

GRANTS FOR SCIENTIFIC COMPUTING RESEARCH ENVIRONMENTS FOR THE MATHEMATICAL SCIENCES (SCREMS)

Program Solicitation

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES
DIVISION OF MATHEMATICAL SCIENCES

PROPOSAL DEADLINE: *February 20*

NATIONAL SCIENCE FOUNDATION

The Division of Mathematical Sciences (DMS) of the National Science Foundation plans a limited number of grants for the support of computing environments for research in the mathematical sciences. This solicitation provides guidance for the preparation of eligible proposals.

Who may submit: Proposals may be submitted by U.S. educational institutions with ongoing research programs in mathematics, applied mathematics, or statistics. Proposals involving inter-institutional or inter-departmental sharing arrangements are welcome.

Purpose: SCREMS proposals are for computing environments dedicated to research in the mathematical sciences. Proposals may request support for purchase of computing equipment, and limited support for professional systems administrators or programmer personnel for research computing needs. These grants are intended for researchers of high quality and productivity whose research requires access to suitable equipment. Awards are made to provide support for specific research projects rather than to provide general computing capacity. Proposers are encouraged to include projects involving symbolic and algebraic computations and graphical representations (visualization) in aid of the research as well as those emphasizing traditional numerical computations and simulations.

Proposers and institutions may find appropriate other NSF sources of support for instrumentation, including: the Major Research Instrumentation (MRI) program, Program Announcement 98-16 (<http://www.nsf.gov/od/osti/mri/mri.htm>), and also the Instrumentation and Laboratory Improvement (ILI) program. ILI supports the development of new or improved laboratory courses or experiments in science, mathematics, engineering, and technology. The program predominantly supports Instrumentation Projects (ILI-IP), which provide matching grants for equipment needed to carry out a proposed project. The most recent due date for this program has passed (November 14, 1997).

Principal Investigator: Faculty member or members administratively responsible for the acquisition planning, use, and maintenance of the equipment. For convenience the Department Head may be designated, but this is not required.

Character of requests: This Program is intended to provide for needs that cannot be met by other research programs of NSF's Division of Mathematical Sciences. Requests are expected to be for support that is required jointly by several (two to five) research projects or difficult to justify for one project alone. Amalgamation of small requests that could be made to disciplinary research programs is discouraged.

When appropriate and cost-effective, requests for group or departmental servers may be suitable for the SCREMS program. It is especially important that the proposers make a strong case for the proposed computing environment as a coherent "computer system" and be able to describe thoroughly and in detail the impact of the proposed equipment on the proposed research activities. If this is intended to be the main computer system for a collection of research projects, describe the minimum computing requirements and explain, if necessary, why a more-than-

minimum system might be proposed. If the proposed equipment includes a "server" and "workstations," are the workstations of power equal to or greater than the server? This would require additional, separate justification.

Budget Request Size: If equipment is requested, the total discounted cost of equipment should be at least \$75,000. If support is requested only for professional systems administrators or programmer personnel for research computing needs, in accordance with the paragraphs below, then the minimum award request may be lower.

Some awards may be as high as \$200,000, provided a case is made for substantial impact and cost-effectiveness. The Division of Mathematical Sciences expects to provide about \$1,000,000 for this activity in Fiscal Year 1998, pending availability of funds. In Fiscal Year 1997, 21 awards were made.

PROPOSAL SUBMISSION

The cover sheet must be submitted via FastLane no later than February 20, 1998. Submission of the entire proposal via FastLane is strongly encouraged. All documentation must be received at NSF by February 25, 1997. The web location for FastLane is

<http://www.fastlane.nsf.gov>

The cover sheet and signed certification page must be sent to:

Announcement No NSF 98-31
NATIONAL SCIENCE FOUNDATION PPU
4201 Wilson Blvd Room P60
Arlington VA 22230

If only the cover sheet has been submitted electronically, ten (10) copies of the entire proposal must also be sent to NSF. Only one (1) copy of NSF Form 1225, Information about Principal Investigator/Project Director, should be sent, attached to the original signed proposal.

Proposals not meeting these conditions will be returned.

When to submit: Proposals submitted in response to this solicitation **must** be: (1) received by NSF no later than February 25, 1998; or (2) be postmarked no later than five (5) days prior to the deadline date; or (3) be sent via commercial overnight mail no later than two (2) days prior to the deadline date.

PROPOSAL FORMAT

Instructions for the preparation of an NSF proposal, information on proposal processing and general grant conditions are included in the publication *Grant Proposal Guide (GPG)*, NSF 98-2, available on the World Wide Web via

<http://www.nsf.gov/cgi-bin/getpub?gpg>.

Unless specified otherwise in this Solicitation, the procedures and conditions stated in that publication will apply.

Proposals should contain each of the seven parts detailed below, in the order given. Proposals should not exceed 15 pages in total length (10 or 12 point font) including any appendices, but excluding the Cover Sheet and Information about Principal

Investigators (NSF Forms 1207 and 1225), Table of Contents, the one-page NSF budget form (Form 1030), Biographical Sketches, and statement(s) of other support. **Proposals not adhering to the page limitations, or to the requirements of NSF 98-2, or not received by the deadline, will be returned.** The Biographical Sketches (*vitae*) section has its own page limit; the entire *vitae* section must not exceed three pages (see section V below).

I. Completed Cover Sheet and NSF Form 1225. (Cover sheet must be submitted via FASTLANE, per above).

1. Program Solicitation: For consideration by DMS-SCREMS; Solicitation number NSF 98-31
2. Title: Scientific Computing Research Environments for the Mathematical Sciences (SCREMS)

II. Project Summary - Proposal Section A

The proposal must contain a summary (200 words overall) briefly describing the equipment requested and the research projects for which it is to be used. Suggested format:

The Department(s) of _____ at
the _____ University (Universities) of _____
will purchase _____ equip-
ment which will be dedicated to the support of research in the
mathematical sciences. The equipment will be used for several
research projects, including in particular: (etc.).

III. Table of contents - Proposal Section B

IV. Project Description - Proposal Section C

This section must consist of the following:

- a) Brief description (not to exceed two pages) of minimum user requirements. Requirements for such items as operating systems, networking capability, compatibility with existing hardware, software requirements, speed, internal and external memory, resolution and color or monochrome capability, etc., should be included.
- b) *Abstracts of individual research projects.* For each of the proposed research projects (usually at least two, and strictly limited to five) give the project title, name(s) of participating researchers, and a short summary of the research project (100 words).
- c) *Detailed explanation of each proposed research project and its relationship to the requested equipment.* This portion of the proposal must not exceed 3 pages per project. For each project listed under Section IVb, above, give appropriate scientific justification and literature references, and explain how the research is dependent upon the requested equipment.

The scientific merit of the research made possible by the requested equipment, and the impact of the proposed equip-

ment on the research activity, are the most important selection criteria.

Proposals are judged by a broad panel of mathematical scientists, and some subareas of the mathematical sciences may not be represented by specialists. Thus, all proposals must contain descriptions of the research projects in sufficient detail so that the scientific merit of each project can be evaluated by qualified reviewers who may or may not be specialists in the proposed research areas. Particular emphasis should be given to those unique or new scientific capabilities which will ensue from the proposed acquisition.

- d) Detailed plan for maintenance and operation. Include names of individuals responsible for the equipment, and the annual budget that the institution will allocate for these purposes. This plan should be for a three year period. If personnel support is requested, please include relevant details, including qualifications and duties of individuals involved, and an explicit statement of the institution's agreement to assume personnel costs permanently, after a period not to exceed two years.
- e) Available equipment. **This section should include a complete description of equipment and related supporting personnel currently available to the Department(s).** List the research computing facilities that are presently available to the participating researchers, and if appropriate describe the support staff dedicated to maintenance and operation of the equipment and system. Make explicit reference to the current location, condition, and use of any equipment purchased by your institution under prior SCREMS grants. List current pending equipment requests to NSF and to other funding sources.

SCREMS proposals need not have a separate Proposal Section D - References Cited - as called for in the GPG. References may be cited within Proposal Section C.

V. Biographical Sketches - Proposal Section E

This section will consist of biographical data and will include only the academic essentials for the participating researchers listed under Section IVb above. This may include, for the participating researchers, a list of up to five publications most closely related to the proposed equipment acquisition, and up to five other significant recent publications. This material should appear in the *Biographical Sketches* section and will not be counted in the page limitation requirement. **The entire Biographical Sketches section is limited to no more than 3 pages.**

VI. Budget, Institutional Commitments and Cost Sharing - Proposal Section F.

Show total costs and all sources of support. The budget should make reference to a representative manufacturer and model numbers, with itemized and total costs. If the request is for equipment only, the total discounted cost of equipment should be at least \$75,000. If support is requested only for professional

systems administrators or programmer personnel for research computing needs, then the minimum award request may be lower.

Significant discounts or contributions of equipment may be available from some manufacturers. Principal Investigators are urged to explore this avenue of cost reduction, and any available discounts should be subtracted from the total budget request.

The proposal should describe the institution's provisions for space, installation, maintenance and operation of the requested equipment. NSF will not provide funds for these items, except as indicated below.

Institutions submitting proposals will be expected to bear a significant share of the cost of the proposed equipment — *at least* one-third of the net (after discount) cost. The level of institutional participation is to be clearly stated in the proposal and will be a major consideration in reaching final decisions. Virtually all currently funded proposals have cost sharing at a level of at least 50%. The institutional participation should not be expressed in terms of existing or irrelevant equipment, site preparation, maintenance, or installation costs.

SCREMS proposals may include requests for partial support (salary and fringe benefits) for professional systems administrators or programmer personnel for research computing needs. In each request for such, provision must be made by the University for substantial cost-sharing (at least half), in addition to agreeing to assume the cost permanently after a fixed, brief period, generally not to exceed two years. (Graduate students performing these functions will not be supported under this program).

No indirect costs will be permitted on equipment portions of grants. It is expected that the indirect cost rate applied to personnel will be limited to not more than 10%, with the difference between the actual indirect cost rate and 10% allocated to the substantial cost-sharing required on SCREMS awards.

VII. Current and pending project support - Proposal Section G.

This includes all anticipated requests for such, from whatever source (e.g., Federal, State or local government agencies, private foundations, industrial or other commercial organizations). See II.D.8 of the GPG (NSF 98-2).

SELECTION CRITERIA

Section IV describing research projects and the dependence of the research on the support requested is the most important part of the proposal. A proposal for a coherent computer system that meets the needs of the research is more competitive than a proposal about which questions arise as to the appropriateness of the particular hardware proposed for the particular research proposed.

Proposals submitted in response to this program solicitation will be subject to the NEW merit review criteria approved by the National Science Board on March 28, 1997 (NSB97-72). The new merit review criteria are:

I. What is the intellectual merit and quality of the proposed activity?

The following are suggested questions that the reviewer will consider in assessing how well the proposal meets this criterion. Each reviewer will address only those questions that he/she considers relevant to the proposal and for which he/she is qualified to make judgments.

How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

II. What are the broader impacts of the proposed activity?

The following are suggested questions that the reviewer will consider in assessing how well the proposal meets this criterion. Each reviewer will address only those questions that he/she considers relevant to the proposal and for which he/she is qualified to make judgments.

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

In addition to the above generic review criteria, reviewers will be asked to use the following criteria, not necessarily in order of importance, when reviewing proposals that respond to this solicitation.

- Quality and significance of the research for which the equipment will be used,
- Qualifications and productivity of researchers,
- Justification of need for proposed equipment, and impact of the proposed equipment on the research activity.
- Choice and appropriateness of equipment,
- Appropriateness of personnel support,
- Plan for maintenance and operation, and
- Institutional cost-sharing and related support.

REQUEST FOR ADDITIONAL INFORMATION

NSF Publications and Forms cited in this publication may be obtained upon request. Questions concerning these proposals should be directed to:

Program Director for SCREMS
Division of Mathematical Sciences
Room 1025
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
Telephone: (703) 306-1870
e-mail: SCREMS@nsf.gov

GRANT ADMINISTRATION

Awards made as a result of this announcement are administered in accordance with the terms and conditions of NSF GC-1, "Grant General Conditions," or FDP-III, "Federal Demonstration Partnership General Terms and Conditions," depending on the grantee organization. Cooperative agreements are subject to NSF Cooperative Agreements General Conditions (NSFCA-1). Copies of these documents are available at no cost from the NSF Publications Clearinghouse, telephone (301) 949-2722, or via e-mail pubs@nsf.gov (Internet). More comprehensive information is contained in the NSF Grant Policy Manual (NSF 95-26, July 1995), for sale through the Superintendent of Documents, Government Printing Office, Washington, DC 20404. The telephone number at GPO is (202) 783-3238 for subscription information.

REPORTING REQUIREMENTS

Upon completion of the project, a Final Project Report (NSF Form 98A), including Part IV Summary, will be required. NSF will send the form with Part I information preprinted to the Principal Investigator (Project Director) approximately one month prior to the grant's expiration date. Applicants should review the sample form in the GPG prior to proposal submission so that appropriate tracking mechanisms are included in the proposal plan to ensure that complete information will be available at the conclusion of the project.

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities,

and persons with disabilities to compete fully in any of the research related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act and Public Burden. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995). Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Gail McHenry, Reports Clearance Officer, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

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