COMPUTING RESEARCH NEWS

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Clinton announces special Internet initiatives

By Fred W. Weingarten
CRA Staff

A series of new initiatives are aimed at improving and expanding educational and public access to the Internet.

In a major science and technology speech delivered October 10 at Oak Ridge, TN, President Clinton announced a series of new initiatives aimed at improving and expanding educational and public access to the Internet. In his speech, the president made strong statements about the importance of research in general and spent a substantial amount of time discussing the way computers and networking were transforming society.

Referring to the rapid growth of the Internet, Clinton said, "The day is coming when every home will be connected to it, and it will be just as normal a part of our life as a telephone and a television. It is becoming our new town square, changing the way we relate to one another, the way we send mail, the way we hear news, the way we play."

Clinton announced three initiatives. Of most direct interest to the research community was a proposed investment of $100 million in fiscal 1998 for a "Next-Generation Internet." The initiative, described as combining both research and research infrastructure elements, has three goals:

1. Connect at least 100 universities and national laboratories at speeds at least 100 times that available in the current Internet, and connect a smaller number at speeds 10 times greater than that.

2. Experiment with the next generation of network technologies—for example, high-quality videoconferencing, multicasting and the ability to reserve bandwidth for applications with special requirements.

3. Demonstrate new applications that meet important national goals and missions, such as distance education and health care.

The $100 million would come from reprogramming $70 million from the Defense budget and the remainder from reprogramming in the High-Performance Computing and Communications agencies. This proposal is only for one year. But Greg Simon, the vice president's chief domestic policy adviser, said the administration would evaluate the program "as we go along."

Many of the details were left to be filled in later. For instance, although the first part of the initiative, a much-higher-speed network for research centers, looks a lot like the new National Science Foundation plan for expanding its vBNS (very-high-speed Backbone Network Service). An NSF spokesperson said the relationship between the new initiative and the vBNS program was under discussion. Similarly, although the president's announcement followed closely on the heels of an announcement by several research universities of their plan to build an "Internet II," it is unclear what the relationship is between the two plans.

Administration documents stated that, over the long term, this new initiative would help alleviate bottlenecks on the current Internet by developing and creating a "first customer" market for new technologies that will help the Internet "continue its exponential rate of growth."

Two other initiatives were announced. One was a joint industry and government "challenge grant" program to put technology in the schools. Several telecommunications industry executives accompanied Clinton on his trip to Tennessee and pledged their support of the effort. According to Education Department officials, the program is a five-year, $2 billion effort. The first year funding is already being put in place, with final approval of $200 million in fiscal 1997 funds to the states and then to local elementary and secondary schools for technology in the schools, based on the existing Title III technology program.

Another initiative was a proposal by the administration to the Federal Communications Commission to guarantee Internet access to the nation's schools and libraries. The FCC is in the middle of a proceeding to decide how to implement a section of the new telecommunications law

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Cray was 'father of the HPC industry'

World-renowned supercomputer architect Seymour Cray died October 5 from severe head injuries sustained in an auto accident near Colorado Springs, CO. Cray spent his life developing the world's fastest supercomputers.

Police blamed the accident on the driver of a Chevrolet Camaro who tried to pass Cray's Jeep Cherokee but struck another car, which then hit Cray's vehicle, causing it to roll three times. No one else was injured in the accident. The driver of the other car, uninjured, was cited for careless driving.

"Seymour Cray had an enormous impact on computing and computer architecture. Not only did he invent practical vector computers, many believe he invented RISC architectures. Certainly many of the people who are credited with major contributions to RISC architectures were inspired by his designs," said Forest Baskett, vice president for research at Silicon Graphics Inc. "He did not receive many of the standard awards that he should have received because he routinely turned them down. He was a great man and very modest."

"Seymour Cray was a legend in his own time—the father of the supercomputer and the high-performance computing industry. He was a creative and technological genius who continued to push himself and those of us privileged to have been his colleagues to new heights of scientific achievement," Bo Ewald, president of Cray Research Inc., said in a letter to Cray Research employees. "He ranks with Edison, Ford, Marconi and Bell as one of the seminal thinkers, inventors and business pioneers of modern times."

Cray, born Sept. 28, 1925, was a native of Chippewa Falls, WI. He earned a bachelor's degree in electrical engineering and a master's degree in applied mathematics from the University of Minnesota. After graduation, like many important computing pioneers, he found his way to Engineering Research Associates, considered by many to be the birthplace of the US computer industry.

Cray co-founded Control Data Corp. in 1957 and was responsible for the CDC 6600, which was introduced in 1963 and was significantly faster than IBM's most powerful machine. The CDC 7600, released in the late 1960s, again furthered Control Data's status as the leader in scientific computing. The Cray 1 and Cray 2 supercomputer were built by Cray Research Inc., a company he formed in 1972.

In 1989 Cray formed Cray Computer Corp., but he filed for bankruptcy in 1995. And in August he started a new company, SRC Computers Inc., and was planning the design of the Cray 5 supercomputer.

"The advances in computing power that his designs made possible led to breakthroughs in such critical areas as enhanced automotive safety, faster pharmaceutical drug design, improved weather forecasting and petroleum exploration, and accelerated the end of the cold war," a statement released by Cray Research said.

"To those of us at Cray Research, he was always an inspiring leader, coach and colleague. He founded a great company with an empowering culture and essentially, the supercomputing industry," the Cray Research statement said. "We will always be in his debt, knowing that Seymour Cray would have us push ourselves and our company toward ever higher computing aspirations and broader applications."

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Letters may be edited for space and clarity.

Expanding the Pipeline

Apply now to 1997 mentor project

The Computing Research Association Distributed Mentor Project brings undergraduate females in computer science and computer engineering (CS&E) to work with a female professor at a research institution for a summer of research.

The intent of the program is to increase the number of women entering graduate school in CS&E. Because of the limited number of female researchers in CS&E who can serve as role models and mentors, undergraduates are brought directly to the professors' institution. Alternatively, a student and mentor from the same institution may apply together.

Students will be involved in research and will also learn how a research university operates, meet graduate students and professors and get a chance to observe a successful female researcher up close. It is an invaluable experience for any female student who is considering applying to graduate school, helping the student both in deciding which graduate schools might be the right choice for her and in boosting her chances of acceptance at those graduate schools. Here is what previous student participants reported after their experience:

"I'm being pulled right into their…research project! Right at the heart of it, and I wasn't expecting that. It's been a confidence booster for me."

"Choosing the right graduate school is important, but now I know better how to do that. And I know that I can go to grad school and make it through and enjoy the time, and get something very, very important out of it."

"My mentor is great. I mean, she's very, very encouraging, very supportive of me. I can't say enough about her."

"She's like this shining model of success, you know? Not a success in terms of like you think of business school success, but success in terms of like, how one would want to live their lives and things like that."

The project is funded by the National Science Foundation.

Basic structure

Both students and professors apply to CRA. A committee will examine the applications and select at least 20 student/professor matches for funding. Notification of matches will be given by March 15, 1997.

Funding for the student consists of $450 per week of research, plus travel. A student's funding is intended to cover about 10 weeks of research in the summer of 1997, but alternative arrangements are possible.

Mentors and their universities receive no funding for the summer of research, but limited funds will be available to cover conference travel for selected students and mentors after the summer of research.

Mentors and students will be given training packages on mentoring and will participate in an electronic discussion group. This will provide additional mentoring opportunities while distributing the load among mentors and will establish cohesiveness among all participants. It is intended to be a source of support for mentors and students.

One aspect of the continuing project is a longitudinal evaluation, covering all five years of the project (1994-98). This third-party evaluation is intended to provide formative feedback and to assess the long-term impact of the project.

The evaluation is *not* intended to check on the performance of individuals participating in the project, and participants' anonymity will be maintained as far as is possible. All participants are expected to take part in the evaluation; the time involved will be minimal.

Copies of this application and other useful information can be accessed on the Web at http://www.cs.wisc.edu/~condon/mentor.html, by anonymous FTP at ftp://ftp.cs.wisc.edu:/cra-mentor and from the AFS file system at /afs/cs.wisc.edu/p/ftp/cra-mentor.

A preliminary evaluation report for the first three years of the project is available at these electronic locations.

Student selection criteria

Applicants should be female undergraduates (US citizens or permanent residents) at a US college or university who are seriously considering graduate studies in CS&E. First consideration will be given to sophomores and juniors (completing two or three years by the summer of 1997). However, first-year students with the skills needed for research and seniors considering graduate school later than September 1997 also may apply.

The primary criteria for selection are:

1. The student's experience and skills must match the needs of some professor's research project.

2. The student's record and recommendations should indicate the potential for success in graduate school.

3. We would like to select students who stand to gain the most from the experience (for example, students at institutions unable to offer research opportunities with female professors).

Student applications

A transcript, letters of recommendation, the technical and mentoring statements and other basic information requested below must be submitted on or before Feb. 1, 1997. Electronic submission to cra-student@cs.wisc.edu is encouraged. Send transcripts and other nonelectronic information to Anne Condon, Department of Computer Science and Engineering, University of Washington, Box 352350, Seattle, WA 98195-2350. Tel. 206-543-4229; fax: 206-543-2969.

1. Basic information. Name; Social Security number; indicate if you are a US Citizen or permanent resident or will be by summer 1997 (required by NSF); school in which currently enrolled; academic year address and telephone; permanent home address and telephone; e-mail address; number of years completed by May 1997; major.

2. Transcript. Send an official transcript, including courses taken through December 1996, grades and a list of courses to be taken spring 1997 to Anne Condon at the University of Washington. An unofficial copy may be sent first if the official copy might be late.

3. Letters of Recommendation. Letters of recommendation are important for predicting likely success in graduate school. However, we understand that some students may not have connected enough with a professor to obtain a substantive letter of recommendation. Therefore, letters are optional, but we encourage students to have *two letters* submitted if possible. Recommenders should contact Anne Condon directly. Electronic submissions are acceptable. E-mail: cra-student@cs.wisc.edu.

4. Technical Statement. We ask for a statement of about 500 words detailing your interests in CS&E and the specific skills you have attained (programming language proficiency, operating systems familiarity, hardware design experience and other skills not evident from your transcript).

5. Mentoring Statement. To help us match you with a mentor, please rank the following topics according to your interest in them: career opportunities in academia or industry, balancing work and family life, improving self-confidence, dealing with a chilly working environment, establishing professional contacts and learning about the research process. If you wish, you may indicate minority status, disability, sexual orientation or any other factor you would like us to consider.

Let us know about any mentoring-related resources you have used in the past (such as mentoring programs, electronic resources, extracurricular technical groups).

6. Restrictions: Let us know of any geographic restrictions or time constraints that would affect a match. In previous years, a number of worthy applicants could not be funded because of overly precise geographical preferences. Also let us know if there is a particular professor with whom you would like to work.

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Conferences and Workshops

Workshop to focus on intellectual property rights

The Computing Research Association is holding a workshop on University Intellectual Property Rights and the Computer Science and Engineering Discipline on December 8-9 in Washington, DC.

The workshop, which is being organized by Randy Katz of the University of California at Berkeley, will focus on drafting a reference policy for software licensing. Participants will identify the underlying principles for when technologies should be licensed, balancing the university's need to retain ownership of its inventions with a desire to enhance university-industrial interaction. The principles include:

• Acknowledging the value of industrial sponsorship through preferential licensing, including free evaluation rights, first rights to license and crediting of research support toward licensing fees.

• Considering placement of software in the public domain that uses copyright protection to retain ownership and supports widespread dissemination and use.

In addition, workshop participants will examine the application of university intellectual property rules to visiting industrial visitors, and the opposite case of university researchers on-site at an industrial laboratory. Participants will draft suggested policies for these situations that encourage university-industrial interaction while protecting the rights of the parties involved.

This is meant to be a *working* workshop. Everyone involved needs to do some detective work before the meeting. This is the kind of data that needs to be collected before the workshop:

• What is your campus (or corporate) policy on licensing, copyrights and patents? Is there a pithy description of these policies or a glossy brochure? Please obtain such descriptions and share them with Katz. Does your campus have a model agreement? If so, can you share it?

• How many university-industry agreements does your campus (or corporation) negotiate per year? Of these, how many are in the information technology or electronics area (as opposed to biotech, for example)? Of those in technology areas of interest to our discipline, how many of these have yielded significant licensing income?

The workshop registration fee is $150 per person and includes a reception on Dec. 8 and continental breakfast, lunch and breaks on December 9.

To register, contact Kimberly Peaks, CRA, 1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009-5728. Tel. 202-234-2111; fax: 202-667-1066; e-mail: info@cra.org. For more information about the workshop's content, contact Katz at randy@cs.Berkeley.edu.

Preliminary workshop agenda

Sunday, December 8	
6:00 P.M.	Reception
Monday, December 9	
8:30 A.M. - 10:00 A.M.	Review licensing data and model agreements collected from workshop participants (this material will be collected and distributed before the workshop meeting)
10:00 A.M. - 10:30 A.M.	Break
10:30 A.M. - NOON	Brainstorm on desired outcomes: What do university faculty and industrial researchers want to achieve in terms of interaction? What forms of intellectual property should be protected? What are the roadblocks to interaction given current policies and draft agreements?
NOON - 1:00 P.M.	Working lunch, continue brainstorming
1:00 P.M. - 2:30 P.M.	Begin drafting desired model agreement with attending lawyers. Basically, their task will be to draft an agreement that reflects the desires expressed in the morning brainstorm session
2:30 P.M. - 3:00 P.M.	Break
3:00 P.M. - 4:30 P.M.	Finish drafting desired model agreements
4:30 P.M. - 5:00 P.M.	Wrap-up and discussion of next steps

Mentor from Page 2

Professor selection criteria

Potential mentors should be female CS&E professors at US universities with active research programs into which the students may be integrated. The primary criteria for selection are:

1. The professor should have a research project suitable for undergraduates and that matches the skills of some student applicants.

2. The professor's university environment should be one conducive to the goals of the mentoring project. For example, an active graduate summer research population provides the protege with a window on future graduate life.

3. The professor should have demonstrated some skill in the delicate task of mentoring undergraduates.

Professors who already have funds to support undergraduates (e.g., through an REU supplement to an NSF grant) may still apply to be matched with a student. In such cases, CRA funding would be applied toward those students' travel expenses.

Mentor applications

We are seeking information we need to make informed decisions but are trying not to burden potential

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COMPUTING RESEARCH NEWS

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1997 Hopper conference planned

Mark your calendars! The 1997 Grace Hopper Celebration of Women in Computing will be held September 19-21 at the Fairmont Hotel in San Jose, CA.

The second Grace Hopper conference—a celebration of women in computing—will feature technical talks by women who are leaders in their fields, and workshops tailored to promote and support the successes of women researchers from all disciplines and all career levels.

General chair: Ruzena Bajcsy, University of Pennsylvania. *Program chair:* Fran Allen, IBM T.J. Watson Research Center. *Fundraising chair:* Anita Borg, Digital Equipment Corp. *Program Committee:* Ed Lazowska, University of Washington. Mary Lou Soffa, University of Pittsburgh; Liba Svobodova, IBM Zurich; Valerie Taylor, Northwestern University; and Telle Whitney, Actel Corp.

More information will be available in future issues of *CRN* and at the conference Web site: http://www.systers.org:80/hopper. Or contact Ann Redelfs, San Diego Supercomputer Center. E-mail: redelfs@sdsc.edu; tel. 619-534-5032.

Infrastructure BOF at Supercomputing

After many proposals and reports from the high-performance computing compiler community, a common compiler infrastructure is now being funded by the Defense Advanced Research Projects Agency and the National Science Foundation to help compiler researchers.

A Common Compiler Infrastructure Birds of a Feather session will be held November 20 from 3:30 P.M. to 5:30 P.M. at Supercomputing '96 in Pittsburgh, PA.

The purpose of this common compiler infrastructure is to:

- Allow compiler researchers to concentrate on their areas of interest without having to reinvent common, standard components of compilers.
- Accelerate the development of compilers and system software for new machines and architectures.
- Allow compiler researchers to make fair comparisons with the work of others without reimplementing previous work.
- Allow researchers and early users to test new compiler techniques and algorithms within the context of a robust compiler with multiple front ends and back ends.
- Improve compiler education by providing a stable, robust model for study.
- Facilitate the transfer of good compiler research ideas to computer and compiler industries.

This BOF session will describe the infrastructure that is being funded. Jack Davidson of the University of Virginia and Monica Lam of Stanford University will describe their components of the infrastructure. The floor then will be opened up for comments and input from the compiler community.

For this infrastructure to work, your input is needed. Room details will be announced when available. Check the BOF bulletin board at the conference.

For more information or if you have questions, contact Lauren Smith. E-mail: llsmith@super.org, tel. 301-688-9513.

Association News

Notes from the Executive Director

Your support of CRA appreciated

The Computing Research Association is able to carry out its programs in support of the computing research community only because of the financial support and volunteer effort so generously given by many individuals and organizations. There is much more CRA could do with additional human and financial resources. You can help us to increase our efforts on behalf of the computing research community by taking any of the following actions:

1. Volunteer to serve on one or more CRA committees, or recommend one of your staff members for CRA committee service.

2. Ask your organization to become a member of CRA. Any organization in the United States, Canada or Mexico that produces computing research, consumes computing research or wants to support computing research most likely is eligible to be a member.

3. Ask your organization to make a charitable donation to CRA, or personally make one. CRA is a 501(c)3 organization under the US tax code, which means that charitable contributions qualify for tax deductions in most circumstances.

4. Ask your organization to provide products or services to CRA, such as computer hardware and software, teams from your company to carry out a project, staff support at a CRA-sponsored event, or access to your specialized staff (for example, legal, accounting, marketing, public relations and so on).

If you would like to discuss this matter further, please contact William Aspray at 202-234-2111 or via e-mail at aspray@cra.org.

CRA welcomes its new members

The Computing Research Association continues to grow. CRA is pleased to welcome two new industrial members: Intel Corp. and Silicon Graphics Inc. One new government laboratory has joined: the National Center for Supercomputer Applications. Two academic departments are new members in 1996-97: Brigham Young University's Department of Computer Science and the University of Denver's Department of Mathematics and Computer Science.

CRA also appreciates the numerous professional society, academic and industrial members that support CRA and have renewed their memberships.

CRA invites nominations for service-related awards

The Computing Research Association invites nominations for the 1997 CRA Distinguished Service Award and the A. Nico Habermann Award. Nominations should be no longer than two pages and describe the contribution that is the basis of the nomination.

CRA Distinguished Service Award

CRA makes an award, usually annually, to a person who has made an outstanding service contribution to the computing research community. This award recognizes service in the areas of government affairs, professional societies, publications or conferences, and leadership that has had a major impact on computing research.

Letters in support of the nomination are welcome but not required.
Deadline: Nominations must be received by Feb. 14, 1997.

A. Nico Habermann Award

CRA makes an award, usually annually, to a person who has made an outstanding contribution to aiding members of underrepresented groups within the computing research community. This award recognizes work in areas of government affairs, educational programs, professional societies, public awareness and leadership that has had a major impact on advancing these groups in the computing research community.

Letters in support of the nomination are welcome but not required.
Deadline: Nominations must be received by Feb. 14, 1997.

Send nominations for both awards to:
CRA Service Awards
Computing Research Association
1875 Connecticut Ave. NW, Suite 718
Washington, DC 20009-5728
Tel. 202-234-2111; fax: 202-667-1066
E-mail: info@cra.org

CRA AWARD FOR OUTSTANDING UNDERGRADUATES

The Computing Research Association is pleased to announce the third annual CRA Undergraduate Award program, which recognizes undergraduate students who show exceptional promise in an area of importance to computing research. The 1996-97 award is made possible by the generous support of Microsoft Corp.

A cash prize of $1,000 will be awarded to each of two undergraduate students, one female and one male, who are majoring in computer science, computer engineering or a similar program. Several other outstanding candidates will be recognized. The awards will be presented at one of the major computing research conferences sponsored by CRA, ACM, the IEEE Computer Society, SIAM or AAAI. The two first-prize winners will receive financial assistance toward their travel to the conference. CRA encourages home departments to provide similar assistance to other students who are recognized.

Because this is a relatively new award, many faculty and students have not yet heard about it. We encourage you to make it widely known in your department. The award is an outstanding way to recognize your best students and your department.

Nomination procedure

A nomination package consists of the following items:
1) Nomination form.
2) Nominee's resume (two-page maximum).
3) Nominee's transcript of academic record.
4) Nomination letter by department chair (two-page maximum).
5) Letter of support from one other supporting nominator (two-page maximum).
6) One-page description of student's research or other achievements.

Criteria for selection of winners

1) Evidence of unusual talent in some area of computing research as demonstrated by one or more of the following:
   a) significant research contributions, individually or as a member of a team
   b) creation of highly innovative software or hardware design
   c) demonstration of exceptional leadership or vision in a field of computing research
   d) other evidence of extraordinary interest, excellence or commitment to computer science and engineering, including industrial experience, participation in special programs and mentoring or tutoring of other students
2) Outstanding academic record

Complete nominations must be submitted by the candidate's department chair by **Feb. 14, 1997.** Each year, a department may nominate no more than one female and one male candidate. Nominees must attend a university or college in the United States or Canada. For more information see http://www.cra.org/awards/97uginfo.html.

Four copies of the nomination package should be sent to:
CRA Undergraduate Award Competition
Computing Research Association
1875 Connecticut Ave. NW, Suite 718
Washington, DC 20009-5728

CRA Award for Outstanding Undergraduates 1996-97 Nomination Form

Name of nominee_____
Sex _____
Program of study_____
Year in program_____
Department _____
University_____
Academic year address, telephone_____

_____
Permanent home address, telephone_____

_____
E-mail address _____
Name of department chair_____
Department chair's e-mail_____
Name of supporting nominator_____
Supporting nominator's e-mail_____
Signatures:

_____
Department chair Date

_____
Supporting nominator Date

Association News

Computer Society offers CD-ROM

A new CD-ROM from the IEEE Computer Society contains the complete editorial content of all 1995 issues of 16 periodicals published by the society. Computer Society '95 provides the complete text of all technical articles in a fully searchable form, not limiting the user to only titles and abstracts.

Users can search by any arbitrary string to find references for their current projects, attach their own electronic notes, place electronic bookmarks and print full articles.

The SGML-based CD-ROM contains the full text and graphics from these respected journals: *Computer*, *IEEE Annals of the History of Computing*, *IEEE Computational Science & Engineering*, *IEEE Computer Graphics & Applications*, *IEEE Design & Test of Computers*, *IEEE Expert*, *IEEE Micro*, *IEEE Multimedia*, *IEEE Parallel & Distributed Technology*, *IEEE Software*, *IEEE Transactions on Computers*, *IEEE Transactions on Knowledge & Data Engineering*, *IEEE Transactions on Parallel & Distributed Systems*, *IEEE Transactions on Pattern Analysis & Machine Intelligence*, *IEEE Transactions on Software Engineering* and *IEEE Transactions on Visualization & Computer Graphics*.

Computer Society '95 is available to IEEE Computer Society members at a special introductory price of $89.95 and to nonmembers for $695. A new price of $154.95 is available to those who would like to join the Computer Society and receive the CD-ROM.

For membership information or to order the CD-ROM, call 800-CS-BOOKS, or use the society's Web site at http://www.computer.org/cspress and order using the secure online form with the Computer Society Online Catalog.

CRA Board to meet in December

The Computing Research Association Board of Directors will meet Monday and Tuesday, December 9-10, at the Embassy Row Hotel in Washington, DC. The meeting will begin with a reception and dinner Monday evening and conclude Tuesday at 3 P.M. The meeting is open, and observers are welcome to attend.

Observers will be charged the cost of meals if they plan to eat with the board. If you are interested in attending contact Kimberly Peaks of CRA as soon as possible, but no later than December 2. Tel. 202-234-2111; e-mail: kpeaks@cra.org.

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CRN Subscription Department
Computing Research Association
1875 Connecticut Ave. NW, Suite 718
Washington, DC 20009
Fax: 202-667-1066; e-mail: crn@cra.org

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mentors with a lengthy application. Mentors may request more than one student, especially if a single student would be isolated. However, we expect to limit awards to two students per mentor. Two or more mentors may submit a single application to jointly supervise one or more students.

All materials are due on or before Feb. 1, 1997. Electronic submission to cra-mentor@cs.wisc.edu is encouraged. Nonelectronic information should be sent to Anne Condon, Department of Computer Science and Engineering, University of Washington, Box 352350, Seattle, WA 98195-2350. Tel. 206-543-4229; fax: 206-543-2969.

1. Basic information. Name; US postal address, telephone and fax; e-mail address. Please include the names and addresses of the chair of your department, your dean or anyone else whom you would like to be notified of your award and contributions to this project, should you be chosen as a mentor.

2. Curriculum vitae. Acceptable in any form, although the short form used for NSF grants is the most convenient.

3. Research proposal(s). A one-page description of each undergraduate project suffices. A copy of material prepared for another grant proposal is acceptable here. The target of this material is the selection committee, not the students.

4. Special requirements. Let us know of the basic skills required of the students, either in courses taken—calculus, linear algebra, data structures, computer graphics, logic design and so on—or other proficiencies (for example, knows C and Unix). This information is crucial for arranging appropriate matches. Highly specific and advanced skills requirements reduce the likelihood of a match. Let us know if you have particular students with whom you would like to work.

5. Mentoring skills. Include information on your mentoring skills and experience. To help us in matching you with a student, let us know of specific topics on which you can provide good advice (see Item #5 in the student application for ideas on topics). Are you willing to participate in an electronic discussion group involving other students and mentors?

6. Working environment and lodging information: If possible, describe the expected working environment for the student. Useful information includes opportunities for technical and social interaction with graduate students as well as institutional commitment (office and computer facilities, and access to institutional recreational facilities). We hope students can obtain low lodging rates—for example, at the university dormitories.

To request a copy or copies of the CRA Distributed Mentor Project brochure when it becomes available, send your request to info@cra.org. CRA encourages departments to make the mentor project information available to potential mentors and to students.

CRA seeks internship candidates

The Computing Research Association seeks an intern to work in its Washington, DC, office. This is an excellent opportunity for an entry-level person in the computing research profession to learn more about the field, meet leading computing researchers and help provide support to the research community.

About half the intern's time will be devoted to: 1) serving as CRA Webmaster; 2) managing CRA data surveys and other data acquisition projects organized by CRA; and 3) providing computer support for the CRA server, databases and office staff.

The rest of the intern's time will be spent working on one or more of CRA's programs or projects, to be determined by an agreement of the intern and CRA's executive director. Possibilities include one of CRA's many programs for women and minorities in the computing profession, work on public policy relating to computing R&D, writing for *Computing Research News* or one of CRA's other publications, or assisting the executive director with a historical research and writing project on the emergence of the academic discipline of computer science and engineering.

Candidates must hold at least a bachelor's degree in computer science, computer engineering or a closely related field and be considering a career in the computing research profession. Candidate must demonstrate technical proficiency to handle the work as Webmaster and computer-support provider.

Good writing and oral communication skills and the ability to work in a team environment are required. Ability to begin the internship on or before Dec. 1, 1996, is highly desirable. The internship is initially for one year, with a possibility of renewal for up to three years. Compensation will include salary plus access to the CRA health plan.

Applicants should send a cover letter as soon as possible describing their qualifications and reasons for being interested in the CRA internship; their available starting date; a copy of their academic record; a list of relevant work and technical experience; and names (with telephone numbers and e-mail addresses) of three references. Please send applications to Kimberly Peaks, CRA's director of administration. E-mail: kpeaks@cra.org; fax: 202-667-1066.

NSF Update

NSF fares well in final 1997 appropriation bill

By Fred W. Weingarten
CRA Staff

In a last-hour burst of activity, Congress solved its differences with itself and with the administration over funding and passed an omnibus continuing resolution bill. This will keep the government running and avoid a government shutdown.

The National Science Foundation (NSF) and Defense research did quite well in the final bill, at least in terms of initial expectations.

Agencies need authorization and appropriation laws. Authorization gives an agency permission to do certain things; appropriation provides the funds to do it. Without a currently valid appropriation, an agency must stop spending all money. If an appropriation bill has not been passed, Congress usually will pass a continuing resolution—a temporary measure that gives the agency permission to continue operating, usually at a somewhat lower level than being considered.

As the October 1 deadline approached—both a fiscal deadline and a political one marked by the urgency of members to go home and campaign—several appropriation bills had not been passed. The congressional leadership decided to wrap them all together into a huge omnibus bill framed as a continuing resolution.

Table 1. NSF Appropriations (in millions of dollars)

	1996 Actual	1997 Request	1997 Final
Research & Related Activities	2,314	2,472	2,432
Education & Human Resources	599	619	619
Academic Research Infrastructure	100	0	0
Major Research Equipment	70	95	80
Salaries and Expenses	132	134	134
Office of Inspector General	5	5	5
Total NSF Budget	**3,220**	**3,325**	**3,270**

The negotiations were not easy. Senators and representatives from both parties literally met around the clock for days to reach the compromise. At the same time, few members of Congress wanted another shutdown; Congress took most of the blame for the last shutdown. Republicans are in a very tight race to keep control of Congress and were not inclined to refuel any more anti-incumbent attitudes among voters. It also was unclear whether Democrats would benefit from any last-minute holdups. So, for all the fussing under the Capitol dome, most outside observers thought a final bill by midnight of September 30 was a foregone conclusion.

The good news is that research funding, for the most part, was not contentious this year. With a few exceptions, the science agencies fared better than expected. Both Defense research funding and NSF appropriations passed both houses in slightly different but easily reconcilable forms. Nevertheless, the appropriations had not come out of conference, and each was part of a bigger bill that had other sections over which strong disagreements had developed.

NSF's final mark was $3.27 billion, down from the administration request of $3.33 billion but up from last year's level of $3.22 billion. The Research and Related Activities line item—the part that contains Computing and Information Science and Engineering (CISE) Directorate funding—received $2.43 billion, slightly less than the administration's request of $2.47 billion but substantially up from last year's $2.31 billion.

The compromise bill also eliminated several problematic provisions in the House version, including a mandated, across-the-board cut in funding of .4%, and a supercomputer procurement provision that would have withheld the salary of any NSF employee who approved the purchase of an imported supercomputer at a price below cost. Finally, the bill removed a proposed $9 million cut in administrative expenses and salaries. Although more detailed allocations to the programs still must be made, the final approved numbers are close enough to the original request that no major readjustments seem warranted or likely. NSF officials will have to take some time to look at the fine print, however, before they release the final allocations. (For details on the allocations in the original budget request, see the budget article on Page 1 of the May 1996 *CRN*.)

This last-minute good news is tempered by great anxiety about the next few years. Administration and congressional budget plans project that science in general, and NSF in particular, are to begin a slow six-year slide, eventually dropping by as much as 40% in constant dollars. Whether there is any hope of countering that grim trend will depend in part on the outcome of the presidential and congressional elections.

Young leaves NSF; assesses his term as head of directorate

By Fred Weingarten
CRA Staff

A few days before the end of his two-year tenure as assistant director for the National Science Foundation's Computer and Information Science and Engineering (CISE) Directorate, Paul Young sat down informally with a small group of science reporters to discuss his experiences.

Over the last two years the critical importance of computer and communications technology to research and, more broadly, to society has been "internalized" both within NSF and in the political community, Young said. The science leadership now "really believes" computing research is vital to the nation, and that belief provides a strong political argument for continued funding.

Young was upbeat about the demise of the High-Performance Computing and Communications program. Rather than a negative message, it was a sign that computing research has matured, he said. He paraphrased a comment made by a member of the House Science Committee at hearings last spring on renewing HPCC. The congressman said, "You mean this work has become too important to be contained in a narrow initiative."

Young pointed out that the cross-agency strategic plan for computing research, which he was instrumental in developing, was a very broad-ranging blueprint for future research programs. And it was firmly grounded on the long-term social and economic benefits of information technology.

Paul Young

Asked if the research community was ready to embrace this applications focus, Young said he thought it was, although he admitted that one could never have "unanimous" agreement among researchers about anything. The important point, he said, was that although applications provided a focus and an argument for priority, support of fundamental

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Hartmanis named to NSF post

Juris Hartmanis, an expert in the theory of computation and computational complexity, has been appointed assistant director of the National Science Foundation's Computer and Information Science and Engineering (CISE) Directorate.

Hartmanis will lead the directorate, which has responsibility for NSF's efforts with the Internet, supercomputers, robotics and intelligent systems, information processing systems and computational research.

"We are thrilled to have someone with the perspective and expertise of Dr. Hartmanis," NSF director Neal Lane said in an agency press release. "He will be an exciting leader of the directorate at a time when computers are affecting nearly every aspect of American life and changing every field of science and engineering."

Hartmanis has been at Cornell University since 1965; he helped create Cornell's Computer Science Department and served as its first chair. He is a member of the National Academy of Engineering and a charter Fellow of the Association for Computing Machinery. In 1993 he received the ACM Turing Award, the highest award in computer science.

Hartmanis served on the Computing Research Association Board of Directors from 1989-94, a critical and formative time for the organization. In 1992 he chaired a National Research Council study, which resulted in the book *Computing the Future: A Broader Agenda for Computer Science and Engineering*. The two years' work with the committee, he said, helped focus his interest on computer science policy.

He received his undergraduate degree in physics from the University of Marburg, a master's in mathematics from the University of Kansas and a doctorate in mathematics from the California Institute of Technology.

In the NSF press release, Hartmanis said he sees the exponential growth in computing power coupled with the growth in communications capabilities as one of the most exciting aspects of computer science today.

"It's been a magnificent ride, like sitting in a cockpit and observing a brand new science being created. I am delighted and surprised at what impact computer science is having," Hartmanis said in the press release. "When I decided to be a computer scientist, I couldn't imagine the dramatic impact it has had."

NSF is an independent federal agency created by Congress in 1950 to promote and advance scientific progress in the United States. The CISE Directorate awards more than $275 million annually.

Policy News

Internet from Page 1

that calls for discounted rates for schools and libraries. They have convened a joint board consisting of federal and state regulators to study the issue and make recommendations to the FCC. The joint board is scheduled to report in early November, at which time the FCC will develop a rule on discounts for libraries and schools.

On the day of the president's talk, the Education Department and the National Telecommunications and Information Administration filed a brief with the joint board calling for "100% discounts" for a basic package of services that would guarantee Internet access and other forms of discount for other advanced services. All of this would be reimbursed through the universal service fund, to which all telecommunications service providers will contribute.

The FCC is an independent regulatory body, however. And although the administration has some persuasive force, the commission will also have to take into account proposals from hundreds of interest groups and organizations that have filed comments with them on this issue. In particular, the reactions of the telecommunications companies as well as those of state regulators will be important. It is likely telephone companies would question the size of the universal service fund required to give such deep discounts and the amount of reimbursement from the fund that they can expect for providing service.

Most educational and library groups have expressed general support for the administration's proposal but caution that many details remain to be worked out.

NSF research initiatives announced

The National Science Foundation's Computer and Information Science and Engineering (CISE) Directorate is introducing three new initiatives in collaborative team research. It also will continue its Experimental Systems program, which stresses collaborative projects.

Teams can represent different subactivities of computing research or other scientific or engineering disciplines. CISE will consider joint funding for multidisciplinary proposals submitted to programs in other directorates and that include computing research. Award sizes are expected to range from $250,000 to $600,000 over two to four years. Workshops and 12-month planning grants will be considered. The three new initiatives are as follows:

Experimental Software Systems: The ESS program will support projects with significant experimental content, conducted by small teams of investigators. Appropriate subjects for the research may include experiments in software engineering, prototyping and evaluation of novel software systems, and experiments in distributed and parallel computing. The program will build on earlier, successful research that may have been conceptual or theoretical in nature and support efforts to evaluate the most promising results. Contact William Agresti. Tel. 703-306-1911; e-mail: wagresti@nsf.gov.

Special Projects in Networking and Communications: This program supports research and experimental projects. The projects, typically submitted by small groups, will include researchers in networking or communications and researchers from other computing areas—such as operating systems, databases, software environments and architecture—or from the social sciences, such as economics, psychology or sociology. Contact Darleen Fisher. Tel. 703-306-1949; e-mail: dlfisher@nsf.gov.

Challenges in CISE: This program will provide support for research that is focused on a single problem, the solution of which requires scientific advances across two or more subactivities of computer science and engineering. Although successful proposals submitted to this initiative are expected to have a primary focus on computing research, proposals including participation of disciplines other than computer science and engineering are also encouraged. Contact Robert Voigt. Tel. 703-306-1900; e-mail: rvoigt@nsf.gov.

More information about the initiatives is available at http://www.cise.nsf.gov.

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research was still the principal objective of NSF programs.

Asked what he is most proud of accomplishing at NSF, Young preceded his answer by saying that it takes longer than two years to make significant changes at NSF. Thus, an assistant director is bringing other people's programs to fruition and will not be around long enough to see his or her own initiatives mature. He clearly was most pleased—although loath to take credit for—the change mentioned above in political attitudes toward computing research, both within and outside science.

Although he said he always admired the enthusiasm and diligence of government science officials, Young said he still was surprised at the dedication and the "white hot" intensity so many of them bring to their work. "They really believe in the importance of what they are doing," he said.

Young is spending this academic year on sabbatical at the University of Wisconsin, which he planned to do two years ago before he was appointed assistant director of CISE. He is looking forward to returning to research and a campus home. But he also expects to be called on continually to get involved in science policy.

Excerpts from Clinton's speech on S&T policy

"Of the 12 Americans who won the Nobel Prize last year, all 12 had received government support for their research. This year, the Nobel Prize winners have just been announced in physics and chemistry. Of the three who won this year in physics and two who won in chemistry, all five received federal funding from the National Science Foundation. Cutting back on research at the dawn of a new century, where research is more important than it has been even for the last 50 years, would be like cutting our defense budget at the height of the cold war. We must not do it, and we will not do it. We must protect the future of the young people here in the audience.

"One of the marvelous things we have learned about research is that it's not necessarily going to benefit just a particular category in which it was undertaken—that ideas don't stay in boxes anymore, that they all become more interrelated."

❒ ❒ ❒

"I tell this story all the time, but I think it's important. We just formed a partnership with IBM to produce a supercomputer over the next couple of years that will do more calculations in one second than you can do at home on your hand-held calculator in 30,000 years. Now, that should give you some indication of how quickly things are changing and how we will be rewarded if we stay on the cutting edge, and how we can be punished if we don't."

❒ ❒ ❒

"The number of people on the Web has been doubling every eight months. Today there are at least 25 million people on the Internet. By 1998 that number will reach 100 million.…

"I want to see the day when computers are as much a part of a classroom as blackboards, and we put the future at the fingertips of every American child.

"If you have the right computers and the right education equipment, the right educational software and properly trained teachers, and then all of these connections are made to the Internet and the World Wide Web and all of the other networks that will be exploding out there, think what this means.

"For the first time ever in history, children in the most rural schools, children in the poorest inner-city school districts, children in standard, middle-class communities, children in the wealthiest schools, public or private, up and down the line, will have access in real time to the same unlimited store of information. It will revolutionize and democratize educa-

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New encryption policy announced

The Clinton administration recently announced a new version of its encryption policy. As in its previous versions, the policy addresses and links two issues—export controls on encryption technology and the desire to guarantee law enforcement access to encrypted data.

In its latest initiative, the administration proposes allowing the export of cryptographic products with key lengths up to 56 bits, a step up from the current 40-bit limit. The threshold is based on the presumed computational effort required to break the code in a so-called "brute force" attack. A 56-bit key length would presumably still be accessible to national law enforcement authorities. However, exporters of these 56-bit key products would have to commit to developing technology that supports so-called "key recovery."

As an additional incentive to industry, the administration also said no key-length export restrictions will apply to cryptographic products that incorporate key recovery systems—if law enforcement access is preserved.

"That vision presumes that a trusted party (in some cases internal to the user's organization) would recover the user's confidentiality key for the user or for law enforcement officials acting under proper authority," said Vice President Gore. "Access to keys would be provided in accordance with destination country policies and bilateral understandings."

Although civil liberties groups were not mollified by the proposed modifications in policy, industry response was divided. The current 40-bit limit is a serious impediment to export, and producers desperately wish to loosen export controls. Furthermore, encryption devices are not the only products affected. Controls also block export of a growing number of software applications that incorporate encryption into their suite of services.

In particular, 11 vendors and organizations announced the formation of an alliance to work on the development of exportable key-recovery technology. According to press reports, the alliance includes IBM Corp., Sun Microsystems Inc., Apple Computer Inc. and RSA Data Security Inc.

Policy News

New generation of interagency groups is born

BY Louise A. Arnheim
Special to CRN

The idea of commissioning an interagency group to protect the integrity of information—particularly within the public sector—is not a new one.

"Information assurance," a popular Washington expression this year, is now the catch phrase of several federal interagency advisory committees, commissions, councils, task forces, forums and working groups. As such, these two words are used to cover a range of civilian and non-civilian concerns, such as unauthorized access, computer fraud, cryptography, national security and network outages.

The idea of commissioning an interagency group to protect the integrity of information—particularly within the public sector—is not a new one. Nor is it unique to the digital, networked environment. More than 40 years ago, President Truman established the US Communications Security Board (USCSB), an interagency body designed to coordinate COMSEC (communications security) among federal government departments and agencies. Today, after a few name changes, that group is known as the National Security Telecommunications and Information Security Systems Committee (NSTISSC).

With the release of the Clinton administration's *Agenda for Action* three years ago, a new wave of interagency activity began. The agenda provided the blueprint for the creation of the Information Infrastructure Task Force, the National Information Infrastructure Advisory Committee (NIIAC), several IITF committees and a host of IITF working groups. Further, one of the agenda's nine principles for the evolving National Information Infrastructure was "ensuring information security and network reliability."

And now a new generation of information assurance groups is being added to the interagency list. An IITF working group has been elevated to board status; a new presidential commission and several substructures are being formed, and NSTISSC itself has produced an information assurance offshoot.

Below is a sampler of the several interagency groups (some old, some new) now wrestling with computer and information security issues, primarily on the civilian side. For each group, the following information (where available) is provided: the group's purpose (as described on each group's Web site), home base or secretariat, membership, recent projects and URL.

CSSPAB

One of the older groups concerned with information assurance is the Computer System Security and Privacy Advisory Board. Established nine years ago through the Computer Security Act of 1987 (PL 100-235), CSSPAB is a federal advisory committee that focuses on "sensitive, unclassified information in federal computer and telecommunications systems," a CSSPAB statement said.

Over the years, CSSPAB has provided input into the National Institute of Standards and Technology (NIST) computer security research program and budget, examined export controls on cryptography and weighed in on a national standard for a Digital Signature Algorithm as well as a Digital Signature Standard. At the most recent meeting, CSSPAB members heard several presentations, including an update on the administration's cryptography policy.

CSSPAB's membership includes a chair and 12 members: four from the federal government and eight from outside the government. All are appointed by the Commerce secretary. NIST provides secretariat. CSSPAB's current chair is Willis Ware of Rand Corp. See http://csrc.nist.gov/csspab.

FIRST

The Forum of Incident Response and Security Teams is an international coalition of response teams from academia, government and business that focuses on the preventive side of computer security. According to FIRST's operational framework, a response team is "an organization whose function is to assist an information technology community or other defined constituency in preventing and handling security-related incidents."

Among FIRST's members are: Apple Computer Inc., Boeing Co., Digital Equipment Corp., NASA, the National Institutes of Health, Northwestern University, Purdue University, Sun Microsystems Inc. and Westinghouse. FIRST works under a formal operational framework but has no authority over the operation of individual member teams. Ken van Wyk of SAIC serves as chair of the FIRST Steering Committee. See http://www.first.org.

FSI

Last year the Federal Security Infrastructure program was created to "coordinate, operationally oversee, monitor, implement and report on the development of an information security infrastructure to support electronic commerce, electronic messaging [and] other applications and [to] support services to users," the FSI program mission statement said.

One of FSI's current projects is a pilot for proof of concept and technology (digital signature and encryption) for a security infrastructure using Web-based applications. FSI is co-chaired by Paul Grant of the Defense Department and Tom Burke of the General Services Administration. FSI's membership includes representatives from GSA, the US Postal Service (USPS), the National Security Agency (NSA), the Treasury Department, the Agriculture Department and the Defense Information Systems Agency. See http://www.gsa.gov/fsi.

GITSB

Originally known as the Government Information Technology Services Working Group of IITF's Committee on Applications and Technology (CAT), GITS was recently elevated to board status by virtue of Executive Order 13011 and is now GITSB.

As a working group under IITF, GITS members focused on the governmentwide promotion and implementation of information technology. As GITSB, the group's objective, as stated in the executive order, is to continue implementation of National Performance Review (NPR) guidelines regarding information technology and promote the use of innovative technologies "among agencies and state and local government and the private sector."

The board is considering several organizational issues, including the selection of a permanent chair. James Flyzik of Treasury is serving as the interim chair. Members include senior-level officials from Defense, Energy, Interior, Justice, Treasury, Veterans Affairs, GSA (including the commissioner of the Federal Telecommunication Service), NPR, Office of Personnel Management, the Social Security Administration and the USPS. See http://www.itpolicy.gsa.gov/mka/gitsb/gitsbtoc.htm.

NRIC

When a software problem in the public-switched network brought business to a halt in the mid-Atlantic region—including Capitol Hill—Congress called upon the FCC to take preventive action. The result was the formation of the Network Reliability Council (NRC), a federal advisory committee that has since issued two reports on network reliability.

With the passage of major telecommunications reform legislation this year, NRC was given an additional responsibility—ensuring interoperability in the new, competitive environment—and was renamed, appropriately, the Network Reliability and Interoperability Council (NRIC).

Like the original council formed in 1992, membership is drawn primarily from the private sector and includes executives from interchange carriers, local-exchange carriers, cable companies, wireless firms and satellite groups. Representatives from the FCC, the National Communications System, the National Telecommunications and Information Administration and the Office of Science and Technology Policy also serve on the council. The current chair is Ivan Seidenberg of Nynex.

NSTISSC

Created through National Security Directive 42 (NSD-42), NSTISSC focuses on national security information and telecommunications systems. Twenty-one federal department and agency heads serve as voting members.

NSD-42 mandates that NSTISSC be chaired by the assistant secretary of Defense for command, control, communications and intelligence (currently Emmett Paige Jr.). Secretariat is provided through NSA.

There are two NSTISSC subcommittees: the Subcommittee on Information Systems Security (SISS), chaired by John C. Davis, director of NSA's National Computer Security Center; and the Subcommittee on Telecommunications Security (STS), chaired by GSA's Burke. These two subcommittees will assist with the start-up of IAIG: the Information Assurance Issues Group. In addition to formulating NSTISSC policy on information assurance, IAIG will advise the new President's Commission on Critical Infrastructure Protection (see below). IAIG Members will be drawn from current NSTISSC membership. See http://www.iitf.nist.gov/committee.html.

For information on NSTISSC, see http://www.dtic.mil/c3i/nstissc.html; for information on assurance group activities, see http://www.gsa.gov/niaig.

President's Commission on Critical Infrastructure Protection

By signing Executive Order 13010 last July, President Clinton created the legal underpinning for several new computer and information security structures. In contrast to the interagency groups described above, this commission takes a broad view of the term "infrastructure" and includes electric utilities, oil and gas, transportation, water *and* telecommunications.

The commission chair will hail from the private sector and be appointed by the president. Member departments and agencies will include no more than two representatives each from Treasury, Justice, DOD, Commerce, Transportation, Energy, the CIA, the Federal Emergency Management Agency, the FBI and NSA.

Aiding the commission will be a Principal's Committee, composed of the cabinet secretaries and directors from the departments and agencies named above; a Steering Committee charged with monitoring the work of the commission; and an Advisory Committee of 10 individuals from the private sector.

To provide for infrastructure integrity in the immediate future, an interim coordinating structure called the Infrastructure Protection Task Force is being established within the Justice Department.

PSWG

One of several subgroups of the Federal Networking Council, the Privacy and Security Working Group is "responsible for addressing network security technology, management, and administration issues related to

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High-Performance Computing

DOD continuing to modernize HPC capabilities

BY Louise A. Arnheim
Special to CRN

Because of HPCMP, high-performance computational capability is available to more than 100 defense labs, test centers, universities and industrial sites.

Since March, the Defense Department has awarded more than $200 million to continue modernization of its overall high-performance computing capability. By setting up four Major Shared Resource Centers (MSRCs), DOD will soon be able to make high-end resources available to individual services and agencies nationwide. Such resources are critical to supporting the type of modeling and simulation used in state-of-the-art warfighting systems.

The four awards were made as part of the Defense Research and Engineering High-Performance Computing Modernization Program. Now in its fourth year, HPCMP was established to ensure America's continued technical superiority in warfighting systems. As a result of HPCMP efforts, high-performance computational capability is now available to more than 100 defense labs, test centers, universities and industrial sites.

The MSRCs are part of a four-step program that includes a high-speed wide-area network, 12 distributed centers and the development of scalable applications software.

Locations for the MSRCs are as follows: the Corps of Engineers Waterways Experiment Station in Vicksburg, MS; the Aeronautical Systems Center at Wright-Patterson Air Force Base in Ohio; the Naval Oceanographic Office at the Stennis Space Center in Mississippi; and the US Army Research Laboratory at the Aberdeen Proving Ground in Maryland. Nichols Research Corp. of Huntsville, AL, won the contract for work at WES and ASC; Grumman Data Systems of Herndon, VA, won for NAVO; and E-Systems of Dallas was the successful bidder for the ARL project in Aberdeen. A separate contract for the high-speed network connecting users to the MSRCs was awarded to AT&T.

Though the MSRCs are located at DOD labs, Anita Jones, director of Defense Research and Engineering, said universities and industries can also benefit. "Two of the military departments routinely allocate high-performance computing resources to university researchers," she said. "The ability to partner with civilian high-performance centers" is built into each MSRC budget.

For example, to help users make the transition to the new technology, Nichols Research is expected to team up with colleges and universities. These institutions will "provide access to libraries and appropriate…tools helpful in the training process" Jones said.

For the MSRC work at Wright-Patterson, Nichols Research has already joined with private sector partners E-Systems, AT&T, SAIC, MEVTEC AIT, Silicon Graphics, Cray Research, IBM and I-Net, and academicians at Ohio State University, the University of Illinois, Rice University, Mississippi State University, Central State University in Ohio and the University of Alaska.

According to DOD press releases, the WES MSRC in Vicksburg will feature computational structural mechanics, computational fluid dynamics, climate/weather/ocean modeling, forces modeling and simulation, and environmental quality modeling simulation. The NAVO MSRC at the Stennis Space Center will focus on ocean modeling, computational fluid dynamics flows around aircraft and watercraft, computational chemistry of new materials and structural mechanics of watercraft.

"In the HPCM program, we are providing for a wide variety of military-unique, high-end applications, which require tremendous computing power," Jones said. As examples, she cited the following applications: "developing stealth aircraft signatures, modeling at the molecular level the flow of air or water across the surface of a weapon system, predicting sea lane weather, and replacing live testing with simulated tests to lower costs and avoid damage to the environment and valuable system components."

Because of the high-speed wide-area network connecting the MSRCs and selected users, high-performance computing power will soon be available to more than 4,000 DOD engineers and scientists. That network—to be known as the Defense Research and Engineering Network (DREN)—will enable users to perform information-intensive tasks from remote sites (e.g., sending large data files and participating in remote, interactive visualization of HPC calculations).

AT&T's contract to provide DREN is valued at $6 million initially, with procurement authority delegated for $430 million. The contract calls for AT&T to provide intersite Internet Protocol and Asynchronous Transfer Mode digital data transmission services to local-area networks.

Another component of the modernization program is the set of 12 distributed centers. Each will function as "smaller versions" of the high-performance systems, and each will be managed by an individual user organization.

The final component—development of scalable applications software—will lead to a set of critical, multipurpose DOD applications programs that run efficiently on the new generation of scalable HPC systems.

HPCMP manager Kay Howell noted that sophisticated computational ability has been a DOD priority dating back to the Army's acquisition of ENIAC 50 years ago. "The DOD has a long history of reliance upon high-performance computing to enhance its operational capabilities. From the earliest days of ENIAC and its use in computing ballistic trajectories, state-of-the-art computing has played an important role in the defense of the US and in national security," she said. "High-performance computing has been, and will continue to be, a major factor in the ability of the US to maintain the technological superiority of its warfighting system."

Jones likened the creation of the MSRCs to the National Science Foundation supercomputer centers established more than a decade ago. "Acquiring, sustaining and cleverly applying state-of-the-practice high-performance computing to military problems is crucial to our future," she said.

Security from Page 8

maintaining and improving the availability, integrity and confidentiality of interagency Internet resources," an FNC statement said. Earlier this year PSWG was awarded an NPR Innovation Fund grant to "compare and validate agency approaches to security," among other tasks. The group's co-chairs are Stephen L. Squires of the Defense Advanced Research Projects Agency and Dennis Steinauer of NIST. See http://www.fnc.gov/SWG.html.

SIF

A substructure of IITF, the Security Issues Forum (SIF) coordinates the work of the various IITF committees and working groups. Attendance at meetings is open to all federal departments and agencies with information system security concerns. Voting members include all cabinet and higher-level agencies.

SIF recently circulated an item for public comment and is now working to finalize a draft incorporating those comments. See http://www.iitf.nist.gov/sif/sif.html.

Technical Advisory Committee to Develop a FIPS for the Federal Key Management Infrastructure

According to its charter, the mission of this new advisory committee is exactly as its name implies: making "technical recommendations regarding the development of a draft Federal Information Processing Standard (FIPS) for the Federal Key Management Infrastructure." The Commerce secretary is charged with appointing the committee's 24 members, each of whom must be "selected solely on the basis of established technical expertise in cryptography and the implementation and use of cryptographic systems." The nomination process reportedly is under way. NIST will provide staff support for the committee. See http://csrc.ncsl.nist.gov/tacdfipsfkmi.

Speech from Page 7

tion in a way that nothing ever has in the history of this country.…

"The business community is committed to taking the lead in putting educational technology into our classrooms. CEOs from our top telecommunications firms are joining together to help us achieve that vision. Sumner Redstone, Lynn Forester, also Robert Allen of AT&T, Larry Ellison of Oracle, Gerry Levin of Time Warner, Brian Roberts of Comcast, Steven Case of America Online, and there will be many more—they're going to make sure that we have the computers in the classrooms, that the teachers are properly trained, that the educational software is the best available and that all these connections are made to democratize education. They will help to raise private sector contributions to match the technology literacy challenge fund that we have created.

"The second thing we have to do is to make sure that all of the schools and the libraries in the country can afford to hook up to the Internet. Today, the cost of using the Internet can price some schools out of cyberspace. Fees can be inconsistent, with the highest rates often hitting places with the fewest resources.

"Soon, all this will change. Under the new telecommunications law I signed a few months ago, the Federal Communications Commission will require that telecommunications service providers give to schools and libraries affordable rates for Internet access.…

"Wouldn't it be a shame if we did all this work and there were schools that literally could not access the Internet, if there were libraries in little rural communities that couldn't do it? It is not necessary. This will pay for itself over and over again by increasing the users, the knowledge. It will explode, and we have to do this."

Professional Opportunities

CRN Advertising Policy

Send copy and payment for Professional Opportunities advertisements to Advertising Coordinator, *Computing Research News*, 1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009-5728. Tel. 202-234-2111; fax: 202-667-1066; e-mail: crn@cra.org. E-mail submissions are preferred.

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

The rate is $2.25 (US) per word. Purchase orders, money orders and checks are acceptable *(please do not send cash)*. All CRA members receive at least 200 free words per dues year. CRA's standard advertising package consists of running an ad in *CRN*, sending it to CRA's jobs@cra.org list and posting it to CRA's Jobs Index Web page for two months. As an alternative to this package, advertisers may request that their Professional Opportunities ads just be published in *CRN* or just distributed electronically. The cost of the ad is the same whether the standard or the alternative package is selected.

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

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

Michigan State University
Department of Computer Science

The Department of Computer Science at Michigan State University invites applications for a 12-month teaching position, classified as a "specialist." The initial appointment will be for a two-year period with a potential for a continuing-stream appointment. The responsibilities for this position include developing and teaching a universitywide introductory computer science service course. The position also requires training and supervision of a large number of graduate teaching assistants and coordinating laboratory sections. The salary range for this position is $45,000-$50,000 per annum, dependent on educational background and experience.

Applicants for the position must have an advanced degree in computer science or related area with substantial teaching or industrial experience. Candidates must have strong teaching credentials, including extensive teaching experience (with majors and nonmajors) and experience in developing undergraduate CS instructional materials, including course development in a team setting. Candidates should have knowledge of instructional literature and theory and the necessary expertise and experience to incorporate curricular innovation, including the use of instructional and media technology in course development and delivery. This position will start May 16, 1997. For full consideration, applications should be submitted by Jan. 10, 1997. However, applications will be accepted until the position is filled.

As a unit within the College of Engineering at Michigan State University, the Department of Computer Science offers the Bachelor of Science, Master of Science and Doctor of Philosophy degrees. The department has received extensive funding for support of its instructional and research activities from a broad spectrum of companies and government agencies, local and national. The department currently has 23 tenure-stream faculty and an enrollment of approximately 140 graduate students and 400 undergraduates. Faculty and staff offices and laboratories are connected to the MSUnet, which provides access to an array of campus computing resources, including the facilities of the College of Engineering, the department's Pattern Recognition and Image Processing Laboratory, Intelligent Systems Laboratory, High-Speed Network and Performance Laboratory, Multimedia Laboratory and Advanced Computing Systems Laboratory. The computing facilities in the department include more than 200 high-end workstations, two workstation clusters interconnected by high-speed networks and other specialized research equipment.

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

Applicants should send a letter of intent, a resume, the names of three references and a statement of teaching interests to Faculty Search Committee, Department of Computer Science, A714 Wells Hall, Michigan State University, East Lansing, MI 48824-1027. E-mail: search@cps.msu.edu.

For additional information about the department, college and the university, see http://www.cps.msu.edu.

Michigan State University is an equal opportunity, affirmative action institution. Persons with disabilities have the right to request and receive reasonable accommodations.

Position number: ENG 50.

Michigan State University
Department of Computer Science

The Department of Computer Science invites applications for four anticipated tenure-stream positions: three at the assistant professor level (position numbers ENG 128, ENG 143, ENG 004) and one at the associate professor level (position number ENG 186). Candidates from all areas of specialization in computer science or computer engineering will be considered. However, for the assistant professor positions, the department has a special interest in candidates in the areas of software engineering, computer graphics and visualization, robotics, database, programming languages, compilers and theory.

The research foci of the department include artificial intelligence and knowledge-based systems, computer architecture and design automation, high-speed networks and performance, parallel and distributed computing systems and algorithms, pattern recognition and image processing, database systems, analysis of algorithms and theory of computation, and software engineering.

Candidates should have a Ph.D. in computer science or computer engineering and have a strong interest in both research and teaching. The appointments will begin in August 1997. For full consideration, applications should be submitted by Jan. 10, 1997. However, applications will be accepted until the positions are filled.

As a unit within the College of Engineering at Michigan State University, the Department of Computer Science offers the Bachelor of Science, Master of Science and Doctor of Philosophy degrees. It also jointly administers a Bachelor of Science degree in computer engineering with the Electrical Engineering Department. The department has received extensive funding for support of its instructional and research activities from a broad spectrum of companies and government agencies, local and national.

The department currently has 23 tenure-stream faculty and an enrollment of approximately 140 graduate students and 400 undergraduates. Special support is available from within the college and university to initiate research by new faculty members.

Faculty offices and laboratories are connected to the MSUnet, which provides access to an array of campus computing resources, including the facilities of the College of Engineering, the department's Pattern Recognition and Image Processing Laboratory, Intelligent Systems Laboratory, High-Speed Network and Performance Laboratory, Multimedia Laboratory and Advanced Computing Systems Laboratory. The computing facilities in the department include more than 200 high-end workstations, two workstation clusters interconnected by high-speed networks and other specialized research equipment.

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

Applicants should send a letter of intent, a resume, the names of three references and a statement of research and teaching interests to Faculty Search Committee, Department of Computer Science, A714 Wells Hall, Michigan State University, East Lansing, MI 48824-1027. E-mail: search@cps.msu.edu.

For additional information about the department, college and the university, see http://www.cps.msu.edu.

Michigan State University is an equal opportunity, affirmative action institution. Persons with disabilities have the right to request and receive reasonable accommodations.

Position numbers: ENG 128, ENG 143, ENG 004 and ENG 186.

Rutgers University
Department of Computer Science

The Mobile Computing Laboratory in the Computer Science Department at Rutgers University seeks to fill postdoctoral/research scientist positions.

As part of the Dataman project, faculty and students are involved in research related to mobile wireless computing. Some of the research projects include geographic messaging, wireless Internet protocols, infostations and wireless information services.

The laboratory has a wireless LAN, access to CDPD, cellular modems and various portable technology for experimentation.

We are looking for systems-oriented candidates with strong research capabilities and prototype development skills. A Ph.D. degree in computer science with prior research experience in operating systems, network protocols, Internet technology or distributed systems is essential.

Please send your resume and the names of three references to Tomasz Imielinski, Department of Computer Science, Rutgers University, New Brunswick, NJ 08903. Electronic inquiries should be directed to imielins@cs.rutgers.edu.

University of Kentucky
Department of Computer Science

The Department of Computer Science at the University of Kentucky invites applications for one or more anticipated tenure-track positions beginning Aug. 15, 1997. Although appointment at assistant professor is preferred, exceptionally qualified candidates will be considered for appointment at associate or full professor. Candidates should have a Ph.D. in computer science or a related discipline. Review of credentials will begin Nov. 1, 1996, and the search process will continue until suitably qualified candidates are found.

We are interested in candidates with an expertise in distributed and high-performance computing, operating systems, networking, vision and computer graphics, and database systems. Strong candidates in other areas will also be considered. Individuals appointed to these positions will be expected to conduct innovative research and participate in the department's undergraduate and graduate instructional programs.

Please send curriculum vitae and the names of three references to Faculty Search Committee, c/o Ms. Diane Mier, Department of Computer Science, University of Kentucky, Lexington, KY 40506-0046. E-mail: diane@cs.engr.uky.edu; fax: 606-323-1971. More information is available at http://www.cs.engr.uky.edu/positions.html.

An equal opportunity, affirmative action employer.

University of California, Irvine
Department of Information and Computer Science

The Department of Information and Computer Science (ICS) invites applications for a tenured position at the full professor level, although promising candidates at other levels may also be considered. Research emphases of interest include databases; digital libraries; human-computer interaction studies, techniques and approaches; intelligent information retrieval; multimedia; networking and communications; visualization; and the study of these technologies and their effect, including aspects of management, privacy, public policy and security. We are looking for candidates with strong research records who would thrive in a highly productive setting. Duties include research and undergraduate and graduate teaching. Applicants must possess a Ph.D.

The ICS Department is an independent campus unit reporting to the executive vice chancellor. ICS faculty emphasize core computer science as well as research in emerging areas of the discipline, with effective interdisciplinary ties to colleagues in biology, cognitive science, engineering, management, medicine and the social sciences. The department currently has 29 full-time faculty and 120 Ph.D. students. The ICS Department has research groups in the areas of algorithms and data structures, artificial intelligence, computer and distributed systems, computer-supported cooperative work, computer systems design, parallel processing, social and managerial analysis of computing, and software/software engineering.

UC-Irvine is located in Orange County, three miles from the Pacific Ocean near Newport Beach and approximately 40 miles south of Los Angeles. The campus is situated in the heart of a national center of high-technology enterprise. Both the campus and the enterprise area offer exciting professional and cultural opportunities. Salaries and benefits are competitive. Mortgage and housing assistance are available. Housing options include newly built, for-sale housing located on campus and within short walking distance from the department.

Send resume and contact information for five references to ICS Faculty Position, 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 Dec. 1, 1996.

The University of California is an equal opportunity employer, committed to excellence through diversity.

Pennsylvania State University
Department of Computer Science and Engineering

The Department of Computer Science and Engineering is seeking qualified candidates for expected tenure-track positions. Applications in all areas of computer science will be considered. Salary and rank will be commensurate with experience. Applicants must have completed all requirements for the Ph.D. degree in computer science, computer engineering or a closely related area before assuming duties. Excellence in research and teaching is required. Candidates for senior positions must have an established research reputation supported by a substantial record of publications. Openings are expected for August 1997.

The Department of Computer Science and Engineering maintains a Computer Systems Laboratory consisting of a distributed system of Sun and DEC workstations and file servers (all running Unix).

Applications should be received by Feb. 28, 1997. Applications will be considered until suitable candidates can be identified.

To apply by electronic mail, send resume in a Postscript file to recruiting@cse.psu.edu. Or send to Chair, Faculty Search Committee, The Pennsylvania State University, Department of Computer Science and Engineering, Box CRA, 220 Pond Laboratory, University Park, PA 16802.

Penn State is an affirmative action, equal opportunity employer. Women and minorities are encouraged to apply.

Stanford University
Department of Computer Science

Join the SUIF compiler team at Stanford to develop a free compiler infrastructure.

We are starting a project, together with Harvard, UCSB and Cygnus Support—a company with a record of supporting GCC—to build a compiler infrastructure for researchers and users. Our goal is to develop an infrastructure that many different compiler groups can contribute to. Its success can lead to a compiler system that is better than any existing systems.

The compiler source languages include Fortran, C, C++ and Java. The advanced components of the compiler include automatic parallelization, pointer analysis, object-oriented programming optimizations and instruction scheduling. The system will be built upon the SUIF compiler that is currently distributed (http://suif.stanford.edu).

We are seeking a highly motivated and super programmer who could help lay the foundation of the infrastructure. The primary responsibility of the research programmer is to assist in the design, implementation, testing, debugging, maintenance and documentation of the compiler system. He or she will interact closely with the rest of the research team, as well as provide support to the external user base. We need somebody who can work independently and innovatively in the face of unreasonable demands; at the same time, the job provides a lot of freedom and growth potential.

The candidate must have a B.S. or M.S. degree in computer science or equivalent and excellent programming skills. He or she must be familiar with C++ and have extensive programming experience in large software projects. Knowledge in optimizing compilers is preferable.

Please send a cover letter, a resume and two references to Professor Monica Lam, Department of Computer Science, Gates Building, 3A-Wing, Stanford University, Stanford, CA 94305-9030. E-mail: lam@cs.stanford.edu.

Iowa State University
Department of Computer Science

We seek outstanding applicants for a tenure-track faculty position at the assistant professor level. Strong preference will be given to experimental computer scientists in the areas of distributed multimedia systems, intelligent agents and robotics, and computational biology. The position requires a Ph.D. in computer science or a related field, strong evidence of research scholarship and funding potential, and interest and ability in teaching graduate and undergraduate students.

Professional Opportunities

The department currently consists of 15 full-time faculty and offers B.S., M.S. and Ph.D. programs. There are approximately 500 undergraduate and 90 graduate majors. Established research and educational programs in our department include software engineering, OS, theory of computation, VLSI, design and analysis of algorithms, database, parallel and distributed computing, programming languages, AI, computer architectures and communication networks. We place strong emphasis on research, support a high-quality graduate program and provide a teaching load of three courses per year. Research collaboration opportunities exist with other research units at ISU, such as Ames Laboratory (US Department of Energy) and Visualization Laboratory (College of Engineering).

ISU is located in Ames, a city with a population of 50,000 and a secondary school system that ranks as one of the best in the United States. For more information, please refer to our WWW page at URL: http://www.cs.iastate.edu.

Applicants should send a curriculum vitae, including names of three references, to Dr. Johnny Wong, Chair of Search Committee, Department of Computer Science, Iowa State University, Ames, IA 50011. Tel. 515-294-2586; fax: 515-294-0258; e-mail: wong@cs.iastate.edu.

The deadline for applications is Jan. 15, 1997, or until the position is filled.

ISU is an equal opportunity, affirmative action employer. Women and minorities are particularly encouraged to apply.

Arizona State University
Department of Computer Science and Engineering

We invite outstanding candidates for tenure-track faculty positions at all ranks. Applicants are required to have completed a Ph.D. in computer science, computer engineering or a closely related field by the date of appointment. Applicants at the assistant professor level must show exceptional promise in teaching and research; applicants at the associate professor level and higher must demonstrate established excellence in teaching and research. Desired qualifications include expertise in the areas of software engineering, computer-aided geometric design, computer graphics, database systems, multimedia systems, distributed computing, networking and/or operating systems.

Arizona State University is a major research university widely recognized as one of the most rapidly emerging educational institutions in the United States. The main campus is in the city of Tempe, in the metropolitan Phoenix area. The Department of Computer Science and Engineering provides a stimulating and fast-growing environment for research and teaching, with ample opportunities for partnerships with high-technology industry and emphasis on quality, leading-edge graduate and undergraduate education.

Applicants must include a curriculum vitae, a selection of most important publications and the names and addresses of four references. Direct applications to Dr. Stephen S. Yau, Chair, Department of Computer Science and Engineering, Arizona State University, PO Box 875406, Tempe, AZ 85287-5406. E-mail: cs-facsearch@asu.edu.

Questions and inquiries may be submitted by e-mail, but applications and nominations must be received by post. The closing date is Dec. 16, 1996. Applications received after that date will be reviewed on the first and the 15th of each month as necessary until the positions are filled. Salary is competitive.

Arizona State University is an equal opportunity, affirmative action employer.

University of Waterloo
Department of Computer Science

The University of Waterloo invites applications for one or more tenure-track faculty positions in computer science. The department prides itself on being a leader in computer science education and home to a diverse research program of international stature. Because of its recognized strengths and breadth, the department is able to attract extremely well-qualified students at both undergraduate and graduate levels; these students contribute extensively to the department's vitality. Successful applicants will be expected to develop and maintain a productive research program, to attract and develop highly valued graduate students, to provide a stimulating learning environment for undergraduate and graduate students and to contribute to the administration of the department.

Of particular interest are candidates whose teaching and research expertise fall within the fields of artificial intelligence, database systems, data structures design, distributed systems, operating systems, programming languages or software engineering. A Ph.D. in computer science or equivalent is required, with evidence of outstanding research accomplishments or potential and evidence of excellence in teaching. Candidates at all levels of experience are encouraged to apply. Rank and salary will be commensurate with experience.

The Department of Computer Science comprises more than 40 full-time faculty members. The department is a key participant in the Information Technology Research Centre (ITRC), a provincial Centre of Excellence that supports basic and applied research in information technology. Excellent offices, laboratories and computing facilities, in addition to attentive support staff, provide a productive work environment. For further information about the department, please see http://math.uwaterloo.ca/CS_Dept.

Applications should include a curriculum vitae and the names and e-mail addresses of three references. The application should be directed to the chair: Professor Frank Tompa, Department of Computer Science, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. E-mail: cs-chair@cs.uwaterloo.ca. Candidates should ask those named as references to direct supporting letters to the same address. The positions are expected to commence during the 1997 calendar year, and applications will be accepted until Jan. 15, 1997.

The University of Waterloo 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.

These appointments are subject to the availability of funds.

University of Michigan
Division of Computer Science and Engineering

Applications are solicited for several faculty positions in the Computer Science and Engineering (CSE) Division at all ranks. 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 multimedia, computer networks, software for distributed computing (including OS), databases, object-oriented programming, graphics and programming languages.

Please send resume and names of five references to Professor Toby J. Teorey, Chair of the Faculty Search Committee, CSE Division, Department of Electrical Engineering and Computer Science, The University of Michigan, 1301 Beal Ave., Room 3401, Ann Arbor, MI 48109-2122.

A nondiscriminatory, affirmative action employer.

University of California, Los Angeles
Department of Computer Science

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

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

Interested applicants should send a letter of application, a resume and the names of four references to Professor Richard R. Muntz, Chair, UCLA Computer Science Department, 4732 Boelter Hall, Los Angeles, CA 90095-1596.

Stanford University
Department of Computer Science

Stanford University's Department of Computer Science seeks applicants for a tenure-track faculty position at the assistant professor level. The department is interested in outstanding candidates from all areas of research in computer science.

Applicants should have a strong interest in both teaching and research. The successful candidate will be expected to teach courses, both in the candidate's specialty area and in related subjects, and to build and lead a team of graduate students in Ph.D. research. To guarantee full consideration, send applications (including a resume, a publications list and the names of five references) by Jan. 15, 1997, to Professor Monica Lam, Search Committee Chair, Department of Computer Science, Gates Hall, 3A-Wing, Stanford University, Stanford, CA 94305-9030.

Note: Candidates whose specialty is in software systems and tools should instead submit their application to Professor Hector Garcia-Molina, Software Systems Search, Department of Computer Science, Gates Hall, 4A-Wing, Stanford University, Stanford, CA 94305-9040.

Candidates whose specialty is computer architecture should send their applications to Professor Mark Horowitz, Architecture Search, Department of Electrical Engineering, Gates Hall, 4A-Wing, Stanford University, Stanford, CA 94305-9040.

For the architecture search only, candidates at the associate or full professor level will also be considered.

Stanford University is an equal opportunity, affirmative action employer and especially encourages applications from minorities and women.

University of Chicago
Department of Computer Science

The Department of Computer Science at the University of Chicago is requesting applications for a position at the level of assistant professor for new or recent Ph.D.s with superior research records and potential. Salary, teaching loads and other conditions of employment are competitive.

Applicants should write directly to Professor Todd F. Dupont, Chair, Department of Computer Science, The University of Chicago, 1100 E. 58th St., Ryerson Hall, Chicago, IL 60637. Inquiries can be directed to chair@cs.uchicago.edu.

An application consists of a letter from the applicant; curriculum vitae containing relevant personal information, educational and employment history, summary of dissertation results, publications, research interests and plans for future research; and at least three letters of recommendation. The letters of recommendation should assess the applicant's scientific powers and promise. It is the responsibility of the applicant to ensure that his/her references send their letters directly to the above address. At least one letter should include comments on the applicant's capabilities and experience in teaching.

Applications for positions in October 1997 should be submitted as soon as possible during the 1996-97 academic year. Decisions are usually made in the late winter.

Prospective candidates are encouraged to view the CS Department's home page at http://www.cs.uchicago.edu.

The University of Chicago is an equal opportunity, affirmative action employer, and encourages applications from underrepresented minorities and women.

Kansas State University
Department of Computing and Information Sciences

The Department of Computing and Information Sciences at Kansas State University invites applications for an anticipated tenure-track position beginning in fall 1997. Applicants should have a Ph.D. degree in computer science by the starting date of the appointment; salary will be commensurate with qualifications. Applicants must be committed to both teaching and research. Primary consideration will be given to candidates in the area of data/knowledge-base systems. Applications must include descriptions of teaching and research interests along with copies of representative publications. Non-US citizens must include visa status.

The department has a faculty of 17 and offers B.S., M.S., M.S.E. and Ph.D. degrees. Computing facilities center around a network of Unix- and Solaris-based single- and multiprocessor Sun workstations, X-terminals, Macintoshes and PCs. More information is available at http://www.cis.ksu.edu.

Please send applications to Dr. Virgil Wallentine, Head, Department of Computing and Information Sciences, 234 Nichols Hall, Kansas State University, Manhattan, KS 66506. E-mail: virg@cis.ksu.edu. Review of applications will commence Jan. 15, 1997, and will continue until the position is filled.

Kansas State University is an affirmative action, equal opportunity employer.

New York University
Department of Computer Science

The department expects to have several regular faculty positions beginning in September 1997 and invites candidates at all levels. The department is strengthening and broadening its existing systems research and to this end is particularly interested in the areas of distributed computing, networking, multimedia, operating systems and security. Faculty members are expected to develop an independent first-rate research program. In addition, they are expected to participate in the departmental teaching activities at all levels, from the undergraduate to the doctoral.

There may also be openings for regular joint positions with science departments. Candidates for such positions are expected to combine expertise and research interests from both computer science and another subject such as chemistry, biology or medicine. The department may also have one or more visiting positions in computer science. Appointments for visiting positions can be for a period of either one or two semesters.

The new appointees for regular positions will be offered competitive salaries, competitive start-up 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 has 23 regular faculty members and a number of visiting, adjunct and research faculty members. Current strengths of the department lie in algorithms, artificial intelligence, compilers, computer graphics, computer vision, databases, distributed and parallel computing, multimedia, natural language processing, programming languages and scientific computing. The department provides a general-purpose, state-of-the-art computing environment. In addition, there are 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 faculty obtain external funding at the level of $6 million per year. Among the funding sources are federal agencies such as AFOSR, DARPA, DOE, NSF and ONR and industrial organizations such as BellCore, IBM Research, Intel, Microsoft, HP and SGI. 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, statement of career objectives, names of references (at least three for junior positions and at least five for senior positions) and key publications. Applicants are encouraged to provide a URL for a page describing their activities. To ensure full consideration, applications should be received no later than Dec. 16, 1996; however, later applications will be considered until all positions are filled.

Please send applications to Professor Zvi Kedem, Faculty Search Committee, Department of Computer Science, New York University, 251 Mercer St., New York, NY 10012-1185.

New York University is an equal opportunity, affirmative action employer.

Duke University
Department of Computer Science

We invite applications for a teaching position starting in January or August 1997, subject to institutional approval. This position is for two and a half years, funded in part by an NSF Educational Innovation grant. Candidates should have demonstrated excellence in teaching, preferably with experience in introductory courses, HCI and object-oriented technology, but all candidates will be considered. Candidates with either a master's or Ph.D. degree will be considered; the title of the position is commensurate with experience and qualifications. Possible titles include lecturer (without Ph.D.) and visiting assistant professor of the practice (with Ph.D.; this title is subject to approval).

Candidates should be enthusiastic and innovative teachers. The position entails teaching two courses per semester with significant graduate and undergraduate teaching-assistant support. The position offers the opportunity to participate in ongoing curricular development, including the integration of visualization and performance analysis and measurement throughout the undergraduate curriculum, and the development of visual and interactive tools to support undergraduate computer science education.

The Computer Science Department at Duke supports a vibrant, growing mix of research and education. The department relocated in 1994 into spacious new quarters in the $70 million Levine Science Research Center. The Durham/Research Triangle area in North Carolina, rated as one of the five best places to live in the United States, offers a wide variety of professional, cultural and recreational attractions.

Applications should include a curriculum vitae, documentation of teaching experience and expertise, a statement of teaching philosophy and interests and a list of at least three references.

Applications will be considered as they arrive, with preference given to those received by Oct. 30, 1996. Applications should be sent to Teaching, Box 90129, Duke University, Durham, NC 27708-0129.

University of Wyoming
Department of Computer Science

Applications are invited for one tenure-track position in computer science at the assistant professor rank or at the associate professor rank with an exceptional research and funding record. A Ph.D. in computer science or closely related field is required. The successful candidate will teach and advise undergraduate and graduate students, serve on committees and perform research in computer vision, image processing, computer graphics and/or spatial data analysis. Persons with teaching or industrial experience are preferred.

Candidates should send a curriculum vitae and arrange for three letters of recommendation to be sent to Professor Henry Bauer, Chair, Department of Computer Science, University of Wyoming, PO Box 3682, Laramie, WY 82071-3682. Screening of applications begins on Jan. 17, 1997, with a closing date of Jan. 31, 1997. Send questions only to bauer@uwyo.edu.

As an equal opportunity, affirmative action employer, the university encourages female and minority applicants.

University of Southern California
Department of Computer Science

Applications are invited for a tenure-track faculty position in software engineering. The SE program performs leading research in software architectures; software environments; software requirements engineering; software process, performance, reliability and cost models; and computer language definition and processing. The CS Department is ranked in the top 20 computer science departments nationally. It offers B.S., M.S. and Ph.D. degrees.

Candidates should have a strong research record, a vigorous commitment to teach and a strong desire and capability to build a sponsored research program. A Ph.D. in computer science or a related areas is required.

Applications consisting of a letter of application and career goals, a curriculum vitae and a list of key publications should be sent to the search chair: Professor Barry Boehm, Computer Science Department, University of Southern California, Los Angeles, CA 90089-0781.

The application deadline is Jan. 1, 1997; early applications are encouraged.

USC is an equal opportunity, affirmative action employer.

Purdue University
School of Electrical and Computer Engineering

The Purdue University School of Electrical and Computer Engineering seeks outstanding candidates in all areas of computer engineering. Candidates are expected to have demonstrated exceptionally strong research and superior teaching potential. Several openings are anticipated for tenure-track faculty at all levels.

Applicants will be required to have a doctoral

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Professional Opportunities

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degree. Send a resume, including a statement of research and teaching interests and a list of at least three references, to Head, School of Electrical and Computer Engineering, Purdue University, 1285 EE Building, West Lafayette, IN 47907-1285. Applications will be considered as they are received.

Purdue University is an equal opportunity, affirmative action employer.

University of Illinois, Urbana-Champaign

Department of Computer Science

The Department of Computer Science at UIUC anticipates one or more full-time tenured and/or tenure-track appointments. Applicants are sought in all areas, with special emphasis on graphics and multimedia and experimental systems. To be considered for a tenured position, applicant must have recognized national and international stature. Successful candidates will be expected to initiate and carry out independent research and to perform academic duties associated with our B.S., M.S. and Ph.D. programs.

Qualifications: Ph.D. in computer science or a closely related field (or imminent completion of degree), outstanding academic credentials and an ability to teach effectively at both the graduate and undergraduate levels. Salary open, based on qualifications.

Starting date: Aug. 21, 1997. To ensure full consideration, applications must be received by Dec. 15, 1996, although a search will continue until positions have been filled. Send resume, including names of three references, to Daniel A. Reed, Head, Department of Computer Science, 1304 W. Springfield Ave., Urbana, IL 61801. Tel. 217-333-6454.

The University of Illinois is an affirmative action, equal opportunity employer.

Ohio State University

Department of Computer and Information Science

The Department of Computer and Information Science invites applications for tenure-track faculty positions at both the junior and senior levels. Strong candidates in the following research areas will be considered: AI, architecture, database systems, graphics, human-computer interaction, networking, parallel and distributed systems, programming languages, scientific computing and software engineering. One of our positions is designated for a candidate working on human-computer interaction.

The department currently has 32 faculty members, three instructors and about 90 master's and 80 Ph.D. students. It is located in a new building equipped with state-of-the-art networks of computers.

Applicants should send a curriculum vitae, along with copies of their most important publications, to Chair, Faculty Search Committee, Department of Computer and Information Science, The Ohio State University, 395 Dreese, 2015 Neil Ave., Columbus, OH 43210-1277. E-mail: fsearch@cis.ohio-state.edu.

The Ohio State University is an equal opportunity, affirmative action employer. Qualified women, minorities and individuals with disabilities are encouraged to apply.

University of California, Berkeley

School of Information Management and Systems

Tenure-track position at the School of Information Management and Systems: The dean of the School of Information Management and Systems (SIMS) at the University of California at Berkeley invites applications for a tenure-track position beginning in the fall semester 1997 at the assistant professor level. Applicants should have received or be about to receive a doctoral degree in computer science, information science, media/communications, business/management or a related field. Candidates should possess expertise and demonstrated research excellence in the areas of human-computer interface, information retrieval, organization of information, computer security, electronic documents, collaborative systems or a related field. The successful applicant will be expected to establish a quality research program and to teach both graduate and undergraduate courses in his/her area of specialty.

Applications with curriculum vitae, a select subset of papers, a short statement of future research plans and interests, and names of three references should be sent to the following address by Dec. 15, 1996: Chair of the Search Committee, #41, School of Information Management and Systems, 102 South Hall, University of California, Berkeley, CA 94720-4600.

Tenure-track joint position at the School of Information Management and Systems and the Haas School of Business: The dean of the School of Information Management and Systems and the dean of the Haas School of Business at the University of California at Berkeley invite applications for a tenured or tenure-track position beginning in the fall semester 1997. Applicants should have received a doctoral degree in business, computer science, information science or a related field at least three years prior to applying.

We are interested in individuals who apply information technology to business issues. Candidates who work in management information systems, corporate strategy, marketing, accounting and related business areas and whose research and teaching interests are primarily focused on information technology are invited to apply. The successful candidate will be expected to establish a quality research program and to teach both graduate and undergraduate courses in information technology and management. Evidence of superior teaching performance is highly desirable, in particular at the M.B.A. level. Extensive interaction is expected with the Fisher Center for Information Technology and Management at the Haas School.

Applications with curriculum vitae, a select subset of papers, a short statement of future research plans and interests, and names of three references should be sent to the following address by Dec. 15, 1996: Chair of the Search Committee, #42, School of Information Management and Systems, 102 South Hall, University of California, Berkeley, CA 94720-4600.

The University of California at Berkeley is an equal opportunity, affirmative action employer.

Professional Opportunities ads available on Web

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

North Carolina State University

Department of Computer Science

The Department of Computer Science at North Carolina State University seeks an assistant professor in the broad area of real-time animation, including believable agents, behavioral animation, interactive animation and intelligent interfaces. The successful candidate will have a Ph.D. in computer science and an extensive research record.

This new position has been created to further strengthen our activities in intelligent learning technologies. Our present activities and their importance to the core mission of NCSU are recognized at the highest levels within the university. A number of faculty have an interest in learning technologies and related areas. Their work is supported by NSF, IBM, Fujitsu, the State of North Carolina and internal university funds.

The department is in a period of rapid growth and advancement and is positioning itself to be at the forefront of selected areas in computer science. In addition to funding from the local industry, we attract research sponsorship from a variety of sources, including DARPA, AFOSR, EPA, NASA, NIH, NSF and ONR. The candidate will have access to our state-of-the-art, high-performance ATM-based networking, computational and multimedia facilities. In December the department's Multimedia Laboratory, with which the successful candidate will be affiliated, will move to a 5,000-square-foot space in the new $41 million Engineering Graduate Research Center.

The new faculty member will find a lively and collegial work environment. Synergistic activities within the department include research into animated intelligent agents, multiagent systems, knowledge-based learning environments, quality of service issues related to network-centric education and training, computer-human interaction, speech recognition and computational linguistics. In addition, several multidisciplinary initiatives that foster research on learning technologies are under way between the Department of Computer Science and other NCSU departments.

The university is located in Raleigh, which forms one vertex of the world-renowned Research Triangle. The Research Triangle area was recently recognized as one of the "best places to live" in the United States. It boasts a large concentration of high-technology companies, such as Alcatel, Bell Northern Research, Data General, Ericsson, Fujitsu, Glaxo-Wellcome, IBM and the SAS Institute, and research institutions such as EPA, NIEHS/NIH and RTI.

Interested candidates should send resumes (including citizenship and visa status) and the names of four references to Chair, Real-Time Animation Recruitment Committee, Department of Computer Science, 226 Withers Hall, North Carolina State University, Raleigh, NC 27695-8206.

Prospective candidates are encouraged to access the department's home page (http://www.csc.ncsu.edu) and to send e-mail to realtime@adm.csc.ncsu.edu.

The university is an equal opportunity, affirmative action employer.

Wayne State University

Department of Computer Science

The Computer Science Department of Wayne State University invites applications and nominations for two tenure-track faculty positions at the assistant or associate professor level. Applicants should be in the areas of distributed computing, operating systems, networking or multimedia.

Candidates should have a Ph.D. in computer science/engineering or a closely related field, a strong interest in and commitment to both research and teaching and a publication record in their area and should show potential for obtaining external research funding.

Wayne State University, located in Detroit's University Cultural Center, is an urban, comprehensive research university serving 32,000 students. The Computer Science Department has 17 faculty members and approximately 60 doctoral, 250 master's and 250 undergraduate students. Faculty members have ties to industries such as Ford Motor Co. and General Motors Corp. Several research and instructional projects are currently being funded by these industries, the Electrical Power Research Institute, the City of Detroit, NSF and NASA.

Applicants should send a letter of intent, a statement of research and teaching interests, a resume and the names of at least three references, their addresses (including e-mail address) and telephone/fax numbers to Dr. William I. Grosky, Chair, Computer Science Department, 431 State Hall, Wayne State University, Detroit, MI 48202. Tel. 313-577-2478; fax: 313-577-3395; e-mail: grosky@cs.wayne.edu.

For full consideration, applications should be submitted by Dec. 1, 1996. However, applications will be accepted until the positions are filled.

Wayne State University is an equal opportunity, affirmative action employer. Applications from minority and women candidates are especially encouraged. Wayne State University: People working together to provide quality service. All buildings, structures and vehicles at WSU are smoke-free.

Rochester Institute of Technology

Department of Computer Science

Applications are invited for full-time tenure-track positions at the assistant professor level, beginning in March or September 1997.

The department offers the B.S. and M.S. degrees in computer science. The B.S. program is accredited by the CSAB. It currently has 117 full-time positions and more than 500 students. Applicants should be prepared to participate in both programs, in a department that emphasizes a strong commitment to teaching as well as to consistent professional development.

A minimum of a master's degree and teaching experience is required. However, a Ph.D. in computer science is preferred. Industrial experience is highly desirable. For further information by e-mail: csdept@cs.rit.edu; or on our Web page: http://www.cs.rit.edu/~csdept/search.

RIT is an equal opportunity, affirmative action employer, and it invites and encourages applications from women and minorities.

Rice University

Department of Computer Science

The Department of Computer Science and the Center for Research on Parallel Computation at Rice University expect to have a number of positions available beginning in the academic year 1997-98 and invite applications for faculty and research staff positions. We are interested in receiving applications for appointments to the tenure-track faculty at the rank of assistant professor (however, appointment as associate or full professor will be considered for exceptionally well-qualified candidates); to the research faculty, which may be at the rank of faculty fellow, senior faculty fellow or distinguished faculty fellow (these are research positions); and to the research staff as a research scientist or as a postdoctoral research associate. We are especially interested in candidates with research experience in artificial intelligence, algorithms and complexity, compilers, computer graphics and geometric modeling, computer systems, database management systems, networks, programming languages and parallel computing. We will consider strong candidates in other areas as well.

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

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

Rice is a well-endowed private university with a strong reputation for academic excellence, particularly in undergraduate teaching. It attracts outstanding students nationally and internationally and provides a stimulating environment for research, teaching and joint projects with industry. Teaching loads are low to accommodate faculty research and faculty salaries are competitive.

Send a resume, a statement of research and teaching interests, and the names and addresses of at least three references to the Faculty Search Committee, Department of Computer Science MS 132, Rice University, 6100 S. Main St., Houston, TX 77005-1892 before Jan. 15, 1997. Please specify the position to which you are applying.

If there are any questions, please call Iva Jean Jorgensen (713-527-4834) or send e-mail to ivy@rice.edu.

Rice University is an equal opportunity, affirmative action employer.

University of Montana

Department of Computer Science

We invite applications for a tenure-track faculty position at the assistant professor level starting September 1997 or later. Strong preference will be given to candidates with a Ph.D. in computer science or a closely related field. Candidates must have an interest in research, undergraduate and graduate computer education, and participation in interdisciplinary activities. All areas of research will be considered, but preference will be given to interests in object-oriented systems, programming languages and operating systems, parallel and distributed systems, database systems, graphics and visualization, and scientific applications. Applicants must show potential for research and teaching effectiveness.

Applicants should submit a letter of application; a detailed resume noting their background, interests and professional objectives; and a professional vitae and transcript (three letters of recommendation should be requested for direct mailing) to Jerry D. Esmay, Faculty Search Committee, Department of Computer Science, The University of Montana, Missoula, MT 59812. Tel. 406-243-2866; e-mail: esmay@cs.umt.edu.

The University of Montana is an EO/AA employer and encourages applications from women, minorities, Vietnam era veterans and persons with disabilities. Initial application screening will begin Jan. 15, 1997, and continue until the position is filled.

North Carolina State University

Department of Computer Science

The Department of Computer Science at North Carolina State University seeks an assistant professor in the broad area of workflow management and data mining, although candidates with a background in other areas of distributed systems will also be considered. We especially seek candidates with interests and qualifications that complement or strengthen our present faculty. The successful candidate will have a Ph.D. in computer science and an extensive research record.

This new position has been created to further strengthen our activities in software systems. Our present activities involve a number of relevant areas, such as workflows and relaxed transaction management, software process modeling, formal methods and tools for concurrency, heterogeneous database access, scientific data management, multiagent systems, machine learning, distributed computing, multimedia and human interfaces. Applications of interest include education, health care, process control and scientific decision-support. The new faculty member will find a lively and collegial work environment. The department is in a period of rapid growth and advancement, and is positioning itself to be at the forefront of selected areas in computer science. We attract research sponsorship from a variety of sources, including DARPA, AFOSR, EPA, NASA, NIH, NSF and ONR. Industrial sources include IBM, Fujitsu, Glaxo-Wellcome and others. The candidate will have access to our state-of-the-art, high-performance ATM-based networking, computational and multimedia facilities. In December the department's Multimedia Laboratory, with which the successful candidate will be affiliated, will move to a 5,000-square-foot space in the new $41 million Engineering Graduate Research Center.

The university is located in Raleigh, which forms one vertex of the world-renowned Research Triangle. The Research Triangle area was recently recognized as one of the "best places to live" in the United States. It boasts a large concentration of high-technology companies, such as Alcatel, Bell Northern Research, Data General, Ericsson, Fujitsu, Glaxo-Wellcome, IBM and the SAS Institute, and research institutions such as EPA, NIEHS/NIH and RTI.

Interested candidates should send their resume (including citizenship and visa status) and the names of four references to Chair, Workflow Recruitment Committee, Department of Computer Science, 226 Withers Hall, North Carolina State University, Raleigh, NC 27695-8206.

Prospective candidates are encouraged to access the department's home page (http://www.csc.ncsu.edu) and to send e-mail to workflow@adm.csc.ncsu.edu.

The university is an equal opportunity, affirmative action employer.

Professional Opportunities

University of Nebraska, Lincoln
Department of Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) invites applications and nominations for the position of department chair. CSE has 20 faculty, 350 undergrads and 94 grad students. The department offers degrees in computer science and computer engineering, with programs leading to the B.S., M.S. and Ph.D. CSE has internationally recognized research programs and seeks to further improve its standing in communication theory and foundations; performance, dependability and security in distributed systems; digital processing and image understanding; and human-centered systems and multimedia.

The University of Nebraska at Lincoln (UNL) is the state's land-grant institution and premiere research campus. UNL has approximately 24,000 students. UNL is committed to pluralistic campus community through affirmative action and equal opportunity and is responsive to the needs of dual-career couples. We ensure reasonable accommodation under the Americans with Disabilities Act. Contact Dr. Samuel B. Treves at 402-472-0872 for assistance.

Qualifications: an earned doctorate in computer science, computer engineering or a closely related field, strong leadership for research and academic programs and credentials appropriate for appointment as a tenured full professor. The candidate's academic credentials or background should permit him/her to be a credible and effective advocate for CSE in both the College of Arts and Sciences and the College of Engineering and Technology.

Application screening will begin Jan. 15, 1997, and continue until the position is filled. Salary will be commensurate with qualifications. Women and minorities are particularly encouraged to apply.

For a complete job announcement, details of the application process and additional information about CSE and UNL, please visit http://http.cs.unl.edu or contact Dr. Samuel B. Treves at 402-472-0872 or streves@unlinfo.unl.edu.

University of Toronto
Department of Computer Science

We invite applications for one or two tenure-track positions at the assistant professor level in communication networks, distributed information systems or software engineering. Salary will be determined according to the successful applicant's experience and qualifications. The appointment is to commence July 1, 1997, and the position is on the St. George (downtown) campus of the University of Toronto.

Applications, including a curriculum vitae and a list of publications, should be sent to Professor Wayne H. Enright, Chair, Department of Computer Science, University of Toronto, Toronto, Ontario M5S 3G4 Canada. Please arrange to have three letters of reference sent directly to the same address. Deadline for application is Jan. 15, 1997.

The attention of applicants is drawn to a similar position, separately advertised, that is presently available on the university's Scarborough campus. A separate application is required, as detailed in the advertisement.

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 Toronto, Scarborough
Department of Computer Science

Applicants are sought for a tenure-track position in computer science at the University of Toronto, Scarborough campus. It is expected that the appointment will be made at the rank of assistant professor.

The university's teaching and research activities in computer science are closely integrated across the university's three campuses in the Greater Toronto area. Duties of the present position will include teaching undergraduate courses on the Scarborough campus, teaching graduate courses on the downtown campus, engaging in research and the supervision of graduate students.

Excellent candidates from all areas of computer science are encouraged to apply. We are seeking people with a strong commitment to, and demonstrated excellence in, both teaching and research. The areas of expertise in which our needs are greatest are operating systems, networks, software engineering, distributed systems and related topics. We especially value individuals with a broad knowledge of computer science. Applicants must hold, or expect to shortly receive, a Ph.D. in computer science or a closely related field.

Applications, including a CV and research statement, should be submitted by Jan. 31, 1997, to Professor J. Thompson, Chair, Division of Physical Sciences, Scarborough Campus, University of Toronto, Scarborough, Ontario M1C 1A4 Canada. Candidates should arrange for at least three letters of reference to be sent to the above address. Inquiries may be addressed to Professor Thompson at jthompso@scar.utoronto.ca or 416-287-7196.

The attention of applicants is drawn to a similar position, separately advertised, that is presently available on the university's downtown campus. A separate application is required, as detailed in the advertisement.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and landed immigrants (permanent residents) of Canada.

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

Duke University
Department of Computer Science

We invite applications for a tenure-track or tenured faculty position in experimental systems starting fall semester 1997. Areas of primary interest in experimental systems include high-speed networks, databases and object-oriented systems, compilers, programming languages, operating systems, mobile computing, software development environments, multimedia, parallel and distributed processing, computer architecture and digital systems design.

The department has major research efforts and funding in the areas of systems and architecture, algorithms, scientific computing and artificial intelligence. Facilities include an NSF-funded experimental cluster of DEC AlphaStations and Sun UltraSPARCs, over 120 other computers and high-end graphics workstations and access to a variety of supercomputers through MCNC in nearby Research Triangle Park.

The department is also connected to the North Carolina Information Highway, the first fully integrated and functioning high-speed statewide network in the United States.

The department relocated in 1994 into spacious new quarters in the $80 million Levine Science Research Center, a state-of-the-art facility devoted to interdisciplinary research in computer science, environmental science, biomedical science and engineering, and medicine.

The Durham, NC, area, which was rated in recent years by *Money* and *Fortune* magazines as the best place in the United States to live and work, offers a wide variety of professional, cultural and recreational attractions.

Applications should include a curriculum vitae, a list of publications and copies of the most important publications. A Ph.D. in computer science or a related area is required. Applicants should also request at least four letters of reference to be sent directly to the faculty search chair. To guarantee full consideration, applications and letters of reference should be received by Feb. 1, 1997, addressed to Professor Carla Ellis, Faculty Search Chair, Department of Computer Science, Duke University, Durham, NC 27708-0129.

Duke University is an affirmative action, equal opportunity employer.

Rensselaer Polytechnic Institute
Department of Computer Science

The Computer Science Department invites applications for tenure-track positions at all levels. Postdoctoral and visiting appointments may also be available. 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 B.S., M.S. and Ph.D. degrees in computer science, has a multimillion-dollar research program and excellent computing facilities. Currently there are 16 full-time faculty members, approximately 250 undergraduate students, 60 master's students and 60 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.

University of New Mexico
Department of Computer Science

Applications are invited for three tenure-track assistant professor positions in the Computer Science Department to begin fall 1997. Applicants must have a doctorate in computer science or closely related field. The department requires demonstrated research accomplishments as well as commitment to teaching excellence at both graduate and undergraduate levels. Applicants must have a strong background in experimental computer science. The department recently received a five-year NSF Research Infrastructure award to integrate current activities around computer science issues fundamental to successful development of the National Information Infrastructure. Individuals with research interests related to this focus or other current departmental research programs are particularly encouraged to apply.

The department has 17 faculty members, an increasing number of research faculty and staff, and offers B.S., M.S. and Ph.D. degrees in computer science. There is excellent access to computing facilities (high-end workstations, IBM SP2, Intel Paragon) and fast networks (ATM, Myrinet) for both research and instruction. Research funding (DARPA, NSF, ONR, LANL, SNL and others) is very strong, approaching $5 million per year. Current research programs focus on adaptive systems, automated reasoning, computer-mediated communications, databases, experimental algorithms, graphics and human-computer interaction, high-performance computing, intelligent systems, security and visualization. The department maintains close relationships with the Santa Fe Institute and the National Laboratories at Sandia and Los Alamos. Joint work with Sandia recently established a new supercomputing performance record. In addition, UNM is the prime contractor for the Maui High-Performance Computing and Visualization Center. For more details about the department, consult http://www.cs.unm.edu.

Review of applications will begin Jan. 1, 1997, and will continue until the positions are filled. Please send curriculum vitae, research statement and names of at least three references to Professor James D. Hollan, Chair, Computer Science Department, University of New Mexico, Albuquerque, NM 87313.

The University of New Mexico is an affirmative action, equal opportunity employer.

Polytechnic University
Department of Computer and Information Science

Applications are invited for tenure-track positions at all levels. We are particularly interested in candidates in the following areas: compilers, computer architecture, operating systems, parallel and distributed systems, programming languages and software engineering. A candidate must have a strong research record including significant publications and the demonstrated ability to secure external funds through grants or contracts appropriate to the level applied for.

The Department of Computer and Information Science offers B.S., M.S. and Ph.D. degrees. Areas of active research include computational biology; computational geometry; image analysis and understanding; large distributed databases; network management; serial, parallel, distributed and randomized algorithms; parallel and distributed systems and architecture; pattern matching and recognition; and software reliability and testing. Polytechnic University (formerly known as Brooklyn Poly) is located on three campuses in the New York City metropolitan area.

Qualified applicants should send their curriculum vitae to the Head of Faculty Search Committee, Department of Computer and Information Science, Polytechnic University, Six MetroTech Center, Brooklyn, NY 11201. E-mail: facsrch@morph.poly.edu.

Polytechnic is an equal opportunity employer. For more information, see http://cis.poly.edu.

Syracuse University
Department of Electrical Engineering and Computer Science

EECS offers both undergraduate and graduate programs. We encourage interdisciplinary programs of study, reflecting the fact that information, communication, signal processing and computation are integral parts of many disciplines. Computer engineering: B.S., M.S. and Ph.D.; computer science: B.S. and M.S.; systems and information science: M.S.; computational science: M.S.; computer and information science: Ph.D.; electrical engineering: B.S., M.S. and Ph.D. EECS also offers an undergraduate minor, and M.S.- and doctoral-level certificates in computational science

Faculty are conducting research in logic programming, parallel and distributed computing, computer networks, semantics, neural networks, artificial intelligence, algorithms, structural complexity theory, coding and combinatorics, computer applications, formal methods in VLSI design and software, object-oriented databases, multimedia processing, communications and signal processing, and Web technology.

Two independent research centers maintained by Syracuse University—the Northeast Parallel Architectures Center (NPAC) and the Center for Computer Applications and Software Engineering (CASE)—provide computing and research opportunities for all students.

For more information, contact Dr. James Fawcett, Department of Electrical Engineering and Computer Science, 123 Link Hall, Syracuse University, Syracuse, NY 13244-1240. URL: http://www.syr.edu; tel. 315-443-2654; fax: 315-443-2583; e-mail: jfawcett@cat.syr.edu.

Purdue University
Department of Computer Sciences

The Department of Computer Sciences at Purdue University invites applications for tenure-track positions at the assistant professor level, although other ranks will be considered for highly qualified individuals. Areas of interest are systems (including networking), software engineering, system software and information security. Applicants should hold a Ph.D. in computer science or a 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 operating systems, networks, programming languages, database systems, software engineering, solid and geometric modeling, theory of computation, numerical computing and scientific visualization. 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.

Applicants should send a curriculum vitae, statement of career objectives and ask references to write letters (at least three for junior positions and five for senior positions). To ensure full consideration, applications must be received by Jan. 17, 1997, although the search will continue until positions are filled.

Please send applications to Chair, Personnel Committee, Department of Computer Sciences, Purdue University, West Lafayette, IN 47907.

Purdue University is an equal opportunity, affirmative action employer.

Clemson University
Department of Electrical and Computer Engineering

Applications are invited for a position in the computer engineering area of the Department of Electrical and Computer Engineering. The rank of the position is open and unrestricted. The department has strong research programs in computer architecture, software standards, evolutionary computing and computer networks.

Candidates should have a solid record of accomplishment in computer engineering research. Candidates should hold a Ph.D. degree in computer engineering or a closely related field. The individual selected will be expected to contribute to both new and ongoing research programs at Clemson and to teach both undergraduate and graduate courses. A detailed description of the department is available at http://www.eng.clemson.

Send resume and names and addresses of five references to Chair, Computer Engineering Search Committee, Department of Electrical and Computer Engineering, 102 Riggs Hall, Box 340915, Clemson University, Clemson, SC 29634-0915. Evaluation will begin Nov. 15, 1996, and will continue until the position is filled.

Clemson University is an equal opportunity, affirmative action employer.

Auburn University
Department of Computer Science and Engineering

The Department of Computer Science and Engineering invites applications for a tenure-track faculty position beginning fall 1997. Responsibilities include research, graduate student supervision, and graduate and undergraduate teaching. Applicants must have a Ph.D. in computer engineering, computer science or a closely related field. We are particularly interested in candidates with research interests in real-time, embedded systems and simulation; computer and communication networks and multimedia; and software engineering. The appointment will be made at the assistant professor level.

The department currently has 11 full-time faculty members and supports strong undergraduate and graduate programs. Faculty research areas include software engineering, parallel computation, artificial intelligence, computer and communication networks and human-computer interaction. Departmental resources include a network of Sun workstations that is linked to the College of Engineering's Sun network and the Internet. Auburn University, with over 21,000 students, is Alabama's land-grant university, located 100 miles southwest of Atlanta. More information about the department and faculty research interests can be obtained from the department's WWW home page. The URL is http://www.eng.auburn.edu/department/cse/csehome.html.

Applicants should send a curriculum vitae and the names, addresses and telephone numbers of three references to James H. Cross II, Chair, Department of Computer Science and Engineering, Auburn University, AL 36849-5347. Questions can be e-mailed to cross@eng.auburn.edu. Review of applications will begin on Dec. 1, 1996, and will continue until the position is filled.

Auburn University is an affirmative action, equal opportunity employer; women and minorities are encouraged to apply.

Washington University, St. Louis
Department of Computer Science

Washington University invites nominations and applications for chair of the Department of Computer Science. Applicants should hold a Ph.D. or D.Sc. degree in computer science or closely related area, have demonstrated strong administrative and leadership capabilities, and have a strong commitment to and record of accomplishment in both research and teaching. Applicants should be at a level that would support nomination for tenure and a named, endowed chair. The position is available summer 1997.

Washington University is a leading national university with about 11,500 students and exceptional professional schools in medicine, engineering, business, law, architecture, social work and fine arts. It has an endowment of over $2 billion and annual federal research support of approximately $185 million. The Department of Computer Science is in the School of Engineering and Applied Science, has about 150 undergraduate majors, 85 graduate students and 18 faculty, and has annual external research funding of approximately $4.1 million. The department plans to continue its growth through the next several years, expanding its research and graduate programs, while enhancing its already outstanding undergraduate program.

The department and its associated research laboratories have exceptional facilities to support computing research, including over 150 workstations and file servers, and a variety of specialized equipment, including a Sun System 2000

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multiprocessor, a Convex supercomputer and a complete computer visualization laboratory. The departmental network infrastructure includes more than a dozen ATM switches with over 100 user ports and connections to application collaborators across the university. It will soon be expanded to include experimental switches with gigabit links.

A major research focus in the department over the next several years will be distributed multimedia computing and communication systems. Consequently, we are particularly interested in individuals with an interest in distributed computing, high-speed networks, high-performance computing, advanced user interfaces and related computer engineering issues. The department also has strong research interests in artificial intelligence, visualization, the computational sciences and computational biology. Applications from outstanding candidates in these and other areas are welcome.

Washington University is located on a pleasant 168-acre suburban campus adjacent to Forest Park, one of the largest municipal parks in the country and home to the St. Louis Zoo, the Art Museum and the Science Center. St. Louis is a delightful place to live, with many fine residential neighborhoods, a minimum of urban hassles and all the amenities one expects of a major metropolitan area, including a world-class symphony orchestra; professional baseball, football and hockey teams; one of the world's most beautiful botanical gardens; and a rich and varied theater community.

Outstanding applicants should send a curriculum vitae and the names and addresses of at least three references to Dr. Mark Franklin, Chair, Computer Science Chair Search Committee, Campus Box 1045, Washington University, One Brookings Drive, St. Louis, MO 63130-4899.

Applications will be considered as they are received. Those received after Jan. 15, 1997, may not receive full consideration.

Washington University is an equal opportunity, affirmative action employer.

University of Delaware
Department of Computer and Information Sciences

The University of Delaware, centrally located on the East Coast, within day-trip distance of New York, Philadelphia, Baltimore and Washington, invites applications for two tenure-track assistant professor positions in the Department of Computer and Information Sciences beginning Sept. 1, 1997. One position will be in the area of computer networks, and the other in the area of systems. Excellent candidates are sought in all areas of computer networks, particularly wireless communications. For the systems position, excellent candidates are sought in computer architecture, operating systems, programming languages, software engineering and multimedia. Responsibilities of these positions include research, pursuit of external funding, supervision of graduate student research, and graduate and undergraduate teaching. The normal teaching load is three courses per year. A Ph.D. degree or its equivalent is required.

The department offers bachelor's, master's and doctoral degrees and has 14 tenure-track faculty, three visiting faculty and five research faculty, along with about 100 graduate students, a majority of whom are pursuing the Ph.D. The department enjoys significant external funding, including a recent award to the UD networking faculty of $3 million as part of a $45 million five-year industry/university consortium to form a new Army Federated Research Laboratory in telecommunications/information distribution. Additional information about the department can be found at http://www.cis.udel.edu.

Candidates should send a curriculum vitae to Dr. Sandra Carberry, Chair, Faculty Search Committee, Department of Computer and Information Sciences, University of Delaware, Newark, DE 19716. In addition, candidates should have three confidential letters of reference sent by Jan. 15, 1997, to the above address or by e-mail to csfacsch@cis.udel.edu. All applications received by Jan. 15, 1997, will be considered.

The University of Delaware is an equal opportunity employer that encourages applications from minority group members and women.

University of Arizona
Department of Computer Science

Applications are invited for tenure-track faculty positions beginning August 1997. The positions are at the assistant professor level, although appointments at higher levels will be considered for highly qualified candidates. The key criterion in applicants is quality. Assistant professor 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 at 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 that exceeded $2.5 million last year. Major funding has included two NSF Institutional Infrastructure grants over the past decade and a Research Infrastructure grant funded last year. Research areas include software systems, programming languages, compilers, operating systems, networks, search systems, database systems, computational biology and theory of computation. In addition to a broad range of equipment necessary to computing research, the department supports its instruction and research programs through an exceptional professional 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. Http://www.cs.arizona.edu. We will start the review of applications on Jan. 15, 1997, and will continue to consider applicants until the position is filled.

The University of Arizona is an equal employment opportunity, affirmative action, ADA-compliant employer. Women and minorities are encouraged to apply.

Rutgers University
Department of Computer Science

The Computer Science Department at Rutgers University is undertaking a major expansion in the software systems area and has at least two openings for tenure-track faculty for the 1997 academic year. We are particularly interested in networking, operating systems, distributed and parallel systems, multimedia and graphics, although strong candidates in all areas of software systems are encouraged to apply.

The new Rutgers University strategic plan places computer science as the area with one of the highest expected growth rates within the university. In the next few years, we plan to significantly expand our software systems group, which already includes DARPA- and NSF-funded laboratories for Mobile and Wireless Computing, Programming Languages, Data Mining, High-Performance Computing and Design, and Software Engineering. (See also http://www.cs.rutgers.edu.) Our department also has close ties to industry, including AT&T, Lucent, NEC, Siemens and several emerging companies in the New York area.

To apply, please submit a curriculum vitae and at least four professional references to Professor Haym Hirsh, Chair of Faculty Recruiting, Department of Computer Science, Hill Center, Busch Campus, Rutgers University, New Brunswick, NJ 08903. Or send e-mail to hiring@cs.rutgers.edu for further information.

University of South Carolina
Department of Computer Science

The Department of Computer Science of the University of South Carolina, Columbia, invites applications for the position of assistant professor of computer science. Specific areas of research interest include software engineering, software security, system software, multimedia systems and parallel systems. Candidates must have completed the Ph.D. degree by the time the appointment begins. The successful candidate will be expected to lead a vigorous independent research program and to participate effectively in undergraduate and graduate teaching.

The department has a faculty of 13, with approximately 300 undergraduate majors and 150 graduate students. Current areas of research include parallel algorithms, mobile networking, graphics and visualization, database, artificial intelligence, image processing, object-oriented systems, multimedia and scientific computing. Additional information about the department may be obtained from the department's Web pages at www.cs.sc.edu.

The University of South Carolina is located in Columbia, the state capital. USC is a comprehensive university with approximately 26,000 students, of whom 10,000 are graduate and professional students. Columbia is in the center of the state, approximately two hours from either the ocean or the mountains.

A curriculum vitae and letter of application should be submitted to the Faculty Search Committee, Department of Computer Science, University of South Carolina, Columbia, SC 29208. These materials may also be submitted via e-mail to fac-search@cs.sc.edu. Applications will be accepted until the position is filled.

The University of South Carolina is an equal opportunity, affirmative action employer.

University of Texas, Austin
Department of Computer Sciences

The Department of Computer Sciences of the University of Texas at Austin invites applications for tenure-track positions at all levels, particularly at the assistant professor level. Candidates must hold or be making satisfactory progress toward a Ph.D. or equivalent degree in computer science or a related area, with a reasonable expectation of completion by Aug. 31, 1997. Offers of employment are contingent upon completion of the Ph.D. degree requirements by that date. Successful candidates are expected to pursue an active research program, perform both graduate and undergraduate teaching and supervise graduate students.

The department is ranked among the top 10 computer science departments in the country. It has 30 tenure-track faculty members across all areas of computer science and participates in the university's Computational and Applied Mathematics interdisciplinary program. Austin, the capital of Texas, is located on the Colorado River, at the edge of the Texas Hill Country. Live music and outdoor recreation are among the many attractions of this beautiful area. Austin is also a center for high-technology industry, including companies such as IBM, Dell, Motorola, Sematech, TI, AMD, MCC and Tandem.

Applicants should submit a curriculum vitae, a statement of research interests, a list of references and up to three representative publications to Professor Simon S. Lam, Recruiting Committee Chair, Department of Computer Sciences, The University of Texas at Austin, Austin, TX 78712-1188. Applications will be accepted until the available positions are filled. E-mail inquiries about your application should be directed to faculty.recruit@cs.utexas.edu. If you maintain a WWW home page, please include its URL in your curriculum vitae.

Letters of reference will be solicited separately. Evaluation of applications will begin soon after Dec. 15, 1996. We anticipate that interview invitations will be extended to selected applicants between January and May 1997.

Women and minority candidates are especially encouraged to apply. The University of Texas is an equal opportunity employer.

Southern Methodist University
Department of Computer Science and Engineering

The Computer Science and Engineering Department at Southern Methodist University invites applications for two distinct faculty positions beginning fall 1997. The first position will be filled by an individual with an interest and expertise in software engineering. The second will be filled by an individual with an interest and experience in one of the following areas: distributed operating systems, networking and communications or computer-systems architecture. 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 degree programs in computer science, computer engineering and software engineering. It currently has 14 faculty members whose research concentration is in artificial intelligence, computational programming, computer arithmetic, computer networks, database systems, distributed operating systems, parallel processing and software engineering as well as other related areas.

Interested individuals should send a complete resume and names of three references, including a one-page statement of research interests and accomplishments, to Professor Dan I. Moldovan, Chair, CSE Department, SMU, Dallas, TX 75275-0122. The search committee will commence applicant screening on or about Dec. 1, 1996. To ensure full consideration, applications must be postmarked before Jan. 31, 1997. However, the committee will continue to accept applications until the positions are filled. All applicants will be notified of the committee's final employment decisions after the positions are filled.

SMU is an affirmative action, equal opportunity, Title IX employer and does not discriminate on the basis of race, color, national or ethnic origin, sex, age or disability.

Lehigh University
Department of Electrical Engineering and Computer Science

The Department of Electrical Engineering and Computer Science seeks applicants for a tenure-track position. We are especially interested in individuals with backgrounds in the areas of software, microelectronics or electromagnetics. Candidates must have a Ph.D. in the appropriate discipline. We require a strong commitment to teaching and evidence of innovative research through appropriate journal publications. We offer programs in computer engineering, computer science and electrical engineering leading to a Ph.D. degree.

Please send curriculum vitae and names of at least three references, together with their postal and e-mail addresses, to Dr. D.R. Decker, Faculty Search Committee, Department of Electrical Engineering and Computer Science, Lehigh University, Bethlehem, PA 18015. E-mail: search@eecs.lehigh.edu.

Lehigh University is committed to recruiting and retaining women and minorities.

University of Missouri, Rolla
College of Arts and Sciences

Applications and nominations are invited for the position of dean of the College of Arts and Sciences at the University of Missouri-Rolla. As chief academic and administrative officer of the college, the dean reports to the chancellor.

The candidate's academic credentials must qualify the individual for a tenured position as full professor in a department within the College of Arts and Sciences. Salary is commensurate with experience and qualifications. Applications with a comprehensive resume and the names, addresses and telephone numbers of five references should be sent to Dr. Paula Lutz, Chair, Search Committee for the Arts and Sciences Dean, College of Arts and Sciences, 121 Fulton, University of Missouri-Rolla, Rolla, MO 65409-1130. For a complete description of the position, see the College of Arts and Sciences Web page at http://www.umr.edu/~casdean.

Review of applications and nominations began October 1. Applications will be accepted until a candidate is selected.

The University of Missouri-Rolla is an affirmative action, equal opportunity employer committed to increasing diversity in its administration. Applications from women and minorities are solicited and strongly encouraged.

Washington State University
School of Electrical Engineering and Computer Science

The School of Electrical Engineering and Computer Science (EECS) solicits applications for two faculty positions; rank is open and depends on candidate's experience. Responsibilities include initiation and supervision of research programs and instruction at undergraduate and graduate levels. Applicants should have an earned Ph.D. degree in computer science or in a closely related field. We seek outstanding and accomplished candidates in specific areas of research that include computer networks, mobile computing and software engineering. A record of publications in refereed journals and international conferences is desired.

Screening of applications will begin on December 15 and continue until the positions are filled. Positions will commence Aug. 16, 1997.

Washington State University has offered the Ph.D. in computer science since 1970 and also offers B.S. and M.S. degrees. The School of EECS has over 40 faculty (approximately 18 with primary interests in computer science and engineering) and 60 computer science graduate students. To find out more about the School of EECS and faculty research interests, please see our Web page at http://www.eecs.wsu.edu. WSU has about 17,000 students and is located in Pullman, a quiet university town in the southeast corner of the state; it is about 75 miles south of Spokane and 280 miles southeast of Seattle.

Applicants should send a cover letter clearly stating the rank they are applying for, a curriculum vitae and the names and addresses of three references qualified to comment on their research and teaching qualifications to Chair, Computer Science Search Committee, School of Electrical Engineering and Computer Science, Washington State University, Pullman, WA 99164-2752.

WSU is an EO/AA educator and employer. Protected group members are encouraged to apply.

Oakland University
Department of Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) invites applications for two tenure-track positions to begin in January 1997 or later. One position is in the area of software engineering (SE), the other in computer science or engineering. The SE position involves research and teaching in a new M.S. program in software engineering. The ideal expertise includes practical aspects of software engineering and its mathematical foundations. The other position involves active research in computer science and/or engineering and teaching undergraduate and graduate courses.

Candidates should have a Ph.D. in computer science or computer engineering and strong interest in both research and teaching. Applications will be accepted until the positions are filled.

Applicants should send a letter of intent, resume, the names of three references and a statement of research and teaching interests to Professor Subra Ganesan, Chair, CSE Department, Oakland University, Rochester, MI 48309-4401. E-mail: ganesan@oakland.edu.

For additional information about the department, college and the university, see http://www.secs.oakland.edu.

Oakland University is an equal employment opportunity, affirmative action and ADA-compliant employer.

University of Massachusetts, Amherst
Department of Computer Science

The Department of Computer Science has several openings for tenure-track faculty positions at the assistant professor level. Applicants must have a Ph.D. in computer science or related area and should show evidence of exceptional research promise. Our primary interest is in candidates whose research interests are in the systems area of computer science. We seek creative and energetic applicants whose research contributions relate to operating systems, databases, information retrieval, architecture and networking. The department is interested in strengthening its efforts in emerging areas such as geographically distributed, heterogeneous and mobile computing, and multimedia systems. Candidates with research interests in other systems-related areas will also be considered. Exceptional applicants may also apply for positions other than at the assistant professor level.

The Department of Computer Science has 38 tenure- and research-track faculty and 150 Ph.D. students with broad-based interdisciplinary research interests. In addition to the positions advertised here for the 1997-98 academic year, the department expects to have more openings in subsequent years. The process of building a new state-of-the-art facility to house the department is now under way. For further information regarding the department and its pleasant environs, please visit http://www.cs.umass.edu on the World Wide Web. Applications should reference Search 221.

We also invite applications for research scientist (Search 222), postdoctoral research associate (Search 223) and research fellow (also Search 223) positions in all areas of computer science. Applicants should have a Ph.D. in computer science or related area (or an M.S. plus the equivalent in experience), and should show evidence of exceptional research promise. These positions are grant-funded; reappointments will be contingent upon additional grant funding.

To apply, send a letter with your vita and names of at least three references to Search {fill in number

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from above}, c/o Chair of Faculty Recruiting, Department of Computer Science, LGRC, Box 34610, University of Massachusetts, Amherst, MA 01003-4610. Review of vitae begins Dec. 1, 1996, and will continue until available positions are filled. Salary commensurate with education and experience; comprehensive benefits package. Positions available subject to funding.

The University of Massachusetts is an affirmative action, equal opportunity employer.

University of Alberta
Department of Computing Science

Applications are invited for three tenure-track positions at the assistant professor level, one in the area of software engineering, one in the area of multimedia systems and one from the areas of artificial intelligence, computer graphics, computer vision or database systems. These are all new positions created as part of a general expansion of the department. The successful candidates in the first two positions should have strong software systems backgrounds. Truly outstanding applicants from other areas of computer science will also be considered for the third position. Responsibilities for all positions include research as well as teaching at both the graduate and undergraduate levels. Excellent support is provided to the successful applicants for establishing their research programs.

The department consists of 33 academic and 22 support staff, and offers a graduate program with over 100 M.Sc. and Ph.D. students. Current computer equipment consists of a network interconnecting several multiprocessor Sun servers, two multiprocessor SGI servers, four Sun file servers delivering 60 gigabytes of storage and over 160 Sun, SGI, HP, DEC and IBM workstations in research laboratories and offices. The department is well-connected via the campus FDDI network to the remainder of the campus units and the Internet. Experimental ATM network connections are available for research projects. Instructional facilities include six Unix workstation (Sun, SGI and Xterm) laboratories, three Pentium-based Microsoft NT laboratories, a new HP Imaging Systems laboratory and one Intel 486 laboratory. There are well-supported research laboratories in algorithmics, artificial intelligence, cognitive science, communication networks, computer graphics, computer vision and robotics, database, parallel and distributed systems, and software engineering. A new multimedia research lab and institute has just been started.

The salary offered will be commensurate with qualifications and experience. Send curriculum vitae, the names of three references and up to three reprints 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, 1997, with employment commencing on July 1, 1997.

Please send applications to Dr. Paul G. Sorenson, Chair, Department of Computing Science, University of Alberta, Edmonton, Alberta T6G 2H1 Canada. E-mail: sorenson@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.

Washington State University, Tri-Cities
School of Electrical Engineering and Computer Science

One faculty position at the assistant professor level is available at the WSU Tri-Cities site in Richland, WA. A Ph.D. in computer science or a closely related field is required. The successful candidate will contribute to instruction at the undergraduate and graduate levels in computer science and initiate an active research program. Preferred research areas include parallel and distributed systems, operating systems, database theory and software engineering. Industrial experience is desirable. Applicants should provide a resume and a list of three references including addresses and phone numbers. The deadline for applications is Dec. 16, 1996. The position start date is Aug. 16, 1997.

Address correspondence: Chair, Computer Science Search Committee, WSU Tri-Cities, 100 Sprout Road, Richland, WA 99352.

WSU is an equal opportunity, affirmative action educator and employer. Protected group members are encouraged to apply.

University of Oregon
Department of Computer and Information Science

The Department of Computer and Information Science invites applications for tenure-track faculty positions starting in September 1997. Candidates should evidence a strong commitment to both research and teaching. We are particularly interested in applicants in software engineering. Other areas of interest include networking, human-computer interaction, graphics, visualization, multimedia and computational science.

The department is associated with the NSF-funded Software Engineering Research Center (SERC), the Computational Intelligence Research Laboratory (CIRL), the Cognitive and Decision Sciences Institute and the Computational Science Institute (CSI). Instructional laboratories consist of Unix-based workstations and computer servers. Research facilities include special equipment for user-interface design, graphics and parallel processing. A new computational science laboratory houses an array of SGI Powerchallenges with high-performance graphics hardware.

The University of Oregon is located in Eugene, a community rated among the most livable in the nation. Qualified candidates should send their curriculum vitae and the names of at least four references to Faculty Search Committee, Computer and Information Science, University of Oregon, Eugene, OR 97403-1202. E-mail: faculty.search@cs.uoregon.edu. For full consideration, applications should be received by Jan. 10, 1997. We shall continue to accept applications until the position is filled.

The University of Oregon is an equal opportunity, affirmative action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

University of Illinois, Urbana-Champaign
Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering anticipates possible tenure and tenure-track faculty appointments in computer engineering, particularly in the areas of computer architecture, design verification, fault tolerance and parallel processing.

Applicants must have outstanding academic credentials and an ability to teach effectively at both the graduate and undergraduate levels. Selected candidates will be expected to initiate and carry out independent research and to perform academic duties associated with our B.S., M.S. and Ph.D. programs. Ph.D. required for tenure-track positions. Salary open, based on qualifications. Starting date is negotiable. Applications must be received by Jan. 15, 1997, to receive full consideration.

Send resume including at least three references to Dr. Sung-Mo (Steve) Kang, Department Head, Electrical and Computer Engineering Department, 1406 W. Green St., Urbana, IL 61801. Tel. 217-244-0968.

The University of Illinois at Urbana-Champaign is an affirmative action, equal opportunity employer.

University of Western Ontario
Department of Computer Science

The Computer Science Department at the University of Western Ontario invites applications for two tenure-track positions at the level of assistant professor. Candidates should have a Ph.D. in computer science or related discipline and show evidence of strong research potential and excellence in teaching. One position is specifically targeted to persons with expertise in software engineering or related areas.

The Computer Science Department is composed of 18 regular faculty plus visiting and teaching faculty members. The department offers B.Sc., M.Sc. and Ph.D. degrees in computer science and maintains an in-house, state-of-the-art computing environment consisting of 200 workstations and research facilities for graphics and imaging, parallel computing, distributed computing, multimedia, text processing, AI and vision, and computing facilities for the handicapped. The university has taken the initiative to establish a new undergraduate program in software engineering.

The department receives funding from NSERC, ITRC, industry and government agencies—such as the Canadian Genome Analysis and Technology Program and Industry, Science and Technology Canada (ISTC)—for research into a broad range of areas including algorithms, artificial intelligence, computer graphics, databases, distributed and parallel computing, formal languages and automata, image processing, programming languages, software engineering and vision.

The University of Western Ontario, located in London, Ontario, offers an attractive campus with many activities. London offers a reasonable cost of living coupled with many amenities found in larger cities, as well as convenient access to the metropolitan areas of Toronto and Windsor/Detroit.

The deadline for applications is Jan. 31, 1997. The effective date of appointment is July 1, 1997. Applications should be sent to Dr. Sylvia Osborn, Acting Chair, Department of Computer Science, The University of Western Ontario, Middlesex College, London, Ontario N6A 5B7 Canada.

Positions are subject to budget approval. In accordance with Canadian immigration requirements, this advertisement is directed 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.

Virginia Polytechnic Institute and State University
Department of Computer Science

The Virginia Tech Department of Computer Science seeks to fill two anticipated positions at the assistant professor level, starting fall 1997. We are recruiting in the areas of user interface software and tools, software engineering applied to user interface development, networked information systems and problem-solving environments.

The department has special strengths in human-computer interaction (HCI), scientific computing and software engineering. Research funding is strong—over $2 million per year. We are in the fourth year of an NSF Research Infrastructure grant in HCI and an NSF Educational Infrastructure grant in the use of digital libraries in computer science education. We have just begun a five-year NSF Graduate Research Traineeship Program in HCI. A new NSF Academic Research Infrastructure grant will provide a CAVE virtual environment to be placed within the $26 million Advanced Communications and Information Technology Center soon to be constructed on campus.

Virginia Tech is located near Roanoke, in the New River Valley, between the Appalachian Mountains and the Blue Ridge Mountains, and immediately adjacent to 1.77 million acres of national forest. It is the home of the Blacksburg Electronic Village, one of the most advanced community networking projects in the country. The department has a number of educational technology grants that are integrated with this infrastructure.

Please send resume and the names of three references to Faculty Search, Computer Science Department, Virginia Tech, Blacksburg, VA 24061-0106. All materials should arrive by December 15. 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 Faculty Search, Department of Computer Science (tel. 540-231-6931) by the application deadline.

Wright State University
Department of Computer Science and Engineering

Applications are invited for tenure-track appointments at the assistant, associate and full professor levels. Applications for non-tenure-track and instructor positions will also be considered. An earned Ph.D. in computer science, computer engineering or closely related field is required (M.S. for instructors), with evidence of scholarship in the field. Senior applicants should have a distinguished record in research and teaching. While there is interest in candidates with experience in networking, multimedia, virtual environments, databases, parallel processing and software engineering, all high-quality applicants will be considered.

The department has 20 faculty members, 460 undergraduates and 140 graduate students; it offers B.S., M.S. and Ph.D. programs in computer science and computer engineering. It is housed in a new building with excellent laboratories.

Applications should include rank sought, curriculum vitae, statement of research and teaching interests, copies of three publications, documentation of teaching ability and names of three to five references who are sending recommendations directly to the committee. Send applications to Search Committee, Department of Computer Science and Engineering, WSU, Dayton, OH 45435. Consideration of candidates begins immediately until Oct. 31, 1997. Inquire at 937-873-5131.

WSU is an equal opportunity, affirmative action employer.

Georgia Institute of Technology
College of Computing

Georgia Tech's College of Computing invites applications for tenure-track faculty positions. We are primarily interested in entry-level candidates but will consider exceptional individuals at all levels. With an academic faculty of 43, a research faculty of nine and eight postdoctoral fellows, the college has a current enrollment of 800 undergraduates, 120 master's students and 140 Ph.D. students. The college is ranked among the top computer science programs nationally. One of the college's missions is to interact significantly with other academic units, so candidates with an interdisciplinary research focus and an interest in potential joint appointments are most welcome.

Candidates should send complete resumes and names of at least three references, preferably by Jan. 15, 1997, or until positions are filled, to Dr. Mostafa Ammar, Chair, Faculty Search Committee, College of Computing, Georgia Institute of Technology, Atlanta, GA 30332-0280. Tel. 404-894-3152; fax: 404-894-9846; e-mail: recruiting@cc.gatech.edu.

For more information about the College of Computing, see the World Wide Web site at URL: http://www.cc.gatech.edu.

Georgia Tech is an affirmative action, equal opportunity employer. Applications from women and underrepresented minorities are strongly encouraged.

Philips Research

Philips Research in Palo Alto is a research lab in Silicon Valley, part of the worldwide research organization of Philips Electronics, a leader in electronic systems and components with over $40 billion in annual sales. Philips is the developer of the compact disc and the digital compact cassette. We currently have research positions available on a project that is building prototype multimedia systems for medical applications, with emphasis in integrating medical images and clinical information.

Member of research staff: real-time video. This position involves design and implementation of integrated multimedia medical applications and user interfaces. Experience with real-time video in a Windows and/or Unix environment is required. Knowledge of RAIDs, networking, Windows NT, Java, image processing and medical informatics is a plus. Advanced degrees or substantial applicable experience in computer science, electrical engineering or a related discipline are preferred.

Member of research staff: systems engineer. Candidates for this position must have experience with systems integration and software engineering on large projects over multiple platforms. Knowledge of networking, databases, object-oriented design methodologies, configuration management and GUI design is a plus. Advanced degrees or substantial applicable experience in computer science, electrical engineering or a related discipline are preferred.

Philips provides a full range of employee benefits and an attractive compensation package. All applicants should include a resume documenting their qualifications. E-mail/fax applications are acceptable, but please include full address and phone information. Please address your resume to the attention of Ms. Mariette Parekh, Philips Research, 1070 Arastradero Road, Palo Alto, CA 94304. E-mail: mariette@prpa.philips.com; fax: 415-846-4309.

Philips is an equal opportunity employer M/F/H. Principals only need apply.

Clemson University
Department of Computer Science

The Department of Computer Science seeks applicants for two assistant professor level tenure-track faculty positions and one non-tenure-track lecturer position for fall 1997. For the tenure-track positions, strong preference will be given to applicants in the areas of graphics, software engineering and networking/distributed systems. Applicants should hold or expect to receive the Ph.D. degree in computer science or a related field by the appointment date. Evidence of accomplishment or strong potential for accomplishment in both teaching and research are expected. For the lecturer position, applicants should hold the M.S. degree in computer science and provide evidence of a strong commitment to high-quality undergraduate instruction.

The department has more than 300 undergraduate majors and more than 100 graduate students, and offers B.A., B.S., M.S. 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.

Applicants should send a curriculum vitae and names of three references to the Faculty Search Committee, Department of Computer Science, Clemson University, Clemson, SC 29634-1906. Screening will begin Jan. 31, 1997, and continue until the positions are filled.

Clemson University is an equal opportunity, affirmative action employer.

Texas A&M University
Department of Computer Science

Applications are invited for a tenure-track faculty position at the assistant, associate and full professor levels in the area of software systems.

The department is particularly interested in candidates in the areas of software engineering, databases and human-computer interaction. However, outstanding candidates from all areas of specialization will be considered.

The Computer Science Department is in the College of Engineering and has 28 faculty members including four NSF PYI/NYI/Career award recipients. The department has a rapidly growing research program and has had nearly $3 million in external research funding annually including an NSF infrastructure grant.

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 affirmative action, equal opportunity 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 and their addresses (including e-mail) and telephone/fax numbers to Faculty Search Committee, Department of Computer Science, Texas A&M University, College Station, TX 77843-3112. Applications will be accepted until the positions are filled.

University of Denver
Department of Mathematics and Computer Science

We invite applications for a tenure-track faculty position at the assistant professor level to begin fall 1997. The minimum requirements are (by September 1997) a Ph.D. in CS or related areas and demonstrated ability in research and teaching. The department is particularly interested in a candidate who complements our current research interests and who is able to teach and direct projects in operating systems, networks and/or telecommunications at the graduate level. We will also consider candidates in other systems-related areas, both theoretical and applied.

Our faculty have research programs in algorithms, computational geometry, database systems, graphics, optical networks, parallel computer architecture, parallel/distributed processing, performance modeling, scientific

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Canadian News

Top Canadian computer scientists honored

Two computer scientists, Demetri Terzopoulos and Ming Li, were among the four recipients of the 1996 E.W.R. Steacie Memorial Fellowships, one of Canada's premier science and engineering prizes.

Also, two computer scientists were appointed to the Academy of Science: Gilles Brassard of the Universite de Montreal's Departement d'Informatique et de Recherche Operationnelle and Nicholas Pippenger of the University of British Columbia's Department of Computer Science.

Winners of the E.W.R. Steacie Memorial Fellowships are internationally recognized researchers, nominated by universities from across Canada. The Steacie Fellowships are awarded by the Natural Sciences and Engineering Research Council of Canada and give recipients an opportunity to expand their research and receive additional research assistance.

Terzopoulos, of the University of Toronto's Department of Computer Science, is cited for his breakthroughs in the evolving fields of computer vision and computer graphics.

When Terzopoulos asks if you would like to see his fish, don't be surprised when he turns on his computer. His fish are virtual creatures, and they inhabit a computer-generated virtual world.

Terzopoulos has gained prominence for his outstanding contributions to computer vision and computer graphics and is now also doing pioneering work in artificial life, an emerging field that transcends the traditional boundaries of computer science and biological science.

His virtual fish are remarkable computational models that capture the physics of the animal in its environment as well as its locomotion, perception, behavior and learning. In the context of computer animation, Terzopoulos' fish are not just highly realistic graphical puppets. Rather, the fish are autonomous artificial creatures with "eyes" to see their virtual world and "brains" that govern their actions. They swim, forage, eat and mate on their own.

Terzopoulos sees exciting research opportunities with potentially big payoffs at the intersection of different disciplines. "Computer vision and computer graphics have developed independently of one another into major fields of computer science," he said. "However, they are fundamentally related. Graphics involves creating images from models, while vision involves creating models from images. The goal of my visual modeling research is to bridge the gap between these two fields."

Equally exciting is Terzopoulos' work on human facial modeling. He has produced what is widely recognized as the most realistic biomechanical and expressive model of the human face to date. Modeling faces can play a role in planning reconstructive facial surgery and predicting its results. It is also a central concern for automated face recognition and video compression for teleconferencing.

"There are many interesting questions to explore," Terzopoulos said. "My research is so multidisciplinary, there's no chance of becoming pigeonholed. In fact, it sometimes feels as if I'm at the center of a vortex."

The fish can be viewed on the Web at http://www.cs.toronto.edu/~dt.

When computer scientist Li was working on his doctorate at Cornell University in the early 1980s, his adviser, Juris Hartmanis, gave him several papers to read on "Kolmogorov complexity." He put them away. One year later, Li realized that this theory of randomness, first formulated about 30 years ago, could provide the breakthrough for a problem he was trying to solve. It did, and so began his deep fascination with the theory.

Li, now a professor at the University of Waterloo, is playing a key role in developing and demonstrating the power of Kolmogorov complexity. His book (co-authored with Paul Vitanyi), *An Introduction to Kolmogorov Complexity and Its Applications*, was the first comprehensive book in this field. It is used to teach graduate seminar courses all over the world; various parts of the book have been translated into Chinese, Japanese and Russian. Li and Vitanyi's work has changed the status of Kolmogorov complexity—from elegant idea to versatile tool for concrete investigations.

The power of Kolmogorov complexity is that it allows scientists to quantify the randomness of individual objects in an objective and absolute manner. This is impossible using classical probability theory. For example, in computer science it is often necessary to determine how fast a certain program runs. This is difficult using conventional methods because the program must be run with a large number of inputs, each result analyzed and an average time arrived at. Using Kolmogorov complexity, only one input is needed to complete the analysis.

In one area of his current research, which also includes machine learning and computational biology, Li is extending the use of Kolmogorov complexity in the analysis of computer programs, DNA sequence analysis, physics and computation. Others are following his lead. "Since our book came out in 1993, I've been hearing from researchers who have been inspired to use Kolmogorov complexity—from philosophers working on inductive inference to marine scientists trying to use it to measure the complexity of dolphin sounds," Li said. "This is a powerful idea. There are few applications that would surprise me."

Meanwhile, the Royal Society of Canada, founded in 1882, has a mandate to promote and develop learning and research in the arts and sciences through its three academies: the Academie des Lettres et des Sciences Humaines, the Academy of Humanities and Social Sciences and the Academy of Science. Researchers appointed to these academies are acknowledged by their peers as having reached the top of their respective domains.

Montreal's Brassard is a world authority in cryptology and quantum information theory. He worked on zero-knowledge protocols, which allow one to prove knowledge of a secret without having to disclose anything about it. He pioneered the field of quantum cryptography, which takes advantage of Heisenberg's uncertainty principle to bring a radically new dimension to the ancient problem of secure communication. He invented quantum teleportation, which allows the transmission of an unknown and unmeasurable quantum state. *Discover* magazine featured it among the top world science stories of 1993. He championed quantum computing, which harnesses quantum mechanics to the cause of computational speed.

UBC's Pippenger is a world leader in theoretical computer science and is a notable expert on switching networks. He has also made fundamental contributions to Boolean circuit complexity, algebraic function complexity and the theory of parallel computation. He is noted both for technical prowess and mathematical erudition in his use of tools from mathematical analysis, algebra, combinatorics, probability theory, coding theory and information theory.

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supercomputing and software engineering. We offer B.S. and M.S. degrees in computer science and mathematics, and a joint Ph.D. in mathematics and computer science. For more information, contact our Web site 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 its metro area population of 1.8 million, is consistently ranked as one of the country's most pleasant places to live. The University of Denver is committed to enhancing the diversity of its faculty and staff and particularly encourages applications from women, minorities and the disabled.

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

Brandeis University
Department of Computer Science

The Computer Science Department of Brandeis University invites applications for the position of assistant professor of computer science, to begin September 1997.

We are seeking candidates with research interests in building systems, in such areas as parallel or distributed computing, operating systems, databases, HCI, computer graphics, scientific visualization, multimedia, networks and applications to the Web. All applicants are expected to have a completed Ph.D. by Sept. 1, 1997, in computer science/engineering, an outstanding research record and documentation of strong teaching.

The Computer Science Department is part of the Volen Center for Complex Systems, dedicated to interdisciplinary research in science; the center includes faculty from biology, psychology, linguistics, biochemistry, chemistry and physics. For additional information visit our Web page at http://www.cs.brandeis.edu.

For full consideration, applications must be received by Jan. 1, 1997. Please send by surface mail (not by fax or e-mail) a curriculum vitae, your two best publications and at least three letters of reference to Professor Richard Alterman, Search Committee Chair, Computer Science Department, Brandeis University, Waltham, MA 02254. Tel. 617-736-2703; fax: 617-736-2741; e-mail: search @cs.brandeis.edu.

Brandeis University is an equal opportunity, affirmative action employer; women and minorities are encouraged to apply.

University of Pittsburgh
Department of Computer Science

The Department of Computer Science invites applications for one tenure-track faculty position at the assistant professor level beginning with the 1997-98 academic year. This position is subject to budgetary approval. Applicants are sought in the multimedia area with research interests in computer graphics, human-computer interaction, computer vision, software environments for multimedia, distributed multimedia computing or intelligent multimedia systems.

Responsibilities include research, supervision of graduate student research (Ph.D. and M.S.), and graduate and undergraduate teaching. Candidates should have a Ph.D. in computer science and a strong interest in both teaching and research.

The department currently has 22 full-time faculty members and supports strong graduate and undergraduate programs. Departmental resources include a research library and extensive computing facilities, including a departmental network linking nearly 300 systems, workstations and other devices, and supporting a wide variety of architectures and platforms. Network access is also provided to the general computing facilities of the university as well as to the Pittsburgh Supercomputer Center (of which the University of Pittsburgh is a founding member). For further information about the department, please see http://www.cs.pitt.edu.

Applications should include a curriculum vitae and names of three references and should be sent to Professor S.K. Chang, Chair of Faculty Search, Department of Computer Science, University of Pittsburgh, Pittsburgh, PA 15260. Applications must be received by Feb. 1, 1997.

Pitt is an equal opportunity, affirmative action employer and especially encourages women and ethnic minorities to apply.

Brigham Young University
Department of Computer Science

The Computer Science Department invites faculty applicants who have a Ph.D. and strong research orientation. The department offers B.S., M.S. and Ph.D. degrees. See http://www.cs.byu.edu for more information.

BYU is an EEO employer with a preference for LDS candidates.

Northwestern University
Department of Computer Science

The department invites applications for a tenured position at the level of associate or full professor, as part of a new initiative in computer science emphasizing research in the fundamental enabling technologies for interactive systems, including HCI, distributed systems, hypermedia and development environments.

The initiative is aimed at complementing the department's existing strengths in artificial intelligence and interactive learning environments with outstanding candidates in systems, software engineering and theory.

Candidates should have a proven record in research in CS or related fields, and significant leadership and administrative experience.

Proposed starting date: September 1997.
Closing date for receipt of applications: May 1997.
Rank and salary range: open.

Applications should be sent to Roger C. Schank, Chair, Department of Computer Science, 1890 Maple Ave., Evanston, IL 60201. E-mail: schank@ils.nwu.edu.

Northwestern University is an affirmative action, equal opportunity employer. Hiring is contingent upon eligibility to work in the United States. Applications are especially encouraged by women and minorities.

Northwestern University
Department of Computer Science

Applications are invited for tenure-track positions at the level of assistant professor, as part of a new initiative in computer science emphasizing research in the fundamental enabling technologies for interactive systems including:

- Interfaces, including HCI, interface design and user-interface management systems.
- Computer graphics and animation, augmented and virtual reality.
- Programming and authoring environments.
- Distributed systems.
- Multimedia and hypermedia database technology.

The initiative is aimed at complementing the department's existing strengths in artificial intelligence and interactive learning environments with outstanding candidates in systems, software engineering and theory.

Proposed starting date: September 1997.
Closing date for receipt of applications: May 1997.
Salary range: open.

Applications should be sent to Roger C. Schank, Chair, Department of Computer Science, 1890 Maple Ave., Evanston, IL 60201. E-mail: schank@ils.nwu.edu.

Northwestern University is an affirmative action, equal opportunity employer. Hiring is contingent upon eligibility to work in the United States. Applications are especially encouraged by women and minorities.