

**FINANCIAL ASSISTANCE  
FUNDING OPPORTUNITY ANNOUNCEMENT**



**U.S. Department of Energy  
Office of Science  
Office of Advanced Scientific Computing Research**

**Advanced Architectures and Critical Technologies for  
Exascale Computing**

**Funding Opportunity Number: DE-FOA-0000255**

**Announcement Type: Initial  
CFDA Number: 81.049**

**ISSUE DATE: 1/29/2010**

**Preapplication Due Date: N/A**

**Application Due Date: 3/26/2010, 11:59 PM Eastern Time**

## NOTE: REQUIREMENTS FOR GRANTS.GOV

**Where to Submit:** Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

**Registration Requirements:** There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See <http://www.grants.gov/GetStarted>. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

**IMPORTANT NOTICE TO POTENTIAL APPLICANTS:** When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

**Questions:** Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). Part VII of this announcement explains how to submit other questions to the Department of Energy (DOE).

**All applications should be in a single PDF file.**

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## PART I – FUNDING OPPORTUNITY DESCRIPTION

GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:

### Technical/Scientific Program Contact:

**Program Manager:** Dr. Daniel Hitchcock  
Office of Advanced Scientific Computing Research  
Office of Science  
U. S. Department of Energy  
**Phone:** 301-903-6767  
**E-Mail:** [Daniel.Hitchcock@science.doe.gov](mailto:Daniel.Hitchcock@science.doe.gov)

**Program Manager:** Dr. Lucy Nowell  
Office of Advanced Scientific Computing Research  
Office of Science  
U. S. Department of Energy  
**Phone:** 301-903-3191  
**E-Mail:** [Lucy.Nowell@science.doe.gov](mailto:Lucy.Nowell@science.doe.gov)

### STATUTORY AUTHORITY

Public Law 95-91, US Department of Energy Organization Act  
Public Law 109-58, Energy Policy Act of 2005

### APPLICABLE REGULATIONS

U.S. Department of Energy Financial Assistance Rules, codified at 10 CFR Part 600  
U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 CFR Part 605

### SUMMARY:

The Office of Advanced Scientific Computing Research (ASCR) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications from interdisciplinary teams of Computer Science/Computer Engineering researchers in the areas of [Advanced Architectures and Critical Technologies for Exascale Computing](#). Multi institutional applications with cohesive emphasis on transformational discoveries that address key barriers on the path to exascale computing are encouraged. Partnerships among academic institutions, National Laboratories, and industry are strongly encouraged. This program is managed in cooperation with NNSA and DARPA.

Scientific challenges such as understanding the causes and potential impacts of climate change, improving the efficiency of combustion, and unraveling the mysteries of dark energy and dark matter, as well as a variety of national security challenges, require computational capabilities at

extreme scale. At the same time, industry reports make it clear that the exponential growth in processor clock speeds that sustained increases in computational speed for more than 15 years has ended. Projections suggest that building an exascale computer from today's technology would cost approximately \$1 billion, with power consumption of over a Gigawatt and a mean time between failures of only ten minutes.

This Funding Opportunity Announcement invites applications for basic and applied research to address fundamental challenges in the design of energy-efficient, resilient hardware and software architectures and technology for high performance computing systems at exa-scale.

#### **SUPPLEMENTARY INFORMATION:**

It is likely that exascale computer systems will be comprised of as many as a billion cores and that such systems will be capable of 10 billion-way concurrency in simultaneous operations. Industry reports indicate that data movement will be the limiting factor for exascale systems, rather than processors and computational operations, especially when power constraints are considered. At the same time, memory per core is expected to decline sharply for exaflop systems, and the performance of storage systems continues to lag far behind. Multi-level storage architectures that span multiple types of hardware are anticipated and will require new approaches to run-time data management and analysis.

Topics of interest include but are not limited to:

- Approaches for reducing and/or managing power requirements for high performance computing systems, including the memory and storage hierarchy
- Approaches for reducing and/or managing heat in high performance computing systems
- Methods for improving system resilience and managing the component failure rate, including approaches for shared information and responsibility among the OS, runtime system, and applications
- Co-design of systems that support advanced computational science at the extreme scale
- Scalable I/O systems, which may include alternatives to file systems
- Approaches to information hiding that reduce the need for users to be aware of system complexity, including heterogeneous cores, the memory hierarchy, etc.

#### **References**

- *ExaScale Computing Study: Technology Challenges in Achieving Exascale Systems: The International Exascale Software Project Roadmap*, report for the DARPA Information Processing Techniques Office (IPTO), September 2008, [http://www.exascale.org/iesp/Main\\_Page](http://www.exascale.org/iesp/Main_Page)
- *Modeling and Simulation at the Exascale for Energy and the Environment*, <http://science.doe.gov/ascr/ProgramDocuments/Docs/TownHall.pdf>
- *Operating and Runtime Systems for Extreme Scale Scientific Computation*, [http://www.sc.doe.gov/grants/LAB07\\_23.html](http://www.sc.doe.gov/grants/LAB07_23.html) and <http://www.sc.doe.gov/grants/FAPN07-23.html>
- *ExaScale Software Study: Software Challenges in Extreme Scale System*, report for the DARPA Information Processing Techniques Office (IPTO), September 2009,

<http://users.ece.gatech.edu/mrichard/ExascaleComputingStudyReports/ECSS%20report%20101909.pdf>

- *System Resilience at Extreme Scale*,  
<http://institutes.lanl.gov/resilience/docs/IBM%20Mootaz%20White%20Paper%20System%20Resilience.pdf>

Interested proposers should also be aware that ASCR anticipates related Funding Opportunity Announcements on **Scientific Data Management and Analysis at Extreme Scale** and on **X-Stack Software Research**. When available, additional information may be found on the ASCR Funding Opportunities web site at <http://science.doe.gov/ascr/Misc/Funding.html>. Existing ASCR programs of likely interest to proposers include the following:

- *Mathematics for Complex, Distributed, Interconnected Systems*,  
[http://www.science.doe.gov/grants/LAB09\\_23.html](http://www.science.doe.gov/grants/LAB09_23.html)
- *Joint Mathematics/Computer Science Institute*,  
[http://www.sc.doe.gov/grants/LAB09\\_22.html](http://www.sc.doe.gov/grants/LAB09_22.html)
- *Mathematics for Analysis of Petascale Data*,  
[http://www.science.doe.gov/grants/LAB09\\_10.html](http://www.science.doe.gov/grants/LAB09_10.html)

## **Community Building**

An important goal of this FOA is to foster an active, integrated research community of versatile researchers who are committed to the goal of achieving exascale computation for scientific discovery. Accordingly, each research team should plan to send representatives to a kick-off meeting and an annual PI meeting, where they will give presentations on the status and promise of their research and engage in working sessions to address shared problems. Meeting attendees will include invited participants from other relevant research communities. The objectives of these meetings include fostering a sense of community and serving as a venue for exchange of information with complementary programs.

The application will need to include plans for the dissemination of research results, such as:

- Publications, conferences, and educational activities for the science user community: what mechanisms will the project employ to present its work to a broader community to ensure sustained activities in the research area and promote adoption by communities of scientists?
- Code release: how will the codes be released to allow other researchers to continue building and expanding on the knowledge gained?
- Testing at scale: Will the project perform software testing at scale? If so, what are the requirements for this testing (for example, hardware, specific architecture, specific test bed, etc)?

This program requires open source software development. Applications should identify the open source license to be used.

## **PART II – AWARD INFORMATION**

### **A. TYPE OF AWARD INSTRUMENT.**

DOE anticipates awarding cooperative agreements under this Funding Opportunity Announcement.

### **B. ESTIMATED FUNDING.**

It is anticipated that up to \$5,000,000 annually will be available for multiple awards for this program. Multiple (4-6) awards are planned to be made in Fiscal Year 2010, and applications may request project support for up to three years. All awards are contingent on the availability of funds, progress of the research, and programmatic needs.

DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

### **C. MAXIMUM AND MINIMUM AWARD SIZE.**

See B. Estimated Funding section above.

### **D. EXPECTED NUMBER OF AWARDS.**

See B. Estimated Funding section above.

### **E. ANTICIPATED AWARD SIZE.**

See B. Estimated Funding section above.

### **F. PERIOD OF PERFORMANCE.**

See B. Estimated Funding section above.

### **G. TYPE OF APPLICATION.**

DOE will accept new applications under this FOA.

## **PART III - ELIGIBILITY INFORMATION**

### **A. ELIGIBLE APPLICANTS.**

All types of domestic entities are eligible to apply, except other Federal agencies, Federally Funded Research and Development Centers (FFRDCs), and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31,1995.

Inter-institutional collaborations are strongly encouraged to enhance and strengthen research capabilities as needed. Collaboration could include institutions such as universities, industry, non-profit organizations, federal laboratories and FFRDCs, including the DOE National Laboratories. Collaborations should be limited to filling critical voids in expertise and represent only a modest portion of the overall effort. Additionally, Federal agencies should not be included as participants or expect to receive funding under this Funding Opportunity Announcement.

### **B. COST SHARING.**

Cost sharing is not required.

### **C. OTHER ELIGIBILITY REQUIREMENTS.**

N/A

## PART IV – APPLICATION AND SUBMISSION INFORMATION

### A. ADDRESS TO REQUEST APPLICATION PACKAGE.

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download Application Package". Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

### B. LETTER OF INTENT AND PREAPPLICATION.

#### 1. Letter of Intent.

A Letter of Intent is not required.

#### 2. Preapplication.

Preapplications are not required.

### C. CONTENT AND FORM OF APPLICATION – SF 424 (R&R).

You must complete the mandatory forms and any applicable optional forms (e.g., SF-LLL-Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below. **Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.**

#### 1. SF 424 (R&R).

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at [http://www.management.energy.gov/business\\_doe/business\\_forms.htm](http://www.management.energy.gov/business_doe/business_forms.htm), under Certifications and Assurances.

#### 2. RESEARCH AND RELATED Other Project Information.

Complete questions 1 through 5 and attach files. The files must comply with the following instructions:

##### **Project Summary/Abstract (Field 7 on the Form).**

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s) (PD/PI), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5” by 11”

paper with 1” margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click “Add Attachment.”

**Project Narrative (Field 8 on the Form).**

The project narrative **must not exceed 20 pages** of technical information, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right).

EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE. The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

The application narrative should begin with a cover page that includes: the project title, the Lead PI’s name and complete contact information.

**The cover page must also include the following information (this page will not count in the project narrative page limitation):**

**Applicant/Institution:**

**Street Address/City/State/Zip:**

**Principal Investigator:**

**Postal Address:**

**Telephone Number:**

**Email:**

**Funding Opportunity Announcement Number: DE-FOA-0000255**

**DOE/Office of Science Program Office:** Office of Advanced Scientific Computing Research

**DOE/Office of Science Program Office Technical Contact:** Dr. Daniel Hitchcock

**DOE Grant Number (if Renewal Application):**

**Budget Table:** Table should list the Lead PI and institution and all funded Co-PIs, their institutions and the amount of funding requested for each year for the project for each funded investigator.

**Is this a Collaboration?** If yes, please list ALL Collaborating Institutions/PIs and indicate which ones will also be submitting applications. Also indicate the PI who will be the point of contact and coordinator for the combined research activity.

The narrative comprises the research plan for the project. Letters of intent from all non-funded collaborators and short curriculum vitae of all senior personnel must be included in the application. Applications not meeting these requirements will be deemed ineligible during the initial screening process. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

**The project narrative must include:**

**Project Objectives:**

This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

The Project Narrative comprises the research plan for the project, it should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the method to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities.

**Project Timetable:**

This section should outline as a function of time, year by year, all the important activities or phases of the project, including any activities planned beyond the project period. Successful applicants must use this project timetable to report progress.

**Appendix 1: Biographical Sketch.**

Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form. **Provide the biographical sketch information as an appendix to your project narrative. Do not attach a separate file.** The biographical sketch appendix will not count in the project narrative page limitation. The biographical information (curriculum vitae) for each person must not exceed 3 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

*Education and Training.* Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

*Research and Professional Experience:* Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

*Publications.* Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

*Synergistic Activities.* List no more than 5 professional and scholarly activities related to the effort proposed.

Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers.

Provide the following information in this section.

Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state “None.”

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last five years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates during the past five years.

**Appendix 2: Current and Pending Support.**

Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subawardees, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. **Provide the Current and Pending Support as an appendix to your project narrative. Do not attach a separate file.** The Current and Pending Support Appendix will not count in the project narrative page limitation. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review. Save the information in a separate file and attach to the “Attach Current and Pending Support” field in each profile.

**Appendix 3: Bibliography & References Cited.**

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. In order to reduce the number of files attached to your application, **please provide the Bibliography and References Cited information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.**

**Appendix 4: Facilities & Other Resources.**

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to

the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. In order to reduce the number of files attached to your application, **please provide the Facility and Other Resource information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.**

**Appendix 5: Equipment.**

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. In order to reduce the number of files attached to your application, **please provide the Equipment information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.**

**Appendix 6: Other Attachment.**

If you need to elaborate on your responses to questions 1-5 on the “Other Project Information” document, **please provide this information as an appendix to your project narrative. This appendix will not count in the project narrative page limitation.**

**Do not attach any of the requested appendices described above as files for fields 9, 10, 11, and 12, instead follow the above instructions to include the information as appendices to the project narrative file (these appendices will not count in the project narrative page limitation).**

**3. RESEARCH AND RELATED BUDGET.**

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV, G).

**Budget Justification (Field K on the form).**

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. **Attach a single budget justification file for the entire project period in Field K.** The file automatically carries over to each budget year.

**4. PROJECT/PERFORMANCE SITE LOCATION(S)**

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

**Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.**

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

**5. SF-LLL Disclosure of Lobbying Activities.**

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

**Summary of Required Forms/Files**

Your application must include the following documents:

| <b>Name of Document</b>  | <b>Format</b> | <b>Attach to</b> |
|--|---------------|------------------|
| <b>SF 424 (R&amp;R)</b>  | Form          | N/A              |
| <b>RESEARCH AND RELATED Other Project Information</b>          | Form          | N/A              |
| Project Summary/Abstract                                       | PDF           | Field 6          |
| Project Narrative, including required appendices               | PDF           | Field 7          |
| <b>RESEARCH &amp; RELATED BUDGET</b>                           | Form          | N/A              |
| Budget Justification   | PDF           | Field K          |
| <b>PROJECT/PERFORMANCE SITE LOCATION(S)</b>                    | Form          | N/A              |
| <b>SF-LLL Disclosure of Lobbying Activities, if applicable</b> | Form          | N/A              |



## D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS.

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable

## E. SUBMISSION DATES AND TIMES.

### 1. Letter of Intent Due Date.

A Letter of Intent (LOI) is not required.

### 2. Preapplication Due Date.

Preapplications are not required.

### 3. Formal Applications.

Formal applications submitted in response to this Funding Opportunity Announcement must be received by **March 26, 2010**, 11:59 p.m. Eastern time, to permit timely consideration of awards in **Fiscal Year 2010**. **You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

## F. INTERGOVERNMENTAL REVIEW.

This program is not subject to Executive Order 12372 Intergovernmental Review of Federal Programs.

## G. FUNDING RESTRICTIONS.

Cost Principles. Costs must be allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600 and 2 CFR 215.

Pre-award Costs. Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600 and 2 CFR 215. Recipients must obtain the prior approval of the awarding agency / contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse

such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

## **H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS.**

### **1. Where to Submit.**

**Where to Submit:** Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

**All applications should be in a single PDF file.**

### **2. Registration Process.**

There are several one-time actions you must complete in order to submit an application (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See <http://www.grants.gov/GetStarted>. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.doc> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

## Part V - APPLICATION REVIEW INFORMATION

### A. CRITERIA.

#### 1. Initial Review Criteria.

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the funding opportunity announcement.

#### 2. Merit Review Criteria.

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria which are listed in descending order of importance codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project;
2. Appropriateness of the Proposed Method or Approach;
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources; and
4. Reasonableness and Appropriateness of the Proposed Budget.

The evaluation process will include program policy factors such as the relevance of the proposed research to the terms of the FOA and the agency's programmatic needs. Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Scientific and technical merit includes potential impact on scientific applications relevant to the Office of Science and the DOE.

### B. REVIEW AND SELECTION PROCESS.

#### 1. Merit Review.

Applications that pass the initial review will be subjected to a formal merit review and will be evaluated based on the criteria codified at 10 CFR Part 605.10(d) in accordance with the guidance provided in the "Office of Science Merit Review System for Financial Assistance." This Merit Review System is available at: <http://www.science.doe.gov/grants/merit.html>.

#### 2. Selection.

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

### **3. Discussions and Award.**

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600 and 605; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

### **C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES.**

DOE is striving to make awards within 6 months. The time interval begins on the date applications are due or the date the application is received, if there is no specified due date/deadline. Awards will be made in Fiscal Year 2010.

## Part VI - AWARD ADMINISTRATION INFORMATION

### A. AWARD NOTICES.

#### 1. Notice of Selection.

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

#### 2. Notice of Award.

A Notice of Financial Assistance Award or Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes, either as an attachment or by reference: 1. Special Terms and Conditions; 2. Applicable program regulations, if any; 3. Application as approved by DOE/NNSA; 4. DOE assistance regulations at 10 CFR Part 600; 5. National Policy Assurances to Be Incorporated As Award Terms; 6. Budget Summary; and 7. Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For grants and cooperative agreements made to universities, non-profits, and other entities subject to OMB Circular 2 CFR, the Award also includes the Research Terms and Conditions located at <http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp>.

### B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.

#### 1. Administrative Requirements.

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 and 10 CFR Part 605 (See: <http://www.gpoaccess.gov/cfr/index.html>). The FDP terms and conditions and DOE FDP agency specific terms and conditions are located on the National Science Foundation web site at [http://www.nsf.gov/awards/managing/fed\\_dem\\_part.jsp](http://www.nsf.gov/awards/managing/fed_dem_part.jsp).

#### 2. Special Terms and Conditions and National Policy Requirements.

##### Special Terms and Conditions and National Policy Requirements.

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at [http://management.energy.gov/business\\_doe/business\\_forms.htm](http://management.energy.gov/business_doe/business_forms.htm). The National Policy Assurances to Be Incorporated As Award Terms are located at [http://management.energy.gov/business\\_doe/business\\_forms.htm](http://management.energy.gov/business_doe/business_forms.htm).

##### Intellectual Property Provisions.

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at [http://www.gc.energy.gov/financial\\_assistance\\_awards.htm](http://www.gc.energy.gov/financial_assistance_awards.htm).

### **Statement of Substantial Involvement**

Either a grant or cooperative agreement may be awarded under this FOA. If the award is a cooperative agreement, the DOE Specialist and DOE Project Officer will negotiate a Statement of Substantial Involvement prior to award. (Sample attached-see Part IX)

### **C. REPORTING.**

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F4600.2, attached to the award agreement. For a sample checklist, see <http://www.management.energy.gov/documents/DOEF4600pt292009.pdf>.

## **D. PART VII - QUESTIONS/AGENCY CONTACTS**

### **A. QUESTIONS.**

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at <http://www.compusearch.com/products/fedconnect/fedconnect.asp> and [https://www.fedconnect.net/FedConnect/PublicPages/FedConnect\\_Ready\\_Set\\_Go.pdf](https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf). DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). DOE cannot answer these questions.

### **B. AGENCY CONTACT:**

**GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:**

#### **Technical/Scientific Program Contact:**

**Program Manager:** Dr. Daniel Hitchcock  
Office of Advanced Scientific Computing Research  
Office of Science  
U. S. Department of Energy  
**Phone:** 301-903-6767  
**E-Mail:** [Daniel.Hitchcock@science.doe.gov](mailto:Daniel.Hitchcock@science.doe.gov)

**Program Manager:** Dr. Lucy Nowell  
Office of Advanced Scientific Computing Research  
Office of Science  
U. S. Department of Energy  
**Phone:** 301-903-3191  
**E-Mail:** [Lucy.Nowell@science.doe.gov](mailto:Lucy.Nowell@science.doe.gov)

## **PART VIII - OTHER INFORMATION**

### **A. MODIFICATIONS.**

Notices of any modifications to this FOA will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements. More information is available at <http://www.fedconnect.net> and <http://www.compusearch.com/products/fedconnect/fedconnect.asp>.

### **B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.**

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

### **C. COMMITMENT OF PUBLIC FUNDS.**

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

### **D. PROPRIETARY APPLICATION INFORMATION.**

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

“The data contained in pages \_\_\_\_\_ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government’s right to use or disclose data obtained without restriction from any source, including the applicant.”

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

“The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation.”

## **E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL.**

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

## **F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM.**

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE’s own needs or to insure the commercialization of technology developed under a DOE agreement.

## **G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER.**

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

## **H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES.**

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

## PART IX - ATTACHMENT

### A. STATEMENT OF SUBSTANTIAL INVOLVEMENT

The U.S. Department of Energy (hereinafter “DOE”) and each organization receiving an award (“Recipient”) hereby enter into a Cooperative Agreement (“Agreement”) for the purpose of conducting a three-year mutually agreeable research program entitled “DOE and Recipient Cooperative Agreement.”

The agreement supports the research and development of technologies to create and implement an exascale computational science hardware platform. The agreement will be an integral part of the Advanced Architectures and Critical Technologies for Exascale Computing (AACTEC) program, for which a goal is to create shared resources for computational science that requires exaflops of computation. The AACTEC program also has a goal of ensuring that any software tools developed will be fully and freely available and can be used by researchers at universities and DOE laboratories. Since the agreement is part of the much larger effort, government involvement is needed to assure proper integration. The responsibility for leadership of the overall project rests with the senior project Principal Investigators (PIs) (for science, computing, and overall management).

Therefore, in accordance with the DOE Financial Assistance regulation (10 CFR Part 600), the following statements describe the anticipated substantial involvement between DOE and the Recipient, under the cooperative agreement award.

**DOE ROLES AND RESPONSIBILITIES:** Substantial involvement of the Department is required to assure success in meeting the overall objectives of the AACTEC program as an integrated program with interrelated elements. Since there are multiple financial assistance awards to multiple organizations for interdependent efforts within the AACTEC program, it is imperative that program management from the Office of Advanced Scientific Computing Research (ASCR) be involved to the extent necessary to direct the work of each organization to ensure that the individual efforts are integrated into the larger program. Progress within the project will be assessed annually, based on an annual report compiled by the collaboration and submitted by the project senior PIs to the DOE program managers, which will be used to determine future programmatic direction. There will be a DOE/AACTEC management team consisting of DOE program managers that will provide guidance for the coordination of the effort, assisting with the establishment of goals for collaborations.

**PARTICIPANT ROLES AND RESPONSIBILITIES:** The Recipient shall provide all personnel, facilities, equipment, supplies and services, and otherwise do all things necessary for, or incident to, conducting the research project. The Recipient is responsible for the management of effort necessary for timely and professional execution of the project work defined by the milestones and deliverables attributed to the Recipient’s staff, and for the coordination of the effort with goals established in collaboration with the project PIs, in conjunction with guidance from the AACTEC management team. The Recipient will operate their local research project in

consultation with the overall project PIs and the ASCR program managers, will contribute to the overall annual project assessment, and will submit this together with a summary of local progress by the Recipient in the annual continuation progress report associated with their Cooperative Agreement.

### **TECHNICAL DIRECTION:**

**DOE ROLES AND RESPONSIBILITIES:** DOE may provide technical direction to the Recipient as follows: (1) redirect the work effort; (2) shift work emphasis between work areas or tasks; (3) require pursuit of certain lines of inquiry; and/or (4) fill in details or otherwise provide technical guidance to the Recipient in order to accomplish the tasks and requirements stated in the financial assistance application incorporated into this Agreement. DOE technical direction shall not impose tasks or requirements on the Recipient additional or different from the tasks and requirements stated in the financial assistance application incorporated into this Agreement. To be valid, technical direction must be issued in writing. Technical direction may not: (1) constitute an assignment of additional work outside the tasks and requirements stated in the financial assistance application incorporated into this Agreement; (2) in any manner cause an increase or decrease in the total estimated project cost or the time required for project performance; (3) change any of the expressed terms and conditions of the Agreement; or (4) accept non-conforming work.

DOE will actively monitor the Recipient's research and development activities. DOE will actively collaborate with the Recipient in evaluating and setting research objectives, milestones, and deliverables.

**RECIPIENT ROLES AND RESPONSIBILITIES:** The Recipient shall provide all personnel, facilities, equipment, supplies, and services, and otherwise do all things necessary for, or incident to, conducting the research project. The Recipient is responsible for the overall management of the effort necessary for timely and professional execution of the project work. The Recipient shall proceed promptly with the performance of technical directions duly issued by the DOE Project Officer in the manner described in DOE ROLES AND RESPONSIBILITIES, above, and which are within the DOE Project Officer's authority. The Recipient shall immediately cease performance of any technical direction upon receipt of a written instruction to that effect from the Contracting Officer. If, in the opinion of the Recipient, any technical direction issued by the DOE Project Officer is not within the authorities defined in DOE ROLES AND RESPONSIBILITIES, above, the Recipient shall not proceed but shall notify the Contracting Officer in writing within 5 working days after the receipt of any such technical direction and shall request the Contracting Officer to rescind such direction or mutually agree to modify the Agreement accordingly. The Contracting Officer shall have the authority to make the final determination with respect to technical direction. If the Recipient disputes the determination and cannot informally resolve the dispute with DOE, the Recipient shall follow the procedures set forth in 10 CFR 600.22. The only persons authorized to give technical direction to the Recipient under this Agreement are the Contracting Officer and any DOE Project Officer as listed in Block 11 of the Notice of Financial Assistance Award. Any action taken by the Recipient in response to any direction given by any person other than the Contracting Officer or DOE Project Officer

shall not be binding upon the Government.

**DURATION OF SUBSTANTIAL INVOLVEMENT:** The substantial involvement by DOE under this cooperative agreement will remain for the term of the cooperative agreement award unless otherwise amended. Moreover, this statement of substantial involvement by DOE does not increase DOE's liability under this Agreement award.