCF-6 Benchmarks and details for running each of the benchmarks can be found at:

<https://www.olcf.ornl.gov/benchmarks/>

OLCF-6 Benchmarks questions, and only benchmarks-related questions, may be submitted via electronic mail to [OLCF6benchmarks@ornl.gov](mailto:OLCF6benchmarks@ornl.gov). The Contract Administrator will receive copies of emails from this email address. Offeror neutral (i.e., nonproprietary) questions and their answers, without identification of the submitter, will be posted on the OLCF-6 Benchmarks website. Offeror-specific or proprietary questions and their answers will be held in confidence and not posted on the OLCF-6 Benchmarks website. The Company, at their sole discretion, will determine the appropriateness of posting Offeror-specific questions and answers with potentially edited content (to protect the anonymity of the source).

If there are any discrepancies between the OLCF-6 Benchmark website and this document, the OLCF-6 Benchmark website is authoritative.

Review the OLCF-6 Run Rules on the OLCF-6 Benchmark website. For the Application Benchmarks, the Company expects both **Ported** and **Optimized** results.

The individual benchmark codes can be downloaded from the above OLCF-6 Benchmarks website as tar files. Each benchmark is documented with a summary file with general information about that benchmark including a description of the code, how to build and to run it, and any specific information about timing or storage issues. The benchmark source code and makefiles are in the tar file. Larger problem sets are available for download on the OLCF-6 Benchmarks website.

It is extremely important for the Offeror to provide the Company as much benchmark data as possible in the Offeror's Proposal, Volume 7, in the form of the OLCF-6 Benchmark Results spreadsheet, benchmark output files, and a description of any modifications (e.g., to source code, makefiles, and/or run scripts). Furnishing full results is rewarded more than incremental performance differences between vendors. If the Offeror cannot run a particular code or problem for whatever reason, Offeror should justify why the runs were not completed in the benchmark response. All benchmark omissions will be fully described by the Offeror and will be reviewed and evaluated by the Company; supporting documentation may be provided.

### **H.1 SECTION 1: BENCHMARKS, MAKEFILES, SCRIPTS, AND OUTPUT FILES**

If running benchmarks on current hardware, describe the system. If simulating the benchmarks, describe the simulator's specifications of the targeted system. The Offeror should include all diffs (e.g., to application source code, makefiles, run scripts,) and the application output files.

Correct execution and measurements will be certified by the Offeror.

Reported information in this section should be sufficient to convince the Company's Technical Evaluation Team that the Offeror did actually run the benchmarks on the reference system and obtained the reported results. In addition, the Company will evaluate the modifications to ensure consistency with reported modifications and allowed modifications requirements.

### **H.2 SECTION 2: OLCF-6 BENCHMARK RESULTS SPREADSHEET**

The Offeror should use the Excel spreadsheet "OLCF-6 Benchmark Results" (as found on the OLCF-6 Benchmarks website) to report the projected figures of merit (FOM) on the proposed system.

The data from each of the Application Benchmarks will be reported per the instructions in the respective benchmark description files. The final aggregate FOM is defined as the geometric average of the Application Benchmark FOMs and is automatically calculated by the spreadsheet.

### **H.3 SECTION 3: SCALING BENCHMARK RESULTS TO OLCF-6 REPORT**

The Offeror should submit a report that justifies the scaling between the RFP benchmark runs and the Offeror's projected performance for the OLCF-6 system and otherwise highlights noteworthy aspects of the Offeror's performance on the RFP benchmark suite. This report should include any additional information the Offeror used in the estimation process from simulation results to back-of-the-envelope estimations.

The Company will be the sole judge of the validity of any scaled results.

## **I. PROPOSAL EVALUATION AND AWARD INFORMATION**

### **I.1 EVALUATION FACTORS AND BASIS FOR SELECTION**

The OLCF-6 evaluation will be performed by staff members of Oak Ridge National Laboratory (ORNL). ORNL is managed by UT-Battelle, LLC, under Prime Contract DE-AC05-00OR22725 with DOE. The Company operates under procurement policies and procedures consistent with its Prime Contract.

ORNL staff will seek assistance of staff from Lawrence Berkeley National Laboratory (LBNL), Argonne National Laboratory (ANL), Jefferson Laboratory (JLab), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratory (SNL), and Los Alamos National Laboratory (LANL) in the proposal evaluation process.

The Company envisions separate Build and NRE awards.

The OLCF-6 Technical Requirements Document (TRD), Attachment C, contains the collective technical requirements of the Company for an exascale High Performance Computing (HPC) system. This system is required to meet the mission needs of the Advanced Scientific Computing Research (ASCR) Program within DOE's Office of Science (DOE-SC).

The delivery and acceptance timing provided above represents the current outlook and alignment of programmatic requirements and funding.

The Company reserves the right to (1) make a selection on the basis of initial proposals; (2) choose any proposal for their award; (3) negotiate with any or all Offerors for any reason; (4) award subcontracts to one or more Offerors; (5) award subcontracts based on all or part of an Offeror's proposal, including any options contained in the proposal; (6) reject any or all proposals and make no award; (7) waive any minor irregularities in any proposal; and (8) cancel this request for proposal (RFP) at any time prior to award without cost to the Company or the Government.

### **I.2 BASIS OF AWARD – TRADE-OFF**

An award resulting from this RFP will be made to the responsible Offeror(s) who submits a proposal that is determined to provide the best value to the Company considering LCF diversity, price, and technical criteria.

#### **I.2.a Leadership Computing Facility Diversity**

DOE SC's ASCR Program has a requirement that ORNL and ANL systems must always be diverse from one another. ANL has a system planned for acceptance in 2024 called "Aurora", which is outside this RFP, and is expected to be in production through 2029. Consequently, the OLCF-6 system must be diverse from the Aurora system.

Diversity will be evaluated by how much it promotes a competition of ideas and technologies; how much it reduces risk that may be caused by delays or failure of a particular technology or shifts in vendor business focus, staff, or financial health; and how much the diversity promotes a rich and healthy HPC ecosystem.

Vendor proposals will be graded as "meets" or "fails to meet" as it pertains to this diversity requirement.

### **I.2.b Price**

In determining the best value, the total price as defined below will be considered along with the technical merits and the trade-offs between them (e.g., the value in selecting a higher priced proposal against the technical merit of the proposal).

The Company will evaluate the following price-related factors.

- Reasonableness of the total proposed price and the prices of proposed components and options in a competitive environment.
- Reasonableness, transparency, and workability of the Offeror's Price Risk Sharing model for commodities or technologies.
- Proposed price compared to the value.
- Total Cost of Ownership (TCO) including siting, power, cooling, floor space costs, capital and license costs, maintenance costs, operating costs (e.g., power), deinstallation, taxes if applicable among others.
- Price trade-offs and options embodied in the Offeror's proposal.
- Financial considerations, such as, cost-share and financial incentives included in the proposal.

### **I.2.c Technical Criteria**

The technical evaluation process consists of the proposals being reviewed, evaluated, and rated using a qualitative grading system that assesses the degree of compliance with the Technical Criteria requirements and the level-of-performance risk. Each Technical Criterion will be graded based on the following ratings:

- |        |  |
|--------|--|
| Blue   | Proposal exceeds the performance or capability requirements necessary for acceptable subcontract performance and provides little or no risk to the Company.                                |
| Green  | Proposal meets the performance or capability requirements necessary for acceptable subcontract performance and provides low-to-moderate risk to the Company.                               |
| Yellow | Proposal marginally meets the performance or capability requirements necessary for acceptable subcontract performance or provides moderate-to-high risk to the Company.                    |
| Red    | Proposal fails to meet the performance or capability requirements necessary for acceptable subcontract performance or provides unacceptable risk to the Company. Proposal is un-awardable. |

**The Technical Criteria are of equal importance and technical is more important than price.**

The Technical Criteria are:

### **I.2.c.i Performance Features**

#### Target Requirements

The Company will validate that an Offeror's technical proposal satisfies the Mandatory Requirements and Mandatory Options. Failure to satisfy the Mandatory Requirements and Mandatory Options will result in no further evaluation of an Offeror's proposal.

The Company will then assess how well an Offeror's technical proposal addresses the Target Requirements and Technical Options. An Offeror is not solely limited to discussion of these features. An Offeror may propose other features or attributes if the Offeror believes they may be of value to the Company. At the discretion of the Company, consideration may be given to proposed features and attributes in the evaluation process. In all cases, the Company will assess the overall value of each proposal.

#### Performance

- How well the proposed solution meets the overall programmatic objectives expressed in the TRD Section 1.1 PROGRAM OVERVIEW AND MISSION NEEDS.
- The degree to which the technical proposal meets or exceeds the Target Requirements and Technical Option Requirements.
- Functionality, performance, and scalability of the proposed systems.
- Quality and quantity of the OLCF-6 Benchmark results. Each benchmark result will be assessed.
- Delivered performance and scalability, including the delivered bandwidth and latency to applications. Of particular importance is the delivered MPI all-to-all performance at full system scale.
- Reliability, availability, and serviceability of the system, such as, MTABF, MTTR, hardware and software failsafe features, effectiveness of diagnostics, and data protection mechanisms.
- Features, reliability, performance, and scalability of the proposed I/O subsystem(s) and flexibility and robustness of the I/O interfaces to the OLCF-6 I/O subsystem.
- Minimization of physical plant requirements, such as, facilities modifications for installation, system footprint, overall floor space, power, and cooling.
- Credible roadmaps for hardware and software. The Company are not interested in acquiring technology for which DOE is the sole market nor are they interested in acquiring end-of-life technology. The technology must have potential commercial viability.
- Realism and completeness of the project work breakdown structure.
- Support of official and de facto standards for hardware and software.
- Access to software source code, both to open-source and closed-source, to aid the Company in debugging.
- Commitment to open-source development of software.

- The proposed hardware and software support models and how these models will provide five years of base system maintenance and optional sixth and seventh year extended maintenance. The feasibility of the support models for open-source components must be realistically and persuasively addressed. Specifically, the Company will assess how well the maintenance model will work in practice.
- The proposed open-source software development projects, which address key technological areas for HPC systems that directly address OLCF-6 requirements with an open-source solution.

### NRE

- The proposed NRE activities leading up to the OLCF-6 systems for impact, risk reduction, effectiveness, and DOE application performance.
- The quality and depth of integration between the NRE proposal and the proposal for the delivered system as demonstrated through the Go/No-Go linkage.
- The degree of innovation in the proposed NRE activities.
- The extent to which the proposed NRE achieves substantial gains over current industry roadmaps and trends.
- The extent to which the proposed NRE will impact HPC and the broader commercial marketplace.
- Degree of likelihood that the proposed NRE will achieve the proposed results.

#### **I.2.c.ii Feasibility of Successful Performance and Schedule Realism**

The successful performance of the system is critical to achieving the programmatic mission of the Company. The Company will also evaluate the realism of the proposed schedule.

- The Company will assess the likelihood that the Offeror's machine(s) will work as proposed.
- The Company will assess the risks to both the Offeror and the Company associated with the proposed solution, as well as the Offeror's assessment of those risks.
- The Company will evaluate how well the proposed technical approach and solutions align with the Offeror's corporate product roadmap, product strategy, and the level of corporate commitment to the project.
- The Company will assess the proposed delivery schedule relative to the delivery requirements for the systems(s).
- The Company will consider the realism of the proposed schedule including its relationship to the Offeror's development, manufacturing, testing facilities, support offering, and the quality and roll out of technology proposed in the project and management plans.
- The Company will evaluate the proposed NRE and its effects on reducing risks to the schedule for the system.



- The Company will evaluate the realism and completeness of the proposed project plan.

### **I.2.c.iii Supplier Attributes**

The Company will evaluate the following supplier attributes.

#### Capability

- The Offeror's experience and past performance in providing high-end computing systems and its demonstrated commitment to high-end computing customers.
- The Offeror's demonstrated commitment to providing high-end computing systems over the long term.
- The Offeror's demonstrated ability to meet complex and far-reaching schedule and delivery obligations.
- The Offeror's demonstrated ability to work as a member of a successful large-system integration project.
- The Offeror's history of working with third parties to ensure third-party software or other components operate correctly on the system.
- The expertise and skill level of Offeror's key personnel.
- The contribution of the key personnel to the management plan for successful and timely completion of the work.
- The Offeror's ability to diagnose and to determine the root cause of hardware and software problems in a timely manner.
- The Offeror's manufacturing and testing facilities ability and availability to support successful and timely completion of the work.
- If other companies (i.e., lower-tier subcontractors) are significant parties to some proposals, the Company will evaluate the prime contractor on its ability to ensure the responsiveness of its partners to the performance requirements for the duration of the subcontracts, particularly the clear identification of responsibility among the partners for the proposed work.
- The Company may solicit information concerning the Offeror's record of performance from other sources and use it in the evaluation based on records provided in Volume 2.

#### Open-source Position

Solutions based on open-source software are highly desirable to the Company.

- The alignment of this proposal with the Offeror's open-source software strategy.
- The Offeror's experience and past performance in working with communities to provide solutions based on open-source software including working with communities to integrate enhancements and bug fixes back upstream.

- The Offeror’s development and support resources available to the partnership.

#### Financial Condition

An Offeror’s and subcontractor’s financial condition is of critical importance to the Company. The successful Offeror must have significant, verifiable financial resources to perform the work, including the ability to satisfy the obligations under subcontracts proposed to conduct the work.

- The Offeror’s financial condition (refer to Section G of this document).

#### Consortium

If a proposal is submitted by a consortium led by an integrating subcontractor (as opposed to the primary original equipment manufacturer), the Company will assess the likelihood that the integrating subcontractor can ensure the responsiveness of its partners in the consortium to the performance requirements for the duration of the subcontracts. This assessment will be based on the proposed detailed consortium management plan that explains the corporate relationships and responsibilities between or among the parties to the consortium and any other information provided by the Offeror or otherwise available to the Company. The Company believes that only aggressive, top-level management relationships that clearly identify who is responsible for what among the members of the consortium can reduce the performance risk posed by the integrating subcontractor-led consortium approach. In particular, the Company will assess how responsibility for component hardware and software development, hardware and software bug fixes, system testing, and problem root cause identification and resolution (*FOR ALL PROPOSED HARDWARE AND SOFTWARE*, not only those developed directly by the consortium) is assigned and committed to in the proposed management plan.

### **I.3 ADDITIONAL CONSIDERATIONS**

The Company may, at their sole discretion, exercise any proposed TO(s) at the time of initial award, at the Technical Decision Point, or by any mutually acceptable option exercise date(s).

The Company may exercise fixed-priced options to reduce the system after award if Congress reduces annual appropriated funding such that it makes the system reduction necessary. This option, if exercised at the Technical Decision Point, would reduce the total fixed-price of the OLCF-6 Build subcontract(s).

The Company intends to award the OLCF-6 Build subcontract and set the projected Commodity Price Risk Share values if the Offeror included Commodity Price Risk Sharing for any commodities. The Company, at its sole discretion, may use the Offeror’s projected values or any other values. If the Company chooses to use values different than the Offeror proposed, the contract values (e.g., system and options) will be adjusted up or down to reflect the new values. See Table 8 for two examples.

**Table 8: Examples of revising the Price Risk Share values.**

**Example 1:** The Offeror’s proposal includes 8 PiB of HBM with a Price Risk Share projected cost of \$5/GiB. If the Company determines that this value is too low, the Company could increase the target price to \$10/GiB. The value of the contract would then be increased by the difference of \$42.9M (8,388,608 GiB times \$5/GiB).

**Example 2:** The Offeror’s proposal includes 720 PB of flash SSDs with a Price Risk Share projected cost of \$0.20/GB. If the Company determines that this value is too high, the Company could decrease

the target price to \$0.10/GB. The value of the contract would then be decreased by the difference of \$72.0M (720,000,000 GB times \$0.10/GB).

The Company may need to adjust the system size up or down to maintain the overall budget. Section E.2.d describes how the Price Risk Share will be handled at the Technical Decision Point.

The Company may consider Price Risk Share approaches proposed by the Offeror for other technological aspects of the proposed system. Such Offeror-proposed risk-sharing approaches may include novel mechanisms to reduce or to mitigate project risks and do not need to be confined to ones that are directly derived from those described in these instructions.

Any technology refresh options or alternate configurations proposed by the Offeror may be awarded by the Company at their sole discretion.

## **APPENDIX A. RESUME FORMAT**

**Name:**

**Proposed Title/Assignment on Contract:**

**Experience Summary:** (A succinct summary of overall experience and capabilities including the name and phone number of the client that may be used for reference checking):

**Current Assignment** (Include description and from/to dates):

**Current Client/Customer** (Include current address and telephone number):

**Education:**

**Technical Qualifications:**

**Description(s) of Experience Relevant to Proposed Contract Assignment:**

**Provide Three Business-Related References:**

References listed in the resumes may be contacted to verify relevant experience as part of the evaluation process.

**List Awards/Honors/Publications:**

*RESUMES MUST NOT EXCEED TWO PAGES IN LENGTH*

**END OF PROPOSAL EVALUATION AND PROPOSAL PREPARATION INSTRUCTIONS**