

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) <small>(Indicate the most specific unit known, i.e., program, division, etc.)</small> Computer & Information Science & Engineering		FOR NSF USE ONLY NSF PROPOSAL NUMBER		
PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE NSF 93-112/REU/August 4, 1993				
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	FILE LOCATION
Employer Identification Number (EIN) or Taxpayer Identification Number (TIN) IRS #381381271N	Show Previous Award No. If This Is: <input checked="" type="checkbox"/> A Renewal or <input type="checkbox"/> An Accomplishment-Based Renewal CDA-9200118		Is This Proposal Being Submitted To Another Federal Agency? YES _____ NO <input checked="" type="checkbox"/> _____ If YES, List Acronym(s)	
Name of Organization to Which Award Should be Made: Hope College		Address of Awardee Organization, Including Zip Code: Department of Computer Science Hope College Holland, MI 49422-8000		
Awardee Organization Code (if known)				
Name of Performing Organization, If Different From Above		Address of Performing Organization, If Different, Including Zip Code:		
Performing Organization Code (if known)				
Is Submitting Organization: <input type="checkbox"/> For Profit Organization <input type="checkbox"/> Small Business <input type="checkbox"/> Minority Business <input type="checkbox"/> Woman Owned Business				
Title of Proposed Project REU: An Undergraduate Research Participation Program in Computer Science				
Requested Amount \$ 102,000	Proposed Duration (1-60 months) 36 months	Requested Starting Date March 1, 1995		
Check Appropriate Box(es) If This Proposal Includes: <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Vertebrate Animals <input type="checkbox"/> Human Subjects <input type="checkbox"/> Historical Places <input type="checkbox"/> Beginning Investigator (See GPG Section I) <input type="checkbox"/> Group Proposal <input type="checkbox"/> Small Grant For Exploratory Research (SGER, See GPG Section II, C. 12) </div> <div> Any of the Items Listed Below: <input type="checkbox"/> National Environmental Policy Act <input type="checkbox"/> Proprietary and Privileged Information <input type="checkbox"/> Disclosure of Lobbying Activities </div> <div> <input type="checkbox"/> Facilitation for Scientists/Engineers with Disabilities <input type="checkbox"/> Research Opportunity Award <input type="checkbox"/> International Cooperative Activity: </div> </div>				
Country/Countries				
P/VPD Department Computer Science		P/VPD Postal Address Department of Computer Science Hope College Holland, MI 49422-8000		
P/VPD Fax Number 616-395-7123				
Names (Typed)	Social Security No.*	High Degree, Yr	Telephone Number	Electronic Mail Address
P/VPD Name Herbert L. Dershem	271-40-8660	Ph.D. 1969	616-395-7508	dershem@cs.hope.edu
Co-P/VPD				
Co-P/VPD				
Co-P/VPD				
Co-P/VPD				
NOTE: The FULLY SIGNED Certification Page must be submitted immediately following this Cover Sheet.				
<small>*Submission of social security numbers is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing the proposal. SSN solicited under NSF Act of 1950, as amended.</small>				

PROJECT SUMMARY

The Project Summary should include a statement of objectives, methods to be employed, and the significance of the proposed activity to the advancement of knowledge or education. Avoid use of the first person to complete this summary. DO NOT EXCEED ONE PAGE. (Some Programs may impose more stringent limits.)

NSF RESEARCH EXPERIENCES FOR UNDERGRADUATES PROGRAM

Project Summary Form

Type all entries. See the reverse side for instructions and codes to be used in filling out this form.

1. Major Field: Computer Science 2. Highest Degree Code: B
3. Subfields: _____ 4. Focus Code: UD
5. Audience Code(s): WM 6. Scope Code: N 7. Type of Project: SI
8. Name of Institution: Hope College 9. Inst. Code: PRIV
10. Name of Principal Investigator: Herbert L. Dershem Tel.No. 616-395-7508
11. Name of Student Recruitment Point-of-Contact: Herbert L. Dershem
SRPOC Tel.No.: 616-395-7508 SRPOC e-mail address: dershem@cs.hope.edu
12. Project Title: REU: An Undergraduate Research Participation Program in Computer Science

13. Number of Students Involved: 6 per year 14. Activity Period: _____ S
15. Other Institutions Involved: None, though three students per year will be attending institutions other than Hope College

16. Summary of Proposed Work:

The REU program at Hope College is designed to provide talented undergraduates with a meaningful research experience that will encourage them to consider a career in computer science research. Our goal is to expose the students to the techniques, attitudes, and rewards of computer science research and to provide encouragement and direction in the pursuit of such a career. We will strongly recruit women and minority students to our program. Six participants will be selected each year, three from Hope College and three from other institutions. Those students will work for ten weeks during the summer in close collaboration with a Hope faculty mentor. Students will have the opportunity to use the Hope College Computer Science SUN SPARCstation network as well as the INMOS transputers. Areas of research include parallel algorithms, system development environments, data communications, voice recognition, graphics algorithms, algorithm animation, and programming language comparisons. The students will perform independent research, give oral presentations on their work, attend workshops on graduate school, prepare scientific papers, and present their work at seminars at their home institutions.

TABLE OF CONTENTS

For font size and page formatting specifications, see GPG section II.C.

Section	Total No. of Pages in Section*
Cover Sheet (NSF Form 1207 - Submit Page 2 with original proposal only)	1
A Project Summary (NSF Form 1358 (not to exceed 1 page))	1
B Table of Contents (NSF Form 1359)	13
C Project Description (NSF Form 1360) (including Results from Prior NSF Support) (not to exceed 15 pages) Exceed only if approved in advance of proposal submission by NSF Assistant Director or Program Announcement/Solicitation	4
D Bibliography (NSF Form 1361)	5
E Biographical Sketches (Not to exceed 2 pages each.)	1
F Summary Budget (NSF Form 1030, including up to 3 pages of budget justification.)	
G Current and Pending Support (NSF Form 1239)	
H Facilities, Equipment and Other Resources (NSF Form 1363)	
I Special Information/Supplementary Documentation	1
J Appendix (List below.) Include only if approved in advance of proposal submission by NSF Assistant Director or Program Announcement/Solicitation.	
Appendix Items: Recruitment materials	

NARRATIVE

1 INTRODUCTION

Hope College is a four-year liberal arts college dedicated to excellence. The Science Division at Hope College is one of the strongest divisions of its kind at any four-year college. Hope College was the site of the next national meeting of the Council on Undergraduate Research in 1992 and is the recipient of a recent major grant from the Kellogg Foundation to help improve K-8 science and mathematics education as well as grants from Sherman Fairchild Foundation and the Kresge Foundation to fund major equipment purchases.

The faculty and administration of Hope College believe research participation by undergraduates to be a critical component in the training of future scientists. All of the science departments at Hope College offer independent study programs involving student research for which academic credit is awarded. Outstanding majors are encouraged to continue their research on a full time basis during the summer months. For the past three summers, the Computer Science Department has been one of four Hope College science departments with REU summer research programs. In addition, the department has had two students participate in summer REU projects at other institutions.

Hope College has a long tradition of undergraduate research in the sciences. The Computer Science Department has become a part of this tradition. A recent study indicated that Hope was the third most productive institution in Computer Science research from among the 48 institutions in the "Oberlin group" as measured by publications in the period 1977-1987. During the 13 year period from 1981-1994, the Computer Science Department graduated 190 majors. Of those, 34 attended graduate or professional school and 164 participated in a Research/Independent Study course during the academic year.

Institutional Support Hope College strongly encourages faculty/student collaborative research. Undergraduate research with NSF support was carried out by more than 70 students during the summer of 1994 in the departments of Computer Science, Physics, Mathematics, Biology, and Chemistry. Institutional support for collaborative research outside of the sciences has increased by the establishment of a President's Discretionary Fund for this purpose.

2 RESULTS FROM PRIOR NSF SUPPORT

Grant Number: CDA-9200118

Amount of Award: \$86,550

Support Period: April 1, 1992 to September 30, 1995

Title: REU: An Undergraduate Research Participation Program in Computer Science

2.1 Summer, 1992

2.1.1 Recruitment

In February, 1992, information about the Hope REU program was sent to most undergraduate Computer Science departments in the United States. We contacted as many as possible via the InterNet and mailed announcements to other schools that we thought would have good candidates. We received 82 applications from institutions other than Hope College and 7 applications from Hope students. After an extensive selection process which involved all three of the participating faculty, we chose 6 students to participate, three from Hope College, one from Plymouth State University, one from Taylor University, and one from the University of Dayton.

2.1.2 Projects

The research program began on June 1, 1992 and extended until August 7. The participants were placed in research teams, two working with each professor. A third member was added to one team with support from the Pew Midstates Consortium, and an additional student was funded by local funds to serve as the systems programming assistant to all groups.

The three projects were as follows:

An Object Oriented Application/Programmer Interface for Network Programming

Faculty Mentor: Shirley Browne

Undergraduate Researchers: Jennifer Howell, Ming Shu*, Robert Wohlfarth

*** Supported by Pew Midstates Consortium Undergraduate Research Grant.**

This project developed an Application/Programmer interface designed to support a structured approach to network programming. Special attention has been paid to the needs of multimedia applications and to the future requirements of network protocols. After surveying the current approaches, the need was observed for an interface which provides ease of use, extensibility, and portability. An object-oriented method, which will meet these needs, was proposed and described. Certain features of real-time applications, such as synchronization, are not currently supported, but will be addressed as areas for further study.

Using the Computer to Visualize and Simulate Models of Abstract Models of Computation

Faculty Mentor: Herbert Dershem

Undergraduate Researchers: Brett Folkert, Ryan McFall

There are many models of computation including finite state automata, push down automata, and Turing Machines. A program called TUMS has been developed to aid in the construction and understanding of these models. With this tool, the student will better understand the capabilities and limitations of a particular model because the student will be able to build and execute specific machines in a visually manipulated environment.

Photosynthesis: An Object Oriented Test Bed for Parallel Ray Tracing

Faculty Mentor: Gordon Stegink

Undergraduate Researchers: Eric Matthews, Mike Shield

Ray tracing has emerged as one of the most popular techniques for image synthesis. However, its computationally intense nature makes it practical only on dedicated computer graphic workstations and supercomputers. Beyond efficiency schemes such as bounding volumes and octrees, the next step appears to lie in concurrent solutions. Photosynthesis was developed as an object oriented test bed for ray tracing in parallel, utilizing existing hardware and PVM (Parallel Virtual Machine). PVM was developed at Oak Ridge National Laboratory and enables networked computers to function as a single computing resource. Photosynthesis is a PVM application comprised of two separate processes that break the viewplane into sections for rendering on different processors. The diversity of PVM coupled with object oriented design makes Photosynthesis very adaptable software for experimental ray tracing.

In addition to the research work that was carried out, and weekly seminars which were devoted to reports on the research, several other activities were provided in the program. Professor Dershem conducted a preparation seminar for the Computer Science GRE in four weekly evening sessions. The entire group of students and faculty attended the SIGGRAPH Annual Conference together. Weekly social gatherings were held at the homes of the faculty or other suitable locations.

2.1.3 Post-Summer Results: Presentations and Papers

Eric Matthews and Michael Shield presented a paper on their work with Professor Stegink at the Argonne Symposium for Undergraduate Research on November 7, 1992.

Two papers were presented at the Pew Midstates Consortium Undergraduate Research Symposium on November 14, 1992, one by Ryan McFall on his work with Professor Dershem and the other by Ming Shu on his work with Professor Browne.

Jennifer Howell, Robert Wohlfarth, and Ming Shu presented a paper at the 1993 Symposium on Applied Computing about their work with Professor Browne in the summer of 1992.

Ryan McFall presented his work as a member of a panel on the REU program at the 1993 SIGCSE Symposium. In addition, McFall and Dershem have co-authored a paper, "Finite State Machine Simulation in an Introductory Lab," which was presented at the 1994 SIGCSE Technical Symposium on Computer Science and included in the Proceedings.

2.2 Summer, 1993

2.2.1 Recruitment

In January, 1993, we sent information about the Hope REU program to most undergraduate Computer Science departments in the United States. We contacted as many as possible via the InterNet and mailed announcements to other schools that we thought would have good candidates. We included a special mailing to the Computer Science departments at predominately minority institutions and to the minority affairs officers at major universities. We received 59 completed applications from institutions other than Hope College and 11 applications from Hope students. After an extensive selection process which involved all three of the participating faculty, we chose 6 students to participate, three from Hope College, one from Plymouth State University, one from DePauw University, and one from the Gustavus Adolphus College.

2.2.2 Projects

The research program began on May 24, 1993 and extended until July 30. The participants were placed in research teams, two working with each professor. Two additional members were added to one team with support from a NASA grant, and an additional student volunteer was added to another group as a programming support person. There were nine student participants in all. In addition, the pool of applicants for the REU program provided two summer research students for Professor Shirley Browne of the Hope College Computer Science Department who spent the summer of 1993 doing research at the University of Tennessee and Oak Ridge National Laboratories on the XLib project. Those two students were supported by funding from the Department of Energy.

The three projects at Hope College were as follows:

AdaVision and THREADS: Algorithm Animations and Experimental Laboratories for Teaching a Data Structures Course in Ada

Faculty Mentor: Herbert Dershem

Undergraduate Researchers: Wendy Barth, Cheri Bowsher, Bob Chen*

***Volunteer undergraduate assistant**

The goal of the project is to implement a laboratory for the data structures course using Ada and algorithm visualization and animation techniques. The work involved enhances the course and contributes to the learning success of enrolled students. The first half of the project, AdaVision, is an instructional aid consisting of six algorithm animations. The second half of the project consists of the development of a tool called THREADS used to run experiments in a laboratory setting.

AdaVision combines Ada code with dynamic images to serve as a teaching tool for data structures courses taught in Ada. Using the algorithm animation package XTANGO, animations are created so students may view the connection between Ada code and the action of algorithms on data and data structures. With the exception of the AVL insertion, the Ada code associated with each algorithm appears in the display area of XTANGO.

THREADS (Test Harness for Repetitive Experiments on Ada Data Structures) is a tool that can be used to run tests on data structures and algorithms in a laboratory setting, reporting back to the user some type of measurement of the test. The tests are black box programs that are implemented separately, using Ada packages, and may be tested and run separately as well. Because of THREADS' use of Ada packages, students are exposed to more data structures and algorithms. Students will spend their time seeing and experiencing the effects of algorithms instead of coding the algorithms and corresponding data structures. This should increase their ability to analyze the effectiveness and/or efficiency of different approaches to a problem.

The Genetic Algorithm Parallel Programming Project

Faculty Mentor: Gordon Stegink

Undergraduate Researchers: Russell Nelson, Bryan Showers

The Genetic Algorithm Parallel Programming Project is a combination of the study of Genetic Algorithms and Parallel Programming. The Genetic Algorithm portion of the project involves a graphical interface program that enhances the visualization of the results of a basic Genetic Algorithm program. The program illustrates a Genetic Algorithm which finds a path between two points, subject to constraints. Chromosome bits represent the directions

of the pieces of the path. The Genetic Algorithm starts by taking random guesses on finding this path. As the algorithm cycles through subsequent generations it evolves into a single path. The program visualizes the different paths taken as values in a color ramp. As a piece of the path is more frequently traveled the color darkens. Similarly, as a piece is less frequently traveled the color of the path gets lighter. The study of Parallel Programming used PVM (Parallel Virtual Machine), and implemented a non-graphical Simple Genetic Algorithm program in which several populations ran at the same time, each on its own slave machine under the control of a master machine.

An Empirical Case Study of Software Integration Techniques

Faculty Mentor: Michael Jipping

Undergraduate Researchers: Jonathan Beard*, Michael Crider*, Serge Hallyn, Nicholas Rahn

*** Supported by grant from NASA**

Software integration refers to various ways of building an infrastructure in which separate programs can work together. The software engineering community has specified and researched several different methods for integrating software; some of these have been specified as standards for the software community. This project studies the effectiveness of implementations of two different strategies: ToolTalk, from Sun Microsystems, implements control integration and the Portable Common Tool Environment (PCTE), from Emaraude, implements data integration. The project studied the methods, the features of each integration technique used, sought to summarize experience gained in the implementation, and evaluated each method in the light of the software implementation.

In addition to the research work that was carried out, and weekly seminars which were devoted to reports on the research, several other activities were provided in the program. Professor Dershem conducted a preparation seminar for the Computer Science GRE in four weekly evening sessions. Weekly social gatherings were held at the homes of the faculty or other suitable locations.

The research program began on May 24, 1993 and extended until July 30. The participants were placed in research teams, two working with each professor. Two additional members were added to one team with support from a NASA grant, and an additional student volunteer was added to another group as a programming support person. There were nine student participants in all. In addition, the pool of applicants for the REU program provided two summer research students for Professor Shirley Browne of the Hope College Computer Science Department who spent the summer of 1993 doing research at the University of Tennessee and Oak Ridge National Laboratories on the XLib project. Those two students were supported by funding from the Department of Energy.

2.2.3 Post-Summer Results: Papers and Presentations

Russell Nelson and Bryan Showers presented a paper, "The Genetic Algorithm Parallel Programming Project" at the Pew Midstates Consortium Undergraduate Research Symposium in Chicago on November 7, 1993.

A paper entitled "AdaVision and THREADS: Algorithm Animations and Experimental Laboratories for Teaching a Data Structures Course in Ada," was presented at the Argonne Symposium for Undergraduate Research on November 5, 1993 by Wendy Barth and Cheri Bowsher on their work with Professor Dershem.

The four students who worked with Professor Jipping presented their results in a technical symposium at Langley Space Flight Center on October 22, 1993.

2.3 Summer, 1994

2.3.1 Recruitment

In January, 1994, we sent information about the Hope REU program to most undergraduate Computer Science departments in the United States. We contacted as many as possible via the InterNet and mailed announcements to other schools that we thought would have good candidates. We included a special mailing to the Computer Science departments at predominately minority institutions and to the minority affairs officers at major universities. The majority of contacts were made on the internet. Forms were made available on the World Wide Web and via FTP. Announcements were distributed to the USENET newsgroup Comp.Edu and to various other

lists. We received 65 completed applications from institutions other than Hope College and 12 applications from Hope students. After an extensive selection process which involved all three of the participating faculty, we chose 6 students to participate, three from Hope College, one from St. Joseph College in Indiana, one from Susquehena University, and one from the Haverford College.

2.3.2 Projects

Creating an Integrated Concurrent System Design Environment

Faculty Mentor: Michael J. Jipping

Undergraduate Researchers: Mike Crider*, Serge Hallyn*, John Duperon, Heather Mintz

* Supported by grant from NASA

The overall goal of the research project was to develop an integrated set of tools capable of designing and evaluating parallel system software in the context of various parallel hardware configurations. The research continued work started by the principal investigator as part of a research team at NASA Langley Research Center investigating tool integration methods and at Hope College on parallel software design tools.

This work was the second part of the overall project, beginning to investigate and construct an integrated design environment. The environment design philosophy, its components, and the way they integrate together and with existing tools were developed. Specifically, a graphical user interface to an integrated tool environment was constructed along with a tool to seek out and correct anomalies in parallel program code.

Algorithm Visualization and Animation

Faculty Mentor: Herbert L. Dershem

Undergraduate Researchers: Cheri Bowsher, Darrick Brown

The overall goal of this project is to implement a laboratory for the data structures course using Ada, algorithm visualization and animation techniques, and algorithm measurement using a tool called THREADS. Manuals have been developed to be used by students to guide their work in the laboratory. The work done in this project enhances the course and contributes to the learning success of the enrolled students.

Previous work on this project includes 6 completed algorithm animations and a basis for the THREADS program. The previously created animations include linked list, infix to postfix conversion, binary tree insert and delete, AVL tree insertions with rotations, splay tree zig-zag and zig-zig rotations, and AVL single and double rotations. Previous work on THREADS included the creation of the interface and fundamental program routines.

The philosophy used in developing the laboratory maintains that individual laboratory sessions be closed, use Ada packages, involve algorithm measurement experiments, and make use of algorithm animation. A closed laboratory means that collectively, all students have a scheduled time to work in the lab setting. An instructor is also present at this time to aid and direct their work. Many of the Ada packages are already developed, and any packages that do not already exist can be easily implemented by the students. Thus, more data structures can be covered in the course. The animations help students become more familiar with algorithms and the experiments allow students to experience different qualities of the algorithms.

Electric Darwinism: Finding an Ideal Path Using Genetic Algorithms

Faculty Mentor: Gordon A. Stegink

Undergraduate Researchers: Deborah Kaplan, Nick Slager

Our program, Road, is a genetic algorithm designed to evolve the best possible path between two "houses". The initial population of paths is a selection of chromosomes in which each randomly generated allele corresponds to the instruction to move one space "east", "northeast" or "southeast". The fitness of the path is determined by the distance between its final destination and its intended goal, and by the area between the given path and the straight path between the two houses. Along the path are obstacles which try to hinder the line from reaching its given destination. The hindering objects are randomly placed on the screen; each type of object (a "village", or some "terrain"), has a set value by which it effects fitness. As the "roads" run, the program graphics produce a visual representation of the algorithm. By imitating nature's methods of improvement, our program dynamically optimizes the route between the two houses.

In addition to the research work that was carried out, and weekly seminars which were devoted to reports on the research, social gatherings were held at the homes of the faculty or other suitable locations.

The research program began on May 23, 1994 and extended until July 29. The participants were placed in

research teams, two working with each professor. Two additional members were added to one team with support from a NASA grant. There were eight student participants in all.

2.3.3 Post-Summer Results: Papers and Presentations

At the time of the writing of this proposal, no presentations have been made although each team is planning on submitting their work for presentation during the 1994-95 academic year.

2.4 Bibliography

The following is a bibliography of publications and presentations from the first two years of the Hope College REU Computer Science project at the time of the preparation of this proposal. Others are planned for the near future.

2.4.1 Papers presented

McFall*, R. 1992. Using the Computer to Visualize and Simulate Abstract Models of Computation. Pew Midstates Consortium Undergraduate Research Symposium. Grinnell, IA., October

Shu*, M. 1992. An Object-Oriented Application/Programmer Interface. Pew Midstates Consortium Undergraduate Research Symposium. Grinnell, IA.

Matthews*, E. and M. Shield*. 1992. Photosynthesis: An Object-Oriented Test Bed for Parallel Ray Tracing. Argonne Symposium on Undergraduate Research. Argonne, IL.

Howell*, J., R. Wohlfarth*, and M. Shu*. 1993. An Object-Oriented Application/Programmer Interface for Network Programming. Symposium on Applied Computing. Indianapolis, IN.

Engel, G., H. Dershem, R. McFall*, A. Lopez, and S. Wiltz. 1993. Research Experience for Undergraduates Panel. SIGCSE Technical Symposium on Computer Science Education. Indianapolis, IN.

Nelson*, R. and B. Showers*. 1993. The Genetic Algorithm Parallel Programming Project. Pew Midstates Consortium Undergraduate Research Symposium. Chicago, IL.

Barth*, W. and C. Bowsher*. 1993. AdaVision and THREADS: Algorithm Animations and Experimental Laboratories for Teaching a Data Structures Course in Ada. Argonne Symposium for Undergraduate Research. Argonne, IL.

Dershem, H. 1993. Algorithm Animation for Data Structures. United States Air Force Academy Computer Science Colloquium. USAF Academy, CO.

Jipping, M., S. Hallyn*, M. Crider*, N. Rahn*, and J. Beard. 1993. An Empirical Case Study of Software Integration Techniques. NASA Langley Space Flight Center Symposium. Langley, VA.

McFall*, R. and H. Dershem. 1994. Finite State Machine Simulation in an Introductory Lab. SIGCSE Technical Symposium on Computer Science Education. Phoenix, AZ.

2.4.2 Papers Published

Howell*, J., R. Wohlfarth*, and M. Shu*. "An Object-Oriented Application/Programmer Interface for Network Programming," Proceedings of the 1993 Symposium on Applied Computing, 1993.

McFall*, R. and H. Dershem. "Finite State Machine Simulation in an Introductory Lab," SIGCSE Bulletin, 26,1 (1994), pp. 126-130.

3 NATURE OF STUDENT ACTIVITIES

3.1 Student Involvement

The student participants in this project will be expected to spend a minimum of 40 hours per week for 10 weeks on the research project to which they are assigned. Each student will be assigned a faculty mentor, two or more students being assigned to each mentor and working as a team. Early in the program, the students will work closely with their mentors, but as they gain experience they will be encouraged to work more independently. Each

student will do library research in addition to the laboratory research so that they become familiar with techniques for searching and using research literature.

3.2 Student Orientation

The P.I. will serve as the program coordinator and will be responsible for all of the administrative details including housing arrangements, stipend payments, mentor assignments, scheduling of starting dates for students, the seminar program, organizing social activities, and submission of progress reports. It will be particularly important for the P.I. to provide an orientation to the campus and the department for the non-Hope student participants. All students will receive an orientation to the departmental laboratory facilities, both hardware and software, and the library facilities, particularly the use of various research tools.

During the orientation period, each mentor will also provide her students with the particular information needed to carry out the assigned project.

3.3 Weekly Seminars

Each week a seminar will be held which will be attended by all students and faculty. Early in the project period, each student will present one seminar describing the nature of the problem being investigated and a proposed research plan. At the end of the project period, each student will present the results of the research project.

In addition to these student presentations, other seminars will include faculty presentations on research methods, technical writing, and the use of various computer resources. Also, Hope alumni who are currently attending graduate school in Computer Science will present seminars and informally meet with the research students to describe the nature of graduate study in Computer Science.

3.4 Research Projects

The problems described below represent research interests of Hope faculty that could be made available to undergraduate students as research projects in this program. Each project describes how a student could meaningfully participate and is designed to require the student to apply experience and information gained in formal classroom instruction.

Project 1: Probabilistic and Parallel Techniques applied to the construction of two-dimensional Voronoi diagrams

Herbert L. Dershem

Not until recently have studies appeared introducing parallel construction of Voronoi diagrams.^{1 2 3 4} Even less has been done in the applications of probabilistic techniques to the same problem.⁵ We propose the implementation of basic tools for the construction and display of Voronoi diagrams in two dimensions using the two classical approaches, divide-and-conquer⁶ and sweepline⁷ followed by the study and implementation of parallel

1. A. Aggarwal, B. Chazelle, L. Guibas, C. O'Dunlaing, and C. Yap, *Proc. 26th IEEE Symp. Found. Comput. Sci.*(1985)
2. H. Dadoun and D.G. Kirkpatrick, *Proc. 3rd ACM Symp. Comput. Geom.*(1987)
3. O. Schwarzkopf, *Proc. 6th Annual Symp. Theor. Aspects of Comp. Sci.*(1989)
4. R. Cole, M.J. Goodrich and C. O'Dunlaing, *Automata, Languages, and programming, Proc. of 17th Annual Symp.*(1990)
5. L.J. Guibas, D.E. Knuth, and M. Sharir, *Automata, Languages and programming, Proc. of 17th Annual Symp.*(1990)
6. M.I. Shamos and D. Hoey, *Proc. 16th IEE Symp. Found. Comput. Sci.*(1975)
7. S.J. Fortune, *Algorithmica* 2(2):153-174 (1987)

and probabilistic approaches. We will also apply the same techniques to the solution of related problems such as Delaunay triangulation and Convex Hulls.

Implementation will be done using the SUN SPARCstations and Transputers.

Project 2: Client Design for Network Searching

Shirley V. Browne

Efficient access to network resources will require a transition from a browsing to a searching paradigm. Current World-Wide Web browsers, such as Mosaic, are oriented towards browsing and provide only gateways to search services, rather than integrating native support for searching into the main client program. As a result, the user is faced with a variety of search interfaces and must carry out separate searches of the available search services. Users are given little guidance in formulating queries and typically have no way to evaluate the effectiveness of a search (e.g., whether a search was unsuccessful because no information was available or because inappropriate query terms were used).

This research will focus on designing effective native search support for WWW clients. The following issues will be investigated:

- Effective hypertext display of on-line thesauri and their syndetic structures (e.g., broader terms, narrower terms, related terms), including assistance to the user in refining and modifying searches.
- Automatic translation of user entry vocabularies into controlled vocabularies used in various indexes.
- Combination and manipulation of search results and elimination of redundancy.
- Negotiation of query result syntax and format with search servers (e.g., via the Z39.50 protocol).
- Provision for user control over search strategies (e.g., maximizing precision or recall, setting cutoff values).

Resources which may be used in carrying out this project include the following:

- The on-line GAMS (Guide to Available Math Software) classification and thesaurus, developed by the Computing and Applied Mathematics Laboratory at NIST.
- The Z39.50 client library available from the Clearinghouse for Networked Information Discovery and Retrieval (CNIDR).
- Client libraries for Universal Resource Name resolution being developed at the Corporation for Research Initiatives (CNRI) and at the University of Tennessee.
- A Latent Semantic Indexing (LSI) database service under development at the University of Tennessee.

Project 3: Concurrent Software Metrics

Michael J. Jipping

Concurrent software design differs from sequential software design in several significant respects. Little has been done to coordinate and integrate the solutions to parallel and sequential design. This project focuses on tools for the design phase of concurrent systems, specifically contextual concurrent software metrics. The project develops metrics addressing a specific issue in concurrent system design: verifying the absence of anomalies in a design. It also works at developing a measure of anomalies present in a design and implementing anomaly resolution, refining and extending the work of Taylor and Muhanna. The objectives are threefold: (1) define anomalies in a way that is meaningful at the design phase; (2) define and implement adaptations of algorithms that will address the presence of anomalies in a concurrent design; and (3) develop and implement resolution algorithms for both deadlock and resource corruption anomalies. Students have been participating in this project for the past three years.

This project is being developed jointly with NASA/JOVE and the NASA Langley Research Center.

Project 4: Voice Recognition

Michael J. Jipping

This project will develop software for a voice recognition system that is (1) inexpensive, (2) easily added to existing systems, and (3) flexible and extensible. The software will be part of a larger project to produce the "VoiceBox": a small computing unit that can be connected to a computer and uses software on the box and in the host computer to recognize and interpret voice input. This VoiceBox is based on INMOS Transputers for processing and will take one to four of them. The driving software will adapt itself to the number of units in the box. This project has several novel parts: combining neural network technology with compiler construction lexical analysis techniques to build the phoneme recognizer; providing an adaptable parallel implementation to the

phoneme recognizer; and providing a "translator/interpreter toolkit" for the construction of one's own translator or interpreter.

Project 5: Using readability measures to estimate software complexity

Herbert L. Dershem

Previous student research has developed several measures of software complexity based on formulas used to estimate the readability of English text. This project would extend the work done in the following ways: (1) obtain empirical data based on comparisons of new metrics with traditional metrics on sample software; (2) experiment with changes in parameters in the readability metrics to further refine their accuracy; and (3) implement parsers to evaluate these metrics in a variety of languages.

Project 6: World-Wide Web Client Extension Mechanisms

Shirley V. Browne

Current general-purpose World-Wide Web browsers are not easily customizable for users with specialized needs. For example, a molecular biologist may wish to have his or her client program understand and manipulate a special data format for a molecular database or interact with a remote execution service that processes user-originated data. Client flexibility and adaptability would be greatly increased by providing a mechanism for automatically extending, updating, and customizing a general-purpose client program. Current methods of extending client capability (e.g., execution of shell scripts from the client, the x-exec URL scheme) are prone to security holes. A better mechanism would consist of interpreters for one or more client extension languages, together with a means of locating and retrieving modules written in these languages. The capabilities of the extension languages would be purposefully limited, by means of a safe execution environment, so as to prevent malicious or accidentally destructive actions. The extension modules will in effect be executable documents which may be catalogued, indexed, searched for, and retrieved just as ordinary documents are. Their retrieval would not result in their visual display, however, but rather in their execution by the client program. Thus a particular discipline, such as computational biology, could set up a system of file servers that archived client modules that were particularly useful to the computational biology community and could be downloaded by users to customize their client programs for access to computational biology services.

This research project will focus on developing a safe execution environment for client extension modules and on developing client extension modules for a particular user community that will illustrate the usefulness of the mechanism. The following issues will be investigated:

- What operations may safely be executed by a client extension module? What operations are necessary to have sufficient capability for interacting with network services?
- What is the appropriate client program architecture for supporting client extension modules and allowing these modules to interact with each other? Can existing clients such as Mosaic be extended or is a totally new client architecture needed?
- What descriptive and naming information is needed to allow client programs to automatically locate and retrieve appropriate extension modules?

This project will adapt existing scripting language and user interface toolkit interpreters, such as those for Tcl, Python, and Tk (the source code for which is public-domain) to provide a safe execution environment. A user community will be located that will work with the project to develop extension modules relevant to that community's discipline. Candidates for this user community include researchers in the Biology and Chemistry departments at Hope College and the Groundwater Contamination research group at Oak Ridge National Lab.

Project 7: Comparison of the use of Ada 9X to C++ for the development of object-oriented programs

Herbert L. Dershem

Ada 9X has facilities for the definition and use of classes. This project will provide a comparison of these features to those of C++ by studying how a variety of classes already implemented in C++ can be implemented in Ada 9X. Particular attention will be given to techniques for effectively utilizing the object-oriented features of Ada 9X. A document will be produced evaluating Ada 9X as a language for object-oriented programming.

Professor Dershem's work on this project will be supported by a contract from the United States Air Force.

3.5 Post-Project Activities

All REU participants will be required to submit a final written report on their research activities, as well as an evaluation of the overall program. The P.I. and the mentor will recommend follow-up activities for each participant to carry out during the following academic year. For external students this might involve remote access to Hope College computing facilities as well as communication via electronic mail between student and mentor. For Hope students, this follow-up work will include formal continuation of the project by enrollment in the departmental Senior Project Seminar and/or the Independent Study/Research course. All participants will be encouraged to make a presentation of their work at their home institution and at a scientific meeting. When appropriate, the student's work will be included in a publication submitted to a professional journal.

4 THE RESEARCH ENVIRONMENT

4.1 Faculty

The department's four faculty members are a good mix of junior and senior faculty, with two of each. Three of the faculty hold a Ph.D. in Computer Science and all are active in Computer Science research and have experience supervising undergraduate research. All four members of the faculty have been principal investigators in National Science Foundation projection the past five years. In addition, they have been the recipients of support for research from other government agencies including the Department of Energy, NASA, DARPA, and the United States Air Force.

In the three years of REU programs at Hope, all four of the faculty have supervised undergraduate research teams. Because of Professor Stegink's planned participation as a Fulbright Fellow, he will be unavailable to work with this project in the summers of 1995 and 1996. Therefore, Professors Dershem, Jipping, and Browne are included as participating faculty in this proposal. These faculty will supervise the research of the proposed project as their availability permits.

4.2 Facilities and Equipment

The departments of Computer Science, Mathematics, and Physics are housed in Vander Werf Hall. This building was constructed in 1964 and a major renovation was completed in 1990, resulting in the building being joined to Van Zoeren Hall. The complex now includes, in addition to the three laboratories that are exclusively for Computer Science, three campus-wide computer laboratories which contain 53 PC-compatible systems, 6 Macintosh computers, 50 X-terminals, and a wide variety of workstations, all connected via a campus network backbone.

The Computer Science hardware facilities are currently comprised of 16 Sun workstations. These are shown in the table below:

Machine/Part	Peripherals (if any)
Sun 4/360	32 MB memory, 688 MB and 5.0 GB disk drives, 9600-baud US Robotics Sportster modem, CD-ROM drive, 8mm Exabyte backup unit
Sun 4/470	32 MB memory, 669 MB and 1.3 GByte disk drives, CD-ROM drive, SCSI tape drive
(4) Sun SPARCstation 10s	32 MB memory, 3.5" floppy drives, GX graphics coprocessor, 500 MB and 1 GB disk drives
(2) Sun SPARCstation 5s	32 MB memory, 3.5" floppy drives, GX graphics coprocessor, 1 GB disk drive

Machine/Part	Peripherals (if any)
(2) Sun SPARCstation IPCs	16 MB memory, 500 MB disk drive, 3.5" floppy
(2) Sun SPARCstation 1s	16 MB memory, 3.5" floppy drive, GX graphics coprocessor, 500 MB disk drive
(3) Sun SPARCstation 1+s	16 MB memory, 3.5" floppy drive, GX graphics coprocessor, 500 MB disk drive
(32) INMOS Transputers	These are parallel processing units housed in the Sun 4/470

One of the IPCs is a "spare parts" machine. A 8mm backup unit -- an Exabyte tape drive -- is connected to the Sun 4/360 file server. The lab has one laser printer, an NEC LC890 SilentWriter, and four Epson dot-matrix printers (various models). The lab has four modems: two 2400-baud modems, a 9600-baud US Robotics Sportster connected to the Sun 4/360, and a 9600-baud Telebit Q-Blazer Plus modem. The lab also has a variety of "odd-and-ends": many microphone sets and a Sun "dials and knobs" input device are included among these.

Lab software includes the standard Sun operating system and documentation, windowing system, and reference material. Unbundled components include C and C++ compilers, network management and protocol implementations, word processors, and code debugging environments. Parallel tools have been purchased for working with the parallel Transputer environment. Many public domain tools are in use.

The lab's software and hardware provide access to the Internet through a college-owned Merit SCP. These facilities also provide access to campus Vaxes through an Ethernet bridge.

The lab is currently administered by one individual. About 7 hours per week are devoted to lab administration. Both software and hardware administration is handled by this individual. Operator duties, e.g., file system backups and preventative maintenance are mostly automated. The department handles maintenance of its facilities by itself. It negotiates maintenance contracts, keeps on hand supplies for its printers and other peripherals, provides the "raw materials" (e.g., cable, connectors, etc.) and tools for hardware maintenance, and maintains a "spare parts machine" for computer hardware maintenance.

4.3 Departmental Statistics

Year	Graduating Majors	Graduates Attending Grad School	Independent Study and Research Projects	Summer Research Students
1983-84	16	2	22	0
1984-85	29	3	34	0
1985-86	18	2	12	0
1986-87	15	3	5	0
1987-88	16	2	17	1
1988-89	8	4	9	2
1989-90	14	3	10	2
1990-91	14	1	14	3
1991-92	12	6	2	7*
1992-93	8	2	5	8*
1993-94	4	1	2	8*
1994-95 (est.)	7	3	4	8**
1995-96 (est.)	14	4	4	7**

* These figures include 6 students each summer supported by NSF REU

** These figures include positions already funded plus 6 each summer which would be funded by this proposal.

5 STUDENT PARTICIPANTS

5.1 Recruitment of Participants

5.1.1 Hope College Students

The summer research program in Computer Science will be announced in all upper-level Computer Science classes, in the departmental seminar, through notices on the departmental bulletin board, and through a mailing to all Computer Science majors. A packet describing the program, research areas, participant benefits and obligations, and applications procedures will be available from the departmental office. Since upper-level classes in Computer Science are typically smaller than 20 students, the professors will be able to individually encourage especially promising students to apply including women and minorities.

5.1.2 Non-Hope College Students

Fifty percent of the participants in the REU program will be from institutions other than Hope College. A special effort will be made to encourage women and minorities from other institutions to apply.

A program announcement will be sent to the Mathematics and Computer Science chairs and the Officer for Minority Affairs at all colleges and universities within an approximate 500 mile radius of Hope College. These Chairs and Officers will be sent a reply card which will ask them to send the names of women and minorities who are majoring in Computer Science. They will also be asked to post the announcement of the program. The P.I. will contact all students whose names are submitted on the reply cards to encourage them to apply to the program.

Extensive use will be made of the Internet. Announcements will be distributed to a mail list of Computer Science Departments via email. This mail list has been constructed from inquiries received during the past three years of the Hope College Computer Science REU program. In addition, publicity and application forms will be made available via World Wide Web and FTP. Information will also be sent to pertinent USENET news groups.

Contacts will be made with Computer Science department chairs at institutions which have historically enrolled a large percentage of minority students, inviting faculty to nominate minority students at their institution for participation in the program. In February, 1994, Professor Gordon Stegink of the Hope College Computer Science Department visited Clark-Atlanta University to recruit REU students to the Hope College program and to discuss the possibility of Hope and Clark-Atlanta exchanging students and faculty for research.

All promotional materials will be distributed by January 31. Applications and transcripts will be due by March 30 and notification of the awards will be made no later than April 15.

5.2 Selection Process

There will be six student participants in the program, three from Hope College and three from other institutions. During the application process, the Hope students will be considered as one pool of applicants and the non-Hope students as another.

All applicants will be asked to submit a written statement indicating their career goals and the role of research in their future plans. Students from other institutions will also be asked to provide a transcript and a letter of reference from a faculty member. These items will be obtained directly by the P.I. for Hope student applicants.

A number of criteria will be considered in the selection of participants within each pool of applicants. These are the applicant's (1) academic record; (2) demonstrated interest in Computer Science and research; (3) potential for success in research as indicated by independence, creativity, and motivation; and (4) career plans. The faculty participants in this program will comprise the selection committee that will make the final selection of student participants.

The overall aim of this process is to provide flexible guidelines for the selection of participants to insure that the program will have the maximum impact on the participants in their choice of a career in Computer Science and on the discipline of Computer Science itself.

5.3 Matching Participants with Research Projects

After the student participants are selected, the P.I. will coordinate the assignment of students to specific faculty mentors and research projects. Each faculty mentor will be asked to select from the participants those students whose interests and qualifications match the requirements of one of the mentor's research programs and interview that group of students. Those students at institutions other than Hope College will be interviewed by phone. As a result of these interviews, each mentor will provide a priority list of those participants that she would like to supervise. The P.I. will then make the final assignments based on these priority lists as well as consultation with the mentors and the student participants. No assignment will be made that is not enthusiastically supported by both the mentor and the student participant.

BIOGRAPHICAL SKETCH

Herbert L. Dershem

Department of Computer Science
Hope College
Holland, MI 49422-8000

Academic Rank: Professor of Computer Science

Education:

B.S. University of Dayton, 1965
M.S. (Computer Science) Purdue University, 1967
Ph.D. (Computer Science) Purdue University, 1969

Experience:

Assistant Professor, Hope College, 1969-1974
Associate Professor, Hope College, 1974-1981
Professor, Hope College, 1981-
Visiting Research Scientist, Oak Ridge National Laboratories, 1977-1978
Visiting Professor, Boston University Overseas Program, 1982-1983
Distinguished Visiting Professor, United States Air Force Academy, 1993-1994

Honors and Awards:

NDEA Fellow, Purdue University, 1965-1968
Project COMPUTe Awardee, Dartmouth College, 1972
NASA/ASEE Summer Fellow, Goddard Space Flight Center, 1976
Oak Ridge Associated Universities Summer Fellow, 1977

Grants:

Co-director, "Introduction of the Computer in the Statistics Curriculum," NSF Office of Computing Activities, 1971-73
Director, "A Modular Approach to the Introductory Course in Computer Science," NSF Local Course Improvement Program, 1978-1980
Co-Director, "A Microcomputer Laboratory for use in Teaching Statistics," NSF Instructional Scientific Equipment Program, 1979-1980
Director, "CSNET Membership in Support of Computer Science Research," NSF RUI Program, 1987-1990
Director, "REU: An Undergraduate Research Participation Program in Computer Science," NSF CISE, 1992-1994
Director, "Use of Ada, Laboratories, and Visualization in the Teaching of Data Structures and Discrete Mathematics," DARPA Curriculum Development Grant, 1993-1994
Director, "Curriculum and Textbook Development Using Ada 9X for the Teaching of Object-Oriented Concepts," U.S. Air Force Contract, 1994-1996

Publications: (23 total, those since 1989 included below)

Programming Languages: Models and Structures, H. Dershem and M. Jipping, Wadsworth Publishing Company, 1990

"Finite State Machine Simulation in a Introductory Lab," Ryan McFall and Herbert L. Dershem, *Proceedings of the 1994 SIGCSE Technical Symposium, SIGCSE Bulletin*, 26,1,126-130, March, 1994

Collaborators: Advisors, and Advisees: Robert Lynch, David Cook, Rick Sward

BIOGRAPHICAL SKETCH

Shirley V. Browne

Computer Science Department
University of Tennessee
107 Ayres Hall
Knoxville, TN 37996-1301

Academic Rank: Assistant Professor

Education:

B.A., Indiana University, 1978
M.Ed., University of Illinois, 1980
M.S., Wichita State University (Mathematics), 1985
M.S., Purdue University (Computer Science), 1986
Ph.D., Purdue University (Computer Science), 1990

Experience:

Software Librarian and Applications Programmer, IFR, Inc., 1980-1981
Scientific Programmer, Cessna Aircraft Company, 1984
Instructor of Mathematics and Computer Science, Wichita State University, 1981-1985
Assistant Professor of Computer Science, Hope College, 1990-
Research Associate, University of Tennessee, 1993-1995

Research Experience:

Assisted in the development of new string-matching algorithms
(Joint work with Alberto Apostolico and Concettina Guerra at Purdue University)

Led a team in developing a graphical user interface and client-server software for a relational database model
of a network directory service
(Joint work with other members of Douglas Comer's research seminar on distributed systems at Purdue
University)

Developed algorithms for quorum-based recovery in replicated databases, implemented and tested these
algorithms on a prototype distributed database system
(Joint work with Bharat Bhargava at Purdue University)

Developed and implemented an object-oriented application programmer interface for multimedia applications
(Joint work with summer REU students)

Currently working on storage, search, and retrieval mechanisms and on user interfaces for distributed scientific
software repositories.
(Joint work with Jack Dongarra at the University of Tennessee)

Honors and Awards:

Purdue University Graduate School Fellowship, 1985-1987

Grants:

"Synchronization, Performance, and Fault Tolerance Issues in Distributed Multimedia Systems," NSF
Research Planning Grant, 1992-1993
"Development of a course and research projects in networking and data communications," Pew Midstates
Consortium Grant, 1992

Publications:

- "A Generic Algorithm for Transaction Processing During Network Partitioning", B. Bhargava and S. Browne, *Proc. 8th Conference on Foundations of Software Technology and Theoretical Computer Science*, Pune, India, December, 1988
- "Quorum-based Recovery in Replicated Database Systems", S. Browne, Ph.D. thesis, Purdue University, May, 1990
- "Adaptable Recovery Using Dynamic Quorum Assignments", B. Bhargava and S. Browne, *Proc. 16th International Conference on Very Large Databases*, Brisbane, Australia, August, 1990
- "Communication-based Recovery in Replicated Databases", B. Bhargava and S. Browne, *Proc. 10th International Conference on Computer Communications*, New Delhi, India, November, 1990
- "A Real-Time Group Membership Protocol", S. Browne, Second Great Lakes Computer Science Conference, Kalamazoo, MI, Oct. 17--19, 1991
- "Fast Linear-Space Computations of Longest Common Sequences", A. Apostolico and S. Browne and C. Guerra, *Theoretical Computer Science* 1992.
- "Composite Object Replication in Distributed Database Systems", B. Bhargava, S. Browne, and J. Srinivasan, in *Proc. International Conference on Information Systems and Management of Data (CISMOD)*, Bangalore, India, July 1992.
- "Communication and Synchronization Issues in Distributed Multimedia Database Systems", S. Browne, in *Advanced Database Systems*, ed. Nabil Adams and Bharat Bhargava, Springer-Verlag, 1993.
- "Netlib Services and Resources", S. Browne, J. Dongarra, S. Green, E. Grosse, K. Moore, T. Rowan, and R. Wade, University of Tennessee Technical Report UT-CS-93-222, 1993.

Collaborators, Advisors, Advisees: B. Bhargava, Jack Dongarra

BIOGRAPHICAL SKETCH
Michael J. Jipping
Department of Computer Science
Hope College
Holland, MI 49422-8000

Academic Rank: Assistant Professor

Education:

B.S., Calvin College, 1981

M.S., University of Iowa (Computer Science), 1984

Ph.D., University of Iowa (Computer Science), 1986

Experience:

Assistant Professor, University of Iowa, 1986-1987

Assistant Professor, Hope College, 1987-

Research Fellow, NASA Langley Research Center, Summer, 1992

Grants:

Director, "A New Course in Parallel Programming for Undergraduates," NSF Instrumentation and Laboratory Improvement, 1990

Recipient, NASA Joint Venture Award, 1992-1995

Director, "Building a Software Infrastructure for Parallel Software Design," NASA Langley Research Center, 1993-1996

Recipient, NASA/Jove Augmentation Award, 1995-1996

Publications: (Undergraduate co-authors indicated with an asterisk)

"An Information-Based Methodology for the Design of Concurrent Systems," M. Jipping, Ph.D. thesis, University of Iowa, 1986

"Performance Prediction in Distributed System Design," M. Jipping and R. Ford, *Proceedings of the 1986 Rockwell International Software Engineering Symposium*, 3.2.1-3.2.8, Cedar Rapids, IA, October, 1986

"Predicting Performance for Concurrency Control Design," M. Jipping and R. Ford, *1987 ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems*, 132-142, Alberta, Canada, May, 1987

Programming Languages: Structures and Models, H. Dershem and M. Jipping, Wadsworth Publishing Co., 1990

"Concurrent Distributed Pascal: A Hands-on Introduction to Concurrency," M. Jipping, J. Toppen*, and S. Weeber*, *Proceedings of the 1990 SIGCSE Technical Symposium, SIGCSE Bulletin*, 21,1,94-99, February, 1990

"On the Performance of Concurrent Tree Algorithms," R. Ford, M. Jipping, R. Schultz, and B. Wenhardt, *Journal of Parallel and Distributed Computing*, 8, 253-256, March, 1990

"Developing a Formal Model for Concurrency Control Design," M. Jipping, *Proceedings of the Second Great Lakes Computer Science Conference*, April, 1991.

"Open Environments to Support Systems Engineering Tool Integration: A Study Using the Portable Common Tool Environment (PCTE)," D.E. Eckhardt, M.J. Jipping, C.J. Wild, S.J. Zeil, and C.C. Roberts, *NASA Technical Memorandum 4489*, NASA Langley Research Center, September, 1993.

"Using Tcl as a ToolTalk Encapsulation Mechanism," *Proceedings of the 1993 Sun User Group Conference*, December, 1993.

Collaborators, Advisors, Advisees: Ray Ford

First Year SUMMARY PROPOSAL BUDGET

Organization Hope College Principal Investigator / Project Director Herbert L. Dershem				For NSF Use Only			
				Proposal No.	Duration (months)		
					Proposed	Granted	
Award No.							
A. Senior Personnel: P/VPD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director						\$ 3,500 (a)	\$
2. Michael J. Jipping, Faculty Associate						1,500 (b)	
3. Shirley V. Browne, Faculty Associate						1,500 (b)	
4.							
5.							
6. () Others (List individually on budget explanation page)						6,500	
7. () Total Senior Personnel (1 - 6)							
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other						6,500	
Total Salaries and Wages (A + B)						1,300 (c)	
C. Fringe Benefits (if charged as direct costs)						7,800	
Total Salaries, Wages and Fringe Benefits (A + B + C)							
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel							
1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1. Stipends \$ 18,000 (d)							
2. Travel 1,500 (e)							
3. Subsistence 1,200 (f)							
4. Other							
() Total Participant Costs						20,700	
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts						1,000 (g)	
6. Other						29,500	
Total Other Direct Costs							
H. Total Direct Costs (A through G)							
I. Indirect Costs (Specify Rate and Base) 25% of student stipends						4,500	
Total Indirect Costs						34,000	
J. Total Direct and Indirect Costs (H + I)							
K. Residual Funds (If for further support of current projects see GPM 252 and 253)						\$ 34,000	\$
L. Amount of This Request (J) or (J minus K)							
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 9/14/94	For NSF Use Only		
Institutional Representative Typed Name & Signature* James M. Gentile				DATE 9/14/94	Indirect Cost Rate Verification		
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Second Year **SUMMARY** **PROPOSAL BUDGET**

Organization Hope College				For NSF Use Only			
				Proposal No.	Duration (months)		
Principal Investigator / Project Director Herbert L. Dershem				Award No.	Proposed	Granted	
A. Senior Personnel: P/VPD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director							\$ 3,500 (a)
2. Michael J. Jipping, Faculty Associate							1,500 (b)
3. Shirley V. Browne, Faculty Associate							1,500 (b)
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)							6,500
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)							6,500
C. Fringe Benefits (if charged as direct costs)							1,300 (c)
Total Salaries, Wages and Fringe Benefits (A + B + C)							7,800
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel							
1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1. Stipends \$ 18,000 (d)							
2. Travel 1,500 (e)							
3. Subsistence 1,200 (f)							
4. Other							
() Total Participant Costs							20,700
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts							1,000 (g)
6. Other							
Total Other Direct Costs							29,500
H. Total Direct Costs (A through G)							
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs							4,500
J. Total Direct and Indirect Costs (H + I)							34,000
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)							\$ 34,000 \$
M. Cost Sharing Proposed Level \$				Agreed Level if Different \$			
PI / PD Typed Name & Signature Herbert L. Dershem				DATE 9/14/94		For NSF Use Only	
Institutional Representative Typed Name & Signature James M. Gentile				DATE 9/14/94		Indirect Cost Rate Verification	
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Third Year **SUMMARY** **PROPOSAL BUDGET**

				For NSF Use Only			
				Proposal No.	Duration (months)		
Organization Hope College				Award No.	Proposed	Granted	
Principal Investigator / Project Director Herbert L. Dershem							
A. Senior Personnel: P/VPD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Personnel		Funds Requested By proposer	Funds granted by NSF (if different)
	Cal	Acad	Sumr				
1.	Herbert L. Dershem, Project Director			\$	3,500 (a)	\$	
2.	Michael J. Jipping, Faculty Associate				1,500 (b)		
3.	Shirley V. Browne, Faculty Associate				1,500 (b)		
4.							
5.							
6.	() Others (List individually on budget explanation page)						
7.	() Total Senior Personnel (1 - 6)				6,500		
B. Other Personnel (Show numbers in brackets)							
1.	() Post Doctoral Associates						
2.	() Other Professionals (Technician, Programmer, etc.)						
3.	() Graduate Students						
4.	() Undergraduate Students						
5.	() Secretarial - Clerical						
6.	() Other						
Total Salaries and Wages (A + B)					6,500		
C. Fringe Benefits (If charged as direct costs)					1,300 (c)		
Total Salaries, Wages and Fringe Benefits (A + B + C)					7,800		
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel							
1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1.	Stipends \$ 18,000 (d)						
2.	Travel \$ 1,500 (e)						
3.	Subsistence \$ 1,200 (f)						
4.	Other						
() Total Participant Costs					20,700		
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts					1,000 (g)		
6. Other							
Total Other Direct Costs					29,500		
H. Total Direct Costs (A through G)							
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs					4,500		
J. Total Direct and Indirect Costs (H + I)					34,000		
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)				\$	34,000	\$	
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 9/14/94	For NSF Use Only		
Institutional Representative Typed Name & Signature* James M. Gentile				DATE 9/14/94	Indirect Cost Rate Verification		
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Cumulative SUMMARY PROPOSAL BUDGET

				For NSF Use Only			
				Proposal No.	Duration (months)		
Organization Hope College				Award No.	Proposed	Granted	
Principal Investigator / Project Director Herbert L. Dershem							
A. Senior Personnel: P/VPD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director						\$ 10,500 (a)	\$
2. Michael J. Jipping, Faculty Associate						4,500 (b)	
3. Shirley V. Browne, Faculty Associate						4,500 (b)	
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)						19,500	
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)						19,500	
C. Fringe Benefits (If charged as direct costs)						3,900 (c)	
Total Salaries, Wages and Fringe Benefits (A + B + C)						23,400	
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel							
1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1. Stipends \$ 54,000 (d)							
2. Travel 4,500 (e)							
3. Subsistence 3,600 (f)							
4. Other							
() Total Participant Costs						62,100	
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts							
6. Other						3,000 (g)	
Total Other Direct Costs						88,500	
H. Total Direct Costs (A through G)							
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs						13,500	
J. Total Direct and Indirect Costs (H + I)						102,000	
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)						\$ 102,000	\$
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 9/14/94	For NSF Use Only		
Institutional Representative Typed Name & Signature* James M. Gentile				DATE 9/14/94	Indirect Cost Rate Verification		
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Budget Explanation

- (a) The salary for the Project Director includes \$2,000 for administration of the project and \$1,500 for directing the work of two undergraduates.
 - (b) The salary of the Faculty Associates is \$1,500 for directing the work of two undergraduate participants.
 - (c) Fringe benefits is based on 20% of the faculty salaries.
 - (d) Student stipends are \$300 per week for 10 weeks for 6 students.
 - (e) Travel budget includes \$250 per student. This will be used to reimburse participants for travel between home and campus at the beginning and conclusion of the program, and to pay participant travel expenses to make presentations of their results during the following academic year. Local funds will be used to supplement these travel expenses.
 - (f) The cost of student housing is approximately \$40 per week for a total cost of \$400 per student. Hope College will subsidize one-half of this amount, leaving \$200 per student to be paid by the grant.
 - (g) Other costs are budgeted at \$1,000 per summer. This will be used for postage, telephone, copying, and other general expenses. It will also be used to help defray the cost of off-campus speakers.
- Item I. Indirect Costs: The current charge by the college is 63.3%. The college will forgo the amount in excess of 25% (net of 38.3%) as a contribution to the program.

Institutional Support

The Computer Science Department and Hope College are committed to the principle that excellence in undergraduate education must include active student involvement in significant research. In support of this commitment, the college will contribute a substantial part of the resources required to carry out this REU project. The college will provide housing to the students at one-half of the normal cost as well as providing all of the services normally available to Hope summer students. These services include use of the physical activities center, the career and counseling center, library facilities, and computing facilities.

The college supports the research efforts of faculty and students through release time for faculty, faculty development grants, travel funds to scientific meetings, acquisition and maintenance of hardware and software, general secretarial and clerical support, and funds for expendable supplies.

The current rate of indirect costs for proposals at Hope is 63.3% of all salaries and wages. Hope College will pay all overhead costs in excess of the 25% of student salaries requested in this proposal.

A summary of Hope College contributions to the REU program is given in the table below:

Contributions of Hope College to REU Project	Annual	Total (3 yrs)
Housing, 6 students @ 10 weeks per student	\$ 1,200	\$3,600
Excluded indirect costs, 63.3% all salaries minus request	\$11,000	\$33,000
TOTAL	\$12,200	\$36,600

CURRENT AND PENDING SUPPORT

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Herbert L. Dershem	Other agencies (including NSF) to which this proposal has been/will be submitted.
---	---

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **REU: An Undergraduate Research Participation Program in Computer Science**

Source of Support: **NSF-REU**

Award Amount (or Annual Rate): **\$ 102,000**

Period Covered: **3/1/95 - 12/31/97**

Location of Project: **Hope College**

Person-Months Committed to the Project. Cal: Acad: **5%** Summ: **25%**

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **Curriculum and Textbook Development Using Ada 9X for the Teaching of Object-Oriented Concepts**

Source of Support: **United States Air Force**

Award Amount (or Annual Rate): **\$33,934**

Period Covered: **7/1/94 - 8/31/96**

Location of Project: **Hope College**

Person-Months Committed to the Project. Cal: Acad: **10%** Summ: **67%**

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Award Amount (or Annual Rate): **\$**

Period Covered:

Location of Project:

Person-Months Committed to the Project. Cal: Acad: Summ:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Award Amount (or Annual Rate): **\$**

Period Covered:

Location of Project:

Person-Months Committed to the Project. Cal: Acad: Summ:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Award Amount (or Annual Rate): **\$**

Period Covered:

Location of Project:

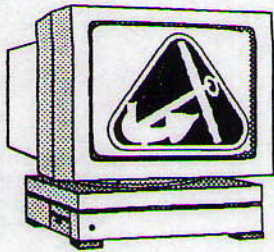
Person-Months Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

NSF Form 1239 (1/94)

Page G-

USE ADDITIONAL SHEETS AS NECESSARY



Hope College
Department of Computer Science

Undergraduate Research in Computer Science
Summer 1994

The Computer Science Department at Hope College with support from the Research Experiences for Undergraduates Program of the National Science Foundation, is providing an opportunity for a number of undergraduate computer science students to participate in a ten-week research program.

Dates: May 30, 1994 to August 5, 1994

Stipend: \$2,600

Housing: On-campus housing provided at no cost

Travel: Limited travel funds are available for participants

Eligibility: Any student who will be enrolled in an undergraduate degree program in Fall, 1994 is eligible. Women and members of minority groups are particularly encouraged to apply.

Projects: Research opportunities are available in the fields of Software Development Environments for Parallel Programming, Algorithm Visualization and Animation, and parallel genetic algorithms.

Application Deadline: March 18, 1994

Applications and Further Information: Available from your Computer Science Department or from

Michael J Jipping
Department of Computer Science
Hope College
Holland, MI 49423

(616) 394-7509

FAX: (616) 394-7123

reu@cs.hope.edu

Internet: There is more information available via anonymous FTP from the site "smaug.cs.hope.edu" under the "/pub/reu" directory. Also, information is available from the World Wide Web as the page "<http://smaug.cs.hope.edu/reu/info.html>"

NATIONAL SCIENCE FOUNDATION
4201 Wilson Boulevard
Arlington, VA 22230

Office of Cross-Disciplinary Activities
Computer & Information Science & Engineering Directorate

General Information for Applicants
Research Experiences for Undergraduates (Sites Program) - FY 1995

This year, twenty-three proposals were submitted to the Research Experiences for Undergraduates Sites competition in the Computer & Information Science & Engineering Directorate. In accordance with usual practice, a panel of scientists and engineers was convened to provide evaluations of the proposals. Based upon their reviews and evaluations, and with funds available to this program this year, we expect to be able to recommend about twenty-six percent of these proposals for awards.

Verbatim copies of all completed reviews for your proposal are enclosed as is a panel summary. In reading them, please keep in mind that reviewers are addressing their comments primarily to the National Science Foundation, not to the proposer. Although many reviewers do provide helpful information, they sometimes make remarks without giving detailed references or providing specific suggestions for improvement. Some reviews may contain non-substantive, irrelevant or erroneous statements that the program officer did not use in evaluating the proposal. These comments are so marked.

Decisions about particular proposals often prove very difficult, and factors other than the reviewer's comments and ratings may influence decisions. While the scientific merit of the proposal and its worthiness in relation to other proposals received in the same competition are always critical considerations, maintaining appropriate balance among subfields, availability of other funding, amount of funding available to the program, and the geographic distribution of projects supported by the Foundation are also important decision factors.

Information about reconsideration of declined proposals is found in the Foundation's Grant Proposal Guide. This should be available at your institution, usually at the office which formally submitted your proposal. Foundation policy is to accept a revised proposal for review and evaluation as a new proposal, in accordance with designated program deadlines, if reviewer's comments have been substantially addressed.

If you would like further information about the evaluation or the program itself, please contact Harry G. Hedges, Program Director, REU Sites Program, at (703) 306-1980, or via e-mail: hhedges@nsf.gov.

Review Analysis
Hope College
CDA-9423943

This REU Site proposal requests funds to support six students per year for three years, in programs carried out during the Summers. Areas of work include parallel algorithms, system development environments, algorithm animation, data communications, and others. The students will utilize an advanced workstation network and a transputer system on the Hope College campus.

Women and minority students will be strongly recruited. Hope College has operated very successful REU Site programs over the last several years and can be expected to continue this pattern of success.

Four of the five reviewers on the review panel individually rated this proposal as "Competitive", while one rated it as "Highly Competitive". The panel as a whole placed it in their "Competitive" category, recommended it for funding if funds were available and stated that "this program stands out in the arena of institutions to which Hope College belongs".

I concur with the review Panel's evaluation and recommend the proposal be funded as a continuing grant as requested at \$34,000 per year for three years.



Harry G. Hedges
Program Director
REU Sites Program, CDA/CISE

January 23, 1995

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Program

PANEL SUMMARY FOR:
Proposal CDA-94 23943

Investigator: H.L. Dershem
Institution: Hope

Major Strengths:

Quality well-scoped projects
Good announcements
This program stands out in the
arena of institutions to which
Hope College belongs

Weaknesses:

Additional comments. Hope's program is small. You might
consider directing some of your own students
toward other REU sites
Hope might consider including the ethics component
that NSF allows if staffing is available.
It is important to target computer engineering programs
as well as CS programs

Overall Rating:

Highly Competitive ☐

Competitive ☒

Not Competitive ☐

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Program

EVALUATION FOR:
Proposal CDA-94 23943

Investigator: Denshem
Institution: Hope College

Anonymous copies of this review will be sent only to the principal investigator. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from Chairpersons of Congressional Committees having responsibility for NSF, reviewers' comments and identities will be given maximum protection from disclosure.

All of the selection criteria for this program are indicated below. Please comment on each of them. Your remarks are of critical importance in providing guidance both to the proposers and to the NSF project officers.

1. Value of the educational experience for undergraduates, particularly the appropriateness of the research projects for undergraduate involvement and the nature of student involvement.

Projects appear to be doable by undergrads, but do not appear to be highly challenging.

2. Quality of the supervisor, facilities, and management plans.

adequate

3. Merit of the proposed research activities.

not highly challenging. Previous research has not resulted in high-quality publications.

4. Adequacy of the participant selection procedures.

adequate

5. Caliber of plans for student preparation and continuation of projects.

good

6. Institutional record in the production of computer scientists and engineers.

relatively small program.

7. General institutional commitment to the project.

~~insufficient~~ moderate,

8. Plans for involving underrepresented groups (women, minorities, and persons with disabilities).

adequate.

9. Additional comments.

Overall Rating:

Highly Competitive ☐

Competitive ☒

Not Competitive ☐

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Program

EVALUATION FOR:
Proposal CDA-94 23943

Investigator: Dershem
Institution: Hope College

Anonymous copies of this review will be sent only to the principal investigator. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from Chairpersons of Congressional Committees having responsibility for NSF, reviewers' comments and identities will be given maximum protection from disclosure.

All of the selection criteria for this program are indicated below. Please comment on each of them. Your remarks are of critical importance in providing guidance both to the proposers and to the NSF project officers.

1. Value of the educational experience for undergraduates, particularly the appropriateness of the research projects for undergraduate involvement and the nature of student involvement.

Various research projects (SEI networks, puzzle algorithms, etc)

2. Quality of the supervisor, facilities, and management plans.

3 faculty will supervise students - facilities are adequate - There will be a weekly seminar and a final written report -

3. Merit of the proposed research activities.

Good projects, done by students

4. Adequacy of the participant selection procedures.

3 participants local, 3 from outside (in addition) will be supported with other funds - i or 2 students

5. Caliber of plans for student preparation and continuation of projects.

orientation. weekly seminars - presentation of final results. -
No specific plans for continuation (except for Hope students).

6. Institutional record in the production of computer scientists and engineers.

good

7. General institutional commitment to the project.

1/2 housing costs + reduced indirect costs on faculty salaries

8. Plans for involving underrepresented groups (women, minorities, and persons with disabilities).

Some plans for recruiting - Not clear what the past record is in recruiting minorities.

9. Additional comments.

Overall Rating:

Highly Competitive ☐

Competitive ☒

Not Competitive ☐

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Program

EVALUATION FOR:
Proposal CDA-94 23943

Investigator: Dorcham
Institution: Uga

Anonymous copies of this review will be sent only to the principal investigator. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from Chairpersons of Congressional Committees having responsibility for NSF, reviewers' comments and identities will be given maximum protection from disclosure.

All of the selection criteria for this program are indicated below. Please comment on each of them. Your remarks are of critical importance in providing guidance both to the proposers and to the NSF project officers.

1. Value of the educational experience for undergraduates, particularly the appropriateness of the research projects for undergraduate involvement and the nature of student involvement.

*Highly valuable experience esp for
a small 4-year college*

2. Quality of the supervisor, facilities, and management plans.

Good supervision

3. Merit of the proposed research activities.

Average, but worthwhile for the REU program

4. Adequacy of the participant selection procedures.

Good - chooses from the local pool.

5. Caliber of plans for student preparation and continuation of projects.

Good

6. Institutional record in the production of computer scientists and engineers.

Excellent record in encouraging students to continue. Is this program a contributing factor?

7. General institutional commitment to the project.

Strong. They value overhead which is really high.

8. Plans for involving underrepresented groups (women, minorities, and persons with disabilities).

Careful. They have a good track record.

9. Additional comments.

Overall Rating:

Highly Competitive ☒

Competitive ☐

Not Competitive ☐

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Program

EVALUATION FOR:
Proposal CDA-94 23943

Investigator: *DERSHEM*
Institution: *HOPE COLLEGE*

Anonymous copies of this review will be sent only to the principal investigator. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from Chairpersons of Congressional Committees having responsibility for NSF, reviewers' comments and identities will be given maximum protection from disclosure.

All of the selection criteria for this program are indicated below. Please comment on each of them. Your remarks are of critical importance in providing guidance both to the proposers and to the NSF project officers.

1. Value of the educational experience for undergraduates, particularly the appropriateness of the research projects for undergraduate involvement and the nature of student involvement.

*APPARENTLY THIS IS AN IMPORTANT COMPONENT
OF MANY OF HOPE'S UNDERGRADUATE CS MAJORS*

2. Quality of the supervisor, facilities, and management plans.

*ADEQUATE RESOURCES FOR THE RESEARCH PROJECTS
OUTLINED*

3. Merit of the proposed research activities.

*STRONG RESEARCH FOR A PRIMARILY TEACHING
INSTITUTION*

4. Adequacy of the participant selection procedures.

*MORE DETAILS OF ~~RECRUITING~~ SELECTION CRITERIA
WOULD HAVE BEEN HELPFUL.*

5. Caliber of plans for student preparation and continuation of projects.

*PI SEEMS TO HAVE DESCRIBE A FAIR PROCESS
OF MATCHING STUDENTS AND SUPERVISORS*

6. Institutional record in the production of computer scientists and engineers.

APPARENTLY GOOD AT THE UNDERGRADUATE LEVEL

7. General institutional commitment to the project.

COMMENDABLE SUPPORT

8. Plans for involving underrepresented groups (women, minorities, and persons with disabilities).

NOT MUCH DISCUSSION OF DIVERSE RECRUITMENT

9. Additional comments.

RECRUITING BROCHURE IN APPENDIX IS A PLUS

Overall Rating:

Highly Competitive ☐

Competitive ☒

Not Competitive ☐

NATIONAL SCIENCE FOUNDATION
Office of Cross Disciplinary Activities
Computer and Information Science and Engineering Directorate

Research Experiences for Undergraduates - Sites Programs

EVALUATION FOR:

Proposal CDA-94 23943

Investigator: H. L. Dershem

Institution: Hope College

Anonymous copies of this review will be sent only to the principal investigator. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from Chairpersons of Congressional Committees having responsibility for NSF, reviewers' comments and identities will be given maximum protection from disclosure.

All of the selection criteria for this program are indicated below. Please comment on each of them. Your remarks are of critical importance in providing guidance both to the proposers and to the NSF project officers.

1. Value of the educational experience for undergraduates, particularly the appropriateness of the research projects for undergraduate involvement and the nature of student involvement.

The students are involved in current problems that appear to be associated with their mentors' mainstream research interests. The program maintains a weekly seminar schedule. Students are encouraged to present work to their home institutions upon return in the Fall. The emphasis on communication of work is commendable.

2. Quality of the supervisor facilities, and management plans.

The supervisor is experienced in operating an REU program. The complement of workstations is quite adequate for the number of students. Single-programmer software development tools are available, but CASE tools are not mentioned. Specifics about parallel software tools are scarce, although the Oak Ridge PVM is mentioned.

3. Merit of the proposed research activities.

The projects appear to be current to the CS arena, although single-developer oriented.

4. Adequacy of the participant selection procedures.

The selection process from within the pool of applicants appears to be fair and effective at selecting superior students. (No GPA data are provided.) The initial selection pool is hampered by somewhat arbitrary identification of publicity targets. In light of the electronic distribution, the use of a broadbased list, such as Forsythe departments, would be more equitable. (This would target computer engineering students, too.)

5. Caliber of plans for student preparation and continuation of projects.

It appears that students do not begin to acquaint themselves with their project until arrival on the campus. The seminar program, continued collaboration via the internet, and home-institution seminars constitute good continuation effort.

6. Institutional record in the production of computer scientists and engineers.

7. General institutional commitment to the project.

Other than access to resources, the institution provides neither monetary nor in-kind support.

8. Plans for involving underrepresented groups (women, minorities, and persons with disabilities).

The applicant pool is augmented with extra publicity contact with minority institutions within a 500 mile radius. No mention is made of efforts to increase female participation.

9. Additional comments.

Overall Rating: Highly Competitive ☐ Competitive ☒ Not Competitive ☐



Hope College
Holland, MI 49423

Business Office

Date: February 17, 1995

To: Herb Dershem

From: Kevin Kraay

RE: NSF Grant Award

Congratulations on your approval for a National Science Foundation grant in the amount of \$4,131 for the project entitled "REU: An Undergraduate Research Participation Program in Computer Science."

Instead of creating a new account number for this award, I will add this to the previous award, account number **5-22822**. Please use this account number for expenses associated with this additional funding.

To comply with Circular A-21, Hope College has established the following policy:

Hope College personnel who are working on federally funded grants and contracts shall maintain a daily log of activity. The log shall record the project worked on and the approximate time spent. This log shall be retained by the individual for a period of not less than three years after the end date of the federally funded programs for which records are being maintained. Upon request, these records will be made available for inspection or audit.

The Drug-Free Workplace Act of 1988 requires Hope College to certify that we will maintain a drug-free workplace. This certification took place on the application for the NSF grant when you applied. It also requires the College to provide to each employee working with a Federally sponsored program the College's policy on drugs. A copy of this policy is attached for your reference.

Please contact me if you have any questions.



HOPE COLLEGE

OFFICE OF THE PROVOST

April 19, 1995

Professor Herbert L. Dershem
Chairperson
Department of Computer Science
Hope College

Dear Herb:

Heartiest congratulations on your receipt of a \$34,000 grant from the National Science Foundation!

This three-year REU grant is a fine honor for you, for your department and for the college. I commend you for your efforts to obtain funds which will support An Undergraduate Research Participation Program in Computer Science.

Again, heartiest congratulations! Best wishes as you go about implementing the grant and in all your endeavors.

Sincerely,

Jacob E. Nyenhuis
Provost

JEN:bm/apr95

pc: Dean James M. Gentile



HOPE COLLEGE

DEPARTMENT OF COMPUTER SCIENCE

July 5, 1995

Tracy Zeigler
National Science Foundation
4201 Wilson Boulevard
Room 1160
Arlington, VA 22230

Dear Ms. Zeigler:

Enclosed you will find a revised cover and budget pages for NSF REU proposal 9423943. These are being submitted to request a supplement to the above project to cover the college contribution for FICA/MQFE taxes for the student participants in our program. This supplemental funding is \$4,131 per year for three years for a total of \$12,393. This amount is 7.65% of the total student stipends.

Thank you for assisting us in this matter. We will be happy to supply any further information that you might require.

Sincerely,

Herbert L. Dershem, Chair
Department of Computer Science

James M. Gentile, Dean
Division of Natural Sciences

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) <small>(Indicate the most specific unit known, i.e. program, division, etc.)</small> Computer & Information Science & Engineering		FOR NSF USE ONLY NSF PROPOSAL NUMBER		
PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE NSF 93-112/REU/August 4, 1993				
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	FILE LOCATION
Employer Identification Number (EIN) or Taxpayer Identification Number (TIN) IRS #381381271N		Show Previous Award No. If This Is: <input checked="" type="checkbox"/> A Renewal or <input type="checkbox"/> An Accomplishment-Based Renewal CDA-9200118		Is This Proposal Being Submitted To Another Federal Agency? YES _____ NO <input checked="" type="checkbox"/> _____ If YES, List Acronym(s)
Name of Organization to Which Award Should be Made: Hope College		Address of Awardee Organization, Including Zip Code: Department of Computer Science Hope College Holland, MI 49422-8000		
Awardee Organization Code (if known)				
Name of Performing Organization, If Different From Above		Address of Performing Organization, If Different, Including Zip Code:		
Performing Organization Code (if known)				
Is Submitting Organization: <input type="checkbox"/> For Profit Organization <input type="checkbox"/> Small Business <input type="checkbox"/> Minority Business <input type="checkbox"/> Woman Owned Business				
Title of Proposed Project REU: An Undergraduate Research Participation Program in Computer Science				
Requested Amount \$ 114,393		Proposed Duration (1-60 months) 36 months		Requested Starting Date March 1, 1995
Check Appropriate Box(es) If This Proposal Includes Any of the Items Listed Below:				
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Vertebrate Animals <input type="checkbox"/> Human Subjects <input type="checkbox"/> Historical Places <input type="checkbox"/> Beginning Investigator (See GPG Section I) <input type="checkbox"/> Group Proposal <input type="checkbox"/> Small Grant For Exploratory Research (SGER, See GPG Section II, C. 12) </div> <div style="width: 30%;"> <input type="checkbox"/> National Environmental Policy Act <input type="checkbox"/> Proprietary and Privileged Information <input type="checkbox"/> Disclosure of Lobbying Activities </div> <div style="width: 30%;"> <input type="checkbox"/> Facilitation for Scientists/Engineers with Disabilities <input type="checkbox"/> Research Opportunity Award <input type="checkbox"/> International Cooperative Activity: </div> </div>				
Country/Countries				
PI/PD Department Computer Science		PI/PD Postal Address Department of Computer Science Hope College Holland, MI 49422-8000		
PI/PD Fax Number 616-395-7123				
Names (Typed)	Social Security No. *	High Degree, Yr	Telephone Number	Electronic Mail Address
PI/PD Name Herbert L. Dershem	271-40-8660	Ph.D. 1969	616-395-7508	dershem@cs.hope.edu
Co-PI/PD				
Co-PI/PD				
Co-PI/PD				
Co-PI/PD				
NOTE: The FULLY SIGNED Certification Page must be submitted immediately following this Cover Sheet.				
<small>*Submission of social security numbers is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing the proposal. SSN solicited under NSF Act of 1950, as amended.</small>				

CERTIFICATION PAGE

Certification for Principal Investigators and Co-Principal Investigators:

I certify to the best of my knowledge that:

- (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and
- (2) the text and graphics herein as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if an award is made as a result of this application.

I understand that the willful provision of false information or concealing a material fact in this proposal or any other communication submitted to NSF is a criminal offense (U.S. Code, Title 18, Section 1001).

Name (Typed)	Signature	Date
PI/PD Herbert L. Dershem		July 5, 1995
Co-PI/PD		
Co-PI/PD		
Co-PI/PD		
Co-PI/PD		

Certification for Authorized Institutional Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding Federal debt statue, debarment and suspension, drugfree workplace, and lobbying activities (see below), as set forth in the Grant Proposal Guide (GPG), NSF 94-2. Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U.S. Code, Title 18, Section 1001).

Debt and Debarment Certifications

(If answer @yes^a to either, please provide explanation.)

Is the organization delinquent on any Federal debt?

Yes___ No_x_

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes___ No_x_

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, 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 awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) 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 this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, @Disclosure Form to Report Lobbying,^a in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED INSTITUTIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME/TITLE (TYPED) James M. Gentile/Dean for the Natural Sciences			7/5/95
TELEPHONE NUMBER 616-395-7714	ELECTRONIC MAIL ADDRESS gentile@hope.cit.hope.edu	FAX NUMBER 616-395-7125	

**First Year
SUMMARY
PROPOSAL BUDGET**

Organization Hope College				For NSF Use Only			
				Proposal No.	Duration (months)		
Principal Investigator / Project Director Herbert L. Dershem				Award No.	Proposed	Granted	
A. Senior Personnel: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director							\$ 3,500 (a)
2. Michael J. Jipping, Faculty Associate							1,500 (b)
3. Shirley V. Browne, Faculty Associate							1,500 (b)
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)							6,500
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)							6,500
C. Fringe Benefits (if charged as direct costs)							1,300 (c)
Total Salaries, Wages and Fringe Benefits (A + B + C)							7,800
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel 1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1. Stipends \$ 18,000 (d)							
2. Travel 1,500 (e)							
3. Subsistence 1,200 (f)							
4. Other 4,131 (h)							
() Total Participant Costs							24,831
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts							
6. Other							1,000 (g)
Total Other Direct Costs							1,000
H. Total Direct Costs (A through G)							33,631
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs							4,500
J. Total Direct and Indirect Costs (H + I)							38,131
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)							\$ 38,131 \$
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 7/5/95		For NSF Use Only	
Institutional Representative Typed Name & Signature* James M. Gentile				DATE 7/5/95		Indirect Cost Rate Verification	
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Second Year SUMMARY PROPOSAL BUDGET

Organization Hope College				For NSF Use Only			
				Proposal No.	Duration (months)		
Principal Investigator / Project Director Herbert L. Dershem				Award No.	Proposed	Granted	
A. Senior Personnel: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director						\$ 3,500 (a)	\$
2. Michael J. Jipping, Faculty Associate						1,500 (b)	
3. Shirley V. Browne, Faculty Associate						1,500 (b)	
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)						6,500	
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)						6,500	
C. Fringe Benefits (If charged as direct costs)						1,300 (c)	
Total Salaries, Wages and Fringe Benefits (A + B + C)						7,800	
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel 1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs 18,000 (d)							
1. Stipends \$ 1,500 (e)							
2. Travel 1,200 (f)							
3. Subsistence 4,131 (h)							
4. Other							
() Total Participant Costs						24,831	
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts						1,000 (g)	
6. Other							
Total Other Direct Costs						1,000	
H. Total Direct Costs (A through G)						33,631	
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs						4,500	
J. Total Direct and Indirect Costs (H + I)						38,131	
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)						\$ 38,131	\$
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 7/5/95	For NSF Use Only		
Institutional Representative Typed Name & Signature* James M. Gentle				DATE 7/5/95	Indirect Cost Rate Verification		
				Date Checked	Date Of Rate Sheet	Initials - ORG	

Third Year **SUMMARY** **PROPOSAL BUDGET**

Organization Hope College				For NSF Use Only			
				Proposal No.	Duration (months)		
Principal Investigator / Project Director Herbert L. Dershem				Award No.	Proposed	Granted	
A. Senior Personnel: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad	Sumr	
1. Herbert L. Dershem, Project Director						\$ 3,500 (a)	\$
2. Michael J. Jipping, Faculty Associate						1,500 (b)	
3. Shirley V. Browne, Faculty Associate						1,500 (b)	
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)						6,500	
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)						6,500	
C. Fringe Benefits (if charged as direct costs)						1,300 (c)	
Total Salaries, Wages and Fringe Benefits (A + B + C)						7,800	
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel							
1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs							
1. Stipends \$ 18,000 (d)							
2. Travel 1,500 (e)							
3. Subsistence 1,200 (f)							
4. Other 4,131 (h)							
() Total Participant Costs						24,831	
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts							
6. Other						1,000 (g)	
Total Other Direct Costs						1,000	
H. Total Direct Costs (A through G)						33,631	
I. Indirect Costs (Specify Rate and Base)							
25% of student stipends							
Total Indirect Costs						4,500	
J. Total Direct and Indirect Costs (H + I)						38,131	
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)						\$ 38,131	\$
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature*				DATE		For NSF Use Only	
Herbert L. Dershem				7/5/95		Indirect Cost Rate Verification	
Institutional Representative Typed Name & Signature*				DATE		Date Checked	Initials - ORG
James M. Gentile				7/5/95			

Cumulative SUMMARY PROPOSAL BUDGET

Organization Hope College Principal Investigator / Project Director Herbert L. Dershem				For NSF Use Only			
				Proposal No.		Duration (months)	
						Proposed	Granted
Award No.							
A. Senior Personnel: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
				Cal	Acad		
1. Herbert L. Dershem, Project Director						\$ 10,500 (a)	\$
2. Michael J. Jipping, Faculty Associate						4,500 (b)	
3. Shirley V. Browne, Faculty Associate						4,500 (b)	
4.							
5.							
6. () Others (List individually on budget explanation page)							
7. () Total Senior Personnel (1 - 6)						19,500	
B. Other Personnel (Show numbers in brackets)							
1. () Post Doctoral Associates							
2. () Other Professionals (Technician, Programmer, etc.)							
3. () Graduate Students							
4. () Undergraduate Students							
5. () Secretarial - Clerical							
6. () Other							
Total Salaries and Wages (A + B)						19,500	
C. Fringe Benefits (if charged as direct costs)						3,900 (c)	
Total Salaries, Wages and Fringe Benefits (A + B + C)						23,400	
D. Permanent Equipment (List item and dollar amount for each item exceeding \$1,000.)							
Total Permanent Equipment							
E. Travel 1. Domestic (incl. Canada and U.S. possessions)							
2. Foreign							
F. Participant Support Costs 54,000 (d)							
1. Stipends \$ 4,500 (e)							
2. Travel 3,600 (f)							
3. Subsistence 12,393 (h)							
4. Other							
() Total Participant Costs						74,493	
G. Other Direct Costs							
1. Materials and Supplies							
2. Publication Costs/Documentation/Dissemination							
3. Consultant Services							
4. Computer (ADPE) Services							
5. Subcontracts							
6. Other						3,000 (g)	
Total Other Direct Costs						3,000	
H. Total Direct Costs (A through G)							
I. Indirect Costs (Specify Rate and Base) 25% of student stipends							
Total Indirect Costs						13,500	
J. Total Direct and Indirect Costs (H + I)						114,393	
K. Residual Funds (If for further support of current projects see GPM 252 and 253)							
L. Amount of This Request (J) or (J minus K)						\$ 114,393	\$
M. Cost Sharing Proposed Level \$				Agreed Level If Different \$			
PI / PD Typed Name & Signature* Herbert L. Dershem				DATE 7/5/95		For NSF Use Only	
Institutional Representative Typed Name & Signature* James M. Gentile				DATE 7/5/95		Indirect Cost Rate Verification	
				Date Checked		Date Of Rate Sheet	
						Initials - ORG	

Budget Explanation

- (a) The salary for the Project Director includes \$2,000 for administration of the project and \$1,500 for directing the work of two undergraduates.
- (b) The salary of the Faculty Associates is \$1,500 for directing the work of two undergraduate participants.
- (c) Fringe benefits is based on 20% of the faculty salaries.
- (d) Student stipends are \$300 per week for 10 weeks for 6 students.
- (e) Travel budget includes \$250 per student. This will be used to reimburse participants for travel between home and campus at the beginning and conclusion of the program, and to pay participant travel expenses to make presentations of their results during the following academic year. Local funds will be used to supplement these travel expenses.
- (f) The cost of student housing is approximately \$40 per week for a total cost of \$400 per student. Hope College will subsidize one-half of this amount, leaving \$200 per student to be paid by the grant.
- (g) Other costs are budgeted at \$1,000 per summer. This will be used for postage, telephone, copying, and other general expenses. It will also be used to help defray the cost of off-campus speakers.
- (h) College contribution for FICA/MQFE taxes for participants.

Item I. Indirect Costs: The current charge by the college is 63.3%. The college will forgo the amount in excess of 25% (net of 38.3%) as a contribution to the program.

Institutional Support

The Computer Science Department and Hope College are committed to the principle that excellence in undergraduate education must include active student involvement in significant research. In support of this commitment, the college will contribute a substantial part of the resources required to carry out this REU project. The college will provide housing to the students at one-half of the normal cost as well as providing all of the services normally available to Hope summer students. These services include use of the physical activities center, the career and counseling center, library facilities, and computing facilities.

The college supports the research efforts of faculty and students through release time for faculty, faculty development grants, travel funds to scientific meetings, acquisition and maintenance of hardware and software, general secretarial and clerical support, and funds for expendable supplies.

The current rate of indirect costs for proposals at Hope is 63.3% of all salaries and wages. Hope College will pay all overhead costs in excess of the 25% of student salaries requested in this proposal.

A summary of Hope College contributions to the REU program is given in the table below:

Contributions of Hope College to REU Project	Annual	Total (3 yrs)
Housing, 6 students @ 10 weeks per student	\$ 1,200	\$3,600
Excluded indirect costs, 63.3% all salaries minus request	\$11,000	\$33,000
TOTAL	\$12,200	\$36,600



HOPE COLLEGE

OFFICE OF THE PRESIDENT

July 25, 1995

Mr. Perry W. Hooks, Grants Officer
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Mr. Hooks:

SUBJECT: Grant # CDA-9423943
Amendment # 1
Proposal # CDA-9542161

I am pleased to acknowledge your letter of July 19, 1995, regarding the amended grant award of \$4,131 for the support of the project directed by Herbert L. Dershem of our Department of Computer Science. The total grant awarded now totals \$38,131. The project is entitled

“REU: An Undergraduate Research Participation Program
in Computer Science.”

The amended award expires January 31, 1997.

We pledge our best efforts to use those resources wisely and in accordance with the terms and conditions set forth.

With all good wishes,

John H. Jacobson, President

JHJ/km

pc: ~~Dr. Jacob E. Nyenhuis~~, Provost
✓ Dr. Herbert L. Dershem, Professor of Computer Science & Chair
Dr. James M. Gentile, Dean for the Natural Sciences
Mr. Barry Werkman, Controller

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD • ARLINGTON, VIRGINIA 22230

RECEIVED

JUL 24 1995

PRESIDENTS OFFICE

Hope College

Award Date

Grant No.

Amendment No.

Proposal No.

July 19, 1995

CDA-9423943

001

CDA-9542161

Dr. John H. Jacobson
President
Hope College
Holland, MI 49423-3698

Dear Dr. Jacobson:

The National Science Foundation hereby awards \$4,131 to Hope College for additional support of the project described in the request for supplemental support.

This project, under the direction of Herbert L. Dershem, Department of Computer Science, is entitled:

"REU: An Undergraduate Research Participation Program in Computer Science."

This award with this amendment totals \$38,131 and expires January 31, 1997.

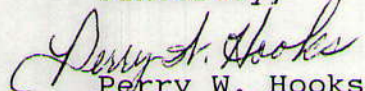
This grant is awarded pursuant to the authority of the National Science Foundation Act of 1950 (42 U.S.C. 1861 et seq.) and is subject to GC-1 Grant General Conditions (05/94).

Except as modified by this amendment, the grant conditions remain unchanged.

The attached budget indicates the amounts, by categories, on which NSF has based its support.

The cognizant NSF program official for this grant is John Cherniavsky (703) 306-1980. The cognizant NSF grants official is Mary L. Inabinet (703) 306-1213.

Sincerely,


Perry W. Hooks
Grants Officer

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD • ARLINGTON, VIRGINIA 22230

- 2 -

CDA-9423943
001

SUMMARY PROPOSAL BUDGET

	PERSON	MOS		Funds granted
	cal	acad	sumr	By NSF
A. (0.00) Total Senior personnel	0.00	0.00	0.00	\$0
B. Other Personnel				
1. (0.00) Post doctoral associates	0.00	0.00	0.00	\$0
2. (0.00) Other professionals	0.00	0.00	0.00	\$0
3. (0.00) Graduate students				\$0
4. (0.00) Secretarial-clerical				\$0
5. (0.00) Undergraduate students				\$0
6. (0.00) Other				\$0
Total salaries and wages (A+B)				\$0
C. Fringe benefits (if charged as direct cost)				\$0
Total salaries wages and fringes (A+B+C)				\$0
D. Total permanent equipment				\$0
E. Travel 1. Domestic				\$0
2. Foreign				\$0
F. Total participant support costs				\$4,131
G. Other direct costs				
1. Materials and supplies				\$0
2. Publication costs/page charges				\$0
3. Consultant services				\$0
4. Computer (ADPE) services				\$0
5. Subcontracts				\$0
6. Other				\$0
Total other direct costs				\$0
H. Total direct costs (A through G)				\$4,131
I. Total indirect costs				\$0
J. Total direct and indirect costs (H+I)				\$4,131
K. Residual funds / Small business fee				
1. Residual funds (if for further support of current projects GPM 252 and 253)				\$0
2. Small business fee				\$0
L. Amount of this request (J) or (J - K1 + K2)				\$4,131
M. Cost sharing				



HOPE COLLEGE

OFFICE OF THE PRESIDENT

February 14, 1996

Mr. Perry W. Hooks, Grants Officer
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Mr. Hooks:

SUBJECT: Grant # CDA-9423943
Amendment# 002

I am pleased to acknowledge your letter of February 6, 1996, regarding the additional award of \$38,131 for additional support of the Research Experiences for Undergraduates (REU) program at Hope College under the direction of Dr. Herbert L. Dershem of our Computer Science Department.

The project is entitled:

"REU: An Undergraduate Research Participation Program in Computer Science."

The award with the current amendment (#002) now totals \$76,262 and expires January 31, 1997.

We pledge our best efforts to use those resources wisely and in accordance with the terms and conditions set forth.

With all good wishes,

John H. Jacobson, President

JHJ/km

pc: Dr. ~~Jacob~~ E. Nyenhuis, Provost
~~Dr.~~ Herbert L. Dershem, Professor of Computer Science
Dr. James M. Gentile, Dean for the Natural Sciences
Mr. Barry Werkman, Controller

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD • ARLINGTON, VIRGINIA 22230

Award Date February 6, 1996
Grant No. CDA-9423943
Amendment No. 002

Dr. John H. Jacobson
President
Hope College
Holland, MI 49423-3698

RECEIVED

FEB 12 1996

Dear Dr. Jacobson:

STUDENTS OFFICE
Hope College

The National Science Foundation hereby awards \$38,131 to Hope College for additional support of the project being funded by the above-referenced award.

This project, under the direction of Herbert L. Dershem, Department of Computer Science, is entitled:

"REU: An Undergraduate Research Participation Program in Computer Science."

This award with this amendment totals \$76,262 and expires January 31, 1997.

This grant is awarded pursuant to the authority of the National Science Foundation Act of 1950 (42 U.S.C. 1861 et seq.) and is subject to GC-1 Grant General Conditions (10/95).

Except as modified by this amendment, the grant conditions remain unchanged.

The attached budget indicates the amounts, by categories, on which NSF has based its support.

The cognizant NSF program official for this grant is Harry G. Hedges (703) 306-1980. The cognizant NSF grants official is Carolyn Kofa (703) 306-1213.

Sincerely,

Perry W. Hooks
Perry W. Hooks
Grants Officer



HOPE COLLEGE

OFFICE OF THE PRESIDENT

February 17, 1997

Mr. Perry W. Hooks, Grants Officer
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Mr. Hooks:

SUBJECT: Grant # CDA-9423943
Amendment # 003

I am pleased to acknowledge your letter of January 20, 1997, regarding the continuing grant award of \$38,131 for the support of a project directed by Herbert L. Dershem in our Department of Computer Science. The project is entitled:

"REU: An Undergraduate Research Participation Program
in Computer Science."

This award with this amendment totals \$114,393 and expires January 31, 1998. Except as modified by this amendment, the grant conditions remain unchanged.

We pledge our best efforts to use those resources wisely and in accordance with the terms and conditions set forth.

With all good wishes,

John H. Jacobson, President

JHJ/mjw

pc: Dr. Jacob E. Nyenhuis, Provost
✓ Dr. Herbert L. Dershem, Professor of Computer Science
Dr. James M. Gentile, Dean for the Natural Sciences
Mr. Barry Werkman, Controller

Progress Report
NSF REU Grant # CDA 9423943
REU: An Undergraduate Research Participation Program in
Computer Science

Hope College
December 18, 1995

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant.

During the summer of 1995, eight students participated in undergraduate summer research in computer science at Hope College. Six of these were funded by the NSF REU grant, one was funded through a NASA grant to Professor Mike Jipping, and one was funded through an Air Force contract to Professor Herb Dershem. The students and their projects are listed below:

Project 1: Evaluating Parallel Software Design Tools (Michael J. Jipping)

John Duperon, sophomore from Hope College (duperon@cs.hope.edu)

Jeff Oegema, sophomore from Hope College (oegema@cs.hope.edu)

Project 2: Comparison of the use of Ada 9X to C++ for the development of object-oriented programs (Herbert L. Dershem)

Manuel Calderon, junior from University of Texas at El Paso (calderon@cs.utep.edu)

Andrew Van Pernis, junior from Hope College (vnpernis@cs.hope.edu)

Project 3: Construction of an Operating Systems Laboratory (Michael J. Jipping)

Darrick Brown, junior from Hope College (dbrown@cs.hope.edu)

Mike Crider, junior from Hope College (crider@cs.hope.edu)

Project 4: Dynamic Updating and Dynamic Visualization of Large Voronoi Diagrams (Gordon A. Stegink)

Rob Powell, junior from Taylor University (rpowell@css.tayloru.edu)

Dan Toth, junior from Hiram College (tothsd@hramf.hiram.edu)

The students were on campus participating in research for 10 weeks. The program was carried out as specified in the proposal.

2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant.

The program for the summer of 1996 will be carried out as specified in the proposal. Ryan McFall

who is presently a Visiting Instructor of Computer Science at Hope College will be supervising students in place of Gordon Stegink who will not be available to work on this project during the summer of 1996. Publicity materials will be distributed in January 1996.

3. Statement of funds estimated to remain unobligated -- if more than 20% -- at the end of the period for which NSF currently is providing support.

I do not estimate that there will be any unobligated funds.

4. Proposed budget for the ensuing year in the NSF format, only if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested.

We are requesting no modifications to the approved budget for the 1996 program

5. Information about other current and pending research support of senior personnel, if changed from the previous submission.

Professor Michael J. Jipping has the following current support not reported in the original proposal:

NSF ILI grant "A Laboratory for Experimenting with Operating Systems and Networking Concepts", 6/95 through 5/98, \$52,601.

NASA/Jove Augmentation Grant, 6/96 through 7/96, \$17,981.

NSF ILI grant "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", 6/96 through 5/98, \$46,356.

6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission.

No change.

7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

No change.

Progress Report
NSF REU Grant # CDA 9423943
REU: An Undergraduate Research Participation Program in
Computer Science

Hope College
December 17, 1996

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant.

During the summer of 1996, six students participated in undergraduate summer research in computer science at Hope College with support from the NSF REU grant. The students and their projects are listed below:

Project 1: Building a Networking Laboratory (Michael J. Jipping)

Michael Thelen, sophomore from Hope College (thelen@cs.hope.edu)

Victor Polites, junior from Hope College (polites@cs.hope.edu)

Project 2: Java-Oriented Test Harness (Herbert L. Dershem)

Marvin Malkowski, sophomore from University of Wisconsin-Stevens Point
(marvk@dwave.net)

Project 3: Java-Based Object-Oriented Fraction Visualization (Herbert L. Dershem)

Marsha Janjecic, freshman from St. Josephs College (mjb1329@saintjoe.edu)

Project 4: A JDBC Implementation for Sybase (Ryan McFall)

Kathryn Boner, sophomore from Franklin & Marshall College (KM_Boner@acad.fandm.edu)

Project 5: Foundations of a Pascal to Java Compiler (Ryan McFall)

Jason Bucata, junior from Hope College (bucata@cs.hope.edu)

The students were on campus participating in research for 10 weeks. The program was carried out as specified in the proposal. A summary of the projects can be found on the World Wide Web at <http://www.cs.hope.edu/~dershem/reuposters96.html>

2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant.

The program for the summer of 1997 will be carried out as specified in the proposal. Publicity materials will be distributed in January 1997.

3. Statement of funds estimated to remain unobligated -- if more than 20% -- at the end of the period for which NSF currently is providing support.

I do not estimate that there will be any unobligated funds.

4. Proposed budget for the ensuing year in the NSF format, only if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested.

We are requesting no modifications to the approved budget for the 1996 program

5. Information about other current and pending research support of senior personnel, if changed from the previous submission.

Professors Michael J. Jipping, Herbert L. Dershem, and Gordon A. Stegink has the following current support not reported in the original proposal:

NSF ILI grant "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", 6/96 through 5/98, \$46,356.

Professor Michael J. Jipping has the following current support not reported in the original proposal:

NSF ILI grant "A Laboratory for Experimenting with Operating Systems and Networking Concepts", 6/95 through 5/98, \$52,601.

6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission.

No change.

7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

No change.

APPENDIX D

ANNUAL NSF GRANT PROGRESS REPORT

NSF Program: Research Experiences
for Undergraduates

NSF Award Number: CDA-9423943

PI Name: Herbert L. Dershem

Period Covered By This Report: March 1, 1995 through Sept 1, 1995

PI Organization: Hope College

Date: December 18, 1995

PI Address: Department of Computer Science
Hope College
Holland, MI 49422-9000



Check if Continued Funding is Requested

Please include the following information:

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant;
2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant;
3. Statement of funds estimated to remain unobligated—if more than 20%—at the end of the period for which NSF currently is providing support;
4. Proposed budget for the ensuing year in the NSF format, *only* if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested;
5. Information about other current and pending research support of senior personnel, if changed from the previous submission;
6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission; and
7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

I certify that to the best of my knowledge (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and (2) the text and graphics in this report as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I understand that the willful provision of false information or concealing a material fact in this report or any other communication submitted to NSF is a criminal offense (U.S. Code, Title 18, Section 1001.)

PI Signature: Herbert L. Dershem

Progress Report
NSF REU Grant # CDA 9423943
REU: An Undergraduate Research Participation Program in
Computer Science

Hope College
December 18, 1995

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant.

During the summer of 1995, eight students participated in undergraduate summer research in computer science at Hope College. Six of these were funded by the NSF REU grant, one was funded through a NASA grant to Professor Mike Jipping, and one was funded through an Air Force contract to Professor Herb Dershem. The students and their projects are listed below:

Project 1: Evaluating Parallel Software Design Tools (Michael J. Jipping)
John Duperon, sophomore from Hope College (duperon@cs.hope.edu)
Jeff Oegema, sophomore from Hope College (oegema@cs.hope.edu)

Project 2: Comparison of the use of Ada 9X to C++ for the development of object-oriented programs (Herbert L. Dershem)
Manuel Calderon, junior from University of Texas at El Paso (calderon@cs.utep.edu)
Andrew Van Pernis, junior from Hope College (vnpernis@cs.hope.edu)

Project 3: Construction of an Operating Systems Laboratory (Michael J. Jipping)
Darrick Brown, junior from Hope College (dbrown@cs.hope.edu)
Mike Crider, junior from Hope College (crider@cs.hope.edu)

Project 4: Dynamic Updating and Dynamic Visualization of Large Voronoi Diagrams (Gordon A. Stegink)
Rob Powell, junior from Taylor University (rpowell@css.tayloru.edu)
Dan Toth, junior from Hiram College (tothsd@hramf.hiram.edu)

The students were on campus participating in research for 10 weeks. The program was carried out as specified in the proposal.

2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant.

The program for the summer of 1996 will be carried out as specified in the proposal. Ryan McFall

who is presently a Visiting Instructor of Computer Science at Hope College will be supervising students in place of Gordon Stegink who will not be available to work on this project during the summer of 1996. Publicity materials will be distributed in January 1996.

3. Statement of funds estimated to remain unobligated -- if more than 20% -- at the end of the period for which NSF currently is providing support.

I do not estimate that there will be any unobligated funds.

4. Proposed budget for the ensuing year in the NSF format, only if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested.

We are requesting no modifications to the approved budget for the 1996 program

5. Information about other current and pending research support of senior personnel, if changed from the previous submission.

Professor Michael J. Jipping has the following current support not reported in the original proposal:

NSF ILI grant "A Laboratory for Experimenting with Operating Systems and Networking Concepts", 6/95 through 5/98, \$52,601.

NASA/Jove Augmentation Grant, 6/96 through 7/96, \$17,981.

NSF ILI grant "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", 6/96 through 5/98, \$46,356.

6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission.

No change.

7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

No change.

ANNUAL NSF GRANT PROGRESS REPORT

NSF Program: Research Experiences
for Undergraduates
PI Name: Herbert L. Dershem

NSF Award Number: CDA-9423943

Period Covered By This Report: March 1, 1996 thru Sept 1, 1996

PI Organization: Hope College

Date: January 17, 1996

PI Address: Department of Computer Science
Hope College
Holland, MI 49422-9000

☒ Check if Continued Funding is Requested

Please include the following information:

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant;
2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant;
3. Statement of funds estimated to remain unobligated —if more than 20%— at the end of the period for which NSF currently is providing support;
4. Proposed budget for the ensuing year in the NSF format, **only** if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested;
5. Information about other current and pending research support of senior personnel, if changed from the previous submission;
6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission; and
7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

I certify that to the best of my knowledge (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and (2) the text and graphics in this report as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I understand that the willful provision of false information or concealing a material fact in this report or any other communication submitted to NSF is a criminal offense (U.S. Code, Title 18, Section 1001.)

PI Signature: Herbert L. Dershem

NSF Form 1328 (7/95)

Progress Report
NSF REU Grant # CDA 9423943
REU: An Undergraduate Research Participation Program in
Computer Science

Hope College
December 17, 1996

1. Brief summary of progress, including results obtained to date, and their relationship to the general goals of the grant.

During the summer of 1996, six students participated in undergraduate summer research in computer science at Hope College with support from the NSF REU grant. The students and their projects are listed below:

Project 1: Building a Networking Laboratory (Michael J. Jipping)

Michael Thelen, sophomore from Hope College (thelen@cs.hope.edu)

Victor Polites, junior from Hope College (polites@cs.hope.edu)

Project 2: Java-Oriented Test Harness (Herbert L. Dershem)

Marvin Malkowski, sophomore from University of Wisconsin-Stevens Point
(marvk@dwave.net)

Project 3: Java-Based Object-Oriented Fraction Visualization (Herbert L. Dershem)

Marsha Janjecic, freshman from St. Josephs College (mjb1329@saintjoe.edu)

Project 4: A JDBC Implementation for Sybase (Ryan McFall)

Kathryn Boner, sophomore from Franklin & Marshall College (KM_Boner@acad.fandm.edu)

Project 5: Foundations of a Pascal to Java Compiler (Ryan McFall)

Jason Bucata, junior from Hope College (bucata@cs.hope.edu)

The students were on campus participating in research for 10 weeks. The program was carried out as specified in the proposal. A summary of the projects can be found on the World Wide Web at <http://www.cs.hope.edu/~dershem/reuposters96.html>

2. A brief summary of work to be performed during the next year of support if changed from the original proposal; an indication of any current problems or favorable or unusual developments; and any other significant information pertinent to the type of project supported by NSF or as specified by the terms and conditions of the grant.

The program for the summer of 1997 will be carried out as specified in the proposal. Publicity materials will be distributed in January 1997.

3. Statement of funds estimated to remain unobligated -- if more than 20% -- at the end of the period for which NSF currently is providing support.

I do not estimate that there will be any unobligated funds.

4. Proposed budget for the ensuing year in the NSF format, only if the original award letter did not indicate specific incremental amounts or if adjustments to a planned increment exceeding the greater of 10% or \$10,000 are being requested.

We are requesting no modifications to the approved budget for the 1996 program

5. Information about other current and pending research support of senior personnel, if changed from the previous submission.

Professors Michael J. Jipping, Herbert L. Dershem, and Gordon A. Stegink has the following current support not reported in the original proposal:

NSF ILI grant "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", 6/96 through 5/98, \$46,356.

Professor Michael J. Jipping has the following current support not reported in the original proposal:

NSF ILI grant "A Laboratory for Experimenting with Operating Systems and Networking Concepts", 6/95 through 5/98, \$52,601.

6. A statement describing any contribution of the project to the area of education and human-resource development, if changed from any previous submission.

No change.

7. Updated information on animal care and use, Institutional Biohazard Committee and Human Subject Certification, if changed substantially from those originally proposed and approved.

No change.

NATIONAL SCIENCE FOUNDATION
4201 Wilson Blvd.
Arlington, VA 22230

PI/PD Name and Address

Dershem, Herbert L

Holland, MI 494229000
United States

NATIONAL SCIENCE FOUNDATION

FINAL PROJECT REPORT

PART I - PROJECT IDENTIFICATION INFORMATION	
1. Program Official/Org.	<i>Harry Hedges - EIA</i>
2. Program Name	<i>CISE INSTITUTIONAL INFRASTRUCT</i>
3. Award Dates	From: <i>02/15/95</i> To: <i>01/31/98</i>
4. Institution and Address	<i>Hope College</i> <i>Hope College</i> <i>Holland, MI 49423</i>
5. Award Number	<i>9423943</i>
6. Project Title	<i>REU: An Undergraduate Research Participation Program in Computer Science</i>

NSF Grant Conditions (Article 17, GC-1, and Article 9, FDP-11) require submission of a Final Project Report (NSF Form 98A) to the NSF program officer no later than 90 days after the expiration of the award. Final Project Reports for expired awards must be received before new awards can be made (NSF Grants Policy Manual Section 677).

Below, or on a separate page attached to this form, provide a summary of the completed projects and technical information. Be sure to include your name and award number on each separate page. See below for more instructions.

PART II - SUMMARY OF COMPLETED PROJECT (for public use)

The summary (about 200 words) must be self-contained and intelligible to a scientifically or technically literate reader. Without restating the project title, it should begin with a topic sentence stating the project's major thesis. The summary should include, if pertinent to the project being described, the following items:

- The primary objectives and scope of the project
- The techniques or approaches used only to the degree necessary for comprehension
- The findings and implications stated as concisely and informatively as possible

(See enclosed SUMMARY OF COMPLETED PROJECT)

PART III - TECHNICAL INFORMATION (for program management use)

List references to publications resulting from this award and briefly describe primary data, samples, physical collections, inventions, software, etc. created or gathered in the course of the research and, if appropriate, how they are being made available to the research community. Provide the NSF Invention Disclosure number for any invention.

(See enclosed TECHNICAL INFORMATION)

I certify to the best of my knowledge (1) the statements herein (excluding scientific hypotheses and scientific opinion) are true and complete, and (2) the text and graphics in this report as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or of individuals working under their supervision. I understand that willfully making a false statement or concealing a material fact in this report or any other communication submitted to NSF is a criminal offense (U.S. Code, Title 18, Section 1001).

Submitted via FastLane	
Principal Investigator/Project Director Signature	Date

IMPORTANT: MAILING INSTRUCTIONS

Return this *entire* packet plus all attachments in the envelope attached to the back of this form. Please copy the information from Part I, Block I to the *Attention block* on the envelope.

PART IV -- FINAL PROJECT REPORT -- SUMMARY DATA ON PROJECT PERSONNEL

(To be submitted to cognizant Program Officer upon completion of project)

The data requested below are important for the development of a statistical profile on the personnel supported by Federal grants. The information on this part is solicited in response to Public Law 99-383 and 42 USC 1885C. All information provided will be treated as confidential and will be safeguarded in accordance with the provisions of the Privacy Act of 1974. You should submit a single copy of this part with each final project report. However, submission of the requested information is not mandatory and is not a precondition of future award(s). Check the "Decline to Provide Information" box below if you do not wish to provide the information.

Please enter the numbers of individuals supported under this grant.
Do not enter information for individuals working less than 40 hours in any calendar year.

	Senior Staff		Post-Doctorals		Graduate Students		Under-Graduates		Other Participants ¹	
	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
A. Total, U.S. Citizens	4						16	2		
B. Total, Permanent Residents										
U.S. Citizens or Permanent Residents ² :										
American Indian or Alaskan Native										
Asian.										
Black, Not of Hispanic Origin.										
Hispanic							1			
Pacific Islander										
White, Not of Hispanic Origin	4						15	2		
C. Total, Other Non-U.S. Citizens										
Specify Country										
1.										
2.										
3.										
D. Total, All participants (A + B + C)	4						16	2		
Disabled³										

☐ Decline to Provide Information: Check box if you do not wish to provide this information (you are still required to return this page along with Parts I-III).

¹ Category includes, for example, college and precollege teachers, conference and workshop participants.

² Use the category that best describes the ethnic/racial status for all U.S. Citizens and Non-citizens with Permanent Residency. (If more than one category applies, use the one category that most closely reflects the person's recognition in the community.)

³ A person having a physical or mental impairment that substantially limits one or more major life activities; who has a record of such impairment; or who is regarded as having such impairment. (Disabled individuals also should be counted under the appropriate ethnic/racial group unless they are classified as "Other Non-U.S. Citizens.")

AMERICAN INDIAN OR ALASKAN NATIVE: A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

ASIAN: A person having origins in any of the original peoples of East Asia, Southeast Asia or the Indian subcontinent. This area includes, for example, China, India, Indonesia, Japan, Korea and Vietnam.

BLACK, NOT OF HISPANIC ORIGIN: A person having origins in any of the black racial groups of Africa.

HISPANIC: A person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.

PACIFIC ISLANDER: A person having origins in any of the original peoples of Hawaii; the U.S. Pacific territories of Guam, American Samoa, and the Northern Marianas; the U.S. Trust Territory of Palau; the islands of Micronesia and Melanesia; or the Philippines.

WHITE, NOT OF HISPANIC ORIGIN: A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.

PART II - SUMMARY OF COMPLETED PROJECT

The REU program in Computer Science at Hope College provided talented undergraduates with a meaningful research experience to encourage them to consider a career in computer science research. The primary objective of the project was to expose the students to the techniques, attitudes, and rewards of computer science research and to provide encouragement and direction in the pursuit of such a career. A strong effort was made to recruit women and minority students into the program.

Six participants were selected each year, three from Hope College and three from other institutions. These students worked with a Hope College faculty mentor for ten weeks during the summer in the Hope College Computer Science laboratory. Areas of research included concurrent systems, algorithm animations, programming languages, computational geometry, database systems, compiler construction, and web-based instructional tools. The students performed independent research, gave oral presentations on their work, attended workshops on graduate school, and prepared scientific papers and presentations.

PART III - TECHNICAL INFORMATION

Grant Number: CDA-9423943

Amount of Award: \$114,393

Support Period: March 1, 1995 to February 28, 1998

Recruitment:

In January of each year (1995-1997) the PI advertised the availability of positions for summer research by doing the following:

- Mailing announcements and applications to over 300 computer science departments**
- Distributing information on a number of electronic lists and providing on-line application forms and web-based information about the program**
- Mailing announcements to the minority affairs officer at over 300 institutions**
- Informing department chairs at predominantly minority institutions about the program via email and soliciting nominations from them.**

Each year between 60 and 90 applications were received from which the three external participants were chosen. In addition, three Hope College participants were chosen each year from approximately 20 applications.

Participants: In addition to the six undergraduate researchers supported by REU, there were additional students participating in these projects with funding from other sources. In 1995, one student was funded by NASA and one by an Air Force contract. In 1997, one student was funded by the Hughes Foundation.

Projects: The projects are given below by topic and participants. An asterisk (*) indicates the undergraduate student was supported by non-REU funding.

1995

Evaluating Parallel Software Design Tools

Faculty Mentor: Michael J. Jipping

Undergraduate Researchers: John Duperon and Jeff Oegema*

Comparison of the Use of Ada 95 to C++ for the Development of Object-Oriented Programs

Faculty Mentor: Herbert L. Dershem

Undergraduate Researchers: Manuel Calderon and Andrew Van Pernis*

Construction of an Operating Systems Laboratory

Faculty Mentor: Michael J. Jipping

Undergraduate Researchers: Darrick Brown and Michael Crider

Dynamic Updating and Dynamic Visualization of Large Voronoi Diagrams

Faculty Mentor: Gordon A. Stegink

PART III - TECHNICAL INFORMATION

(Page 2 of TECHNICAL INFORMATION)

Undergraduate Researchers: Robert Powell and Dan Toth

1996

Building a Networking Laboratory

Faculty Mentor: Michael J. Jipping

Undergraduate Researchers: Michael Thelen and Victor Polites

Java-Oriented Test Harness

Faculty Mentor: Herbert L. Dershem

Undergraduate Researcher: Marvin Malkowski

Java-Based Object-Oriented Fraction Visualization

Faculty Mentor: Herbert L. Dershem

Undergraduate Researcher: Marsha Janjecic

A JDBC Implementation for Sybase

Faculty Mentor: Ryan McFall

Undergraduate Researcher: Kathryn Boner

Foundations of a Pascal to Java Compiler

Faculty Mentor: Ryan McFall

Undergraduate Researcher: Jason Bucata

1997

Visualization in Java

Faculty Mentor: Herbert L. Dershem

Undergraduate Researcher: James VanderHyde

Educational Animations of Algorithms

Faculty Mentor: Herbert L. Dershem

Undergraduate Researcher: Peter Brummund

Dynamic Anomaly Detection in Java

Faculty Mentor: Michael J. Jipping

Undergraduate Researchers: Michael Bradshaw, Nathan Oostendorp, and Anita Van Engen*

Persistent Annotation of HTML Documents

Faculty Mentor: Ryan McFall

Undergraduate Researchers: Daryl Blood and Jeff Penney

Papers and Posters presented:

Penney*, J. and D. Blood*. 1997. Persistent Annotation of HTML Documents.

Pew Midstates Undergraduate Research Symposium. Chicago, IL

PART III - TECHNICAL INFORMATION

(Page 3 of TECHNICAL INFORMATION)

Bradshaw, M., Oostendorp, N., and A. Van Engen. Dynamic Anomaly Detection in Java. Poster at 1998 SIGCSE Symposium. Atlanta, GA

Papers published:

Van Engen*, A., Bradshaw*, M., and N. Oostendorp*. 'Extending Java to Support Shared Resource Protection and Deadlock Detection in Threads Programming', Crossroads, Winter, 1997.

Dershem, H. and P. Brummund*. 'Tools for Web-Based Sorting Animation,' Proceedings of 1998 SIGCSE Symposium.

Dershem, H. and J. Vanderhyde*. 'Java Class Visualization for Teaching Object-Oriented Concepts,' Proceedings of 1998 SIGCSE Symposium.