Program Announcement To DOE National Laboratories
LAB 99-08
Next Generation Internet
Research in Basic Technologies

The Office of Advanced Scientific Computing Research (OASCR) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals for the Next Generation Internet Research in Basic Technologies program. The Next Generation Internet (NGI) is a multi-agency federal research and development program to develop, test, and demonstrate advanced networking technologies and applications. This particular research notice invites research proposals for innovative, fundamental networking research to support DOE-specific activities that include, but are not limited to, very high speed interfaces to connect devices to networks; protocols and techniques for coordinating multiple, heterogeneous network-attached devices; software to allow applications to adapt to changing network conditions; and network performance characterization.

The NGI initiative is a multi-agency Federal research and development (R&D) program that is developing advanced networking technologies, developing revolutionary applications that require advanced networking, and demonstrating these capabilities on testbeds that are 100 to 1,000 times faster end-to-end than today's Internet. Partnerships among academia, industry, and governments (Federal, state, local, and foreign) that will keep the U.S. at the cutting-edge of information and communications technologies are encouraged. (Details on submitting proposals involving partnerships can be found in the Application Guide for the Office of Science Financial Assistance Program on the world wide web at http://www.er.doe.gov/production/grants/grants.html). The strategic R&D investments are coordinated across the agencies involved and are focused to produce an environment where advanced networking R&D breakthroughs are possible. Information concerning NGI can be found at http://www.ngi.gov/.

Topic Details

DOE's current core programs in network and application research are intended to enhance the Department's ability to satisfy mission requirements through advanced technologies such as distributed computing, national collaboratories, remote access to facilities, and remote access to petabyte-scale datasets with complex internal structure. The DOE NGI network research described in this notice will focus on developing network-aware middleware and application friendly tools and capabilities for its applications, as well as continuing research in high speed end system interfaces,

network management, and differentiated services. The objective of this research is to enable more efficient and smarter use of network resources, as well as to support higher speeds (that is, end-to-end capacity)..

The DOE encourages the submission of proposals for innovative, fundamental networking research. The DOE particularly encourages research in the following areas:

- Congestion and flow control techniques to provide applications with easy-to-use tools, capabilities, and interfaces that make efficient use of advanced infrastructure; for example, reliable ordered multicast.
- Multi-gigabit end system interfaces, analyzers, and switches along with mechanisms to reduce operating system overhead for data transfers.
- Protocols and techniques for coordinating multiple, heterogeneous network-attached devices.
- Techniques to support secure and fair user access to and use of network resources, provide secure inter-network peering, perform accounting/costing, and provide secure access to on-line facilities.
- Mechanisms to provide application controlled Class of Service and Quality of Service.
- Techniques for IP, ATM, and WDM network monitoring and analysis.
- Application-friendly, network-aware middleware to provide IP, ATM, and WDM resource and admission control, scheduling, management, prioritization, accounting (such as bidding and costing), authentication, analysis, monitoring, assurance and debugging mechanisms.

A theme common to these research topics is the development of "network aware" and infrastructure manipulating software in middleware, including libraries, system software and tools, that will be available to the application through easy-to-use-application interfaces. Research may focus on providing the "network aware" middleware support required by DOE applications. These applications will be heavily collaborative in nature and will concurrently use distributed resources such as supercomputers, high end storage systems with extremely large scientific data sets, unique on-line facilities, and massive, multi-dimensional datasets in tele-immersive environments. Software tools developed are expected to interoperate with existing middleware tools as well as those under development.

DATES: Proposers are encouraged to submit a brief preproposal. All preproposals, referencing Program Announcement LAB99-08, should be received by DOE by 4:30 P.M., E.S.T., February 12, 1999. A response to the preproposals discussing the potential program relevance and encouraging or discouraging a formal proposal generally will be communicated within several days of receipt.

Formal proposals submitted in response to this announcement must be received by 4:30 P.M., E.S.T., March 31, 1999, in order to be accepted for merit review and to permit timely consideration for award in fiscal year 1999.

ADDRESSES: Preproposals, referencing Program Announcement LAB99-08, should be sent by E-mail to hitchcock@er.doe.gov.

Formal proposals, referencing Program Notice 99-08, should be sent to: U.S. Department of Energy, Office of Science, Mathematical, Information, and Computational Sciences Division, ER-31, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB99-08. This address must also be used when submitting proposals by U.S. Postal Service Express Mail, any other commercial overnight delivery service, or when hand-carried by the proposer.

FOR FURTHER INFORMATION CONTACT: Dan Hitchcock, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone: (301) 903-6767, E-mail: hitchcock@er.doe.gov, fax: (301) 903-7774.

Program Funding

It is anticipated that up to $2 million will be available for multiple awards to be made in FY 1999 in the categories described above, contingent on the availability of appropriated funds. Proposals may request project support up to three years, with out-year support contingent on the availability of funds, progress of the research, and programmatic needs. Annual budgets are expected to range from $200,000 to $300,000 total costs.

Preproposals

A brief preproposal may be submitted. The preproposal should identify on the cover sheet the institution, Principal Investigator name, address, telephone, fax and E-mail address, title of the project, and the field of scientific research. The preproposal should consist of a two to three page narrative describing the research project objectives and methods of accomplishment. These will be reviewed relative to the scope and research needs of the Next Generation Internet Research in Basic Technologies Program.

Preproposals are strongly encouraged but not required prior to submission of a full proposal. Please note that notification of a successful preproposal is not an indication that an award will be made in response to the formal proposal.

The instructions and format described below should be followed. Reference Program Announcement LAB99-08 on all submissions and inquiries about this program.

OFFICE OF SCIENCE
GUIDE FOR PREPARATION OF SCIENTIFIC/TECHNICAL PROPOSALS
TO BE SUBMITTED BY NATIONAL LABORATORIES

Proposals from National Laboratories submitted to the Office of Science (SC) as a result of this program announcement will follow the Department of Energy Field Work Proposal process with additional information requested to allow for scientific/technical merit review. The following guidelines for content and format are intended to facilitate an understanding of the requirements necessary for SC to conduct a merit review of a proposal. Please follow the guidelines carefully, as deviations could be cause for declination of a proposal without merit review.

1. Evaluation Criteria

Proposals will be subjected to formal merit review (peer review) and will be evaluated against the following criteria which are listed in descending order of importance:

Scientific and/or technical merit of the project

Appropriateness of the proposed method or approach

Competency of the personnel and adequacy of the proposed resources

Reasonableness and appropriateness of the proposed budget

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement, the uniqueness of the proposer's capabilities, and demonstrated usefulness of the research for proposals in other DOE Program Offices as evidenced by a history of programmatic support directly related to the proposed work.

2. Summary of Proposal Contents

Field Work Proposal Format (Reference DOE Order 5700.7C) (DOE ONLY)
Proposal Cover Page
Table of Contents
Abstract
Narrative
Literature Cited
Budget and Budget Explanation

Other support of investigators
Biographical Sketches
Description of facilities and resources
Appendix

2.1 Number of Copies to Submit

An original and seven copies of the formal proposal/FWP must be submitted.

3. Detailed Contents of the Proposal

Proposals must be readily legible, when photocopied, and must conform to the following three requirements: the height of the letters must be no smaller than 12 point with at least 2 points of spacing between lines (leading); the type density must average no more than 17 characters per inch; the margins must be at least one-half inch on all sides. Figures, charts, tables, figure legends, etc., may include type smaller than these requirements so long as they are still fully legible.

3.1 Field Work Proposal Format (Reference DOE Order 5700.7C) (DOE ONLY)

The Field Work Proposal (FWP) is to be prepared and submitted consistent with policies of the investigator's laboratory and the local DOE Operations Office. Additional information is also requested to allow for scientific/technical merit review.

Laboratories may submit proposals directly to the SC Program office listed above. A copy should also be provided to the appropriate DOE operations office.

3.2 Proposal Cover Page

The following proposal cover page information may be placed on plain paper. No form is required.

Title of proposed project SC Program announcement title Name of laboratory Name of principal investigator (PI) Position title of PI Mailing address of PI Telephone of PI Fax number of PI Electronic mail address of PI Name of official signing for laboratory* Title of official Fax number of official Telephone of official Electronic mail address of official Requested funding for each year; total request Use of human subjects in proposed project:

If activities involving human subjects are not planned at any time during the proposed project period, state "No"; otherwise state "Yes", provide the IRB Approval date and Assurance of Compliance Number and include all necessary information with the proposal should human subjects be involved.

Use of vertebrate animals in proposed project:

If activities involving vertebrate animals are not planned at any time during this project, state "No"; otherwise state "Yes" and provide the IACUC Approval date and Animal Welfare Assurance number from NIH and include all necessary information with the proposal.

Signature of PI, date of signature
Signature of official, date of signature*

*The signature certifies that personnel and facilities are available as stated in the proposal, if the project is funded.

3.4 Abstract

Provide an abstract of no more than 250 words. Give the broad, long-term objectives and what the specific research proposed is intended to accomplish. State the hypotheses to be tested. Indicate how the proposed research addresses the SC scientific/technical area specifically described in this announcement.

3.5 Narrative

The narrative comprises the research plan for the project and is limited to 25 pages. It should contain the following subsections:

Background and Significance: Briefly sketch the background leading to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps which the project is intended to fill. State concisely the importance of the research described in the proposal. Explain the relevance of the project to the research needs identified by the Office of Science. Include references to relevant published literature, both to work of the investigators and to work done by other researchers.

Preliminary Studies: Use this section to provide an account of any preliminary studies that may be pertinent to the proposal. Include any other information that will help to establish the experience and competence of the investigators to pursue the proposed project. References to appropriate publications and manuscripts submitted or accepted for publication may be included.

Research Design and Methods: Describe the research design and the procedures to be used to accomplish the specific aims of the project. Describe new techniques and methodologies and explain the advantages over existing techniques and

methodologies. As part of this section, provide a tentative sequence or timetable for the project.

Subcontract or Consortium Arrangements: If any portion of the project described under "Research Design and Methods" is to be done in collaboration with another institution, provide information on the institution and why it is to do the specific component of the project. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation", "Biographical Sketches", and "Description of Facilities and Resources".

3.6 Literature Cited

List all references cited in the narrative. Limit citations to current literature relevant to the proposed research. Information about each reference should be sufficient for it to be located by a reviewer of the proposal.

3.7 Budget and Budget Explanation

A detailed budget is required for the entire project period, which normally will be three years, and for each fiscal year. It is preferred that DOE's budget page, Form 4620.1 be used for providing budget information*. Modifications of categories are permissible to comply with institutional practices, for example with regard to overhead costs.

A written justification of each budget item is to follow the budget pages. For personnel this should take the form of a one-sentence statement of the role of the person in the project. Provide a detailed justification of the need for each item of permanent equipment. Explain each of the other direct costs in sufficient detail for reviewers to be able to judge the appropriateness of the amount requested.

Further instructions regarding the budget are given in section 4 of this guide.

* Form 4620.1 is available at web site:
http://www.er.doe.gov/production/grants/forms.html

3.8 Other Support of Investigators

Other support is defined as all financial resources, whether Federal, non-Federal, commercial or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive

dates of the project or proposed project, annual funding, and level of effort devoted to the project.

3.9 Biographical Sketches

This information is required for senior personnel at the laboratory submitting the proposal and at all subcontracting institutions. The biographical sketch is limited to a maximum of two pages for each investigator.

3.10 Description of Facilities and Resources

Describe briefly the facilities to be used for the conduct of the proposed research. Indicate the performance sites and describe pertinent capabilities, including support facilities (such as machine shops) that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution, if any.

3.11 Appendix

Include collated sets of all appendix materials with each copy of the proposal. Do not use the appendix to circumvent the page limitations of the proposal. Information should be included that may not be easily accessible to a reviewer.

Reviewers are not required to consider information in the Appendix, only that in the body of the proposal. Reviewers may not have time to read extensive appendix materials with the same care as they will read the proposal proper.

The appendix may contain the following items: up to five publications, manuscripts (accepted for publication), abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions stating their agreement to participate in the project (do not include letters of endorsement of the project).

4. Detailed Instructions for the Budget
(DOE Form 4620.1 "Budget Page" may be used)

4.1 Salaries and Wages

List the names of the principal investigator and other key personnel and the estimated number of person-months for which DOE funding is requested. Proposers should list the number of postdoctoral associates and other professional positions included in the proposal and indicate the number of full-time-equivalent (FTE) person-months and

rate of pay (hourly, monthly or annually). For graduate and undergraduate students and all other personnel categories such as secretarial, clerical, technical, etc., show the total number of people needed in each job title and total salaries needed. Salaries requested must be consistent with the institution's regular practices. The budget explanation should define concisely the role of each position in the overall project.

4.2 Equipment

DOE defines equipment as "an item of tangible personal property that has a useful life of more than two years and an acquisition cost of $5000 or more." Special purpose equipment means equipment which is used only for research, scientific or other technical activities. Items of needed equipment should be individually listed by description and estimated cost, including tax, and adequately justified. Allowable items ordinarily will be limited to scientific equipment that is not already available for the conduct of the work. General purpose office equipment normally will not be considered eligible for support.

4.3 Domestic Travel

The type and extent of travel and its relation to the research should be specified. Funds may be requested for attendance at meetings and conferences, other travel associated with the work and subsistence. In order to qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Consultant's travel costs also may be requested.

4.4 Foreign Travel

Foreign travel is any travel outside Canada and the United States and its territories and possessions. Foreign travel may be approved only if it is directly related to project objectives.

4.5 Other Direct Costs

The budget should itemize other anticipated direct costs not included under the headings above, including materials and supplies, publication costs, computer services, and consultant services (which are discussed below). Other examples are: aircraft rental, space rental at research establishments away from the institution, minor building alterations, service charges, and fabrication of equipment or systems not available off-the-shelf. Reference books and periodicals may be charged to the project only if they are specifically related to the research.

a. Materials and Supplies

The budget should indicate in general terms the type of required expendable materials and supplies with their estimated costs. The breakdown should be more detailed when the cost is substantial.

b. Publication Costs/Page Charges

The budget may request funds for the costs of preparing and publishing the results of research, including costs of reports, reprints page charges, or other journal costs (except costs for prior or early publication), and necessary illustrations.

c. Consultant Services

Anticipated consultant services should be justified and information furnished on each individual's expertise, primary organizational affiliation, daily compensation rate and number of days expected service. Consultant's travel costs should be listed separately under travel in the budget.

d. Computer Services

The cost of computer services, including computer-based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates should be included.

e. Subcontracts

Subcontracts should be listed so that they can be properly evaluated. There should be an anticipated cost and an explanation of that cost for each subcontract. The total amount of each subcontract should also appear as a budget item.

4.6 Indirect Costs

Explain the basis for each overhead and indirect cost. Include the current rates.