

COMPUTING RESEARCH NEWS

More than 25 Years of Service to the Computing Research Community

November 1998

Vol. 10/No. 5

PITAC's Interim Report: Expeditions Of An IT Kind

By Louise Arnheim

It was nearly two centuries ago that Thomas Jefferson asked Meriwether Lewis and William Clark to chart an overland route to the Pacific Ocean. The famed "expedition" was based on Jefferson's assumption that such a route could be charted and his shrewd calculation that America's trading position would be greatly improved if it could.

With that same adventurous spirit, a Presidential Advisory Committee envisions expeditions and similar ventures into uncharted domains of information technology (IT). Their findings are outlined in the "Interim Report to the President: New Federal Research Initiatives: Creating an Effective Management Structure" (<http://www.hpcc.gov/ac/interim>). The report's authors are the twenty-five members of the President's Information Technology Advisory Committee (PITAC).

While the report's primary purpose is in influence FY 2000

funding levels for federal R&D, its 1998 release is intended to "get discussion going," says PITAC co-chair Ken Kennedy.

In the September issue of *Computing Research News*, CRA Board Chairman Edward Lazowska urged the computing research community to rally behind the report's major ideas. In this issue, *CRN* takes a closer look at these ideas, and previews some of the likely hurdles they will face between now and next year's millennium budget vote.

Federal IT-R&D

PITAC's principal conclusion, that federal funding for information technology is "dangerously inadequate," suggests an economic future where the United States' "robust technological edge" is significantly diminished. In this regard, Juris Hartmanis, outgoing Associate Director of the Directorate for Computer and Information Sciences and Engineering (CISE), National Science Foundation (NSF), calls the report "a timely

warning that this country is not investing enough in computer science and engineering research to maintain U.S. world leadership in information technology."

Overall, the Committee calls for \$1 billion for IT over the next five years. But aside from funding levels for a few select proposals, the interim report abstains from naming specific budget figures (the Committee does, however, endorse the President's FY '99 budget for IT R&D, as well as the 21st Century Research Fund). According to Kennedy, it is likely that the final report (expected early next year) will supply such numbers.

However, increasing dollar amounts is not PITAC's only concern. The interim report also calls for fundamental changes in the modes and management of federal R&D. For example, much of the report talks about federal R&D machinery in need of realignment -- from the current emphasis on applied research to a renewed appreciation for basic research; from sponsoring short-term single-investigator studies to investing in long-term, multiple-investigator studies; and from the current concentration on hardware to an intensive effort to develop software.

To maintain this balance across the wide spectrum of federal agencies engaged in IT-related R&D, PITAC says a single agency is needed to keep watch. "The only current feasible

The Triennial Federated Computing Research Conference (FCRC)

Atlanta, GA April 30 - May 7, 1999.

Visit our website www.cra.org/Activities/conferences/fcrc.html for more details

candidate" for this role, PITAC concludes, is the NSF. Accordingly, new IT funding would then be divided almost equally between NSF and other agencies. Within NSF itself, more than half of new funding would be put towards the modes cited above (the remainder would be allocated to "traditional programs within CISE -- expanded as appropriate to projects of larger size and longer duration"). PITAC also recommends more IT representation on the National Science Board.

PITAC continued on Page 8

Inside CRN

Expanding the Pipeline	2	DNS to Commerce	5
Industrial vs. Faculty Salaries	3	Executive Fellowship	5
Policy 101	4	Departmental Profiles Survey	6-8
New Gov't Affairs Director	5	Professional Opportunities	10-16

CRA National Study of IT Worker Shortage

Many of CRA's members are reporting anecdotal data that suggests there is a significant shortage of information technology workers in the United States. Academic departments are experiencing tremendous increases in the number of recruiters on campus to hire their graduates, as well as increases in graduate students and faculty members being attracted away to industrial posts. And yet our industrial members are reporting their difficulties in filling positions. To investigate this growing concern and suggest national solutions, CRA is undertaking a study of the alleged shortage of Information Technology (IT) workers in the United States. The National Science Foundation (NSF) is funding the effort.

The national policy debate over the IT worker shortage has an interesting history. Over the past two years, a trade association, Information Technology Association of America (ITAA), produced two reports arguing that there is a serious shortage of information workers in the United States. The first study is *Help Wanted: The IT Workforce Gap At The Dawn Of A New Century*, Feb. 1997, Stuart Anderson, ITAA. The second study is *Help Wanted*

1998: A Call for Collaborative Action for the New Millennium, Feb. 1998, ITAA and the Virginia Polytechnic Institute and State University (Virginia Tech). Concern that the United States might have a deficit of hundreds of thousands of IT workers, coupled with an apparent worsening of the problem, captured the attention of the U.S. Department of Commerce. It too released its own report with findings similar to the first ITAA report. The Commerce report was roundly criticized by the U.S. General Accounting Office (GAO), which faulted the statistical methods used in gathering the data put forward by ITAA and the Commerce Department, and questioned the basic shortage reported by both.

Proposed legislation in the U.S. Congress to raise the cap on the number of H-1B visas given out each year has attracted national policy attention to the worker shortage issue. H-1B visas are a kind of temporary visa used by a number of high-tech companies, among others, to employ foreign workers. The largest numbers of H-1B workers, by far, come from India. The ITAA and most of the computer industry have lined up in favor of increasing the cap, while the

labor unions and others have lobbied against the increase. This issue, for example, has pitted members of the IEEE Computer Society, many of whom work in industry and can see the signs of the shortage, against the IEEE USA organization (the lobbying arm for the IEEE in Washington), which is trying to protect jobs for U.S. electrical engineers.

CRA has been concerned about the misunderstandings that have been expressed by some of the participants in this H-1B debate and repeated in the national press. One particularly common misunderstanding was that the worker deficit could be overcome if only the universities would produce the requisite number of computer science and engineering graduates. It is clear that this reasoning is faulty on at least two grounds. First, the ITAA and Department of Commerce reports give a broad definition of IT workers, which includes virtually anyone who works in an IT organization; but degree recipients in computer science and engineering are not typically the people who hold many of these jobs, such as help desk support or web designer. Second, these organizations

National Study Continued on Page 3

NONPROFIT ORG.
U.S. POSTAGE
PAID
WASHINGTON, DC
PERMIT NO. 993

CRA
1100 Seventeenth Street, NW
Suite 507
Washington, DC 20036-4632

Expanding the Pipeline

Committee on the Status of Women in Computing Research

By Joan Francioni

We have all heard about the relatively low percentage of women and minorities in computer science and engineering (CS&E) at all stages of the educational pipeline. As far as CRA is concerned, this is and has been an undesirable situation.

In 1991, CRA took direct action to try to change this by establishing the Committee on the Status of Women in Computing Research (CRA-W). This committee was charged with taking positive action to directly increase the number of women participating in computer science and engineering research and education at all levels. In addition to this mission, the committee also works to increase the degree of success women experience and to provide a forum for addressing problems that often fall disproportionately within women's domain. It is hoped that the committee activities will have a positive impact on other underrepresented groups in CS&E. Moreover, there is a commitment to improving the working environment for computer scientists and engineers of both genders.

In this article, we present an overview of CRA-W's activities. Anyone interested in participating in any of these activities should contact the lead member of the project. Further details about the projects can be found on the committee's webpage: <http://www.cra.org/Activities/craw/>.

Activities for High School and Undergraduate Students

A "Women in Computer Science" careers booklet has been designed to motivate young women at the undergraduate and high school levels to consider a career in the field of computer science. The booklet contains biographies of eighteen successful women who have chosen interesting and rewarding computer-related careers. The biographies represent a variety of occupations, ethnic backgrounds, achievement levels, and geographic locations. They also include family and/or outside activities of the women, in addition to employment responsibilities and interests. The booklet is available online at <http://www.sdsc.edu/CRAW/careers/>.

In the first printing, funded by NSF, 15,000 booklets were distributed. ACM supported the printing of 35,000 additional copies, allowing the booklet to be distributed to each high school in the United States.

[Lead member: Dian Rae Lopez, lopezdr@cda.mrs.umn.edu]

Activities Targeted to Undergraduate Students

The **Distributed Mentor Project** was one of the committee's first large projects. The program matches female undergraduate students with female professors for a summer of research and mentoring at the

mentor's home institution. The program seeks to provide the students with a model not only for research, but also with a model of a successful female academic. Separate funding was obtained from NSF to provide research funding for the students.

In 1994, the first group of 25 students spent the summer doing research with female faculty mentors. Since then, 20 to 28 students each summer have participated in this program with mentors all across the country. In addition to arranging the mentor-student matches, the committee works with the LEAD (Learning through Evaluation, Adaptation, and Dissemination) Center at the University of Wisconsin, Madison to provide follow-up and ensure that the project has broad impact.

[Lead member: Mary Jean Harrold, harrold@cis.ohio-state.edu]

The **Collaborative Research Experience for Women in Undergraduate Computer Science and Engineering (CREW)** program is a relatively new program. It is designed to provide research experiences for groups of two to three undergraduate women, who will each work together at the students' home institution. By increasing the opportunity to do research and by decreasing the isolation that may be experienced in doing independent research, women scientists and engineers will hopefully be encouraged to pursue similar work in graduate school. The students each receive a stipend of \$1,000 and up to \$500 per project may be used to request special equipment, travel, or supporting materials. At the end of the project, students will be required to submit a one-page summary of their work. These summaries will be posted on the CRA-W website and students will be encouraged to submit papers and present their work to other appropriate journals and conferences.

[Lead member: Sheila Castaneda, cast@keller.clarke.edu]

The first **Computing Research Association Outstanding Undergraduate Award** competition was held in 1994-1995 (sponsored by Microsoft and CRA). The competition, held annually, recognizes exceptional female and male undergraduates in CS&E. Nominations are submitted by CS&E departments for Outstanding Female Undergraduate and Outstanding Male Undergraduate Awards. The winners are presented with a prize at a major computing research conference. Superior nominees in each category are also recognized with honorable mention certificates.

[Lead member: Ruzena Bajcsy, bajcsy@central.cis.upenn.edu]

Activities for Undergraduate and Graduate Students

The experience of attending a research conference has been found to be very motivating for young students. In addition to the excitement of the conference itself, interaction with faculty (particularly

female faculty who can act as role models) is important in the decision of women to pursue a research career. The **Conference Experiences for Women Project** increases the number of female students who can have these opportunities by promoting and funding female-undergraduate and new graduate student attendance at research conferences. The Education, Outreach, and Training group of the Partnership for Advanced Computational Infrastructure (EOT-PACI) of the NSF fund this project.

[Lead member: Nancy Leveson, leveson@mit.edu]

A serious problem for women students is a lack of information about programs and opportunities that already exist. The **Graduate Information Kit for Women in CS&E** contains information about how to select and apply to a graduate program. It includes an appendix with information on graduate fellowships in CS&E targeted for applicants from underrepresented groups. Although targeted primarily to women, much of the information is valuable to all students interested in graduate study in this field. The booklet is currently being updated. The revised version will be posted on the committee's webpage in the near future.

[Lead member: Ann Redelfs, redelfs@sdsc.edu]

Activities for Ph.D. Graduate Students and Faculty

Since 1993, CRA-W has sponsored a series of **Workshops on Academic Careers for Women in Computer Science**. Knowing that women are almost always a minority in their own departments (and frequently the only female in the department), the CRA-W workshops were designed to bring new women faculty together with women already established in their fields. These workshops also targeted Ph.D. graduate students in order to give them information for deciding whether to go into industry or academics upon graduation.

Within the forum of the workshop, a group of established professionals provides practical information, advice, and support to their younger colleagues. Each of the workshops is associated with a major professional meeting, providing many attendees with the opportunity to attend technical talks and make contacts in their research areas. In an effort to serve as a resource for a wider group of men and women than are able to attend the workshops, the sessions have been transcribed and developed into summaries (see the CRA-W website). In addition, a more complete publication is currently being prepared.

[Lead member: Fran Berman, berman@cs.ucsd.edu]

CRA-W has taken an active role in encouraging the nomination of deserving senior women for presti-

CRA-W Continued on Page 9

Computing Research Association

Board Officers

Edward Lazowska
Chair
University of Washington

Mary Lou Soffa
Vice Chair
University of Pittsburgh

Kenneth C. Sevcik
Secretary
University of Toronto

James Foley
Treasurer
Mitsubishi Electric Research

Board Members

Frances E. Allen
IBM T.J. Watson Research Center

Sandra Johnson Baylor
IBM T.J. Watson Research Center

Anita Borg
Xerox Palo Alto Research Laboratory

Robert Cartwright
Rice University

Timothy Finin
University of Maryland, Baltimore County

Peter Freeman
Georgia Institute of Technology

John Gannon
University of Maryland

C. William Gear
NEC Research Institute Inc.

Mary Jane Irwin
Pennsylvania State University

Leah Jamieson
Purdue University

David S. Johnson
AT&T Labs - Research

Stephen S. Johnson
Transmeta Corporation

Sidney Karin
University of California, San Diego

Nancy G. Leveson
University of Washington

Jill P. Mesirov
Whitehead/MIT Center for Genome Research

James Morris
Carnegie Mellon University

David Patterson
University of California, Berkeley

Guylaine M. Pollock
Sandia National Laboratories

Daniel Reed
University of Illinois at Urbana-Champaign

Barbara Ryder
Rutgers University

Lawrence Snyder
University of Washington

Eugene Spafford
Purdue University

John A. Stankovic
University of Virginia

Jeffrey Ullman
Stanford University

Mary K. Vernon
University of Wisconsin, Madison

Stephen S. Yau
Arizona State University

Stuart Zweben
Ohio State University

Executive Director

William Aspray



Association News

Industrial and Faculty Salaries Compared in Two CRA Surveys

Data from two CRA surveys, the Salary Survey of Computer Science Researchers in Industrial Laboratories and the Taulbee Survey, have been compiled in a graph that compares industrial and faculty starting salaries. Figure 1 plots the mean minimum, mean, and mean maximum salaries from the two surveys, both conducted in late fall 1997. The results indicate that, roughly speaking, the mean 12-month industrial salary is about 143 percent of the mean 9-month university salary in these surveys.

CRA's Industry Committee, recognizing the need for a survey that explicitly addressed the issue of salaries paid to computer science researchers employed in industrial computer science laboratories, proposed that the industrial salary survey be initiated.

In November 1997, CRA conducted the first survey with nine companies, representing 655 individuals, participating. CRA staff analyzed the results and, because of the proprietary nature of the information, the summary data were distributed in January 1998 only to the companies that participated in the survey.

The survey asked for minimum, average, and maximum starting salaries for computer science Ph.D.s in computer science research positions at the experience levels of 1 to 5, 6 to 10, 11 to 15, and 16 to 20 years over a 12-month period. The

experience level is plotted in Figure 1 at the points 3, 8, 13, and 18 years. (The 12-month salaries include the estimated value of bonuses and stock plans as determined by each respondent.)

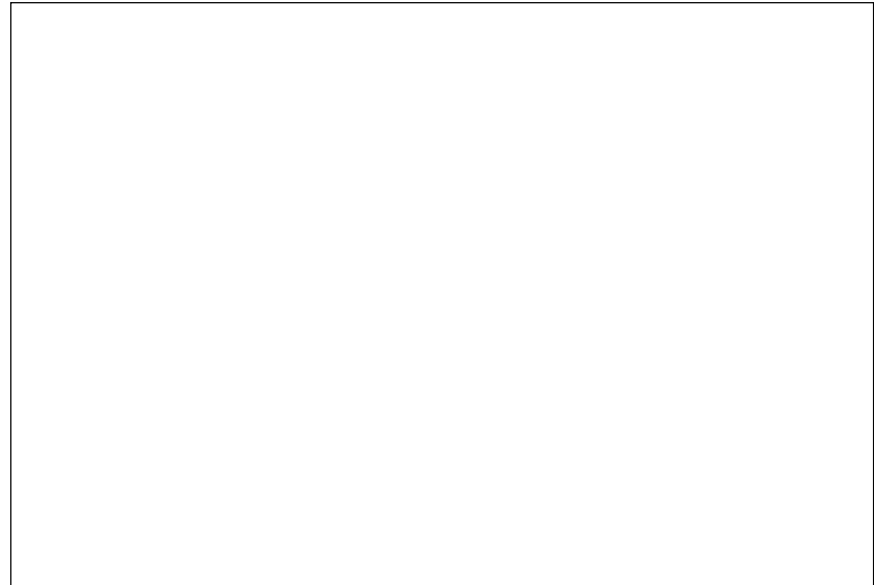
The industrial salary data were compared to the data reported from the annual CRA Taulbee Survey. This survey covers the enrollment, production, and employment of Ph.D.'s in CS & CE, and salary and demographic data for faculty in CS & CE in North America. Preliminary salary data for faculty are published in *Computing Research News* each January, and the full results of the survey appear in the March edition. These data are used not only by academic institutions, but also by federal agencies, the media, and the computing industry as well. Last year, 135 departments responded to the Taulbee Survey.

The data used from the Taulbee survey assigns experience levels of 3, 9, and 22 years to assistant, associate, and full professors, respectively. (Experience levels are not asked for in the Taulbee Survey, which is why they needed to be assigned.) Figure 1 shows the 9-month salaries for the top 12 institutions (with the exception of the starting salaries at the experience level point of 0, which were taken over the whole U.S.).

The 1998 CRA Taulbee Survey is currently under way; responses are due on **November 13**. The second

CRA survey of industrial lab salaries will begin in early November, with results available in January 1999 to companies that participate.

Figure 1 is publicly distributed with the approval of last year's participating companies. ■



National Study from page 1

are speaking of current deficits that already number 200,000 and are growing, while the annual national production of bachelor's degrees in computer science and engineering is only about 25,000; thus there is no chance that these graduates could fill all of the positions.

CRA approached the NSF's Directorate for Computer and Information Science and Engineering (CISE), suggesting that it support a study of the IT worker shortage, with a particular emphasis on the supply issues. The study would be conducted in partnership with CRA's affiliated computer professional societies: AAAI, ACM, IEEE Computer Society, SIAM, and USENIX. NSF agreed to support the study, provided that it is "objective and scientific." To achieve these goals, the study has been designed to involve a broad spectrum of people from both academia and industry to serve on the study group and to review preliminary drafts, and to take a new and unbiased look at all the relevant data that can be collected from various public and private sources. Under the direction of CRA Board Member Peter Freeman and CRA Executive Director William Aspray, the study group began its work in May 1998. There is an ambitious schedule to produce a final report no later than March 1999, so that the findings can be considered in the national policy debate in the first congressional session of the new year.

One of the first things that the steering committee (composed of representatives from our affiliate societies, plus several others -- a complete list of the study group is on page 9) did was meet with government employees who have been concerned about the IT worker issue in order to find out what kinds of information and recommendations would be most helpful to them. Discussions with representatives of NSF, the GAO, the Defense Advanced Research Projects Agency (DARPA), the Office of Science and Technology Policy (OSTP), and

Congressional committees on science and technology issues suggested that the study group should focus on a reevaluation of existing data, new categorizations of information workers to be used in future data-gathering, and seed-corn issues in selected areas of computing such as data mining and networking, among others.

The steering committee met several times to figure out what value it could add to the debate. In order to collect and interpret the data surrounding this issue, the steering group contracted with the Commission on Professionals in Science and Technology to procure data, and with a labor economist familiar with the IT labor market to assist with the interpretation. The study group was broadened to include people familiar with various aspects of the issue: formal education of various kinds from community college through graduate school, continuing and alternative education, underrepresented groups in computing, past IT worker shortages, previous seed-corn issues and national responses to them, industrial recruiting and job skill issues, and relevant labor issues.

After several meetings to discuss strategies and approaches, the study group was divided into three subcommittees to analysis and draft preliminary recommendations. Stuart Zweben and Steve Johnson are, respectively, leading groups studying the supply and demand issues; while Paul Davis is heading a group that is examining contextual issues such as the international marketplace, underrepresented groups, seed-corn issues, and other exogenous factors. The three subcommittees will report back to the full study group in mid-November to hash out recommendations. By the end of the year the two principal investigators will write a first draft of the report, which will go out for extensive review in early 1999.

It is too early to report any findings at this time. Look for results of the study in the March or May 1999 issues of *CRN* and on the CRA webpages <http://www.cra.org>. ■

Nominations sought for CRA Service Awards

CRA invites nominations for the 1998 CRA Distinguished Service Award honoring outstanding service to the research community in the areas of government affairs, professional societies, publications, or conferences, and leadership, and the A. Nico Haberman Award for outstanding contributions in aiding members of underrepresented groups. Nominations should be no longer than two pages and describe the contribution that is the basis of the nominations. See our website, <http://www.cra.org/main/cra.awards.html> for specifics.

Past Distinguished Service Award Recipients:

1998: Merrell Patrick, National Science Foundation
1997: Anita Jones, University of Virginia
1996: Paul Young, University of Washington
1995: Randy Katz, University of California at Berkeley
1994: William A. Wulf, University of Virginia
1993: not awarded
1992: Joseph Traub, Columbia University
1991: David Gries, Cornell University
1990: Robert Kahn, CNRI
1989: Peter Denning, George Mason University
1988: Kent Curtis, National Science Foundation (posthumous)

Past Habermann Award Recipients:

1998: Bryant York, Northeastern University
1997: Andrew Bernat, University of Texas at El Paso
1996: Caroline Wardle, National Science Foundation
1995: Eugene Lawler (posthumous), University of California at Berkeley
1994: Richard A. Tapia, Rice University

COMPUTING RESEARCH NEWS

Vol. 10/No. 5/November 1998

Computing Research News (ISSN 1069-384X) is published five times per year: in January, March, May, September, and November. Copyright 1998 by the Computing Research Association (CRA), 1100 Seventeenth Street, NW, Suite 507, Washington, DC 20036-4632; tel. 202-234-2111. All rights reserved. Material in *CRN* is not endorsed by CRA nor intended to reflect any official positions of CRA or its board.

Subscriptions: Call 202-234-2111, send e-mail to crn@cra.org or mail subscription inquiries to CRA, 1100 Seventeenth Street, NW, Suite 507, Washington, DC 20036-4632. A free subscription is available to qualified subscribers. One-year paid subscriptions are \$30 in the United States, \$45 (U.S.) in Canada and \$54 (U.S.) elsewhere.

Change of Address: Note that a change of address must include the old and new addresses with ZIP+4 if available. Please include a street address or PO Box.

Postmaster: Send address changes to CRA, 1100 Seventeenth Street, NW, Suite 507, Washington, DC 20036-4632. Postage paid at Washington, DC.

CRA Communications Committee
John A. Stankovic, Committee Chair, University of Virginia
Anita Borg, Xerox Palo Alto Research Laboratory
Dave Nicol, Dartmouth University

Computing Research Association Staff
William Aspray, Executive Director and *CRN* Editorial Director
Stacy Cholewinski, Editor and Communications Manager
Malika Jackson, Administrative Assistant
Kimberly Peaks, Director of Administration
Jean Smith, Program Associate
Lisa Thompson, Director of Government Affairs

Policy News

Policy 101: Science Policy and the Computing Societies

By Fred W. Weingarten

Introduction

My current role with CRA as Director of Public Policy is drawing to an end. This is a good opportunity to look back over eight years of representing computing research in this town, and assess over the course of two or three articles in general where the field now stands in the science policy debate. In doing so, I'm not going to spend a lot of time in the past. Opportunity always lies in the other direction, toward the future, and I think that computing research will be faced with enormous opportunities over the next few years. In these articles, I'm going to briefly address three basic issues.

In this piece, I'm going to describe briefly the nature and structure of the science policy debate; in January, I'll discuss the decision-making process and how to influence it. In a final piece in March, I'll explore what the computing research community, itself, should consider doing, especially in light of recent developments, particularly the opportunities presented by the Interim Report of the President's Information Technology Advisory Committee (PITAC) (see "PITAC's Interim Report: Expeditions Of An IT Kind," page 1). March is when the two-year political cycle really starts; it is also when the computing research community should start any campaign to improve the state of affairs of computing research funding along the lines of the recommendations of the report.

Computing Research at the Table

At the Snowbird ski resort in Utah in the summer of 1988, computer science and computer engineering department chairs decided at their biennial meeting to reconstitute what was then known as the Computer Science Board as a formal organization. The organization was to be called the Computing Research Association and its offices would be located in Washington, D.C. The choice of a Washington address was deliberate. The principal purpose of this organizational change, as some explained later, was to give computing research "a seat at the table." The Snowbird group felt that, for too long, decisions regarding the nature and evolution of their field were being made by people who were, at best, ignorant of its particular needs or, at worst, hostile to its interests.

Coming into existence only in

**Taulbee Survey
Due
November 13**

**Remember to submit the
survey online at
[www.cra.org/Survey/
FillOut](http://www.cra.org/Survey/FillOut)**

the early 1960's, the fields of computer science and computer engineering are much the junior to the traditional fields of research in the natural sciences, whose origins date back several centuries or even millennia. Over the preceding decades, computing researchers had seen federal research policy and funding priorities set predominantly by representatives from these older fields, most of whom were much too old to have been exposed to computers or computer science in their graduate training or research.

It is commonly said that the heavy representation of physicists in post-war science policy circles was a reward for the important contributions they made during the war. My guess is that their willingness to engage in politics came about because they realized, first, that the well-being of basic research in physics had become inextricably linked with federal government support — if for no other reason, because of the rapidly escalating price for experimental facilities. Second, some of these scientists, confronting the awful (and awesome) results of their work, felt that an enormous sense of social and political responsibility had been laid on them.

But now, computing and digital communications, technologies that had their origins in that same war and that grew in the post-war environment, are assuming major social and economic significance. At that 1988 Snowbird meeting, attendees declared that computing research had come of age, and it was time for the field to assert a voice in the policy debate. CRA in its current form was created to carry out that mission.

Having Something to Say

Ah, but how to do so? It is one thing to have a seat at the table. One simply buys a chair and hires someone to sit in it. That was me. It is quite another to have something useful to say and to influence the debate. While I have rarely been accused of lacking something to say, and I did the best I could, it has taken the field some time to develop a coherent message that everyone could agree on. Looking back, it seems symbolic to me that shortly after I arrived at CRA, the field erupted in a fight over the NRC report, *Computing the Future, A broader Agenda for Computer Science and Engineering*, 1992.

The specifics of that fight are not important, but it illustrated the difficulty computing research faced in getting its story together and, even more importantly, in getting it commonly agreed on within the community.

We are being asked with great urgency by the political community to participate in policy making. It is no longer necessary for us to convince political leaders that computing research is important to the nation; that is broadly accepted as a

proposition in all the right places. But in politics, good will does not translate automatically into good policy, or even tangible support. Now, we have to answer a broad range of questions from policy makers and politicians whose bottom line is: "What should we do about it?" And, of course, if computing researchers don't provide a convincing answer, others are standing by, ready to do so for us.

Answering that question is not easy. Science policy is a complex set of issues, and a fifty-year history of debate and many established precedents — customary ways of thinking — underlie the present system. It is not easy to say something new, even if we do have a sense that the present system is not serving computing research as well as it might and that something new needs to be said.

So, the computing research community has to undertake two tasks to prepare itself to assert an effective voice on science policy: develop its message, and organize to deliver it. The organization I will leave for the next articles in this series. Here, I want to concentrate on the structure of policy itself.

The Bottom Line of Science Policy

It is often said (even by me) that the bottom line of science policy is the dollar sign, since the principal focus is on government funding of research. But, in fact, the underlying structure of science policy is much more complex. Federal funds come by way of intricate, political decision-making — a careful dance among science agencies, the administration, the Congress, and the research community. This process assures that any decision to spend federal money on R&D, even for fundamental research, comes with strings attached.

Some of those strings:

Purpose: Whether we have a surplus or deficit in the budget, many more hands are out than there are funds available. All appropriations have to be justified and tied, in some way, to a public purpose. Pure philanthropy is not a particularly persuasive argument. That means that support of research has to be tied to national objectives: economic growth, national security, public health, national pride, and so on. Linking the two end points — politically acceptable purposes and the need to fund undirected fundamental research — can be a difficult, even a distasteful task, one for some in the scientific community, but in a democracy, it is absolutely critical to getting public money spent on science.

Priorities: Here is where the toughest fights will occur. Congress insists, and so far the scientific community resists the demand, that priorities be set. But priorities are and always have been set on science funding. When Congress decides to spend \$10 billion on a superconducting supercollider, it's setting priori-

ties; and when it changes its mind, that, also, is priority-setting. Similarly the choice to spend \$7 billion on basic medical research and \$500 million on basic computing research clearly reflects, rightly or wrongly, current political priorities. So, the issue is not to set or not to set priorities; the issue is whether the scientific community will participate in the process. Many senior science policy people still argue against setting priorities, saying that science needs to be supported across the board, and that we need a broad spectrum of healthy research activity. Both ideas seem correct to me, not contradictory, but, then, I've been in Washington too long.

Processes: Here comes the bureaucracy! But, the fact is, to spend billions of dollars requires organization and process, and organization and processes can make a big difference on the community. There is a wide range of models already within the government, from NSF's model of peer-reviewed individual investigator grants to support of massive federal contract labs like Los Alamos. Suppose one were to argue for doubling funding for basic computing research. Who should be the lead agency? How should it be spent? Who will decide what to spend it on and how will that decision be made? These decisions are sometimes made in a bureaucratic process that resembles trench warfare and that often takes place below the threshold of attention for the affected communities. But, the choices do have consequences, sometimes enormous ones. Again, since decisions on process will be made one way or the other, shouldn't the community be part of the debate?

Proscriptions (Strings): Finally, we need to keep in mind that political decisions are not always rational (those of you in shock may close your eyes while reading this paragraph). Even straightforward funding or authorization bills will often come attached with odd and often intrusive little strings. Funds will be earmarked for various purposes or institutions, restrictions will be placed on the expenditures or on use of federal funds. Thankfully, much of this stuff goes away, but a lot of time is spent on it each year by the Washington science policy community, and sometimes it doesn't go away.

So, science policy has these two interlocking and mutually dependent aspects:

- Its overall purpose, which is to keep the federal science programs well funded.
- All of the corollary but critically important considerations raised above (each of which raises a far more complicated and richer set of questions than I have given justice here).

Next month, I'll discuss the political environment in which these policy decisions are made. Who are the players and what games do they play? ■

Policy News

CRA Appoints New Director Of Government Affairs

CRA has recently made a major new commitment to its government affairs program, appointing its first full-time Director of Government Affairs while retaining the services of Fred W. "Rick" Weingarten, our former Executive Director and Director of Public Policy, as a consultant. We believe these changes will enable CRA to be even more effective in the coming years, as we work on policy issues related to computing research funding, underrepresented groups in the profession, and other policy issues of concern to the computing research community.

We are pleased to announce the appointment of Lisa Thompson as CRA's new Director of Government Affairs. Lisa received a Bachelor's degree in Physical Sciences from the University of Southern California and studied science policy at George Washington University. She worked briefly for the Council of Scientific Society Presidents on policy issues before joining the Joint Policy Board for Mathematics. There, for the past eight years, she has run the government affairs program, focusing on both research and educational issues

for the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics (an affiliate society of CRA).

Lisa is thoroughly familiar with the legislative process and players in the science and technology area, and she knows how to communicate effectively with lawmakers and their staffs. She has developed a highly regarded electronic

bulletin to apprise researchers in the field of activities in Washington. She has also compiled useful information kits for mathematicians that provide them basic talking points on mathematics policy to use with lawmakers and offers practical advice on topics such as how to write a Congressman. Lisa has also been an active member in the Coalition for National Science Funding (CNSF), which works to obtain increased funding for all areas of science, and she is well known in the Washington science policy

community.

Rick's comments on Lisa's appointment are as follows: "I have known and worked with Lisa for many years on science policy issues

that affected both CRA and the mathematics community. I know that the CRA community will find her to be an incredibly talented and knowledgeable representative for computing research. She will

do a great job."

Rick will continue to serve the community by spending about a day a week as a consultant on policy issues to CRA. Rick joined CRA in 1990, serving as the first full-time Executive Director and simultaneously holding the position of Director of Public Policy. He did an extraordinary job at establishing CRA as an important presence in the science policy community in Washington and has been an excellent proponent for computing

research. He built up CRA membership, as well as a staff and programs to serve them. With the growth of the organization, it became time in 1995 to separate the senior administrative post from the government affairs directorship. Rick stayed on at CRA half time, serving as the Director of Public Policy, while holding a similar half-time position at the American Library Association (ALA). After three satisfying years in these dual half-time positions, Rick decided it was time for him to throw himself full-time into new efforts. He has accepted a one-year position to recreate ALA's information technology policy office (ALA's think-tank). In this role, he will set new policies and priorities for this organization and hire a permanent director. After assisting ALA with this senior management issue, Rick plans to move on to another policy or educational position.

It is CRA's good fortune to be able to draw on the knowledge and ability of both Lisa and Rick. CRA is looking forward to continuing its tradition of serving the computing research community with this partnership. ■

Domain Names Transferred to Department of Commerce

Over the past two years, CRN has been reporting the story behind domain name registration. Network Solutions Inc. began registering domain names under the authority of the National Science Foundation (NSF) through a cooperative agreement with the United States Government in 1993. There has been nearly 2 million domain names registered under the top-level domains of .com, .edu, .gov, .net, and .org with Network Solutions over this five year time frame.

NSF has now transferred the cooperative agreement to the Department of Commerce. Commerce will now administer the registration of domain names in an effort to move the practice away from a government-centered arrangement

toward a more private-sector one.

It has been reported by the Council of Scientific Society Presidents that, "after an extensive public comment process, the Department of Commerce issued a Statement of Policy on privatizing and the future administration of the Internet domain name system (DNS). The policy statement describes a process whereby a new, globally representative, not-for-profit corporation, formed by the private sector, would assume various responsibilities for DNS management, including development of future policies for domain name registration. (see: http://www.ntia.doc.gov/ntiahome/domainname/6_5_98dns.htm)."

CRN had also reported in November 1997 that more than \$60

million in fees had been accumulated through the former agreement for the registration of domain names. Network Solutions had been required to put 30% of registration fees collected into an interest-bearing account designated as an intellectual infrastructure fund. This money had been slated for use by NSF for the Next Generation Internet project. However, disagreement over the legitimacy of the collection of such fees and problems with the appropriation of its use had frozen access to the funds.

A class action lawsuit against the collection of these fees had been filed, but in late August of this year a District of Columbia Circuit Court dismissed the lawsuit and lifted the preliminary injunction on the use of

these funds by NSF.

However, the debate over the funds did not end. Senate Majority Leader Trent Lott (R-Mississippi) sought to attach a provision to the Internet Tax Freedom Act, S. 442, that would repeal the provision in the FY '98 emergency supplemental appropriations law which directed the \$60 million in question to NSF.

However, Senator Lott was unsuccessful in adding such language to the Internet Tax Freedom Act.

At press time, Congress was preparing its final legislation of the session — a catchall spending bill for FY '99. Lott's language could still be included in this bill.

CRN will keep you informed in coming issues of the status of the use of these funds. ■

Internet Tax Freedom Act

Both the House and the Senate have passed S. 442, the Internet Tax Freedom Act. This bill creates a three-year moratorium on the collection of taxes by local and state agents from electronic commerce conducted on the Internet.

At the time CRN goes to press, it is anticipated that the President's signature is soon to follow. In a statement from the Office of the Press Secretary released on October 8, 1998 the President affirms his resolve to sign this bill into law.

STATEMENT BY THE PRESIDENT

"I am pleased that the Senate has joined the House in passing the

Internet Tax Freedom Act. This bill will create a short-term moratorium on new and discriminatory taxes that would slow down the growth of the Internet, and launch a search for long-term solutions to the tax issues raised by electronic commerce. As I said earlier this year in my speech on Internet policy, we cannot allow 30,000 state and local tax jurisdictions to stifle the Internet, nor can we allow the erosion of the revenue that state and local governments need to fight crime and invest in education. I look forward to signing this legislation into law so that America can continue to lead the world in the Information Age." ■

CRA Seeks Applications for Executive Fellowship Program

Exceptional, highly motivated, mid-career and senior computer and information scientists from the nation's universities are invited to apply for a one-year Fellowship in a federal agency in Washington, DC.

Applicants should have extensive technical expertise in some area of information technology. They should also have a strong interest in broad applications of information technology in government and society. Actual experience in applying technology to societal problems is highly desirable.

From two to four fellowships will be awarded this year. Fellows selected will begin September 1, 1999

Complete details about the fellowship program and application information can be found on the CRA website: <http://www.cra.org/Policy/execfell.html>

DEADLINE: January 15, 1999

Electronic applications are preferred, and may be sent to: executive_fellowship@cra.org

Questions may also be sent to this e-mail address, or telephoned to CRA at 202-234-2111.

Send non-electronic information to: CRA Executive Fellowship Program, 1100 17th Street, NW, Suite 507, Washington, DC 20036-4632; or Fax: 202-667-1066. ■

Profiles Survey

1997-1998 CRA Departmental Profiles Survey

By Mirek Truszczynski and Stephen Seidman

In spring 1998, the Computing Research Association conducted a survey of U.S. and Canadian Ph.D. granting departments of computer science and engineering to collect data on budget, staff support, space, faculty teaching loads, and graduate student support. The survey asked for the data for the most recent annual period for which the data were available. In most cases this meant the period from July 1, 1996 to June 30, 1997. The results of the survey were reported in a workshop at the 1998 CRA Conference at Snowbird.

The survey was sent to 186 Ph.D. granting programs in computer science and computer engineering. The response rate for U.S. programs was 52.2%, with 89 out of 170 programs responding. The response rate for the Canadian programs was 50%, where 8 out of 16 programs responded.

When analyzing the results of the survey, we divided the U.S. programs into four groups according to the most recent NRC ranking: CS departments ranked 1 - 12 (7 responses), CS departments ranked 13 - 24 (9 responses), CS departments ranked 25 - 36 (9 responses), and CS departments ranked 37 or higher (60 responses including 4 not ranked by the NRC). In a different analysis, we divided the U.S. computer science and computer engineering programs into public (65 responses) or private (24 responses) institutions.

Some departments responding to the survey did not provide answers to all the questions. However, the proportion of missing values was small, only sporadically exceeding 10%. We believe that these response rates are sufficiently high for the aggregate results of the survey, presented below, to be meaningful.

Too few (four) computer engineering departments responded to the survey to allow us to report the results for this group separately and

maintain the anonymity of the respondents.

Finally, we want to emphasize that this article presents only a statistical summary of the results of the survey. We did not attempt to give a detailed interpretation of the data for two reasons. First, there are significant differences among academic institutions in handling budgets, space, and personnel. We feel that although these differences are important, averaging over many responses decreases their effect and yields meaningful aggregate data. Second, since this was the first survey of its kind in many years, there is no temporal data to substantiate any conjectures about longitudinal trends.

Support staff

Table 1 presents the average ratio of the number of secretaries, computer support staff, and research programmers to the number of full-time equivalent (FTE) faculty for all categories of programs. The results show that for the categories of secretarial support staff and research programmers, this ratio is higher for the U.S. programs than for the Canadian ones. The ratio is higher for the Canadian programs for computer support staff. Further, privately funded institutions have generally higher levels of staff support per FTE than institutions supported by public funds. Finally, the ratio of staff support is generally higher in top ranked departments.

Budget

Table 2 presents the average ratio of annual department expenditures for the most recent complete fiscal year (in thousands of U.S. dollars) to the number of FTE faculty. (Please note that all Canadian dollars were converted to U.S. dollars for comparison and analysis.) Total expenditures include the regular departmental budget expenditures (salaries,

including TA stipends, equipment purchases, and maintenance, and operating expenses), expenditures of funds from external grants and contracts and from discretionary accounts, and expenditures of overhead funds returned to the department. Total expenditures do not include the value of equipment donations. There are no significant differences between the three groups of top-ranked U.S. programs. However, the average expenditure per FTE in a U.S. program ranked 37 or higher is about 40% lower than the same average for programs ranked 1 - 36. There is also a striking difference between U.S. and Canadian programs, with the average expenditure per FTE in Canadian programs being more than 50% lower than in the United States.

Table 3 summarizes the findings on the rate of external funding per faculty member. Unlike other results of the survey, there is a significant

difference here between private and public institutions.

The rate of external funding is also higher in the U.S. than in Canada. It is also higher for top-ranked departments than for departments ranked 37 and higher.

The survey also asked about the structure of the budget. These data are summarized in Table 4. The data show that external funding plays a smaller role in the budgets of the Canadian programs compared with the U.S. Similarly, the portion of the budget that comes from external funds in the U.S. departments ranked 37 and up is lower than in the programs ranked 1 - 36.

Table 5 presents the average ratio of annual departmental expenditures for instructional and research laboratories to the number of FTE faculty (in thousands of U.S. dollars). These expenditures include mainte-

Survey Continued on Page 7

Table 1. Support Staff per Faculty Member

	Secretarial Staff	Computer Staff	Research Programmers
Private	.48	.24	.18
Public	.32	.19	.13
US CS Ranked 1-12	.87	.34	.20
US CS Ranked 13-24	.40	.25	.22
US CS Ranked 25-36	.56	.40	.20
US CS Other	.28	.15	.13
US	.37	.20	.14
Canadian	.27	.26	.07

Table 2. Annual Budget per Faculty Member (thousands of US dollars)

Private	\$286
Public	224
US CS Ranked 1-12	337
US CS Ranked 13-24	358
US CS Ranked 25-36	337
US CS Other	202
US	240
Canadian	109

Table 3. External Funding per Faculty Member (thousands of US dollars)

Private	\$168
Public	92
US CS Ranked 1-12	206
US CS Ranked 13-24	205
US CS Ranked 25-36	157
US CS Other	81
US	110
Canadian	53

Table 4. Budget Composition

	Private	Public	US CS Ranked 1-12	US CS Ranked 13-24	US CS Ranked 25-36	US CS Other	US	Canadian
Overhead	2 %	2 %	1 %	1 %	3.5 %	2 %	2 %	7 %
Discretionary	4	2	4	5	3.5	2	2	0
External	40	36	44	52	46	32	37	19
Regular Budget	54	60	51	42	47	64	59	74

Table 5. Annual Lab Expenditures (per Faculty Member)

	Private	Public	US CS Ranked 1-12	US CS Ranked 13-24	US CS Ranked 25-36	US CS Other	US	Canadian
Instructional	\$5,000	\$10,000	\$11,000	\$5,000	\$17,000	\$28,000	\$9,000	\$12,000
Research	20,000	18,000	28,000	24,000	47,000	12,000	19,000	11,000

Table 6. Instructional Lab Expenditure Structure

	Private	Public	US CS Ranked 1-12	US CS Ranked 13-24	US CS Ranked 25-36	US CS Other	US	Canadian
Maintenance	15 %	12 %	15 %	17 %	7 %	12 %	13 %	7 %
Equipment Purchases	49	43	31	40	49	45	45	33
Staff	36	45	53	43	44	43	42	60

Profiles Survey

Table 7. Research Lab Expenditure Structure

	Private	Public	US CS Ranked 1-12	US CS Ranked 13-24	US CS Ranked 25-36	US CS Other	US	Canadian
Maintenance	11%	10%	26%	13%	6%	9%	11%	1%
Equipment Purchases	57	57	22	62	61	58	57	1
Staff	32	33	52	25	33	33	32	1

Table 8. Equipment Donations

	top 25%	median	bottom 25%
Instructional Lab	\$400,000 or more	\$180,000 or more	\$17,000 or less
Research Lab	\$500,000 or more	\$123,000 or more	\$45,000 or less

Table 9. Space—Sources of Funding

	New	Renovated	Planned
Institutional	88%	72%	70%
State	32	28	40
Federal	6	0	0
Industrial	0	12	12
Private	6	4	21

Survey from Page 6

nance costs, equipment purchases, and personnel costs. The value of donated equipment is not included. It is noteworthy that the ratio for instructional laboratories is higher in Canada than in the U.S., but that the ratio for research laboratories is lower in Canada. Further, the per-FTE level of support for research laboratories in the U.S. departments ranked 1 – 36 is two to four times higher than for the remaining U.S. programs.

The survey also gathered data on the structure of expenditures for instructional and research laboratories. These data are presented in Tables 6 and 7. As might be expected, staff and equipment purchases predominate.

Equipment donations to instructional and research labs provide substantial support to many computer science programs. Thirty-four U.S. computer science programs reported donations of instructional equipment. The same number of U.S. computer science programs reported research equipment donations. The first quartile, median, and the third quartile of the estimated value of these donations are given in Table 8. Five Canadian programs (out of 8 responding to the survey) reported donations of instructional equipment with an estimated value ranging from \$5,000 to \$255,000. Three Canadian programs reported donations of research computing equipment.

Space

The survey asked about use of space in the departments. We found no clear trends as a function of type (public vs. private), ranking, or country. We thus report the average space use over all responses. The results are shown in Figure 1 below.

The survey indicates significant activity with respect to added or forthcoming space allocated to U.S. computer science departments. Out of 89 U.S. departments, 21 reported acquiring new space in the past year. The amount of new space ranged widely (minimum 41 sq. ft., median 1,600 sq. ft., maximum 8,690 sq. ft.). Five departments reported loss of space.

Twenty-five U.S. departments reported renovation of existing space. The scope of renovation differed substantially among programs (minimum 260 sq. ft., median 1,912 sq. ft., maximum 10,000 sq. ft.). The survey asked respondents to indicate funding sources for the newly acquired or renovated space. The results are shown in Table 9. Institutional and state funding were listed most often by far, with federal, industrial, and private funding being mentioned only sporadically.

As many as 33 U.S. departments expect new space to become available to them by 2005. Of these, 26 (79%) expect new space by the end of 2000. The departments are rather optimistic about timely delivery of the new space. Over 60% expect it to

Table 10. Total Space

	per Faculty Member in sq. ft.
Private	1,212
Public	1,154
US CS Ranked 1-12	1,801
US CS Ranked 13-24	1,425
US CS Ranked 25-36	1,411
US CS Other	946
US	1,156
Canadian	1,166

be available on time or expect it is likely to be available on time. Once again, institutional and state sources are the two most commonly listed (Table 9).

Table 10 presents the ratio of the total departmental space available to the number of FTE faculty. The total departmental space consists of faculty, staff, and graduate student offices, conference and seminar rooms, and research and instructional laboratories operated by the department. There is little difference between the U.S. and Canada, and little difference between U.S. private and public institutions. However, there are significant differences between top-ranked U.S. departments and those ranked 37 and higher. The departments ranked 1 – 12 report almost twice as much space per FTE (1,801 sq. ft.) as those departments ranked 37 and up (946 sq. ft.).

Use of the planned space is similar to the use of the space currently available to the programs. However,

Table 11. Teaching Load

	per Faculty Member Official
Private	2.8
Public	3.5
US CS Ranked 1-12	2.2
US CS Ranked 13-24	2.5
US CS Ranked 25-36	2.6
US CS Other	3.7
US	3.4
Canadian	3.4

there appears to be a greater emphasis on laboratory space, with half of the planned space allocated to research and instructional labs (Figure 2 below).

Too few responses were received from the Canadian departments about recently acquired, renovated, or planned space to report aggregate statistics. Out of 8 Canadian departments responding, two reported a gain of new space and one reported a loss of space. Two Canadian departments reported renovation of some of the existing space during the reporting period. Finally, three Canadian departments expect new space by the end of 2005.

Teaching loads

Data submitted from departments using the quarter system were converted to semesters, using the following conversion: 1 quarter

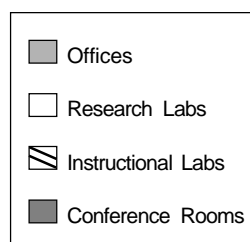
Survey Continued on Page 8

Table 12. Graduate Stipends (median)

	Private	Public	US CS Ranked 1-12	US CS Ranked 13-24	US CS Ranked 25-36	US CS Other	US	Canadian
Teaching Assistant	\$9,500	\$10,500	\$11,425	\$11,316	\$11,000	\$9,970	\$10,500	\$6,172
Research Assistant	11,053	10,919	11,939	12,500	11,163	10,500	10,959	5,752
Fellowship	12,000	12,673	13,000	14,000	13,630	12,000	12,586	10,540

Table 13. Graduate Student Support

	students with support / total full-time students
Private	.70
Public	.65
US CS Ranked 1-12	.86
US CS Ranked 13-24	.77
US CS Ranked 25-36	.77
US CS Other	.62
US	.66
Canadian	.75



Current Space

Planned Space

Profiles Survey

Survey from Page 7

course = 0.67 semester courses. An official teaching load of 3 semester courses per year was reported by 31% of the respondents, and an additional 31% reported an official teaching load of 4 semester courses per year. The minimum reported was 0.67 and the maximum reported was 8.

Table 11 on page 7 presents the average *official* teaching loads. Teaching loads are correlated with the rank. In particular, official teaching loads in departments ranked 1 – 36 are about 50% lower than in the departments ranked 37 and higher. Teaching loads reported by programs at private universities are about 20% lower than those reported by departments at public institutions. *Actual* teaching loads reported are generally lower than official loads. However, due to technical problems with the survey form, the data on actual teaching loads are not reliable and will not be reported.

Ninety-five percent of the departments that responded to the survey allow for teaching load reductions. Of these, 86% allow for reduction as part of startup packages

for new faculty members. Other commonly cited reasons for load reductions are: administrative duties, course buyout, and strong research program, cited respectively by 83%, 76%, and 44% of the departments that permit load reductions. The average reported buyout was 19% of annual salary. One-quarter of the departments also listed type and size of class as reasons for load reduction.

Graduate student support

One of the goals of the survey was to determine typical work requirements for teaching and research assistants. We found that for 78% of the U.S. programs, the standard work requirement for a TA is 20 hrs/week, with the mean being close to 20 hrs/week for all classes of programs. In contrast, the Canadian respondents report a mean standard work requirement for a TA of only 12 hrs/week. In the case of research assistants, 80% of the U.S. programs report 20 hrs/week as the standard work requirement. The mean standard work requirement for an RA reported by the Canadian programs was 17.6 hrs/week.

The survey asked for the net value of stipends (stipend for a nine-

month assignment minus tuition and fees) for teaching assistants, research assistants, and fellowship holders. Since there was significant variability in the reported stipends, we decided to report the median stipend values, which are less sensitive to inaccuracies in the reported data. The median net stipends are shown in Table 12. The results show that there are no significant differences in net stipends among different categories of programs. However, teaching and research assistantship stipends reported by the Canadian programs are substantially lower (by about 40%) than those reported by the U.S. institutions. The results in Table 12 also show that teaching assistantship stipends are slightly lower than for research assistantships and these, in turn, are lower than for fellowships.

Academic progress was the factor given most frequently (63%) in determining stipend amounts. Others commonly reported included: passed qualifier (50%), differences in the source of funding (48%), recruitment enhancements (26%), and GPA (15%).

In the survey, we also gathered information on the number of supported graduate students. Table 13 presents the ratio of the number of graduate students with support to the number of full-time graduate students for various categories of programs.

The survey provided interesting insights into recruitment incentives used to attract new graduate students. Forty-one percent of U.S. programs and 65% of Canadian programs reported first-year stipend enhancements. Guaranteed multi-year support was reported by 51% of programs, with 44% guaranteeing support for 2 years and 16% of them guaranteeing support for 3 years. Paid visits to campus were reported as an incentive by 44% of programs, with a median

amount per visit of \$500 and a maximum of \$1,000. Finally, guaranteed summer support was reported by 28% of the programs. The median amount of summer support was \$3,600 for a U.S. program and \$3,332 and for a Canadian program.

Conclusions

The initial feedback from the Snowbird workshop where the results of the survey were presented indicates that such data are of great interest to computer science and computer engineering departments. It was a common sentiment that the survey needs to be conducted regularly every two or three years so as to provide meaningful data for the temporal analysis of changes in resources available to computer science and engineering programs. At the same time, discussions at the workshop and e-mail correspondence received by the authors indicated several shortcomings in the survey design and in the implementation of web-based survey forms. The survey is currently under review by the CRA Board with the goal of making it more precise, streamlining it, and making it easier to complete. It is expected that the survey will be repeated in two years.

Acknowledgments

We would like to thank Larry Finkelstein, Chip Martel, and Moshe Vardi for their help in developing the survey. Greg Andrews' leadership, help, and encouragement throughout the whole project is greatly appreciated. We would also like to acknowledge the assistance obtained from the CRA staff, especially from Bill Aspray, Jean Smith, and Stacy Cholewinski. Finally, we would like to thank Lena Truszczynska for her help in analyzing the results of the survey. ■

CRN Subscription Form

Please check one:

- I want to subscribe or renew my subscription to *CRN*. I qualify for a free subscription.
- I want to subscribe, but do not qualify for a free subscription. A one-year subscription in the United States is \$30 and \$45 in Canada. Foreign subscriptions are \$54. All subscriptions must be paid in US currency. Please enclose a check made payable to the **Computing Research Association**.
- This is a change of address. I have included my address label or a copy of the old address.
- Check here if you do not want your name given to organizations that ask to send information to *CRN* subscribers. CRA screens all such requests.

Free Subscription Policy: *CRN* is mailed free to 1) faculty members, administrators and full-time researchers in college and university computing departments; 2) research staff members and administrators of nonprofit, for-profit and government laboratories involved in computing research; and 3) persons who affect policies related to computing research. Free subscriptions are only available in the United States and Canada.

Name _____
 Title/Position _____
 Phone _____ E-mail _____
 Organization _____
 Type of Organization _____
 Department _____
 Address _____
 City _____ State _____ ZIP+4 _____

Please note: We cannot process your subscription unless you include a complete street address or a post office box. To request an electronic subscription form, send your request to crn@cra.org.

Mail this form to: CRN Subscription Department
 Computing Research Association
 1100 Seventeenth St. NW, Suite 507
 Washington, DC 20036-4632
 Fax: 202-667-1066; e-mail: crn@cra.org

PITAC from Page 1

Research Priorities

The bulk of the report concentrates on four research priorities: software, scalability, high-end computing, and socio-economic and workforce impacts (notably, many of PITAC's suggestions are similar to those made at CRA's May 1997 workshop, "Research Challenges for the Next Generation Internet").

Software -- Declaring software "the new physical infrastructure of the information age," PITAC recommends additional funding for software in computer science engineering and applications.

Historically, reports PITAC, federal programs have underestimated the amount of money needed for software development and testing. Today, demand for software outpaces U.S. ability to produce it and companies still depend on users to identify bugs.

And despite previous failures to establish national software libraries, PITAC believes these endeavors are

so important that they should be tried again.

Scalability -- Noting how the Internet's popularity and our dependence on it are increasing daily, PITAC warns that "we cannot safely extend what we currently know to more complex systems." PITAC calls for greater investment in "core software and communications technologies."

Additionally, the Committee recommends "broadening" the NGI infrastructure testbed to include information, commerce, and other services. It also urges formation of additional industry partnerships to finance projects on a scale large enough to examine design and deployment issues.

High-End Computing -- The Advisory Committee prefaces recommendations in this area by briefly recounting the nation's evolution from high-performance computing to high-end computing. The Committee then calls for more

PITAC Continued on Page 9

PITAC from Page 8

research in:

- innovative computing technologies and architectures; and
- software for improving high-end computing performance.

Furthermore, the Committee encourages the attainment of petaops/petaflops-level performance more as a technology driver, not "as a goal unto itself."

Socio-Economic and Workforce Issues— Here, the Committee advocates greater research on the socio-economic impacts of technology adoption. In the Committee's judgment, research regarding the former has been merely speculative and more empirical data are needed.

With regard to workforce issues, two recommendations are particularly noteworthy for the computing research community. First, in an effort to increase IT literacy and access at all education levels, PITAC suggests expansion of government/university/industry partnerships. One such channel for expansion, it notes, could be the Experimental Program to Stimulate Competitive Research (EPSCoR).

The second recommendation arises from the Committee's conclusion that the current shortage of computer science Ph.D.s and faculty (and consequently, a substantial IT labor force) is due not only to salary considerations, but "the perception that universities are no longer the place where the most exciting work is being done." It proposes that increased funds for long-term research would attract and retain computer science graduate students.

Virtual Center Expeditions

Invoking the spirit of Lewis and Clark, the legend of H.G. Wells, and the imagination of D.H. Gelertner, PITAC invites researchers to "live in the technological future." By establishing "virtual center expeditions," the federal government would give researchers a mandate to explore the unknown. As Kennedy observes, "we have a long history of ideas (such as the World Wide Web) that weren't predicted."

What the United States needs, he says, are the types of "wide-ranging explorations of the future that characterize Xerox PARC and MIT Project Mac."

As proposed by PITAC, each center could (through competitive bidding) receive as much as \$40 million annually for ten years. The focus of such expeditions could be infrastructure-based (examples include distributed databases, tele-immersion) or discipline-based (bioinformatics, multiscale engineering).

Enabling Technology Centers

To advance the use of next generation IT in various applications (health care, transportation, government services, environment), PITAC proposes Enabling Technology Centers (ETC's). These centers could be based at either universities or federal research institutions. As many as fifteen centers might operate at once, with each receiving as much as \$10 million annually for ten years. Each ETC could enter into a five-year cooperative agreement, with a formal review in the third year for renewed funding. As a model, PITAC suggests NSF's Science and Technology Centers.

What's Up Ahead

Since the report's release, subpanels of PITAC members and non-members have been meeting to review comments on the interim report. Additionally, says Kennedy, Committee members have been interacting with the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) "so things are moving apace."

On Capitol Hill, the House Subcommittee on Basic Research held hearings on the report in early October. Subcommittee reaction to the report was generally favorable. In fact, several Members tried to prepare witnesses (among them, CRA Board Chairman Edward Lazowska) for the inevitable budget questions they would face in testifying before Congress next year.

Rep. Eddie Bernice Johnson (D-Texas) asked whether PITAC's goals could be met if new funds were not forthcoming. In other words, could existing R&D funds be reallocated and applied to long-term investments? Neal Lane (in his first appearance before the Subcommittee as Director of OSTP) replied that "while there's always an opportunity for reallocation," without additional revenue "it would be hard to make much progress in response to the recommendations of the Committee."

Rep. Gil Gutknecht (R-Minnesota), who favored PITAC's recommendations, cautioned that the Y2K problem might give other Members pause in appropriating new funds for IT R&D. "Here we are, a little more than a year away from the millennium," he said, and the Administration is requesting additional funds "for a problem which, frankly, did not exactly sneak up on us." Gutknecht, who also serves on the House Budget Committee, said "the computer industry has a little bit of a black eye right now." The Congressman added, "we need better answers for other folks."

In his opening statement Lazowska noted that a common PITAC theme was, essentially, "it's the software, stupid." Picking up on that paraphrase of the famous campaign slogan, Rep. Vernon Ehlers (R-Michigan) asked witnesses to explain the complexity of the software issue and how they anticipated closing the software gap.

Other concerns raised included NSF as the lead agency for coordinating related R&D, teacher training in IT, and the Department of Energy's Accelerated Strategic Computing Initiative (ASCI) program.

As this issue of CRN goes to press, PITAC is expected to hold another meeting to discuss the subpanels' findings. PITAC's final report is expected next February. Thus, by the time any budget figures are submitted to Congress, the 2000 Presidential Election will be ramping up.

CRN will continue to follow developments and report further on PITAC in future issues. ■

Computing Research Association IT Worker Study Group Members

Peter Freeman (study Chair)*
CRA Representative
Georgia Institute of Technology

Kenneth Anderson
Mount Laurel, NJ
(formerly Siemens Corporate Research)

Avron Barr
Stanford University

Robert Campbell
Manatee Community College

Morgan Cole
Microsoft Corporation

Paul Davis*
SIAM Representative
Worcester Polytechnic Institute

Timothy Finin*
AAAI Representative
University of Maryland, Baltimore Co.

Thomas D. Fleming
IBM

Dennis Frailey
Raytheon Systems Co.

Jimmie Haines
Boeing

Mary Jane Irwin*
Pennsylvania State University

Richard H. Jaross, Director
Sun Microsystems, Inc.

Stephen Johnson*
USENIX Representative
Transmeta Corp.

Rob Kling
Indiana University

Doris K. Lidtke*
Towson University

Robert Ritchie
Menlo Park CA
(formerly Hewlett-Packard)

Richard Skinner
Clayton College and State University

Michael Teitelbaum
Alfred P. Sloan Foundation

Shirley Tessler
Stanford University

Stephen Yau*
IEEE Computer Society
Representative
Arizona State University

Stuart Zweben*
ACM Representative
Ohio State University

CRA Staff:
William Aspray (study Co-Chair)*
Jean Smith

* Steering Committee Member

CRA-W from Page 2

gious awards (such as ACM and IEEE Fellows, ACM Grace Murray Hopper Award, etc.). The goal of the **Awards Project** is to disseminate information about such awards and to identify and nominate qualified female candidates.

[Lead member: Mary Jean Irwin, mji@cse.psu.edu]

The **Systems-Academia** electronic network is modeled after the Systems network and is targeted toward graduate students and faculty women in CS&E. Over 500 women are part of this moderated mailing list. Electronic discussions on the list focus on topics pertinent to academia and provide an additional venue for mentoring young women faculty and graduate students.

[Lead member: Nancy Leveson, leveson@mit.edu]

General Activities

The **Women's Database Project** supports a database of over 700 Ph.D.-level women in CS&E who are working in North America. "Ph.D.-level" means that the women have a Ph.D. degree in CS or CE, that they have a Ph.D. degree in a related field but identify themselves as computer scientists or engineers, or that they are currently enrolled in a Ph.D. program in Computer Science or Computer Engineering. The CRA database has been used extensively since 1992 for statistical studies and for diverse recruiting purposes. The database has been queried for appropriately qualified women job candidates, program committee members,

editorial board members, and invited speakers for conferences. Women of all career levels are listed in the database and searches can be tailored to career level, technical area, or other parameters. [Lead member: Joann Ordille, joann@bell-labs.com]

And, of course, there is the "Expanding the Pipeline Column," where issues related to women and minorities are brought to your attention every issue of CRN. If you would like to submit an article for this column, please contact Joan Francioni (joanf@wind.winona.msus.edu).

CRA-W is supported by the National Science Foundation, which assists in travel to meetings and seed money for the committee's projects, and by the EOT-PACI. Administered by the NPACI in San Diego, EOT-PACI provides general support for

CRA-W, including support for new CRA-W programs, maintaining the committee's webpage and handling publicity for CRA-W. Larger projects, such as the Mentoring Workshops, have successfully acquired separate funding to support their efforts. The current co-chairs of the CRA-W committee are Jan Cuny, University of Oregon (cuny@cs.uoregon.edu), and Leah Jamieson, Purdue University (lhj@ecn.purdue.edu).

Joan Francioni is a professor at Winona State University in Minnesota. She is a member of CRA-W and the publication committee of CRN. Her current research focuses on computer technology for persons with disabilities.

She can be reached for comments or article ideas at joanf@wind.winona.msus.edu. ■

Professional Opportunities

CRN Advertising Policy

Send copy and payment for Professional Opportunities advertisements to Advertising Coordinator, e-mail: crn@cra.org. **E-mail submissions are preferred.** Items may be mailed to *Computing Research News*, 1100 Seventeenth Street, NW, Suite 507, Washington, DC 20036-4632; fax: 202-667-1066.

The format of an ad must conform to the following: 1) the first line must contain the name of the university or organization, 2) the second line must contain the name of the department or unit, and 3) the body of the ad should be in paragraph form. The words in the first two lines are included in the total word count for the ad. You may request in writing that some text be set in bold; a bold word in the body of the ad counts as two words.

The rate is \$2.25 (U.S.) per word. Purchase orders, money orders, and checks are acceptable (please do not send cash). All CRA members receive 200 free words per dues year. CRA's standard advertising package consists of running an ad in *CRN*, and distributing it electronically to CRA's jobs listserv and webpage (where it remains for no less than two months). As an alternative to this package, advertisers may request that their Professional Opportunities ads just be published in *CRN* or just distributed electronically. The cost of the ad is the same whether the standard or the alternative package is selected.

Professional Opportunities display ads cost \$60 (U.S.) per column inch, with a two-inch minimum. Ads must be submitted in camera-ready, offset (positives or negatives) or mechanical form. If your ad is larger than three inches, please request our Advertising Rate Card.

Computing Research News is published five times per year: in January, March, May, September, and November. Professional Opportunities ads with application deadlines falling within the month of publication of *CRN* will not be accepted for publication in *CRN* unless the ad says applications will be accepted until the position is filled. If the closing date of a Professional Opportunities ad does not correspond with the publication of an issue of *CRN*, advertisers can choose the alternative advertising package and only have the ad distributed electronically. Advertising copy that is to appear in *CRN* must be received at least one month before publication. The deadline for the January issue is December 1. Ads for electronic distribution only may be submitted at any time.

Arizona State University Computer Science and Engineering Department

We anticipate that we will have several tenure-track faculty positions open at all ranks (Assistant, Associate, and Full) for the year 1999-2000, and invite outstanding candidates to apply. Applicants are required to have completed a Ph.D. in computer science, computer engineering, or a closely related field by the appointment date. Applicants at the assistant professor level must show exceptional promise and applicants at the associate professor level and higher must demonstrate established excellence in research and teaching appropriate to rank. Desired areas of interest include software engineering, computer architecture/systems, networking, distributed systems, artificial intelligence, database systems, data mining, and knowledge-based systems.

We also invite applications for a non-tenure track lecturer position that requires at least a MS in computer science, computer engineering, or related field. The applicant must demonstrate evidence of being a highly motivated, excellent teacher.

ASU is a major research university widely recognized as a rapidly emerging educational institution in the United States. The main campus is located in the city of Tempe in the metropolitan Phoenix area. The Department of Computer Science and Engineering provides a stimulating and fast-growing environment for research and teaching with ample opportunities for partnerships with high-technology industry and emphasis on quality, leading-edge graduate and undergraduate education. For more information about the department, refer to the website: <http://www.eas.asu.edu/~csdept/>.

Applicants must include a detailed curriculum vitae, hard copies of their most important publications, and the names and addresses of four references. Complete applications and nominations must be received by post and directed to: Chair of Faculty Search Committee, Department of Computer Science and Engineering, Arizona State University, PO Box 875406, Tempe, AZ 85287-5406. Tel. 602-965-3190. The initial closing date is November 10, 1998. Applications received after that date will be reviewed weekly as necessary until the positions are filled. Salary is competitive. Positions pending budgetary approval.

ASU is an Equal Opportunity/Affirmative Action employer.

Ben-Gurion University Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science at the Ben-Gurion University of the Negev in Israel invites applications for three tenure track positions at all levels.

Candidates must have a Ph.D. in computer science or a related field and demonstrate excellence in research and teaching. Candidates in all areas of computer science will be considered.

Applications, including resume and the name and address of at least three references (please indicate e-mail addresses) should be sent to: Prof. Shlomi Dolev, Head, CS Division Dept. of Mathematics and Computer Science Ben-Gurion University P. O. Box 653 Beer-Sheva, 84105, ISRAEL. Email: dolev@cs.bgu.ac.il. Additional information can be obtained through our webpage: www.cs.bgu.ac.il, or by contacting Dr. Dolev directly.

Brown University Department of Computer Science Faculty Position

Applications are invited for a senior position in computer science, with tenure, commencing no later than July 1, 1999. Outstanding applicants are sought in systems and artificial intelligence. In systems, we are looking for candidates in the following areas: databases, distributed systems, environments, networks, operating systems, programming languages, software engineering and Web-related technologies. In artificial intelligence, we are looking for candidates in machine learning, computer vision, robotics, automated decision making, and information retrieval.

Candidates are expected to have outstanding research credentials, a strong commitment to teaching, and demonstrated leadership ability. They must also have a doctoral degree in computer science or closely related areas. Candidates are sought who will meet the teaching and research needs of the department.

Successful applicants will find at Brown a stimulating environment conducive to professional growth. Brown has a strong department with a variety of interesting research projects in analysis of algorithms, artificial intelligence, combinatorial optimization, computational complexity, computational geometry, computer graphics, concurrent data structures and architectures, database systems, graph drawing, operating systems, parallel computation, parallel and distributed debugging, programming environments, programming languages, robotics, and software engineering. The undergraduate and graduate students are first-rate.

Applicants should send a resume in hard copy and have at least five referees send letters of recommendation to:

Prof. Stanley Zdonik
Dept. of Computer Science
Brown University, Box 1910
Providence, RI 02912
Inquiries may be addressed to
faculty_search@cs.brown.edu.

All application materials must be received by October 15, 1998 for full consideration. Additional letters of recommendation may be requested.

Brown University is an Equal Opportunity/Affirmative Action employer and strongly encourages applications from women, minorities, and protected persons.

Bucknell University

College of Engineering
Rooke Chair in the Historical and Social Context of Engineering

The Rooke Chair in the Historical and Social Context of Engineering will integrate the essential dimensions of engineering and the historical and social context of technology for engineering and non-engineering students alike at Bucknell. With a focus on fostering a deeper understanding of the social context of engineering, at the project level and the broad historical level alike, the Rooke Chair will examine the past and current social influences and technological imperatives within which engineering and technological change take place.

In filling the Chair, the University seeks candidates with established records as teachers-scholars, preferably at the associate or full professor level, in one of the engineering disciplines offered at Bucknell: chemical, civil, computer science, electrical, and mechanical; who have demonstrated a scholarly interest in the historical and social context of engineering and technology. The successful candidate will have a Ph.D. degree in one of the above engineering disciplines. The successful candidate will also have demonstrated a commitment to quality undergraduate engineering education and the ability to publish in appropriate venues and will be qualified to teach undergraduate engineering courses. The candidate should possess a capacity for developing Bucknell's special potential for interdisciplinary teaching and scholarship at the interstices of engineering, the social and natural sciences, and the humanities.

It is anticipated that the position will be filled in the College of Engineering prior to the beginning of the Fall 1999 semester. Applicants should send a detailed curriculum vitae, the names of three references, and a statement of research and teaching interests before January 15, 1999, to the following address:

Chair, Rooke Search Committee
205 Dana Building
College of Engineering
Bucknell University
Lewisburg, PA 17837

Bucknell encourages applications from women and members of minority groups (EEO/AA)

Brooklyn College of The City University of New York (CUNY) Department of Computer and Information Science (CIS)

We are seeking to fill four tenure-track vacancies at either the Assistant or Associate Professor level. We are an urban liberal arts college, and our department has 19 full-time faculty, approximately 1000 undergraduate majors, over 150 Master's students and over 20 affiliated doctoral students of the CUNY Graduate Center. Several major research projects are currently underway. Extensive faculty and student SUN/UNIX and PC networks are used in teaching and research.

We would prefer to hire one individual in each of the following area categories:

1. operating systems, distributed systems, and/or programming methodology
2. graphics and/or multimedia
3. database systems and/or information systems
4. artificial intelligence, computer architecture, networks, software engineering, and/or computing education

A successful candidate will teach undergraduate and/or graduate courses in CIS and is expected to develop a research program in the field. He or she should have a broad knowledge of computer science and should have good teaching skills. For appointment as an Assistant Professor, a candidate should have a Ph.D. in computer science. For appointment as an Associate Professor, a preferred candidate should have a record of participation in research grants and high-quality research in the field.

Please send a curriculum vitae and three letters of reference to Aaron Tenenbaum, Dept. of CIS, Brooklyn College, 2900 Bedford Avenue, Brooklyn, NY 11210 (tbaum@sci.brooklyn.cuny.edu). Please indicate which of the four areas above interest you and whether you are applying for the Assistant or Associate Professor position. Please include your e-mail address and phone number.
EEO/AA/IRCA/ADA

Case Western Reserve University Case School of Engineering

Faculty Positions in Computer Science

The Case School of Engineering invites applications at the assistant/associate professor level for multiple tenure-track positions in the Computer Science Program, Department of Electrical, Systems, Computer Engineering and Science, starting in the 1999-2000 academic year. Applicants should have a Ph.D. in Computer Science or Computer Engineering. Demonstrated excellence in both research and teaching is required. Candidates in all areas are encouraged to apply. However, the areas of multimedia and human-computer interfaces, graphical interface design, distributed computer systems and networks, operating systems, compilers, software development environments, programming languages, theory of computing, and computer architecture are of most interest. Salary will be commensurate with the qualifications of the applicant. Case Western Reserve University is a private, research university located in Cleveland, Ohio.

Applications should be directed to: G. Ozsoyoglu, Faculty Search Committee Chair, 406 Olin, Case

Western Reserve University, 10900 Euclid Ave., Cleveland, OH 44106-7071. A complete application shall contain a curriculum vitae, the names and addresses of at least three references, and a statement of research and teaching objectives. The search committee will make its decisions based on its estimate of the candidate's ability to perform excellent research and effective teaching. Case Western Reserve University is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.

Computists International Computists' Communiqué

For careers beyond programming: research jobs, competitions, AI/industry news, announcements.
<<http://www.computists.com>>, laws@computists.com.

Dartmouth College Department of Computer Science

The Department of Computer Science at Dartmouth College invites applications for a tenure-track position in computer science at the level of Assistant Professor. The department seeks strong candidates in applied computer science (defined broadly e.g., systems, applications, inter-disciplinary research). Candidates must excel in both teaching and research. A Ph.D. in computer science is required.

The Department of Computer Science currently includes thirteen computer science faculty, and there are two additional computer science faculty in the Thayer School of Engineering who are members of the Ph.D. Program in Computer Science. The Computer Science program resides in the modern Sudikoff Laboratory for Computer Science and offers Bachelors, MS and Ph.D. degrees in Computer Science. Research interests of current faculty include algorithm analysis and design, computational biology, computational geometry, electronic publishing, image and signal processing, information retrieval, micro-electro-mechanical systems, multimedia systems and tools, network computing, parallel and distributed computation, robotics, systems analysis, and theory.

Dartmouth College is a highly selective Ivy League university with approximately 4000 undergraduates and 1000 graduate students. It combines the advantages of a small liberal arts college (small class size, excellent students, and close student-faculty interaction) with the research activity of a university. As an indication of this dual commitment, research and teaching both count strongly in decisions on promotion and tenure.

Faculty in the Department have DEC and SGI workstations in their offices. The department has additional DEC and SGI servers as well as an SGI Origin 2000 parallel computer. A newly awarded NSF CISE Research Infrastructure grant will greatly augment this equipment over the next five years. A campus-wide PC network serves all students and faculty and is heavily used in undergraduate courses and for campus communication.

Interested persons should submit a curriculum vitae, a statement of research plans and interests, and at least three, preferably four, letters of recommendation, at least one of which should comment on teaching. Review of applications will begin immediately and will continue until the search is complete. Please address application material and general inquiries to: Computer Science Recruiting, Computer Science Department, Dartmouth College, 6211 Sudikoff Laboratory, Hanover, New Hampshire 03755-3510. Specific questions on the selection process can be referred to Professor David Nicol, Recruiting Chair, nicol@cs.dartmouth.edu. Information about the department can be found at URL <http://www.cs.dartmouth.edu>.

Dartmouth College is an Equal Opportunity Employer. Women and minorities are encouraged to apply.

DePaul University Computer Science, Information Systems, and Telecommunications Faculty Positions

The School of Computer Science, Telecommunications, and Information Systems (CTI) of DePaul University invites applications for multiple tenure-track positions beginning September 1999. We welcome applications from outstanding applicants in all areas of specialization. CTI is a young and growing school in downtown Chicago, offering BS, MS and Ph.D. degrees in Computer Science, Information Systems, Software Engineering, Human-Computer Interaction, Telecommunications, and Distributed Systems. CTI currently has over 40 full-time faculty and a student body currently growing at a rate of 30% per year.

By bridging faculty from several areas of computing and information technology and by placing them in the Loop — the heart of Chicago's business and financial district — DePaul has established a unique, dynamic, and entrepreneurial school. CTI rewards excellent teaching, provides strong support for research, and encourages creative applied scholarship.

Computer Science faculty are actively pursuing research in artificial intelligence, biomedical signal and image processing, computational complexity, computer vision, intelligent agents, distributed computing, databases, human computer interaction, foundations of programming languages, graphics, parallel and distributed algorithms, quantum computation, software engineering, and software reliability.

Information Systems faculty are actively

Professional Opportunities

pursuing research in electronic commerce, technology supported learning, group support systems, collaborative systems design, and IT strategy.

Telecommunications faculty are actively pursuing research in performance analysis of data networks, techniques for providing differentiated quality of service to Internet applications, formal methods in protocol development, simulation tools for network education, and distributed multimedia systems.

More information about CTI may be found at <http://www.cs.depaul.edu>.

Candidates should have a Ph.D. in a relevant field by the date of appointment. To apply, complete the application form at <http://www.cs.depaul.edu/facultyapp.html> and send a curriculum vitae, a research statement, a teaching statement and at least three letters of reference to:

Donna Max, Executive Assistant to the Dean
School of Computer Science, Telecommunications and Information Systems
DePaul University
243 South Wabash Avenue
Chicago, IL 60604
E-mail: faculty_search@cs.depaul.edu
Electronic submissions are encouraged.

Applications will be accepted until positions are filled.

DePaul University is an Equal Opportunity Employer.

DIMACS Center

Postdoctoral Fellowships

DIMACS, the Center for Discrete Mathematics and Theoretical Computer Science, invites applications for several postdoctoral fellowships for 1999-00. DIMACS, an NSF Science and Technology Center, is a partnership of Rutgers University, Princeton University, AT&T Labs - Research, Bell Laboratories, Bellcore, and NEC Research.

Research at DIMACS focuses on such areas as analysis of algorithms, combinatorics, complexity, computational algebra, discrete and computational geometry, discrete optimization, graph theory, and outreach from discrete mathematics/theoretical computer science to such areas as molecular biology, statistical mechanics, and telecommunications.

Recent PhDs in all areas of theoretical computer science and discrete math are invited to apply. Most positions will be in a special year and focus on areas of Large Scale Discrete Optimization, Massive Data Sets, DNA Computing, Mathematical and Computational Support for Molecular Biology and Simulations of Telecommunications Systems, and in particular in the new special year on Computational Intractability and the continuing special focus on Networks.

Most postdoctoral fellowships will be for one year and will be headquartered at Rutgers or Princeton. But several positions are planned for two years, with part of the time spent at a partner institution such as AT&T Labs or the Institute for Advanced Study. In particular, we are planning two two-year postdoctoral fellowships jointly with AT&T Labs.

Postdoctoral Fellows conduct research and may collaborate with many visitors and permanent members at the partner sites. They are encouraged to participate in the research, outreach, and educational activities of the center.

Application Procedure: The Center's WWW site <http://dimacs.rutgers.edu/Participation> contains full information about these postdoctoral positions and should be consulted for application information. Applications are due January 8, 1999 for full consideration.

DIMACS Center, Rutgers University, 96
Frelinghuysen Road, Piscataway, NJ 08854-8018;
Tel: 732-445-5928; Email:
postdoc@dimacs.rutgers.edu
DIMACS is an EO/AA employer.

Duke University

Department of Computer Science

Visiting Assistant Professor Position Available

A postdoctoral position at the level of Visiting Assistant Professor of Computer Science is available starting by January 1999 in the Department of Computer Science at Duke University, under the supervision of Prof. Jeff Vitter. Applicants must have clearly demonstrated experience and skills in systems development. Familiarity with external memory algorithms and database algorithms is a definite plus. Teaching responsibilities include one research course per year.

The position will include membership in the Center for Geometric Computing. The problems of interest revolve around high-performance geometric computations. They include development of efficient methods for spatial databases and geographic information systems, especially those dealing with massive amounts of data. The candidate is expected to play a vital role in the development and/or use of the TPIE programming environment (<http://www.cs.duke.edu/TPIE/>) for external memory computation.

Details about the position and how to apply can be found on the Web at <http://www.cs.duke.edu/>. Applications should be in by October 15, 1998.

Florida Atlantic University

Computer Science and Engineering

The Department of Computer Science and Engineering seeks applications for three tenure-track

faculty positions at the Assistant/Associate Professor level and three Instructor positions. Qualifications for the Instructor positions include an MS in Computer Science, Computer Engineering, or a closely related field and some industrial and/or academic experience. The appointments will begin from January 1999 or August 1999. Review of applications will begin from November 1, 1998 and will continue until the positions are filled. Salaries, fringe benefits, and teaching loads are competitive.

The Department has several well-equipped laboratories. It interacts closely with many high-tech companies in the area, which have helped provide state-of-the-art facilities. We have an active research program, with both federal and industrial sponsors. More information about the department is available at <http://www.cse.fau.edu>.

Applicants should send a resume, including the names, phone numbers, and e-mail addresses of at least three professional references, along with a cover letter specifying teaching and research interests, to Faculty Search Committee, Department of Computer Science and Engineering, Florida Atlantic University, 777 West Glades Road, Boca Raton, Florida 33431. Electronic mail communications should be addressed to searchcomm@cse.fau.edu. Florida Atlantic University is an Equal Opportunity/Access/Affirmative Action institution.

Georgia Institute of Technology

College of Computing

Georgia Tech's College of Computing invites applications for tenure-track faculty positions. We are primarily interested in entry-level candidates but will consider exceptional individuals at all levels. With an academic faculty of 48, a research faculty of 16, and 3 postdoctoral fellows, the College has a current enrollment of 1,150 undergraduates, 70 Masters students, and 150 Ph.D. students. The College has strengths in a broad range of areas and is ranked among the top computer science and information technology programs nationally. One of the College's missions is to interact significantly with other academic units; candidates with an interdisciplinary research focus and/or interest in potential joint appointments are welcome.

Preference will be given to applications received by January 15, 1999. We prefer electronic applications (consult <http://www.cc.gatech.edu/general-info/faculty-application-instructions.html>). Please e-mail us a URL pointing to your application materials, including a resume, and the names of at least three references.

E-mail: recruiting@cc.gatech.edu
Hardcopy applications should be sent to:
Dr. Janet Kolodner
Chair, Faculty Search Committee
College of Computing
Georgia Institute of Technology
Atlanta, GA 30332-0280
Tel. 404-894-1634
Fax: 404-894-9846
Georgia Tech is an Affirmative Action/Equal Opportunity Employer; applications from women and under-represented minorities are strongly encouraged.

Gettysburg College

Computer Science

Gettysburg College invites applications for a tenure-track assistant-professor position in computer science beginning August 1999. A Ph.D. in computer science or a closely related field, promise of excellence in teaching, and a commitment to continued scholarship are essential. Applicants are expected to have a strong interest in undergraduate teaching and a desire to involve undergraduate students in their research programs.

Gettysburg College is a highly selective liberal arts college located within 90 minutes of the Baltimore-Washington area. Established in 1832, the College has a rich history and is situated on a 220-acre campus with an enrollment of 2,200 students.

Send letter of application, curriculum vitae, and statements of teaching philosophy and scholarship goals in a liberal arts environment to:
Computer Science Search Committee
Department of Mathematics and Computer Science
Gettysburg College
Gettysburg, PA 17325.

Do not send additional information, including letters of recommendation, with your application. Applications received by December 15, 1998 will receive full consideration; applications received after this deadline may be considered until the position is filled.

The College seeks to promote diversity in its community through its Affirmative Action/Equal Opportunity programs; included in an attractive benefits package is a Partner Assistance Program.

Harvey Mudd College

Computer Science Department

Assistant Professor of Computer Science
Claremont, California, <http://www.hmc.edu>.
The Computer Science Department of Harvey Mudd College intends to appoint a tenure-track Assistant Professor of Computer Science, to start July 1, 1999. While applicants are invited from all areas of computer science, applicants teaching and conducting research in one or more of the following are preferred: distributed systems and algorithms, software engineering, artificial intelligence, robotics, computer graphics, computer architecture and operating systems.

The successful candidate will have completed

the Ph.D. in Computer Science by the time of appointment, and is expected to devote attention to excellence in teaching, as well as to the development of a research program.

Harvey Mudd College is a highly selective undergraduate college (650 students) oriented toward science, mathematics, and engineering. It is a member of the geographically contiguous Claremont Consortium, which includes Pomona College, Scripps College, Pitzer College, Claremont-McKenna College, The Claremont Graduate University, and the newly created Keck Graduate Institute of Applied Life Sciences. While these institutions are run independently, the consortium collectively provides the equivalent of a small university environment to both its students and faculty.

The Computer Science Department offers the newest major at the college, the major having been established in 1992; and in recent years computer science has been the fastest growing major, now second only to engineering as the most popular major.

Qualified students engage in research and publication with faculty members. Our students are among the very brightest, and in 1997 won the ACM International Intercollegiate Programming Competition in only our third year of participation in the contest, also having the distinction of being the first all-undergraduate institution to win the competition.

The department's Computer Science Clinic provides a strong link to the industrial community in the form of yearlong student projects. The successful applicant is expected to become an active and enthusiastic participant as a Clinic supervisor.

Claremont is a pleasant suburban community in the foothills of the beautiful San Gabriel Mountains near the boundary between Los Angeles and San Bernardino counties. It is a 25 minute drive from either Pasadena or Orange County, with access to the cultural attractions of Los Angeles, as well as ocean beaches and mountain ski areas within a 45 minute drive.

Applicants should respond with a curriculum vitae, a statement regarding teaching and research philosophy or plan, and supporting materials such as reprints. Concurrently, please request three references to write to us directly.

Email applications and reference letters (plain text is preferred) are accepted: mike@cs.hmc.edu.
Professor Michael A. Erlinger, Acting Chair
Computer Science Department
Harvey Mudd College
301 E. Twelfth Street
Claremont, CA 91711

Harvey Mudd College is an Equal Opportunity Employer. Applications from groups typically underrepresented in college computer science faculties are strongly encouraged.

Kansas State University

Department of Computing and Information

Sciences

Faculty Position

The department of Computing and Information Sciences at Kansas State University invites applications for a tenure-track position beginning in Fall 1999. Applicants should have a Ph.D. degree in Computer Science by the starting date of the appointment; salary will be commensurate with qualifications. Applicants must be committed to both teaching and research. Primary consideration will be given to computer scientists who work in data/knowledge base systems. Exceptional candidates in other areas such as programming languages, distributed and parallel systems, and software engineering will be considered. Applications must include descriptions of teaching and research interests along with copies of representative publications. Non-U.S. citizens must include visa status.

The department has a faculty of seventeen and offers BS, MS, MSE, and Ph.D. degrees. Computing facilities center around a network of UNIX- and Solaris-based single- and multi-processor Sun workstations, X-terminals, and PCs. Details can be found at the URL <http://www.cis.ksu.edu/>.

Please send applications to Dr. Virgil Wallentine, Head, Department of Computing and Information Sciences, 234 Nichols Hall, Kansas State University, Manhattan, KS 66506 (email: virg@cis.ksu.edu). Review of applications will commence January 15 and will continue until the positions are filled.

Kansas State University is an Affirmative Action/Equal Opportunity Employer.

Loyola University Chicago

Department of Mathematical and Computer

Sciences

Computer Science Faculty Positions

The Department of Mathematical and Computer Sciences invites applications for several tenure-track positions in computer science beginning in Fall 1999. Each position is at the level of assistant professor or associate professor as appropriate. Applicants should have or expect to have a Ph.D. in computer science or a closely related field. Successful candidates are expected to pursue an active research program and make significant contributions to the teaching program. The department performs research in a range of computer science areas, including programming languages and systems, parallel and distributed computing, networks,

Jobs Continued on Page 10

Professional Opportunities

Jobs from Page 10

algorithms, theory of computation, computer simulation, and software engineering. Members of the department are supported by external funding agencies. Applicants in all areas are encouraged to apply.

The department awards BS and MS degrees in computer science. The department has over 180 undergraduate majors and over 160 graduate students in computer science. The department is located on Loyola's scenic Lake Shore Campus on the far north side of Chicago.

Review of applications will commence in early January and will continue until the positions are filled. Please send a curriculum vitae and arrange to have three letters of recommendation sent to:

Chair, CS Hiring Committee
Department of Mathematical and Computer Sciences
Loyola University Chicago
Chicago, IL 60626

All materials must be in paper form. Inquiries may be sent to cs-hiring@cs.luc.edu. For further information, see <http://www.cs.luc.edu/>. Loyola University Chicago is an Equal Opportunity/Affirmative Action Employer. Applications from women and minorities are encouraged.

Management Recruiters International

I have an outstanding opportunity for a software engineer/developer in middle Virginia. Multi-billion dollar company is looking for someone that can write in VC++ in an object-oriented manner. A system architect who can design and implement software methodologies. Also desired knowledge of 16-bit microprocessors (8-bit too) and embedded real time systems. Company is working on the Smart House concept where one could control entire house systems from a PC. Be a part of an R&D team of the best and brightest. Excellent compensation and benefits. Best person would have two + years experience with a BSEE or BSCS and ActiveX is a real plus.

Contact Dan Schuhmacher 512-310-1918.

McGill University

School of Computer Science
Assistant Professor

The School of Computer Science at McGill University wishes to invite applications for two tenure-track positions at the assistant professor level, to begin June 1, 1999. One position is in the systems area, including, but not limited to, networks, architecture, real-time systems. The other position is in the general area of computational intelligence, including, but not limited to, machine learning, model-checking, reasoning with uncertainty, speech understanding, neural nets.

Hardcopy applications, including a curriculum vitae, a list of publications with copies of one or two sample reprints, a research proposal and the names and e-mail addresses of three references should be sent to:

Head, Search Committee
School of Computer Science
McGill University
McConnell Engineering Building, #318
3480 University Street
Montreal, QC H3A 2A7

The review process will start December 1, 1998 and the search will continue until the positions are filled. Further information and the status of the job search can be found on our webpage, www.cs.mcgill.ca.

McGill University is committed to equity in employment and in accordance with Canadian immigration requirements priority will be given to Canadian citizens and permanent residents of Canada.

Michigan State University Department Of Computer Science and Engineering

Assistant and Associate Professor

The Department of Computer Science invites applications for two tenure-stream positions at the assistant professor level (position number ENG 143 and ENG 158) and one at the associate professor level (position number ENG 138). Candidates from all areas of specialization in computer science or computer engineering will be considered. However, the department has a special interest in candidates in the areas of computer architecture and operating systems, databases, programming languages and compilers. The research foci of the department include artificial intelligence, knowledge-based systems, genetic algorithms, robotics, computer architecture, design automation, high-speed networks, parallel and distributed computing, pattern recognition, computer vision, database systems, machine learning, analysis of algorithms, theory of computation, software engineering, and multimedia systems. Candidates should have a Ph.D. in Computer Science or Computer Engineering and have a strong interest in both research and teaching. The appointments will begin in August 1999. For full consideration, applications should be submitted by January 8, 1999. However, applications will be accepted until the positions are filled.

As a unit within the College of Engineering at Michigan State University, the Department of Computer Science offers the Bachelor of Science, Master of Science, and Doctor of Philosophy degrees. It also jointly administers a Bachelor of Science degree in Computer Engineering with the

Electrical and Computer Engineering Department. The department has received extensive funding for support of its instructional and research activities from a broad spectrum of companies and government agencies — local and national. The Department currently has twenty-five tenure-stream faculty, and an enrollment of approximately 150 graduate students and 500 undergraduates. Special support is available from within the college and university to initiate research by new faculty members. Faculty offices and laboratories are connected to the MSUnet which provides access to an array of campus computing resources. The Department maintains the Pattern Recognition and Image Processing Laboratory, Intelligent Systems Laboratory, High Speed Network and Performance Laboratory, Software Engineering and Network Systems Laboratory, Multimedia Laboratory, Advanced Computing Systems Laboratory and Autonomous Agents Laboratory. The computing facilities in the department include more than 200 high-end workstations, two workstation clusters interconnected by high-speed networks, and other specialized research equipment.

Michigan State University enjoys a park-like campus of 2,100 developed acres and 3,100 acres of outlying research facilities and natural areas. The campus is adjacent to the cities of East Lansing and the capital city, Lansing. The Greater Lansing area has approximately 250,000 residents. The communities have excellent school systems and place a high value on education.

Applicants should send a letter of intent, resume, the names of three references, and a statement of research and teaching interests to:

Faculty Search Committee
Department of Computer Science and Engineering 3115 Engineering Bldg.
Michigan State University
East Lansing, Michigan 48824-1226
search@cse.msu.edu

MSU has a history of exploring opportunities for the employment of spouses. For additional information about the Department, College, and the University, see <http://www.cse.msu.edu>.

Michigan State University is an Equal Opportunity/Affirmative Action Employer. Institution and handicappers have the right to request and receive reasonable accommodations.

Position Numbers: ENG 143, ENG 158, and ENG 138.

North Carolina State University Department of Computer Science Network Security

The Department of Computer Science at North Carolina State University seeks an Assistant Professor in the area of Network Security, taken here to include cryptography, high-confidence networking, intrusion detection and response, distributed system security, electronic commerce, active networking, secure internet programming, network management, mobile computing and wireless networking. Candidates are expected to have both strong theoretical and applied interests in the area of networking research and education. The successful candidate will have a Ph.D. in computer science or a related field, and an extensive research record.

This new position has been created to further strengthen our activities in advanced networking research as well as the interactions of the department with the high-technology industry. A number of faculty have an interest in networking/distributed system technologies and applications. Their work is supported by among others AFOSR, Cisco, DARPA, Ericsson, Fujitsu, IBM, MCNC, Nortel, NSA, NSF, and the State of North Carolina.

The Department is in a period of rapid growth and advancement, and is positioning itself to be at the forefront of selected areas in computer science. In addition to funding from the above organizations, we attract support from many other organizations. The candidate will have access to our state-of-the-art high-performance ATM-based network, and the North Carolina Giga-POP and Internet-2 facilities. The University is located in Raleigh, which forms one vertex of the world-renowned Research Triangle Park. The Research Triangle area was recently recognized as one of the best places to live in the U.S. It boasts a high concentration of high-technology companies.

Interested candidates should send their curriculum vitae (including citizenship and visa status) and the names of four references to:

Chair, Network Security Recruitment Committee
Department of Computer Science
North Carolina State University
Raleigh, NC 27695-8206

Prospective candidates are encouraged to access the department's homepage (<http://www.csc.ncsu.edu>) and to send e-mail to network_security_search@csc.ncsu.edu. The University is an Equal Opportunity, Affirmative Action employer.

North Carolina State University Department of Computer Science Electronic Commerce

The Department of Computer Science at North Carolina State University seeks as assistant professor in the broad area of electronic commerce to begin August 16, 1999. We especially seek candidates with interests and qualifications that complement our present faculty. The successful candidate will have a Ph.D. in Computer Science and an extensive research record in topics related to electronic commerce.

McMaster University

Department of Computing and Software Faculty of Engineering

FACULTY POSITIONS IN COMPUTING and SOFTWARE

McMaster University is recognized as the most innovative University in Canada. The Faculty of Engineering at McMaster has a new department, Computing and Software, that offers a new program in Software Engineering and an established program in Computer Science. The department currently has 17 faculty and is rapidly expanding. To learn more about our research strengths, check our web page at www.cas.mcmaster.ca.

We are seeking new colleagues at all levels. We seek outstanding candidates from all areas of Software Engineering and Computer Science, but we are especially interested in applicants working in: performance prediction, optimization (both discrete and continuous), biomedical computing, computers in communication systems, computer security, distributed data networks, high performance computing, real-time control systems, and man-machine interfaces.

We have taken the position that Software Engineering is a branch of engineering and have designed the new program to meet the engineering accreditation criteria of the Canadian Engineering Accreditation Board. Ability to be registered as a Professional Engineer in the Province of Ontario, or become registered within three years of appointment, will be considered an advantage.

Applicants should have a Ph.D. in engineering, computer science, mathematics or a related field. We consider creative experience in industry to be as relevant as academic experience. All our faculty members are expected to teach graduate, undergraduate, and service courses as well as supervise graduate student research. They must have a strong and demonstrated commitment to research in a university environment and will have normal faculty administrative and committee responsibilities.

McMaster University has an employment equity program that encourages applications from all qualified candidates, including women, aboriginal people, persons with disabilities and visible minorities. In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens or permanent residents of Canada.

Salary is commensurate with experience and qualifications. Applications, including a curriculum vita, a statement detailing research and teaching interests and the names of five referees should be sent to: Chair, Department of Computing and Software, Faculty of Engineering, McMaster University, 1280 Main St. West, Hamilton, Ontario, Canada L8S 4L7.

Applications will be accepted until the positions are filled.

This new position has been created to further strengthen our activities in software systems, which currently include research in areas such as workflow, virtual enterprises, heterogeneous and object-oriented databases, machine learning, multiagent systems, multimedia, distributed computing, networking, and human interfaces. Applications of interest include education, health care, process control, and finance. The new faculty member will find a lively and collegial work environment.

The department is in a period of rapid growth and advancement, and is aggressively positioning itself to be at the forefront of selected areas in computer science. We attract research sponsorship from a variety of sources, including ARPA, AFOSR, EPA, NASA, NIH, NSF, and ONR. Industrial sources include IBM, Fujitsu, Glaxo-Wellcome, Proctor & Gamble, and others. The candidate will have access to our state-of-the-art networking, computational, and multimedia facilities. The department receives excellent support from the college of engineering and the university. We recently obtained space in the new \$41 million Engineering Graduate Research Center on NCSU's industry-oriented Centennial Campus.

NCSU is located in Raleigh, a vertex of the world-renowned Research Triangle, which boasts a large concentration of high-tech companies and research institutions. The state of North Carolina is a world center of banking and finance. The Research Triangle area is recognized as one of the best places to live in the U.S.

Interested candidates should send their resume, two or more sample papers, and the names of four references to:

Chair, Electronic Commerce Recruitment Committee
Department of Computer Science
North Carolina State University
Raleigh, NC 27695-8206, USA

Prospective candidates should access the department's homepage (<http://www.csc.ncsu.edu>) and write to ec@csc.ncsu.edu if necessary. Information about additional openings in operating systems and network security may be obtained from the department's homepage. NC State is an Equal Opportunity, Affirmative Action employer. Individuals with disabilities desiring accommodations in the application process should contact the Computer Science Department at NC State University at 919-515-2858.

Ohio State University Department of Computer and Information Science

Multiple tenure-track faculty positions are available in the Department of Computer and Information Science (CIS) at The Ohio State

University. Areas of primary interest include AI, database systems, graphics, human-computer interaction, networking, parallel and distributed computing, and software engineering. Appointments at all ranks will be considered.

One of the openings is designated for Human-Computer Interaction (HCI), in which expertise in one or more of the following areas is particularly desirable: human-computer interaction, human-centered intelligent systems, computer-supported cooperative work, distributed cognitive systems, visualization, information display, and user interfaces. The successful candidate for the HCI position will hold a full-time faculty appointment in the CIS Department, and will be expected to interact significantly with the University's Institute for Ergonomics, which is an interdisciplinary center focusing on cognitive and physical ergonomics.

Applicants should send a curriculum vitae, along with a cover letter, by e-mail to: fsearch@cis.ohio-state.edu or by hardcopy to:

Chair, Faculty Search Committee
Department of Computer and Information Science
The Ohio State University
2015 Neil Avenue, DL395
Columbus, OH 43210-1277

Review of applications will begin immediately and will continue until the positions are filled. For additional information please see <http://www.cis.ohio-state.edu>.

The Ohio State University is an Equal Opportunity/Affirmative Action Employer. Qualified women, minorities, and individuals with disabilities are encouraged to apply.

Old Dominion University Computer Science Department

The Department of Computer Science seeks to fill tenure-track positions at the Assistant Professor level beginning Fall 1999 (One could start Spring 1999). A Ph.D. in Computer Science or closely related field augmented by experience in computer science is required. Successful candidates will be expected to establish a funded research program and to excel at teaching. Areas of interest include high performance computing and communication, networked multimedia, mobile computing, systems programming, security, web technology, and object oriented programming. The department offers BS, MS, and Ph.D. degrees and provides an environment that encourages/supports research. Collaborative opportunities exist across departments and colleges, as well as with other institutions in the area. Sites of collaborative interaction within 30 minutes of campus include Eastern Virginia Medical School, NASA Langley Research Center, Thomas Jefferson National Laboratory, and Virginia Modeling,

Professional Opportunities

Analysis and Simulation Center.

To apply, send a curriculum vitae and the names, addresses, and telephone numbers of three references to:

Larry Wilson, Chair Recruiting Committee
Department of Computer Science
Old Dominion University
Norfolk, VA 23529-0163
Fax: 757-683-4900

We will begin interviewing and possibly hiring on November 1, 1998. Late applications will be considered. Minorities and women are particularly encouraged to apply. Old Dominion University is an Affirmative Action/Equal Opportunity Employer and requires compliance with the Immigration Reform and Control Act of 1986.

Pennsylvania State University Department of Computer Science and Engineering

Applications are invited for tenure-track faculty positions at all ranks. While we will consider applications in all areas of computer science and engineering, we are particularly interested in candidates who build and evaluate hardware and software systems and who have expertise in areas such as compilers, networks, multimedia, operating systems, and databases. We can consider multiple and coordinated hires in these targeted areas.

Applications in computational molecular biology are also encouraged.

Applicants should hold a Ph.D. in computer science, computer engineering, or a closely related field and should be committed to excellence in research and teaching.

The Department of Computer Science and Engineering has a faculty of twenty-four tenure-track faculty and it expects to grow significantly over the next several years. Penn State has made a major commitment to Information Science and Technology on campus and plans to build a new School in that area.

Applications should be received by January 29, 1999 to receive full consideration. To apply by electronic mail, send your resume (including curriculum vitae and the names and addresses of at least three people willing to write a letter of recommendation) as a postscript file to recruiting@cse.psu.edu or by post to:

Chair, Faculty Search Committee
The Pennsylvania State University
Department of Computer Science and
Engineering
220 Pond Laboratory, Box CRA
University Park, PA 16802-6106 USA

For more information about the Department of CSE at PSU, see <http://www.cse.psu.edu/>. PSU is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.

Purdue University School of Electrical and Computer Engineering

Purdue University School of Electrical and Computer Engineering seeks outstanding candidates in computer engineering for research and teaching in the following areas: artificial intelligence, computer architecture, computer networks, operating systems, software engineering, VLSI, and CAD. Strong candidates in other areas of computer engineering are also encouraged to apply. Openings are for tenure-track faculty at all levels.

Send a resume, including a statement of research and teaching interests and a list of at least three references, to:

Head, School of Electrical and Computer
Engineering
Purdue University
1285 EE Building
West Lafayette, IN 47907-1285

Applications will be considered as they are received. Purdue University is an Equal Opportunity/Affirmative Action employer.

Queen's University Department of Computing and Information Science

The Department of Computing and Information Science invites applications for two tenure-track positions at the Assistant Professor level. Queen's University is one of the top universities in Canada and is well known for the high quality of its students and faculty. Queen's University is situated in Kingston, a beautiful and historic city, which is located on Lake Ontario within easy travelling distance of Toronto, Montreal, Ottawa, and Syracuse. Kingston offers the amenities of a large city and the comfort of a small city.

The Department of Computing and Information Science, which has 19 faculty, 21 staff and approximately 70 graduate students, is committed to excellence in both research and teaching. The faculty are doing research in a number of areas of computer science including computational imagery, molecular scene analysis, robotics and perception, software technology, database systems, computational geometry, parallel computation, and computational linguistics.

The Department will consider applicants in database systems, software engineering, graphics, artificial intelligence, computer architecture, computer networks, and related areas. Applicants should have a Ph.D. degree in Computer Science or a related field. The successful candidate will be expected to develop an active research program and to teach effectively at the undergraduate and graduate levels. Salary is commensurate with

qualifications and experience.

Applicants are requested to send a curriculum vitae, including a list of publications and the names of three references, and copies of up to three recent papers to Dr. Janice Glasgow, Chair, Department of Computing and Information Science, Queen's University, Kingston, Ontario, Canada K7L 3N6. The deadline for applications is November 30, 1998 — applications will be accepted until the position is filled. Queen's University is committed to employment equity and welcomes applications from all qualified men and women, including visible minorities, aboriginal people, persons with disabilities, gay men and lesbians.

Reed College Mathematics Department

The Reed College Mathematics Department invites applications for a tenure-track professorship in Computer Science, to begin in Fall 1999. Reed College is a distinguished liberal arts college with 1200 students that is noted for its commitment to the sciences and for its able students. Applicants are expected to have a Ph.D. by the start of the 1999-2000 academic year, and should have a serious commitment to integrating computer science into the undergraduate curriculum, broad training in computer science, and the ability to direct senior theses (required of all students). Further information on the position can be found at the URL: <http://www.reed.edu/cssearch/>.

Applicants should send an application letter and curriculum vitae to: Joe Buhler, Chair, Computer Science Search Committee, Mathematics Department, Reed College, 3203 S.E. Woodstock Blvd., Portland, OR 97202-8199. In addition, applicants should arrange to have three letters of recommendation sent to the same address. We will begin reading applications in the middle of November and continue until the position is filled. Reed College is an EO employer.

Rice University Department of Computer Science

The Department of Computer Science and the Center for Research on Parallel Computation at Rice University expect to have a number of positions available beginning in the academic year 1999-00 and invite applications for faculty and research staff positions. We are interested in receiving applications for appointments to the tenure-track faculty at the rank of assistant professor (however, appointment as associate or full professor will be considered for exceptionally well qualified candidates), to the research faculty which may be at the rank of faculty fellow, senior faculty fellow, and distinguished faculty fellow (these are research positions), and to the research staff as a research scientist or as a postdoctoral research associate. We are especially interested in candidates with research experience in artificial intelligence, algorithms and complexity, compilers, computer graphics and geometric modeling, computer systems, database management systems, networks, programming languages, and parallel computing. We will consider strong candidates in other areas as well.

Applicants should hold a Ph.D. degree or the equivalent in computer science or a related discipline or expect to complete such requirements prior to assuming an appointment. Strong evidence of a commitment to excellence both in research and teaching is required for a tenured or tenure-track appointment. Preference will be given to early applications.

The Department of Computer Science offers five degrees: Bachelor of Arts, Bachelor of Science, Master of Computer Science, Master of Science, and Doctor of Philosophy. NSF Educational Innovation, Research Infrastructure and Science and Technology Center grants, along with major grants and contracts from both industrial organizations and government agencies, have enabled the Department to build a superb research facility, including parallel and multiprocessor systems, a large network of engineering workstations, an extensive local area network, a high-speed network test-bed, and access to the scientific communities via NSF, NASA, and Department of Energy electronic networks. The Center for Research on Parallel Computation supports several major research projects and provides access to massively parallel computer systems located at several cooperating institutions. The computer science department is located in the new Computational Engineering Building, along with the Departments of Computational and Applied Mathematics, Statistics, and part of Electrical and Computer Engineering.

Rice is a well-endowed private university with a strong reputation for academic excellence, particularly in undergraduate teaching. It attracts outstanding students nationally and internationally and provides a stimulating environment for

research, teaching and joint projects with industry. Teaching loads are low to accommodate faculty research and faculty salaries are competitive.

Send a resume, a statement of research and teaching interests, as well as the names and addresses of at least three references to: The Faculty Search Committee, Department of Computer Science MS 132, Rice University, P.O. Box 1892, Houston, Texas 77251-1892, before January 15, 1999. Please specify the position to which you are applying.

For more information, see <http://www.cs.rice.edu/> or call Iva Jean Jorgensen, 713-527-4834 or send email to ivajean@rice.edu. Rice University is an Equal Opportunity/Affirmative Action employer.

Robert Morris College Computer Science Department

Robert Morris College is a private, non-profit institution of higher education that awards numerous Associate Degrees and a Bachelors Degree in Business. There are part-time and full-time openings for Computer Science Faculty at our Chicago, Naperville, Orland Park, and Springfield Illinois campuses.

A Master's Degree in Computer Science is required. Strong consideration will be given to applicants who have their Ph.D. or are ABD. The candidates selected for the positions will be expected to demonstrate a clear love for teaching and working with students. Send a letter of application, resume and transcripts to: Robert Morris, College, Human Resources, 180 North LaSalle, Chicago, IL 60601 or fax to (312)836-4611. E-mail may be received at hr@smtprmcil.edu.

Santa Clara University Department of Computer Engineering

The Department of Computer Engineering at SCU invites applications for a tenure-track appointment at the assistant professor level in, but not limited to, the areas of software engineering, computer networks, or real-time systems.

SCU (<http://www.scu.edu>) is a private, Jesuit university located in the heart of Silicon Valley. It was established in 1851 as the first 4-year college in California. The University enrolls about 4000 undergraduates and 4000 graduate students. The department (<http://www.cse.scu.edu>) offers BS, MS, and Ph.D. degrees, has ten full-time and forty adjunct faculty, and about 165 undergraduate and 350 graduate students. The department aspires to combine the University's Jesuit tradition of competence, conscience, and compassion with a Silicon Valley entrepreneurial spirit to educate engineers who, by their personal lives and by their professional activities, will make a strong positive impact on their communities and the world.

Candidates should have a doctorate in computer engineering, computer science, electrical engineering, or a related field, and a demonstrated potential for quality research, as well as dedication to excellence in teaching and service.

Send a curriculum vitae, a brief statement of research interests with copies of three publications and the names, addresses, telephone numbers, and e-mail addresses of four references to: Dr. Dan Lewis (dlewis@scu.edu), Chair, Department of Computer Engineering, Santa Clara University, Santa Clara, CA 95053. Santa Clara University is an equal opportunity/affirmative action employer.

Slippery Rock University Department of Computer Science Tenure track position(s) available beginning Fall 1999

Earned doctorate in Computer Science or closely related field is required. Candidates must be committed to excellence in teaching. Successful performance in an on-campus interview, including a teaching session is required. A successful applicant must be able to teach core computer science courses. The ability to work productively with students and colleagues required. Preference will be given to candidates with expertise in algorithms, software engineering, architecture, visual programming, computer networks, and those demonstrating familiarity with a broad range of continuous assessment techniques.

Duties may include committee work at departmental, college, and university levels; involvement in student activities; research that may involve undergraduate students; community service as well as academic advisement; scholarly activities; related service and other duties as assigned.

The department has eight full-time faculty members and offers a BS program in both Computer Science and Information Systems. Computing facilities include DEC-Alpha and NT workstations. Slippery Rock University is located an hour north of Pittsburgh and offers a picturesque rural setting

with easy access to the city.

Send letter of application, curriculum vitae (these may be e-mailed in Microsoft Word format), graduate and undergraduate transcripts (official transcripts will be necessary before hiring), and names, addresses, and phone numbers of three references to:

Screening Committee
Department of Computer Science
Slippery Rock University
Slippery Rock, PA 16057
Fax: 724/738-4513
E-mail: robin.hovis@sru.edu

Review of applications will begin January 15, 1999. Slippery Rock University is a member of the State System of Higher Education and is an Affirmative Action, Equal Opportunity employer building a diverse academic community and encourages minorities, women, veterans, and persons with disabilities to apply. You can learn more about us on our webpage at www.sru.edu.

University of Alabama in Huntsville Computer Science Department

The Computer Science Department of the University of Alabama in Huntsville (UAH) invites applications for tenure-track faculty positions at the Assistant Professor level. A Ph.D. in Computer Science or closely related area is required. Applicants should have good communication and teaching skills and a demonstrated ability to do research.

UAH is located in one of the country's most rapidly expanding high-technology areas with a population of approximately 365,000 and a large technical community with excellent public schools and inexpensive housing. Opportunities to pursue research supporting NASA and other government activities are numerous. The University has an enrollment of over 7,000 students with research centers in areas of information technology, robotics, optics, microgravity, space plasma and materials development in space, which provide opportunities for joint projects.

The Computer Science Department has sixteen full-time faculty, offers the BS, MS, and Ph.D. degrees and has research emphasis in the areas of artificial intelligence, software engineering, computer vision, advance computing architectures, and data management systems.

The department has a wide variety of computational systems including a SUN Sparcstation lab and PC labs. In addition, there is already access across the campus backbone to the State of Alabama's CRAY C94 located in an adjacent research park.

Please submit a detailed resume with references to: Professor Carl G. Davis, Computer Science Department, University of Alabama in Huntsville, Huntsville, Alabama 35899. Qualified women and minority candidates are encouraged to apply.

Initial review of applications will begin January 15, 1999 and will continue until a suitable candidate is found.

The University of Alabama in Huntsville is an Equal Opportunity/Affirmative Action Institution.

University at Albany - SUNY Department of Computer Science

The University at Albany Computer Science Department invites applications at all levels for faculty positions beginning January 1999 or September 1999. Candidates must have a doctorate in computer science or a related field.

At the junior level, we seek applicants working in distributed systems, networks, operating systems, and in areas related to high-performance computing.

At the senior level, strong preference will be given to those that have a demonstrated capability for research leadership and external funding in the systems and networking areas, and also in formal methods including hardware and software verification.

The department has well established strengths in theory and formal methods including algorithms, data structures, automated reasoning and unification, software design, and especially in computational complexity, as witnessed by the 1993 Turing Award bestowed on one of our faculty.

The Department has an active research program and offers BS, MS, and Ph.D. degrees; see our webpage <http://www.cs.albany.edu>.

Applications should be sent to: Neil V. Murray, Chair, Faculty Search Committee, Computer Science Department, University at Albany, 1400 Washington Avenue, Albany, NY 12222 (nvm@cs.albany.edu).

The University at Albany is an Equal Opportunity/Affirmative Action Employer. Applications from women, minority persons, handicapped persons, and/or special disabled or Vietnam era veterans are especially welcome.

University of Arizona Department of Computer Science <http://www.cs.arizona.edu>

Applications are invited for tenure-track faculty positions at all ranks, beginning employment August 1999. Candidates must hold a doctorate in computer science or related field, have a commitment to excellence in teaching, and have demonstrated strong potential for excellence in research.

The Department of Computer Science at The University of Arizona has a long history of research accomplishment, influential software distribution

Professional Opportunities Ads Available on Web

Not all departments and organizations choose to run their Professional Opportunities ads in *CRN* — their ads are only distributed electronically to the Computing Research Association's Website and jobs listserv. If you are interested in seeing more Professional Opportunities ads, access the Jobs Webpage at <http://www.cra.org/Jobs>. If you would like to subscribe to jobs@cra.org so you can read the announcements before they are published in *CRN* (or see the ones that don't appear in *CRN*), send the following mail message to listproc@cra.org: `subscribe jobs firstname lastname`.

Jobs Continued on Page 14

Professional Opportunities

Jobs from Page 13

(e.g., Icon, SR, Blast, x-kernel, glimpse) and substantial external funding to individual faculty, exceeding 2.5 million dollars last year. Major funding has included two NSF Institutional Infrastructure grants over the past decade, and a Research Infrastructure grant funded three years ago. Research areas include programming languages, compilers, operating systems, networks, algorithm design, database systems, computational biology, and theory of computation. In addition to providing a broad range of equipment necessary to computing research, the Department supports its instruction and research programs through an exceptional laboratory staff.

Applicants must send a curriculum vitae and the names of at least three references to: Faculty Recruiting Committee, Department of Computer Science, The University of Arizona, PO BOX 210077, Tucson, AZ 85721-0077. We will start the review of applications on October 1, 1998, and will continue to consider applicants until the positions are filled, subject to availability of funds. The University of Arizona is an EEO/AA employer - M/W/D/V.

University of Alabama Department of Computer Science <http://www.cs.ua.edu>

The University of Alabama Department of Computer Science invites applications for a tenure-track position at the Assistant Professor level to begin August 16, 1999. Applicants must have completed a Ph.D. in computer science or related area before the starting date. Applicants in all areas of computer science will be considered. Evidence of ongoing and potential for future research, a commitment to teaching, and willingness to participate fully in the department's graduate and undergraduate programs are basic requirements.

Outstanding applicants should send a curriculum vitae and the names and addresses of at least three references to:

Dr. Allen Parrish, Chair
Computer Science Search Committee
Department of Computer Science
Box 870290
The University of Alabama
Tuscaloosa, AL 35487-0290

Review of applications will begin January 15, 1999 and will continue until the position is filled. The University of Alabama is an Equal Opportunity/Affirmative Action employer. Women and minorities are particularly encouraged to apply. The University may employ only US citizens and aliens authorized to work in the United States.

University of California at Berkeley Department of Electrical Engineering and Computer Sciences

The University of California at Berkeley invites applications for tenure-track positions in electrical engineering and computer sciences beginning in Fall Semester 1999.

Several faculty searches have been approved. We are also considering the possibility of joint searches with other UC Berkeley departments. Applications for appointments at the assistant professor level will be given highest preference, but other levels will so be considered under exceptional circumstances.

Applicants should have received (or be about to receive) a doctoral degree in Computer Science, Electrical Engineering, or Computer Engineering or a related field. All areas of research in Computer Science and Electrical Engineering will be considered. A principal requirement is demonstrated excellence in research. In addition, potential for excellence in teaching and leadership are important requirements. Successful applicants will be expected to establish a quality research program and to teach both graduate and undergraduate courses in their general area of specialty.

Interested persons should send a resume, a select subset of publications, a one- to two-page statement of their future research plans and interests, and the names of three references by December 31, 1998, to the appropriate address

below. The applicant should request their references to forward letters of reference directly to the same address. These letters will not be requested directly by the department. Applications submitted after the deadline will be not considered; earlier applications are encouraged.

Electrical Engineering applications should be sent to:

EE Faculty Search Committee Chair
c/o Jean Richter
Department of Electrical Engineering and
Computer Sciences
231 Cory Hall #1770
University of California
Berkeley, California 94720-1770

Computer Science applications should be sent to:
CS Faculty Search Committee Chair
c/o Anita Bailey
Department of Electrical Engineering and
Computer Sciences
381 Soda Hall #1776
University of California
Berkeley, California 94720-1770
The University of California is an Equal Opportunity, Affirmative Action Employer.

University of California, Irvine Department of Information and Computer Science (ICS)

Open Faculty Positions in Information and Computer Science

The Department of Information and Computer Science (ICS) has several tenured or tenure-track positions open in the following areas of research emphases:

A. Software and software engineering: requirements and design methods, distributed software engineering and technologies, software architectures and component-based technologies.

B. Computer networks: network protocols and management, mobility support, security and quality of service to applications, flexible and expandable middle-ware services.

C. Computer-supported cooperative work: social impacts of computing, information studies and human-computer interactions.

D. Embedded computer systems: system architectures, design, validation and testing of embedded systems, embedded software, compiler and software tools, hardware-software co-design.

E. Interdisciplinary applications of computing such as computer graphics and animation, scientific data visualization, computational statistics, computational biology, medical informatics, information organization, storage, retrieval and visualization.

Available positions are for a full professor in software/software engineering and assistant professor positions in other areas, but exceptional candidates from all ranks will be considered. In all cases, we are looking for applicants with a Ph.D. degree in Computer Science or a related field, and strong research credentials as evidenced by scholarly publications. Applicants for senior positions must also demonstrate a proven track record in original research and teaching activities.

The ICS Department is organized as an independent campus unit reporting to the Executive Vice Chancellor. It runs the second most popular major at UCI and has designed an undergraduate honors program that attracts the campus' most qualified students. The Department currently has 32 full-time faculty and 125 Ph.D. students involved in various research areas including computer science theory, artificial intelligence, networks and distributed systems, databases, multimedia systems, computer systems design, software/software engineering, human-computer interaction and computer-supported cooperative work. ICS faculty are involved in the forefront of research in the emerging areas of the computer science discipline such as multimedia/embedded computing, knowledge-discovery in databases, bioinformatics and the role of information in computer science and society. The faculty has effective interdisciplinary ties to colleagues in biology, cognitive science, engineering, management, medicine, and the social sciences. ICS at UC Irvine represents one of the fastest growing departments and a computer science program that builds upon our strengths in core as well as growth areas of computer science.

Although UCI is a young university, it has attained remarkable stature in the past 3 decades. Two Nobel prizes were recently awarded to UCI faculty. UCI is located three miles from the Pacific Ocean near Newport Beach, approximately forty miles south of Los Angeles. Irvine is consistently ranked among the safest cities in the U.S. and has an exceptional public school system. The campus is surrounded by high-technology companies that participate in an active affiliates program. Both the campus and the area offer exciting professional and cultural opportunities. Mortgage and housing assistance are available including newly built, for-sale housing located on campus and within short walking distance from the department.

Applicants should send a cover letter indicating which of the five areas above [A-E] best fits their research, a curriculum vitae, sample papers and contact information for five references to:

ICS Faculty Position [A-E]
c/o Joy Schuler
Department of Information and Computer
Science
University of California, Irvine
Irvine, CA 92697-3425

Application screening will begin immediately upon receipt of curriculum vitae. Maximum consideration will be given to applications received by December 1, 1998. Salaries commensurate with experience.

The University of California is an Equal Opportunity Employer, committed to excellence through diversity.

University of California, Los Angeles Department of Computer Science

The Department of Computer Science at the University of California, Los Angeles invites applications for tenure-track positions at all levels. Applications are welcome from distinguished candidates at more senior levels.

Quality is our key criterion for applicant selection. Applicants should have a strong commitment to both research and teaching and an outstanding record of research for their level. We seek applicants in any mainstream area of Computer Science, but we particularly welcome those with a strength in operating systems, compilers, graphics, database systems, networking, and security.

Interested applicants should send a letter of application, a resume, and the names of four references to: Professor Richard R. Muntz, Chair, UCLA Computer Science Department, 4732 Boelter

Hall, Los Angeles, CA. 90095-1596.

University of California, Riverside Marlan and Rosemary Bourns College of Engineering

Faculty Positions in Computer Science

The University of California at Riverside invites applications for tenure-track or tenured faculty positions in the Department of Computer Science and Engineering, starting in the 1999-2000 academic year. Applicants should have a Ph.D. degree in Computer Science or a closely related field. Candidates in all areas are encouraged to apply. However, the area of computer systems — including such specialties as architecture, databases, operating systems, and software engineering — is of particular interest. Strong preference will be given to senior candidates with an established exceptional record of achievement in research and teaching. Only those junior candidates who can demonstrate evidence of outstanding potential in research and teaching will be considered. Salary level will be competitive and commensurate with the appointment rank and qualifications of the candidate.

University of California Riverside is a major research institution and a member of the nine-campus University of California System, widely regarded as the most distinguished system of public higher education in the United States. The College, is located in a state-of-the-art building, Bourns Hall, and currently has resource commitments to hire a number of junior and senior faculty members over the next five years. The annual extramural research funding for the college is in excess of seven million dollars. Graduate degrees in computer science are offered at both MS and Ph.D. levels. More information is available on the WWW at <http://www.cs.ucr.edu>.

The city of riverside, located about 60 miles away from Los Angeles, offers easy access to mountains, Pacific Ocean beaches, cultural activities, shopping, and other attractions.

Applications and inquiries should be sent to: Chair, Faculty Search Committee, Department of Computer Science and Engineering, University of California, Riverside, CA 92521-0304, 90-787-5639, or by e-mail to hire@cs.ucr.edu. A complete application shall include curriculum vitae. List of publications, the names and addresses of at least four references, and a statement of research and teaching objectives. To receive full consideration, complete applications must be received by January 4, 1999. Late applications may be considered if position(s) is not filled from the original pool of applicants.

The University of California, Riverside is an Equal Opportunity/Affirmative Action Employer.

University of California, Santa Cruz Computer Science Department

The Computer Science Department of the University of California, Santa Cruz (UCSC) invites applications for two tenure-track Assistant Professor positions in systems. We are interested in candidates with expertise in building computer systems and with research experience in one or more of the following areas: distributed systems, parallel systems, database systems (especially, distributed or heterogeneous databases), storage systems, operating systems, and compilers. The successful candidates are expected to maintain a quality research program and teach at both the graduate and undergraduate levels.

Positions available Fall 1999. Applicants should submit, by January 11, 1999, a curriculum vitae, a statement of research and teaching interests, copies of selected reprints, and have at least three letters of recommendation sent to:

Chair, Computer Science Search Committee
225 Applied Sciences
University of California
Santa Cruz, CA 95064
E-mail: recruit@cse.ucsc.edu

Please refer to Position #195X in all correspondence. For more information on these positions e-mail recruit@cse.ucsc.edu, or see <http://www.cse.ucsc.edu/events/cs-recruit.html>. For additional information about the Computer Science Department, see <http://www.cse.ucsc.edu/>. UCSC is an EEO/AA/IRCA Employer.

University of Florida College of Engineering Computer and Information Science and Engineering Department

BellSouth Eminent Scholar's Chair in Computer Communication and Networking
The College of Engineering at the University of Florida invites nominations and applications for an endowed, chaired professorship in the field of computer communication and networking. It is expected that the successful candidate will interact with faculty from both the Department of Computer and Information Science and Engineering (CISE) and the Department of Electrical and Computer Engineering (ECE). The university is a member of the American Association of Universities (AAU) and is the 16th ranked public university. The University of Florida College of Engineering is ranked 13th among AAU public universities with engineering colleges.

For the BellSouth Chair we seek a researcher and teacher of great distinction whose work has been internationally acclaimed. Preference will be given to the candidate with research emphasis in one or more of the following areas: network communication, multimedia networking, distributed and heterogeneous systems, mobile/wireless networks,

and computer/communication security. Proceeds from an endowment and additional resources will provide an environment commensurate with the qualifications of the candidate sought. The Department of Computer and Information Science and Engineering offers degrees in the Colleges of Engineering, Liberal Arts and Science, and Business Administration. It has a current enrollment of about 1000 undergraduate and 160 graduate students. The Gourman Report ranks the department 10th among leading U.S. institutions with computer engineering programs. The Department of Electrical and Computer Engineering currently has enrolled about 540 undergraduates and about 270 graduate students. The Gourman Reports ranks the department 22nd of more than 250 electrical engineering undergraduate programs. The ECE and CISE faculty includes 14 fellows of professional engineering societies (12 IEEE Fellows) and two members of the National Academy of Engineering, one of whom holds an endowed chair in Microelectronics.

Nominations and applications should be sent to:

Dr. Gerhard X. Ritter, Chair
Department of Computer and Information
Science and Engineering
Attn: BellSouth Chair Search Committee
University of Florida
Post Office Box 116120
Gainesville, FL 32611-6120
Tel. 352-392-1211

The application deadline is March 31, 1999. The University of Florida is an Affirmative Action Employer and women and minorities are encouraged to apply.

University of Idaho Department of Computer Science

The University of Idaho Department of Computer Science invites applications for several tenure-track positions at the assistant professor level. Candidates should be researchers with excellent teaching abilities who will fit in well with our established research expertise in computer security, database security, software reliability, distributed systems, computer architecture, or evolutionary algorithms — but outstanding candidates at other levels and in other areas will also be considered. At least one of the open positions is allocated for a candidate with security specialization.

More information about the Department of Computer Science can be found at <http://www.cs.uidaho.edu/>. Applicants must submit a curriculum vitae and three letters of reference to Dr. Jim Alves-Foss, Search Committee Chair, Department of Computer Science, University of Idaho, Moscow, ID 83844-1010 (email: search@cs.uidaho.edu). Complete applications will be accepted until January 18, 1999 or until suitable candidates are selected. The University of Idaho is an EO/AA employer.

University of Illinois at Urbana- Champaign Beckman Institute for Advanced Science and Technology Research Scientist

The Artificial Intelligence Group of the Beckman Institute for Advanced Science and Technology is seeking two full-time research scientists, with expertise in knowledge-based expert systems, uncertain reasoning, and machine learning. Of particular interest are applicants with expertise in Bayesian networks, artificial neural networks, and blackboard systems. The Beckman Artificial Intelligence Group is the primary center of artificial intelligence research at the University of Illinois, with twelve faculty members from departments across campus and over fifty graduate students. We seek someone who will be an active researcher and can assist with leading a research group.

Candidate must have a Ph.D. in computer science or a related field. This is a full-time, 12-month, academic professional position. The University of Illinois has a comprehensive benefits package. Salary is competitive and commensurate with experience. These positions are grant-funded; reappointments are contingent on continued funding. The current funding in place is for three and a half years.

The positions are open until filled. Starting date is as soon as possible. If interested, please send a description of background and interests, curriculum vitae, and the names of three references to:

Professor David Wilkins
Search Committee Chair
Beckman Institute, University of Illinois
405 North Mathews
Urbana, IL 61801
Phone: 217-333-2822

Applications by e-mail in Word, ASCII, or PostScript are preferred. Please e-mail: ai-search@odyssey.ai.uiuc.edu.

The University of Illinois at Urbana-Champaign is an Affirmative Action/Equal Opportunity Employer.

University of Maryland, College Park College of Computer, Mathematical, and Physical Sciences

The University of Maryland, College Park invites applications and nominations for the position of Dean for the College of Computer, Mathematical, and Physical Sciences. This is one of the strongest academic colleges at the University, its faculty is organized in six departments: Astronomy,

Professional Opportunities

Computer Science, Geology, Mathematics, Meteorology, and Physics; and three nationally-known research institutes: the Institute for Physical Science and Technology; the University of Maryland Institute for Advanced Computer Studies, and the Institute for Plasma Research. Three of the departments, Computer Science, Mathematics, and Physics, were ranked among the top ten at public universities in the most recent National Research Council ratings.

The Dean, who reports directly to the Vice President for Academic Affairs and Provost, provides both academic and administrative leadership for the College. The University of Maryland, College Park, is a Carnegie I category comprehensive research-oriented, public university with almost 35,000 students in baccalaureate, master's and doctoral programs. Further information on the College can be found at <http://inform.umd.edu/CMPS/>. Candidates should possess an earned doctorate, have a record of accomplishment commensurate with appointment as a tenured professor in a department of the College, and possess a demonstrated capacity for creative and effective leadership. The successful candidate must demonstrate a dedication to fostering the goal of diversity within the College. For a copy of the complete position description, please contact Ms. Sheila Mahaffy on 301-405-5626, or by e-mail smahaffy@umdacc.umd.edu.

University of Kentucky Department of Computer Science

The Department of Computer Science at the University of Kentucky invites applications for one or more anticipated tenure-track positions beginning August 15, 1999. Although appointment as Assistant Professor is preferred, exceptionally qualified candidates will be considered for appointment at Associate or Full Professor level. Candidates should have a Ph.D. in Computer Science or a related discipline. Review of credentials will begin on November 1, 1998, and the search process will continue until suitably qualified candidates are found.

We are especially interested in candidates with an expertise in databases, networking, computer graphics and computer vision, and multimedia. Exceptionally strong candidates in other areas will also be considered. Experience with interdisciplinary projects is desirable. Individuals appointed to these positions will be expected to conduct innovative research and participate in the Department undergraduate and graduate instructional programs.

The University of Kentucky is the flagship graduate degree-granting institution in Kentucky. The Department of Computer Science of the University of Kentucky is strongly committed to the goal of maintaining research and teaching excellence and high national visibility. The Department offers BS, MS and Ph.D. degrees. There are about 500 undergraduate and 75 graduate students currently enrolled. Our faculty are actively involved in research in artificial intelligence, computer vision, cryptography, databases, graphics and image processing, networking, numerical analysis, operating systems and theory. The Center for Robotics and Manufacturing Systems and the Center for Computational Sciences, located on campus, greatly enhance the opportunities for professional development. In 1995, the Department was awarded a research infrastructure grant from the National Science Foundation and has a state-of-the-art research computing facility. Additional research opportunities will be created by the Center for Networking Excellence, to open in the Department in 1999.

The University of Kentucky is an equal opportunity employer and especially encourages applications from women and minority candidates.

Please send curriculum vitae and the names of three references to: Faculty Search Committee, c/o Ms. Diane Mier, Department of Computer Science, University of Kentucky, Lexington, KY 40506-0046
E-mail: diane@cs.engr.uky.edu; Fax: (606) 323-1971. For details see: <http://www.cs.engr.uky.edu/positions.html>. An equal opportunity / affirmative action employer

University of Massachusetts Amherst Computer Science Department Faculty and Research Scientist Positions

We have several openings for tenure-track faculty positions at the assistant professor level. Applicants must have a Ph.D. in Computer Science or related area and should show evidence of exceptional research promise. Our primary interest is in candidates whose research interests are in systems, especially in architecture, embedded systems, language implementation, networks, and operating systems. We will however consider candidates in others areas of systems, artificial intelligence, and theoretical computer science. The department would like to strengthen its efforts in emerging areas such as embedded systems, multimedia, and geographically distributed, heterogeneous, and configurable computing. Exceptional applicants at the associate and full professor level are also invited to apply.

The Department of Computer Science has thirty-nine tenure and research track faculty and one hundred and sixty Ph.D. students with broad interdisciplinary research interests. In addition to the positions advertised here for the 1999-2000 academic year, the department expects to have more openings in subsequent years. The department will be moving into a new state-of-the-art facility in the summer of 1999. For candidates with a "two-body problem," a wealth of academic and industrial employment opportunities exist in the area. Please see our WWW departmental pages for more information, <http://www.cs.umass.edu>. Applications

should reference search R6426.

We also invite applications for Research Scientist (search R6424), Postdoctoral Research Associate (search R6423), and Research Fellow (also search R6423) positions in all areas of Computer Science. Applicants should have a Ph.D. in Computer Science or related area (or an MS plus equivalent experience), and should show evidence of exceptional research promise. These positions are grant-funded; reappointments will be contingent upon continued funding.

To apply, send a letter with your curriculum vitae and names of at least three references to:

Search (fill in number from above)
c/o Chair of Faculty Recruiting
Department of Computer Science
Lederle Graduate Research Center
University of Massachusetts
Amherst, MA 01003-4610

Review of applications begins December 1, 1998, and will continue until available positions are filled. Salary commensurate with education and experience; comprehensive benefits package. Positions available subject to funding. The University of Massachusetts is an Affirmative Action/Equal Opportunity employer. Women and members of minority groups are encouraged to apply.

University of Mississippi Department of Computer and Information Science

The Department of Computer and Information Science invites applications for a tenure-track Assistant Professor position. Requirements include a Ph.D. or D.Sc. in Computer Science and ability to teach undergraduate and graduate students, conduct research in major areas of computer science, and supervise MS and Ph.D. students. Research opportunities exist in the Mississippi Center for Supercomputing and other centers on campus. The Department recently received a \$1M Adler Endowment for laboratory facilities and innovative educational programs.

The University is located in the historic town of Oxford in the wooded hills of north Mississippi, an hour drive from Memphis. Oxford has a small-town atmosphere with affordable housing and excellent schools. Review of applications will begin immediately and continue until the position is filled. The applicant must provide evidence of research potential and effective communication skills. Send complete curriculum vitae (including graduate courses and visa/citizenship status) and names of three references to Dr. Robert P. Cook, Chair, Department of Computer and Information Science, University of Mississippi, 302 Weir Hall, University, MS 38677. E-mail: search@cs.olemiss.edu. WWW: <http://www.cs.olemiss.edu>. Fax: 601-232-5623.
The University of Mississippi is an AA/ADA/EOE.

University Of Missouri-Rolla Department of Computer Science

The Department of Computer Science invites applications for several tenure-track positions at the level of assistant professor. Employment will begin August 15, 1999. Qualifications for the position include an earned doctorate in computer science or equivalent before August 15, 1999. Successful candidates are expected to establish a viable research program and to teach at both the graduate and undergraduate levels. Applicants are primarily sought in all areas of software engineering, real-time systems, formal methods, user interface, parallel and distributed processing, intelligent systems, graphics, or scientific visualization. Effective English communication skills are necessary.

The Department grants the BS, MS, and Ph.D. degrees and has both undergraduate and graduate students are actively involved in research. Current departmental activities are in the areas of software engineering, parallel and distributed computing, distributed database, computer vision, and intelligent systems. The University of Missouri-Rolla is the primary science and engineering campus of the University of Missouri system and, as such, provides opportunities for interdisciplinary research with faculty members in other departments. The UMR Intelligent Systems Center also provides interdisciplinary research opportunities and faculty members may become research investigators in that center.

Dual career couples in computer science are strongly encouraged to apply. The successful applicants will be expected to be able to interact with disciplinary and multidisciplinary colleagues.

The committee will begin review of applications on February 1, 1999. Applications will be accepted until February 10, 1999. Applicants should send a curriculum vitae and a statement of research and teaching interests, and arrange to have three letters of reference sent to:

Human Resource Services
Reference Number: R52670, R51573, R50063
University of Missouri-Rolla
1202 North Bishop
1870 Miner Circle
Rolla, MO 65409-1050

In accordance with U.S. immigration requirements, qualified applicants must be eligible to legally work in the United States. UMR is an AA/EEO employer. Females, minorities, and persons with disabilities are encouraged to apply.

University of Nebraska - Lincoln Computer Science and Engineering Department

The UNL CSE Department invites applications for several tenure-track faculty appointments at

Assistant, Associate, or Full professor rank to begin August 1999. Applicants should have promise for innovative research and teaching in:

- VLSI design or design automation
- Software engineering
- Enterprise systems including electronic commerce
- Distributed object technologies and middleware
- Human-computer interaction
- Database and information systems
- Computer and communications security
- Theory and algorithms

and hold or be completing a Ph.D. in Computer Science, Computer Engineering, or related field. Exceptional candidates in other areas will be considered.

The CSE Department offers both computer science and computer engineering programs leading to BS, MS, and Ph.D. degrees and has 20 tenure faculty lines, over 500 undergraduates and 100 graduate students. UNL is Nebraska's comprehensive research university with Carnegie I standing and membership in the American Association of Universities. In 1998, UNL received the largest gift in its history to establish the JD Edwards Honors Program in Computer Science and Management.

Review of applications begins January 18, 1999, and will continue until all positions are filled. A resume, statement of research and teaching interests, and three references letters should be sent to:

Al Surkan, CSE Search Committee Chair
Computer Science and Engineering Department
University of Nebraska - Lincoln
Lincoln, Nebraska 68588-0115

See www.cse.unl.edu; e-mail search@cse.unl.edu; phone 402-472-2401; fax 402-472-7767. UNL is committed to a pluralistic campus community through AA/EO, is responsive to dual career couples, and makes reasonable ADA accommodations.

University of New Mexico Department of Computer Science Faculty Positions at All Ranks

The Department of Computer Science at the University of New Mexico is conducting two searches to fill up to three tenure-track faculty positions. Two of the positions are in systems (including: compiler construction, computer architecture, computer networks, computer security, operating systems, and software engineering), the other is open to applicants in all areas of computer science.

Candidates for both searches must have completed, or be about to complete, a doctorate in Computer Science, Computer Engineering, or closely related field. Applicants must demonstrate a commitment to undergraduate and graduate education and the ability to establish a nationally visible research program (preference will be given to applicants whose research meets the needs of the department.) Applicants for all ranks will be considered, although preference will be given to applicants for junior positions.

Currently, the faculty consists of 16 tenure-track professors (expected to increase to 18 in coming years), a permanent lecturer, and two visiting professors. Active research programs include: adaptive computation, artificial intelligence, automated reasoning, computer security, data mining, distributed and parallel operating systems, experimental algorithmics, high-performance networks, scientific computing, and scientific visualization. The department has internationally recognized research programs in several of these areas and enjoys strong research collaborations with the Santa Fe Institute and Sandia and Los Alamos National Laboratories.

The Department of Computer Science is one of five departments in the School of Engineering at the University of New Mexico. The department offers BS (accredited by CSAB), MS, and Ph.D. degrees with approximately 100 graduate and 150 undergraduate students. The University of New Mexico has a student enrollment of approximately 25,000 and is a Carnegie Institute Division I research university. For further information about the Computer Science Department at the University of New Mexico, see: <http://www.cs.unm.edu>.

For best consideration, applications for either search should be received by December 15, 1998, although we will continue to accept applications until the positions are filled. Each application should include a curriculum vitae, a research statement, a teaching statement, and the names of four references. A cover letter should indicate which search you would like to be considered for, summarize your experience, and indicate the level of the appointment you are seeking.

Applications should be sent to:
CS Faculty Search Committee, Department of Computer Science, The University of New Mexico, Albuquerque, NM 87131-1386; e-mail faculty_search@cs.unm.edu

Inquires regarding the general faculty search should be directed to George Luger (luger@cs.unm.edu). Inquires regarding the systems faculty search should be directed to Arthur B. (Barney) Maccabe (maccabe@cs.unm.edu).

The University of New Mexico is an Equal Opportunity/Affirmative Action employer and educator.

University of New Mexico Department of Computer Science

Applications are invited for one or more visiting professor positions, and one lecturer position, in the Computer Science Department to begin in Fall 1999. Applicants for the visiting position must have a Doctorate; for the lecturer position they must have a masters degree (doctorate preferred) in Computer Science or a closely related

field and a commitment to teaching excellence. The anticipated teaching load for either position is three courses per semester, or equivalent (with some course development or educational research possible). The lecturer position is expected to primarily involve undergraduate educational responsibilities; the visitor may additionally have graduate-level responsibilities based on the qualifications and interests of the individual.

The department offers BS (accredited by CSAB), MS, and Ph.D. degrees; it has 16 tenure-line faculty, with approximately 100 graduate and 1500 undergraduate students. The department has a special emphasis on interdisciplinary research. Active research programs include: adaptive computation, artificial intelligence, automated reasoning, computer security, data mining, distributed operating systems, experimental algorithmics, and scientific visualization. The department has two NSF Young Investigators, an NSF Infrastructure grant, and close ties to the Maui High-Performance Computing Center.

UNM also provides unique research opportunities for faculty and students due to its close proximity to the Santa Fe Institute, Sandia and Los Alamos National Laboratories, and the USAF Research Laboratory (Phillips). Albuquerque offers a high quality of living, including the amenities of New Mexico's major metropolitan area, easy access to outdoor activities and rural living, and a moderate year-round climate. See <http://www.cs.unm.edu> for additional information.

For best consideration, applications should be received by January 15, 1999. The search will continue until the positions are filled.

Inquiries and applications (including curriculum vitae, personal statement, and names of at least three references) for the visiting professor positions should be addressed to:

Professor Edward Angel
Chair, CS Visiting Faculty Search Committee
Department of Computer Science
University of New Mexico
Albuquerque, NM USA 87131-1386
angel@cs.unm.edu

Inquiries and applications (including curriculum vitae, personal statement, and names of at least three references) for the lecturer position should be addressed to:

Jeanine Ingber
Chair, CS Lecturer II Search Committee
Department of Computer Science
University of New Mexico
Albuquerque, NM USA 87131-1386
ingber@cs.unm.edu

The University of New Mexico is an Equal Opportunity/Affirmative Action employer and educator.

University of Oregon Department of Computer and Information Science

The Department of Computer and Information Science invites applications for a tenure-track faculty position at the Assistant or Associate Professor level starting in September 1999. Candidates should evidence a strong commitment to both research and teaching. We are particularly interested in applicants in software engineering. Related areas of interest include human-computer interaction, graphics, visualization, multimedia, and distributed systems.

The Department offers BS, MS, and Ph.D. degrees. The Department is associated with the NSF-funded Software Engineering Research Center (SERC), the Computational Intelligence Research Laboratory (CIRL), the Cognitive and Decision Sciences Institute, and the Computational Science Institute (CSI). Instructional laboratories consist of UNIX-based workstations and computer servers. Research facilities include special equipment for user-interface design, graphics, and parallel processing. A new computational science laboratory houses an array of SGI Powerchallenges with high-performance graphics hardware. The University of Oregon has been cited by national publications as one of the six most "wired" campuses in the country.

The University of Oregon is located in Eugene, a community rated among the most livable in the nation. Qualified candidates should send their curriculum vitae and the names of at least four references to: Faculty Search Committee, Computer and Information Science, University of Oregon, Eugene, OR, 97403-1202; e-mail: faculty.search@cs.uoregon.edu; url: <http://www.cs.uoregon.edu/>. For full consideration, applications should be received by January 15, 1999. We shall continue to accept applications until the position is filled.

The University of Oregon is an Equal Opportunity/Affirmative Action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

University of Pittsburgh Department of Computer Science

The Department of Computer Science at the University of Pittsburgh invites applications for a tenure-track position at the rank of Assistant Professor. Subject to budget approval, the position would begin in the Fall Term, 1999. Outstanding candidates are sought in areas of computer systems, including but not limited to architecture, databases, networks, operating systems, and parallel, distributed, and real-time systems.

Responsibilities include research, supervision

Jobs Continued on Page 16

Jobs from Page 15

of graduate student research (Ph.D. and MS), and graduate and undergraduate teaching. Candidates should have a Ph.D. in Computer Science and demonstrate exceptional research potential and teaching ability.

The Department currently has twenty-two full-time faculty members and provides a stimulating environment for research and teaching that results in strong graduate and undergraduate programs. In particular, the department already has a strong systems research group. Other areas of strength in the department include algorithms and theory, artificial intelligence, compilers and programming languages, and software systems and engineering. Departmental resources include extensive computing facilities of over 250 workstations and personal computers with multimedia capabilities and specialized networks and devices. Faculty members also have network access to additional high performance computing platforms provided by the general computing facilities of the University as well as by the Pittsburgh Supercomputer Center (of which the University of Pittsburgh is a founding member). For further information about the department please see <http://www.cs.pitt.edu>.

Applications should include a curriculum vitae, statement of research interests, and names and addresses of at least three references and should be sent to: Prof. Rami Melhem, Faculty Search Chair, Department of Computer Science, University of Pittsburgh, Pittsburgh, PA 15260. Please direct your inquiries to faculty-search@cs.pitt.edu. To ensure full consideration, applications must be received by January 15, 1999.

The University of Pittsburgh is an Equal Opportunity/Affirmative Action employer and especially encourages women and ethnic minorities to apply.

University of Texas at Austin Department of Computer Sciences

The Department of Computer Sciences of the University of Texas at Austin invites applications for tenure-track positions at all levels, particularly at the assistant professor level. All tenure-track positions require a Ph.D. or equivalent degree in computer science or a related area at the time of employment. Successful candidates are expected to pursue an active research program, perform both graduate and undergraduate teaching, and supervise graduate students.

The department is ranked among the top ten computer science departments in the country. It has thirty-six tenure-track faculty members across all areas of computer science and participates in the University's Computational and Applied Mathematics interdisciplinary program. Austin, the capital of Texas, is located on the Colorado River at the edge of the Texas Hill Country. Live music and outdoor recreation are among the many attractions of this beautiful area. Austin is also a center for high-technology industry, including companies such as IBM, Dell, Motorola, Sematech, AMD, MCC, Tivoli, Trilogy, Dejanews, and Origin Systems. For more information please see the department webpage at <http://www.cs.utexas.edu/>.

Applicants should submit a curriculum vitae, a statement of research interests, a list of references, a homepage URL, and up to three representative publications to:

Professor Raymond J. Mooney
Recruiting Committee Chair
Department of Computer Sciences
The University of Texas at Austin
Austin, TX 78712-1188

Letters of reference will be solicited separately.

E-mail inquiries about your application should be directed to faculty.recruit@cs.utexas.edu

Evaluation of applications will be done throughout the academic year until available positions are filled. Candidates are encouraged to apply early; applications received after January 15, 1998 will only be considered if positions remain available. Women and minority candidates are especially encouraged to apply. The University of Texas is an Equal Opportunity Employer.

University of Texas at Dallas Computer Science Program

Tenure-Track Position

The Computer Science Program of the University of Texas at Dallas invites applications for tenure-track faculty positions at all levels, starting September 1998.

The successful candidates will be selected from applicants with strong research programs in systems areas including software engineering databases, telecom software, network management, multimedia systems, and real-time systems. Candidates must have a Ph.D. degree in Computer Science, or equivalent. Candidates for junior positions should show strong potential for excellent teaching and research; candidates for senior positions should have a strong record of research, teaching, and external funding.

The Computer Science Program offers the Ph.D. degree in Computer Science and has Master's degrees in Computer Science with major in Software Engineering as well as tracks in Telecommunications, and Traditional Computer Science. We have experienced very rapid growth in enrollment in recent years. The university is located in the most attractive suburbs of the Dallas metropolitan area. There are over 250 high-tech companies within ten miles of the campus, including Texas Instruments,

Nortel, Alcatel, Ericsson, DSC, Nokia, Fujitsu, MCI, EDS, and Perot Systems. Almost all the country's leading telecommunications companies have major research and development facilities in our neighborhood. Opportunities for joint university-industry research projects and consulting are excellent.

In addition to individual faculty workstations, the department has six computer/research laboratories, equipped with high-performance workstations and high-end PCs. Computers on campus are connected via Ethernet and have access to the Internet. Students and faculty have dial-in access to campus computing facilities.

Currently the computer science department has twenty tenured/tenure-track faculty and eight senior lecturers. The potential for growth is excellent. For more information, contact Dr. Simeon Ntafos, Chair of the Search Committee, at 972-883-2809 or 972-883-2808, send e-mail to ntafos@utdallas.edu, or view the internet webpage at <http://www.utdallas.edu/dept/cs/>. The search committee will be evaluating applications on January 1, 1999 ad will continue until the positions are filled.

Applicants should mail their curriculum vitae with a list of at least five academic or professional references as soon as possible to: Academic Search #733, The University of Texas at Dallas, P.O. Box 830688, M/S AD 23, Richardson, TX 75083-0688. Indications of sex and ethnicity for Affirmative Action statistical purposes is requested but not required. The University of Texas at Dallas is an Equal Opportunity/Affirmative Action employer and strongly encourages applications from candidates who would enhance the diversity of the University's faculty and administration.

University of Utah Department of Computer Science

The University of Utah's Department of Computer Science seeks applicants for tenure track faculty positions at either the assistant or associate professor level. The department places a strong emphasis on interdisciplinary, multi-investigator research activities addressing large-scale problems of significant impact. Both research areas and course offerings benefit from the quality and breadth of our faculty and emphasize a balance of theoretical foundations and practical engineering. Candidates are sought who will complement the current mix of faculty within the department: in the areas of computer graphics/scientific visualization/scientific computing, systems/networking/languages, artificial intelligence, and databases. Applicants should have earned a Ph.D. in Computer Science or a closely related field.

The University of Utah is located in Salt Lake City, the hub of a large metropolitan area with excellent cultural facilities and unsurpassed opportunities for outdoor recreation only a few minutes drive away. Additional information about the department can be found at <http://www.cs.utah.edu>.

Please send curriculum vitae and names and addresses of at least four references to:

Faculty Recruiting Committee
c/o Shawn Darby
Department of Computer Science
50 So. Central Campus Drive
Rm 3190 MEB
University of Utah
Salt Lake City, UT 84112-9205

The University of Utah is an Equal Opportunity, Affirmative Action Employer and encourages nominations and applications from women and minorities, and provides reasonable accommodation to the known disabilities of applicants and employees.

University of Virginia Department of Computer Science

The Department of Computer Science invites applications for faculty positions at all ranks. Outstanding candidates in all areas of Computer Science will be considered, but software engineering, computer architecture, real-time systems, multimedia operating systems, security, and human-computer interaction are of particular interest. Both tenure track and research track openings exist. The Department has a first rate experimental computer science research program and has in place an innovative undergraduate CS curriculum. We are looking for candidates who are or have the potential to become outstanding in both research and teaching. Positions open until filled. Salary commensurate with experience.

Send a resume and the names of three references to:

Professor Jack Stankovic, Chair
Department of Computer Science
Thornton Hall
University of Virginia
Charlottesville, VA 22903.

Virginia is an Equal Opportunity, Affirmative Action Employer. <http://www.cs.virginia.edu>.

Valparaiso University Department of Mathematics and Computer Science

Assistant Professor position beginning January or August, 1999. Qualifications: Ph.D. in CS and an interest in undergraduate research. Valparaiso University prides itself on excellent classroom teaching. Faculty are expected to maintain a program of scholarly activity and to provide service to the university community.

Valparaiso University (located 60 miles from Chicago and 15 miles from Lake Michigan) is a scholarly community committed to Christian higher education in the Lutheran tradition. The Computer

Science program is in the College of Arts and Sciences, and collaborates extensively with the Computer Engineering program. Computer networked resources include laboratories for Sun workstations, Windows and Macintosh PCs, and a Vax minicomputer. Women and minorities are especially encouraged to apply.

Send a letter of application, statement of teaching philosophy, summary of research plans, curriculum vitae and the names of three references to: Patrick Sullivan, Department of Mathematics and Computer Science, Valparaiso University, Valparaiso, IN 46383. E-mail: psullivan@orion.valpo.edu. The application review process will begin October 15 and will continue until the position is filled.

Vanderbilt University Department of Computer Science Chair of the Department of Computer Science

Vanderbilt University invites applications and nominations for Chair of the Department of Computer Science. The position will be available July 1, 1999.

Vanderbilt University is an independent, coeducational, nonsectarian, private university committed to cultural diversity and dedicated to undergraduate and graduate teaching, research, and professional training. Current enrollments are about 5900 undergraduate and 4400 graduate and professional students.

The Department of Computer Science is one of six departments in the School of Engineering. Currently, there are ten tenure-track faculty positions with approximately 110 undergraduate students and fifty graduate students enrolled in bachelors, masters, or doctoral degree programs in computer science. The department jointly administers a bachelor's degree in Computer Engineering in which approximately 100 undergraduate students are enrolled. Additional information is available at <http://www.vuse.vanderbilt.edu>.

A dynamic individual with a distinguished record of teaching and research, with proven management ability, and with the energy and desire to lead the program to a higher level is being sought. The candidate must have the ability to work effectively with faculty and students, to develop with the constituents of the department both short and long-term plans, to enhance the graduate and research efforts while maintaining a strong undergraduate program, and to foster interdisciplinary research. Candidates must have an earned doctorate in Computer Science or a closely related discipline with professional achievements that would justify an appointment as a full professor with tenure.

Review of applications and nominations will begin on December 15, 1999. Applicants should send a letter of interest; a resume; and names, addresses, phone numbers, and e-mail addresses (if available) of four references to:

CS Chair Search Committee
School of Engineering
Vanderbilt University
Box 1826 Station B
Nashville, TN 37235-1826

Vanderbilt University is an Equal Opportunity, Affirmative Action Employer. Women, minorities, and people with disabilities are encouraged to apply.

Washington State University School of Electrical Engineering and Computer Science

Applications are invited for the Boeing Distinguished Professor in Software Engineering at the rank of Full Professor. Applicants should have a Ph.D. in computer science or a closely related field, proven academic or industrial experience and a strong record of research, funding and publication and a demonstrated ability to teach effectively. Applications are also invited for two tenure-track positions in computer science at the rank of Assistant or Associate Professor. Applicants must have earned a Ph.D. in computer science or a closely related field. Preference will be given to candidates with an interest in computer graphics, software engineering, scientific computing, or human-computer interaction. Candidates must have a strong interest in and a demonstrated capacity to conduct publishable research and must display the potential for successful teaching. Screening of applications will begin on December 1, 1998, and continue until the positions are filled. Applicants should send a cover letter, a curriculum vitae, and the names and addresses of three references to:

Chair, EECS Search Committee,
School of Electrical Engineering and Computer Science,
Washington State University
P O Box 642752
Pullman WA 99164-2752

For further information see <http://www.eecs.wsu.edu/>.

Washington University in Saint Louis Department of Computer Science

Applications are invited for tenure-track faculty positions at the Assistant, Associate, and Full Professor levels. Applicants should hold a doctorate in Computer Science or a closely related field, have a record of accomplishment in research, and demonstrate a strong commitment to teaching.

Washington University is a leading private national university recognized for its world class intellectual contributions (20 Nobel Prize Laureates have been associated with the University), its exceptional resources (an endowment of \$2.8 billion, among the largest in the nation), and its

location in the midst of a delightful residential community that places much value on education and culture. With annual external research funding in the range of \$6 million, Computer Science is emerging as one of the preeminent departments in the University and the School of Engineering and Applied Science. Over the next several years, the Department plans to expand its size from 15 to 20 regular faculty. This aggressive growth pattern will be accompanied by commensurate increases in departmental resources.

The Department seeks outstanding candidates likely to develop synergistic relationships with existing areas of excellence within the department: networking and communications; distributed computing and object-oriented software technologies; graphics, visualization, and human interfaces; artificial intelligence; computer architecture and engineering; theoretical computer science, algorithms, and programming languages; and computational science with emphasis on biomedical applications. With the strong backing of the University and the School, the Department is committed to making significant investments in promising new areas of study and to providing the kind of resources and environment that will enable new faculty members to flourish intellectually. Academic couples seeking to co-locate are strongly encouraged to apply. Research groups in search of a highly supportive institutional environment may also want to consider relocating to Washington University.

For more information on our department, see our World Wide Web page at <http://www.cs.wustl.edu>.

Qualified applicants should send a curriculum vitae and the names and addresses of at least three references to Dr. Catalin Roman, Chairman, Department of Computer Science, Campus Box 1045, Washington University, One Brookings Drive, St. Louis, MO 63130-4899.

Applications will be considered as they are received. Those received after February 1, 1999, may not receive full consideration. Washington University is an Equal Opportunity/Affirmative Action employer.

Wheaton College Department of Mathematics and Computer Science

Wheaton College (IL)-Department of Mathematics and Computer Science invites applications for one, and possibly two, tenure-track positions; Assistant or Associate Professor, beginning August 1999. A Ph.D. in Computer Sciences or a closely related field is required. A commitment to effective teaching, an ongoing program of research, and close interaction with students is essential. There is opportunity to contribute to the development and expansion of an established program.

The Department offers a major and a minor in both mathematics and computer science. Applicants should send curriculum vitae including names of three references and a list of computer science courses taught to:

Dr. Robert Brabenec, Chair
Department of Mathematics and Computer Science
Wheaton College
Wheaton, IL 60187

Application deadline is December 15, 1998.

Wheaton is an evangelical Christian liberal arts college whose faculty and staff affirm a Statement of Faith and adhere to lifestyle expectations. The College complies with federal and state guidelines for nondiscrimination in employment. Women and minority candidates are encouraged to apply.

York University Department of Computer Science

The Department of Computer Science at York University invites applications for multiple tenure track positions available in all areas and at all levels. The appointment is to commence July 1st, 1999. Junior candidates should hold a Ph.D. in Computer Science. The ability to teach graduate and undergraduate courses and conduct research in major areas of computer science is critical. For senior positions, a demonstrated outstanding record of research, teaching, and service in computer science is essential.

Applications, including a curriculum vitae and a list of publications, should be sent to:

Professor Michael Jenkin,
Search Committee Chair,
Department of Computer Science,
York University,
Toronto, Ontario, M3J 1P3, Canada.

Please arrange to have three letters of references sent directly to the same address. The deadline for application is January 15th, 1999.

The Department of Computer Science at York includes twenty-eight faculty members, and is in the process of moving to a new building with increased research, teaching, and faculty space. The department offers a full range of graduate and undergraduate programs, including a Ph.D. York University is the third largest university in Canada. It is located in Metropolitan Toronto, and is within easy reach of downtown Toronto. For further information concerning the department see our departmental web page <http://www.cs.yorku.ca>.

York University is implementing a policy of employment equity, including affirmative action for women faculty members. In accordance with Canadian immigration requirements, in the first instance, this advertisement is directed to Canadian citizens and permanent residents.