COMPUTING RESEARCH NEWS

The News Journal of the Computing Research Association

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Senate fails to pass follow-on to HPC Act

By Fred W. Weingarten
CRA Staff

The legislative follow-on to the High-Performance Computing Act (HPCA) of 1991 failed to pass in the Senate when an unnamed Republican senator placed a hold on the bill in the final hours of the 1993 congressional session. Thus ended a year that began with great hopes but became increasingly frustrating to those working to formulate and pass an applications-focused High-Performance Computing and Communications (HPCC) bill. Although most supporters still expect an HPCC bill to pass next year, HPCC's history has become increasingly convoluted, and some are now skeptical.

In late fall 1991, during the closing days of its session, Congress passed HPCA and sent it to President Bush. Contrary to fears of a pocket veto due to Republican distaste for technology policy, the president signed the bill into law Dec. 9, 1991. Although Reps. Rick Boucher (D-VA) and George Brown (D-CA) were chief sponsors of the bill in the House and were very active in modifying it and moving it through that chamber, the bill often is publicly identified with its original author and champion in the Senate, Al Gore.

In spring 1992, Gore submitted a follow-on bill that focused on applications. The bill was a broad, first cut that was intended to open debate rather than stand as a final product. Gore's vice presidential nomination that summer stopped progress on the bill. While the Clinton/Gore campaign pushed infrastructure and technology policy to the front of the national debate, the bill was left without an active champion in the Senate and it languished without hearings ever being held.

Thus ended a year that began with great hopes, but became increasingly frustrating to those working to formulate and pass an applications-focused HPCC bill.

In January 1993, the so-called Gore II bill was packaged as Title 6 in Senate Bill S 4, a hodgepodge of technology policy bills left over from the previous session of Congress. In the House, the information infrastructure portion of HR 820 (the House version of S 4) was stripped out and introduced separately as HR 1757. This move allowed Boucher, chair of the Science, Space and Technology Subcommittee on Science, to handle the information issues while HR 820 went to a different subcommittee on a separate track.

(Boucher has a dual interest in an infrastructure bill. Not only is he chair of the Science Subcommittee and a key sponsor of HPCA, he sits on the Energy and Commerce Subcommittee on Telecommunications and has a keen interest in helping shape the future of the telecommunications industry. He immediately saw a link between HPCC and the National Information Infrastructure initiative.)

For most of 1993, the action centered in the House. The Senate mustered little serious interest in HPCC and seemed content to let the House handle the hearings, negotiations and reworking that usually accompany serious legislation. Boucher appeared happy to assume the leadership role on the bill.

Boucher listened to some key constituencies to ensure that they were comfortable with the bill. (CRA made several suggestions and pointed out that research—a key element of HPCA—was not reflected at all in the new bill.)

Some fights over the bill were vicious and taxing. For instance, regional telephone companies suggested language that, in the eyes of many higher education and research groups, threatened to severely restrict the ability of agencies to support information infrastructure for research and education. When those groups, including CRA, protested

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Congress, NAS and OTA tackle impact of technology on privacy

By Juan Antonio Osuna
CRA Staff

A flurry of privacy studies and bills has swept the Capitol in recent months, suggesting a renaissance of an age-old topic. The Office of Technology Assessment, the General Accounting Office and the National Academy of Sciences released reports on privacy with a focus on the impact of computers and networks. In the midst of these discussions, Congress has already begun introducing legislation.

Computerizing medical records key privacy issue

In no other industry does technology threaten privacy more than in the health care industry, an OTA report suggested.

The computerization of patient records—now only in its infancy—has prompted industry and government to seek new ways of protecting patient records against abuse.

The 168-page OTA report, *Protecting Privacy in Computerized Medical Information*, offered these anecdotes:

• Working surreptitiously at night, a Colorado medical student stole and sold patient records to medical malpractice attorneys for $50 each.

• In a survey of health care workers, a physician was promised confidentiality and agreed to be tested for AIDS. Despite these promises, surveyors told her employer, a county hospital, that she tested positive.

• An overzealous reporter disguised himself as a doctor, entered a New York hospital and sneaked out records of a well-known actress's treatment for a venereal disease.

One way of guarding against such abuses is keeping information with the patients rather than institutions, some experts say. At a hearing of the Senate Judiciary Subcommittee on Technology and the Law in October, Sherman Hope, a 61-year-old physician, testified about a project he has led in Brownfield, Texas—population 9,560.

Besides requiring authentication to access all in-house databases, Hope's system allows patients to remove records from the computers and keep them on their "ChartCards," wallet-sized cards that record patient diagnoses, illnesses and treatments.

"The patient has a choice of either furnishing or refusing to furnish his card to another institution, including a medical institution, prospective employer or insurance company," Hope said.

While less than 1% of US physicians use computers or cards for patient records (50% to 60% use computers for billing, scheduling and insurance claims), France already has issued 250,000 smart cards containing such information as a citizen's social security benefits, bank references, blood type, missing organs, pregnancy, illnesses, dates and places of examinations, work-related risks and genetic factors.

"The smart card, as a patient-borne record, would represent a distributed database with the advantage that real-time access to information is available only with the informed consent of the patient," the OTA report said.

Beyond the smart card, a newer more advanced system has been developed, said Richard Haddock

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CRN *welcomes letters from its readers. Letters may be edited for space and clarity. Send them to Joan Bass, Managing Editor,* CRN, *1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009. E-mail: jbass@cra.org. Letters must include your name, address and telephone number or E-mail address.*

Opinions

Computing the Future revisited

BY Juris Hartmanis and Herbert Lin

We believe it would be appropriate for the computer science and engineering (CS&E) community to once again review its reaction to the National Research Council's report, *Computing the Future: A Broader Agenda for Computer Science and Engineering*, which was released about 18 months ago.

This report described a path for the field's future that was both intellectually robust and politically responsive to the emerging order of science policy. Specifically, the report called for the protection of the field's intellectual core while articulating the importance of explicit connections between CS&E's research agenda and important national needs. We believe that recent events in the world of science policy have only served to underscore the significance of *Computing the Future*'s message.

This year's congressional budget deliberations were a shot across the bow for the entire CS&E community. Specific bill and report language calling for the National Science Foundation to devote significantly less attention to "curiosity-driven research" and for NSF's Computer and Information Science and Engineering (CISE) Directorate in particular to take a $50 million reduction in its High Performance Computer and Communications (HPCC) program was avoided this year. But the pressures that led to such language being seriously considered will not go away.

It is true that of all the scientific fields, CS&E should be most immune to the charge that its science is unrelated to national needs. But the fact that the community had to face the possibility of being affected by the language described above simply indicates that the community as a whole has not made its case well to congressional decisionmakers.

How can the community make its case more effectively? The first step is to make attitudinal and cultural changes. The CS&E community must understand that involvement with the political process that sets national priorities and funding levels may well be a prerequisite for research to flourish. (We note parenthetically that CISE is now looking for a permanent assistant director.) Moreover, the community must learn to embrace the notion that a search for interesting research problems in applied, strategic or commercially relevant problem domains is as noble as a search motivated by pure intellectual curiosity.

Juris Hartmanis, a professor of computer science at Cornell University, was chair of the Computer Science and Telecommunications Board's committee that produced Computing the Future: A Broader Agenda for Computer Science and Engineering, *National Academy Press, 1992.*

Herbert Lin was study director for the project.

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strongly, Boucher in effect forced all of them to sit down together and negotiate language all sides could live with.

On July 26, 1993, HR 1757 passed the House 326 to 61. Attention shifted to the Senate, which until that time had been silent. Would the Senate go along with the changes? Would a new debate fracture the strange and fragile coalition formed during negotiations over the so-called Boucher Bill? A letter to the Senate was signed by a broad cross section of that coalition, including the tele phone companies, urging the Senate to substitute the Boucher language in whole into its bill. Signals were sent back that this would be acceptable.

In early October the Clinton administration, apparently in response to concerns raised by some agencies, began circulating a proposed rewrite of the bill, which triggered an explosive reaction among the constituencies. The rewrite appeared to open up many issues settled in HR 1757 and eliminated or changed many of the elements favored by particular constituencies. (For example, the word "research" once again disappeared from the bill. The National Science Foundation's role was redefined as "fostering the development of technology.")

These rewrites were incorporated into the version of S 4 that went to the floor of the Senate.

Reaction in the community was mixed. Bills that pass both houses with different language go to conference to negotiate the differences. There was a possibility that a reasonable bill, acceptable to everyone, could emerge from a conference—Boucher was a key member of the House conference team. Because a conference cannot happen until a bill passes the Senate, optimists argued that S 4 should move ahead in its present form. Others argued that a conference is risky and the research community could easily end up with something worse than status quo (that is, no bill).

And that's how it stood as Congress went into its winter recess.

The debate has become quite complicated. An interesting array of players has been involved. Here are some of the arguments raised in the recent debate.

The administration, in explaining why it submitted the new language, argued that HR 1757 was too detailed and called for micromanagement by Congress. Administration officials said their version was cleaner and would give agencies the leeway to pursue new opportunities that might arise.

Agencies that have networking responsibilities, such as NSF, the Energy Department and the Advanced Research Projects Agency, worried about undue restrictions on funding networking projects for research, education and libraries.

Of course, each agency involved in HPCC also has its own views and is a separate player.

Boucher and the subcommittee staff spent a lot of time and effort crafting HR 1757, which accomplishes their objectives and creates a coalition of support. He is not happy about actions that threaten the bill.

Members of the Senate Commerce, Science and Transportation Committee want S 4 out, and the fate of the information infrastructure portion, frankly, is a subordinate concern to them.

The Senate Energy and Natural Resources Committee was relatively silent on S 4 until recently, but staff have been at some recent negotiations. Additional authorizing language now in S 4 that is directed at the laboratories, coupled with eased language on networking, seems to have satisfied this committee.

Many commercial and non-profit organizations were involved in the debate during this past year.

On the industrial side, large computer manufacturers, smaller start-ups, software and database houses, the Baby Bells, long-distance carriers and the national and regional Internet service providers all had different views on various aspects of the legislation. The computer industry focused on the applications development portions of the bill, while the communications companies cared about the networking parts. But even groups with similar interests had different opinions on the issues covered in the bill.

Higher education, research organizations and libraries focused on networking language that could restrict university information systems and networking. These groups also have fought hard for maintaining support for a strong computational and communications infrastructure for education and research.

Libraries and public interest organizations have expressed concern about access provisions of the bill, particularly portions of HR 1757 concerning experiments in government data dissemination that disappeared in the administration draft.

Looking at this list of interested parties, it is surprising that any bill has been able to move through Congress. Because it has moved forward in the House and may well move, in some form, through the Senate next session attests to the deeper consensus on general technological priorities for the nation. Everyone differs in the details.

Unfortunately, as is often heard on the Hill, "The devil is in the details."

Expanding the Pipeline

Conference celebrates women in computing

By Anita Borg, Annie Warren and Mary Jo Doherty

On behalf of the Computing Research Association Committee on the Status of Women in Computer Science (CRAW), we are pleased to announce our joint sponsorship of a new conference celebrating the achievements of women in computing.

The first Grace Hopper Celebration of Women in Computing will be June 9-11 at Loews' L'Enfant Plaza Hotel in Washington, DC. The conference is sponsored by CRA, the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers Computer Society. The conference is supported by the Office of Naval Research, Motorola Corp., Digital Equipment Corp., AT&T Bell Laboratories and the American Association for Artificial Intelligence (AAAI).

Background

In the 50 years since the introduction of the computer, women have made substantial contributions to the science of computing and to the computer industry, despite our consistent underrepresentation throughout the field. As head of the National Science Foundation's Directorate for Computer and Information Science and Engineering (CISE), the late A. Nico Habermann was determined to encourage women's participation and increase our numbers in the field.

In the fall of 1992, CISE brought together a distinguished group of academics and practitioners to suggest ways to support women in the field and to encourage more young women to enter computing. A major goal was to ensure that the computing field would draw on the female intellectual pool that seemed to be more and more frequently rejecting computing as a career choice. A resultant strategy was to increase the visibility of women in computing to each other, to the rest of the computing field, to the general public and especially to young women who have not yet made a career choice.

To this end, we decided to hold a highly publicized celebration of the accomplishments of women in the computing field. Because a conference of this sort had long been a dream of mine, I (Anita Borg) agreed to chair the Grace Hopper Celebration of Women in Computing (GHC). This conference will complement the successful Windows of Opportunity Symposium (supported by NSF) for female undergraduate and graduate computer science majors held in May 1993 (September *CRN*, Page 4).

The enthusiasm surrounding the planning for the conference has been quite rewarding. The interest expressed within the computing community has reinforced my belief that there is widespread support for continued and increased presence of women in the computing field, and there is concern about trends in the opposite direction. This conference will be an unparalleled opportunity for women and men to hear successful women in computing describe their technical contributions and their visions for the future.

Conference description

GHC will be a three-day technical conference that includes plenty of time for networking and discussion. In addition to luncheons on all three days, the conference registration fee (about $300) will include a gala dinner banquet on June 9 and a reception at the National Museum of Women in the Arts on the evening of June 10. Each of these events will feature talks, entertainment and time to make connections.

The first two days of the conference will feature talks by many of the most successful technical women in the computing field. (The speakers are listed below.) There also will be a panel of senior women who have moved from the technical side into management and who direct the development of computing technology.

The third day will consist of panels, workshops and birds-of-a-feather sessions on a broader and not necessarily technical range of subjects. The actual content of these sessions will depend on proposals from the public.

The speakers chosen for the conference are leaders in their fields and represent most of the major technical computing disciplines in the academic, government and industrial communities. Each speaker will review the state of her field, describe her own contributions and present her vision of the future of her field. In particular, we hope to explore the possibilities for major new collaborative efforts and to generate new areas for both research and development.

We actively encourage attendance by women and men and particularly look forward to the participation of a large number of professional women. There never has been an opportunity to attend a major technical conference at which most participants are female. Attendees will have the opportunity to meet more role models and potential mentors than is possible at most, if not all, other conferences.

To increase the diversity of the participants, we anticipate help from NSF so we can offer travel grants to students and individuals who otherwise would not be able to attend.

Program

The technical sessions will be opened by keynote speaker Anita Jones, who is the director of Defense Research and Engineering and who has oversight of the Defense Department's science and technology programs. She has been a researcher in the area of computer software systems and has published two books and more than 35 articles. Before being appointed to the DR&E position, she was chair of the Computer Science Department at the University of Virginia.

The following distinguished members of the computing community will speak during the first two days of the conference.

Fran Allen is an IBM Fellow and member of the National Academy of Engineers. Allen has been a pioneer in the area of compiler optimization.

Ruzena Bajcsy has been a professor of computer and informa-

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Expanding the Pipeline

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tion science at the University of Pennsylvania since 1972. She is a Founding Fellow of the AAAI and a Fellow of the IEEE. Her work covers the spectrum of problems in the field of computer vision.

Dorothy E. Denning is professor and chair of Computer Science at Georgetown University. She received the 1990 Distinguished Lecturer in Computer Security Award and is past president of the International Association for Cryptologic Research.

Adele Goldberg is the chair of ParcPlace Systems. Solely and with others, Goldberg wrote the definitive books on the Smalltalk-80 system. She received *PC Magazine*'s 1990 Lifetime Achievement Award for her significant contributions to the PC industry.

Shafi Goldwasser is a professor of computer science at the Massachusetts Institute of Technology. Her research interests are in cryptography, computational number theory and complexity theory. She is a recipient of the Godel Prize in theoretical computer science for her work on zero-knowledge interactive proofs.

Susan L. Graham is a professor of computer science at the University of California. She is a member of the National Academy of Engineering and a Fellow of the American Association for the Advancement of Science. Graham was editor-in-chief of the ACM *Transactions on Programming Languages and Systems* from its founding in 1977 until 1992.

Irene Greif is director of Workgroup Technologies at Lotus Development Corp. Her group researches topics including collaborative workgroup-enabled desktop applications and management of distributed information. She served as program chair of the first CSCW conference and editor of *Computer-Supported Cooperative Work: A Book of Readings*.

Barbara J. Grosz is Gordon McKay Professor of Computer Science at Harvard University. She is a Fellow of the AAAS and the AAAI. She also is president of the AAAI and a member and former chair of the board of trustees of the International Joint Conferences on Artificial Intelligence Inc.

Karen Sparck Jones is a senior academic at the Computer Laboratory, University of Cambridge. She has worked on natural language and information processing since the late 1950s. Jones becomes president of the Association for Computational Linguistics this year.

Maria Klawe is head of the Department of Computer Science at the University of British Columbia. She is well-known for her research contributions to theoretical computer science. Klawe is a member of the British Columbia Premier's Advisory Council on Science and Technology and a trustee of the American Mathematical Society. She also is the vice chair of the CRA Board of Directors.

Nancy G. Leveson is the Boeing Professor of Computer Science and Engineering at the University of Washington. She is editor-in-chief of the IEEE *Transactions on Software Engineering* and a member of the CRA Board of Directors. Leveson is the founder of the new research area, software safety.

Barbara Liskov is the NEC Professor of Software Science and Engineering at MIT, where her interests include programming languages, programming methodology, distributed computing and parallel computing. She is a member of the National Academy of Engineering and is a Fellow of the American Academy of Arts and Sciences.

Mary Shaw is a professor of computer science and associate dean for professional programs at Carnegie Mellon University. From 1984 to 1987 she served as chief scientist of CMU's Software Engineering Institute. Shaw is a Fellow of the IEEE and the AAAS.

Outreach

Although GHC on its own would be an outstanding event, we are planning projects to extend its influence far beyond the expected attendance of 400 to 500 people. The extent of each project will depend on the success of our fund raising.

The principal output of the conference will be a high-quality, full-color celebration booklet. It will contain a tribute to Adm. Grace Murray Hopper; a color photograph, biography and statement from each speaker; and a multipage resource guide.

The booklet will be distributed to all graduate students in computer science and computer engineering, to CS and CE departments and to college career counselors.

The invited presentations and discussions that follow will be published in Volume 23 of *Computers and Education*. This volume will be prepared after the conference and will capture the discourse generated during the conference.

A series of GHC videotapes also is planned. We envision a highlights tape (for broad distribution) and a series of tapes presenting the technical talks for distribution to

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Franklin Spier

Association News

CRA offers anonymous FTP site and list server

The Computing Research Association now has its own Internet site and is offering public access via anonymous FTP and a list server

CRA is connected to the Internet via Serial Line Internet Protocol, which provides 14.4 kilobits/sec speeds. Hence, users may find data transfer rates to be slower than they are accustomed to.

On many systems, users can FTP to CRA simply by typing "ftp cra.org" and then supplying "anonymous" as the user name and their E-mail address as the password.

Additionally, CRA maintains a list server (List Processor 6.0) to support various distribution lists. The following lists currently are installed:

- cra_b@cra.org: CRA Bulletin
- jobs@cra.org: Job Announcements
- forsythe@cra.org: Ph.D. Department Chairs
- industrial@cra.org: Industrial Researchers
- undergrad@cra.org: Undergraduate Department Chairs
- cra_members@cra.org: CRA Members
- academic_members@cra.org: CRA Academic Members
- industrial_members@cra.org: CRA Industrial Members
- archive@cra.org: Empty. Send messages or documents here to be archived at cra.org via anonymous FTP.

If you need to add or delete your address from a list, send the proper command to listproc@cra.org in the body of a mail message. For example, if you would like to subscribe to the CRA Bulletin, type "subscribe cra_b <your name>"; type "unsubscribe cra_b" to stop receiving the bulletin. Type "help" to receive more information about using the list server.

Send commands, such as help, to listproc@cra.org, not to a particular list.

We have tried to put people in the proper lists, based on previous databases we have maintained. Users should only need to subscribe or unsubscribe if they find themselves missing messages or getting unwanted messages. Otherwise, there is no need to do anything.

Please note these general rules about CRA lists:

• All messages sent to CRA lists will be automatically forwarded to a CRA staff person for approval. The system will not allow unapproved messages to be sent to a list.

• Subscription requests will be automatically forwarded to a CRA staff person for approval, with the exception of the cra_b and jobs lists. Anyone can subscribe to these lists without approval.

Send questions and error reports to josuna@cra.org

NII discussed at conference

Fred Weingarten, the Computing Research Association's executive director, delivered the opening keynote speech at the British Columbia Information Policy Conference, held at Simon Fraser University Nov 19-21. The conference, which focused on public access issues this year, is an annual event sponsored by the British Columbia Library Association.

Weingarten discussed US initiatives to develop a national information infrastructure (NII) and described some of the policy conflicts and dilemmas that are confronting Congress, the administration and the public interest community. He then set a larger framework for considering information policy issues across national borders, pointing out that the need for compatibility would often conflict with differing national values in areas such as privacy, freedom of speech, public access to information or intellectual property. His speech was followed by more than an hour of questions and a discussion focusing on the similarities and differences in the NII debate in Canada.

Nominees for board sought

The Computing Research Association is seeking nominations for its Board of Directors.

Every spring, CRA's member organizations elect about a third of our board members. However, candidates are not required to be CRA members. Our nominating committee, chaired by Maria Klawe of the University of British Columbia, is seeking nominations. It is very important that the CRA board represent the interests of the entire computing research community, and it is our policy to solicit a broad range of candidates.

Please contact the person you are nominating before submitting their name. Nominees will receive information on CRA and its activities.

Our board is a working board and all members are expected to actively participate in CRA. Although we have a small professional staff at our headquarters, board members are involved in all our major projects. Recent projects have included:

- Planning the biannual CRA Snowbird Conference,
- Conducting the annual CRA Survey on the Production and Employment of Ph.D.s and Faculty in Computer Science and Computer Engineering,
- Coordinating the Federated Computing Research Conference, and
- Increasing the participation of women in computing research with the help of NSF grants.

Board members also are asked to attend at least two board meetings per year. Members are asked to pay their travel costs to the meetings.

We understand that these time demands can be daunting to overburdened researchers. But research in computer science and computer engineering is facing major challenges as the political environment for government support changes. In the United States, Canada and many other countries, computing has been identified as a technology of critical social importance. This increased political attention places new demands on our field and offers new opportunities.

To receive a copy of the nomination form, contact Joan Bass of CRA at tel. 202-234-2111 or E-mail: jbass@cra.org

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libraries and computer science and computer engineering departments and for sale to the public.

To publicize the conference, we are producing a celebration poster designed by Kin Scholz and illustrated by San Francisco artist Ron Chan. We believe it will become a collector's item. A version suitable for framing will be available for purchase.

For more information about the Grace Hopper Celebration of Women in Computing and to be added to our mailing list for future announcements, send E-mail to hopper-info@pa.dec.com or contact Annie Warren, GHC Publicity Chair, Digital Equipment Corp., 250 University Ave., Palo Alto, CA 94301. Tel. 415-617-3335.

Anita Borg is the Grace Hopper Conference general chair. She is a consultant engineer at Digital Equipment Corp.'s Network Systems Laboratory in Palo Alto, CA.

Annie Warren is the GHC publicity chair. She is the technical operations manager at Digital Equipment Corp.'s Western Research Laboratory.

Mary Jo Doherty is a member of the technical staff at Silicon Graphics Inc., Mountain View, CA.

Attention CRA Members

Mailing labels of our membership and the CRA Mailing List are available free to CRA members. The labels are available in electronic form or on Cheshire or laser labels. The labels are $25 per set for non-members. Contact Phil Louis at tel. 202-234-2111; fax: 202-667-1066; or E-mail: plouis@cra.org

Association News

CRA serves its members and the CS community

The Computing Research Association (CRA) is an association of US and Canadian academic departments of computer science and computer engineering, and industrial laboratories engaging in basic computing research. The mission of CRA is to represent and inform the computing research community and to support and promote its interests. CRA helps strengthen research and education in the computing fields through publications, meetings, surveys and other professional activities. Through various communications programs, CRA seeks to improve public and policymaker understanding of the importance of computing and computing research in our society.

In the 1992-93 dues year, CRA had a membership consisting of more than 180 North American Ph.D.-granting and non-Ph.D.-granting departments of computer science and computer engineering and eight non-academic research laboratories. Three professional societies—the Association for Computing Machinery, the American Association for Artificial Intelligence and the Society for Industrial and Applied Mathematics—were affiliated professional society members.

The CRA board of directors, elected by the dues-paying member institutions, is a distinguished group of leaders in computing research from academia and industry.

Meetings

• The biennial *CRA Conference at Snowbird* in July 10-12 will include the Department Chairs Workshop for academic and research laboratory administrators interested in computing research issues and the Research Managers Workshop for industrial lab managers.

• The *Federated Computing Research Conference '93* was a major research meeting that was held for the first time in May. The conference brought together eight existing specialized research meetings that previously convened at different places and times. A CRA Workshop on Academic Careers for Women also was part of the conference. FCRC provided new opportunities for computing researchers to work with one another across boundaries.

Publications

• One of CRA's goals is to help the computing research community become better informed and speak more effectively on science and technology policy issues. *Computing Research News* (*CRN*) is the only publication of its kind devoted to covering issues affecting the computing research community. It has become an invaluable source of information on government policy in the United States and Canada.

Surveys and reports

• The annual *CRA Survey on the Production and Employment of CS&E Ph.D.s and Faculty* (formerly the *CRA Taulbee Survey*) is the principal source of information on the production and employment of Ph.D. and faculty in computer science and computer engineering in North America. The survey, which is printed in *CRN*, is one of the most accurate and complete surveys of its kind in the science and engineering disciplines. It is an invaluable aid to government, academic and industrial organizations that need to better understand the issues and trends affecting the computing research academic pipeline.

CRA also sponsors other assessment and survey projects including maintenance of the *CRA Forsythe List*, a complete, up-to-date listing of Ph.D.-granting programs in computer science and computer engineering.

Human resources

• Several activities focus on strengthening the role of women and minorities in the research disciplines. The *CRA Committee on the Status of Women in Computing Research* was formed to assess the needs of women in computing research and develop programs to encourage and support women who wish to enter the field and advance their research careers. CRA, with NSF support, has initiated several projects including a *CRN* column on expanding the pipeline, a database of women in computer science and a symposium for female students in computing. Also with NSF support, we have started a student mentoring program.

Science policy

CRA is continuing its occasional series of *congressional computing research seminars*. The seminars are designed to expose congressional and administration policymakers to interesting areas of computing research and increase their understanding of the importance of using basic research to address social problems.

CRA played a key role in encouraging Congress to pass the High-Performance Computing Act of 1991. CRA particularly was outspoken on the need for a balanced program that supports basic research and human resource development. CRA will be active in the ongoing debate over national technology policy and the national information infrastructure.

1993-94 Computing Research Association members

(As of Dec. 8, 1993)

Academic Members

Arizona State University (CS)
Auburn University (CSE&E)
Boston University (CS)
Brandeis University (CS)
Brown University (CS)
California Institute of Technology (CS)
Carnegie Mellon University (CSE)
City Univ of New York, Graduate Center (CS)
Clemson University (CE)
Clemson University (CS)
Colorado State University (CS)
Columbia University
Concordia University (CS)
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Duke University
Florida Atlantic University (CS&E)
Florida Institute of Technology (CS)
Florida State University (CS)
George Mason University (CSE)
George Washington University (CS)
Georgia Institute of Technology (CS)
Indiana University (CS)
Iowa State University (CS)
Johns Hopkins University (CSE)
Kansas State University (CS)
Kent State University (CS)
Lehigh University (EES)
Michigan State University (CS)
North Carolina State University (CSE)
North Dakota State University (CS)
Northeastern University (CS)
Northwestern University (EES&CS)
Ohio State University (CIS)
Old Dominion University (CS)
Oregon Graduate Institute (CS)
Oregon State University (CS)
Pace University (CS)
Pennsylvania State University (CSE)
Polytechnic University (CS)
Portland State University (CS)
Purdue University (CS)
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Santa Clara University (CE)
Simon Fraser University (CS)
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State University of New York, Albany (CS)
State University of New York, Binghamton (CS)
State University of New York, Buffalo (CS)
Syracuse University (CS)
Temple University (CS)
Texas A&M University (CS)
University of Alabama (CS)
University of Alberta (CS)
University of Arizona (CS)
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University of California, Berkeley (CS)
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University of California, Los Angeles (CS)
University of California, Riverside (CSE)
University of California, San Diego (CSE)
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University of California, Santa Cruz (CE)
University of California, Santa Cruz (CIS)
University of Chicago (CS)
University of Cincinnati (CE)
University of Colorado, Boulder (CSE)
University of Delaware (CIS)
University of Florida (CIS)
University of Houston (CS)
University of Illinois, Chicago (CSE)
Univ of Illinois, Urbana-Champaign (CE)
Univ of Illinois, Urbana-Champaign (CS)
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Univ of Southwestern Louisiana (CEES&CS)
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University of Texas, Austin (CS)
University of Texas, El Paso (CS)
University of Toronto (CS)
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Non-Academic Members

American Association for Artificial Intelligence
Association for Computing Machinery
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Bell-Northern Research Inc.
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IBM T.J. Watson Research Center
Mitsubishi Electric Research Labs
NEC Research Institute Inc.
Society for Industrial and Applied Mathematics
Sun Microsystems Inc.
Xerox Corp.

Policy News

Legislative Roundup

Compiled by Juan Antonio Osuna
Source: Library of Congress Information System (locis.loc.gov)

Computer and Communication Trade Freedom Act (HR 3431)

Sponsor: Donald Manzullo (R-IL) **Date:** 11/03/93
Status: Referred to the Foreign Affairs Subcommittee on Economic Policy Trade and Environment Nov 17.
Description: The bill amends the Export Administration Act of 1979 with respect to export of computers, semiconductors and telecommunications equipment.

Department of Energy National Competitiveness Technology Partnership Act of 1993 (HR 2875)

Sponsor: Bill Richardson (D-NM) **Date:** 08/04/93
Status: Referred to the Energy and Commerce Subcommittee on Energy Aug 12.
Description: The bill promotes the industrial competitiveness and economic growth of the United States by strengthening the alliance between the DOE laboratories and the private sector and by supporting the development and application of technologies critical to the economic, scientific and technological competitiveness of the United States. It also amends the High-Performance Computing Act of 1991 to provide for cooperative projects involving DOE or DOE laboratories and non-federal entities to test and apply high-performance computing and high-speed networking technologies and authorizes appropriations.

National Science and Technology Policy, Organization and Priorities Act Amendments of 1993 (HR 3476)

Sponsor: Rick Boucher (D-VA) **Date:** 11/9/93
Status: Referred to the House Committee on Science, Space and Technology Nov 9.
Description: The bill amends the National Science and Technology Policy Organization, and Priorities Act of 1976, providing new functions for the Office of Science and Technology Policy and establishing a president's Committee of Advisers on Science and Technology, a National Science and Technology Council, a National Sciences and Technologies Assessment Panel and a Science and Technology Policy Institute.

Telecommunications and Information Infrastructure and Public Broadcasting Facilities Assistance Act of 1993 (HR 2639)

Sponsor: Edward J. Markey (D-MA) **Date:** 07/14/93
Status: Passed House (amended) Nov 8. Received in the Senate, read twice and referred to the Commerce Committee Nov 9.
Description: The bill authorizes appropriations for the promotion and development of the United States national telecommunications and information infrastructure, and the construction and planning of public broadcasting facilities.

Telephone Consumer Privacy Protection Act of 1993 (HR 3432)

Sponsor: Edward J. Markey (D-MA) **Date:** 11/3/93
Status: Referred to the House Committee on Energy and Commerce Nov 3.
Description: The bill amends the Communications Act of 1934 to restrict telephone companies from improperly using, transferring and selling customer information and to require the telephone companies to offer call blocking with caller identification at no charge.

Untitled (HR 3627)

Sponsor: Maria Cantwell (D-WA) **Date:** 11/22/93
Status: Referred to the House Committee on Foreign Affairs Nov 22.
Description: The bill transfers jurisdiction over the export of non-military encryption software from the State Department to the Commerce Department. Currently, State defers decisions on the export of cryptography to the National Security Agency. Mass market or public domain software would no longer require export licenses, except if the destination is a nation currently embargoed or with terrorist elements.

Untitled (Public Law 103-142)

Sponsor: Don Edwards (D-CA) **Date:** 01/05/93
Status: Signed into law Nov 17.
Description: The bill amends Title 18 of the US Code, authorizing the Federal Bureau of Investigation to obtain certain telephone subscriber information, including name, address, length of service and billing records, provided there is "reason to believe" the subscriber is a foreign counterintelligence agent.

Untitled (HR 2912)

Sponsor: Ron Wyden (D-OR) **Date:** 08/06/93
Status: Referred to the House Foreign Affairs Subcommittee on Economic Policy Trade and the Environment Aug 10.
Description: The bill liberalizes controls on the export of telecommunications equipment and technology in order to promote democracy and free communication and to enhance economic competitiveness.

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Congress scrutinizes the security of gov't information

By Juan Antonio Osuna
CRA Staff

The General Accounting Office, an investigative arm of Congress, has released a series of reports criticizing federal agencies for failing to protect the security of electronic information.

One report, *IRS Information Systems: Weaknesses Increase Risk of Fraud and Impair Reliability of Management Information* (GAO/AIMD-93-94), found that 368 IRS employees improperly accessed the Integrated Data Retrieval System, the primary computer database for accessing and adjusting taxpayer accounts. Of these employees, 79 were investigated and only six were referred to the Justice Department for prosecution.

The report also criticized IRS for not having an adequate disaster recovery plan, finding that the backup systems installed at the Detroit data center could not adequately replace mainframes at the Martinsburg, WV, Computing Center in the event of disaster. Furthermore, GAO said the IRS had not completely tested the Detroit center's full processing capabilities since 1989.

"Weaknesses in IRS' general controls increase risk of fraud, unauthorized change of disclosure of taxpayer data and interruptions in critical data processing operations," the report said.

GAO also found computer weaknesses within other federal agencies. Another report, *Document Security: Justice Can Improve Its Control Over Classified and Sensitive Documents* (GAO/GGD-93-134), found computer security to be a major weakness within the Bureau of Prisons, the Drug Enforcement Administration, the Immigration and Naturalization Service, the Justice Department Headquarters, the US Attorney's Offices, the US Marshals Service, the Community Relations Service and the US Trustees Office.

During 1991 and 1992, the Justice Department's Security Compliance Review Group inspected 54 offices within the department. The report found 228 computer security violations within the Justice offices, constituting 38% of all security violations, which are categorized as physical, personnel information, computer and communication.

The highest concentration of computer security violations—81—was found in the DEA, constituting 41% of all security violations in the department.

"Unique user identification numbers and passwords were not used on specialized computer systems; classified and sensitive information, including grand jury information, was improperly processed on computers with hard drives; no risk analysis was done on computer systems; and diskettes containing classified information were not properly marked or secured," the report said.

Rep. Gary A. Condit (D-CA), chair of the Government Operations Subcommittee on Information, Justice, Transportation and Agriculture, requested the investigation out of concern for classified and sensitive information falling into the hands of drug cartels, organized crime and terrorist groups.

Last summer, Condit heard testimony from GAO on the National Crime Information Center computer system, the nation's largest computerized criminal justice information system, consisting of 24 million records accessible by 500,000 people.

GAO noted instances where law enforcement agents entered the system using false codes, retrieved information and sold it to private investigators.

While NCIC is not easily penetrable from the outside, the lack of password authentication allows easy abuse by insiders, GAO said. Most users of the system simply identify themselves and their agencies using identifiers that are not kept secret.

To order any of these GAO reports, call GAO at tel. 202-512-6000.

OTA offering fellowships

The Office of Technology Assessment is offering six one-year appointments to its Congressional Fellowship Program, beginning September 1994 in Washington, DC.

Applicants must have extensive experience in science and technology issues or have completed research at the doctoral level. OTA provides congressional committees with analyses of emerging, complex and often controversial issues. Applicants must be prepared to perform balanced, comprehensive analyses in clear, concise language.

Applicants should submit the following information:

- a two-page resume;
- a one-page listing of most recently published works;
- three letters of reference, including telephone numbers;
- a 1,000-word statement that either 1) evaluates an issue with technical and public policy content and explains why it is of interest to you or 2) summarizes the public policy findings of a work you have done;
- a 250-word statement explaining how OTA and the fellowship fit into your career objectives.

Send reference letters and applications by Feb. 1 to Morris K Udall Fellowships, Personnel Office, Office of Technology Assessment, 600 Pennsylvania Ave. SE, Washington, DC 20003.

Finalists will be interviewed March 29-30. Awards will be announced by April 6.

Policy News

Legislation from Page 7

National Information Infrastructure Act of 1993 (HR 1757)

Sponsor: Rick Boucher (D-VA) **Date:** 04/21/93
Status: Passed the House (326-61) July 26. Referred to the Senate Labor and Human Resources Subcommittee on Education, Arts and the Humanities Sept. 14.
Description: The bill calls for the Federal Coordinating Council for Science, Engineering and Technology to direct an interagency program involving the Departments of Commerce, Energy, Defense, and Health and Human Services; the National Aeronautics and Space Administration; and the National Science Foundation. NSF is charged with leading other federal agencies to assist schools, libraries and local governments in connecting to the National Research and Education Network. Test bed projects would connect hospitals, doctors and researchers to information systems that would allow them to share patient records and medical research.

Department of Science, Space, Energy and Technology Organization Act of 1993 (HR 1300)

Sponsor: Robert Walker (R-PA) **Date:** 3/10/93
Status: Referred to the House Government Operations Subcommittee on Legislation and National Security March 16.
Description: The bill establishes a cabinet-level Department of Science, Space, Energy and Technology to streamline government. The new department would consolidate the National Aeronautics and Space Administration, Environmental Protection Agency, Department of Energy, National Institute of Standards and Technology, National Oceanic and Atmospheric Administration and the National Science Foundation, and would eliminate the White House Office of Science and Technology Policy.

Commission on the Advancement of Women in the Science and Engineering Work Forces Act (HR 467)

Sponsor: Constance Morella (R-MD) **Date:** 1/6/93
Status: Referred to the House Education and Labor Subcommittee on Postsecondary Education and Training Feb. 2.
Description: The bill establishes a 17-member commission to help overcome low representation of women in the sciences.

Privacy for Consumers and Workers Act (HR 1900)

Sponsor: Pat Williams (D-MT) **Date:** 4/28/93
Status: Referred to the House Education and Labor Subcommittee on Labor-Management Relations May 11; hearings held June 30.
Description: This bill requires employers to notify employees and new hirees of the nature, time and place that electronic monitoring might occur, as well as the kind of information to be collected and how it will be used.

Individual Privacy Protection Act of 1993 (HR 135)

Sponsor: Cardiss Collins (D-IL) **Date:** 1/5/93
Status: Referred to the Government Operations Subcommittee on Information, Justice, Transportation and Agriculture Feb. 19.
Description: The bill establishes a five-member Individual Privacy Protection Board.

Copyright Reform Act of 1993 (HR 897)

Sponsor: William Hughes (D-NJ) **Date:** 2/16/93
Status: Passed House (amended) by voice vote Nov. 20. Received in the Senate Nov. 23, read twice and referred to the Committee on Judiciary Nov. 23.
Description: The bill overhauls copyright law. Current law requires plaintiffs to have registered works with the US Copyright Office before they can sue for statutory damages and attorneys' fees. The bill seeks to repeal this law so owners who have failed to register works can still sue for damages.

Technology Education Assistance Act of 1993 (HR 2728)

Sponsor: Thomas C. Sawyer (D-OH) **Date:** 7/23/93
Status: Referred to the House Education and Labor Subcommittee on Select Education and Civil Rights Aug. 11.
Description: The bill authorizes a grant program to improve the use of technology in schools at all levels and establishes a Education Technology Council within the Education Department.

National Competitiveness Act of 1993 (S 4)

Sponsor: Ernest Hollings (D-SC) **Date:** 1/21/93
Status: Placed on Senate Legislative Calendar July 28.
Description: The bill increases US economic competitiveness in critical areas of technology such as advanced manufacturing and engineering and high-performance computing and networking. The bill contains a section titled "Information Infrastructure and Technology Act," which seeks to increase funding for high-performance computing R&D, improve education at all levels, build digital libraries accessible over networks, improve electronic communication among health care providers, increase worker productivity and coordinate the building of a national information infrastructure to serve all citizens.

Telecommunications Infrastructure Act of 1993 (S 1086)

Sponsor: John Danforth (R-MO) **Date:** 6/9/93
Status: Referred to the Senate Commerce Subcommittee on Communications on July 14; hearings held Sept. 8.
Description: The bill seeks to enhance the development of the national telecommunications infrastructure by fostering competition. It preempts any state or local laws governing the telecommunications industry; forces telecommunications providers to sell services on a nondiscriminatory basis without any restrictions on the customer reselling those services; allows the Federal Communications Commission to set telecommunications standards; allows cable companies to offer telecommunications services only if provided through a subsidiary; and allows telephone companies to offer video or other information services only if provided through a subsidiary.

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Benefits of federal funding of HPC diverse, far reaching

High-performance computers are being touted as tools for building almost anything from beer cans to car bumpers, according to industry representatives testifying before Congress in October.

A Cray supercomputer has been used to help develop a beer can that does not explode when it is dropped, Peter R. Bridenbaugh of Aluminum Company of America (Alcoa) told the House Science, Space and Technology Subcommittee on Science.

"There are generally about 10 to 15 design parameters that can impact the performance of a can design," Bridenbaugh said, adding, "We have used the PSCs (Pittsburgh Supercomputing Center) Cray to generate and evaluate hundreds of designs automatically."

He went on to discuss car bumpers, noting that his company can design a bumper within days of a request from an auto manufacturer. "On several occasions," he said, "had we not had access to the PSC Cray we would not have been able to respond with a timely bid, which would have jeopardized our ability to compete in this market."

Alcoa was joined by a handful of other businesses that spoke of the far-reaching and diverse benefits of federally funded high-performance computing. Also testifying were representatives from Prudential Securities, Boeing Commercial Airplane Group, Oracle Corp., and the Mobil Exploration and Producing Technical Center; and Brett Berlin, chair of the Institute of Electrical and Electronics Engineers Committee on Computing and Applications Infrastructure.

Meanwhile, the Science Subcommittee and the House Armed Services Committee have asked the General Accounting Office to investigate the management of the National Coordination Office for High-Performance Computing and Communications.

The GAO report is expected to be released this spring.

Lane: HPC future promising

BY Juan Antonio Osuna
CRA Staff

Neal Lane, newly appointed head of the National Science Foundation, delivered the keynote address at the Supercomputing 1993 Conference of High-Performance Computing and Communications.

In his November talk, given in Portland, OR, Lane spoke optimistically about the future of high-performance computing despite economic barriers.

"The economy…puts large obstacles between us and the next level of success," Lane said. "We all know how it is doing—slow at creating new jobs, uncertainty in international markets; and as we begin the process of defense conversion, many of the most familiar corporate icons are undergoing massive restructuring, which is the polite way to say cutting jobs."

However, there are reasons for optimism, Lane said. "The [Clinton] administration has also voiced what I believe is a genuine commitment to maintaining US leadership in basic science and engineering," he said, adding that Congress and the public also have voiced equal determination.

Lane praised the recent report, *From Desktop to Teraflop: Exploiting the US Lead in High-Performance Computing*, released in October by the NSF Blue Ribbon Panel on High-Performance Computing.

"The report is so thorough and prospective that I believe it could well prove to be as valuable as the Lax report was a decade ago," he said, referring to the 1982 report, *Large-Scale Computing in Science and Engineering* (Lane served as chair of an advisory committee formed to prepare the report.)

Concerning the recent report, Lane said, "This report is still being reviewed within the foundation and by the National Science Board….It is important that as many people as possible have input to the process. I encourage all of you who are interested to read the report, and then share your comments and thoughts with us."

Lane also touched on the politicized subject of strategic versus basic research. "NSF already invests a substantial amount—over half its budget—in a number of research areas that are considered to be of strategic importance to the nation's future. High-performance computing and communications is probably the one most of you know best, and it has strategic implications for many fields and applications."

NII program receives $26 million

Congress appropriated $26 million for the National Information Infrastructure Pilot Projects Program, about half of what the National Telecommunications and Information Administration had requested for fiscal 1994.

NTIA will use the funding to provide matching grants to health care providers, libraries, universities, school districts, state and local governments and other non-profit agencies. Awards will be based on a competitive process of merit review and will be used to connect institutions to existing networks and enhance existing networks to demonstrate the benefits of the NII.

Policy News

Legislation from Page 8

DOE National Competitiveness Technology Partnership Act of 1993 (S 473)

Sponsor: J. Bennett Johnston (D-LA) **Date:** 3/2/93
Status: Placed on Senate Legislative Calendar June 24.
Description: The bill links the Energy Department laboratories with private sector laboratories and implements a National Information Infrastructure Program by amending the High-Performance Computing Act of 1991. It creates a coordinated interagency program that would develop partnerships, deploy information technologies and educate people on how to use them.

Privacy Protection Act of 1993 (S 1735)

Sponsor: Paul Simon (D-IL) **Date:** 11/20/93
Status: Referred to the Committee on Governmental Affairs by unanimous consent Nov. 24.
Description: The bill establishes a Privacy Protection Commission, consisting of five members appointed by the president for seven-year terms. The bill restricts support staff from growing beyond 50 full-time personnel. The agency would conduct studies, investigate privacy abuses, propose legislation and advise federal agencies, but it would not have power to enforce.

Electronic Library Act of 1993 (S 626)

Sponsor: Bob Kerrey (D-NE) **Date:** 3/22/93
Status: Referred to the Senate Committee on Commerce March 22.
Description: The bill establishes state-based electronic libraries. The National Science Foundation—in consultation with the Education Department, the Commerce Department, the Advanced Research Projects Agency and the Library of Congress—would issue grants to states for developing electronic libraries.

Technology for Education Act of 1993 (S 1040)

Sponsor: Jeff Bingaman (D-NM) **Date:** 5/27/93
Status: Referred to the Committee on Labor and Human Resources.
Description: The bill seeks to enhance the use of new technologies in education and sustains a technologically literate work force with specific sections on the Internet, an Electronic Dissemination Network and a program titled "High-Performance Educational Computing and Telecommunications Networks."

Computer Abuse Amendments Act of 1993 (S 1488)

Sponsor: Joseph R Biden Jr (D-DE) **Date:** 09/23/93
Status: Placed on Senate Legislative Calendar Sept. 27.
Description: One component of a collection of anti-crime legislation, the Computer Abuse Act refines criminal provisions for computer abuse.

Rural Electrification Loan Restructuring Act of 1993 (S 1167)

Sponsor: Patrick Leahy (D-VT) **Date:** 06/25/93
Status: Passed Senate without amendment June 25.
Description: The bill amends the Rural Electrification Act of 1936 to prescribe guidelines under which the Rural Electrification Administrator will make insured electric and telephone loans. It authorizes appropriations for electric hardship loans, electric municipal rate loans, telephone hardship loans and telephone refinancing loans.

High Technology Export Reform Act (S 1617)

Sponsor: Judd Gregg (R-NH) **Date:** 11/03/93
Status: Referred to the Committee on Banking Nov. 3.
Description: The bill amends the Export Administration Act of 1979 with respect to exports of computers, telecommunications equipment and semiconductors.

High Technology Indexation Act of 1993 (S 1496)

Sponsor: Dianne Feinstein (D-CA) **Date:** 09/29/93
Status: Referred to the Committee on Banking Sept. 29.
Description: The bill amends the Export Administration Act of 1979 to provide for updated indexing standards for emerging technologies.

Gender Equity in Education Amendments of 1993 (S 1465)

Sponsor: Tom Harkin (D-IA) **Date:** 09/15/93
Status: Referred to the Senate Committee on Labor and Human Resources Sept. 15.
Description: The bill amends certain education laws regarding gender equity training, dropout prevention and gender equity research and data.

Rural Telemedicine Development Act of 1993 (S 1088)

Sponsor: Tom Harkin (D-IA) **Date:** 06/10/93
Status: Referred to the Senate Agriculture, Nutrition, and Forestry Subcommittee on Rural Development and Electrification on July 1.
Description: A companion bill to HR 3070.

Rural Health Improvement Act of 1993 (S 1143)

Sponsor: Max Baucus (D-MT) **Date:** 06/22/93
Status: Referred to the Senate Committee on Finance June 22.
Description: The bill seeks to improve the delivery of health care services in rural areas by creating an Assistant Secretary for Rural Health and by establishing a grant program for the use of interactive telecommunications systems.

Emerging Telecommunications Technologies Act of 1993 (S 335)

Sponsors: Daniel Inouye (D-HI); Ted Stevens (R-AK) **Date:** 2/4/93
Status: Reported out of the Senate Commerce Committee May 25 with an amendment in the nature of a substitute.
Description: A companion bill to HR 707. Unlike the House bill, the Senate one directs the Federal Communications Commission to assign frequencies to companies using competitive bidding

House, Senate agree on cuts to ARPA's budget request

By Juan Antonio Osuna
CRA Staff

Despite House attempts to slash $100 million from the Advanced Research Projects Agency's fiscal 1994 budget request for its High-Performance Computing project, congressional conferees agreed in early November to cut only $43 million.

The House Appropriations Committee originally proposed taking $100 million from the HPC project, which falls within the Computing Systems and Communications Technology program. The Senate Appropriations Committee had pushed for a $53 million reduction.

The HPC project will get $195 million for 1994, while overall the Computing Systems and Communications Technology program will get $326 million. The HPC project represents the bulk, but not all, of ARPA's role in the federal, inter-agency High-Performance Computing and Communications program.

Although the Senate Appropriations Committee had recommended targeting cuts even more specifically at the Scalable Systems and Microsystems projects, conferees decided to leave reductions targeted more generally at high-performance computing

The $43 million decrease represents the difference between 1994 appropriations of $195 million and the 1994 budget request of $238 million for the HPC project. How the $195 million appropriation compares with the 1993 appropriation is a point of contention between the White House and the appropriations committees.

In its report, the Senate Appropriations Committee claimed that its recommended cut of $53 million (prior to conference) still translated into a 15% increase over 1993 appropriations. Further, the report stated, "ARPA has undertaken changes that may lead to a redirection of its HPC investment, making approval of the requested 49% real growth unjustified."

However, a statement submitted by the White House said the Senate committee failed to consider certain projects that did not fall under HPC in 1993 but were reclassified under HPC in the 1994 request. Considering these factors, the statement said, the Senate's $53 million cut represents a 9% reduction in 1994 appropriations over 1993 funding

Given the White House's argument, the $43 million cut now issued by the conferees actually represents a 4% decrease in 1994 over 1993 appropriations.

Despite these cuts, one ARPA-funded HPC center will not be affected—the Maui HPC Center in Hawaii, the home state of Democratic Sen. Daniel K Inouye, who is chair of the Senate Appropriations Subcommittee on Defense. A footnote added to the conference report stated, "The conferees direct that none of the HPC reduction be applied to the funds budgeted for activities at the Maui HPC Center."

These cuts have been attributed to various factors: critical reports by the General Accounting Office and the Congressional Budget Office; lobbying by computer companies that had not received funds from ARPA; and a broad downward trend in defense appropriations.

OTA studies electronic services

The congressional Office of Technology Assessment released a report in November urging the government to increase the delivery of electronic services but not overlook the human element.

"Like any new technological application, electronic service delivery will not work if people find the technology confusing, threatening, cumbersome, generally unfriendly or too costly to use," the report said.

The report said that the government should not cater to the needs of the affluent and the computer literate. "Rural and inner city residents, persons with disabilities and senior citizens are among those who have a lot to gain—or lose—from electronic delivery," the report said.

The report also emphasized the need for agencies to form partnerships among themselves, with state and local counterparts and with the private sector. Currently, these partnerships are inhibited by a federal procurement process "that is already overly complicated, rigid and unnecessarily expensive," the report said.

The 178-page report, *Making Government Work: Electronic Delivery of Federal Services*, was requested by Sen. John Glenn (D-OH), chair of the Governmental Affairs Committee.

Electronic FOIA bill introduced

Sens. Patrick Leahy (D-VT) and Hank Brown (R-CO) introduced a bill Nov. 23 that gives the public access to federal records kept electronically and takes steps to speed the request process.

The Electronic Freedom of Information Improvement Act of 1993 (S 1782) has been referred to the Senate Judiciary Committee.

"We recognized the importance of such electronic access when we recently passed a law requiring that people have on-line access to important government publications, such as the *Federal Register*, the *Congressional Record* and other documents put out by the Government Printing Office," Leahy said in the Nov. 23 *Congressional Record*, referring to another law passed last summer

Policy News

Privacy from Page 1

president of LaserCard Systems Corp., who testified at the October Senate hearing. His company is selling a write-once, read-many optical card with the capacity to store 4.2 megabytes. The read/write devices can be interfaced through a SCSI port, allowing the use of standard encryption software to protect the data on the cards, he said.

Among other solutions OTA proposed were penalties for misuse of health information, required patient consent prior to disclosure and the creation of a special body to oversee the protection of health care data.

"Existing models for data protection, which place responsibility for privacy on individual institutions, will no longer be workable for new systems of high-performance, interactive networks," an OTA press release said.

Besides an overview of existing privacy-related legislation and technical issues such as cryptography, the report offered facts that suggest problems beyond individual mischief and that allude more to potential systematic abuse, as large corporations are increasingly amassing medical information.

For instance, PCS Health Systems Inc. processes 120 million prescriptions per year, with 95% of pharmacies connected to the PCS online system. This information, although "sterilized" of individual information, is sold to market researchers, OTA said.

The Medical Information Bureau keeps records on 15 million people with coding for 210 medical categories (such as high blood pressure) and five non-medical categories (such as a poor driving record). MIB sells the information to health and life insurance companies but says the information is "not used as the basis for a decision to reject an application or to increase the cost of insurance premiums."

Rather, MIB claims, only applicant-provided information is used to reject applications and set premiums. The MIB database is used to verify this information and detect fraud.

Concerning the security of the MIB system, the report said, "Among the safeguards it has established to protect confidentiality are its computer system that is exceptionally user unfriendly to the 1,000 terminals in its network."

According to the October issue of *Privacy Journal*, 85% of the public thinks that protecting medical confidentiality is very important and 69% say there is a need for federal legislation. The publication pointed out that only seven states have any laws related to the privacy of medical records and only 20 states give citizens the right to inspect their own records.

The OTA report offered a backdrop of facts that suggest problems beyond individual mischief and that allude more to potential systematic abuse.

NAS study analyzes tension between privacy and public policy

Federal agencies have a hard time getting the public to participate in surveys because of privacy problems, a National Academy of Sciences study said.

Private Lives and Public Policies: Confidentiality and Accessibility of Government Statistics examined the tension between federal agencies' struggle to collect accurate data and individuals' reluctance to entrust the government with confidential information.

Issued by NAS's National Research Council, the report analyzed three basic needs:

• To protect the privacy of people and organizations,

• To collect and analyze data for shaping public policy, and

• To share data among agencies and the public, thereby decreasing duplication and increasing usefulness.

"Confidentiality problems can lead to serious deterioration in the completeness and quality of the survey data collected, costly duplication of effort and limitations in the ability of users to do analyses that could contribute to the understanding and resolution of significant economic and social problems," said George Duncan, chair of the NAS study panel and professor of statistics at Carnegie Mellon University.

Exacerbating these tensions is the lag of public policy behind technological advancements, the report said. Technological advances in computers and communications offer opportunities and threats: opportunities to process, access and analyze large data sets more efficiently and threats of unauthorized access to individually identifiable data."

To combat these problems, the report issued the following broad recommendations:

• Statistical records across all federal agencies should be governed by a consistent set of statutes and regulations that clearly define and separate statistical data from administrative data and that guarantee confidentiality.

• While meeting data protection requirements, legal barriers that

Continued on Page 15

Coalition tentatively accepts Clipper encryption scheme

By Juan Antonio Osuna
CRA Staff

A 50-member coalition headed by the Electronic Frontier Foundation sent a letter to President Clinton Dec. 6 expressing "tentative acceptance" of the Clipper standard for government escrowing of cryptographic keys.

Two days later, EFF sought to clarify its position, when Computer Professionals for Social Responsibility sent another letter to Clinton, calling the coalition's statement a "grave mistake."

The original letter sent by the EFF-led group said: "We have expressed the coalition's tentative acceptance of the Clipper Chip encryption scheme, but only if it is available as a voluntary alternative to widely available, commercially accepted encryption programs and products."

The letter urged Clinton to ease export controls on cryptography. "The key indication of whether the choice of encryption regimes will be truly voluntary, however, is the ability of American companies to export computer programs and products employing other strong encryption algorithms."

In response, CPSR said: "We disagree with their [the coalition] views. This group has made a grave mistake and does not speak for the many users of computer networks and developers of network services who have vigorously opposed this proposal."

In a clarification after CPSR blasted the coalition, EFF said the group, known as the Digital Privacy and Security Working Group, was only trying to diplomatically bargain for a lift in export controls. "This was a misunderstanding of what the DPSWG offered the administration in this proposal, leading to the belief that both the DPSWG [and]…the Electronic Frontier Foundation have offered to ease their opposition to Clipper."

CPSR is opposed to Clipper on ideological grounds. It says "core is the dubious premise that the government should have the authority to design communications networks that facilitate wire surveillance," CPSR said.

CPSR also attacked Clipper for being based on a classified encryption algorithm. "It is essential to the integrity of the scientific process that standards are openly created and available for public review," their letter said. "While we support the relaxation of export controls on cryptography, we are not willing to concede to the NSA [National Security Agency] the right to develop secret standards."

Among the other groups that signed the EFF letter were the American Civil Liberties Union, IEEE-USA Committee on Communications and Information Policy, and EDUCOM.

Jobs from Page 20

University of Houston
Department of Computer Science

Applications are sought for the Hugh Roy and Lillie Cranz Cullen Professorship in Computer Science beginning in the 1994-95 academic year. The University of Houston is a nationally recognized, comprehensive research and teaching institution that is part of the public system of higher education in Texas.

Through its 14 colleges and schools, the university offers a full range of bachelor's, master's, doctoral and professional programs to more than 32,000 students from across the United States and around the world.

The Department of Computer Science is one of the seven academic departments in the College of Natural Sciences and Mathematics. The college recently set out to establish a first-rate interdisciplinary program on the use of high-performance computers in scientific research. The Department of Computer Science is destined to play a pivotal role in this effort.

The department consists of 19 tenure-track faculty members and offers B.S., M.S. and Ph.D. degrees in computer science. There are approximately 420 undergraduate students, 160 M.S. students and 70 Ph.D. students.

Qualifications for the position include an established, high-profile program of sponsored research in computer science, a record of excellence in teaching and the ability to lead intellectually and organizationally. Preference will be given to applicants whose research areas will support those in computer science, as well as interdisciplinary computational programs in the college.

Send applications, a current curriculum vitae and the names of at least three references to Chair of the Cullen Search Committee, Department of Computer Science, University of Houston, Houston, TX 77204-4375. Inquiries may be made by mail to the above address or by e-mail to cullensrch@cs.uh.edu. Applications will be accepted until the position is filled.

The university is an equal opportunity, affirmative action employer. Women, minorities, veterans and persons with disabilities are encouraged to apply.

Johns Hopkins University
Department of Computer Science and Center for Speech Processing

The Johns Hopkins University invites applications for a new faculty position in the Department of Computer Science in conjunction with the Center for Speech Processing of the G.W.C. Whiting School of Engineering. Appointments at all ranks will be considered.

We are particularly, but not exclusively, seeking candidates with research and teaching interests in the area of speech or language systems, especially language modeling; acoustic signal processing; automatic learning of grammars and semantics from text corpora; machine language translation; and construction of dialogue systems. An interest in using statistical methods of parameter estimation for self-organization also is preferred. Finally, a willingness to participate in collaborative projects involving systems building and software implementation is essential.

This will be a tenure-track position in the Department of Computer Science, with primary research involvement associated with the Center for Speech Processing.

All applicants are expected to have an outstanding research record, commitment to quality teaching and the ability and willingness to develop a research program of the highest quality. Applicants should send a comprehensive curriculum vitae and the names of at least three references to: CSP Faculty Search Committee, Department of Computer Science, Room 224, New Engineering Building, Johns Hopkins University, Baltimore, MD 21218-2694. Fax: 410-516-6134; E-mail: cs_csp_position@cs.jhu.edu.

The Johns Hopkins University is an equal opportunity, affirmative action employer. Minorities and women are strongly encouraged to apply.

1992-93 CRA Survey

Proportion of female graduates and faculty increases significantly, particularly in CS

The preliminary results of the 1992-93 Computing Research Association Survey on the Production and Employment of Ph.D.s and Faculty in Computer Science and Computer Engineering

This report describes the preliminary results of a survey completed in December 1993, of the CRA Forsythe List* of computing departments. The survey concerns the production and employment of Ph.D. recipients who graduated in 1992-93 and the faculty of Ph.D.-granting computing departments during the academic year 1993-94.

This CRA survey (formerly known as the CRA Taulbee Survey) has a long and reputable history. It has resulted in a long-term data history of the development of computing research as a graduate academic discipline. Over that time, we have prided ourselves on obtaining as close to a 100% response rate as possible. To maintain the integrity of our longitudinal database, we will continue to do so.

However, last year our decision to delay publishing our final results until March inconvenienced many people who have come to rely on the data. In many cases, the results are not likely to be affected significantly because 15 departments out of 164 did not return the survey before our deadline.† We have decided to continue trying to get a response from these 15 departments and we will make a final version of the survey available in paper or electronic form later this year.

The departments that did not respond this year did report last year, reported producing 75 Ph.D.–32 in computer science and 43 in computer engineering—in the 1991-92 survey. All figures falling under CS categories pertain to departments that may offer CS and CE degrees. Figures falling under CE pertain to departments offering only CE degrees.

In trying to make the survey more useful to the community, we have added additional explanatory and, where necessary, cautionary footnotes.

We expect to publish a more detailed analysis of the survey in a future edition of *CRN*. Highlights from the preliminary results include:

- By using last year's figures to correct for departments that have not returned the survey, it appears that CS Ph.D. production may have only increased slightly, whereas CE Ph.D. production actually may have decreased. However, the margin of error is greater for CE figures throughout the tables because the eight Ph.D. departments that failed to respond represent almost a third of all the 25 CE surveys that were sent out.
- The proportion of female graduates and faculty grew significantly, particularly in computer science. However, the participation of underrepresented minorities still hovers around the 1% mark for new graduates and 2% for faculty
- Average salaries appear to have remained level, with only fractional increases reported.

Table 1. Titles of Departments

No. of Depts.	
110	Computer or Computing Science(s) Department
13	Electrical and Computer Engineering
4	Computer Science and Engineering
2	Computer and Information Science(s)
1	College or School of Computer Science (or CIS)
4	Electrical Engineering and Computer Science
1	Mathematical and Computer Sciences
1	Computer Science and Operations Research
9	Electrical Engineering
1	Advanced Computer Studies
1	Applied Sciences
1	Computational Science
1	Computer Engineering and Science

**The CRA Forsythe List is a list of departments in the United States and Canada that grant a Ph.D. in computing—computer science (CS) and computer engineering (CE). It is maintained by the Computing Research Association. This is the sixth year computer engineering departments have been included.*

†As of Dec. 6 the following schools had not responded to the survey: Florida Institute of Technology, Department of Computer Science; George Mason University, Department of Information Technology and Engineering/Electrical Engineering; George Washington University, Department of Computer Science; North Carolina State University, Department of Computer Engineering; Stevens Institute of Technology, Department of Computer Science; University of Alabama at Birmingham, Department of Computer Science; University of California at Santa Barbara, Department of Computer Engineering; University of Central Florida, Department of Computer Engineering; University of Illinois at Chicago, Department of Computer Science; University of North Texas, Department of Computer Science; University of Notre Dame, Department of Computer Science; University of South Florida, Department of Computer Science; University of Tennessee at Knoxville, Department of Computer Engineering; University of Texas at Austin, Department of Computer Engineering; and West Virginia University, Department of Computer Science.

Table 2. When Responding Departments Graduated Their First Ph.D.

Year	# of Depts.	Year	# of Depts.	Year	# of Depts.	Year	# of Depts.
Before 1960	4	1968	7	1977	4	1986	7
1960	1	1969	11	1978	3	1987	13
1961	0	1970	2	1979	4	1988	4
1962	0	1971	7	1980	3	1989	7
1963	0	1972	2	1981	5	1990	7
1964	1	1973	10	1982	3	1991	4
1965	1	1974	6	1983	2	1992	2
1966	2	1975	2	1984	5	1993	1
1967	5	1976	2	1985	5		

For Table 2, most departments responded with the first year a Ph.D. was granted in computer science or computer engineering. A few departments responded with the first year a Ph.D. was granted by the department, even if the degree was awarded in electrical engineering or some degree other than CS or CE.

Table 3. Ph.D. Production and Growth

	Year	Depts. That Returned Survey	Ph.D.s Produced	Average per Dept.	Passed Qualifier	Average per Dept.	New Ph.D. Students	Average per Dept.
CS Depts.	1984-85	103 of 109	326	3.2	755	8.2	1,177	12.0
	1985-86	117 of 118	412	3.5	858	7.3	1,170	10.0
	1986-87	123 of 123	466	3.8	1,008	8.2	1,430	12.0
	1987-88	127 of 127	577	4.5	1,113	8.8	1,497	12.0
	1988-89	129 of 129	625	4.8	1,215	9.4	1,632	13.0
	1989-90	135 of 136	734	5.4	1,173	8.7	1,434	11.0
	1990-91	137 of 137	862	6.3	1,301	9.5	1,545	11.0
	1991-92	140 of 140	909	6.5	1,221	8.7	1,666	11.9
	1992-93	131 of 139	894	7.3	1,162	9.7	1,362	10.4
CS&CE Depts.	1986-87	145 of 156	559	3.9	1,168	8.1	1,621	11.0
	1987-88	157 of 161	744	4.7	1,399	8.9	1,801	11.0
	1988-89	158 of 161	807	5.1	1,441	9.1	1,993	13.0
	1989-90	167 of 170	907	5.4	1,482	8.9	1,817	11.0
	1990-91	166 of 168	1,073	6.5	1,646	9.9	1,861	11.0
	1991-92	171 of 173	1,113	6.5	1,495	8.7	2,025	11.8
	1992-93	149 of 164	997	7.3	1,304	9.8	1,576	10.6

1992-93 CRA Survey

Table 4. Ph.D. Production in 1992-93 by Ranking

Rank	Ph.D.s Produced	Ph.D.s per Dept.	Ph.D.s Next Year	Average per Dept.	Passed Qualifier	Average per Dept.	New Ph.D. Students	Average per Dept.
All CS Depts.	894	7.3	1,037	8.0	1,162	9.7	1,362	10.4
CS 1-12	196	17.8	221	18.4	246	22.4	273	22.8
CS 13-24	147	12.3	149	12.4	145	12.1	222	18.5
CS 25-36	111	9.3	130	10.8	186	16.9	163	13.6
Other CS	440	5.0	537	5.8	585	6.8	704	7.4
All CE Depts.	103	7.4	120	7.5	142	10.9	214	12.6

In Tables 3 and 4, as of 1992-93, each average is computed by dividing each total by the number responding to each question. In the past, each average was computed by dividing each total by the number returning the survey. In computing the columns indicating average Ph.D.s produced and average passing qualifier, a few departments that had just begun a Ph.D. program but had not yet awarded their first degrees were ignored.

Table 5. Sex and Minority Status of Ph.D.s

	CS			CE			CS&CE		
Ph.D. Minority Status	Male	Female	Total	Male	Female	Total	Male	Female	Total
White	375	79	454	36	4	40	411	83	494
Black	4	3	7	0	0	0	4	3	7
Hispanic	8	4	12	1	0	1	9	4	13
Asian	239	29	268	49	2	51	288	31	319
Other or Unknown	98	11	109	8	1	9	106	12	118
Total	**724**	**126**	**850**	**94**	**7**	**101**	**818**	**133**	**951**

Table 6. Sex, Minority Status and Citizenship of CS Ph.D.s Since 1970

Year	Total Ph.D.s	Female	Percent of Total	Black	Percent of Total	Hispanic	Percent of Total	Foreign	Percent of Total
1970	112	1	1%	1	1%			22	20%
1971	124	4	3%	1	1%			21	17%
1972	206	12	6%	2	1%			39	19%
1973	208	7	3%	2	1%			41	20%
1974	203	6	3%	2	1%			46	23%
1975	256	21	8%	1	0%	**No information available until 1984-85**		68	27%
1976	246	14	6%	0	0%			57	23%
1977	208	14	7%	0	0%			68	33%
1978	223	19	9%	2	1%			51	23%
1979	248	24	10%	1	0%			65	26%
1980	230	28	12%	0	0%			82	36%
1981	235	26	11%	0	0%			79	33%
1982	244	27	11%	1	0%			83	34%
1983	256	31	12%	2	1%			86	34%
1984	274	29	10%	3	1%			87	32%
1984-85	326	32	10%	3	1%	7	2%	122	37%
1985-86	412	50	12%	6	1%	6	1%	184	45%
1986-87	466	51	11%	1	0%	8	2%	181	40%
1987-88	577	60	10%	4	1%	5	1%	238	41%
1988-89	625	87	14%	0	0%	6	1%	248	40%
1989-90	734	97	13%	3	0%	8	1%	331	45%
1990-91	862	113	13%	7	1%	19	2%	384	45%
1991-92	909	108	12%	11	1%	15	2%	425	47%
1992-93	894	126	14%	7	1%	12	1%	425	48%

In Table 6, percentages are based on total Ph.D.s, even though gender and ethnic origin are not known for a small percentage of this total.

Table 7. Number of Ph.D.s with Disabilities in 1992-93

	US	Canada
CS	3	0
CE	2	0
CS&CE	5	0

The figures in Table 7 probably are too low, as many departments failed to respond to this question.

Table 8. Citizenship of the Ph.D.s in 1992-93

	US	Canada	Foreign	Unknown	Percent Foreign
CS	419	31	425	10	48.0%
CE	32	0	60	11	58.3%
CS&CE	451	31	485	21	49.1%

Table 9. Employment of the Ph.D.s

	# of Ph.D.s	Ph.D. Dept.	Non-Ph.D. Dept.	Non-CS or CE Dept.	Industry	Gov't	Not US or Canada	Unemployed	Self-Employed	Unknown
CS	894	201	92	30	270	30	117	21	17	124
Percent		22.5%	10.3%	3.4%	30.2%	3.4%	13.1%	2.3%	1.9%	13.9%
CE	103	7	0	1	22	3	4	0	1	46
Percent		6.8%	0.0%	1.0%	21.4%	2.9%	3.9%	0.0%	1.0%	44.7%

1992-93 CRA Survey

Table 10. Undergraduate and Master's Degrees

	Non-Ph.D. Degrees, Ph.D. Depts. Only	Undergraduate					Master's				
		89-90	90-91	91-92	92-93	93-94	89-90	90-91	91-92	92-93	93-94
CS	Number of Degrees	8,053	7,975	8,428	7,513	8,030	4,173	4,030	4,183	3,777	3,862
	Number of Depts. Responding	135	135	137	122	122	135	135	137	128	127
	Average per Dept.	60	59	62	62	66	31	30	31	30	30
CE	Number of Degrees	1,628	1,378	1,385	705	676	943	963	938	746	782
	Number of Depts. Responding	32	28	29	16	15	32	28	29	18	17
	Average per Dept.	51	49	48	44	45	30	34	32	41	46
CS&CE	Number of Degrees	9,681	9,353	9,813	8,218	8,706	5,116	4,993	5,121	4,523	4,644
	Number of Depts. Responding	167	167	166	138	137	167	167	166	146	144
	Average per Dept.	58	56	59	60	64	31	30	31	31	32

Table 11. New Graduate Students in Fall 1993

		Total New Grad Students	With CS Degrees	Ph.D. Program	Master's Only Program	Part-Time Master's Students
CS	Total	3,735	2,072	1,362	2,393	861
	Depts. Responding to Question	130	107	131	130	118
	Average per Dept.	29	19	10	18	7
CE	Total	813	112	214	599	195
	Depts. Responding to Question	17	10	17	17	15
	Average per Dept.	48	11	13	35	13
CS&CE	Total	4,548	2,184	1,576	2,992	1,056
	Depts. Responding to Question	147	117	148	147	133
	Average per Dept.	31	19	11	20	8

Table 12. New Ph.D. Students in CS Departments

Depts.	Number of Depts. Responding	Total New Ph.D. Students					Average Number of Students per Dept.				
		1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
Ranked 1-12	12	342	344	314	322	273	29	29	26	27	23
Ranked 13-24	12	243	193	233	215	222	20	18	19	18	19
Ranked 25-36	12	215	165	150	334	163	18	14	13	28	14
All Other	93, 99, 101, 104, 95 (For last five years)	832	732	858	795	704	9	7	8	8	7

For Table 12 and other tables that group computer science departments by the rank of 1-12, 13-24 and 25-36, we based our ranking on information from a 1980 assessment of research doctorate programs in the United States done under the auspices of the National Research Council. We modified our ranking to include top Canadian universities.

Our top 12 schools are Stanford University, Massachusetts Institute of Technology, Carnegie Mellon University, University of California at Berkeley, Cornell University, University of Illinois at Urbana-Champaign, University of California at Los Angeles, University of Toronto, University of Washington, University of Texas at Austin, University of Wisconsin at Madison and the University of South Carolina.

The departments ranked 13-24 are the University of Maryland, Princeton University, Brown University, University of Utah, New York University, University of Massachusetts at Amherst, the State University of New York at Stony Brook, University of North Carolina at Chapel Hill, University of Pennsylvania, Yale University, University of Waterloo and the Georgia Institute of Technology.

The departments ranked 25-36 are the University of California at San Diego, the California Institute of Technology, Columbia University, Ohio State University, Rice University, Duke University, Northwestern University, Syracuse University, Rutgers—the State University of New Jersey, University of California at Irvine, University of Minnesota and the University of Rochester

Table 13. Faculty Statistics, 1993-94 Academic Year

Faculty	All CS&CE Depts.		All CS Depts.		Top 24 CS Depts.		Other CS Depts.	
	Total	Average	Total	Average	Total	Average	Total	Average
Tenure-track (# of people)	3,165	21.2	2,618	20.0	651	27.1	1,967	18.4
Assistant Professor	894	6.0	755	5.8	161	6.7	594	5.6
Associate Professor	985	6.6	821	6.3	187	7.8	634	5.9
Full Professor	1,286	8.6	1,042	8.0	303	12.6	739	6.9
Research Faculty (FTE)	197	0.8	174	0.8	117	0.2	57	1.9
Postdoctorates (FTE)	230	0.6	173	0.8	61	0.4	112	1.0
Non-Tenure-Track Teachers (FTE)	399	0.4	344	0.4	73	0.3	271	0.4
Other (Such as FTE Visitors)	229	0.7	173	0.8	44	0.6	130	0.8

In Table 13, the tenure-track breakdowns are based on the number of people. The other categories are based on full-time equivalents.

Table 14. Women, Minorities and Persons with Disabilities on CS and CE Faculties

		Total	Female	Percent	Black	Percent	Hispanic	Percent	Disabled	Percent
CS	Assistant Professor	755	118	15.6%	14	1.9%	19	2.5%	1	0.1%
	Associate Professor	821	77	9.4%	2	0.2%	8	1.0%	1	0.1%
	Full Professor	1,042	59	5.7%	2	0.2%	12	1.2%	3	0.3%
	Total	**2,618**	**254**	**9.7%**	**18**	**0.7%**	**39**	**1.5%**	**5**	**0.2%**
CE	Assistant Professor	139	13	9.4%	5	3.6%	3	2.2%	0	0.0%
	Associate Professor	164	6	3.7%	1	0.6%	1	0.6%	0	0.0%
	Full Professor	244	5	2.0%	1	0.4%	0	0.0%	0	0.0%
	Total	**547**	**24**	**4.4%**	**7**	**1.3%**	**4**	**0.7%**	**0**	**0.0%**

In Table 14, the percentages are based on total number of professors, even though gender and ethnic origin are not known for a small percentage of this total.

Table 15. Faculty Hiring for 1992-93

	All US CS&CE Depts.	All US CS Depts.	Top 24 US CS Depts.	Other 113 US CS Depts.	12 Canadian CS Depts.
Total Faculty Hired	148	125	41	84	12

1992-93 CRA Survey

Table 16. New Ph.D. Salaries for Fall 1993

	All US CS&CE Depts.	All US CS Depts.	Top 24 US CS Depts.	Other 107 US CS Depts.	12 Canadian CS Depts.
# Depts. Reporting New Ph.D. Salaries	55	46	13	33	5
Minimum (of the Averages)	$39,375	$39,375	$45,000	$39,375	$46,000
Mean (of the Averages)	$48,918	$49,079	$51,146	$48,264	$53,351
Maximum (of the Averages)	$58,464	$58,464	$58,464	$56,520	$58,000

Salaries (in Thousands):		38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53+
Number of Depts. in:	1989-90	0	1	1	1	7	14	12	1	11	8	3	1	1	1	2	0
	1990-91	0	0	1	2	2	3	8	15	20	6	9	4	1	1	1	1
	1991-92	0	0	0	2	1	0	3	8	5	7	11	4	6	4	1	0
	1992-93	0	0	1	1	2	1	1	6	10	9	5	9	10	4	3	3
	1993-94	0	1	1	1	0	0	0	5	6	7	5	6	8	5	4	6

Table 17. Nine-Month Salaries, 113 of 117 CS Departments, United States Only

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	624 of 659	$37,321	$48,985	$64,260	$51,100	$41,400	$54,575	$81,000
Associate	671 of 701	$36,279	$54,357	$71,250	$59,724	$47,250	$65,674	$92,000
Full	846 of 902	$38,000	$64,487	$93,870	$78,990	$53,460	$99,757	$172,000

Table 18. Nine-Month Salaries, 11 of 11 CS Departments Ranked 1-12 and Located in the United States

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	82 of 82	$45,900	$50,715	$57,500	$53,331	$48,284	$57,231	$63,000
Associate	83 of 83	$47,801	$55,303	$64,700	$61,328	$55,580	$67,407	$78,800
Full	145 of 154	$38,000	$62,932	$71,900	$81,612	$76,000	$105,421	$127,600

Table 19. Nine-Month Salaries, 12 of 12 CS Departments Ranked 13-24, United States Only

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	69 of 73	$47,000	$50,623	$57,900	$53,652	$51,011	$55,262	$60,300
Associate	94 of 96	$51,634	$58,399	$67,000	$64,426	$60,253	$70,638	$88,346
Full	125 of 125	$58,900	$70,100	$91,500	$88,489	$101,114	$120,244	$137,000

Table 20. Nine-Month Salaries, 12 of 12 CS Departments Ranked 25-36, United States Only

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	65 of 82	$46,000	$50,995	$57,800	$54,314	$53,250	$57,965	$66,120
Associate	76 of 92	$47,250	$56,997	$66,040	$63,078	$62,750	$70,922	$80,570
Full	81 of 106	$58,000	$69,020	$80,200	$86,088	$80,624	$118,136	$172,000

Table 21. Nine-Month Salaries, 78 of 82 CS Departments Ranked Higher Than 36 or Unranked, United States Only

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	403 of 422	$37,321	$48,221	$64,260	$49,909	$41,400	$53,648	$81,000
Associate	418 of 430	$36,279	$53,234	$71,250	$58,289	$47,250	$63,949	$92,000
Full	495 of 517	$45,227	$63,246	$93,870	$76,084	$53,460	$93,442	$151,734

Table 22. Nine-Month Salaries, 17 of 18 CE Departments, United States Only

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	102 of 139	$33,000	$46,285	$51,700	$49,897	$45,000	$52,408	$63,765
Associate	137 of 164	$34,000	$51,716	$62,650	$57,700	$48,000	$63,954	$74,745
Full	187 of 244	$43,000	$62,336	$76,200	$75,941	$69,700	$97,144	$139,890

Table 23. 12-Month Salaries, 11 of 12 Canadian CS Departments (Canadian Dollars)

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	75 of 81	$31,639	$48,008	$59,081	$56,474	$56,000	$65,622	$80,961
Associate	108 of 111	$40,815	$59,223	$79,313	$69,149	$66,367	$82,573	$124,987
Full	121 of 128	$52,748	$73,087	$90,157	$89,522	$82,300	$105,146	$147,514

Table 24. Nine-Month Salaries, 130 of 135 US CS and CE Departments

Faculty Rank	# Reporting Salary Data	Reported Salary Minimums Min.	Mean	Max.	Avg. of all Salaries	Reported Salary Maximums Min.	Mean	Max.
Assistant	726 of 798	$33,000	$48,642	$64,260	$50,956	$41,400	$54,300	$81,000
Associate	808 of 865	$34,000	$54,019	$71,250	$59,461	$47,250	$65,454	$92,000
Full	1,033 of 1,146	$38,000	$64,229	$93,870	$78,624	$53,460	$99,441	$172,000

For Tables 17-24, each department was asked for the minimum, mean and maximum salary for each category of professor. Because tables show the minimums and maximums of the minimums and maximums reported by each department, these figures reflect salaries of single professors. Also shown are the means of the minimums and maximums reported by each department. For the average of all salaries is the average of the means reported by each department. If a department gave only a partial answer for a category of professor, it was discounted. All Canadian salaries are in Canadian dollars.

1992-93 CRA Survey

Table 25. Anticipated Faculty Growth

		1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	Five-Year Increase
CS	Faculty Size	2,611	2,735	2,805	2,881	2,943	3,002	391 (15.0%)
	Average Size	19.9	20.9	21.4	22.0	22.5	22.9	
CS&CE	Faculty Size	3,195	3,328	3,401	3,485	3,549	3,613	418 (13.1%)
	Average Size	21.4	22.8	22.8	23.4	23.8	24.2	

In Table 25, a significant number of respondents did not project departmentalignore these departments would bring overall statistics down. Hence, the figures growth for the full five years. Some did not project growth for any years. T shown assume that each department will at least maintain its current size.

Table 26. Average Anticipated Five-Year Growth of Faculty in CS Departments

	By Department Rank				By Department Size (Number of Faculty)				
	1-12	13-24	25-36	Other	1-9	10-19	20-29	30-39	40+
Number of Depts. in 1993-94	12	12	12	95	10	66	38	11	5
Average Dept. Size in 1993-94	29.8	24.5	22.9	17.7	7.8	14.8	25.3	35.3	41.0
Average Dept. Size in 1998-99	31.6	29.8	24.0	20.8	10.0	17.9	28.2	36.6	45.4
Average Five-Year Increase in Faculty	1.8	5.3	1.1	3.1	2.2	3.1	2.9	1.4	4.4
Projected Growth	5.9%	21.8%	4.7%	17.4%	28.2%	20.8%	11.5%	3.9%	10.7%

Table 27. Faculty Losses in 1992-93

	CS&CE Departments			CS Departments		
	With Ph.D.	No Ph.D.	Total	With Ph.D.	No Ph.D.	Total
Died	7	1	8	5	1	6
Retired	41	8	49	29	5	34
Visitors Returning to Employer	9	0	9	8	0	8
Teaching Elsewhere	74	2	76	68	2	70
Left for Non-Academic Position	29	4	33	26	4	30
Returned to Graduate School	0	1	1	0	1	1
Other	25	0	25	22	0	22
Total	**185**	**16**	**201**	**158**	**13**	**171**

Privacy from Page 10

prevent federal agencies from sharing data among themselves and the public should be removed. These barriers have led to duplication of efforts by both agencies and data suppliers.

• Legal sanctions should exist to punish external users and agency employees who violate confidentiality requirements.

• In order to alleviate a growing reluctance by the public to participate in surveys, agencies should clearly state how data will be used, whether there will be follow-up interviews, if any cross-referencing of data sets is planned and what the risks are of the data being disclosed accidentally.

• The government should solicit public opinion about surveys.

• Agencies should develop techniques and follow consistent policies for "masking" data to hide individually identifiable information.

• An independent federal advisory body should be created to ensure privacy protection and foster data dissemination for research and statistical purposes. It should have a "professional staff with expertise in privacy protection, computer databases, official statistics and research users of federal data."

In addition to these recommendations, the 274-page report provided a wealth of background information on major federal agencies that gather statistics—the Census Bureau, Bureau of Justice Statistics, Bureau of Labor Statistics, Energy Information Administration, National Agricultural Statistics Service, National Center for Education Statistics and National Center for Health Statistics.

Finally, the report provided an overview of governmentwide and agency-specific legislation regarding confidentiality and accessibility of data.

GAO focuses on cryptography, espionage, export controls

GAO released a report in November that summarized policy issues facing Congress involving cryptography, police surveillance, industrial espionage and export controls.

Communications Privacy: Federal Policy and Actions examined the conflict between national security and civilian interests when it comes to promoting cryptography, the 1992 Federal Bureau of Investigation Digital Telephony Proposal, and this year's Clipper chip standard declared by the Clinton administration.

Simon introduces privacy commission bill

Sen. Paul Simon (D-IL) introduced a bill Nov. 19 to establish a Privacy Protection Commission, which would investigate privacy abuses and advise Congress and federal agencies on how to deal with them.

In the Nov. 19 *Congressional Record*, Simon noted that there are 27 countries that have enacted privacy legislation and 11 more, including Croatia, Lithuania, Estonia and Slovakia, are considering legislation.

Will the United States follow suit? Does privacy weigh heavily enough on the minds of Americans and members of Congress?

These are the questions being asked by a handful of congressional staffers and civil liberties experts, who are waiting for a reaction to Simon's bill.

"It is going to take a massive educational effort both among staff and members and among the general public," Kristina Zahorik, senior legislative aid to Simon, said before an informal meeting at the Washington office of the Computer Professionals for Social Responsibility.

She and other attendees agreed that the privacy bill must piggyback on some grander issue such as health care to get public attention.

The Privacy Protection Act of 1993 (S. 1735) proposes a commission consisting of five members appointed by the president for seven-year terms. The bill restricts support staff from growing beyond 50 full-time personnel.

Missing from the legislation is any regulatory power entrusted to the commission. The agency would conduct studies, investigate privacy abuses, propose legislation and advise federal agencies, but it would not have power to enforce.

If it did, "this bill would not go anywhere," Zahorik said, adding that "we don't want to scare anybody off."

Vice President Gore recommended the creation of a privacy agency in the *National Performance Review* report on reinventing government released in September.

Zahorik expressed hope that industry and business would find the privacy commission bill more digestible than another privacy-related bill introduced earlier by Simon. That bill restricted electronic monitoring in the workplace.

The Privacy for Consumers and Workers Act (S. 984) was referred to the Labor and Human Resources Subcommittee on Employment and Productivity Aug. 3.

"That has caused quite a commotion among the business community," Zahorik said, referring to parts of the bill that restrict periodic monitoring of workers' telephone calls.

Markey seeks to protect telephone consumers

Rep. Edward J. Markey (D-MA) introduced a bill Nov. 3 that amends the Communications Act of 1934, restricting telephone companies from improperly using, transferring and selling customer information and requiring them to offer call blocking with caller identification at no charge.

The Telephone Consumer Privacy Protection Act of 1993 (HR 3432) was referred to the House Committee on Energy and Commerce.

Cantwell introduces bill to change crypto export controls

Rep. Maria Cantwell (D-WA) introduced a bill Nov. 22 that transfers jurisdiction over the export of non-military encryption software from the State Department to the Commerce Department. Currently, State defers decisions on the export of cryptography to the National Security Agency.

Under HR 3627, mass market or public domain software no longer would require export licenses, except if the destination is a nation currently embargoed or with terrorist elements.

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. Tel. 202-234-2111; fax: 202-667-1066; E-mail: jbass@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 and will be printed in bold, 2) the second line must contain the name of the department or unit and will be printed in italics 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. Headings or titles requested in all uppercase or bold will be set in bold and will count as two words.

The rate is $2 (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.

Professional Opportunity display ads cost $30 (US) per column inch. The ad must be submitted in camera ready, offset (positives or negatives) or mechanical form. Please call for information on placing display ads for products or services.

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 will not be accepted. (An ad published in the March issue must show an application deadline of April 1 or later.) Advertising copy must be received at least one month before publication. (The deadline for the March issue is February 1.)

Cornell University
Computer Science Department

Applications are invited for tenure-track positions beginning August 1994. These positions are at the assistant professor level, although appointments at the associate and full professor level will be considered for highly qualified applicants. Applicants should have a Ph.D. in computer science or in a closely related field. The department requires demonstrated research accomplishments at a very high level as well as teaching ability and leadership qualities.

The Department of Computer Science at Cornell University encompasses a wide range of research areas, including algorithms, applied logic and semantics, artificial intelligence, computing theory, concurrency and distributed computing, databases, information organization and retrieval, numerical analysis and scientific computing, programming languages and methodology, and robotics and vision.

Research positions in scientific computation and software systems also are anticipated to become available.

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

Cornell University is an equal opportunity employer and welcomes applications from women and ethnic minorities.

Purdue University
Department of Computer Sciences

Purdue University is establishing an interdisciplinary graduate program in computational science and engineering. It is expected to eventually involve perhaps 20 departments, 75-100 faculty and more than 100 graduate students. The Department of Computer Sciences seeks a highly qualified person dedicated to both research and teaching at the assistant professor level to support this program. Areas of specialization considered appropriate include scientific computing, high-performance computing, geometry systems, mathematical software, applications of computing to science and engineering, and related areas. The department currently has a number of substantial research projects in this area.

The CS Department has state-of-the-art Unix systems as well as direct access to equipment in the Purdue University Computing Center (PUCC). The CS Department facility includes several large Sun file and compute servers, a 64-processor Ncube 2, nearly 200 workstations from Sun, Silicon Graphics and Hewlett-Packard, and a complete video production facility. The PUCC facility has Intel, IBM, Cyber 205 and ETA-10 supercomputers. Purdue is a member of the Concurrent Supercomputing Consortium, which operates a 512-processor Intel Paragon. A new CS&E lab is to be established with graphical and multimedia computing facilities.

Applications are solicited for appointments to begin in late August 1994. Send curriculum vitae and the names of three references by March 1, 1994, to Chair, Personnel Committee, Department of Computer Sciences, Purdue University, West Lafayette, IN 47907.

Purdue University is in a college town of about 25,000, part of the Lafayette metropolitan area of about 125,000 people. The schools are excellent, commuting is easy, the cost of living is reasonable and there is a full range of athletic and cultural events at the university. Salaries are competitive and Purdue has one of the best packages of fringe benefits of any university.

Purdue 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, associate or full professor level, starting September 1994. 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 computer science and interdisciplinary research and teaching. All areas of research will be considered but preference will be given to interests in object-oriented information systems design, parallel and distributed systems, graphics and visualization, and scientific applications.

Applicants for a senior-level appointment must show evidence of research productivity and support, and teaching effectiveness. Applicants for the appointment at the assistant professor level must show potential for research and teaching effectiveness.

Apply to Professor Jerry D. Gray, Department of Computer Science, University of Montana, Missoula, MT 59812. Tel. 406-243-2866. Application letters and transcripts, curriculum vitae and three letters of reference will be accepted until the position is filled. However, we will begin screening applications Jan. 15, 1994.

The University of Montana is an affirmative action, equal opportunity employer. Applicants must have authorization to work in the United States.

University of California, Riverside
Department of Computer Science

The Department of Computer Science at the University of California at Riverside invites applications for one junior and one senior tenure-track faculty position starting in the 1994-95 academic year. We are seeking applicants primarily in the following two areas: 1) computer engineering with specialty in embedded computing systems, hardware and software co-design, VLSI systems and design automation; and 2) computer systems with particular emphasis in database, network, compiler and software engineering.

A Ph.D. and excellence in research and teaching are required. Duties include teaching at both the undergraduate and graduate levels, research, and participation in the department and the computer science program. Salary level will be consistent with the position title and the experience of the candidate.

Send applications and inquiries to Faculty Search Committee, Department of Computer Science, University of California, Riverside, CA 92521. Applications received by **Feb. 1, 1994,** will receive full consideration. Applications after this date will be considered if an appointment is not made from the initial application pool. A complete application shall consist of the curriculum vitae, list of publications, the names and addresses of three references and a written statement on research and teaching objectives.

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

University of Central Florida
Department of Computer Science

The University of Central Florida (UCF) seeks applications for two tenure-track positions in computer science. Both positions will be at the level of beginning assistant professor. We are interested in all strong candidates who have demonstrated research strength in the discipline. We have particular interest in applicants with a research area in one of the following: computer graphics and simulation, natural language systems, object-oriented programming, parallel processing, software tools or virtual reality. Postdoctoral or industrial experience is desirable.

We are a young, dynamic university with about 24,000 students. The Computer Science Department is one of the largest departments on campus, offering the bachelor's, master's and Ph.D. degrees. Faculty research interests include parallel computation, VLSI, artificial intelligence, computer vision, networking technology, graphics and simulation, databases, and design and analysis of algorithms.

The university is located in Orlando, the center of Florida's strong software development industry. Its campus is adjacent to the Central Florida Research Park, which houses the Naval Training Systems Center; the Army's Simulation, Training and Instrument Command; and several university research organizations including the Institute for Simulation and Training and the Center for Research in Electro-Optics and Lasers. Computer science faculty work closely with and receive substantial research support from these groups and from the NASA Kennedy Space Center located within 50 miles of the campus.

Central Florida affords an excellent standard of living. Orlando ranks high among the most livable cities and has a variety of attractions and restaurants. We have a good public school system, easy access to the beaches and a climate that makes it possible to enjoy the outdoors all year long.

Applications will be reviewed through Feb. 15, 1994, and until the positions are filled. Interested, qualified applicants should send resumes and names of at least three references to Dr. Terry J. Frederick, Chair, Department of Computer Science, University of Central Florida, Orlando, FL 32816-2362. Tel. 407-823-2341; fax: 407-823-5419; E-mail: fred@cs.ucf.edu.

UCF is an equal employment opportunity, affirmative action employer. An agency of the state of Florida, it makes applications materials available for public review.

State University of New York, Buffalo
Department of Computer Science

The Department of Computer Science seeks candidates for faculty positions at the assistant or associate professor level. We will consider only those candidates who demonstrate exceedingly high research promise. We are seeking candidates in applied and experimental areas of computer science as well as candidates who will collaborate with researchers in other disciplines. We are especially keen on attracting faculty in parallel computing and systems in order to continue to build our current base in those areas.

The department currently has 15 tenure-track faculty, three full-time lecturers and nine research and adjunct faculty members. Primary research areas include artificial intelligence, complexity theory, computer vision, numerical linear algebra, parallel algorithms, pattern recognition, programming languages, systems and VLSI. Department members are actively engaged in interdisciplinary research with the Graduate Group in High-Performance Computing, Medical Foundation of Buffalo, Cognitive Science Center, NSF National Center for Geographic Information and Analysis and USPS Center of Excellence for Document Analysis and Recognition.

Send application, cover letter, curriculum vitae, a one-page statement and the names and addresses of three references to Professor Anthony Ralston, Chair, Recruiting Committee, 226 Bell Hall, Department of Computer Science, State University of New York, Buffalo, NY 14260-2000. Tel. 716-645-3180; fax: 716-645-3464; E-mail: ralston@cs.buffalo.edu.

SUNY is an affirmative action, equal opportunity employer.

Northeastern University
College of Computer Science

The College of Computer Science invites applications for tenure-track faculty positions at all ranks, especially in the areas of networks, distributed computing and information systems, programming languages and software development, high-performance computing and graphics. Exceptionally qualified candidates in other areas will be considered. A Ph.D. in computer science or a related field is required.

The college has 18 full-time faculty, 1,800 undergraduates, 150 master's students and 35 Ph.D. students. The faculty has attracted external support and is engaged in a broad range of successful research programs. Research seminars draw upon extensive computer science talent from the greater Boston area. The college maintains state-of-the-art equipment, including three parallel computer architectures (a MasPar, CM-2 and transputer), a large network of Sparc and DEC workstations and additional specialized laboratories: a virtual reality lab, a multimedia lab and a Macintosh teaching lab.

Please send a resume, statement of research interests and the names of three references to Chair, Faculty Hiring Committee, College of Computer Science, 161 Cullinane Hall, Northeastern University, Boston, MA 02115. Applications deadline is Dec. 15, 1994. For more information, send e-mail to hiring@ccs.neu.edu.

Northeastern is an affirmative action, equal opportunity employer. The College of Computer Science has a diverse faculty and it strongly encourages applications from women and minorities.

University of California, Santa Barbara
Department of Computer Science

The Department of Computer Science invites applications for a tenure-track faculty position. Applicants should hold a doctoral degree in computer science or a related field. Senior applicants should possess distinguished research records and the ability to attract research funding, while junior candidates must demonstrate exceptional promise. Responsibilities include conducting strong research, supervising graduate students, teaching graduate and undergraduate courses and participating in departmental and university committees. The appointment is scheduled to begin in 1994-95. An unfilled position will remain open until filled.

The College of Engineering and the Department of Computer Science have embarked on a multiyear plan to strengthen the department in experimental computer science. We are seeking applicants interested primarily in software systems, and parallel and high-performance computation and communication. The Department of Computer Science is part of an expanding College of Engineering, which encompasses more than 100 faculty in various engineering disciplines. Excellent instruction and research computing facilities are available.

Send resume and names of at least four referees to Recruitment Committee, Department of Computer Science, University of California, Santa Barbara, CA 93106-5110.

The university is an equal opportunity, affirmative action employer.

Professional Opportunities

Texas A&M University
Department of Computer Science

The Department of Computer Science invites applications for tenure-track faculty positions at the assistant, associate and full professor levels. Research areas of particular interest, with emphasis on distributed and parallel systems, include computational science and engineering, real-time computer and communications systems, theoretical computer science and software systems. However, exceptional candidates from all areas of specialization will be considered.

Candidates should have a Ph.D. in computer science, computer engineering or a closely related field, a strong commitment to both research and teaching and a demonstrated ability to perform research and acquire external funding appropriate to the rank being sought.

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

Applications from minority and women candidates are especially encouraged. Texas A&M University is an affirmative action, equal opportunity employer committed to diversity.

University of Kentucky
Department of Computer Science

The Department of Computer Science at the University of Kentucky invites applications for anticipated visiting positions beginning Aug. 15, 1994. All areas of computer science will be given full consideration. A Ph.D. in computer science or a related discipline is required.

The Department of Computer Science is strongly committed to the goal of maintaining research and teaching excellence and high national visibility. Our faculty are actively involved in research in artificial intelligence, databases, graphics and image processing, numerical analysis, operating systems and theory. More than half are supported by grants from national agencies and four serve on editorial boards of leading computer science journals. The Center for Robotics and Manufacturing Systems and the Center for Computational Sciences, located on campus, greatly enhance the research environment. The department offers Ph.D., M.S. and B.S. degrees. There currently are 110 students in our graduate program, 30 of whom are Ph.D. students.

Please send a curriculum vitae and the names of three references to Professor Victor W. Marek, Chair, Faculty Search Committee, c/o Diane Mize, Department of Computer Science, University of Kentucky, Lexington, KY 40506-0027. Fax: 606-323-1971; E-mail: diane@ms.uky.edu.

The university is an equal opportunity, affirmative action employer. Women and members of minority groups are especially encouraged to apply.

University of Waterloo
Department of Computer Science

The University of Waterloo invites applications for a tenure-track faculty position in computer science, with a specialization in distributed systems. The successful applicant is expected to become an active contributor to ongoing work in distributed systems, which includes distributed debugging, network and system management, programming language issues in distributed systems, and system software for high-speed networks. A Ph.D. in computer science or equivalent is required, with evidence of outstanding research accomplishments or potential. 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 engaged in research and teaching covering a broad spectrum. The department and its extensive research laboratories are housed in the William G. Davis Computer Research Center, centrally located on campus. The department is a key participant in the Information Technology Research Center (a Center of Excellence funded by the government of the Province of Ontario) that supports basic and applied research in information technology.

Send applications, including a curriculum vitae and the names of three references, to Professor Frank Tompa, Chair, Department of Computer Science, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. E-mail: fwtompa@uwaterloo.ca. The position commences Sept. 1, 1994, and applications will be accepted until Feb. 15, 1994.

In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. The University of Waterloo encourages applications from qualified women and men, members of visible minorities, native people and persons with disabilities.

This appointment is subject to the availability of funds.

University of Texas, Austin
Department of Computer Sciences

The Department of Computer Sciences at the University of Texas at Austin invites applications for tenure-track positions at the assistant professor level. Of particular interest to the department are candidates whose research accomplishments are in experimental systems, which will broaden and complement the research interests of our faculty in architecture, compilers, databases, graphics, networking, operating systems, robotics and scientific computing. 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, 1994. 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 40 faculty members across all areas of computer science. 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 also is a center for high-technology industry including AMD, IBM, MCC, Motorola, Sematech, Tandem and TI.

Applicants should submit a curriculum vitae, a statement of research interests, a list of references and up to three representative publications to Professor Al Mok, Recruiting Committee Chair, Department of Computer Sciences, University of Texas at Austin, Austin, TX 78712-1188. Letters of reference will be sought separately. The deadline for applying is Feb. 1, 1994.

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

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

The Electrical and Computer Engineering Department anticipates possible tenure and tenure-track appointments in computer engineering. 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 perform academic duties associated with our B.S., M.S. and Ph.D. programs. A Ph.D. is required. Salary is open and is based on qualifications. The starting date is negotiable. Applications must be received by March 15, 1994, to receive full consideration.

Send resume and at least three references to T.N. Trick, Head, Electrical and Computer Engineering Department, 1406 W. Green St., Urbana, IL 61801. Tel. 217-333-2301.

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

York University
Department of Computer Science

The Department of Computer Science invites applications for tenure-track and limited-term faculty positions at the assistant professor level. The department has strong interests in recruiting faculty members in the areas of computer systems, software systems, computer networks and programming languages. Outstanding applicants in other areas of computer science are strongly encouraged to apply. A Ph.D. in computer science is required. Applicants must demonstrate strong potential for excellence in research and in graduate and undergraduate teaching.

The department has more than 20 faculty members and offers excellent potential for further growth. York University, the third largest university in Canada, is located in Metropolitan Toronto, within easy reach of downtown Toronto.

Send curriculum vitae and the names of four references to: Faculty Recruiting Chair, Department of Computer Science, York University, North York, Ontario, Canada, M3J 1P3. Applications should be received by Jan. 15, 1994; later applications may be considered if positions remain available. This appointment is subject to the availability of funds.

York University has a policy of employment equity, including affirmative action in recruiting female faculty members. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents.

Clarkson University
Department of Mathematics and Computer Science

Clarkson University seeks applications and nominations for the chair of the Department of Mathematics and Computer Science. The department offers undergraduate and graduate degree programs in both mathematics and computer science and has responsibility for providing fundamental instruction to the university.

The successful candidate is expected to be a strong leader in the area of faculty hiring and development in support of the university's commitment to excellence in teaching and faculty scholarship. Clarkson is a technologically oriented university with 2,400 undergraduates and 350 graduate students majoring principally in engineering, science and management. The university is located in a small upstate New York town near the Adirondack Mountains. Three other institutions of higher education are within a 10-mile radius.

Candidates should submit a resume, statement of educational leadership philosophy and the names of at least three references to Dr. A.E. Linkins, Vice President for Academic Affairs, Clarkson University, Box 5800, Potsdam, NY 18699-5800. The committee began reviewing applications Dec. 1 and will continue until the position is filled.

Clarkson University is an equal opportunity, affirmative action employer. Position #546.

University of North Carolina, Chapel Hill
Department of Computer Science

Applications are invited for one or more assistant or untenured associate professor positions to begin August 1994.

Candidates must hold or expect to hold a Ph.D. before starting employment. Priority will be given to candidates who have strong research credentials in parallel algorithms and systems, and hardware systems, but outstanding candidates in any area will be considered.

The university is one vertex of the Research Triangle, a growing center of computer and communications technology with many opportunities for applications in industry. The department operates extensive computing facilities including 325 network workstations and well-equipped laboratories for computer graphics and image processing; communications, networking and collaboration research; and VLSI- and microtechnology-based system prototyping. Our building, which was dedicated in 1987, is extensively wired for video and integrated voice/data communication.

The department runs a MasPar parallel computer with 8,000 processors, and designed and developed the series of PixelPlanes graphics engines. The PixelFlow graphics engine now being constructed in the department will be a scalable parallel graphics engine an order of magnitude faster than current rendering hardware. A fiber-optic connection to the North Carolina Supercomputer Center provides actual communication rates of 200 megabits/sec in applications. Extensive collaborations exist with other departments at UNC-CH, other universities in

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SIAM

Professional Opportunities

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the area and companies in Research Triangle Park concerning virtual reality, molecular graphics, gigabit networks, image analysis and collaboration systems.

Request detailed application instructions, guidelines and general information via e-mail to search@cs.unc.edu or by post to Faculty Search Committee, Campus Box 3175, Sitterson Hall, Chapel Hill, NC 27599-3175.

Minorities and women are encouraged to apply. The university is an equal opportunity, affirmative action employer

Wright State University
Department of Computer Science and Engineering

Wright State University invites nominations and applications for the position of chair of the Department of Computer Science and Engineering. The department resides in the College of Engineering and Computer Science and offers B.S., M.S. and Ph.D. programs in both computer science and computer engineering. Candidates are expected to have an earned Ph.D. in computer science, computer engineering or a closely related field and have a distinguished record in computing that demonstrates strong leadership in both research and teaching

The Computer Science and Engineering Department is one of four departments in the College of Engineering and Computer Science. The department has 21 faculty members, 380 undergraduate majors and 130 graduate students. It is housed in a new, attractive engineering building with a fully networked Unix environment and excellent laboratories. Areas of active research include artificial intelligence, image processing, databases, parallel processing, programming languages and compilers, robotics and software engineering

Wright State University, an institution of 17,000 students, is located on a spacious campus with a significant area of protected green space. It is in a rapidly growing high-tech suburban community surrounded by commercial and government research and development facilities. A significant portion of the department's graduate students comes from these facilities. The university is proactively committed to industrial and government partnerships for research and development ventures. A variety of affordable, pleasant living environments that are attractive to professionals and their families are located convenient to the campus.

Applications should include a curriculum vitae, a brief statement of research and teaching interests, copies of three publications representing the candidate's strongest contributions, names of three references who are to send recommendations directly to the search committee, and any additional important supporting information. The salary is competitive. Send applications and supporting information to Chair, Search Committee, Department of Computer Science and Engineering, Wright State University, Dayton, OH 45435.

Consideration of candidates will begin Feb. 1, 1994, and continue on the first of each month until July 1, 1994, or until the position is filled.

Wright State University is an equal opportunity, affirmative action employer

Wright State University
Department of Computer Science and Engineering

The Department of Computer Science and Engineering invites applications for a tenure track position at the assistant professor level. A Ph.D. in computer science, computer engineering or a closely related field is required. Applicants are sought with research and teaching interests in networking and/or distributed systems. Outstanding candidates with other areas of specialization also will be considered. Preference will be given to candidates who have demonstrated the potential for a successful research career as evidenced by scholarly publications.

Computer Science and Engineering is the largest department in the College of Engineering and Computer Science and offers B.S., M.S. and Ph.D. degrees in both computer science and computer engineering. The department currently has 21 faculty members, 380 undergraduate majors and 130 graduate students. Areas of active research include artificial intelligence, image processing, databases, parallel processing, programming languages and compilers, robotics and software engineering. Department facilities include a fully networked Unix environment of Sun and DEC workstations and Cray access.

Applicants should send a curriculum vitae with cover letter, a brief statement of teaching and research interests, graduate academic transcripts, teaching evaluations and copies of recent publications. The applicant also should have three letters of recommendation sent directly to the search committee. Send applications and supporting information to Chair, Search Committee, Department of Computer Science and Engineering, Wright State University, Dayton, OH 45435.

Consideration of candidates will begin Feb. 1, 1994, and will continue on the first of each month until July 1, 1994, or until the position is filled.

Wright State University is an equal opportunity, affirmative action employer

Kansas State University
Department of Computing and Information Sciences

The Department of Computing and Information Sciences at Kansas State University invites applications for a tenure-track position beginning in fall semester 1994. Applicants should have a Ph.D. in computer science with a research specialty in software engineering, data engineering or parallel algorithms. Salary will be competitive and commensurate with qualifications. The applicant must have a commitment to both research and teaching All applications should include a description of current research and teaching experience and interests, and include several of his/her best publications. Non-US citizens must include their visa status. The department offers the B.S., M.S. and Ph.D. degrees. Each faculty office is equipped with a workstation on the network. The department is housed in a new building

Please send resumes to Dr. Virgil Wallentine, Head, Department of Computing and Information Sciences, Kansas State University, Nichols Hall, Room 234, Manhattan, KS 66506. E-mail: virg@cis.ksu.edu. Application deadline is March 1, 1994.

Kansas State University is an affirmative action, equal opportunity employer

Boston University
Department of Computer Science

Applications are invited for a tenure-track assistant professorship beginning September 1994. Qualifications required of all applicants include a Ph.D. in computer science, commitment to research and teaching and a strong background in experimental or applied areas of computer science.

The Computer Science Department currently consists of nine faculty and offers B.A., M.A. and Ph.D. programs. Our research interests include distributed and real-time systems, computational linguistics, logic of computation, parallel computing and theoretical computer science. The department has excellent computing resources that include many Sun workstations, terminals and servers, and laboratories for distributed systems, graphics and computer music. We have a close association with many other campus groups working on aspects of computing and access to other facilities including a Connection Machine (CM-5).

Review of applications will begin immediately and will continue until the position is filled. Qualified applicants should send a detailed resume and arrange for at least three references to be sent to: Faculty Search Committee, Computer Science Department, Boston University, Boston, MA 02215. Please include a cover letter that states the names of your references and your major area of specialization.

Boston 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, is recruiting for up to three university/limited-term faculty positions in the Department of Computer and Information Sciences beginning Sept. 1, 1994.

A Ph.D. degree or its equivalent and excellence in research and teaching are required. Applicants close to finishing their Ph.D. requirements also are encouraged to apply. Candidates are sought in all areas of computer science, but special interests exist for candidates with research interests in computer systems, artificial intelligence, theory of computation, computer networks, algorithms, parallel computing and symbolic mathematical computation. Applicants with a special interest in teaching undergraduate courses in data structures, compilers, databases and algorithms also are sought.

The department offers bachelor's, master's and doctoral degrees and has 15 tenure-track faculty, four visiting faculty, five adjunct and research faculty, and more than 80 graduate students, of whom 58 are full time. The department has excellent research computing facilities and is well-connected with gateways to major networks.

Candidates should send a curriculum vitae to Professor Adarsh Sethi, Recruiting Committee Chair, Department of Computer and Information Sciences, University of Delaware, Newark, DE 19716. In addition, candidates should have three confidential letters of reference sent directly to the above address. All applications received by March 31, 1994, will be considered.

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

University of Tennessee
Department of Computer Science

The Department of Computer Science seeks to fill tenure-track faculty positions at the rank of professor, associate professor or assistant professor, as credentials warrant, beginning fall 1994. For a full professorship, a strong research record in the areas of operating systems, networking or software engineering is sought, but all major fields in computer science may be considered. Experience directing doctoral students is especially important. Applicants for associate professor should have a strong research record, preferably in the above named areas; experience directing doctoral students is desirable. Applicants for assistant professor should have a strong interest in research, preferably in the above-named areas. Applicants for all positions should have a doctoral degree in computer science or a related area. Applicants should specify the rank for which they are applying.

Fully networked departmental Sun, IBM and DEC workstations abound for students and faculty. In addition, the department and the Mathematical Science Section of the Oak Ridge National Laboratory jointly operate the Advanced Computing Laboratory, which includes a fully networked Intel iPSC/860 with 128 processors, an iPSC/2 with 64 processors, two Sequent Balances and a Sequent Symmetry, a Stardent Titan with four processors, a Cogent, an Ncube, and a Kendall Square Research machine with 32 processors and various file servers. Also, Oak Ridge National Laboratory is acquiring an Intel Paragon. The department recently received a National Science Foundation Small-Scale Infrastructure Award. The department is part of the NSF Science and Technology Center for Research in Parallel Computing. The university operates an IBM 3090 and a large VAX cluster

Please respond to search@cs.utk.edu. The mailing address is Search Coordinator, Department of Computer Science, 107 Ayres Hall, University of Tennessee, Knoxville, TN 37996-1301.

The university is an equal employment opportunity, affirmative action, Title IX, Section 504, ADA employer

University of Texas, Arlington
Department of Computer Science and Engineering

You are invited to apply for tenure-track or visiting faculty positions in all areas of computer science and computer engineering Applicants with expertise in one or more of the following areas will be given preference: computer architecture, database systems, intelligent systems and robotics, networks and telecommunications, parallel and distributed processing, programming languages and compilers, or software engineering. Rank is open. An earned doctorate and a commitment to teaching and scholarly research are required. Tenure-track openings are expected for **September 1994** Applications will be accepted until all positions are filled.

Interested persons should send a resume and reference letters to Bill D. Carroll, Professor and Chair, Computer Science and Engineering Department, PO Box 19015, University of Texas at Arlington, Arlington, TX 76019. Tel. 817-273-3787; fax: 817-273-3784; E-mail: carroll@cse.uta.edu.

The University of Texas at Arlington is an equal opportunity, affirmative action employer

Columbia University
Department of Computer Science

We are anticipating at least one tenure-track opening. We invite applications from exceptional candidates at all ranks and in all areas except artificial intelligence, but we are particularly interested in areas that complement current departmental research interests. In addition, we have interest in the areas of applied databases and programming languages.

Our department of 19 tenure-track faculty and two lecturers emphasizes research and attracts excellent Ph.D. students, virtually all of whom are fully supported. Departmental facilities include numerous Sun 4 servers; Sun, HP, Digital, IBM and Next workstations; plus state-of-the-art experimental equipment. The department is in the second year of an NSF CISE infrastructure grant, and we recently purchased an HP parallel cluster. We are within an hour's drive of the research laboratories of AT&T, Bellcore, IBM, Matsushita, NEC, NYNEX, Philips, Siemens and other leading industrial companies.

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

Candidates for assistant professor should exhibit exceptional research promise, while those seeking a more senior position should have an outstanding record of research achievement. Interest and ability in teaching undergraduates and graduates is necessary Please submit a summary of research interests, resume, E-mail address and the names of at least three references to Professor Kathleen McKeown, Faculty Search Chair, Department of Computer Science, 450 Computer Science Building, Columbia University, New York, NY 10027. E-mail: recruiting@cs.columbia.edu.

Columbia University is an equal opportunity, affirmative action employer. We encourage applications from women and minorities.

Columbia University
Department of Computer Science

The Computer Science Department is considering hiring an outside person to serve as chair of the department and professor. Our department of 19 tenure-track faculty and two lecturers emphasizes research and has strengths in the areas of theoretical computer science, vision/robotics, artificial intelligence, user interfaces, software and hardware. Nearly all of our eligible professors have been awarded PYIs, NYIs or ONR YIs, and two have been awarded Packard Fellowships. We attract excellent Ph.D. students, virtually all of whom are fully supported. Current undergraduate majors number about 100, M.S. students about 100 and Ph.D. students about 70.

Departmental facilities include numerous Sparc servers; Sun, HP, Digital, IBM and Next workstations; plus state-of-the-art experimental equipment for vision/robotics and for mobile computing. The department is in the third year of an NSF CISE infrastructure grant, and we recently purchased an HP parallel cluster. We are within an hour's drive of the research laboratories of AT&T, Bellcore, IBM, Matsushita, NEC, NYNEX, Philips, Siemens and other leading companies.

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

Professional Opportunities

University-subsidized housing and parking are available.

Candidates should have a demonstrated record of outstanding research with broad-based funding and be excellent teachers. Evidence of scientific and organizational leadership, educational innovation and administrative effectiveness is expected. Please submit a curriculum vitae, e-mail address and the names of at least three references to Chair Search Committee, Department of Computer Science, 450 Computer Science Building, Columbia University, New York, NY 10027. E-mail: recruiting@cs.columbia.edu.

Columbia University is an equal opportunity, affirmative action employer. We encourage applications from women and minorities.

Brown University
Department of Computer Science

Applications are invited for a faculty position commencing Sept. 1, 1994, at the assistant or associate professor level. Candidates must demonstrate high research and scholarship potential and significant teaching ability. Applicants are sought with research interests in theoretical and analytical aspects of computer science. Preference will be given to candidates who have contributed to the principles of computing systems (including, but not limited to, parallel and distributed computing, cryptography and secure networks).

Candidates must hold a Ph.D. in computer science and are expected to have an outstanding research record and significant teaching ability. Senior candidates are expected to have leadership stature in their area of expertise; junior candidates should show potential. Successful applicants will find at Brown a stimulating environment conducive to professional growth, with state-of-the-art equipment and excellent undergraduate and graduate students.

Send a resume and have at least three referees (five for the associate professor position) send letters of recommendation to Professor Paris Kanellakis, Computer Science Department, Brown University, Box 1910, Providence, RI 02912. All application materials must be received by April 15, 1994, for full consideration.

Brown is an equal opportunity employer and encourages applications from members of protected groups.

New York University
Department of Computer Science

The Computer Science Department expects to have several faculty positions available beginning September 1994 and invites applications at all levels. This includes both regular and visiting positions; the visiting positions can be for terms of one semester or a full year.

Candidates for junior positions need to show evidence of strong research potential and candidates for senior positions must have an outstanding track record. The department is most interested in candidates in systems areas such as distributed computing, networks, operating systems and real-time and fault tolerant computing.

Successful candidates are expected to pursue an active research program. Junior candidates must show potential for leadership; senior candidates must have a proven leadership track record. In addition, successful candidates are expected to participate in teaching core courses at all levels.

The Departments of Computer Science and Mathematics together form the Courant Institute of Mathematical Sciences, a division of New York University. The Computer Science Department has 25 regular faculty and a number of visiting, adjunct and research faculty members.

The department maintains a state-of-the-art computing environment consisting of well over 100 workstations. In addition, there are specialized research facilities for graphics, multimedia, parallel computing, robotics and vision.

Substantial external funding, at the level of $6 million per year, from AFOSR, ARPA, DOE, NIH, NSF, ONR and industry supports research in a broad array of areas including algorithms, artificial intelligence, compilers, computer graphics, databases, multimedia, natural languages, numerical analysis, parallel architectures and computation, programming languages, robotics, software engineering and computer vision. There are considerable opportunities for collaborative research; presently there are joint projects with industrial laboratories at AT&T and IBM and with the following university departments/divisions: Biology, Mathematics, Physics, Psychology, the Institute for Neural Sciences, the Medical School, Stern School of Business and the Tisch School of the Arts.

New York University, the largest private university in the country, is located in Greenwich Village, one of the most attractive residential areas of Manhattan. Applications should be sent to Professor Zvi Kedem, Chair, Department of Computer Science, New York University, 251 Mercer St., New York, NY 10012-1185.

An equal opportunity, affirmative action employer. The department welcomes applications from women and underrepresented minorities.

University of Chicago
Department of Computer Science

Junior and senior positions are available for outstanding candidates with expertise in one of the areas of experimental computer science, such as programming languages, distributed systems or computer architecture. Successful applicants will have the opportunity to help us create a new Systems Group in the department, complementing the existing very strong Theory and AI groups. We might consider truly exceptional candidates in other areas.

Send curriculum vitae and three letters of reference to Professor Janos Simon, Chair, Department of Computer Science, University of Chicago, 1100 E58th St., Chicago, IL 60637. E-mail inquiries can be directed to *chair@cs.uchicago.edu.*

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

Arizona State University
Department of Computer Science and Engineering

The department seeks outstanding candidates for a tenure-track, junior faculty position. Of primary interest are the areas of distributed systems, networks, multimedia systems, artificial intelligence and parallel computation. Applicants will be required to have completed a Ph.D. in computer science, computer engineering or a closely related field by the date of appointment, and must show promise of excellence in teaching and research.

Arizona State University is a rapidly emerging major research university. The College of Engineering and Applied Sciences has been recognized for its innovative Engineering Excellence Program, a three-way partnership between state government, industry and the university.

The department consists of 25 faculty offering the B.S. in computer science, the B.S.E. in computer systems engineering, both professional and research-oriented master's degrees and the Ph.D. The program has an enrollment of nearly 600 undergraduate students, 250 master's students and 60 Ph.D. students. Annual research expenditures are at $1.1 million. In addition to university and college computing facilities, the department operates four current technology undergraduate instructional laboratories and a variety of workstation-based research laboratories. Technical support is provided by staff from Engineering Computing Services, and Information Technology, the university's computer infrastructure unit. In January 1993 the department moved into the newly opened Goldwater Center for Engineering and Science.

Please send a curriculum vitae, a selection of most important publications and the names and addresses of three references to Ben M. Huey Faculty Search Committee, Department of Computer Science and Engineering, Arizona State University, Tempe, AZ 85287-5406. Internet E-mail: Ben.Huey@asu.edu.

Questions and inquiries may be submitted by E-mail, but applications and nominations must be received by post. The search committee will begin to review applications on Feb. 1, 1994. Applications received after that date will be reviewed on the 15th of the month as necessary until the position is filled. Salary is competitive.

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

North Carolina State University
College of Engineering

North Carolina State University invites applications and nominations for the position of dean of the College of Engineering.

The dean, as chief executive officer of the College of Engineering, provides leadership for large, high-quality programs in education, research and extension. The college is one of the largest in the country, with average annual enrollments of approximately 6,000 undergraduates and 1,200 graduate students. Of the 423 faculty and research staff members, 210 are tenure-track faculty members. The 10 departments offer 17 B.S., 17 M.S. and 15 Ph.D. degree programs. Annual research contracts and grants exceed $28 million; total research expenditures exceed $38 million annually. Substantial interdisciplinary research is conducted under the auspices of large, well-supported research centers and institutes including the Center for Communications and Signal Processing, the Center for Transportation and the Environment, the Integrated Manufacturing Systems Engineering Institute, the Mars Mission Research Center, the NSF Engineering Research Center for Advanced Electronic Materials Processing and the Precision Engineering Center.

Candidates must have an earned doctoral degree in engineering or a related field; distinguished performance in education, research and administration; communication skills; ability in fund-raising activities; and a demonstrated commitment to education, research and extension. Review of applications will begin Feb. 1, 1994, and will continue until the position is filled. Send resume, cover letter and three references to Dr. Robert Clark, Chair, Dean of Engineering Search Committee, North Carolina State University, Box 7901, Raleigh, NC 27695-7901.

Being an affirmative action, equal opportunity employer, North Carolina State University eagerly seeks applications and nominations of members of underrepresented groups.

Duke University
Department of Computer Science

We invite applications for three tenure-track or tenured faculty positions and one non-tenure-track faculty position in computer science starting September 1994.

Two of the three tenure-track positions are available at various ranks (assistant through full professor) in the area of experimental systems, and the third tenure-track position is available at the rank of assistant professor, preferably in the area of scientific computing. Areas of primary interest in experimental systems include operating systems, computer architecture and digital systems design, high-speed networks, software design environments and engineering, parallel processing, databases and object-oriented technology, multimedia, graphics and algorithm animation, and compilers. Areas of primary interest in scientific computing include numerical algorithms and analysis (e.g., non-linear methods, multigrid techniques, domain decomposition, adaptive algorithms, inverse problems), large-scale computation, scientific visualization, scientific databases and digital libraries, and application-specific computing (e.g., biomedical computing). Exceptional candidates in all areas of computer science will be considered.

The non-tenure-track position as assistant professor of the practice of computer science is renewable and promotable. Initial appointments typically are four years. Faculty with this rank concentrate on teaching, curriculum development and other aspects of computer science education, and can engage in research as well.

The department recently began a major curricular reform including the phasing in of object-oriented programming and software engineering in the early courses, as well as an alternative track emphasizing computational science for undergraduate majors. We have developed innovative courses for non-majors that receive national recognition and funding. Future plans for course development include significant use of graphical animation and multimedia.

The department has major research efforts and funding in the areas of systems, algorithms and complexity, scientific computing and artificial intelligence. Facilities include a CM-5 parallel computer, more than 100 graphics workstations and access to a variety of supercomputers through MCNC in nearby

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Canadian News

Liberal agenda good news for researchers

BY Douglas Powell

After nine years of Conservative government rule, the federal Liberals have returned to power on an agenda of economic renewal that should be good news to Canadian computing researchers in universities, government and industry.

The Liberal wish list includes:

• a 20% increase in basic R&D spending over four years,

• the creation of a national apprenticeship program for the new economy emphasizing jobs in areas such as information technology, telecommunications and computer services, at a cost of $576 million (Canadian) by 1997-98,

• $90 million to establish a Canadian Technology Network,

• more money for matching funding programs involving industry and universities and

• a promise of stable funding for the university granting councils, the National Research Council and the Networks of Centers of Excellence.

But whether reality will match the rhetoric is unclear and could remain so for years. Promises made by opposition parties on the campaign trail often have a way of being whittled away by the economic realities of governing. In Canada, that reality is a federal deficit that is out of control (and significantly higher than the US deficit on a per capita basis) and a chronic unemployment rate of 11.3%.

Nevertheless, in crafting an economic revitalization program, which sounds similar to the one pushed by Bill Clinton and Al Gore, the new Liberal government is recognizing that information technology is one of the few growth sectors in Canada's resource-based economy. In 1992, the information technology sector in Canada employed 277,819 Canadians—significantly more than the traditional sectors—and generated $43.4 billion in revenues.

Furthermore, information technology-related R&D dominates Canadian industrial outlays, accounting for more than 35% of the $5.6 billion spent by Canadian industry. Information technology-related firms also have the highest ratio of current R&D spending to sales, with telecommunications leading at 20%, followed by engineering and scientific services at 17%, and computer and related services at 14%. While industrial R&D spending continues to nudge upward in constant dollars—with increases of 1.2% in 1992, 0.6% in 1991 and 5.6% in 1990—federal spending on R&D remains flat at $5.9 billion per year.

> *The new Liberal government is recognizing that information technology is one of the few growth sectors in Canada's resource-based economy.*

For computing researchers in Canadian universities, the primary source of funding is one of the three federal granting councils—the Natural Sciences and Engineering Research Council (NSERC), which has a total budget of $500 million. About 11% of NSERC's research budget is devoted to basic research in computing science and electrical engineering. NSERC directly, and computing researchers indirectly, would be the main benefactors of the $1 billion increase in federal R&D spending over the next four years as proposed by the new Liberal government.

An additional source of computing research money is the NRC, a network of government laboratories that includes the Institute for Information Technology. The proposed Canada Technology Network would be based on NRC's Industrial Research Assistance Program that provides aid to Canadian industry. However, NRC currently is mired in uncertainty as it awaits the appointment of a new president by the governing Liberals.

NRC president Pierre Perron resigned almost a full year before his five-year appointment expired. In a letter to NRC employees dated Aug. 26, Perron announced $9 million in cuts to the NRC operating budget by April 1995, and a further 10% to 15% cut between 1995 and 2000. NRC's current operating budget is about $248 million, with a total budget of $471 million.

Perron also laid out the challenges facing the new government. "If Canada is to catch up with the average of the G-7 countries, governments at all levels would have to more than double their investments in R&D over the coming years, while industry would have to increase theirs by a factor of three to four," he said in his letter. "Our government should not weaken its already anemic support of R&D through entrenchment and cutbacks.... Unfortunately, the overwhelming preoccupation with the rate of growth and the size of our national debt often clouds these important considerations."

How these cutbacks will be implemented remains to be seen. But it is almost certainly another blow for scientists who work in the laboratories, where the current work force of 3,000 has shrunk by about 20% since 1986. Perron's tenure, which began in July 1989, had been marred by controversy, as the government labs tried to remodel for the 1990s and better serve Canadian industry. The entire structure has been reorganized along industrial sectors, creating five new divisions and wiping out others.

But some within the NRC say the research base has been eroded and replaced with a growing managerial infrastructure of administrators and accountants. Worse, the organization lacks vision. Said one insider, "NRC is not solving scientific problems; it also is not solving the problems of industry."

Politically, science is once again a junior ministry (secretary of state) within Industry Canada. However, technology, especially information technology, is certain to grab the lion's share of attention. More importantly, Industry Canada has emerged with the industrial development mandate that lies at the core of the Liberal job creation and economic growth agenda. The new minister of Industry, 43-year-old tax lawyer John Manley, has been described as "the undisputed star among the Liberal cabinet's new faces and a major new heavyweight."

Nevertheless, the Canadian research community knows all too well the canyon that exists between rhetoric and reality. In 1984, Brian Mulroney's Conservatives were elected on a promise to double Canada's gross expenditures on R&D as a percentage of gross domestic product (GERD/GDP) from 1.4% to 2.8%. Economists and policymakers dislike the use of GERD/GDP ratios because it fails to recognize Canadian factors such as a small defense industry, a proportionately smaller manufacturing sector and the heavy presence of multinationals, which invisibly pass along research results.

But politicians have made an issue of it, often at their own folly. After nine years of Conservative rule, Canada's GERD/GDP has increased to 1.5%, about half that of the United States. Computing researchers will wait and see what the Liberals deliver.

Douglas Powell is a graduate student at the University of Guelph in Guelph, Ontario.

Jobs from Page 19

Research Triangle Park. The department will relocate in summer 1994 into spacious new quarters in the $70 million Levine Science Research Center now nearing completion. The Durham area in North Carolina, rated as one of the top places to live in the United States, offers a wide variety of professional, cultural and recreational attractions.

Applications should include a curriculum vitae, a list of publications, copies of the most important publications and a list of references. A Ph.D. in computer science or related area is required. Applications should be sent by Feb. 15, 1994, to Professor Jeffrey S. Vitter, Chair, Department of Computer Science, Duke University, Durham, NC 27708-0129.

Duke University is an affirmative action, equal opportunity employer.

University of Texas, El Paso
Department of Computer Science

UTEP invites applications for a tenure-track faculty position in computer science. A Ph.D. in computer science is required. Specialization in systems is of particular interest, but strong candidates in other core areas of computer science are encouraged to apply. Present research interests in the department include artificial intelligence, software engineering and concurrent systems. The department currently is funded under a five-year NSF II-MI grant. The undergraduate program is ABET-accredited; a master's degree is offered and a Ph.D. in cooperation with the Electrical Engineering Department is being implemented. Applicants will be expected to participate fully in teaching, research and service. The position is available in spring 1994. Review of applications will begin March 1, 1994, and continue until the position is filled.

The university is located in El Paso, which provides a unique cultural melange set in a mild climate conducive to year-round outdoor activities. Applicants should send a resume, a statement of professional interests and objectives, a description of teaching experience, and a list of three references (with name, address and telephone numbers) to Chair UTEP, Department of Computer Science, El Paso, TX 79968. Minorities and women are particularly encouraged to apply. UTEP does not discriminate on the basis of race, color, national origin, sex, religion, age or disability in employment or the provision of services.

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1994 CRA Conference at Snowbird
July 10–12 ◆ Snowbird, Utah

The 1994 CRA Conference at Snowbird will include the Department Chairs Workshop and the Research Managers Workshop. The CRA Conference at Snowbird is the flagship conference for academic and research laboratory administrators interested in computing research issues. If you would like to receive information about the conference when it becomes available, fill out this form and return it to CRA.

Name _____

Title/Position _____

Organization _____

Department _____

Address _____

City _____ State _____

ZIP+4 _____ E-mail Address _____

CRA Conference at Snowbird, Computing Research Association,
1875 Connecticut Ave. NW, Suite 718, Washington, DC 20009.
Tel. 202-234-2111; Fax: 202-667-1066; E-mail: plouis@cra.org.