# COMPUTING RESEARCH NEWS

# Bill Joy, Sun Microsystems, Inc., Discusses PITAC Report

**By Jean E. Smith**

Bill Joy, Founder and Vice President of Research at Sun Microsystems, Inc., was interviewed by *CRN* on November 17, 1998. Mr. Joy and Ken Kennedy, Rice University, co-chair the President's Information Technology Advisory Committee (PITAC). The PITAC's interim report was submitted in August 1998; the final report will be released in February 1999.

**CRN:** Why do you think "core" research in computer science and computer engineering is critically important to achieving the objectives of the PITAC's report?

**Joy:** Without long-term research we will lose the industry to countries that do long-term research and development. The United States is a leader in the Internet, for example,

because we did the fundamental research to understand the protocols, and that led to the whole industry around the Internet. Without that kind of research it is possible that the Internet industry would not exist in the United States, but somewhere else. So it is important to our technological base, our defense needs, and our economy that fundamental research in hypergrowth areas like technology is done here.

**CRN:** How would you characterize the feedback and reactions to the interim PITAC report?

**Joy:** Very positive overall. But some people thought the research examples we used were too short-term so, if anything, they were pushing us more in the direction that we were inclined to go anyway. But it is hard to give examples of breakthrough ideas without doing the work that leads to those ideas — except retrospectively. It's like talking about something that is invisible. Some people said the report should talk more about fields like quantum computing. If you want to see what people contemporaneously

think of as long-term basic research, you can go to the DARPA website and look at what they're saying and extrapolate from there. DARPA's research is as close to the edge as any.

**CRN:** How will the PITAC's final report differ from the interim report?

**Joy:** The fundamental conclusions of the report have not changed. The committee has increased the emphasis on human-computer interface research. Some topics have been pulled up to a higher level and some have been pushed down to make room. We have tried to keep the number of recommendations finite. From the feedback received, we have tried to emphasize what people thought was most important. And we added some numbers to back up some of the things we said in the report.

The big issue now is to translate the report's findings into action in Congress, and that is where the committee needs to expend its energy in 1999. We need to find bipartisan support. From some of the things I've read in the newspaper, I think there are already some positive responses on the House side, and we've already had that kind of support in the Senate. The outgoing Speaker of the House is a strong supporter of technology. Hopefully the incoming Speaker will be as well, and we'll be able to get some support from him or from other senior people in the House.

**CRN:** Research funding competes with many other important priorities for Congress. What do you think will convince Congress of the necessity of pursuing the PITAC vision?

**Joy:** Technology has been a very high-growth industry, and the growth has been disinflationary. Technology creates high-paying jobs and it keeps the industry in the United States. It helps to produce the kind of strong budget surpluses that we are seeing right now because these high-tech companies are profitable and they pay a lot of taxes. These are the types of industries that grow the economy.

Investments that the United States made in the Sputnik era are now paying off. We need to make similar kinds of investments so we will have that kind of money available to help pay for Social Security benefits when the baby-boomers retire. The only way we are going to solve that problem, other than by cutting benefits substantially, is to grow the economy. And the strongest opportunity we have for growth is in technology.

We have to take a long-term view and invest now to cover the benefits required 20 or 30 years from now. The amount of money needed is not enormous. The truth is that university research in computing and

# Opportunities in Distance and Continuing Ed.

**By Stephen Seidman and Christopher Lacher**

For many years, computer science and engineering departments have been called upon to deliver undergraduate and graduate degree programs to off-campus locations. The demand for such *distance education* has come from individuals who are unable to come to campus and from corporations requesting further education for their employees. Many departments in U.S. universities have responded to this demand, using full-time or part-time instructors to deliver face-to-face instruction at remote sites or videotaping classes for delivery to remote students or sites.

The primary factor driving the need for *continuing education* is the rapid change in the computer industry. The skills of computer scientists and engineers in industry must be updated on an ongoing basis with training that is not necessarily degree-based. Continuing education in computer science and engineering has primarily been provided by professional society tutorials and commercial or university short courses.

Communications technologies are being used to accommodate the

growing needs for both distance and continuing education. The National Technological University (http://www.ntu.edu) uses satellite feeds to distribute taped lectures to industrial sites. Drexel University (http://www.cis.drexel.edu/aln/index.htm) and the New Jersey Institute of Technology (http://njit.asanet.com) have pioneered the use of computerized conferencing systems. More recently, some departments have started to experiment with web-based computer science instruction. For example, Colorado State University is offering an entirely web-based Java course for C++ programmers (http://www.cs.colostate.edu/~cs154/syllabus.html). Some publishers have also started to provide web-based continuing education materials. Examples of such courses can be found at http://www.ora.com.

Outside the United States, many countries have established non-residential universities that provide distance education to large numbers of students. The pioneering distance-education university is the United Kingdom's Open University (OU) (http://www.open.ac.uk). OU has decades of experience with distance education, currently enrolling 157,000 students. It produces course

materials in text, CD-ROM, television, and web-based formats at its non-residential campus in Milton Keynes, and distributes them to students throughout the United Kingdom and elsewhere. OU provides a distributed network of tutors to support its students and evaluate their work. Other national distance universities include France's Centre National d'Enseignment à Distance (185,000 students, http://www.cned.fr), Germany's FernUniversität (60,000 students, http://www.fernuni-hagen.de), and Canada's Athabasca University (http://www.athabascau.ca).

The best example of the use of distance education for computer science education is OU's new object-oriented programming course (M206). This 32-week course was first offered in 1998, with an initial enrollment of 5,100 students in the United Kingdom and Europe (http://mcs.open.ac.uk). M206 materials include a specially modified Smalltalk environment (developed by LearningWorks Systems), a 53-chapter text written specifically for the course, a webpage for each text chapter, 11 BBC/OU television

Expanding the Pipeline

# Collaborative Research Experience for Women

**By Sheila Castaneda**

In 1994, the National Center for Educational Statistics surveyed 1,158,170 students who had received their baccalaureate degrees the previous year. This survey included 9,650 women with Computer Science (CS) degrees. Of those, 2.94 percent were enrolled in graduate school one year after graduating. If the study were restricted to CS women with a GPA greater than or equal to 3.5, the percentage falls to 2.53. By comparison, of the 17,860 men with CS degrees, 9.23 percent went on to graduate school. If the male sample is restricted to a GPA greater than or equal to 3.5, the percent going on to graduate school is 29.19.

A new initiative sponsored by the Computing Research Association's Committee on the Status of Women in Computing Research (CRA-W) is designed to provide groups of undergraduate women the experience of participating in collaborative research in an effort to lessen the gap in the statistics between men and women.

The Collaborative Research Experience for Women in Undergraduate Computer Science and Engineering (CREW) is designed to provide collaborative research experiences for groups of two to three undergraduate women during the academic year. Research is conducted at the home institutions of the students. The student researchers work with a sponsoring faculty member on a project for which monetary support is typically not available. Ordinarily each student receives a stipend of $1,000 for her research work. There is no support provided by this program for faculty stipends, however up to $500 per project may be requested for special equipment, travel or supporting materials. It is hoped that 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 be encouraged to pursue similar work in graduate school.

To be eligible, students should be entering their junior or senior years. All projects must be directly related to computer science or computer engineering and be suitable for undergraduate research.

At the end of the project, students are required to submit a one-page summary of their work. These summaries are posted on the CRA-W website. Of course, students are also encouraged to submit papers and present their work to other appropriate journals and conferences.

In the first year of the project, twenty-two applications were received and nine were funded. These nine projects involve twenty-three undergraduate women working with ten sponsoring faculty members at the following institutions:

> Brooklyn College, CUNY
> Bryn Mawr College
> Case Western Reserve University
> Grinnell College
> Mills College
> North Carolina A&T State University
> Sonoma State University
> Texas Christian University
> University of Wisconsin, La Crosse

The nine groups of undergraduate women are involved in a wide variety of research areas including robotics, expert systems, smart objects, VLSI partitioning, web tools, motion planning, and processor allocation. These well-defined projects are reasonable for undergraduate research and are scoped to allow students to achieve measurable results during the current academic year. Often, these research projects were the only ones available on their home campuses for the students to participate in, and for several of the faculty members it was the only funding source for the research projects. During the course of their research, the student teams work closely with each other and with their sponsors, who provide guidance and often actively participate in the actual research.

It is hoped that the CREW project will provide a positive collaborative research experience for the students involved. To help evaluate the effectiveness of the program, students will be asked to complete a survey of their research experience, the CREW program, and the effect it has had on their future plans. A follow-up survey will occur a year after the completion of their projects to help evaluate the longer-term effects.

The deadline for applications for the 1999-2000 academic year is **May 15, 1999**. More information about the Collaborative Research Experience for Women in Undergraduate Computer Science and Engineering can be found at the web location www.cra.org/Activities/craw/crew.html. Questions and comments should be addressed to Sheila Castaneda at cast@keller.clarke.edu.

*Sheila E. Castaneda is Chair and Associate Professor in the Computer Science Department at Clarke College in Dubuque, Iowa. She is also a member of the CRA-W and is the project director of the CREW program.* ∎

# 1998-99 Outstanding Undergraduate Awards

The Computing Research Association honors the recipients of the 1998-99 CRA Outstanding Undergraduate Awards competition, sponsored this year by the Microsoft Corporation and Mitsubishi Electric Research Lab.

The Outstanding Female Undergraduate Award went to **April Rasala** from Dartmouth College, and the Outstanding Male Undergraduate Award went to **Marsette Vona**, also of Dartmouth College. The runner-up for the male award was **Pedro Felzenszwalb**, Cornell University.

## About the Winners

**April Rasala** is majoring in computer science in her senior year at Dartmouth College where she is a Rufus Choate Scholar. As a student research assistant, she worked on problems in bicriteria scheduling. Specifically, she looked at schedules that would (approximately) minimize both schedule length and average completion time. Her work led to improved bounds on the existence of schedules that are near optimal for both criteria. She also participated in CRA-W's Distributed Mentor Project, working last summer with researchers at the University of Washington on finding generic algorithms that perform well across a wide range of online problems. Her work analyzed the performance of one candidate for such a generic algorithm, the Work Function Algorithm. April has worked as a grader/section leader for several undergraduate courses and she has spent a quarter working as a software engineer at Hewlett-Packard.

**Marsette Vona** is also a senior Rufus Choate Scholar majoring in computer science at Dartmouth. He was nominated for his work on the design, construction, and control of self-reconfigurable robots. Self-configuring robots are made of identical robot modules that can dynamically change their internal geometric structure to adapt to their operating environment and required functionality. Marsette designed and built the first robotic module capable of three-dimensional self-reconfiguration. He made contributions to its fabrication process and control algorithms as well. He is now working both on creating and testing a distributed system of these robots and on developing a new self-configuring robotic design using cubic modules. Marsette is also the winner of the Francis L. Town Scientific Prize, the Philip R. Jackson Award, and the Microsoft Outstanding Junior Award.

**Pedro Felzenszwalb** (Runner-Up) is a senior majoring in computer science at Cornell University. He was nominated for his work on computer vision. Pedro became interested in image segmentation after several summers working on problems in digital compression at Xerox PARC. His research has led to the development of a formal characterization of certain desirable properties for segmentation and an efficient algorithm that produces segments having those properties. He has also worked on the design of robots whose

## Community Highlights

# For Computing Research, The Past Is Prologue, A CSTB Report

**By Jerry Sheehan**

The computing research community has an enviable track record of contributing to innovation. From graphical user interfaces to relational databases to speech recognition systems, many of today's desktop computing technologies trace their roots to university and industry laboratories. Popular accounts of such technologies tend to properly credit researchers for their pioneering efforts, but often overlook the contributions of the federal government to the innovation process.

A new report from the Computer Science and Telecommunications Board (CSTB), "Funding A Revolution: Government Support for Computing Research," remedies this imbalance. Authored by a committee of computing researchers, historians of technology, economists, and former government officials, the report reviews developments in computing between 1945 and 1995 to highlight the role of government in supporting research. The report examines specific developments in the areas of relational databases, the Internet, theoretical computer science, artificial intelligence and virtual reality, gleaning lessons that can guide future government efforts to support computing.

## Tracing Government Contributions

The report finds that the government exerted tremendous influence on the development of computing technology. The federal government launched the computing revolution immediately after World War II and has continued to sustain it, even as the industry itself has evolved. It did so by contributing funds for research, supporting the education and training of students, and providing research equipment for university laboratories. As such, government became an essential element of the nation's research infrastructure in computing, complementing the roles of industry and universities.

Federal research funding is perhaps the most visible government contribution to computing. From less than $10 million in 1960, federal support for computer science research climbed to almost $1 billion in 1995. Though declining as a fraction of the nation's total computing research budget (until industry cut back its funding significantly in the early 1990s), federal funding supported a range of innovative technologies, including timeshared computing, computer graphics, packet-switched networks, and intelligent systems. In fact, over half the research papers cited in U.S. computing-related

patents filed between 1993 and 1994 acknowledge public funding as a source of support.

Such funding had a profound affect on universities. Nationwide, federal funding comprised roughly 70 percent of university research funds in computer science between 1976 and 1995. Much of this funding was used to support graduate research assistants. A growing percentage of graduate students in computer science have received federal support for their studies, even as enrollments have increased. In computer science departments at Carnegie Mellon, MIT, Stanford, and the University of California at Berkeley, over half of all graduate students (master's and Ph.D.) received financial support from the government between 1985 and 1995. In addition, most of the funding used by academic computer science departments to purchase research equipment comes from federal agencies.

The results of such investments have been far-reaching. They have enabled federal agencies to perform their public missions and also create the technology base and human resources upon which the computing industry has been built. Companies such as Sun Microsystems, Silicon Graphics, Informix, and Netscape Communications were founded by researchers who developed technol-

ogy with government support. Others, like IBM and Microsoft, have continued to hire trained graduates and have incorporated research results into their product lines.

## Supported Research

Government funding has been effective in stimulating innovation largely because it supported work outside the scope of most industrial research investments. A significant fraction of federal monies has been aimed at long-term, fundamental research. Such research can produce large payoffs, but is inherently risky and often takes decades to produce tangible results. Further, the results can be so basic that it is hard for any individual company to keep its competitors from adopting them. Hence, industry can only support limited amounts of such research.

Federal efforts aimed at building large systems have also produced significant results. Consider the Air Force's Semi-Automatic Ground Environment (SAGE) project of the 1950s. Intended to develop a command and control system for responding to attacks by Soviet bombers, SAGE involved researchers from MIT, IBM, and other laboratories. The system served as a testbed that sparked innovations ranging from real-time computing to

# Board Nominees Sought

The Computing Research Association is seeking nominations for its Board of Directors. The deadline for receipt of nominations is March 1, 1999.

Each spring CRA's member organizations elect about one-third of the association's board members to three-year terms. Candidates are not required to be affiliated with CRA member organizations. It is important that the CRA Board represent the interests of the entire computing research community, and it is CRA's policy to solicit a broad range of

candidates.

The CRA board is a working board, and all members are expected to actively participate. Although CRA has a small professional staff, board members have detailed involvement in all major projects. Recent and current projects include:

● planning the biennial CRA Conference at Snowbird.

● conducting the annual CRA Taulbee Survey.

● conducting other surveys (e.g., industrial lab salaries; departmental budgets, space, personnel).

● developing workshops on critical policy issues for computing research.

● at the invitation of the White House, defining and overseeing an executive branch technology policy internship program for CS faculty members.

● planning academic careers and effective teaching workshops.

● increasing the participation of women in computing research, with the help of National Science Foundation grants.

In addition to actively participating in board projects, board members are asked to attend at least two board meetings per year and pay their travel costs to the meetings.

Service on this board is important. Research in computer science and computer engineering is facing major challenges as the political

environment for government support changes. In the United States, Canada, and many other countries, computing has been identified as a technology of critical social importance. This increased political attention places new demands on our field and offers new opportunities.

Please contact the person you are nominating before submitting his or her name to ensure that the nominee is willing to stand for election to the board. They will be required to write a brief (100-word) statement supporting their nominations. Nominees will receive information about CRA and its activities (also available on the web at http://www.cra.org).

To receive a nomination form, send an e-mail request to Jean Smith at elections@cra.org. Nominations must reach CRA by **March 1, 1999.** ∎

## 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 underpresented 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 Distinquished 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, first to win the award

Policy News

# Policy 102: Science Policy and the Actors Involved

**By Fred W. Weingarten**

In my previous article, I described the "what" of science policy, the variety of issues and concerns of which it is comprised. Even when the basic goal is simply defined as federal funding for research, the range of debate can be surprisingly wide and complex. I'm going to talk about the "who" of science policy -- who makes it, who influences it, who approves it, or (on the negative side) who messes it up? The picture is complicated, as one might expect when dealing with questions of influence and power in policy and political processes.

John Kennedy reportedly observed that when he was a senator, all power seemed to reside at the other end of Pennsylvania Avenue, in the White House. When he became president, however, it seemed that all power resided in the other direction, in the Congress. That observation captures a basic reality of policy and politics in Washington -- nobody seems to be fully in charge of anything.

Of course, at any particular time, on any particular issue, someone or some organization may seem to be in control of the process, but power is nearly always in flux. This can be frustrating for those who want things to get done or decisions to be made quickly and efficiently, and it can be particularly frustrating for those pushing for major policy change. Once a consensus has been forged around a policy framework, there is not much interest in reopening negotiations, if for no other reason than someone is benefiting from that framework. It becomes easier to do things gradually, seeking incremental change within the old framework, because new decisions don't have to be made or old ones reopened. (Recall the failed attempt to completely restructure health care policy in the early days of this administration.) This Diffusion of power results in policy inertia.

Our political system was designed to be ambiguous and conflicting. There are good reasons for this to be so. The country is big, powerful, and incredibly diverse in its people's interests and values. It is best not to concentrate power too much, and it is necessary that any major policy changes be made only after broad consultation and deliberation. No doubt, though, we also pay a price for inertia.

Right or wrong, intended or not, diffusion of power has important consequences for people working in science policy, particularly if they are trying to promote change on the scale proposed in the Interim Report of the President's Information Technology Advisory Committee (PITAC). (See interview with Bill Joy, Co-chair of the PITAC Committee, page 1.) It means that in order to achieve the desired result of implementation of the full program, a lot of power centers need to be brought into some rough alignment, and marshalling of

those who will promote the program and neutralizing those who might be inclined to oppose it must be done. How to do that is the subject of my next article. For now, let's look at the policy-making landscape.

## Overview

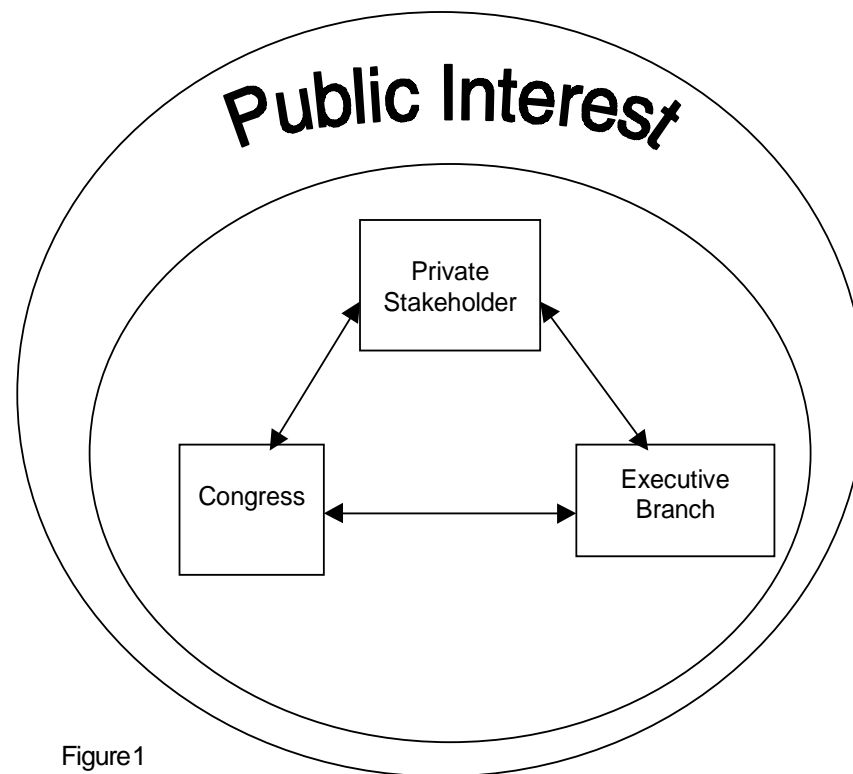Figure 1 provides a top-level map of the policy environment. There are



Figure 1

three basic power centers Congress, the Executive Branch, and a collection of private and quasi-private organizations and individuals that represent the community that is directly affected by or interested in science policy. I call this group the "Private Stakeholder."

Around these three groups is a penumbra of influence that I label "public interest." I assert that in the particular area of science policy, the public has, for the most part, not been a strong force one way or the other. The general public view that research is, by and large, a social good and that it's okay for Congress to spend some tax money on it -- precisely how much and on what are decisions comfortably left to the system. This runs counter to occasional spurts of angst from some in the science community, who worry that the public is ignorant about science and contend that, if people just understood research better, they might support more funding. I'm skeptical about that particular argument.

That is not to say public opinion should be ignored. It can be a powerful force, good or bad. I certainly believe that it is important for the computer field to be sensitive to public concerns about potential negative effects of information technology. And, it would be a powerful impetus to realizing the PITAC's program were it to find its way in some form onto the presidential campaign platforms of one or both parties.

Nevertheless, my principal focus here is on the three "core" groups shown in figure 1. Discussing them is complicated enough, for each has a

fairly elaborate structure of competing interests.

## Executive Branch

Well, surely, the Executive Branch isn't complicated. "After all, it has a single boss and operates from a uniform policy," you might be tempted to say. "And pigs fly," I'd answer. Probably tougher even than

negotiating with Congress are the daily negotiations the White House conducts within the labyrinths of executive agencies, trying to get the government reading off of the same page (or even out of the same book, or even the same library).

Each agency has its own legislated missions, most of which began long before the current president came into office and will last long after he is gone. Each one also has a set of interested constituencies that exert various degrees of influence on its policies and priorities. It may even have a formal or semiformal authority telling it what to do. For example, NSF operates under the oversight of the National Science Board, which may not always agree completely with the administration's priorities.

Each agency has its own budget issues. Although each year begins with a single presidential budget being sent to Congress, each agency must negotiate its own budget with its own authorization and appropriations committees. This means that even though an agency may want to cooperate within a multiagency program like the Next Generation Internet, it is forced to examine and define its potential role in the program through its own peculiar lens. That's why hammering complicated multiagency programs together can be both frustrating and time-consuming.

Furthermore, the White House itself has its own set of conflicting interests because the president has multiple roles to play and conflicting interests to serve. As a result, there are people in the White House who

worry about the politics of decisions. Also, policy analysts in offices such as the Office of Science and Technology Policy look at the core substance of issues, and the inevitable keepers of the budget at the Office of Management and Budget are always saying, "Nice idea, but where is the money coming from?"

Sometimes on a particular issue, all three messages will be coming out of the White House at once. The president may express sympathy for the need to double research budgets. The budget director voices skepticism whether we can afford it, and the political staff ask what's the benefit and cost of spending limited political capital on this issue versus all other possible ones. (This situation is not unusual, nor is it specific to the current White House. They all act the same way, because all presidents face very similar dilemmas in running the government.)

## Congress

Congress has its own morass of interests and power centers that have to be accommodated also. Just for starters, we have two houses, populated by 100 senators and 435 representatives. Each has been chosen in a separate election and considers himself or herself to be an autonomous decision-maker. It is a self-organizing group; the Constitution really says very little about day-to-day processes and structures. Members have personal offices with staff whose principal function is to serve their specific political interests and provide service to their constituents.

Each member also serves on committees, where the principal legislative work is done. So, adding to the complexity, we have several dozen committees and subcommittees to deal with. Science and technology policy, particularly when it involves computers, touches a surprisingly large number of them, including, of course, the Committee on Appropriations.

Finally, think of all the lines that partition these people in ways that affect their specific interests in issues — political party, regionality, ideology (not always party specific), ethnicity and gender, and so on.

The bottom line is that it is not easy to get a majority congressional vote for some new change in policy, although it can be done. It took many years and the efforts of countless people to get the High Performance Computing Act through congress, but it did pass and with a nearly unanimous and bipartisan vote at that.

## Stakeholders

Finally, let's take a look at ourselves, the computing research community, we the people, the stakeholders, the special interest groups, as we are sometimes known to those who disagree with our views. (We have influence on science policy and our voices are heard through a surprisingly complex group

## Policy News

# 1999 Federated Computing Research Conference

Planning continues for the third Federated Computing Research Conference (FCRC), which will be held in Atlanta at the downtown Hilton April 30 - May 6, 1999. CRA will be a cosponsor along with ACM, IEEE, and other organizations, with ACM doing the major part of the administrative work. The conference chair is CRA Board member David S. Johnson of AT&T Labs. Past Chair Mary Jane Irwin, CRA Board member from Pennsylvania State University, is on the steering committee, along with David Wise of Indiana University and Donna Baglio of ACM.

As in the past, registrants for one conference can attend talks at any of the other conferences going on at the same time. In addition, registration fees will be structured to encourage attendees at one conference to extend their stay for all or part of a conference in the other half of the schedule.

The portion of the registration fee that covers overall conference overhead will only be charged once for each attendee, no matter how many conference events he or she chooses to attend.

The remainder of the registration fee consists of charges and individual conference "package fees." The charges will cover the daily amenities, which include continental breakfasts, breaks, bundled lunches, and evening "mix and mingle" hours. (The charges are uniform among all the conferences, at the request of past attendees.) The conference package fees will cover conference-specific items, such as receptions and business meetings, conference proceedings, and program committee expenses.

Although there will be no FCRC-wide excursions this time, ISCA and PADS intend to include excursions in their packages, for which other attendees may purchase tickets.

For more information, see the FCRC webpage: http://www.acm.org/sigs/conferences/fcrc/. Details of the program and how to register should be available there by early February.

The conferences committed to participate so far are:
CRA Workshop on Academic Careers for Women in Computing Science (CRA-W)
ACM/IEEE International Symposium on Computer Architecture (ISCA)
ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)
ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming (PPOPP)
ACM SIGMETRICS Symposium on Parallel and Distributed Tools (METRICS)
ACM Workshop on Parallel and Distributed Simulation (PADS)
ACM/IEEE Workshop on I/O in Parallel and Distributed Systems (IOPADS)
ACM Symposium on Theory of Computing (STOC)
IEEE Conference on Computational Complexity (Complexity)
ACM Symposium on Principles of Distributed Computing (PODC)
ACM/UMIACS Workshop on Parallel Algorithms (WOPA)

The tentative schedule for the confirmed conferences is as follows:

|          | FRI 4/30 | SAT 5/1 | SUN 5/2 | MON 5/3 | TUE 5/4 | WED 5/5 | THU 5/6 |
|----------|------|-----|-----|-----|-----|-----|-----|
| CRA-W    | X    | X   |     |     |     |     |     |
| PLDI     |      |     | T   | X   | X   | /   |     |
| ISCA     |      |     | T   | X   | X   | /   |     |
| STOC     |      |     |     | X   | X   | X   |     |
| PADS     |      |     | T   | X   | X   | /   |     |
| PPOPP    |      |     |     |     | /   | X   | X   |
| METRICS  |      | T   | X   | X   | /   |     |     |
| PODC     |      |     |     | X   | X   | X   |     |
| COMPLEX  |      |     |     | X   | X   | X   |     |
| WOPA     |      |     |     |     |     | X   | X   |
| IOPADS   |      |     |     |     |     | X   |     |

X = Full Day Session
/ = Half Day Session
T = Tutorials

In addition, there will be workshops on Scalable Shared Memory Multiprocessors on Friday afternoon and Saturday (4/30-5/1) and Compiler Support for System Software (WCSSS'99) on Wednesday (5/5), as well as an assortment of tutorials and FCRC-wide plenary speakers Sunday through Thursday.

of organizations and individuals. Each has its particular capabilities and strengths and each has its own role to play.)

Stakeholder voices include individual scientists, particularly (not exclusively,) those whose prominent awards, academy memberships, or titles lend credibility to their views. These include Academy members, Medal of Science and Technology winners, and, of course, Nobel Prize winners. Nobel Prize-winning physicist, Kenneth Wilson, was a major influence on the HPCC Program.

In addition to acting as individuals, scientists belong to influential groups. They sit on advisory committees to NSF and other agencies and they belong to study groups of the National Research Council, particularly the Computer Science and Telecommunications Board, and, of course, the President's Information Technology Advisory Committee -- groups that conduct studies and publish reports urging policy actions.

The scientific societies also exert a strong policy voice in support of the fields their membership represents. Many are based or have offices in Washington specifically for this purpose. When CRA was created, it was purposefully located in Washington because its membership expected it to assume a major role in science policy, representing the needs and interests of computing research.

Coalitions of scientific organizations also form to advocate in support of particular issues such as NSF appropriations, the HPCC Initiative, and so on.

Some of these groups can be ad-hoc, coming and going quickly as issues change; others have broader agendas that may persist over the long term.

Lastly, there are several organizations that, while not scientific societies themselves, have occasional interest in science policy. Most important for the computing community are industry groups and coalitions. They can be powerful voices for or against computing research initiatives. Although their energy can often be difficult to tap in to and channel.

### Wrapping it all up

What does this enormously complex array of players in science policy mean for us? My thesis is as follows:

**For major policy change to take place, there must be agreement among the three major sectors —** executive, congressional, and stakeholders. In order for that to happen, communication among them must be strong. That is why I drew the lines connecting them as arrows. Cultural and communication barriers exist among the three groups that limit their ability to understand each other and reach consensus.

In fact, one of the major tasks of Washington science representatives is to monitor and strengthen conversation among them. I am not the only one, I am sure, who has been asked to carry a message from an executive agency to congressional staff and vice versa, and between both government sectors and the scientific community.

And, of course, the same need for convergence (and similar barriers) exists within each group. Agencies and the administration need to be aligned, as do the various interests in Congress. And, our own community, as well as the broader science policy community, needs to be brought together. HPCC was successful, not just because computer scientists wanted it, but because other disciplines and the computer industry pushed for it.

In these first two articles, I sketched briefly a structure of how science policy is made. Next time, I'll show what this structure implies for us in trying to fully implement the recommendations of the PITAC.

We have a choice here. We can use the PITAC's recommendations simply as useful ammunition for an incremental gain over current funding. This requires no major change in strategy or effort on our part. On the other hand, what the Committee really proposed represents a major shift, both in funding and in the patterns of research support. If that is what we want to see happen, my thesis above suggests that we need to expend far more energy and develop and follow a sustained strategy for changing minds. It won't happen just because the PITAC, or even the President, asked for it! ∎

# Next Generation Internet Act Passes

The 105th Congress passed legislation that amends the High-Performance Computing Act of 1991. The amendments authorize appropriations for the fiscal years 1999 and 2000 for the Next Generation Internet (NGI) program. The President's Information Technology Advisory Committee (PITAC) is to monitor and give advice concerning the development and implementation of the NGI program and is to report to the President and the Congress on its activities, and for other purposes.

The amendments contain important statements which emphasize the continued importance of the computing fields, such as "The United States investment in science and technology has yielded a scientific and engineering enterprise without peer, and [the] Federal investment in research is critical to the maintenance of United States leadership."

The new language is meant to increase the focus on research and development. As was meant with the introduction of NGI, the appropriations will create a network infrastructure that can support greater speed, robustness, and flexibility than is currently available and promote connectivity and interoperability among advanced computer networks of Federal agencies and departments. NGI also has a focus on research in technology that may result in high-speed data access for users without concern for economic viability and geographic locality.

This act is noted as the 'Next Generation Internet Research Act of 1998' and can be found on the CRA website under http://www.cra.org/Policy/ngi.html. ∎

1997-1998 Taulbee Survey

# 1997-1998 Preliminary Taulbee Data on Faculty Salaries

**By Dexter Kozen and Jim Morris**

Each September, the Computing Research Association surveys academic departments in the United States and Canada that offer the Ph.D. in computer science or computer engineering. The annual CRA Taulbee Survey collects data on enrollment in the undergraduate, master's, and Ph.D. computing programs, about employment of Ph.D. graduates of these programs, and on the number and salaries of faculty in these programs.

This is the 28th year that CRA has tracked the production and employment of Ph.D.s in the computer science field. For the past 12 years, computer engineering data have also been incorporated into the survey. The traditionally high response rate to the survey makes the data especially useful; the data are used widely, not only by CRA's members but also by other organizations and institutions.

Each January, as a service to our members, CRA publishes a prelimi-nary report of the survey's salary data. We believe these preliminary results comprise enough data to be valuable and valid as tools for planning and evaluation. The full survey, including updated salary data, enrollment, production, and employment data, and trend analyses, will appear in the March 1999 issue of *CRN*.

The following tables show the results in a format comparable to that used in previous CRA surveys. In the tables that group the departments by rank, the groupings are based on the 1993 National Research Council ranking of research-doctorate programs in the United States, released in 1995.

Each department is asked to report the minimum, mean, and maximum salary for each professorial rank and the number of persons at each rank. The salaries are those effective as of January 1, 1999. For U.S. departments, nine-month salaries are reported in U.S. dollars. For Canadian departments, twelve-month salaries are reported in Canadian dollars.

The column labeled "#Faculty" is the sum of the number of faculty in each rank for those departments that reported salary data in that rank. The minimum and maximum of the reported salary minima (and maxima) should be self-explanatory. Thus, the range of salaries in a given rank among departments that reported data for that rank is the interval ["minimum of the minima," "maximum of the maxima"]. The means of the reported salary minima (maxima) in a given rank are computed by summing the departmental reported minimum (maximum) and dividing by the number of departments reporting data at that rank. The average salary at each rank is computed by summing the individual means reported at each rank and dividing by the number of departments reporting at that rank.

For comparison with last year's data, Table 10 shows the overall (unweighted) average salaries for the U.S. departments and separately for the Canadian departments. The preliminary data from 1997 are those published in the January 1998 *CRN*, and the final data from 1997 are those published in the March 1998 *CRN*. As can be seen, the U.S. averages appear to have increased about 4% in both the Assistant Professor and Full Professor categories from last year. Averages at the Associate professor level increased by around 1%. Canadian averages appear to have changed at a similar rate, however the Full Professor category average seems to have slightly decreased. This category is however based on a smaller number of departments and is therefore more strongly influenced by a single department's values. *The reader should note that there was an error in the preliminary reporting of the number of Canadian departments responding –– the actual number was 10. However, the salary data was correct. The response rate was corrected in the final statistics in the March 1998 *CRN* reporting. The reader should also note that the 'Other' category for preliminary data on new Ph.D.s has not been included. This should be corrected in the final statistics in the March 1998 *CRN* reporting.

On behalf of CRA, we thank all of the participating departments for their efforts to meet the deadline. ∎

### Table 1. Nine-Month Salaries, 112 Responses of 149 US CS Departments

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 461 | $29,150 | $57,632 | $70,900 | $60,523 | $45,000 | $63,730 | $83,600 |
| Associate | 738 | $40,758 | $63,420 | $90,000 | $70,038 | $54,535 | $77,479 | $109,260 |
| Full | 945 | $43,300 | $76,144 | $110,000 | $93,554 | $59,747 | $119,176 | $223,569 |

### Table 2. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 1-12

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 67 | $60,000 | $63,265 | $70,000 | $66,588 | $63,860 | $70,736 | $78,100 |
| Associate | 89 | $49,050 | $71,158 | $90,000 | $77,997 | $77,009 | $84,674 | $91,400 |
| Full | 195 | $43,000 | $80,301 | $110,000 | $106,475 | $126,400 | $146,682 | $170,000 |

### Table 3. Nine-Month Salaries, 12 Responses of 12 US CS Departments Ranked 13-24

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 58 | $33,000 | $60,594 | $69,700 | $65,021 | $63,000 | $68,830 | $81,000 |
| Associate | 75 | $57,349 | $67,707 | $75,850 | $75,697 | $73,300 | $84,475 | $98,300 |
| Full | 153 | $64,672 | $78,375 | $92,200 | $104,073 | $125,500 | $148,611 | $223,569 |

### Table 4. Nine-Month Salaries, 12 Responses of 12 US CS Departments Ranked 25-36

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 58 | $56,250 | $60,146 | $68,000 | $63,206 | $59,614 | $66,844 | $75,000 |
| Associate | 74 | $58,472 | $67,761 | $79,000 | $72,878 | $64,793 | $78,303 | $92,100 |
| Full | 134 | $67,574 | $77,013 | $90,000 | $96,879 | $92,619 | $128,768 | $180,000 |

### Table 5. Nine-Month Salaries, 77 Responses of 113 US CS Departments Ranked Higher than 36 or Unranked

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 278 | $29,150 | $55,984 | $70,900 | $58,569 | $45,000 | $61,451 | $83,600 |
| Associate | 500 | $40,758 | $61,026 | $83,500 | $67,613 | $54,535 | $75,243 | $109,260 |
| Full | 463 | $48,978 | $75,067 | $104,300 | $89,551 | $59,747 | $109,164 | $185,234 |

### Table 6. Nine-Month Salaries, 6 Responses of 19 US CE Departments

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 18 | $50,908 | $56,702 | $63,500 | $58,541 | $53,263 | $60,132 | $70,000 |
| Associate | 36 | $59,700 | $62,882 | $66,000 | $67,100 | $62,800 | $73,877 | $81,296 |
| Full | 37 | $63,000 | $75,628 | $84,921 | $88,806 | $78,686 | $108,620 | $138,000 |

# 1997-1998 Taulbee Survey

## Table 7 Twelve-Month Salaries, 12 Responses of 18 Canadian CS Departments (Canadian Dollars)

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
|---|---|---|---|---|---|---|---|---|
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 35 | $40,000 | $57,288 | $75,215 | $59,217 | $40,000 | $62,030 | $85,000 |
| Associate | 118 | $46,350 | $64,697 | $82,175 | $71,990 | $46,350 | $83,060 | $126,703 |
| Full | 134 | $58,520 | $75,767 | $95,474 | $90,823 | $58,520 | $111,357 | $162,075 |

## Table 8. Nine-Month Salaries, 118 Responses of 168 US CS and CE Departments

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
|---|---|---|---|---|---|---|---|---|
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Assistant | 479 | $29150 | $57,583 | $70,900 | $60,418 | $45,000 | $63,541 | $83,600 |
| Associate | 774 | $40,758 | $63,392 | $90,000 | $66,887 | $54,535 | $77,294 | $109,260 |
| Full | 982 | $43,300 | $76,118 | $110,00 | $93,313 | $59,747 | $118,639 | $223,569 |

## Table 9. Nine-Month Salaries for New Ph.D's,  Responding US CS and CE Departments

| Faculty Rank | # Faculty | Reported Salary Minimums | | | Average of all Salaries | Reported Salary Maximum | | |
|---|---|---|---|---|---|---|---|---|
| | | Minimum | Mean | Maximum | | Minimum | Mean | Maximum |
| Tenure | 73 | $51,500 | $60,458 | $74,000 | $60,735 | $51,500 | $61,142 | $75,000 |
| Researcher | 10 | $40,000 | $51,651 | $70,000 | $54,311 | $40,000 | $56,257 | $70,000 |
| Postdoc | 12 | $30,000 | $40,222 | $60,000 | $40,777 | $30,000 | $41,333 | $60,000 |

## Table 10. Nine-Month Salaries, Comparison with 1997 Survey

| | US CS/CE Departments | | | Canadian CS Departments | | |
|---|---|---|---|---|---|---|
| | Preliminary 1997 | Final 1997 | Preliminary 1998 | Preliminary 1997 | Final 1997 | Preliminary 1998 |
| # Reporting / Surveyed | 110 / 146 | 117 / 146 | 118 / 168 | 10 / 17* | 13 / 17 | 12 / 18 |
| Assistant | $57,592 | $57,755 | $60,418 | $56,961 | $56,991 | $59,217 |
| Associate | $66,344 | $66,542 | $66,887 | $71,224 | $70,457 | $71,990 |
| Full | $89,754 | $89,566 | $93,313 | $91,108 | $91,415 | $90,822 |

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| Education from page 1 |
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programs (topics include security, HCI, and OOA/OOD), and 3 BBC/OU CD-ROMs.  Programming projects include individual and group assignments coordinated by local tutors.  Assignments are submitted and returned by e-mail, and OU course technology supports electronic markup of assignments.  More information on M206 can be found at the following websites:  http://www3. open.ac.uk/courses/cframedes/  m206.  htm and http://www-cs.open .ac.uk/%7Em206/m206.html.

A recent partnership between OU and the Florida university system will bring M206 and other OU computer science courses to the United States in 1999.  Florida State University's computer science department will administer the courses.  Local tutorial services will be provided at community college campuses.

Developing web-based materials for computer science courses is facilitated by the availability of supporting software.  The best-known example is WebCT (http://homebrew. cs.ubc.ca/webct/webct.html), developed by the computer science department of the University of British Columbia.  WebCT can be used to publish materials that supplement existing courses or to create entire on-line courses.  It uses Web browsers as the interface for a course-building environment, and includes tools that provide services to students (navigation tools, homepages, conferencing, on-line chat, self-evaluation) and instructors (access control, course calendar, automatic index generation, automatic grading and reporting, student progress tracking).  WebCT has been used for over sixty courses at the University of British Columbia, including an upper-level undergraduate operating systems course and a first-year C++ course with an enrollment of 650 students.

Students enrolled in distance and continuing education courses will need support for asynchronous learning.  The Mallard Project (http://www.cen.uiuc.edu/Mallard/) at the University of Illinois has developed effective tools that provide such support services, including automatic assignment grading and reporting, asynchronous student assistance, and synchronous whiteboards.  Mallard allows students to be given randomized assignments, and Java applets can be used for grading.  Mallard has been used for courses in electrical engineering, economics, and language instruction (Italian, Spanish).

It is clear that on-campus instruction will not be able to meet the computer science education needs of an increasingly diverse and distributed population. The OU example shows that distance and continuing education provides significant opportunities for computer science.  These opportunities include using the web to provide materials and support asynchronous learning, and collaborating with publishers and professional societies to develop materials.  It is important to note that while there are great opportunities, responding to them is not cost-free.  The OU's development cost for M206 was over £500,000, and its tutorial network was already in place.

In summary, the increasing need for distance and continuing education in computer science presents departments with new opportunities.  The Web offers a cost-effective way to meet this need by bringing CS courses to large numbers of students, and current tools simplify the process of developing web-based course materials.  On the other hand, a significant up-front investment will be needed in course development and delivery infrastructure.

*Stephen Seidman is Professor and Chair of Computer Science at Colorado State University.  He can be reached for comments or questions at seidman @cs.colostate.edu.  Chris Lacher is Professor of Computer Science at Florida State University.  He can be reached for comments or questions at lacher@cs.fsu.edu. The idea for this article came from a workshop session at the CRA Conference at Snowbird '98 this past summer.* ∎

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| Past from page 3 |
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core memories to computer graphics. Many of the pioneers of computing learned their craft through hands-on experimentation with SAGE and subsequently staffed the companies and laboratories of the nascent computing industry.

The Internet is a more modern example of this phenomenon.  Federal support created the community of researchers who developed and promulgated networks based on the Internet Protocol and invented a range of related applications, such as e-mail.

Federally sponsored research has also built on pioneering work in industry.  For example, both relational databases and reduced instruction set computing (RISC) technology were first proposed by researchers at IBM.  The company did not immediately commercialize either technology.  Rather, commercialization was hastened by federal support for university research that further refined the technology and built a pool of expertise.  Many researchers involved in these projects assisted in the subsequent commercialization of the technology, working with established companies or starting new ones.

Sponsored research through NSF tends to support small research programs undertaken by individual investigators.  It has funded numerous small-scale efforts that planted the seeds for larger programs.  NSF's support for MIT's Compatible Time Sharing System in the early 1960s became the basis for DARPA's much larger Project MAC.  This project explored a broader range of technologies for human-computer interaction, of which computer timesharing is only one example.

### Structuring Federal Support

Why has federal support been effective in stimulating innovation in computing?  The report offers several suggestions.

First, computing research has benefited from multiple sources of federal support.  The most obvious benefit of diverse funding agencies is the opportunity for researchers to seek project support from multiple sponsors, widening the range of applications developed and approaches taken.  Diversity helps to ensure continuous support for research areas as they continue to mature.

Second, agencies were able to recruit strong program managers.  Visionary leaders, such as J.C.R. Licklider, Ivan Sutherland, and Robert Taylor, who were drawn from the research community for short tours of duty, were instrumental in identifying new research areas and ensuring sustained support.

Third, federal agencies have continued to adapt to changes in the political and technological environments.

related technologies was always government-sponsored. Much of the research was related to fighting the Cold War and to building large computers and supercomputers for defense purposes. And it also was related to building a nuclear arsenal. Now, to verify the nuclear arsenal, we need to make the peacetime version of this earlier investment.

Although the investment requires a relatively small amount of money, I understand that it is always at the margin. But if we do a rate-of-return calculation on how much tax revenue this will bring in if we can imagine the industry, it will be an incredibly good investment compared with any investment in brick and mortar. It has a huge potential payoff. Not only that, but the investment will be funding education, one of the president's top goals. An educated workforce in technology is a strong asset for the nation both for defense and for growth. Even more than an investment in research, the PITAC's recommendations would be an investment in education.

**CRN:** The interim report emphasizes software research –– how would you compare the federal investment in software research to that of companies like Sun and Microsoft?

**Joy:** Sun and Microsoft are investing in software research. Unfortunately, it is not really an investment in education. No matter how many people we employ in research and how much we do –– and even if we make the research results available, which we do –– it doesn't directly support the university system. Industry is still a net consumer of Ph.Ds and master's students, not a supplier. We do support some research in universities, but it cannot be on the scale required and it is not the right kind of money that is needed to really build the university system.

Universities need strong support. They need longer-term support than they have received, and they need support that is less tied to specific peer review. Many times the great ideas are not what peers would think of as great. To really see over the horizon, we need to fund more truly innovative

(and a little bit off-the-map) research, similar to what was done in the 1960s with the moon shot and at Xerox PARC. That is why we need the virtual centers for "Expeditions" recommended in the PITAC's report. These are really about getting a group of people together to pretend what the future will be like and imagine what would be possible, and then trying to build the environment where those things are true.

This type of effort takes some focus, and it requires larger programs than you can support from a single NSF grant. The PITAC has encouraged DARPA to adopt a more long-term focus in creating these kinds of experiments. We are very pleased to see that DARPA has, in fact, already issued a BAA (Broad Agency Announcement) seeking proposals for this kind of "Expedition" idea.

**CRN:** So there has been a response to the report's recommendations already?

**Joy:** Yes, but that's the whole point of releasing an interim report. It is part of a process, and we're halfway there. The committee received very good feedback and we appreciate the time people spent providing it. We have been reacting to that feedback and revising the work. But more importantly, we are going to try to build a consensus that this is a good investment for our country for the

next 20 years.

The report is not about the companies that exist now. It is not about the research Microsoft or Sun or IBM conduct or don't conduct. It is about the fact that 20 or 30 years ago we didn't have a Microsoft or a Sun or an Apple. The PITAC is interested in the next generation of these companies. We need new companies for new ideas, and we want the people who are going to start them and work at them to get an education so they can continue to build our economy. The report is about a commitment to education. It is not an enormous commitment, given that this offers the highest growth and the most disinflationary opportunity available. These are exactly the kinds of jobs we want to create.

**CRN:** What specific actions would you like the computing research community to take as a result of this report?

**Joy:** Not only do we need the government to help by making this investment in education and research; we also need the companies in our industry to take a longer-term view and to invest more in basic research. It is unfortunate that the basic research investment has declined. The market has become so

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motion, when it strayed from ideal, would be automatically corrected through the laws of mechanics. He has been a teaching assistant as well for undergraduate courses at Cornell.

**Honorable mention was given to the following:**

John Alex, Brown University
Brett Allen, University of British Columbia
Ian Buck, Princeton University
Christina de Juan, University of Central Florida
Patrick Eaton, University of Illinois, Urbana-Champaign
Dennis Geels, Rice University
Caitlin Kelleher, Virginia Polytechnic Institute and State University
Emre Kiciman, University of California, Berkeley
Christopher Koopmans, University of Illinois, Urbana-Champaign
David Liben-Nowell, Cornell University

Boon Thau Loo, University of California, Berkeley
Andrea Mantler, University of Manitoba
Melissa Moy, University of Maryland
Janak Parekh, Columbia University
James Patten, University of Virginia
Patrick Riley, Carnegie Mellon University
Ekaterina Saenko, University of British Columbia
Sarah Schwarm, University of Virginia
Henry Simpson, Duke University
Micheale Taylor, Arizona State University
Victor Wen, University of California, Berkeley
Lilla Zollei, Mount Holyoke College
*This year the selection committee consisted of Janice Cuny, University of Oregon; Greg Andrews, University of Arizona; and Larry Snyder, University of Washington.* ∎

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## Looking to the Future

History cannot predict the path computing technology will follow in the future. Research is inherently uncertain. Few could have predicted the success of early research programs on packet switching, fewer still the subsequent growth of the Internet. History cannot determine which policies will be most effective in stimulating research in the face of future challenges. But, as the latest CSTB report demonstrates, history

can guide efforts to rethink federal support for computing research, even as it enters a new millennium.

"Funding A Revolution: Government Support For Computing Research" *is available from National Academy Press, Tel. 1-800-624-6242. Currently available in prepublication format, the final book will be available in January. It is also on the web at http://www.nap.edu/readingroom/enter2.cgi?0309062780.html.*

*Jerry Sheehan is a Senior Program Officer at CSTB. He can be reached at JSheehan@nas.edu for comments or questions.* ∎

# Professional Opportunities

## Allegheny College
### Department of Computer Science

The Department of Computer Science is seeking applications for a position in support of its new track in Applied Computing to begin in the Fall of 1999. Applicants must demonstrate a commitment to excellence in teaching and continuing contribution to the discipline. Qualifications for a tenure-track position include a Ph.D. in Computer Science or Software Engineering; alternative credentials in Software Design can lead to a term appointment. Preference will be given to candidates with interests in software systems design and development. Responsibilities include teaching and advising undergraduates, guiding students in research projects, and contributing to the College's new freshman-sophomore general education curriculum, which includes the teaching of writing and speaking skills. Salary and rank will be commensurate with credentials and experience.

Allegheny College is a selective, private, liberal arts college in northwestern Pennsylvania serving 1,900 residential students with about 130 faculty. The Department currently has three faculty members, and graduates between nine and twenty majors each year. More information about both the traditional and the new applied computing tracks is available on the Web at http://www.alleg.edu/Academic/CompSci/.

Send a letter of application, a curriculum vitae, and applicable transcripts, and arrange to have three letters from references, at least one of whom can comment on teaching, sent to:
Dr. Robert D. Cupper, Professor and Chair
Department of Computer Science
Allegheny College
Meadville, PA 16335
E-mail: cupper@sparc1.alleg.edu
Tel. 814-332-2881
Review of applications will begin January 31 and continue until the position is filled. Allegheny College is an EOE. Women and minorities are strongly encouraged to apply.

## Argonne National Laboratory
### Computational Science, Mathematics, and Computer Science (MCS) Division
*Undergraduate Program (June 1-Aug 13)*

Focus: Research in numerical and nonnumerical methods, parallel tools, scientific visualization, collaboration tools, distributed computing, computational science, and systems administration. See the website http://www.mcs.anl.gov/division/information/educational_programs/undergrad-compsci.html for more details
Contact: Jan Griffin, MCS Division,

Argonne National Lab., 9700 S. Cass Ave., Argonne, IL 60439; griffin@mcs.anl.gov; 630-252-7271; fax: 630-252-5676.
The deadline date is February 15, 1999.

## Argonne National Laboratory
### Mathematics and Computer Science Division
*Givens Associates*

Graduate Students in numerical analysis or computational mathematics are encouraged to apply for Givens Associate positions for Summer 1999. Students will work with Argonne scientists designing, analyzing, and implementing numerical and visualization methods and techniques.
For further information, see http://www-fp.mcs.anl.gov/division/information/open_positions/givens99.html or contact Jan Griffin at griffin@mcs.anl.gov.
The deadline date is February 10, 1999. Argonne is an Equal Opportunity/Affirmative Action employer.

## Bell Laboratories, Lucent Technologies
### Scientific Computing Research Department
*Member of Technical Staff*

The Scientific Computing Research Department at Bell Laboratories, Murray Hill, New Jersey, wishes to hire a Member of Technical Staff. We seek applicants who would be applying for the position of assistant professor in academia. The department is looking for candidates with a strong background in computer science who have conducted innovative research in large-scale scientific computation. Strong preference will be given to researchers with demonstrated expertise in numerical methods for partial differential equations, experience with interdisciplinary research in the physical sciences, and personal involvement in scientific software development.

The members of the Scientific Computing Research Department conduct research in the core areas of numerical analysis, as well as computational geometry, pattern recognition, modeling languages, and numerical modeling of physical systems including wave propagation, fiber technology, and semiconductor devices. The department is part of the Computing and Mathematical Sciences Research Division, which includes groups working on a broad research program in the computer and mathematical sciences as well as applications. Further background information can be obtained via the following URL: http://cm.bell-labs.com/cm/cs/.

Interested applicants should submit a curriculum vitae and a description of their computational and interdisciplinary experience via electronic mail to cs-recruiting@research.bell-labs.com. LaTeX, Postscript, or HTML preferred.
Written inquiries should be directed to:
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## Boston University
### Department of Computer Science

Applications are invited for four tenure-track Assistant Professorships beginning September 1999. Qualifications required of all applicants include a Ph.D. in Computer Science, a strong research record, and commitment to teaching.

The department has a special interest in candidates pursuing experimental computer science research, including networking, operating systems, distributed systems, scalability, reliability and security of networked systems, databases, information retrieval and visualization, and computer graphics.

Currently, the Computer Science Department consists of twelve faculty, and offers BA, MA, and Ph.D. programs. Our research interests include parallel, distributed, and real-time systems; networks; performance evaluation; image and video computing; logic of computation; and theoretical computer science.

The Department has excellent computing resources and has access to the university supercomputing facilities, high-speed campus networks, and national vBNS and I2 internetworking. We have been the recent recipient of significant government and industry grants for research, research infrastructure, and for graduate student support. We anticipate a sustained period of strong growth based on our recent successes.

Additional information on the department and this search is available from http://www.cs.bu.edu.

Qualified applicants should send a detailed resume and arrange for at least three references to be sent to:
Faculty Search Committee
Computer Science Department
111 Cummington Street
Boston University
Boston, MA 02215
Please include a cover letter stating the names of your references and your major area(s) of specialization.
Boston University is an Equal Opportunity/Affirmative Action employer. Women, minorities, and persons with disabilities are particularly encouraged to apply.

## Bowdoin College
### Department of Computer Science
*Visiting Assistant Professor*

The Department of Computer Science at Bowdoin College invites applications for a one-year visiting position at the rank of Visiting Assistant Professor or Instructor for the 1999-2000 academic year. Ph.D. preferred; ABD considered. Area of interest is open. The successful candidate will be expected to teach two courses each semester including one introductory course each semester, Algorithms in the Fall, and Programming Languages in the Spring. Teaching experience is preferred.

Applicants should send a letter of application, a curriculum vitae, a statement of teaching philosophy and interests, and arrange for three reference letters to be sent to:
David Garnick
Department of Computer Science
8650 College Station
Brunswick, ME 04011-8486
Questions can be directed by e-mail to garnick@bowdoin.edu. Consideration of applications will begin February 1 and continue until the position is filled.

Bowdoin is a highly selective, coeducational, liberal arts college of 1550 students located two hours north of Boston, close to Portland, along the Maine coast in a community of 24,000. Departmental lab facilities include Macintoshes for the introductory courses, and a network of Linux machines for intermediate and advanced courses. Further information about Bowdoin and the department is available at www.bowdoin.edu.

Bowdoin is committed to equal opportunity through affirmative action. Women and members of minority groups are encouraged to apply.

## Brown University
### Department of Computer Science
*Computer Science Faculty Position*

Applications are invited for a tenure-track faculty position at the level of assistant professor in computer science commencing no later than

September 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 sought who will meet the teaching and research needs of the department. They must also have completed all the requirements for the doctoral degree by no later than September 1, 1999. The initial appointment will be for three years and is renewable.

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.

Applicants should send a resume in hard copy and have at least three referees send letters of recommendation to:
Prof. Steven P. Reiss
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 January 15, 1999 for full consideration.
Brown University is an Equal Opportunity/Affirmative Action employer and strongly encourages applications from women, minorities, and protected persons.

## Bucknell University
### Department of Computer Science

Applications are invited for an entry level, tenure-track Assistant Professor position beginning in Mid-August of 1999. Ph.D. in Computer Science or Computer Engineering and evidence of commitment to excellence in teaching and research are required. Must have interest in participating in the ongoing development of one of the core curriculum areas of programming languages, data structures, operating systems, and computer architecture, as well as research interest that builds on areas in the core. Excellent salary and fringe benefits.

Bucknell is a highly selective primarily undergraduate institution. The Department of Computer Science has eight full-time faculty positions. The programs are accredited by both ABET and CSAB. More information about the program is found at www.eg.bucknell.edu/csci. The computing environment for instruction and research is based on seventy SUN workstations.

Applications will be considered as received and recruiting will continue until the position is filled. Please send a resume, graduate transcript (photocopy acceptable), and the names and addresses of three references to:
Gary Haggard, Chair
Department of Computer Science
Bucknell University
Lewisburg, PA, 17837
Bucknell encourages applications from women and members of minority groups.

## Carnegie Mellon University
### Department of Engineering and Public Policy and the Department of Computer Science
*Joint Appointment*

Carnegie Mellon seeks faculty candidates in information technology and public policy for a joint appointment between the Department of Engineering and Public Policy and the Department of Computer Science. Position requires Ph.D. in CS, IS, or Computer Engineering and demonstrated policy research skills. Topics of interest include policy issues in networked systems and service provision; R&D policy; management of technical innovation; security, privacy and vulnerability; interoperability and other standards; human interfaces; aids for decision making and policy analysis; resource equity; and social impacts.
Resume, references, and sample papers to:
Granger Morgan, EPP
Carnegie Mellon
Pittsburgh, PA 15213

## Clemson University
### Department of Computer Science

The Department of Computer Science seeks applications for two Assistant Or Associate

# Professional Opportunities

Professor tenure-track positions for Fall 1999. For one of the tenure-track positions, the research interest should be in the area of visualization. This person will participate in the research program of the NSF-funded Engineering Research Center. The application of the research is the visual simulation of continuum or molecular models. For the second position, strong preference will be given to applicants in the area of software engineering. Applicants in graphics or networking are also encouraged to apply.

Applicants should hold or expect to receive the Ph.D. degree in Computer Science by the appointment date. Evidence of accomplishment in both teaching and research are expected.

The department has more than 450 undergraduate majors and more than 125 graduate students, and offers BA, BS, MS, and Ph.D. degrees. Clemson University is the land-grant university of South Carolina and has an enrollment of more than 17,000. Clemson, SC is a small college town located on Lake Hartwell at the edge of the Blue Ridge Mountains. Additional information can be found starting at the department's website: http://www.cs.clemson.edu.

Applicants should send curriculum vitae and names of three references to:
Faculty Search Committee
Department of Computer Science
Clemson University
Clemson SC 29634-1906

Screening will begin February 1, 1999 and continue until the positions are filled. Clemson University is an Equal Opportunity/Affirmative Action employer.

## Colgate University
### Department of Computer Science

Colgate University invites applications for a tenure-stream position at the rank of Assistant Professor starting in the Fall 1999. A Ph.D. degree or equivalent with strong interest in both teaching and research are expected. Applicants are sought with expertise in the area of operating systems. The successful applicant will also help staff other department courses and may participate in university core programs.

Colgate University is a highly competitive liberal arts university situated in upstate New York. The university is committed to promoting excellence in both teaching and research.

Review of applications will begin February 1 and continue until the position is filled. Resumes and three letters of recommendation should be sent to:
Chair, Faculty Search Committee
Department of Computer Science
Colgate University
13 Oak Drive
Hamilton, New York 13346

Colgate is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply.

## College of Charleston
### Department of Computer Science

The College of Charleston Department of Computer Science invites applications for a new tenure-track position at the Assistant Or Associate Professor level (pending final budgetary approval). The department is especially interested in adding faculty in the areas of networking and software architecture. A Ph.D. in Computer Science is preferred although A.B.D. candidates in computer science will also be considered. The successful candidate should demonstrate a commitment to quality undergraduate teaching, and show potential for sustained scholarly activity. The starting nine-month salary range is highly competitive. Startup money and space are also provided.

Review of applications will start on February 1, 1999 and will continue until position is filled. Please send your curriculum vitae, statement of teaching philosophy, and the names and e-mail addresses of three professional references to csdept@cs.cofc.edu via attachment or URL. If you prefer not to apply electronically, please mail your application to:
Dr. Christopher Starr, Chairman
Department of Computer Science
College of Charleston
66 George Street
Charleston, SC 29424

For more information see www.cs.cofc.edu. The College of Charleston is an Equal Opportunity/Affirmative Action Employer and welcomes applications from women and minorities.

## Colorado State University
### Department of Computer Science

The Department of Computer Science at Colorado State University solicits applications for a tenure-track faculty position at the

Assistant Professor level, beginning Fall 1999. Candidates should have research interests that are consistent with the department's emphasis on collaborative and interdisciplinary research that spans our specialties: artificial intelligence (computer vision, evolutionary computation, neural networks, planning), software engineering (formal methods, testing, program comprehension, reliability), and parallel and distributed computing (reconfigurable architectures, networks of workstations, mobile computing). Suitable research areas include human-computer interaction, robotics, databases, distributed computing, networking, and multimedia. Applicants must have a Ph.D. in computer science or computer engineering. Applicants will be expected to teach undergraduate and graduate courses, and they must demonstrate potential for excellence in research and teaching.

The Computer Science Department has over 500 undergraduate majors and ninety-five graduate students enrolled in Master's and doctoral programs. The department currently has sixteen tenure-track faculty. Computer facilities are excellent, and there are ample opportunities for research collaborations with local industry. Colorado State University, with an enrollment of 22,000 students, is located in Fort Collins, Colorado, an attractive community of over 100,000 people, at the base of the Front Range of the Rocky Mountains, sixty-five miles north of Denver. The northern Front Range offers a wide range of outdoor recreational activities. More information about the department and its research programs can be obtained from the department's homepage at http://www.cs.colostate.edu.

Applicants should send a curriculum vitae and names, addresses, and e-mail addresses of at least three professional references to:
Faculty Search Committee
Computer Science Department
Colorado State University
Fort Collins, CO 80523

The department's telephone number is 970-491-5862, and e-mail inquiries should be directed to faculty-search@cs.colostate.edu. Applications and nominations will be considered until the position is filled; however, applicants should submit applications by January 15, 1999, for full consideration.

Colorado State University is an EEO/AA employer.

## Columbia University
### Department of Computer Science

The Department of Computer Science anticipates at least one tenure-track opening this year. This is part of the planned expansion of faculty positions over the next several years, based in part on a major gift to the School of Engineering and Applied Science from the Fu Foundation. We invite applications from exceptional candidates at all ranks with particular focus on the following areas: information systems (such as information retrieval, database systems, and data mining), computer engineering (such as computer architecture, computer system design, and VLSI CAD), and human-computer interaction.

Our department of twenty tenure-track faculty and three lecturers emphasizes excellence in research and teaching and attracts excellent Ph.D. students, virtually all of whom are fully supported by research grants. Departmental facilities include Sun and SGI servers, numerous Sun and SGI workstations, PCs and Macs, plus state-of-the-art experimental systems. The department is in the third year of an NSF CISE research infrastructure grant. We have close ties to the nearby research laboratories of AT&T, Bell Atlantic, Bellcore, IBM, Lucent, Matsushita, NEC, Siemens, and other leading industrial companies, including the start-up companies of Manhattan's Silicon Alley and the financial companies of Wall Street.

Columbia University is one of the leading research universities in the United States, and New York City is one of the cultural, financial, and communications capitals of the world. Columbia's enclosed campus of tree-lined walks is located in Morningside Heights on the Upper West Side. The department has its own building plus additional space and facilities in the adjacent interdisciplinary Schapiro Center for Engineering and Physical Science Research. University subsidized housing and parking are available.

Candidates for tenure-track Assistant Professor should exhibit exceptional research promise, while those seeking a more senior position should have an outstanding record of research achievement. Interest and ability in teaching undergraduates and graduates is necessary. Please submit a summary of research interests (prominently stating the closest area among those listed above), curriculum vitae, e-mail address, and the names and e-mail addresses of at least three references to:
Faculty Search Chairperson
Department of Computer Science
450 Computer Science Building
Mail Code 0401
Columbia University
New York, New York 10027

E-mail: recruiting@cs.columbia.edu

A confirmation of receipt will be sent by e-mail. Columbia University is an Equal Opportunity/Affirmative Action Employer. We encourage applications from women and minorities.

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

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## Cornell University
### Department of Computer Science
*TENURE-TRACK POSITIONS, ALL LEVELS*

Applications are invited for tenure-track positions beginning August 1999. These positions are at the Assistant, Associate, or Full Professor level depending on experience. Applicants should have a Ph.D. in Computer Science or in a closely related field. The department requires demonstrated research accomplishment at the highest level, as well as outstanding teaching ability and leadership qualities.

The Department of Computer Science at Cornell University encompasses a wide range of research areas, including artificial intelligence, concurrency and distributed computing, databases, algorithms, information organization and retrieval, multimedia systems, applied logic and semantics, numerical analysis and scientific computing, theory of computation, programming languages and methodology, computer vision, computational biology, graphics, networks, operative systems, and natural language processing.

We are especially interested in networks, databases, digital libraries, graphics, systems, and computational biology. Applicants in all areas of computer science will be considered. REF: AP#1

*NON-TENURE TRACK POSITIONS*

We are seeking applicants for non-tenure track positions at all levels beginning August 1999. The primary focus of these positions would be research or teaching. Applicants should have a Ph.D. in Computer Science or closely related field, a research program including demonstrated research accomplishments, and a commitment to excellence in teaching computer science. REF: NT#5

*RESEARCH*

Also available: research positions in scientific computing and software systems. REF: RES#3

Further information about the department is available on the World Wide Web at URL: http://www.cs.cornell.edu/

Applicants should submit a curriculum vitae and the names of at least three references to:
Chair, Faculty Recruiting Committee
Department of Computer Science
4130 Upson Hall
Cornell University
Ithaca, NY 14853-7501

Please include reference number with application.

Cornell University is an Equal Opportunity employer and welcomes applications from women and ethnic minorities.

## 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.

## Eastern Connecticut State University
### Mathematics and Computer Science Department
*Two Positions*

Assistant Professor, tenure-track. Ph.D. preferred, ABD to be completed by Fall 1999 considered, in Computer Science or a closely related field. While all areas of computer science will be considered, preference will be given to candidates in computational science, database systems, computer graphics and multimedia, or operating systems.

The applicant is expected to be able to teach courses, which range from introductory to upper-level undergraduate computer science courses. The regular teaching load is twelve credit hours per semester.

Interested candidates should send a letter of interest, current curriculum vitae, transcript of all graduate work, a statement of teaching philosophy and research interests, documentation of teaching ability, and three letters of recommendation to:
Dr. Jianhua Lin, Chair
Computer Science Search Committee
Mathematics and Computer Science Department
Eastern Connecticut State University

Review of applications will begin immediately and will continue until the positions are filled. Further information about the university and department is accessible from the University webpage at www.ecsu.ctstateu.edu.

ECSU is an AA/EEO Employer. Women, members of protected classes, and people with disabilities are encouraged to apply.

## Florida International University
### School of Computer Science

Applications are invited for tenure-track faculty positions at the level of Assistant Professor. A Ph.D. in Computer Science or related area is required. Candidates with high research potential and a strong commitment to undergraduate and graduate instruction are encouraged to apply. Two types of candidates are being sought. Those with the capability to be excellent teachers and with a research interest in computer architecture or other major area of computer science, and those with interest and experience in distributed systems architecture, modeling, design, and analysis of distributed systems, computer networks, the development of large-scale distributed systems to join our Center for Advanced Distributed Systems Engineering, and those with interest and experience in research in databases, especially distributed databases, to join our High Performance Database Research Center.

Normal teaching assignments in the School range from three to five courses per year with an expectation of research performance commensurate with the teaching load. Our salary and benefits package is highly competitive.

The School of Computer Science is a designated Program of Excellence at the University and enjoys the strong support of the university administration. Through its two research centers for High Performance Database Research and for Advanced Distributed Systems Engineering the School has attracted substantial support form NASA and NSF together with

# Professional Opportunities

considerable additional funding from federal, state, and private agencies. The School has twenty-five faculty members and offers BS, MS, and Ph.D. degrees in Computer Science. The current enrollment is approximately 600 undergraduate and 80 graduate students.

Applications including a letter of interest, curriculum vitae, e-mail address, and the names of three professional referees should be sent to:

Recruiting Committee Chair
School of Computer Science
Florida International University
University Park
Miami, FL 33199

Applications are accepted by postal mail or fax and must be postmarked no later than January 16, 1999. Further information may be obtained from the school website www.cs.fiu.edu, from the sites of our research centers: http://hpdrc.cs.fiu.edu and http://cadse.cs.fiu.edu, or by e-mail to recruit@cs.fiu.edu.

Florida International University is a member of the State University System of Florida and is an Equal Opportunity/Affirmative Action employer. Minorities and women are encouraged to apply.

## Florida International University
### The State University System of Florida
*Director, School of Computer Science*

The School of Computer Science is seeking a distinguished computer scientist to assume a leading role in maintaining both its strength as a center of research and also the strength of its undergraduate and graduate programs.

Florida International University invites applications and nominations for the position of Director of the School of Computer Science. We are seeking an individual with a record of experience suitable for appointment at the rank of Professor. The individual should have excellent leadership skills, distinguished record of research and external funding support, administrative experience, and a strong teaching record. An earned Doctorate in Computer Science or related field is required.

The School of Computer Science enjoys strong support from the university administration and is expected to continue to play an important role in the university's quest to achieve recognition as a Carnegie Research I University. The Director is expected to provide strong leadership in this development and in the continued development of our degree programs.

The Computer Science program was initiated in 1972 and elevated to the status of a School within the College of Arts & Sciences in the Fall of 1987. Our BS degree program is CSAB accredited. Currently, the School has twenty-five full-time faculty members who support approximately 600 undergraduates, fifty-five Master's students, and twenty-five doctoral students. Further faculty growth is expected.

The School's research activities are concentrated in two areas: databases and distributed computing. The High Performance Database Research Center and the Center for Advanced Distributed and Systems Engineering enjoy large funding from NASA, NSF, ARO, AFOSR, and other sources. The School received $2.6M in external funding in 1997-98, much of it for our two research centers. Research is also being done in the areas of software engineering; analysis of algorithms; formal methods, temporal logic and program synthesis; and cognitive science. The School's research and instructional programs are supported by a variety of scientific workstations, parallel systems, and PCs interconnected to an ATM-based campus network.

FIU is the largest university in South Florida and the fourth largest of the ten institutions in the State University System. It has more than 30,000 students and 1,300 faculty members. It offers more than 220 academic programs at the Bachelor's, Master's and Doctoral levels.

Nominations or applications (including the names of five references) should be mailed to:

Prof. Jai Navlakha
Chairperson-SCS Director Search Committee
School of Computer Science
Florida International University
Miami, Florida 33199

Personal inquiries can be made by phone or e-mail.

Tel. 305-348-2026
Fax: 305-348-3549
E-mail: navlakha@cs.fiu.edu

All applications postmarked no later than. February 11, 1999 will be considered.

FIU is an Equal Opportunity/Equal Access/ Affirmative Action employer institution.

## Florida State University
### Department of Computer Science

The Florida State University is entering a period of significant growth both in Computer Science and allied areas (e.g., computational science). The Department of Computer Science invites applications for tenure-track positions at all ranks. New faculty will have the opportu-

nity to help shape the department's future.

Applicants are required to have completed a Ph.D. in Computer Science, Computer Engineering, or a closely related field by the date of the appointment.

Exceptionally qualified individuals in any area of computer science are encouraged to apply. Priority will be given to applicants with strengths that will contribute to the development of new research groups. We are especially interested in research in: trusted systems (including safety, reliability, and security); computational science (especially visualization); architecture of computing and networked systems; massive data storage, processing, and archiving; other research areas that would be supportive of education in software engineering and computer and network system administration. Selection will be based on evidence of outstanding research accomplishments and teaching ability.

Please send a resume and arrange for at least three letters of reference to be sent to the following address:

Faculty Search Committee
Computer Science Department
PO Box 4530
Florida State University
Tallahassee, FL 32306-4530

The Florida State University is an Equal Opportunity/Affirmative Action employer that encourages applications from minorities and women and complies with the Americans with Disabilities Act. It is a public records agency pursuant to Chapter 119, Florida Statutes.

The university has about 30,000 students and is located in the Florida capital l- a city of approximately 250,000, surrounded by forests, lakes, and farms, and about an hour's drive from the Gulf Coast. It has excellent public schools and affordable housing. The department offers degrees at the BS, MS, and Ph.D. levels. Further information about the university and the department can be found at the websites: www.fsu.edu and www.cs.fsu.edu.

## Florida State University
### Department of Computer Science
*Associate in Computer Science*

Applications are invited for a non-tenure-track faculty position, to serve as administrative aide to the Chair in the Department of Computer Science and to serve in a teaching role in the department. Minimum qualifications include a Ph.D. in Computer Science or a closely related field, or a Master's degree and at least three years of relevant teaching and administrative experience. Administrative experience in an academic CS department is desirable, though similar experience in industry or government could substitute. A high level of personal maturity and responsibility, and experience interacting with people, are both needed. Preference will be given to individuals with a background in software engineering.

The duties of the position are distributed approximately equally between teaching and departmental administration. The administrative responsibilities are delegated by the Chair of the department, and are expected to include graduate recruitment and admissions, the internship program, training and supervision of teaching assistants, and development of the software engineering curriculum.

The university is entering a period of significant growth in computing-related programs, which is likely to require doubling the size of the Department of Computer Science over the next few years.

Please send a resume and arrange for at least three letters of reference to be sent to the following address:

Ted Baker, Professor & Chair
Computer Science Department
PO Box 4530
Florida State University
Tallahassee, FL 32306-4530

The Florida State University is an Equal Opportunity/Affirmative Action employer that encourages applications from minorities and women and complies with the Americans with Disabilities Act. It is a public records agency pursuant to Chapter 119, Florida Statutes.

The university has about 30,000 students and is located in the Florida capital - a city of approximately 250,000, surrounded by forests, lakes, and farms, and about an hour's drive from the Gulf Coast. It has excellent public schools and affordable housing. The department offers degrees at the BS, MS, and Ph.D. levels. Further information about the university and the department can be found at the website's: www.fsu.edu and www.cs.fsu.edu.

## George Mason University
### Department of Computer Science

The Department of Computer Science at George Mason University invites applications for faculty positions starting August 1999. Appointments are available at the assistant professor level (tenure-track). Positions at the associate and full professor levels will be considered for highly qualified candidates.

This department is committed to interdisciplinary, multi-investigator research in high-impact areas, including agent technology, for which we have significant relevant expertise. We seek candidates in distributed software systems, internet technologies, machine intelligence and

multimodal interfaces. Candidates in these and other areas whose expertise can be applied to the design and development of mobile, reactive, autonomous, adaptive, collaborative, or interactive software agents are strongly encouraged to apply. Candidates for visiting positions will also be seriously considered. Applicants should hold a Ph.D. in Computer Science or a closely related discipline, and are expected to develop an excellent funded research program. Salary is competitive.

George Mason University, in Fairfax County, Virginia, is seventeen miles west of Washington, DC. Opportunities for government and industrial interaction are excellent. The school system is outstanding. World-class cultural events abound. Our website is www.cs.gmu.edu and for GMU information see www.gmu.edu.

To apply send a letter of application including a statement of professional goals, full resume, samples of representative publications, and the names of four references. Send all materials to:

Chair, Recruitment Committee
Department of Computer Science
Mail Stop 4A5
George Mason University
Fairfax, VA 22030-4444
Send inquiries to recruit@cs.gmu.edu.

The search process will continue until suitable candidates are identified by the recruitment committee. AA/EOE.

## Georgia State University
### Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science of Georgia State University invites applications for anticipated tenure-track positions for assistant professor beginning August, 1999. Earned Ph.D. in Computer Science, or a closely related discipline, and an excellent record in publications in computer science are required with preference for extramural funding. Preference is for individual with specialty in operating systems, artificial intelligence, human-computer interaction, software engineering, algorithms, or architecture. Departmental computing facilities for research and instruction include 128 networked computers, five laboratories, one with ATM switches for network research and another for hypermedia and visualization research.

The departmental facilities are supported by two full-time Systems Programmers.

Applicants should send a letter of application, vita without birthdate, but with citizenship status, and three letters of reference and transcripts of all graduate and undergraduate work to:

Chair, Department of Mathematics and Computer Science
Georgia State University
University Plaza
Atlanta, Ga. 30303-3083
(or e-mail to: mfraser@cs.gsu.edu)

Applications must be postmarked no later than 2/12/99. Georgia State University, an EEO/AA institution.

## Harvard University
### Computer Science Department

We invite applications and nominations for two tenure-track faculty positions in Computer Science to begin in the fall of 1999. Candidates should have an outstanding research record and a strong commitment to undergraduate teaching and graduate training. Applicants must have completed a Ph.D. by September 1, 1999. Information about Harvard's current faculty, research, and educational programs is available at http://www.deas.harvard.edu/. Harvard's computer science activities are expected to move to the new Maxwell Dworkin Laboratory in 1999 and to enjoy a period of substantial growth in subsequent years.

Candidates should send a curriculum vitae, a list of publications, and a statement of research and teaching interests, and should also arrange to have sent at least three letters of reference to:

CS Search Committee
Division of Engineering and Applied Sciences
ESL 418
40 Oxford Street
Cambridge, MA 02138

Applicants may, in addition, include up to three papers representative of their research.

Harvard is an Equal Opportunity/ Affirmative Action employer and encourages applications from women and members of minority groups.

Applicants should apply before February 1, 1999.

## Indiana University
### Computer Science Department
*Faculty Positions*

The Indiana University Computer Science Department seeks outstanding applicants for a number of tenure-track faculty positions. We are also expecting to fill one non-tenure-track position.

The department is involved in establishing a new, multi-disciplinary School of Informatics involving cognitive science, computer science, library and information science, information systems, and scientific and biomedical informatics. The positions we seek to fill are intended to strengthen the school's planned emphasis in systems, artificial intelligence and cognitive science, computer graphics, and programming languages. These positions will be at the assistant professor level, but strong senior candidates in the area of programming languages will also be considered.

A Ph.D. in Computer Science is required. In addition to research, a strong contribution to the educational mission of the department is expected.

The non-tenure-track position is for an Assistant Professor (*Lecturer) Part-time/Director of Educational Development. We are looking for a vigorous computer scientist with interest in teaching, developing, and administering undergraduate courses. Research interest in computer science pedagogy is an advantage. *Title will be dependent on background and qualifications.

The department occupies a recently renovated spacious limestone building, and has extensive state-of-the-art computing facilities. The attractive wooded campus of Indiana University is located in Bloomington, voted one of the most cultural and livable small cities in the United States, and only forty-five minutes from the Indianapolis airport. To learn more about the department please visit our website at www.cs.indiana.edu.

Please send a detailed curriculum vitae and a list of references to:

Faculty Search
Computer Science Department
Indiana University
Lindley Hall 215
Bloomington, IN 47405-4101
E-mail: search@cs.indiana.edu

Indiana University is an Affirmative Action/Equal Opportunity Employer.

## Interdisciplinary Center, Herzliya
### Faculty positions in Computer Science

The School of Computer Science at the Interdisciplinary Center (IDC) in Herzliya invites applications for full-time Computer Science faculty starting October 1999 in all areas of Computer Science. Candidates must demonstrate superior research and scholarship potential, as well as a commitment to teaching and education. Successful applicants are expected to pursue an active research program and to contribute fully to the growth and development of all aspects of IDC. A Ph.D. in Computer Science or a closely related area is required.

We offer excellent salaries, benefits, and working conditions. IDC is a non-profit, accredited academic institution, dedicated to excellence in research and teaching. Courses are given in both Hebrew and English. Founded in 1994 and located on a beautiful campus in Herzliya, our goal is to become Israel's first private university.

We provide excellent conditions for research, starting with a reasonable teaching load. The School of Computer Science is a member of Israel's largest R&D Consortium, called MOST (part of the Chief Scientist MAGNET program). The MOST Consortium provides full funding for several research projects run by our faculty.

IDC operates a campus-wide network of NT and Unix workstations, an advanced Digital Media lab, and fast terrestrial and satellite-based links to the Internet. Our teaching facilities are state of the art, equipped with the latest in communications, multimedia, video conferencing, and presentation technologies.

Applicants should send a current resume, the names of at least three people who can comment on the applicant's professional qualifications, and copies of recent papers to:

Prof. Richard Zippel
P.O.B. 167
Herzliya, Israel 46150
or to rz@idc.ac.il. Electronic submissions are preferred. IDC is an equal opportunity, merit-based employer. Candidates from all backgrounds are encouraged to apply.

## La Salle University
### Department of Mathematics and Computer Science

Computer Science: La Salle University Department of Mathematics and Computer Science invites applications for two tenure-track

# Professional Opportunities

faculty positions in Computer Science at the rank of Assistant Professor beginning Fall 1999. Candidates should have a Ph.D. in Computer Science. The successful candidate will be expected to teach and advise both undergraduate and graduate students in Computer Science. The department is interested in all areas of Computer Science with a special interest in networks, client/server environments, distributed computing, multimedia system design, software engineering, and project management.

La Salle University is a Catholic, liberal arts university offering the BA and BS degrees in Computer Science and the MA degree in Computer Information Science. The Department of Mathematics and Computer Science is dedicated to excellence in teaching. The typical teaching load is twelve undergraduate hours per semester. Faculty teaching in the graduate program may reduce the teaching load to nine hours.

Please submit a curriculum vitae, three letters of recommendation, and a letter indicating teaching and research interests to:

Linda J. Elliott, Chair
Department of Mathematics and Computer Science
La Salle University
1900 West Olney Avenue
Box 258
Philadelphia, PA 19141-1199
(elliott@lasalle.edu)

Review of applications will begin immediately and continue until the positions are filled.

La Salle University is an 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, 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.

## Michigan Technological University
### Department of Computer Science
*Tenure-Track Faculty Position*

Applicants in all areas of computer science and computational science and engineering are invited to apply for one or more tenure-track faculty positions beginning March or September 1999. Applicants for Assistant Professor positions are expected to demonstrate potential for excellence in teaching and research.

Michigan Tech, designated as one of four Michigan research universities, has over 6,200 students and 400 faculty. The department has ten full-time faculty members and well-established undergraduate and MS programs with excellent students. The Department has a central role in the interdepartmental Computational Science and Engineering Ph.D. program. In addition to supporting work in traditional computer science areas, this program fosters research and teaching in the application of computer science to problems in engineering and the sciences.

Facilities in the Department include a network of Sun Sparc, Digital Alpha and SGI servers and workstations. In addition, the Computational Science and Engineering Center, recently funded by NSF, will provide additional computational resources for faculty and students associated with the CS&E Ph.D. program.

Michigan Tech is located in Houghton, a rural community in Michigan's scenic Upper Peninsula. Surrounded by Lake Superior and nearby forests, the community offers year-round recreational opportunities. This environment combined with a competitive compensation package and a low cost of living results in an excellent quality of life.

Review of applications will continue until the position(s) is filled. Women and minorities are particularly encouraged to apply. Applicants should send a resume, email address, and a list of at least three references to:

Dr. Linda Ott, Chair
Department of Computer Science
Michigan Technological University
Houghton, Michigan 49931
E-mail: linda@mtu.edu
Tel. 906-487-2209

For more information see our webpage http://www.cs.mtu.edu/.

Michigan Technological University is an equal opportunity educational institution/equal opportunity employer.

## Monmouth College
### Department of Mathematics and Computer Science
*http://www.monm.edu*

Monmouth College, a nationally ranked liberal arts college, invites applications for a tenure-track position in Computer Science to start August 1999. Candidates who have or expect a Ph.D. in Computer Science will be preferred. Applications will be considered from candidates who have a Ph.D. in a related field and a Masters Degree in Computer Science. Strong commitment to undergraduate teaching in a liberal arts setting is essential. Interest in participating in an innovative general education program is a plus. Experience in education or industry is desirable. Teaching responsibilities include all levels of computer science courses. Teaching load is twenty-one to twenty-four semester hours per year.

Monmouth College, a college of 1050 students located in west central Illinois, is committed to increasing diversity within the campus community. The Department of Mathematics and Computer Science is expanding to five tenure-track members. Our new colleague will help shape the direction of the computer science curriculum.

Send a letter of application, curriculum vitae, a statement of teaching philosophy, and three letters of recommendation to:

Mr. Michael McNall
Director of Personnel
Monmouth College
700 East Broadway
Monmouth, IL 61462

Formal evaluation of applications will begin January 15, 1999 and continue until the position is filled. Monmouth College is an Equal Opportunity employer. Women and minority candidates are strongly encouraged to apply.

## NASA Goddard Space Flight Center
### Center of Excellence in Space Data and Information Sciences (CESDIS)
*Staff Scientist*

Applications for Staff Scientist are invited by USRA for its Center of Excellence in Space Data and Information Sciences (CESDIS) at the NASA Goddard Space Flight Center in Greenbelt, MD. General areas of interest include the Earth and computational and information sciences. The successful candidate will hold a Ph.D. in a related discipline.

In the field of Earth science, particular areas of interest include marine boundary layer modeling, global climate modeling, implementation of geophysical models on parallel architectures, air-sea interaction, satellite retrieval of cloud properties, cirrus clouds, and land surface parameterizations. The successful candidate studying Earth science would be expected to conduct independent research, collaborate with local scientists and others from the NASA High Performance Computing and Communications (HPCC) Earth and Space Science (ESS) project, and serve as a mentor for summer students.

Particular interests in computational science include Lagrangian modeling techniques, high-performance parallel computing, and familiarity with the Beowulf architecture. The successful candidate working in computational science would be expected to assume a leadership role within the CESDIS research group, which will include contributing to ongoing Beowulf software projects, establishing relationships with NASA collaborators within the NASA Beowulf project, identifying and assuming the technical lead on a software development effort that will benefit the NASA research and operational projects, engaging ESS scientists at GSFC and evaluating the potential of cluster computing with respect to their computational requirements, and providing summaries of results for presentation to NASA management and at technical meetings.

Candidates are sought in the field of information science with experience in geographic information systems, image processing, knowledge discovery, visualization, multi-media information and communication systems, and digital library applications. A successful candidate in the information sciences would be expected to conduct independent research, collaborate with local scientists on problems relating to archiving, processing, visualizing and interpreting NASA data, provide technical input for funding proposals, and serve as a mentor for summer students.

Starting salary will be competitive and benefits package comprehensive. USRA is a private, non-profit, equal opportunity corporation. Women and minorities are encouraged to apply. Submit application letter and curriculum vitae with publications to:

Staff Scientist Search, CESDIS
Code 930.5
NASA Goddard Space Flight Center
Greenbelt, MD 20771

Arrange for three letters of reference to be submitted to the same address. Applications will be accepted through January 30, 1999 or until the position is filled.

## New York University
### Computer Science Department

The department expects to have several regular faculty positions beginning in September 1999 and invites candidates at all levels. To strengthen and broaden its existing groups in computer systems and multimedia, the department is conducting two searches, each for multiple positions. In computer systems, we are particularly interested in distributed systems, embedded systems, verification networks, operating systems, and security. In multimedia, we are particularly interested in computer-human interfaces (e.g. graphics, speech, and vision), educational technology, virtual reality, and Web technology; an interdisciplinary appointment is possible for a senior candidate. Faculty members are expected to develop an independent first-rate research program and to participate in teaching at all levels from the undergraduate to the doctoral. The new appointees will be offered competitive salaries, competitive startup packages, and low-cost university housing within short walking distance of the department. New York University, the largest private university in the world, is located in Greenwich Village, one of the most attractive residential areas of Manhattan.

The department may also have one or more visiting positions, with appointments for either one or two semesters. The department has twenty-five regular faculty members and several adjunct, clinical, research, and visiting faculty members. Current strengths of the department lie in algorithms, artificial intelligence, computer graphics, computer vision and image processing, databases, distributed and parallel computing, multimedia, natural language processing, programming languages, and scientific computing. The department provides and maintains a general-purpose state of the art computing environment. There are also specialized laboratories and research facilities for compiler optimization and instruction level scheduling, computer graphics and multimedia, computer vision, and parallel and distributed computing.

The department has external funding at the level of $6m per year. Its sources include federal agencies such as AFOSR, DARPA, DoE, NSF, and ONR; and industrial organizations such as BellCore, IBM Research, Intel, Microsoft and HP. Collaborative research with industry is facilitated by the geographic proximity to the main research centers of AT&T, BellCore, IBM, Lucent, Matsushita, NEC, and Siemens.

Applications should include a resume, a statement of career objectives, key publications, and names of references (at least three for junior positions and at least five for senior positions). Applicants are encouraged to provide a URL for a description of their activities. To guarantee full consideration, applications should be received no later than January 6, 1999; however, this is not a hard deadline as all candidates will be considered to the extent feasible, until all positions are filled.

Please send applications to:
c/o Karen Christie
Faculty Search
Department of Computer Science
New York University
251 Mercer Street
New York, NY 10012-1185

New York University is an Equal Opportunity/Affirmative Action employer.

## North Carolina State University
### Department of Computer Science
*Operating Systems*

The North Carolina State University Department of Computer Science seeks a tenure-track Assistant Professor in the area of operating systems to begin August 16, 1999. We are seeking candidates who have worked on operating systems support for distributed computing, real-time embedded computing, parallel computing, networked multimedia computing, or mobile wireless computing. Candidates are expected to have strong experimental and theoretical interests in the areas of operating systems research and education. The successful candidate will have a Ph.D. in Computer Science or a related field and demonstrated potential to establish a strong research and teaching program at NCSU. This new position has been created to complement our established research strength in computer networking and distributed systems. A number of faculty have an interest in multimedia networking, optical networks, network security, real-time communication, quality-of-service, concurrent system testing, distributed database systems, and object-oriented programming. Their work is supported by NSF, DARPA, AFOSA, Cisco, Ericsson, Fujitsu, IBM, MCNC, Nortel, NSA, 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. 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 also boasts a high concentration of high-technology companies. Interested candidates should send their curriculum vitae and the names of four references to:

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

Prospective candidates should access the department's homepage (http://www.csc.ncsu.edu), and write to os_search@csc.ncsu.edu if necessary. Information about additional openings in electronic commerce 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 NCSU at 919-515-2858.

## Northern Illinois University
### Department of Computer Science

The Department of Computer Science at Northern Illinois University invites applications for a tenure-track position at the Assistant Professor level. Applicants are sought in all areas, but software engineering, networking, or database experience is desirable. Candidates should have a Ph.D. in Computer Science or a closely related discipline and have a strong interest in both teaching and research. Remuneration is commensurate with qualifications and experience.

Pending funding a second position for candidates meeting the above criteria may also be available.

Computing facilities include PCs networked via Ethernet LAN Architecture with an ATM backbone, an IBM 9672-RB4 CMOS Enterprise Server running MVS, SUN workstations, and two SPARC 1000 computing systems. Information about the department and Northern Illinois University can be obtained by consulting the department's homepage, www.cs.niu.edu.

Interested candidates should submit curriculum vitae to:
Rodney Angotti, Chair
Department of Computer Science
Northern Illinois University
DeKalb, Illinois 60115
e-mail angotti@cs.niu.edu

Application review will begin February 15, 1999 and continue until position is filled.

Northern Illinois University is an Equal Opportunity/Affirmative Action Employer.

## Northern Michigan University
### Mathematics and Computer Science Department

The Department of Mathematics and Computer Science at Northern Michigan University invites applications for a tenure-track position in Computer Science at the rank of Assistant Professor beginning with the 1999-2000 academic year. The successful applicant must possess a Ph.D. in Computer Science or closely related field prior to employment, be prepared to teach the range of courses in an undergraduate curriculum as well as some undergraduate mathematics courses, and

# Professional Opportunities

demonstrate the potential to become an effective teacher and an active scholar. Applicants with specialized interests in any area of computer science are encouraged to apply; however, preference will be given to applicants whose special interests are in one or more of the following areas: object oriented design, distributed computation, databases or real-time computation. Additional desirable qualifications include a willingness to contribute to the development of our computer science program and work with business and industry to develop career opportunities for our graduates, and involve undergraduates in ongoing research efforts.

Applications should include a complete resume, letter of application, transcripts, and names, addresses (including e-mail), and telephone numbers of three references. Nominations are welcomed, and should be submitted as early as possible. Application materials should be sent to:

Terrance L. Seethoff, Head
Department of Mathematics and Computer Science
Northern Michigan University
1401 Presque Isle
Marquette, Michigan 49855-5340
906-227-2020
E-mail Address: tseethof@nmu.edu.

For additional information see http://www.nmu.edu/. Applicant review will begin February 1, 1999, and will continue until the position is filled. NMU is an AA/EOE.

## Northwestern University
### Department of Computer Science

Invites applications at the junior level. We seek outstanding candidates in all areas of systems, broadly construed, including operating systems, multimedia, databases, programming languages and environments, distributed systems, networking, and graphics and animation. Outstanding candidates from other areas of computer science may also be considered.

Send applications to:
Search Committee
Northwestern University
Dept. of Computer Science
1890 Maple Ave.
Evanston, IL 60201
by Feb. 19, 1999.

Northwestern University is an Equal Opportunity/Affirmative Action Employer. Hiring is contingent upon eligibility to work in the United States. Applications by women and minorities are especially encouraged.

## Northwestern University
### Department of Computer Science

Invites applications at the senior level. We seek outstanding candidates in all areas of systems, broadly construed, including operating systems, multimedia, databases, programming languages and environments, distributed systems, networking, and graphics and animation. Candidates should have a proven record of research leadership in computer science.

Send applications to:
Search Committee
Northwestern University
Dept. of Computer Science
1890 Maple Ave.
Evanston, IL 60201
by Feb. 15, 1999.

Northwestern University is an Equal Opportunity/Affirmative Action Employer. Hiring is contingent upon eligibility to work in the United States. Applications by women and minorities are especially encouraged.

## Oakland University
### Department of Computer Science and Engineering
*Rochester, Michigan*
*Chair*

The Department of Computer Science and Engineering invites applications and nominations for the position of chair. Qualifications for the position include an earned Doctorate in Computer Science or Engineering or a related field, an excellent record of scholarly accomplishments, a demonstrated ability to attract external research funding, and strong leadership skills.

Starting date: August 1999 or earlier. Applications will be reviewed beginning February 1st, and will be accepted until the position is filled.

Nominations and applications should be submitted to:

Professor Fatma Mili, CSE Search Committee Chair
c/o Office of the Dean
School of Engineering and Computer Science
Oakland University
Rochester MI 48309-4478
E-mail: mili@oakland.edu

Oakland University is an Equal Opportunity/Affirmative Action ADA-compliant employer. Women and minorities are especially

encouraged to apply.

More information about the position can be found at: http://www.secs.oakland.edu/cse-search

## Oklahoma State University
### Computer Science Department

The Oklahoma State University (OSU) Computer Science Department is seeking applications from qualified candidates for the position of Professor and Department Head. The term of initial appointment will begin August 1, 1999.

The OSU Computer Science Department is a growing department that is committed strongly to the goal of excellence in research, teaching, and extension. It offers a full range of undergraduate and graduate courses leading to BS, MS, Ph.D., and Ed.D. degrees in Computer Science. The department recently expanded its BS and MS programs to the new OSU campus in Tulsa, OK and also offers courses to students at remote sites using interactive video and the World Wide Web. There are currently more than 200 undergraduate students and more than 150 graduate students enrolled in the department. The department has a goal of CSAB/CSAS accreditation within the next few years.

Applicants must qualify for the rank of Professor in the Computer Science Department and have a commitment to research, teaching, and extension excellence. A record that clearly demonstrates strong leadership, innovation, and consistent success in securing external research funding is requisite for this tenured position.

Stillwater is a small, attractive university city of about 38,000, located on the prairie in north-central Oklahoma. Stillwater is 65 miles west of Tulsa and 65 miles north of Oklahoma City. There are numerous cultural activities within a two-hour drive of Stillwater. The Oklahoma State University campus is one of considerable beauty with modified Georgian architecture.

Oklahoma State University encourages applications from qualified women, minorities, and persons with disabilities. Please send curriculum vitae and names of three references to:

Chair, Computer Science Head Search Committee
Computer Science Department
Oklahoma State University
Stillwater, OK 74078-1053
Telephone: 405-744-5668
Fax: 405-744-9097
E-mail: head-search@cs.okstate.edu
WWW: http://www.cs.okstate.edu/search.

Review of applications will begin January 15, 1999, but applications will be accepted until the position has been filled. Oklahoma State University is an Equal Opportunity/Affirmative Action employer.

## Oklahoma State University
### Computer Science Department
*Faculty Search*

Applications are invited for anticipated full-time, tenure-track and visiting positions at the Assistant Professor level. The term of initial appointment will begin in Fall 1999.

The Oklahoma State University (OSU) Computer Science Department is seeking applications from qualified candidates with teaching and research experience in any areas of Computer Science. A Ph.D. or D.Sc. in Computer Science or a closely related area is required.

The OSU Computer Science Department is a growing department that is committed strongly to the goal of excellence in research, teaching, and extension. It offers a full range of undergraduate and graduate courses leading to BS, MS, Ph.D., and Ed.D. degrees in Computer Science. The department recently expanded its BS and MS programs to the new OSU campus in Tulsa, OK and also offers courses to students at remote sites using interactive video and the World Wide Web. There are currently more than 200 undergraduate students and more than 190 graduate students enrolled in the department. The department has a goal of CSAB/CSAC accreditation within the next few years.

Stillwater is a small, attractive university city of about 38,000, located on the prairie in north-central Oklahoma. Stillwater is sixty-five miles west of Tulsa and sixty-five miles north of Oklahoma City. There are numerous cultural activities within a two-hour drive of Stillwater. The Oklahoma State University campus is one of considerable beauty with modified Georgian architecture.

Tulsa is one of two metropolitan cities in Oklahoma, located in northeastern Oklahoma. Tulsa is sixty-five miles east of Stillwater where the main campus of Oklahoma State University is located. The population of Tulsa is about 380,000, and the population of Tulsa County is about 530,000. There are numerous cultural activities in Tulsa, including a performing arts center that regularly hosts touring Broadway shows, and the Tulsa opera, ballet, and philharmonic orchestra. Just a few minutes away, one also can enjoy outdoor activities such as fishing, boating, and hiking.

Oklahoma State University encourages applications from qualified women, minorities, and persons with disabilities. Please send curriculum vitae and names of three references to:

Chair, Faculty Search Committee
Computer Science Department
Oklahoma State University
Stillwater, OK 74078-1053

Please specify whether you are interested in a tenure-track or visiting position. Tel. 405-744-5668; FAX: 405-744-9097; E-mail: faculty-search@cs.okstate.edu; www: http://www.cs.okstate.edu/search.

Application deadline is January 15, 1999, but applications will be accepted until the position has been filled. Oklahoma State University is an Equal Opportunity/Affirmative Action Employer.

## Portland State University
### Department of Computer Science

Two Faculty Positions in Systems and Software Engineering

Portland State University is recruiting for two tenure-track, faculty positions to begin Fall 1999. The positions preferably will be at the Assistant Professor level but candidates will be considered at the Associate Professor level.

For the first position, we primarily seek candidates in the computing systems area (operating systems, networking, performance analysis, security, distributed systems, compilers and/or architecture) although all areas may be considered.

The second position requires outstanding credentials in software engineering, preferably with industrial experience. Primary teaching duties for this position will be in the Oregon Masters of Software Engineering Program.

Portland State University is located in downtown Portland, Oregon, approximately one hour from magnificent beaches and approximately one hour from twelve month per year skiing. Portland is in the heart of one of the major software/hardware development centers in the country. Within the Portland metropolitan area are the world headquarters of Sequent, Tektronix, and Mentor Graphics, and the site of the world's largest campus of Intel.

The department has sixteen faculty and offers a CSAB accredited BS and an MS in Computer Science. We anticipate approval of a Ph.D. program this year. For the past 10 years, teaching loads have been light (typically one

course per quarter) to allow each faculty member ample time to maintain quality research and teaching programs and to interact with local industry. The department currently services approximately 350 undergraduates and eighty graduate students. Further information about the department is available at http://www.cs.pdx.edu.

Review of applications will begin immediately and will continue until the positions are filled. Please send a statement of research and teaching interests, a curriculum vitae, and the names of three references to:

Faculty Search Committee
Department of Computer Science
Portland State University
PO Box 751
Portland, OR 97207-0751

Please indicate whether you are applying for the systems or the software engineering position.

Portland State University is an Equal Opportunity/Affirmative Action employer.

## Princeton University
### Department of Computer Science

The Department of Computer Science at Princeton University invites applications for Assistant Professor, tenure-track positions. We are entertaining applications in all areas of computer science. Candidates for more senior ranks with exceptional records of research will also be considered.

Applicants must demonstrate superior research and scholarship potential as well as teaching ability. A Ph.D. or equivalent in Computer Science or related areas is required. Successful candidates at all ranks are expected to pursue an active research program and to contribute significantly to the teaching programs of the department.

Applications should include a resume and the names of at least three people who can comment on the applicant's professional qualifications. Applicants should be sent to:

Chair, Search Committee
Dept. of Computer Science
Princeton University
35 Olden Street
Princeton, NJ 08544-2087
E-mail: search@cs.princeton.edu

The Committee will begin to consider applications in January 1999. Princeton

# Professional Opportunities

University is an Equal Opportunity/Affirmative Action employer.

## Princeton University
### Department of Computer Science
The Department of Computer Science at Princeton seeks applications from outstanding teachers to assist the faculty in teaching our introductory course sequence. There is no deadline for applications, but candidates are encouraged to apply early.

Candidates should have an exceptional record of classroom instruction and curricular innovation. Princeton University prides itself on the quality of its undergraduate teaching and the Computer Science Department is committed to being a leader in developing new courses and teaching methods.

The job involves recitation sections (two per semester) in the first and second year as well as certain responsibilities for overall management of the introductory sequence. There is also work supervising assistants in introduction (i.e TA's) and developing curricular material, classroom demonstrations, and laboratory exercises. Lecturers are appointed to one-year terms, renewable for up to six years. Promotion to the rank of senior lecturer, with unlimited renewable terms, is a possibility. We are seeking candidates who are interested in establishing a long-term professional relationship at Princeton. Qualified applicants should send a letter of application, a resume, and the names of four references to:

  Lecturer Recruiting Committee
  Department of Computer science
  Princeton University
  Princeton, NJ 08544
  Princeton University is an Equal Opportunity/Affirmative Action Employer.

## Purdue University
### Department of Computer Sciences
The Department of Computer Sciences at Purdue University invites applications for tenure-track positions beginning August 1999. Positions available are at the Assistant Professor level. Appointments at the Associate and Full Professor levels, however, will be considered for highly qualified applicants. Areas of particular interest are: computer graphics and scientific visualization, database systems, information security, operating systems and networking, and software engineering. Excellent candidates in other areas of computer science and its applications will be seriously considered. Senior candidates must possess a distinguished record of accomplishments in research, teaching, and service.

Applicants should hold a Ph.D. in Computer Science, or a closely related discipline, and should be committed to excellence in teaching and research. Salary is competitive and depends on background and experience.

The Department of Computer Sciences encompasses a wide range of research areas including analysis of algorithms and theory of computation, databases, distributed and parallel computing, geometric modeling and scientific visualization, information security, networking and operating systems, numerical computing, parallelizing compilers, programming languages, and software engineering.

Each faculty member has access to the departmental and University computing facilities, which include a variety of high performance computing platforms. For more information see http://www.cs.purdue.edu.

Candidates should send curriculum vitae, statement of career objectives, and arrange sending at least three confidential letters of reference. The interviewing process will continue until positions are filled. Please send applications to:

  Chair, Faculty Search Committee
  Department of Computer Sciences
  Purdue University
  West Lafayette, IN 47907
  Purdue University is an Equal Opportunity/Affirmative Action employer.

## Rensselaer Polytechnic Institute
### Department of Computer Science
The Computer Science Department invites applications for tenure-track, clinical, and visiting positions at all levels. Preference will be given to applicants in experimental computer science (particularly in distributed systems, networking, parallel processing, and software engineering). However, exceptional candidates in all areas will be considered. Applicants should have a doctorate in Computer Science or a related area and a commitment to excellence in research and teaching.

The Department offers BS, MS, and Ph.D.

degrees in Computer Science, has multimillion-dollar research programs and excellent computing facilities.

Collaborative and interdisciplinary research is encouraged. For example, the Department maintains close collaboration with faculty in Computer Engineering, Civil Engineering, and Mechanical Engineering.

Currently there are seventeen full-time faculty members, approximately 400 undergraduate students, sixty Master's students, and sixty Ph.D. students. Send resumes and have at least three reference letters sent to:

  Professor Boleslaw Szymanski
  Chair of New Staff Committee
  Department of Computer Science
  Rensselaer Polytechnic Institute
  Troy, NY 12180-3590
  Rensselaer is an Equal Opportunity/Affirmative Action employer.

## Rutgers University
### Computer Science Department
*Faculty Positions*
The Computer Science Department at Rutgers University is seeking outstanding candidates for several tenure-track positions for the 1999 academic year. We are particularly interested in artificial intelligence, bio-computing, cryptography, databases, digital libraries, distributed and parallel systems, networking, operating systems, security, software engineering, and theoretical computer science, although exceptionally strong candidates in all areas are encouraged to apply.

The new Rutgers University strategic plan places computer science as an area with one of the highest expected growth rates within the university. Our department's $4 million of outside funding is distributed among forty-five research projects, spanning the spectrum of computer science. We are partners in major centers in theoretical computer science (DIMACS), cognitive science (RuCCS), and wireless and mobile computing (WINLAB), among others. (For more details, see http://www.cs.rutgers.edu.) Our department also has close ties to industry including AT&T, Bellcore, Hewlett-Packard, Lucent, NEC, Siemens, and Sun, as well as several emerging companies in the New York area.

To apply please submit a curriculum vitae including names of at least four professional references to:

  Professor Eric Allender, Hiring Chair
  Department of Computer Science
  Rutgers, the State University
  110 Frelinghuysen Road
  Piscataway, NJ  08854-8019
  by February 1, 1999, or send e-mail to hiring@cs.rutgers.edu for further information. We especially encourage applications from women and other under-represented groups.

## 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 and 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.

## Simon Fraser University
### School of Computing Science
Applications are invited for two tenure-track positions at the Assistant Professor level. A Ph.D. in Computing Science or equivalent is required, with a strong commitment to

excellence in research and teaching. The ideal candidate will have demonstrated research expertise in a systems area, such as software engineering, graphics, multimedia systems, database systems, distributed systems or networking. However, outstanding candidates in all areas and at all levels will be considered.

Responsibilities include research as well as teaching at the graduate and undergraduate levels. Excellent support will be provided to the successful applicants for establishing their research programs. As well, researchers in advanced systems will be eligible for fellowships in the B.C. Advanced Systems Institute (see http://www.asi.bc.ca/asi/programs/funding/descript.html).

The School of Computing Science has thirty-three faculty members, and offers an expanding graduate program with over 100 M.Sc. and Ph.D. students. The School has state-of-the art computer equipment with excellent network support. There are well-equipped research laboratories in areas including algorithms, artificial intelligence, graphics and multimedia, and database systems. As well, the School has strong links with the university's Centre for Systems Science, the B.C. Advanced Systems Institute, and local industry.

Simon Fraser University serves about 18,000 students. The university has been ranked first in the "Comprehensive" category for the second year running in a national ranking of Canadian universities carried out by Maclean's Magazine. The university is situated on top of Burnaby Mountain just east of Vancouver and commands magnificent views of Burrard Inlet, the North Shore Mountains, the Fraser River, and Vancouver harbour. The Lower Mainland area of British Columbia is unique in Canada for its mild climate and varied recreational opportunities.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Simon Fraser University is committed to the principle of equity in employment and offers equal employment opportunities to qualified applicants. Applications will be accepted until the position is filled; January 31, 1999 may be taken as a practical cutoff. For updated information see http://www.cs.sfu.ca/.

To apply, send a curriculum vitae, evidence of research productivity (including selected reprints), and the names, addresses and phone numbers of three referees to:

  Dr. James P. Delgrande, Director
  School of Computing Science
  Simon Fraser University
  Burnaby, British Columbia, Canada, V5A 1S6
  E-mail: cs-chair@cs.sfu.ca

## Southern Methodist University
### Computer Science and Engineering
The Computer Science and Engineering Department at Southern Methodist University invites applications for two faculty positions beginning Spring or Fall 1999. Priority will be given to individuals with expertise in: distributed operating systems, networking, communications, telecommunications software, or computer systems architecture. Candidates at all ranks will be considered. The successful candidates must hold a Ph.D. in Computer Science, Computer Engineering, or a closely related area and demonstrate a strong commitment to excellence in teaching and research.

The Dallas area has one of the highest concentrations of high-tech corporations in the nation, offering abundant opportunities for industrial research cooperation and consulting.

The CSE Department resides within the School of Engineering and Applied Science and offers BS, MS, and Ph.D. degrees in Computer Science and in Computer Engineering. It currently has thirteen faculty members whose research concentration is in artificial intelligence, computational programming, computer arithmetic, computer networks, database systems, distributed operating systems, parallel processing, software engineering, as well as other related areas. Additional information may be found at www.seas.smu.edu/cse.

Interested individuals should send a complete resume and names of three references, including a one-page statement of research interests and accomplishments to:

  Professor J. L. Kennington
  Search Committee Chair
  Department of Computer Science and Engineering
  SMU
  Dallas, TX  75275-0122
  To ensure full consideration, applications must be postmarked before February 15, 1999, however, the committee will continue to accept applications until the positions are filled.

SMU is an Equal Opportunity/Affirmative Action, Title IX employer and does not discriminate on the basis of race, color, national or ethnic origin, sex, age, or disability.

## Southwest Texas State University (SWT)
### Department of Computer Science
Applications are invited for three newly created tenure-track positions at the Assistant Professor level to begin Fall 1999. Applicants must have an earned Doctorate in Computer Science or Computer Engineering and a commitment to excellence in teaching, research, and service.

The Department of Computer Science, with its sixteen full-time equivalent faculty, 550 undergraduate majors, and 110 master's students, is part of SWT, a comprehensive university with 21,000 students. SWT is located in San Marcos, Texas, a scenic college town close to both Austin and San Antonio. With proximity to many major high-tech companies, the department and the university have enjoyed significant growth in the past decade. For more information see http://infinite.cs.swt.edu/recruitment/.

Application review will begin February 15, 1999, and will continue until the positions are filled. To apply, send a printed resume and a list of at least three references with telephone, e-mail, and postal addresses to:

  Chair, Recruitment Committee
  Department of Computer Science
  SWT
  San Marcos, TX 78666-4616
  SWT is an AA/EEO employer. Women and minorities are encouraged to apply.

## Stanford University
### Department of Computer Science
*Faculty Opening*
The Computer Science Department of Stanford University invites applications for a tenure-track faculty position from candidates with expertise in the areas of continuous and discrete modeling, numerical analysis, or high-performance scientific computing. There is a particular interest in candidates who wish to pursue a research program on tools for high-performance computing (such as languages, compilers, and architectures). Candidates are also expected to be actively interested in application areas which include, but are not restricted to, some of the following: physical simulation, mining of massive data sets, statistical learning, data visualization, computational biology (e.g., protein folding, molecule binding), and medical imaging. Higher priority will be given to the overall innovation and promise of the candidate's work than to contributions to any of these specific topics.

Applicants should have a Ph.D. in a relevant field. Evidence of the ability to pursue a research program and a strong commitment to graduate and undergraduate teaching are required. The successful candidate will be expected to teach courses, both in the candidate's specialty area and in related subjects, at the graduate and undergraduate levels, and to build and lead a team of graduate students in Ph.D. research.

The appointment will be made at the level of an Assistant Professor. The position is available beginning Autumn 1999 and is offered in collaboration with the Scientific Computing and Computational Mathematics (SC-CM) Program. Further information about the Computer Science Department and the SC-CM Program can be found at http://www-cs.stanford.edu and http://www-sccm.stanford.edu, respectively.

Applications should include a curriculum vitae, statements of research and teaching interests and the names of five references. The application should be sent to:

  Professor Rajeev Motwani, Search Committee Chair
  c/o Laura Kenny-Carlson
  Computer Science Department
  Stanford University
  Gates 2B
  Stanford, CA 94305-9025
  The interview process will begin on January 15, 1999, but applications will be accepted until February 15, 1999. Stanford University is an equal opportunity employer and welcomes applications from women and minority candidates.

## Stanford University
### Departments of Linguistics and Computer Science
*Faculty Opening*
Stanford University's Departments of Linguistics and Computer Science seek applicants for a tenure-track faculty position in areas combining linguistics and computation. Candidates will be expected to show breadth and depth in both areas and to demonstrate the ability to make an intellectual contribution to both linguistics and computer science.

Example topics of interest include, but are not limited to, natural language dialog processing and understanding, development and evaluation of linguistic methods using large speech and text databases, speech recognition, computational modeling of cognitive processing of language, lexical knowledge bases, symbolic

# Professional Opportunities

and statistical methods of language processing, and linguistic knowledge representation. Interest in an application area, such as information retrieval, data mining, or web services is desirable. Higher priority will be given to the innovation and promise of the candidate's work than to any of these specific topics and applications.

Applicants should have a Ph.D. in a relevant field. Evidence of the ability to pursue a research program and a strong commitment to graduate and undergraduate teaching are required. The successful candidate will be expected to teach courses, both in the candidate's specialty area and in related subjects, at the graduate and undergraduate levels, and to build and lead a team of graduate students in Ph.D. research.

The appointment will be made at the level of an Assistant Professor. The position is available beginning Autumn 1999 and is offered jointly in the Linguistics and Computer Science Departments. Further information about these departments can be found at http://www-linguistics.stanford.edu and http://www-cs.stanford.edu, respectively.

Applications should include a curriculum vitae, statements of research and teaching interests, and the names of five references. The application should be sent to:

    Professor John Mitchell
    Search Committee Chair
    c/o Laura Kenny-Carlson
    Computer Science Department
    Stanford University
    Gates 2B
    Stanford, CA 94305-9025

The interview process will begin on January 15, 1999, but applications will be accepted until February 15, 1999. Stanford University is an Equal Opportunity employer and welcomes applications from women and minority candidates.

## Stanford University
### Departments of Electrical Engineering and Computer Science
*Faculty Opening*

Stanford University's Departments of Computer Science and Electrical Engineering invite applications for a tenure-track faculty position from candidates with expertise in the area of computer architecture. The search will use a broad definition of computer architecture. There is a particular interest in applicants who wish to pursue a research program in architecture issues for systems that go beyond future PC and workstation designs. Specific example areas of interest range from architectures for data warehousing, signal compression or coding, embedded computing, vision and graphics, to understanding the interactions between large parallel applications and the machines they run on.

Applicants should have a Ph.D. in a relevant field. Evidence of the ability to pursue a research program and a strong commitment to graduate and undergraduate teaching are required. The successful candidate will be expected to teach courses, both in computer architecture and in related subjects, at the graduate and undergraduate levels, and to build and lead a team of graduate students in Ph.D. research.

The appointment will be made at the level of an Assistant Professor. The position is available beginning Autumn 1999 and is offered jointly in the Electrical Engineering and Computer Science Departments. Further information about these departments can be found at http://www-cs.stanford.edu and http://www-ee.stanford.edu, respectively.

Applications should include a curriculum vitae, statements of research and teaching interests, and the names of five references. The application should be sent to:

    Professor Bill Dally, Search Committee
    Chair
    c/o Eileen Schwappach
    Computer Systems Laboratory
    Gates Building, RM 409
    Stanford University
    Stanford, CA 94305-9040

The interview process will begin on January 15, 1999, but applications will be accepted until March 15, 1999. Stanford University is an Equal Opportunity employer and welcomes applications from women and minority candidates.

## State University of New York at Buffalo
### Department of Computer Science and Engineering
*Six Faculty Positions in Computer Science and Engineering*

The newly-formed Department of Computer Science and Engineering (CSE), consisting of faculty from the former CS department and computer engineering faculty from the former ECE department, is slated to grow by fifteen tenured/tenure-track faculty positions over the next few years. This year we have one opening at the Associate/Full professor level, four openings at the Assistant/

Associate professor level, and one opening at the Lecturer level.

Associate/Full Professor in Software Engineering: We invite applications from outstanding researchers, with an excellent publication and research record, who will take the lead in building a strong research group and a degree program in software engineering. Candidates are expected to have a Ph.D. in Computer Science/Engineering or related field. Address applications to:

    Chair, Software Engineering Search
    Committee
    226 Bell Hall
    CSE Department
    University at Buffalo
    Buffalo, NY 14260-2000
    E-mail: cse-search@cse.buffalo.edu

Assistant/Associate Professor: We seek excellent researchers in any area of computer science/engineering. Current faculty interests are in computational science/engineering, computer networks, intelligent systems, multimedia and databases, programming languages, theory and algorithms, VLSI, and Computer Architecture. Junior candidates must expect to have a Ph.D. in Computer Science/Engineering or closely related field by September 1999, and must demonstrate evidence of potential for publishing and developing a successful funded research program. Senior candidates are expected to have an excellent publication and research record. Address applications to:

    Chair, Faculty Search Committee
    226 Bell Hall
    CSE Department
    University at Buffalo
    Buffalo, NY 14260-2000
    E-mail: cse-search@cse.buffalo.edu

Lecturer (non-tenure-track): Applicants should have a Masters or Ph.D. degree in Computer Science/Engineering or closely related field by September 1999, with clear evidence of ability to teach and develop undergraduate level courses in CSE. Appointees are expected to concentrate on and excel in teaching and teaching-related activities, and also participate in department and university governance. Address applications to:

    Chair, Lecturer Search Committee
    226 Bell Hall
    CSE Department
    University at Buffalo
    Buffalo, NY 14260-2000
    E-mail: cse-lecturer-search@cse.buffalo.edu

All applications should include a cover letter, curriculum vitae, and names and addresses of three references. Lecturer applicants should include a one-page teaching statement. Deadline for all applications: January 31, 1999 or until positions are filled.

The University at Buffalo is New York's largest and most comprehensive public university. As the second largest city in New York State, Buffalo is the hub of a metropolitan area with a population over 1.1 million. University life is enriched by scenic, recreational, and cultural opportunities in the city, suburbs, and the neighboring Niagara and Metro Toronto regions. For more information about our department, the university, and the metropolitan area, please visit our website at http://www.cse.buffalo.edu. SUNY is an Equal Opportunity/Affirmative Action employer.

## State University of New York at Buffalo
### Department of Computer Science and Engineering
*Professor and Chair, Computer Science and Engineering*

The newly-formed Department of Computer Science and Engineering (CSE) invites applications for the position of Professor and Chair of the Department.

The CSE department consists of faculty from the former CS department and computer engineering faculty from the former ECE department. Over the next few years it is slated to grow by fifteen tenured/tenure-track positions, nearly doubling its present size. We seek an internationally recognized scholar with vision and leadership who will help shape the department's growth at this crucial juncture.

Current faculty interests are in computational science/engineering, computer networks, intelligent systems, multimedia and databases, programming languages, theory and algorithms, VLSI and Computer Architecture. Faculty members are also affiliated with the Center for Cognitive Science, the National Center for Geographic Information and Analysis, the Center of Excellence in Document Analysis and Recognition, and the newly-formed Center for Computational Research. The faculty include AAAI, ACM, Guggenheim, IEEE, and Sloan Fellows as well as NSF PYI and CAREER awardees. The average annual research expenditure of the department over the past three years has been $3.7 million, and the combined annual funding at the Centers exceeds $5 million.

The CSE department offers degree programs at the bachelors, masters, and doctoral level, and currently has 135 graduate students and over 900 undergraduate majors. The department also

manages and operates extensive computing laboratories for undergraduate and graduate teaching as well as research.

Candidates are expected to have a Ph.D. in Computer Science/Engineering or related field. Applicants should include a cover letter, curriculum vitae, and names and addresses of five references. Address applications to:

    Prof. Colin Drury
    CSE Chair Search Committee
    342 Bell Hall
    University at Buffalo
    Buffalo, NY 14260
    E-mail: cse-chair-search@cse.buffalo.edu

Deadline for all applications is February 15, 1999 or until the position is filled.

The University at Buffalo is New York's largest and most comprehensive public university. As the second largest city in New York State, Buffalo is the hub of a metropolitan area with a population over 1.1 million. University life is enriched by scenic, recreational, and cultural opportunities in the city, suburbs, and the neighboring Niagara and Metro Toronto regions. For more information about our department, the university, and the metropolitan area, please visit our website at http://www.cse.buffalo.edu. The University at Buffalo is an Equal Opportunity/Affirmative Action employer.

## State University of New York at Stony Brook
### Computer Science Department
*Faculty Positions*

The Computer Science Department of SUNY Stony Brook has at least two tenure-track junior faculty positions for Fall 1999. We are particularly, but not exclusively, interested in applications from the experimental computer systems area, such as operating systems, networking, graphics, databases, computer architecture, Internet-related systems, and automated verification. We especially encourage candidates who have experiences in building unique hardware/software systems to apply for these openings.

The Department currently has twebty-four faculty members and is expected to grow to thirty-four in the next few years. There are four main active research areas in the department: graphics/visualization, logic programming/database, concurrency/verification, and computer systems. Detailed information on the research activities of these groups can be found in the department's homepage http://www.cs.sunysb.edu.

A newly established Center for Data-Intensive Computing at Brookhaven National Laboratory will be associated with the Department. The Center is expected to have about ten computer scientists and will emphasize data mining, visualization, parallel and distributed computing and networking, and modeling and simulation.

Applicants should have a Ph.D. in Computer Science or a related discipline. Please submit by February 1999 a detailed curriculum vitae, the names of three references, and reprints of best publications to:

    Professor Tzi-cker Chiueh, Chair
    Faculty Recruiting Committee
    Computer Science Department
    SUNY at Stony Brook
    Stony Brook
    NY 11794-4400
    Telephone: 516-632-8449 (or 8470)
    E-mail: chiueh@cs.sunysb.edu.

Please include web pointers to online resume and publications, if possible.

Applications from women and minorities are particularly welcome. Stony Brook is an Affirmative Action/Equal Opportunity educator and employer.

## Stevens Institute of Technology
### Department of Computer Science
*Faculty Positions*

Stevens has three tenure-track positions available at the rank of Assistant or Associate Professor in the Department of Computer Science starting in September 1999. The Department has ten full-time faculty, and more than a dozen part time faculty. It offers BS, MS and Ph.D. degrees. In particular, we are seeking outstanding candidates in software engineering, computer graphics, data mining computer architecture, but candidates in all other areas of computer science will also be considered.

Successful candidates are expected to pursue an active research program, perform both graduate and undergraduate teaching and supervise graduate students. Prospective faculty can look forward to a research environment in which collaboration with industry is encouraged.

Stevens is located in Hoboken, NJ, across the Hudson River from the Empire State Building in Manhattan.

Salary and rank will be commensurate with qualifications and experience.

Special compensation is available for people with exceptional qualifications.

Applicants should send a curriculum vitae,

list of publications, and a statement of current and planned research. Also, candidates should arrange to have at least three letters of recommendation sent by postal mail or e-mail to:

    Stephen L. Bloom, Director
    Department of Computer Science
    Stevens Institute of Technology
    Hoboken, NJ 07030
    E-mail: bloom@cs.stevens-tech.edu

Stevens Institute of Technology is an Equal Opportunity Employer.

## Swarthmore College
### Computer Science Program
*Swarthmore, PA*

Applications are invited for a tenure-track position (pending administrative approval) at the Assistant Professor rank. Swarthmore College is a small, selective, liberal arts college located in a suburb ten miles outside of Philadelphia. The computer science program offers concentrations, minors, and majors in computer science at the undergraduate level. We have a CS laboratory of Sun workstations as well as access to a campus network of Macintoshes, PCs, and Decstations. Both a Sun and Mac or PC will be provided in the office of the successful applicant. Applicants should have some teaching experience and be comfortable teaching a wide range of courses at the introductory and intermediate undergraduate level. Fluency in C, Scheme and one of C++ or Java is desired. Some preference will be shown to applicants who can involve undergraduate students in their research. We will consider all subareas of CS. Areas of special interest are: communications and networking, operating systems, or parallel programming. A resume and three letters of reference should be sent to:

    Charles F. Kelemen
    Swarthmore College
    Computer Science Program
    500 College Avenue
    Swarthmore, PA 19081

At least two of the letters of reference should speak to the candidate's teaching ability. Applications from women and members of minority groups are encouraged.

We expect to begin interviewing in late January or early February. Applications will be accepted until the position is filled.

## Syracuse University
### Department of Electrical Engineering and Computer Science
*Several positions*

The department invites applications for: (1) one tenured senior faculty position in RF/Wireless systems; (2) one tenure-track junior faculty position in software systems. These two positions are part of a continuing search and the starting date can be as soon as January 1, 1999, or as soon as possible thereafter.

In addition, at least two new positions are available: (3) one tenure-track junior faculty position in electrical engineering for an individual with experience in experimental research or laboratory instruction; and (4) at least one tenure-track junior faculty position in one of the following areas: distributed computing, VLSI computer-aided design, or software systems. For these new positions, the application deadline is January 15, 1999 or until the position is filled, and the starting date is August 24, 1999 or as soon as possible thereafter.

For all positions, a doctorate in a field appropriate to the area is required. Submit curriculum vitae, research and teaching statements, copies of selected publications, and have three reference letters sent to:

    Faculty Search Committee
    Department of Electrical Engineering and
    Computer Science
    121 Link Hall
    Syracuse University
    Syracuse, NY 13244-1240, USA
    Please see: http://uplink.syr.edu/faculty/search/d1/positions.html for more information.

Syracuse University is an Equal Opportunity/Affirmative Action Employer. Qualified individuals from underrepresented groups are urged to apply.

## Temple University
### Department of Computer and Information Sciences

We anticipate tenure-track positions in the areas of distributed systems, software engineering, networks, and databases. Applicants should hold a Ph.D. in Computer Science or Information Systems. Candidates will be selected based on their ability to contribute to strong undergraduate and graduate instructional programs, while contributing to a growing research program. Salaries are highly competitive and will be determined by the appointee's experience, evidence of research potential, and record of scholarly achievement.

# Professional Opportunities

The CIS Department offers programs through the College of Science and Technology and through the School of Business and Management leading to the Bachelors, Masters, and Ph.D. degrees. The Ph.D. in Computer & Information Sciences provides exciting opportunities for faculty to participate in a truly multi-disciplinary program.

Temple University, a member of the Pennsylvania Commonwealth System of Higher Education, is located in Philadelphia and serves a highly diverse population of 27,000 students. Temple University is an Equal Opportunity/ Affirmative Action employer and specifically encourages applications from women and minorities. Additional information about the department is available at http:// www.cis.temple.edu.

To apply, submit curriculum vitae, and bibliography to:

Professor Elliot B. Koffman
Chair, Faculty Search Committee
Temple University (038-24)
Department of Computer & Information Sciences
Rm. 311, 1805 N. Broad St.
Philadelphia, PA 19122-6094
Email: koffman@cis.temple.edu

### Texas A&M University
#### Department of Computer Science

Applications are invited for several tenure-track and visiting faculty positions. Outstanding candidates at all levels and from all areas of specialization will be considered. Candidates should include in their letter of application the type of position for which they are applying.

Texas A&M University has long enjoyed national leadership status in engineering education. Today, the Dwight Look College of Engineering is one of the largest and best endowed in the nation, and it ranks among the top institutions in every significant national poll.

The Department of Computer Science is one of the fastest-developing departments in the College. In recent years, it has built a strong national reputation based on the quality of its faculty and programs. The Department offers BS, Master's and Ph.D. degrees in computer science and, jointly with the Department of Electrical Engineering, in computer engineering. The computer science graduate and undergraduate programs are among the largest in the nation. Full-time faculty currently number thirty-five, and the annual research budget is approximately $3 million, including six NSF PYI/NYI/ CAREER awards. More information is available on the Web at http:// www.cs.tamu.edu.

Candidates should have a Ph.D. in Computer Science or a closely related field, a strong commitment to both research and teaching, and demonstrated ability to perform research and acquire external funding appropriate to the rank being sought. Applications from minority and women candidates are especially encouraged. Texas A&M University is an Equal Opportunity/Affirmative Action employer committed to diversity.

Applicants should send a statement of research and teaching interest, a complete resume, and the names of at least three references, their addresses (including e-mail) and telephone/fax numbers to:

Faculty Search Committee
Department of Computer Science
Texas A&M University
College Station, Texas 77843-3112
Applications will be accepted until positions are filled.

### Tulane University
#### Department of Electrical Engineering and Computer Science
*YAHOO! Endowed Chair in Information Technology*

The Department of Electrical Engineering and Computer Science of Tulane University invites applications and nominations for the Yahoo! Founder Chair in Engineering. The holder of the endowed chair will provide leadership for research and instructional programs in computer engineering. The recipient will work closely with colleagues in the EECS Department and other departments within the School of Engineering as well as with other University research units.

Qualifications include (a) an earned doctorate in computer engineering, computer science, electrical engineering, or a related discipline, (b) exceptional leadership capabilities in other sponsored research and instructional activities, (c) ability to interact productively with the industrial community and government agencies, (d) outstanding record of scholarly activity, and (e) international visibility in an area of information technology.

Applicants should be eligible to work in the U.S. Dedication to research, teaching, and service is required. The chair holder is expected to have particular skills and interests in information technology and teach related courses. Candidates from the industrial community are encouraged to apply.

Tulane is a private nonsectarian university with a proud educational tradition stretching back more than 150 years. In addition to the School of Engineering, there are professional schools in Business, Architecture, Law, Social work, and Medicine. The EECS Department has fifteen faculty members and currently enrolls more than 190 students in baccalaureate programs in Electrical Engineering, Computer Science, and Computer Engineering. The Department offers MS and Ph.D. degrees with specialization in Electrical Engineering, Computer Engineering, and Computer Science.

There are more than seventy full-time graduate students enrolled. The faculty is responsible for more that $1.1M in new external research funds during the 1996-97 academic year. For more information, visit the homepage: http://www.eecs.tulane.edu/. Tulane University is located in New Orleans, Louisiana one of America's most distinctive cities. New Orleans is the venue for many national and international conferences, as well as major sports events.

Nominations, or curriculum vitae with the names, addresses, and telephone numbers of five references, together with a personal statement concerning qualifications and activities relative to the endowed chair, should be sent to:

Prof. Mark Benard, Chair
Endowed Chair Search Committee
Dept. of Electrical Engineering & Computer Science
Tulane University
New Orleans, LA 70118
Applications will be accepted until the position is filled; however, the search committee will begin reviewing applications no later than December 1998. Tulane University is an Equal Opportunity/Affirmative Action employer.

### University of Alberta
#### Department of Computing Sciences

Applications are invited for at least three tenure-track positions at the Assistant Professor level, as part of our department's continued expansion. Candidates are sought in database systems, software engineering, networks and systems, and algorithmics. Outstanding candidates in other areas and at more senior ranks will be considered. Responsibilities for all positions include research and teaching at both the graduate and undergraduate levels. Excellent research startup support is provided to successful candidates.

The Department consists of thirty-five academic staff, twenty-five support staff, 110 graduate students, and 300 undergraduate students. We have made significant effort in recruiting good students, and our goal is to have a graduate program that is among the best in North America. Our facilities include an extensive and well-maintained network of all varieties of computing systems, including a forty-four processor SGI Origin 2000 (the largest academic computer in Canada), the only virtual-reality immersive display (CAVE) in Canada, and a well-equipped imaging laboratory created with the support of HP. The Department is locally well connected via the Campus FDDI network. Experimental ATM network connections are available for research projects. There are research laboratories in algorithmics, artificial intelligence, cognitive science, communication networks, computer graphics, computer vision and robotics, database, parallel and distributed systems, and software engineering. The department plays a leadership role in two multidisciplinary institutes: the Research Institute for Multimedia Systems (RIMS), which manages the CAVE, and the Multimedia and Advanced Computational Infrastructure (MACI), which manages the SGI Origin 2000. Salary will be commensurate with qualifications and experience.

Send curriculum vitae, the names of three references and up to three reprints or copies of important publications. A Ph.D. or equivalent is the minimum qualification; new Ph.D.'s should include a copy of their transcript. Applications will be accepted until March 1, 1999 with employment commencing on July 1, 1999. To discover more about our department please visit www.cs.ualberta.ca. Please send applications to:

Randy Goebel, Chair
Department of Computing Science
University of Alberta
Edmonton, Alberta
Canada, T6G 2H1
Telephone: 403-492-4589
Fax: 403-492-1071
E-mail: goebel@cs.ualberta.ca
The University of Alberta is committed to the principle of equity in employment. As an employer, we welcome diversity in the workplace and encourage applications from all qualified women and men, including Aboriginal peoples, persons with disabilities, and members of visible minorities.

### 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 (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
Applications will be considered 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 Arizona
#### Department of Computer Science
*http://www.cs.arizona.edu*
*Lecturer in Computer Science*

Applications are invited for the position of Lecturer beginning employment August 1999. Lecturer candidates must hold a graduate degree in Computer Science or closely related field, have a strong commitment to excellence in teaching, and have substantial experience teaching computer science at the university level. Compensation is competitive and depends on experience and qualifications. This is a non-tenured position, with appointment for a fixed term of three years, and possible reappointment, subject to review, afterwards.

Duties of this position include teaching undergraduate computer science courses in areas such as program development and software design, machine organization and architecture, data structures, and foundations of computing. Duties also include academic advising of students, service on department committees involved in undergraduate life, and development of new curriculum and instructional laboratories.

The Department of Computer Science at The University of Arizona consists of twelve graduate faculty and two senior lecturers. Department faculty have a distinguished history of awards in teaching excellence, research accomplishment, influential software distribution, and substantial external funding. Areas of research and curriculum include software systems, programming languages, compilers, operating systems, networks, parallel algorithms, database systems, computational biology, and theory of computation. There are approximately eighty graduate and 150 undergraduate majors in the Department's programs. In addition to providing a broad range of equipment necessary to computing research and instruction, the Department supports its instruction and research programs through an exceptional professional laboratory staff. For more information about the Department, see the website at http:// www.cs.arizona.edu.

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
A majority of the references should be able to comment directly upon the candidate's teaching experience and abilities. We will start the review of applications on January 15, 1999, and will continue to consider applicants until the position is filled, subject to availability of funds. The University of Arizona is an EEO/ AA employer - M/W/D/V.

### University of Arkansas
#### Department of Computer Systems Engineering

The Department of Computer Systems Engineering invites applications for tenured/ tenure-track faculty positions at all ranks. The department seeks candidates interested in developing a strong research program along with a strong commitment to teaching. Candidates are sought with expertise that complement the college's strategic areas of emphasis in database architectures and telecommunications. Desired areas of expertise are databases, embedded and real time systems, networking, distributed and parallel systems, reconfigurable computing systems, and VLSI design. A Ph.D. in Computer Engineering, Electrical Engineering, or closely related field is required.

The department has 340 undergraduate and fifty graduate students, and is seeking to double the graduate program. College research facilities include HiDEC, (the College of Engineering's High Density Electronics Center), and laboratories for computer architecture, image processing, and networking.

Applications should be sent to:
Chair, Faculty Search Committee
Department of Computer Systems Engineering
313 Engineering Hall
University of Arkansas
Fayetteville, AR, 72701
Electronic submissions and questions should be sent to search@engr.uark.edu. Information on the department and area can be accessed at http://web.cseg.engr.uark.edu.

A complete application includes a cover letter discussing teaching and research interests, curriculum vitae, and names and addresses of three references. Applications will be accepted and reviewed until all positions are filled.

The University of Arkansas is committed to achieving racial, ethnic, and gender diversity in its faculty. Therefore, the University is interested in applications from all qualified candidates who would contribute to such diversity within the Department of Computer Engineering.

### University of California, Davis
#### Department Of Computer Science
*Faculty Positions*

The Department of Computer Science, at the University of California, Davis, invites applications for several tenure-track faculty positions. The department is primarily seeking candidates at the Assistant Professor level; it will also consider senior candidates who have a truly distinguished record. The department welcomes applications from strong candidates in all areas; it is particularly interested in computer systems, visualization/computer graphics/ computational geometry, networks, and computational science and engineering. (For the Computational Science and Engineering position, the possibility exists for a joint appointment with the Lawrence Berkeley National Laboratory or the Lawrence Livermore National Laboratory for candidates with relevant experience.)

The CS Department currently has nineteen faculty, with a substantial research facility covering all major areas of computer science. It is experiencing a period of strong growth in research and instruction and expects to continue this trend. The Davis campus is the third largest in the University of California system. UC Davis ranks among the nation's top twenty universities in research funding and has been rated as one of the top five 'up and coming' universities in the country.

Davis is a pleasant, family-oriented community in a small college-town setting with excellent public schools and a mild climate. Davis is ideally located for many recreational, cultural, and professional activities. It is just fifteen miles from California's capital city of Sacramento and is within easy driving distance of the Sierra Nevada Mountains, Berkeley, San Francisco, Silicon Valley, Napa Valley wine country, and the Pacific Coastal areas.

Please consult our webpage for additional information and application procedures: http://www.cs.ucdavis.edu/ or send e-mail to: apply@cs.ucdavis.edu.

These positions are open until filled. UC Davis is responsive to the concerns of dual career couples and offers a Partners Opportunity Program. UC Davis 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

# Professional Opportunities

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 CV, 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, Santa Barbara
### Department of Computer Science
*Faculty Positions*

The University of California, Santa Barbara, invites applications for faculty positions in Computer Science. Applicants in all areas of computer science are welcome. However, the department emphasizes building strengths in software systems and in computational science and engineering (CSE). Areas of particular interest include experimental computer science, scientific visualization, high performance computing, and multimedia networking. For candidates with outstanding qualifications, a tenured appointment is possible; multi-departmental and/or senior-level appointments are a possibility for CSE candidates.

The Department of Computer Science is part of an expanding College of Engineering, which encompasses over 100 faculty in various engineering disciplines. Excellent instruction and research computing facilities are available. UCSB is a major research institution, elected member of the Association of American

Universities, as well as an integral part of the nine campus University of California system, widely regarded as the most distinguished system of public higher education in the United States. Graduate degrees in Computer Science are offered at the MS and Ph.D. levels.

Applicants should hold a doctoral degree in Computer Science or a related field; appointments are scheduled to begin in 1999-2000.

Primary consideration will be given to candidates who apply by March 1, 1999, however the position will remain open until filled. Send resume and names of at least four referees to:

Recruitment Committee
Department of Computer Science
University of California
Santa Barbara, CA 93106-5110

To apply by electronic mail, send the application in an ASCII or postscript file to: recruitment@cs.ucsb.edu. Additional information about the Computer Science Department may be found at www.cs.ucsb.edu.

## University of Central Florida
### School of Computer Science

The School of Computer Science at the University of Central Florida in Orlando, is offering exciting opportunities in career-oriented, non-tenurable, full-time teaching positions responsible for developing and delivering both conventional and distance learning courses for majors as well as service courses. Our facilities include state-of-the-art classroom and "teaching" laboratories.

Applicants must have an MS, or Ph.D. in Computer Science or a related field, with strong teaching credentials. Work toward a Ph.D. is encouraged with up to six credits of tuition waived per term.

Send a complete resume and three letters of reference to:

Lecturer Search Committee
School of Computer Science
Box 25000
University of Central Florida
Orlando, FL 32816

The University of Central Florida is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.

## University of Cincinnati
### Department of Electrical & Computer Engineering and Computer Science

The Department of Electrical & Computer Engineering and Computer Science invites applications and nominations for Assistant/Associate Professor tenure-track positions in Computer Science and Engineering. Areas of special interest include communications and mobile computing, distributed computing, operating systems, and programming languages. Successful candidates should have the potential and commitment to develop research programs and will be involved in teaching at the undergraduate and graduate levels. Candidates should have earned Ph.D. degrees in Computer Science, Computer Engineering, or closely related fields.

The ECECS Department offers fully ABET-accredited undergraduate programs in Computer Engineering and Electrical Engineering, a BS degree in Computer Science, and MS and Ph.D. programs in Computer Science & Engineering, as well as in Electrical Engineering. The Department has forty-four full-time faculty, 300 full-time graduate students and 450 undergraduate students, and awards thirty-five MS and fifteen Ph.D. degrees per year. Research and education programs are well funded, with annual research funding in excess of $5 M. The Department has well equipped research and teaching laboratories, and occupies 45,000 square feet of space including research laboratory space in a new Engineering Research Center. A new Center for Distributed and Mobile Computing is also being established.

Curriculum vitae and/or nominations should be sent to:

Thomas Mantei, Head
Dept. of Electrical & Computer Engineering and Computer Science
P.O. Box 210030, University of Cincinnati
Cincinnati, Ohio 45221-0030

The University of Cincinnati is an Equal Opportunity/Affirmative Action employer and encourages applications from women and minorities.

## University of Colorado at Boulder
### Department of Electrical and Computer Engineering
*Faculty Position*

The Department of Electrical and Computer Engineering at the University of Colorado in Boulder invites applications for tenure-track faculty positions which will start in August 1999. The department anticipates hiring at the assistant professor level, but applications at higher levels will be considered.

The department is especially interested in digital systems and implementation. This includes all areas within computer engineering, communications, and digital signal processing. Examples of specialties might be memory hierarchies, mass storage, pipelined design, image processing and communication aspects of networks and distributed systems. Related areas such as VLSI design, electromagnetics of high-speed digital signals, digital signal processing, embedded systems, and power and packaging are also of interest. Candidates with expertise in more than one area are particularly welcome to apply. Senior candidates will also be considered. A Ph.D. in an appropriate field is required. We especially encourage those who would strengthen the College's gender, ethnic, or cultural diversity.

Candidates must demonstrate exceptional potential in both teaching and research. Send resume and names of references to:

Professor Ren Su
Department of Electrical and Computer Engineering
Campus Box 425
University of Colorado at Boulder
Boulder, CO 80309

Acceptance and review of applications will continue until the positions are filled. The University of Colorado is committed to diversity and equality in education and employment. Additional information about the department can be found on the World Wide Web, http://ece-www.colorado.edu.

## University of Colorado at Boulder
### Department of Computer Science

Applications are invited for three tenure-track faculty positions in Computer Science for fall 1999. Two positions are authorized at the Assistant Professor level and one at the Associate Professor level. Our highest priority is to fill at least one position in operating systems (including traditional OS areas as well as distributed systems, networks, mobile computing, soft real-time systems, and web-based systems). We are also especially interested in applicants in the areas of software engineering, multimedia technology (including electronic commerce, graphics, and related areas), machine learning, databases, and programming languages. However, applications in all areas of Computer Science will be considered. Applicants should show strong promise in research and teaching, and will be expected to have completed a Ph.D. degree by the time of the appointment.

The Computer Science Department at the University of Colorado has twenty faculty and about 175 graduate students. It has strong research programs in artificial intelligence, human computer interaction, numerical and parallel computation, software and systems, and theoretical computer science. The computing environment is a contemporary distributed systems environment. The Department is the recipient of three consecutive five-year infrastructure grants from NSF that support its computing infrastructure and collaborative research among its faculty.

Applicants should send a current curriculum vitae, the names of four references, and one-page statements of research and teaching interests to:

Professor Gary Nutt
Search Committee Chair
Department of Computer Science
Campus Box 430
University of Colorado
Boulder, CO 80309-0430.

Review of applications will begin on January 1, 1999, and applications received by that date will get first consideration. Applications received after March 31, 1999

may not be considered for interviews in the spring 1999.

The University of Colorado at Boulder is committed to diversity and equality in education and employment.

## University of Delaware
### Department of Computer and Information Sciences

A tenure-track Assistant Professor position is available beginning September 1, 1999.

We are seeking candidates with research and teaching interests in the area of software engineering and related object-oriented middleware technologies or in the areas of distributed systems, real time systems, and related operating systems topics. Applicants should hold a Ph.D. or its equivalent and should be committed to excellence in research and teaching. The normal teaching assignment is three courses per year.

The department has sixteen tenure-track, two visiting, and three research faculty members, and offers bachelor's, master's, and doctoral degrees. There are approximately 350 undergraduate majors and ninety graduate students. A substantial fraction of the latter are pursuing the Ph.D. We have significant external funding, including a $1.5M grant for an army research lab in telecommunications and information distribution. And a recent $900K NSF CISE Research Infrastructure Grant for parallel and distributed computing. Recent research equipment purchases include a 16 node (64 cpu) Myrinet linked high-performance NOW. Find more on the department at http://www.cis.udel.edu. The University of Delaware (http://www.udel.edu) is centrally located between Philadelphia and Baltimore. Major government and industrial labs are nearby, e.g., Army Research (at Aberdeen Proving Ground), Boeing, DuPont, and Hewlett Packard.

To apply, please send a curriculum vitae to:

Dr. B. David Saunders,
Chair of the Faculty Search Committee,
Department of Computer and Information Sciences,
University of Delaware,
Newark, DE 19716

In addition candidates should have three to five confidential letters of reference sent directly to the above address or by email to csfacsch@cis.udel.edu. Applications are due by January 31, 1999.

Qualified minority group members and women are particularly encouraged to apply. The University of Delaware is an Equal Opportunity employer.

## University of Denver
### Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science invites applications for a tenure-track faculty position at the Assistant Professor level to begin Fall 1999. The minimum requirements are (by September 1999) a Ph.D. in CS or related areas and demonstrated ability in research and teaching. The department is particularly interested in a candidate who can teach and direct research in the systems, graphics, multimedia, networks, mobile computing, telecommunications, and/or software engineering.

Our current faculty have research programs in algorithms, computational geometry, database systems, graphics, network anonymity, optical networks, parallel computer architecture, parallel/distributed processing, performance modeling, scientific supercomputing, and software engineering. We offer BS and MS degrees in each of Computer Science and Mathematics, and a joint Ph.D. in Mathematics and Computer Science. For more information contact our website at http://www.cs.du.edu.

The University of Denver is a medium-sized (8,000 students) private university with a strong emphasis on teaching and research. Class sizes are small, the teaching load is moderate, and the salary is competitive. The University is located in an attractive residential area five miles from downtown Denver. Denver, with a metro area population of 1.8 million, is consistently ranked as one of the country's most pleasant places to live. Many of the country's best ski areas and mountain bike trails, and the 14,000 foot peaks of the Colorado Rockies are only one or two hours away.

The University of Denver is committed to enhancing the diversity of its faculty and staff and encourages applications particularly from women, minorities, and the disabled

Application screening for this position will begin immediately and continue until the position is filled. Applicants should submit a curriculum vitae, a statement of teaching and research interests, and have at least three reference letters sent to:

Chair, Computer Science
Search Committee
Mathematics and Computer Science Dept.

# Professional Opportunities

University of Denver
2360 S. Gaylord St.
Denver, CO 80208-0189

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

The College of Engineering at the University of Florida is pleased to announce its new Information Technology Initiative. This initiative will begin with the addition of two new senior faculty positions in the Department of Computer and Information Science and Engineering. We are seeking outstanding candidates and especially seek expertise in (1) multimedia with emphasis in digital multimedia, web technology, human-computer interaction, computer vision and visualization, interdisciplinary fine arts/ engineering multimedia applications, and (2) bioinformatics with emphasis in multimedia database, data mining, biomedical and genetic engineering.

In addition to the above senior level positions, the Department of CISE announces a tenure-track appointment at the Assistant/ Associate Professor level. Areas of particular interest for this position will be in computer architecture and operating systems.

All applicants should hold a Ph.D. in Computer Engineering, Computer Science, or a closely related discipline, and should be committed to excellence in teaching and research. Salary and support are competitive and depend on background and experience.

The Department of CISE currently has a faculty of twenty-seven and a student body of 160 graduate and 1000 undergraduate students. The Department encompasses a wide range of research areas including high-performance computing, database systems, computer vision and visualization, computer networks and security, distributed and real-time systems, and software engineering.

Candidates should send a curriculum vitae with the names of at least three references. The closing date for applications is March 31, 1999. Please send applications to:
> Professor Randy Chow
> Chair, Faculty Search Committee
> Department of Computer and Information Science and Engineering
> 301 CSE
> University of Florida
> Gainesville, FL 32611
> E-mail: chow@cise.ufl.edu
> Tel. 352-392-1487

The University of Florida is an Affirmative Action Employer and women and minorities are encouraged to apply. For more information about the department and the positions, please visit http://www.cise.ufl.edu/.

## University of Houston
### Department of Computer Science

The Department of Computer Science at the University of Houston (UH) seeks applicants for three tenure-track faculty at any rank. Successful candidates are expected to participate in teaching at any level, to carry out independent research, and to participate in building strong graduate programs in visualization, database technology, systems, communications, and computational sciences. Other areas may be considered as well.

Applicants should have a Ph.D. in a relevant field and have a strong interest in both teaching and innovative research. Successful candidates will have the opportunity to participate in research in the Texas Center for Computational and Information Sciences (TCCIS) and the Virtual Environment Technology Laboratory (VETL). TCCIS has a 64 node IBM SP-2 with mass storage, a 32 node NEC Cenju, a NEC SX-3 and through the VETL a 3-D CAVE. UH also has a new multimedia classroom with 35 workstations, and a PC lab with NT and Risc based servers. UH together with Rice University, Baylor College of Medicine, and Texas A&M University operates a regional OC-12 network connected to the vBNS through the Texas GigaPoP. UH is also an Internet2 Charter Member. The Computer Science department is affiliated with the Center for Research in Parallel Computation (CRPC), an NSF Science and Technology Center, and the two NSF Partnerships for Advanced Computational Infrastructure, NPACI and the Alliance.

For further information see http:// www.cs.uh.edu, http://www.tccis.uh.edu, and http://www.vetl.uh.edu.

The University of Houston is an Equal Opportunity/Affirmative Action employer. Minorities, women, veterans, and persons with disabilities are encouraged to apply.

Applications, including a resume, a list of publications, and the names of at least three references for junior positions and five references for senior positions should be sent to:
> Professor Lennart Johnsson
> Cullen Professor of Computer Science, Mathematics, and Electrical Engineering
> Chair Department of Computer Science
> University of Houston
> Houston, TX 77204-3475
> Tel. 713-743-3374
> FAX: 713-743-3335
> E-mail: Johnsson@cs.uh.edu

## University of Iowa
### Computer Science Department
*Tenure-track faculty position, Fall 1999*

The University of Iowa Computer Science Department invites applications for up to two tenure-track positions at the Assistant Professor level. Extraordinary candidates at a higher rank may be considered. Candidates from all areas of computer science are encouraged to apply. Established research and educational programs in the computer science department include automated reasoning, distributed computing, graphics and virtual environments, programming languages and compilers, software engineering, and video and image processing.

Selection will be based on evidence of outstanding research accomplishments and teaching ability. We seek candidates whose research has achieved, or promises to achieve, national recognition and appropriate extramural funding. Within that level of excellence, we will favor candidates whose interests complement those of current faculty. In evaluating a candidate's teaching ability, we expect to consider breadth of CS background and teaching interests along with communication skills. A Ph.D. in Computer Science (or a closely related field) is required.

Iowa City is a small city of approximately 75,000, with excellent public schools, affordable housing, a world-class medical center with the largest publicly owned teaching hospital in the country, and abundant cultural and recreational activities. The University has approximately 29,000 students. The campus of 100 buildings on 900 acres is nicely situated along both banks of the Iowa River and is adjacent to the thriving downtown commercial area of Iowa City. Information about Iowa City, the University and some of its prominent research and teaching centers, and the Computer Science Department can be found on the World Wide Web at URL http:// www.cs.uiowa.edu/office/hiring.html.

To apply, please send a resume and have three letters of recommendation sent to:
> Hiring Committee
> Department of Computer Science
> University of Iowa
> Iowa City, Iowa 52242

Evaluation of applications will begin immediately and continue until the position is filled. Applications received on or before February 1, 1999 will be assured of consideration. Applications (in Postscript) or informal queries may also be directed to cs_hiring@cs.uiowa.edu.

Women and minority candidates are especially urged to apply for this position. The University of Iowa is an Equal Opportunity/ Affirmative Action employer.

## University of Maryland Baltimore County
### Department of Computer Science and Electrical Engineering

The Department of Computer Science and Electrical Engineering of the University of Maryland Baltimore County (UMBC) invites applications for several tenure-track faculty positions at the rank of Assistant Professor. Higher ranks may be considered.

We are especially interested in applicants in the areas of computer engineering, software systems, computer networks, or electronic commerce, but outstanding candidates in other areas may be considered. Applicants must have, or be about to receive, a Ph.D. in Computer Science, Computer Engineering, Electrical Engineering, or a related discipline.

The department offers B.Sc., M.Sc., and Ph.D. degrees, currently has thirty-three full time faculty, over 1000 students, more than $7M/year in sponsored research, and is planning on significant growth. Together with a large and active Information Systems department, we generate more information technology graduates than any other U.S. research university.

Applications, including curriculum vitae, and a statement of teaching and research interests and goals, should be sent to:
> CSEE Faculty Search
> Department of Computer Science and Electrical Engineering
> University of Maryland Baltimore County
> 1000 Hilltop Circle
> Baltimore, MD 21250
> Tel. 410-455-3500
> Fax: 410-455-3969

Applicants should arrange for three letters of reference to be sent to the same address.

Selection of candidates will start immediately, and will continue until all the positions are filled.

The application and the three reference letters should be received as soon as possible, but not later than March 1, 1999.

Further information about UMBC and the CSEE Department can be obtained through the WWW server http://www.csee.umbc.edu/.

UMBC is an Equal Opportunity/Affirmative Action employer.

## University of Maryland, College Park
### Department of Computer Science

The University of Maryland, College Park, Department of Computer Science is seeking faculty members at all ranks. Truly outstanding candidates in all areas will be considered, but we are especially seeking candidates in the areas of networks, mobile computing, multimedia systems, graphics, databases, or information security.

Under the University of Maryland Flagship Initiative, candidates with established research programs will be considered for joint appointments between the Department and the Institute for Advanced Computer Studies, the Department of Electrical Engineering, and the Institute for Systems Research.

Candidates who are interested should send a curriculum vitae, research summary, and the names of at least three references to:
> University of Maryland at College Park
> Department of Computer Science
> Attention: Recruiting Committee
> College Park, Maryland 20742-3255

At the time they apply, candidates should encourage their references to mail recommendations. For full consideration applications must be received by February 1, 1999.

Additional information about academic and research units at Maryland is available on the World Wide Web:
> Department of Computer Science, http:// www.cs.umd.edu/
> Institute for Advanced Computer Studies, http://www.umiacs.umd.edu/
> Department of Electrical Engineering, http:// www.ee.umd.edu/
> Institute for Systems Research, http:// www.isr.umd.edu/

## University of Michigan
### Computer Science and Engineering
*Ann Arbor, Michigan*

Applications and nominations are solicited for several junior and senior faculty positions in all areas of computer science and engineering. Qualifications include an outstanding academic record, a doctorate or equivalent in Computer Engineering or Computer Science, and a strong commitment to teaching and research. Particular areas of interest include: databases, computer networks, computer security, distributed systems, programming languages, computer architecture, and artificial intelligence.

Please send resume and names of three or more references to:
> Professor Kang G. Shin
> Chair of the Faculty Search Committee,
> CSE Division
> Department of Electrical Engineering and Computer Science
> University of Michigan
> 1301 Beal Avenue, Room 3402
> Ann Arbor, MI 48109-2122
> A Non-Discriminatory/Affirmative Action Employer
> URL: http://www.cse.umich.edu

## University of Michigan
### Department of Electrical Engineering and Computer Science
*Ann Arbor, Michigan*

Applications and nominations are invited for the James R. Mellor Professorship of Engineering in the Department of Electrical Engineering and Computer Science at The University of Michigan. Candidates for this endowed chair professorship are expected to have an outstanding record of research and leadership in computer science and engineering, and a strong commitment to teaching at both the undergraduate and graduate levels.

The primary interest is in candidates of international stature in the general area of software systems including computer networks, security, database and information systems, distributed systems, graphics, operating systems, and programming languages. Exceptional candidates in the other areas of computer science and engineering may also be considered.

Applications and nominations should be sent to:
> Prof. Kang Shin
> CSE Search Committee Chair
> Department of Electrical Engineering and Computer Science
> University of Michigan

Ann Arbor, MI 48109-2122
The University of Michigan is an Equal Opportunity/Affirmative Action Employer.

## University of Minnesota
### Department of Computer Science and Engineering
*Temporary Faculty Positions*

One to six full- or part-time, nine month, non-tenure track faculty positions, with teaching responsibilities in programming fundamental, software engineering, networks, computer engineering, and/or software systems. These are one year teaching positions with a possibility of renewal for up to three years, depending on need, performance, and availability of funds. A Ph.D. in Computer Science or related disciplines, and a commitment to good teaching are required.

Applicants should send a curriculum vitae, documentation of teaching excellence, and names of at least three teaching references to:
> Chair, Temporary Faculty Recruiting Committee
> Department of Computer Science and Engineering
> University of Minnesota
> 4-192 EE/CS Building
> 200 Union Street, SE
> Minneapolis, MN 55455

Anticipated starting date is August 30, 1999. Salary and rank are open and are based on qualifications. Review of completed applications will begin January 15, 1999, but the search will remain open until the positions are filled.

The University of Minnesota is an equal opportunity educator and employer.

## University of New Hampshire
### Computer Science Department

The Computer Science Department invites applicants for a tenure-track Assistant Professor position. The department is particularly interested in candidates with research and teaching interests in formal methods in software engineering and programming languages, or in areas that complement the department's current expertise: parallel and distributed systems, constraint computation, scientific databases, scientific visualization and graphics, computer networks, operating systems, performance evaluation, and collaborative computing. We seek candidates with a commitment to both quality research and quality teaching at the undergraduate and graduate levels.

We offer new faculty a reduced teaching load to assist them in establishing a research program. A Ph.D. in Computer Science is required. We offer BS, MS, and Ph.D. degrees and currently have about 175 undergraduate majors and sixty graduate students. The University of New Hampshire is a medium-sized institution (12,000 students) that is located in the seacoast region of New Hampshire — sixty miles north of Boston and sixty miles south of the White Mountains.

Applicants should submit a curriculum vitae, a statement of research interests, a list of references, and up to three sample publications by February 15, 1999, although applications will be accepted until the position is filled:
> Philip J. Hatcher, Chair
> Department of Computer Science
> Kingsbury Hall
> UNH
> Durham, NH 03824
> Tel. 603-862-3778
> E-mail: Philip.Hatcher@unh.edu
> http://www.cs.unh.edu.

UNH supports diversity among its faculty and strongly encourages women and minorities to apply.

## University of North Dakota
### Department of Computer Science

Applications are invited for a tenure-track position at the Assistant Or Associate Professor level in the Computer Science Department beginning August 16, 1999. A Ph.D. in Computer Science or related field is required. Applicants must have a commitment to excellence in research and teaching and possess good communication skills. Candidates in all areas will be considered with preference given to those specializing in operating systems.

The department has over 220 undergraduate and graduate majors, eight faculty members, and two part-time lecturers. It offers BS, BA, and MS degrees (BS is accredited by CSAB). For more information on UND and the department, see http://www.cs.und.edu.

Screening will continue until the position is filled. For full consideration, applications must be postmarked no later than February 1, 1999. Applicants should send a letter of application, a current curriculum vitae, names and e-mail addresses of at least three references and a one-page statement of teaching and research interests to:
> Faculty Search Committee
> Computer Science Department

# Professional Opportunities

University of North Dakota
Grand Forks, ND 58202-9015
The University of North Dakota is an Equal Opportunity/Affirmative Action Employer.

## University of Pennsylvania
### Department of Computer and Information Science

The University of Pennsylvania invites applicants for tenure-track appointments in both experimental and theoretical computer sciences to start July 1, 1999. Senior level appointments will also be considered.

Faculty duties include undergraduate and graduate teaching, as well as research. The University is looking for applicants whose research would be enhanced by the department's existing strengths in algorithms and computational biology, computer graphics and animation, computer vision and robotics, databases, logic and computation, natural language processing, networks and distributed systems, programming languages, and real-time systems.

The University of Pennsylvania is an Ivy League University located near the center of Philadelphia - the 5th largest city in the United States. Within walking distance of each other are its Schools of Arts and Sciences, Engineering, Medicine, Nursing, Law, Business, and Fine Arts. The University campus and its surroundings in Philadelphia benefit from a rich diversity of cultural opportunities as well as a attractive urban and suburban residential neighborhoods.

To apply, please complete the form located on the Faculty Recruitment Website at: http://www.cis.upenn.edu/positions/faculty_application.html.

While electronic applications are strongly encouraged, hard-copy applications (including the names of at least three references) may alternatively be sent to:
Chair, Faculty Search Committee
Department of Computer and Information Science
School of Engineering and Applied Science
University of Pennsylvania
Philadelphia, PA 19104-6389
Applications should be received by January 15, 1999 to be assured full consideration. Applications will be excepted until the position is filled. Questions can be addressed to faculty-search@central.cis.upenn.edu.

The University of Pennsylvania is an Equal Opportunity/Affirmative Action Employer. The Penn CIS Faculty are sensitive to "two-body problems" and would be pleased to assist with opportunities in the Philadelphia region.

## University of Rochester
### Computer Science Department

The Computer Science Department at the University of Rochester invites applications for tenure-track positions. Candidates at the Assistant Professor level must have received, or be about to receive, a doctorate in Computer Science or a related discipline, and must demonstrate exceptional potential for both research and teaching. Candidates at more senior levels must possess an outstanding record of scholarly achievement. Research interests in all areas of computer science will be considered, but we are particularly interested in (1) networking, IO/databases, and other areas of experimental systems, and (2) natural language and knowledge representation.

Our department is small (twelve faculty), with a strong record of research publication and external funding. We offer an outstanding research environment, with excellent students and facilities, and an unusually close-knit and collegial atmosphere. Current research interests include artificial intelligence (vision/robotics/virtual reality, natural language/knowledge representation), parallel systems (compilers, operating systems and runtime environments, computer architecture, performance analysis and prediction), and theory of computation (computational complexity, data mining, DNA computing). Total enrollment in the Ph.D. program is approximately forty students. Further information can be found at http://www.cs.rochester.edu.

Applicants should send a curriculum vitae, copies of relevant papers, and the names and addresses of at least three references to:
Faculty Recruiting Committee
Department of Computer Science
University of Rochester
Rochester, NY 14627-0226
The University of Rochester is an Equal Opportunity/Affirmative Action employer; women and members of minority groups are strongly encouraged to apply.

## University of San Francisco
### College of Arts and Sciences
*Computer Science*

Pending approval and funding, the Department of Computer Science at the University of San Francisco invites applications for a full-time tenure-track position at the Assistant Professor level, anticipated to begin in Fall 1999.

Teaching Responsibilities may include, inter alia, undergraduate and graduate courses in software engineering, networks, graphical user interfaces, object-oriented design, and programming language paradigms, as well as the design of operating systems, database management systems, and compilers. They may also include beginning undergraduate courses for majors and non-majors. New faculty normally teach three courses per semester.

Qualifications include university teaching experience, a strong commitment to teaching and scholarship, an earned doctorate by Fall 1999, experience and willingness to work in a culturally diverse environment, and an understanding of and commitment to support the mission of the University. The faculty member will be expected to guide Master's-level graduate students and to develop an independent and ongoing research program.

Applicants must submit a letter of application, curriculum vitae, graduate transcripts, copies of recent publications, statement of teaching philosophy, copies of complete teaching evaluations and recent syllabi, and three letters of recommendation to:
Computer Science Search Committee
c/o Peter S. Pacheco, Chair
Department of Computer Science
University of San Francisco
2130 Fulton Street
San Francisco, CA 94117-1080
Applications must be received by February 1, 1999, in order to ensure full consideration.

The University of San Francisco is a private, Catholic and Jesuit institution and particularly welcomes candidates who will positively contribute to such an environment. USF is an Equal Opportunity/Affirmative Action employer, and will provide reasonable accommodations to individuals with disabilities upon request. We particularly encourage minority and women applicants for all positions.

## University of South Carolina
### Department of Computer Science
*Two Faculty Positions*

Applications are invited for tenure-track positions in two focus areas: computational science and forensic computing. Representative areas in computational science include visualization, scientific data analysis, modeling and simulation. Candidates should have a Doctorate in Computer Science or a related discipline.

The department has about 500 undergraduate majors and more than 100 graduate students and offers BS, MS, and Ph.D. degrees. The University of South Carolina has an enrollment of more than 26,000 students and is the comprehensive graduate institution in South Carolina. Columbia is the state capital and is the technology center of the state. For more information see http://www.cs.sc.edu.

Applicants should submit a curriculum vitae, along with the names and addresses of three references to:
Search Committee
Department of Computer Science
University of South Carolina
Columbia, SC 29208
Applicants will be accepted until positions are filled. Foreign nationals should indicate current U.S. immigration status. The University of South Carolina is an Equal Opportunity/Affirmative Action employer

## University of Southern California
### Computer Science Department

Applications are invited for tenure-track positions in Computer Graphics (3-D modeling, animation, user interfaces) and Systems (computer networking, operating systems). The department is highly rated and detailed rankings can be seen on our webpage http://www.usc.edu/dept/cs.

USC is the headquarters of a major Engineering Research Center in multimedia (IMSC). USC is also the home of the Information Sciences Institute (ISI), a major DARPA computer research center. Faculty may interact closely with IMSC and ISI as they develop their research program.

A statement of career goals and curriculum vitae should be sent to:
Vilma Lorenzana
Computer Science Department
USC
Los Angeles, CA 90089-0781
USC is an Equal Opportunity/Affirmative Action Employer.

## University of Toronto
### Department of Computer Science
*Positions Available*

The Department of Computer Science invites applications for several tenure-track and tenured positions at all levels. The Department is an international leader in computer science research and education with an unparalleled breadth of research diversity. Faculty members enjoy an extremely strong international reputation reflected in their awards and honours, involvement in international organizations, and prestigious positions as editors for leading computer science journals. The Department is currently undergoing a significant expansion in complement and research support.

The Department considers excellence in research and teaching to be of prime importance and will consider applicants in all areas of computer science. We are particularly interested in the following areas: systems, including software engineering, distributed computing, networks, and distributed information systems; human-computer interaction; natural language understanding; neural networks. Salary will be determined according to the successful applicant's experience and qualifications. The starting date of the appointments is flexible and could start as early as January 1999. The positions are on any one of the three campuses: St. George (downtown Toronto), Scarborough (east end) or Erindale (west end).

Toronto is a vibrant and cosmopolitan city, considered to be one of the most enjoyable cities in the world in which to work and live.

Applications, including a curriculum vitae and a list of publications, should be sent to:
Professor Eugene Fiume, Chair
Department of Computer Science
University of Toronto
Toronto, Ontario, M5S 3G4
Canada
Preferred deadline for application is January 31, 1999, applications accepted until position is filled.

The University of Toronto encourages applications from all qualified individuals, including women, members of visible minorities, native peoples, and persons with disabilities. Qualified Canadians and non-Canadians are encouraged to apply. Priority will be given in the first instance to Canadian citizens and landed immigrants of Canada.

## University of Toronto
### Department of Computer Science
*Limited Term Faculty Positions, Tutors, and Research Associates*

The Department of Computer Science, University of Toronto invites applications for a number of positions. Subject to budgetary approval, one or more limited term faculty positions, and one or more Tutor positions are available for the 1999-2000 academic year. Applicants must be able to teach a range of computer science courses.

In addition, a number of Research Associate positions may be available in a variety of research areas.

Applications, including a curriculum vitae and a list of publications, should be sent to:
Professor Eugene Fiume, Chairman
Department of Computer Science
University of Toronto
Toronto, Ontario, M5S 3G4
Canada
Please arrange to have three letters of references sent directly to the same address. Preferred deadline for application is January 31, 1999, applications accepted until positions are filled.

In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents of Canada.

In accordance with its Employment Equity Policy, the University of Toronto encourages applications from qualified women or men, members of visible minorities, aboriginal peoples, and persons with disabilities.

## University of Tulsa
### Computer Science Department

The University of Tulsa invites applications for a tenure-track position in Computer Science beginning in Fall 1999. Minimum qualifications are a Ph.D. in Computer Science and a strong commitment to teaching and research. Responsibilities include teaching six hours per semester at the undergraduate and graduate levels, continuing scholarly activity, and pursuit of external funding. Candidates with research specialties in all areas of computer science will be considered; those in computer security, distributed systems and computer networking are particularly encouraged to apply.

The department offers BS, MS and Ph.D. degrees in Computer Science. The BS degree is accredited by the CSAB. Students in the department are highly motivated, having won a number of Goldwater Scholarships, NSF, and DoD graduate fellowships, and a Truman Fellowship. Current faculty have active research programs in artificial intelligence, computer security, software engineering, evolutionary computation, and computational science.

The University of Tulsa, the oldest private university in Oklahoma, is located in a metropolitan area of 750,000 with 3,000 undergraduate and 1,200 graduate and professional students. The University's endowment and trust funds total over $500 million. The computer science programs reside in the College of Engineering and Natural Sciences with access to excellent computer-based teaching laboratories and smart classrooms.

Applications will be evaluated beginning February 1, 1999 and will be accepted until the position is filled. Send curriculum vitae and names of at least three references to:
Computer Science Search Committee
Mathematical and Computer Sciences
University of Tulsa
600 S. College
Tulsa, OK 74104-3189
E-mail: coberly@utulsa.edu
The University of Tulsa, an Equal Opportunity/Affirmative Action employer committed to diversifying its faculty and staff. Members of under-represented groups (people of color, people with disabilities, women, veterans, etc.) are strongly urged to apply.

## University of Washington
### Department of Computer Science & Engineering
*Faculty Opening*

The University of Washington's Department of Computer Science & Engineering seeks applicants for tenure-track faculty positions. A moderate teaching load allows time for quality research and close involvement with students. We expect candidates to have a strong commitment both to research and to teaching. Most CS&E research areas are of interest, especially those areas that broaden the department in emerging areas or that strengthen existing areas that are below critical mass. Applicants must have earned a doctorate by the date of appointment. Information about the department can be found on the web at www.cs.washington.edu.

Although the Department is seeking individuals at the Assistant Professor rank, under unusual circumstances and commensurate with the qualifications of the individual, an appointment may be made at the rank of Associate Professor or Professor.

Applications will be accepted until March 1, 1999. Please send a letter of application, a resume, and the names of four references to:
Faculty Recruiting Committee
Department of Computer Science & Engineering
University of Washington
Box 352350
Seattle, WA 98195-2350
The University of Washington is building a culturally diverse faculty and encourages applications from female and minority candidates. AA/EOE

## University of Western Ontario
### Computer Science Department

The University of Western Ontario is seeking to expand its current research and teaching programs in Computer Science. Applications are invited for at least two tenure-track positions at the levels of Assistant or Associate Professor. One of the positions will focus on software engineering and systems while the others are open to all areas of computer science. Candidates should have a Ph.D. in Computer Science or a related discipline and show evidence of strong research potential and excellence in teaching.

The University of Western Ontario, established in 1878, ranks among the top tier of research Universities in Canada. With a full-time enrollment of about 25,000, the University of Western Ontario graduates students from a full range of academic and professional programs. The university is located in London, a major Canadian city of 320,000. London offers some of the best features of both small and large cities: parks, tree-lined streets and bicycle trails coexist with an international airport and efficient public transportation. London boasts various cultural amenities, including its own theatre and orchestra. Stratford and Toronto are within one and two hours driving distances respectively and offer additional cultural opportunities.

The Computer Science Department currently comprises twenty-one regular faculty, plus additional visiting faculty members. The department offers B.Sc., M.Sc., and Ph.D. degrees in Computer Science, as well as B.Sc. and M.Sc. degrees with specialization in Software Engineering. The department receives funding from government agencies and corporations for research into a broad range of areas, including artificial intelligence and reasoning, computer algebra, computer graphics, databases, design of algorithms, formal languages and automata, image processing and computer vision, parallel and distributed computing, programming languages, and software engineering. See http://www.csd.uwo.ca/ for more details.

In addition to the positions in the Department of Computer Science, the

# Professional Opportunities

department also seeks to fill three positions joint with other units: one joint with the Faculty of Law, the second joint with the Faculty of Information and Media Studies (FIMS), and the third joint with the Department of Electrical and Computer Engineering (ECE). These positions are advertised separately. See the Department of Computer Science webpage at http://www.csd.uwo.ca/ for more details.

The deadline for applications is February 1, 1999. You must indicate in your cover letter the position for which you wish to be considered. With your curriculum vitae, please include a statement of your teaching philosophy and three representative publications. The effective date of appointment is July 1, 1999. Applications should be sent to:

Prof S.M. Watt, Chair
Department of Computer Science, MC355
The University of Western Ontario
London, Ontario N6A 5B7
CANADA

Positions are subject to budget approval. The University of Western Ontario is committed to employment equity, welcomes diversity in the workplace, and encourages applications from all qualified individuals, including women, members of visible minorities, aboriginal persons, and persons with disabilities.

## University of Western Ontario
### Faculty of Law and the Department of Computer Science

The Faculty of Law and the Department of Computer Science invite applications for a full-time tenure-track appointment at the rank of Assistant or Associate Professor to begin July 1, 1999. In addition to demonstrated ability in research and teaching, the successful candidate for this position must have expertise related to some or all of: intellectual property, information technology, software systems and development, or the regulatory environment surrounding software technology and data. The position also requires demonstrably relevant research. The successful candidate will bring enthusiasm, academic strength, and collaborative abilities to the Faculty of Law and Department of Computer Science.

Applications are invited from persons holding an LL.M. (or equivalent in Law) or a Ph.D. in Computer Science (or equivalent).

For further information please contact either Dean Eileen Gillese at the Faculty of Law at 519-679-2111 ext. 8404 or Professor Stephen Watt, Chair, Department of Computer Science at 519-661-4244. The deadline for receipt of applications is February 1, 1999. Interested candidates should forward an application that outlines their current areas of research, a curriculum vitae, and the names and addresses of three academic referees to:

Joint Law/CS Appointments Committee
Josephine Spencer Niblett Building
The University of Western Ontario
London, Ontario, N6A 3K7

Positions are subject to budget approval. In accordance with Canadian Immigration requirements, priority will be given to Canadian Citizens and Permanent Residents of Canada. The University of Western Ontario is committed to employment equity, welcomes diversity in the workplace, and encourages applications from all qualified individuals including women, members of visible minorities, aboriginal persons, and persons with disabilities.

## University of Wisconsin-Madison
### Computer Sciences Department
*Faculty Positions*

The Computer Sciences Department at the University of Wisconsin-Madison is embarking on a multi-year effort to significantly enhance the strengths of the department. As a part of this endeavor, multiple faculty positions are available beginning August 1999.

We invite applications from outstanding candidates in all areas of Computer Science. Applications from candidates in the areas of computer graphics and networking are especially encouraged. Applicants should have a Ph.D. in Computer Science or in a closely related field with demonstrated strength in scholarly research. The positions are at the Assistant Professor level, but exceptional candidates at the senior (Associate or Full Professor) level will also be considered. Successful candidates will be expected to teach at the undergraduate and graduate level, in addition to establishing a significant and highly visible research program.

The department currently has active research projects in a wide variety of areas, including artificial intelligence, computer architecture and VLSI, computer graphics and vision, database systems, mathematical programming, modeling and analysis of computer systems, networking and distributed systems, numerical analysis, operating systems, parallel processing, program development environments, programming languages and compilers, and the theory of computing.

The department has a large variety of sophisticated computer hardware to support research, including several hundred workstations. A locally developed software package called Condor provides additional computing power for compute-bound tasks such as simulations. Condor automatically locates workstations that are idle and transfers jobs to them. Other equipment includes seven Sun UltraEnterprise symmetric multiprocessors (four 16-processor E6000s, one 12-processor E5000, one 12-processor E4000, and two 8-processor E5000s), a Cluster of 40 dual-processor Sun Workstations (COW), a 16-node IBM SP-2, and a 64-node Thinking Machines CM-5.

Further information about the department may be found at http://www.cs.wisc.edu/.

Applicants should submit a curriculum vitae, statement of research objectives, sample publications, and arrange for at least three letters of reference to be sent directly to:

Chair, Faculty Recruiting Committee
Computer Sciences Department
University of Wisconsin-Madison
1210 West Dayton St.
Madison, WI 53706

Applicants are encouraged to submit their applications as soon as possible, but no later than March 15, 1999.

The University is an Equal Opportunity/Affirmative Action employer and encourages women and minorities to apply. Unless confidentiality is requested in writing, information regarding the applicants must be released on request. Finalists cannot be guaranteed confidentiality.

## University of Wisconsin-Madison
### Biostatistics and Medical Informatics Department

Biostatistics and Medical Informatics seeks tenure-track Assistant Professor in new Medical Informatics program, in collaboration with the department of Computer Science, which serves as a focal point between computer science, software engineering, and health science researchers. A Ph.D. in Computer Science, Medical Informatics, or Engineering with a computer science focus preferred, as well as expertise in computational biology, database systems, artificial intelligence, or related fields. Reply to:

David DeMets
600 Highland Avenue
K6/446
Madison, WI 53792
E-mail: demets@biostat.wisc.edu

The University of Wisconsin is an Equal Opportunity/Affirmative Action Employer.

## University of Wisconsin-Milwaukee
### Department of Electrical Engineering and Computer Science

The Department of Electrical Engineering and Computer Science at the University of Wisconsin-Milwaukee is seeking qualified candidates to fill a tenure-track faculty position at the Assistant or Associate Professor level. Candidates should have outstanding promise and a strong commitment to research as well as teaching. In addition, senior candidates must have an established research record. The areas of interest are artificial intelligence and computer graphics, but exceptional candidates in the area of operating systems will also be considered.

The Department offers BS, MS, and Ph.D. degrees, and currently has strengths in a number of areas including artificial intelligence, computational geometry, cryptography and data security, distributed systems, and programming languages and software systems. We are committed to continuing the development of Computer Science at UWM and establishing it as an outstanding program. UWM is located in a pleasant residential neighborhood near the shores of Lake Michigan. Additional information on the Department and UWM may be obtained from http://www.cs.uwm.edu.

Applicants should send a curriculum vitae along with the names of at least three references to:

Professor Peter Haddawy
Department of Electrical Engineering and Computer Science
University of Wisconsin-Milwaukee
P.O. Box 784
Milwaukee, WI 53201
E-mail: haddawy@cs.uwm.edu
Tel. 414-229-4955

Applications must be postmarked or E-mailed by February 1, 1999.

UWM is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply. The names of those who have not requested that their identities be withheld and the names of all finalists will be released on request.

## Virginia Polytechnic Institute
### Department of Computer Science
*Virginia Tech*

The Department of Computer Science seeks two outstanding faculty to join in August 1999. Assistant Professor candidates are preferred but exceptional individuals at the Associate rank will be considered. Individuals with expertise in the following areas (to complement our existing strengths) are sought:

* networks (Blacksburg Electronic Village, an established community network test-bed; Internet Technology Innovation Center; world center for wireless communications)
* information storage & retrieval/database (world leader in electronic theses and dissertations)
* user interface software (Center for HCI, established HCI program)
*software engineering (planned specialized MS program)
* visualization (virtual environments research, including a CAVE)
*high performance computing (Paragon, SP/2, Origin; ICASE, NASA Langley, NCSA affiliations)

Cutting across these areas are large multidisciplinary projects in educational technologies, problem solving environments, and digital libraries. These projects will be enhanced by the University's $26 million Advanced Communication and Information Technology building under construction.

Virginia Tech is located in Blacksburg, a scenic, lively, All-American Award winning city in southwest Virginia with affordable housing. Nearby is the white water of the New River and 1.7 million mountainous acres of national forest.

Applicants should send a curriculum vitae, a 1-2 page statement of research plans and goals, and have at least three letters of reference sent to:

Faculty Search
Dept. of Computer Science
660 McBryde Hall
Virginia Tech
Blacksburg, VA 24061

Review of candidates will begin January 15, 1999, and continue until the positions are filled. For more information, see http://www.cs.vt.edu.

Virginia Tech has a strong commitment to the principle of diversity and, in that spirit, seeks a broad spectrum of candidates including women, minorities, and people with disabilities.

Individuals with disabilities desiring accommodations in the application process should notify us at 540-231-6931.

## Widener University
### Computer Science Department
*Visiting Assistant Professor Position*

Widener University seeks candidates for an anticipated tenure track position in the Computer Science Department for the academic year 99/00. Demonstrated excellence in teaching, preferably at a comparable institution, is required. A Ph.D. in Computer Science is preferred. Candidates with any area of specialization will be considered, but experience in operating systems and networks is preferred. Candidates should send a letter of application, a complete curriculum vitae, and three letters of reference to:

Bob Neveln, Computer Science Coordinator
Science Division
Widener University
One University Place
Chester, PA 19013

Questions may be directed via e-mail to neveln@cs.widener.edu

Applications will be considered as soon as they are complete and the position remains open until filled. Widener University encourages women and minorities to apply.

## Williams College
### Department of Computer Science

The Department of Computer Science at Williams College invites applications for an opening at the Assistant Professor level for the Fall of 1999. A senior appointment is possible in exceptional circumstances. This is a tenure-track position with a three-year initial term. New faculty will join a 5-person department and contribute to an established undergraduate computer science major. Candidates should possess a Ph.D. in Computer Science or a closely related discipline with a strong background in computer science, and should have a commitment to excellence in teaching and an active research program. We are particularly interested in candidates with the capability of teaching and supporting undergraduate research in applied areas of computer science.

Williams is a highly selective, coeducational, liberal arts college of 2100 students located in the scenic Berkshires of western Massachusetts. The Department of Computer Science offers a congenial working environment with small classes, excellent students, and state-of-the-art facilities.

Salaries are competitive and fringe benefits for faculty are attractive. Electronic mail may be sent to lenhart@cs.williams.edu. Applications may be sent to:

Professor William Lenhart, Chair
Department of Computer Science
Bronfman Science Center
Williams College
Williamstown, MA 01267

Applications received by February 1, 1999 will receive full consideration. Williams College is an Equal Opportunity/Affirmative Action employer. Women and members of minority groups are strongly encouraged to apply.

## Yale University
### Computer Science Department

The Yale Computer Science Department is looking for highly qualified candidates for junior faculty positions beginning in the 1999-2000 academic year. We seek to expand and broaden the applied and experimental side of our research and teaching program, building on existing strengths in applied discrete mathematics, combinatorial optimization, complexity theory, computer vision and robotics, cryptography and security, distributed computing and coordination, languages, formal methods and logic, functional programming languages and compilers, high-performance scientific computing, medical applications, network protocols, numerical methods, and parallel architectures. Some new areas of particular interest include computational biology, computational geometry, computer graphics and visualization, databases, digital libraries, human-computer interaction, multimedia, networking and communications, real-time systems, and software engineering.

Applicants are expected to excel in both research and teaching. They will find many opportunities for research collaborations both inside and outside of the computer science department. Interdisciplinary activities are encouraged with Yale's many world-class research groups in computationally-active fields such as biology, chemistry, economics, engineering, geophysics, mathematics, medicine, and physics. Yale is known for excellence in teaching, and applicants will have the opportunity to teach bright students in relatively small graduate and undergraduate classes.

Candidates should hold a Ph.D. in Computer Science or related discipline. Applications should be submitted before February 15, 1999.

Qualified women and minority candidates are encouraged to apply. Yale is an Equal Opportunity /Affirmative Action employer.

Send curriculum vitae and have at least three letters of reference sent to:

Faculty Recruiting Committee
Department of Computer Science
Yale University
P.O. Box 208285
New Haven, CT 06520-8285

competitive that everyone is doing only development and a little bit of advanced development. A lot of companies are not investing in basic research at all. They have an opportunity and an obligation to put something back, and to create foundations and sponsor university research.

I welcome public/private partnerships to do some of these things, and I think these can be part of new programs down the road. Look at all the benefits companies received from NSF's sponsorship and development of the Internet. It would be nice to see people giving things back. There are companies that do, and I think we should do more of it, but that will not replace the government's incredibly important role as the lead sponsor of research in universities. The corporate money is too little and, in general, too conditional.

**CRN:** Is there any fundamental message you would like to convey to the computing research community about the PITAC report?

**Joy:** We are where we are because of what was done a long time ago. We should all spend time talking to students, exciting students, and encouraging students of both sexes to get involved in computing. It would be great if Hollywood would make some movies where people interested in computing weren't represented as nerds. We need to tell people that computing is a great career, it is exciting, and they should think about doing research in universities where interesting things are happening -- and then go start a company using new ideas. ∎