IT for the 21st Century Featured in Budget Proposal

By Lisa Thompson

President Clinton unveiled his Fiscal Year 2000 budget plan on February 1, making good on a promise in his State of the Union address to request a 28 percent increase for computing and communications research. The proposed increase is incorporated in a new research initiative, Information Technology for the Twenty-First Century (IT21C, which draws heavily on the recommendations that the President’s Information Technology Advisory Committee (PITAC) made in its interim Report (see CRN, November 1998).

The budget proposes a bold, new Information Technology Initiative that will invest in long-term, fundamental research in computing and communications, and will increase development and purchases of extremely fast supercomputers. Long-term information technology research will strengthen America’s leadership in an industry that accounts for one-third of our economic growth, create high-tech, high-wage jobs, and improve the quality of life. (see “Computing for the Twenty-First Century,” U.S. Budget, FY 2000)

The $366 million initiative would support research in three categories: long-term information technology research with breakthroughs in computing and communications ($228 million); advanced computing for science, engineering, and the nation ($132 million); and research on the economic and social implications of information technologies ($10 million). The latter activity would also include efforts to train additional information technology workers at universities.

A formal agency plan to participate in the initiative: the National Science Foundation ($146 million), the Department of Defense ($100 million), the Department of Energy (DOE) ($70 million), the National Aeronautics and Space Administration ($38 million), the National Institutes of Health ($6 million), and the National Oceanic and Atmospheric Administration ($6 million).

The President’s Science Advisor for Science and Technology, Nancy Lane, and other research agency officials appeared at a briefing on the science and technology components of the budget plan, and information technology R & D had center stage. Under Secretary of Defense for Acquisition and Technology Jacques Gansler described DoD’s participation in the initiative as critical, given the Joint Chiefs of Staff directive that information superiority be a top strategic objective. NASA Director Dan Goldin noted that everyone in his agency wants to accomplish depends on advances in information technology.

And NOAA Director James Baker said the initiative will have “enormous impact on the way [NOAA] does business.”

NSF Director Rita Colwell called the initiative a “national imperative,” and mentioned that NSF was pleased to be the lead agency. She said it goes to the very heart of the NSF’s mission and stressed that it would benefit “every field, every discipline, and every level of education.” The NSF’s investment comprises $10 million for research on software systems, scalable information infrastructure, high-end computing, and on the social, economic, and workforce impacts of information technologies, with an additional $36 million for development of terascale computing systems. The NSF budget proposal includes a 41.5 percent increase for the Computer and Information Sciences and Engineering Directorate (CISE) to accommodate the new programs.

DoE’s role in the initiative, which mostly falls under the advanced computing category, was described by Secretary of Energy Bill Richardson. A new program, the Scientific Simulation Initiative (SSI), would be established to build on the existing A coordinated Strategic Computing Initiative. While ASCI serves the DoE’s nuclear weapons mission, SSI would be a civilian program designed to develop and deploy advanced computers to probe extremely complex scientific questions of interest to DoE and to improve environmental monitoring.

A new senior management team has been formed within the National Science and Technology Council to set policy and coordinate initiative activities. It will report directly to Lane, and consist of the Directors or Under Secretaries of the participating agencies as well as senior officials from the Office of Management and Budget and the National Economic Council. The team will assist the President in establishing and monitoring goals for the program and allocating research tasks to the agencies on the basis of their missions and capabilities.

The management team is being supported by a working group chaired by the NSF’s Assistant Director, Raulena Bajecly (CISE). NSF

From: CRA Director of Government Affairs

A s CRA’s new Director of Government Affairs, I can’t be more pleased with the way federal computing and communications policy is shaping up for 1999. The computing research community has a golden opportunity to build awareness of computing research and its contributions to the national interest, and my top priority is to make sure we are taking full advantage of that opportunity.

We know in President Clinton and Vice President Gore two technologists who believe government has a responsibility to harness the power of technology for the good of society. They wasted no time in seizing on the recommendations of the President’s Information Technology Advisory Committee and have proposed a new research initiative, Information Technology for the Twenty-First Century (see article, “Information Technology for the Twenty-First Century...,” above) to accelerate R & D on a variety of computing and communications technologies. Congress, too, is in a pro-science mood, provided propos als have clear public benefits, ration alities and accountability measures.

As you know from reading the excellent analysis in the columns of my predecessor, Rick W. Eastern, the transformation of ideas into federal policy is not a straightforward matter. CRA will be devoting considerable effort to getting the proposed funding increases enacted, but we need your help, too. The active involvement of the computing research community is essential to ensuring the full implementation of the initiative.

Standing against us is a compli cated budgetary environment. Although the federal budget is in surplus and is projected to be so for years to come, the White House or either of the Congress is willing to spend the surplus, if they are in agreement on broad principles for doing so.

Congressional appropriators must be told early and often about the vast potential of the research that would be supported through increased funding, and those messages need to come from the computing research community. During my first few months at CRA, I have been working to formulate appropriate messages and devise a plan of action for conveying them. A n important component of our activities is facilitating the individual efforts of computing researchers and leveraging their impact.

To that end, the CRA government affairs website, http://www.cra.org/main/cra.gov.html, has been reoriented to provide members of the community with the resources they need to become effective advocates for computing research. Visitors to the site will get crucial information on: the key policy issues affecting computing research; how the federal policy- and budget-making process works; and how to talk about computing research as part of that process.

For instance, we have collected links about the IT21C initiative in a central location, and an A dvocacy section features two key CRA “Policy Briefs” that can be used by the community to promote the initiative.

In addition, CRA has established a Computing Research Advocacy Network (CRA N), a subscriber-based electronic mailing list outlining opportunities to educate about the role and contributions of computing research.

All members of the computing research community are welcome to join C R A N. I hope you will do so today. Please visit the CRA government affairs website, http://www.cra.org/main/cra.gov.html, for more details. Working together, we can make 1999 a watershed year for recognition and support of computing research.
Models for Innovation Bring Women to the Table

By Anita Borg

CRA Board member Anita Borg founded the Institute for Women and Technology in December 1997 with the support of Xerox’s Palo Alto Research Center. Since then it has become an independent non-profit corporation, added Sun Microsystems to its list of corporate partners, and moved forward with its programs. The Institute’s mission is to increase the impact of women on technology and to increase the positive impact of technology on the world’s women. Eventually, as an R&D center, it will work with industry, academia, government, and communities around the world to involve women in defining and implementing future technologies, and to develop technologies that incorporate women’s genius, interests, situations, and needs. The Institute will be both a lab and a collection of projects that develop processes and products. We are not seeking to build a new “female computer science” or to create a niche subset of the field, but to expand and enrich the way we all think about what we do and for whom we do it. Our work is based on the fact that most organizations that have impact on information technology remain culturally narrow and pre-dominantly male, and often embody the attitude that elite technologists are the only people who have ideas for great new technologies.

Five Project Areas

Exploration and Innovation Events bring together technology experts, business people, potential users, community members, students, and social scientists. A six group, we explored the different needs and overall results.

Virtual development centers maintain a large degree on workshop output. Project work is based on the fact that most organizations that have impact on information technology remain culturally narrow and pre-

dominantly male, and often embody the attitude that elite technologists are the only people who have ideas for great new technologies.

The first workshop series this winter included events at the University of Washington, Xerox PARC, and Santa Clara University. The topic for the series, Technology in Support of Families, was development in support of projects in academia and industry about “technology for the home” that include little or no female participation. The Institute’s network of workshops focuses on technology that is useful to the people who inhabit a home and more broadly, whole families.

A full report on the results of the series will be available on our web page in the late spring. Here are a few ideas in brief:

Exploration and Innovation

The Wall: a real-time wall-sized view into another room or another place, allowing distant family members to virtually connect their living spaces.

Family Scheduling and Coordination

Integrated Family Medical System: monitors individual physical state and drug doses, and accesses medical history and emergency information.

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Policy 103: Challenging the Community to Move Ahead

By Fred W. Weingarten

In the first article in this series, I described the surprisingly wide range of issues that are contained in science policy. In the second, I talked about the number of potential areas in the policy debate. I suggested that, in order to precipitate a major change in policy, not all of these issues have to be aligned behind the change or, in some cases, neutral to it.

In this third "chapter," I attempt to discuss how this might play out in trying to change the levels and patterns of computing research support. In a way, this is the most idiosyncratic and subjective piece. My first two articles reflected more or less how many people who work in science policy professionally see the world. There is far more variation in the styles and approaches people use to get things done in this town. So, I have tried to reflect some of that and have tried to frame them in a way that will invite discussion with others.

This isn't a theoretical debate. The Interim Report of the President's Information Technology Advisory Committee (PITAC) last fall, followed by the more recent announcement of the administration's new IT program, promise a real opportunity for major increases in support for computing research. But they also challenge the community to take an active part in the debate over science policy in new ways to make the promises materialize. The community's future approach to advocacy must be not only more active, but more proactive in asserting the importance of computing research and the needs of the field.

I think that computing science research policy is now moving into a new, third phase. First, from the late 80's until the late 90's, we saw a series of Presidential research agendas, and even universities that could play in the game, were dictated by ARPA and NSF. This was a smart strategy. The justification for computing research was expressed strongly by the research community, and even which disciplines. During that time, the computing field basically didn't have an organized advocacy group, and had no seat at the science policy table.

The second phase began with the debate leading to the passage of the High Performance Computing Act of 1991 (HPCA). Computing and communication technology came to the fore in the general political debate as technologies critical to the nation's welfare. A government, led by the administration led the debate and agenda setting. The justification for computing research was still framed primarily as a response to agency needs and priorities. But at that time, it was also lifted up to be a matter of major importance to the government and societal needs such as health, education, and libraries, or, in some cases, neutral to it.

This was a smart strategy. The HPCP Act program later became known (with the addition of communications), leveraged agency self-interests in order to stimulate a government-wide expansion of investment in computing research. It also managed to open up a broader public debate on the need for the research support for the field. High Performance Computing was even mentioned in a presidential declaration. It was during the same time that CRA opened its doors in Washington, and the field began to develop a formal, organized voice in science policy. The downside of this approach was twofold. A broader, perhaps more dispersed, computing agenda research agenda did not cover the spectrum of research needs. They maintained the pattern of Washington setting the research priorities for the field. That top-down pattern was home to you or your university only once a year when a senior science official became angry that I had voiced some criticism of the programs (concerns) had heard expressed strongly by the research community. He reminded me that he and his government colleagues would set policy "behind closed doors" and we "troops" (a self-derogatory term) were not involved. I had to point out that the CRA community that I represented were a part of the public that policy, and that the administration, in the direction in which I pointed, was not involved, either. It is interesting to note that the advisory committee for which I had been appointed was not involved until six years later, after the Act had expired, in fact. The executive branch simply saw no need to publish input in the program and no need to strengthen communication links with the research community (probably the most important function of an advisory committee).

But that was a transitional stage. Now we have arrived at a third phase, in which computing research policy making will be made in a three-way dialogue among the research institutions, industry, and government. Computing and communications technology have simply become far more important to many communities for such a top-down approach. Nurturing optimal political support for higher levels of funding means bringing in many more voices and accommodating many more concerns. One can see that this is a three-way tension that already exists. A New Directions in CS Research

By John E. Savage

In its early history theoretical computer science research was strongly motivated by the problems of practice. When compilers were being invented, a framework had been developed for the study of languages and their efficient translation. As the computer science community opened its doors and we "troops" (as he called them) worked behind the scenes, the research that was not amenable to the model theory techniques and principles, invented conceptual solutions and a discussion of the nature of computation and the model theory concepts such as the famous N-P-completeness languages in the process.

Traditionally experimental computer scientists identified an important computational problem that was not amenable to the modeling and analysis practiced by theoreticians, invented conceptual solutions, and then demonstrated their viability through proof of concept, that is, by building a system and studying its behavior through experimentation, measurement, and some analysis. Many important conceptual advances have resulted from this approach, advances that are reflected in the software, hardware, and communication technologies that are used today.

Because computer science is now undergoing very rapid change, the early role of universities as the principal centers for the generation of knowledge and examples of new technologies is weakening. Important innovation is now occurring in developing alliances and forming coalitions among those who stand to benefit from innovations in computing and communications. In the field of the PITAC recommendations and the IT2 initiative are important new problems and ideas that are not readily accessible to the research labs and the academic computer science community, and important opportunities are being lost to contribute to the application and development of these ideas and the solution of these problems.

The rapid development of computer science has introduced a new tension between innovation and the generation of knowledge. A new importance has emerged for experimental computer scientists, namely, to work closely with industrial colleagues in order to understand and abstract from the large computer systems that are building. A new importance is also emerging for theoreticians, namely, to work with their experimental computer science colleagues and industrial developers to study the deep and complex computational...
Ph.D. Enrollment Up for the Third Straight Year

By Dexter Kozen and Jim Morris

This article and the accompanying tables present the results of the 28th annual CRA Taulbee Survey of Ph.D. granting departments of computer science (CS) and computer engineering (CE) in the United States and Canada. This survey is conducted annually by CRA to document trends in student enrollment, employment of graduates, and faculty salaries. Information is gathered during the fall and early winter. Responses received by January 20, 1999 are included in the tables.

The survey results are from Ph.D. granting departments only. One hundred and eighty-six departments were surveyed. Information on degree production (Ph.D., Master's, and Bachelor's) and enrollment (Ph.D.) applies to the previous academic year (1997-98). New students in all categories and total enrollments for Master's and Bachelor's refer to the current academic year (1998-99). Projected production refers to the current academic year as well. Information on faculty salaries and demographics also applies to the current academic year. Faculty salaries are those effective January 1, 1999. This year 144 departments submitted surveys – 144 responded to the Ph.D. section, 140 to the Master's section, and 138 to the Bachelor's section. All 144 departments provided faculty information. The response rate was 77%, down slightly from last year’s rate of 80%; however, the overall number of departments responding this year was higher (144 versus 135). We thank all respondents who completed the questionnaire.

Two new questions were added to the survey this year. One requested the average number of years to receive a Ph.D. (5.014). The second asked for the number of positions left unfilled last year in the following categories: tenure-track (156), researcher (0), post-doc (5), lecturer (9), instructor (8), other (4). We expect to use this additional data in a long-term longitudinal analysis.

Degree Production
(Tables 1-6) A total of 933 Ph.D. degrees were awarded in 1998 by the 144 responding departments. This is up 4.5% from the 893 awarded in 1997, reversing a downward trend.

Table 1. Ph.D. Production by Ranking

<table>
<thead>
<tr>
<th>Ph.D.s Produced</th>
<th>Average per Dept.</th>
<th>Ph.D.s Next Year</th>
<th>Average per Dept.</th>
<th>Passed Qualifier</th>
<th>Average per Dept.</th>
</tr>
</thead>
<tbody>
<tr>
<td>US CS Ranked 1-12</td>
<td>217</td>
<td>18.1</td>
<td>231</td>
<td>19.3</td>
<td>187</td>
</tr>
<tr>
<td>US CS Ranked 13-24</td>
<td>134</td>
<td>11.2</td>
<td>162</td>
<td>13.5</td>
<td>179</td>
</tr>
<tr>
<td>US CS Ranked 25-36</td>
<td>103</td>
<td>8.6</td>
<td>129</td>
<td>10.8</td>
<td>104</td>
</tr>
<tr>
<td>US CS Other</td>
<td>375</td>
<td>4.2</td>
<td>486</td>
<td>5.3</td>
<td>479</td>
</tr>
<tr>
<td>Canadian CS</td>
<td>55</td>
<td>4.6</td>
<td>76</td>
<td>6.3</td>
<td>54</td>
</tr>
<tr>
<td>US CE</td>
<td>49</td>
<td>7.0</td>
<td>62</td>
<td>8.9</td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td>933</td>
<td>6.5</td>
<td>1,128</td>
<td>7.8</td>
<td>1,080</td>
</tr>
</tbody>
</table>

Figure 1

Ph.D. Production 1989-98

Table 2. Gender of Ph.D. Recipients

<table>
<thead>
<tr>
<th>CS</th>
<th>CE</th>
<th>CS &amp; CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>747</td>
<td>(86%)</td>
</tr>
<tr>
<td>Female</td>
<td>120</td>
<td>(14%)</td>
</tr>
<tr>
<td>Total</td>
<td>867</td>
<td>66</td>
</tr>
</tbody>
</table>

Table 3. Ethnicity of Ph.D. Recipients

<table>
<thead>
<tr>
<th>CS</th>
<th>CE</th>
<th>CS &amp; CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>339 (39%)</td>
<td>41 (62%)</td>
</tr>
<tr>
<td>Native American/Alaskan Native</td>
<td>5 (1%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>85 (10%)</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>6 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>382 (44%)</td>
<td>15 (22%)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (1%)</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>839</td>
<td>65</td>
</tr>
<tr>
<td>Ethnicity Unknown</td>
<td>28 (3%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>867</td>
<td>66</td>
</tr>
</tbody>
</table>

Table 4. Employment of New Ph.D. Recipients by Specialty

<table>
<thead>
<tr>
<th>New Ph.D.s in Ph.D. Granting Depts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure-Track</td>
</tr>
<tr>
<td>Researcher</td>
</tr>
<tr>
<td>Postdoc</td>
</tr>
<tr>
<td>Instructor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other CS/CE Dept.</td>
</tr>
<tr>
<td>Non-CS/CE Dept.</td>
</tr>
<tr>
<td>Industry</td>
</tr>
<tr>
<td>Government</td>
</tr>
<tr>
<td>Self-Employed</td>
</tr>
<tr>
<td>Employed Abroad</td>
</tr>
<tr>
<td>Other/Unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>184</td>
</tr>
</tbody>
</table>
turn from 915 the previous year, but still short of the record 1,113 in 1992. The prediction from last year’s survey that 1,037 Ph.D. degrees would be awarded in 1998 was, as usual, overly optimistic, but this year the discrepancy was only 10% as opposed to 20% last year. Using an optimism factor of 0.85, next year’s prediction of 1,128 translates to approximately 959 new Ph.D.s in 1999 (Figure 1).

The percentage of women hired was significantly higher than last year, the percentage awarded to women in Ph.D. programs is again about 11.1% in 1998 with 130 departments reporting, and rose about 4.3% in 1997 with 131 departments reporting, rose about 23.8% in 1998, an increase of 23.6% from 6,789 last year. New enrollment in Ph.D. programs is 7,119, up 4.86% from 6,789 last year. Although this is not significantly higher than last year, the percentage awarded to women in all three categories remained constant.

Last year we noted an alarming trend in the number of Ph.D. degrees awarded to Native Americans (from 1,440 in Fall 1997. This is the third straight year of increase, indicating a sustained trend. These numbers bode well for a long-term increase in Ph.D. production. Total enrollment in Ph.D. programs is 7,119, up 4.86% from 6,789 last year. New enrollment in Ph.D. programs shows a similar gain from 3,410 in 1997 to 4,223 in 1998, an increase of 23.8%.

The recent precipitous rise in the number of Bachelor’s degrees, which was essentially flat between 1995 and 1996 with 130 departments reporting, rose about 4.3% in 1997 with 131 departments reporting, and rose again about 11.1% in 1998 with 140 departments reporting.

The ethnicity statistics for bachelor’s and master’s degree recipients remained relatively static. Although the absolute numbers of bachelor’s, master’s, and Ph.D. degrees awarded were significantly higher than last year, the percentage awarded to women in all three categories remained constant.

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much of a change, women have shown significant gains in seniority. For men, the percentage of tenure-track faculty who were associate or full professors was 79.9% in 1996, 82.2% in 1997, and 81.0% in 1998, essentially a steady state. Women, on the other hand, went from 58.0% in 1996 to 61.6% in 1997 to 69.1% in 1998.

Faculty Salaries

Average salaries at U.S. institutions rose 3.7-4.8% with the smallest increase at the full professor level and the largest at the associate professor level (Table 31). This is slightly higher than last year. Canadian salaries posted more modest 3.9% and 2.2% increases at the assistant and associate professor levels, respectively, and actually dropped 0.6% at the full professor level (Table 30). Salaries for U.S. institutions are 9-month salaries and are reported in U.S. dollars; those for Canadian institutions are 12-month salaries and are reported in Canadian dollars.

The salary figures in the first column of Table 25, which appear to be inverted, are correct. This phenomenon was also observed last year. The overall mean salaries reported in the center column in Tables 24-32 are unweighted means, calculated by averaging the mean salaries as reported by each department. They are not weighted by the number of CS & CE faculty at each institution.

Rankings

For tables that group computer science departments by rank, the rankings are based on information collected in the 1995 assessment of research and doctorate programs in 1997-98 CRA Taubbee Survey.
1997-98 CRA Taulbee Survey

Table 17. Gender of Newly Hired Faculty

<table>
<thead>
<tr>
<th>Tenure-Track</th>
<th>Researcher</th>
<th>Postdoc</th>
<th>Instructor</th>
<th>Lecturer</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>164</td>
<td>36</td>
<td>64</td>
<td>44</td>
<td>57</td>
<td>32</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>8</td>
<td>13</td>
<td>12</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1</td>
<td>--</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>44</td>
<td>77</td>
<td>57</td>
<td>69</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 18. Ethnicity of Newly Hired Faculty

<table>
<thead>
<tr>
<th>Tenure-Track</th>
<th>Researcher</th>
<th>Postdoc</th>
<th>Instructor</th>
<th>Lecturer</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>26</td>
<td>4</td>
<td>30</td>
<td>0</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>34</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>116</td>
<td>29</td>
<td>36</td>
<td>47</td>
<td>52</td>
<td>18</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>184</td>
<td>42</td>
<td>76</td>
<td>57</td>
<td>69</td>
<td>38</td>
</tr>
<tr>
<td>Did Not Indicate</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>44</td>
<td>77</td>
<td>57</td>
<td>69</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 19. Gender of Professors

<table>
<thead>
<tr>
<th>Assistant</th>
<th>Associate</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>467 (84%)</td>
<td>861 (88%)</td>
</tr>
<tr>
<td>Female</td>
<td>92 (16%)</td>
<td>114 (12%)</td>
</tr>
<tr>
<td>Total</td>
<td>559</td>
<td>975</td>
</tr>
</tbody>
</table>

Table 20. Ethnicity of Professors

<table>
<thead>
<tr>
<th>Assistant</th>
<th>Associate</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>72 (13%)</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>8 (1%)</td>
<td>5 (2%)</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>1 (2%)</td>
<td>6 (3%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>108 (19%)</td>
<td>228 (24%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>12 (2%)</td>
<td>11 (1%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>337 (60%)</td>
<td>690 (71%)</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>14 (3%)</td>
<td>8 (1%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>552</td>
<td>952</td>
</tr>
<tr>
<td>Ethnicity Unknown</td>
<td>7 (1%)</td>
<td>23 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>559</td>
<td>975</td>
</tr>
</tbody>
</table>

Table 21. Gender of Other Faculty

<table>
<thead>
<tr>
<th>Lecturer</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>317 (78%)</td>
</tr>
<tr>
<td>Female</td>
<td>88 (22%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>3 (0%)</td>
</tr>
<tr>
<td>Total</td>
<td>408</td>
</tr>
</tbody>
</table>

Table 22. Ethnicity of Other Faculty

<table>
<thead>
<tr>
<th>Lecturer</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>11 (3%)</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>4 (1%)</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>9 (2%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>37 (9%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4 (1%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>335 (82%)</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>400</td>
</tr>
<tr>
<td>Ethnicity Unknown</td>
<td>8 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>408</td>
</tr>
</tbody>
</table>

Table 23. Faculty Losses

<table>
<thead>
<tr>
<th>Died</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retired</td>
<td>42</td>
</tr>
<tr>
<td>Took Academic Position Elsewhere</td>
<td>90</td>
</tr>
<tr>
<td>Took Nonacademic Position</td>
<td>52</td>
</tr>
<tr>
<td>Remained, Changed to Part Time</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
</tr>
</tbody>
</table>

Footnotes

1 Includes 35 CE degrees granted by these CS departments.
2 Includes 18 CS degrees granted by these CS departments.
3 Includes 62 CE degrees granted by these CS departments.
4 Includes 20 CS degrees granted by these CS departments.
5 The title of the survey honors the late Orrin E. Taulbee of the University of Virginia, who conducted these surveys for the Computer Science Board from 1970 until 1984.
6 In some instances, departments only answered selective questions within a table or a section. Therefore, for individual fields within tables the response rate may vary ±3.
7 Indicates that the percentage only totals 99.
8 Although the University of Pennsylvania and the University of Chicago were tied in the National Research Council rankings, CRA made the arbitrary decision to place Pennsylvania in the second tier of schools.

The top 12 schools in this ranking are Stanford University, the Massachusetts Institute of Technology, the University of California at Berkeley, Carnegie Mellon University, Cornell University, Princeton University, the University of Texas at Austin, the University of Illinois at Urbana-Champaign, the University of Washington, the University of Wisconsin at Madison, Harvard University, and the California Institute of Technology.

The departments ranked 13-24 are Brown University, Yale University, the University of California at Los Angeles, the University of Maryland, and the California Institute of Technology.

The human resources department of the United States conducted the survey.

The survey makes no distinction between faculty specializing in CS versus CE programs. We tried to minimize inclusion of any faculty in electrical engineering.

Acknowledgments

Stacy C. Kohlenwachter and Jean Smith assisted with the data collection. Stacy also handled the data tabulation and Jean helped follow up with the institutions. We thank them for their assistance.

Note: The title of the survey honors the late Orrin E. Taulbee of the University of Virginia, who conducted these surveys for the Computer Science Board from 1970 until 1984.
The issues presented by the emerging new technologies.

New opportunities of this kind now exist to design, experiment with, model, and analyze the important computational problems encountered in building telecommunications networks, designing large software systems, data management and searching, planning, optimization, distributed computing, scientific computing, and many other areas. Some members of the academic and industrial research communities have discovered these opportunities and have obtained important results on topics such as secure cryptographic systems, web searching algorithms that identify authoritative sites, data caching algorithms that operate with much smaller queues, and scientific computing algorithms that more intelligently allocate work.

In the future we can expect many improvements in all aspects of computation through better modeling and analysis. We can expect the throughput of computer networks to improve as well.

Research Continued on Page 12

1997-98 CRA Taubee Survey

Table 24. Nine-Month Salaries, 122 Responses of 145 US CS Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>498</td>
<td>$29,150</td>
<td>$57,497</td>
<td>$70,900</td>
<td>$60,417</td>
<td>$45,000</td>
<td>$63,642</td>
<td>$83,600</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>806</td>
<td>$40,758</td>
<td>$63,328</td>
<td>$90,000</td>
<td>$69,851</td>
<td>$54,535</td>
<td>$77,184</td>
<td>$109,260</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>999</td>
<td>$43,300</td>
<td>$76,033</td>
<td>$110,00</td>
<td>$93,189</td>
<td>$59,747</td>
<td>$118,467</td>
<td>$223,569</td>
<td></td>
</tr>
</tbody>
</table>

Table 25. Nine-Month Salaries, 12 Responses of 12 US CS Departments Ranked 1-12

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>72</td>
<td>$60,000</td>
<td>$63,059</td>
<td>$70,000</td>
<td>$64,425</td>
<td>$77,009</td>
<td>$84,674</td>
<td>$91,400</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>89</td>
<td>$49,050</td>
<td>$71,158</td>
<td>$90,000</td>
<td>$77,997</td>
<td>$106,352</td>
<td>$126,400</td>
<td>$146,358</td>
<td>$170,000</td>
</tr>
<tr>
<td>Full</td>
<td>201</td>
<td>$43,300</td>
<td>$80,493</td>
<td>$110,00</td>
<td>$93,189</td>
<td>$126,400</td>
<td>$146,358</td>
<td>$170,000</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>58</td>
<td>$33,000</td>
<td>$60,146</td>
<td>$68,000</td>
<td>$63,206</td>
<td>$63,470</td>
<td>$78,303</td>
<td>$92,100</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>74</td>
<td>$68,742</td>
<td>$67,761</td>
<td>$79,000</td>
<td>$72,878</td>
<td>$92,411</td>
<td>$118,768</td>
<td>$180,000</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>153</td>
<td>$64,672</td>
<td>$78,375</td>
<td>$97,200</td>
<td>$96,879</td>
<td>$125,500</td>
<td>$148,611</td>
<td>$223,569</td>
<td></td>
</tr>
</tbody>
</table>

Table 27. Nine-Month Salaries, 86 Responses of 109 US CS Departments Ranked Higher than 36 or Unranked

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>310</td>
<td>$29,150</td>
<td>$55,910</td>
<td>$70,900</td>
<td>$58,529</td>
<td>$59,614</td>
<td>$66,844</td>
<td>$75,000</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>568</td>
<td>$40,758</td>
<td>$61,149</td>
<td>$63,500</td>
<td>$67,607</td>
<td>$64,793</td>
<td>$78,033</td>
<td>$92,100</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>511</td>
<td>$48,978</td>
<td>$74,935</td>
<td>$104,300</td>
<td>$89,273</td>
<td>$92,619</td>
<td>$128,768</td>
<td>$180,000</td>
<td></td>
</tr>
</tbody>
</table>

Table 28. Nine-Month Salaries, 7 Responses of 19 US CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>19</td>
<td>$50,908</td>
<td>$58,059</td>
<td>$66,199</td>
<td>$59,635</td>
<td>$53,263</td>
<td>$60,999</td>
<td>$70,000</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>37</td>
<td>$40,758</td>
<td>$63,412</td>
<td>$90,000</td>
<td>$68,775</td>
<td>$62,800</td>
<td>$75,230</td>
<td>$81,000</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>43</td>
<td>$63,000</td>
<td>$75,967</td>
<td>$84,921</td>
<td>$87,929</td>
<td>$78,686</td>
<td>$107,189</td>
<td>$138,000</td>
<td></td>
</tr>
</tbody>
</table>

Table 29. Nine-Month Salaries, 129 Responses of 166 US CS and CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>517</td>
<td>$29,150</td>
<td>$57,528</td>
<td>$70,900</td>
<td>$60,373</td>
<td>$45,000</td>
<td>$63,493</td>
<td>$83,600</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>843</td>
<td>$40,758</td>
<td>$63,412</td>
<td>$90,000</td>
<td>$69,775</td>
<td>$54,535</td>
<td>$77,024</td>
<td>$109,260</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>1,042</td>
<td>$43,300</td>
<td>$76,030</td>
<td>$110,00</td>
<td>$95,901</td>
<td>$59,747</td>
<td>$117,853</td>
<td>$223,569</td>
<td></td>
</tr>
</tbody>
</table>

Table 30. Nine-Month Salaries for New Ph.D.'s, Responding US CS and CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure-Track</td>
<td>78</td>
<td>$50,000</td>
<td>$60,054</td>
<td>$74,000</td>
<td>$60,320</td>
<td>$50,000</td>
<td>$60,707</td>
<td>$75,000</td>
<td></td>
</tr>
<tr>
<td>Researcher</td>
<td>10</td>
<td>$40,000</td>
<td>$51,651</td>
<td>$65,999</td>
<td>$54,311</td>
<td>$40,000</td>
<td>$56,257</td>
<td>$70,000</td>
<td></td>
</tr>
<tr>
<td>Postdoc</td>
<td>15</td>
<td>$25,000</td>
<td>$39,090</td>
<td>$60,000</td>
<td>$39,772</td>
<td>$30,000</td>
<td>$40,454</td>
<td>$60,000</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>$41,000</td>
<td>$51,328</td>
<td>$61,500</td>
<td>$52,528</td>
<td>$45,000</td>
<td>$53,728</td>
<td>$61,500</td>
<td></td>
</tr>
</tbody>
</table>

Table 31. Twelve-Month Salaries, 12 Responses of 16 Canadian CS Departments (Canadian Dollars)

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Faculty</th>
<th>Reported Salary Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Average of all Salaries</th>
<th>Reported Salary Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>35</td>
<td>$40,000</td>
<td>$57,288</td>
<td>$75,215</td>
<td>$59,217</td>
<td>$40,000</td>
<td>$62,030</td>
<td>$85,000</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>188</td>
<td>$46,350</td>
<td>$64,697</td>
<td>$82,175</td>
<td>$71,190</td>
<td>$46,350</td>
<td>$83,060</td>
<td>$126,703</td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td>134</td>
<td>$58,520</td>
<td>$75,767</td>
<td>$95,474</td>
<td>$90,823</td>
<td>$58,520</td>
<td>$111,357</td>
<td>$162,075</td>
<td></td>
</tr>
</tbody>
</table>

*Issues presented by the emerging new technologies.

New opportunities of this kind now exist to design, experiment with, model, and analyze the important computational problems encountered in building telecommunications networks, designing large software systems, data management and searching, planning, optimization, distributed computing, scientific computing, and many other areas. Some members of the academic and industrial research communities have discovered these opportunities and have obtained important results on topics such as secure cryptographic systems, web searching algorithms that identify authoritative sites, data caching algorithms that operate with much smaller queues, and scientific computing algorithms that more intelligently allocate work.

In the future we can expect many improvements in all aspects of computation through better modeling and analysis. We can expect the throughput of computer networks to improve as well.*
**Professional Opportunities**

**Argonne National Laboratory**

**Mathematics and Computer Science Division**

- *Positions:* An Assistant Professor or a Research Scientist is sought for a position in High Performance Computing.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research and the potential to make significant contributions to the field of high performance computing.
- *Contact:* Lucas Roh (roh@mcs.anl.gov) or Paul Marchette (pam@anl.gov) for additional information.

**Computer Science Division**

- *Positions:* A search is being conducted for a faculty position in the area of scientific computing.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have significant experience in scientific computing.
- *Contact:* Lucas Roh for details.

**Clemson University**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**Clemson University**

- *Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**Computational Genomics**

- *Position:* A postdoctoral position is available in the area of computational genomics.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have experience in computational genomics.
- *Contact:* Chair of the Computational Genomics Department for application details.

**Computational Perception**

- *Position:* A postdoctoral position is available in the area of computational perception.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have experience in computational perception.
- *Contact:* Chair of the Computational Perception Department for application details.

**Iowa State University**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**Illinois Institute of Technology**

- *Computing and Mathematical Sciences* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computing and Mathematical Sciences Department for application details.

**University of California, Berkeley**

- *Department of Electrical Engineering and Computer Sciences* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Electrical Engineering and Computer Sciences Department for application details.

**University of California, Irvine**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**University of Colorado at Boulder**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**University of Oregon**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**University of Virginia**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.

**University of Washington**

- *Department of Computer Science* offers a Ph.D. program in Computer Science and seeks applications from qualified candidates.
- *Requirements:* Applicants must have a Ph.D. in Computer Science or a closely related field and must have demonstrated excellence in research.
- *Contact:* Chair of the Computer Science Department for application details.
Department of Computer and Information Science

Job Search: New Faculty Position Available

The University of North Dakota is an Equal Opportunity/Affirmative Action employer. We strongly encourage applications from women and minorities.

Oakland University
Department of Computer Science and Engineering

Chair

The Department of Computer Science and Engineering invites applications for the position of chair. Qualifications for the position include an earned Ph.D. in Computer Science or a related field. The chair is responsible for the overall management of the department and for the long-term development and growth of the department.

The chair should have a strong record of excellence and leadership in both research and teaching. The chair should also have a strong record of accomplishment in administration, including the ability to effectively manage resources and personnel. The chair should have a proven ability to build and sustain a strong research program and to attract funding from a variety of sources.

Applications should include a letter of application, a curriculum vitae, and the names and contact information of three references. Applications should be submitted to:

Dr. Janice Glasgow
Chair, Department of Computer Science
Sorin Hall, Room 207
Tulane University
New Orleans, LA 70118


Oregon Graduate Institute of Science and Technology

Computer Science Department and Engineering

The Department of Computer Science and Engineering at Oregon Graduate Institute of Science and Technology invites applications for the position of associate professor. The successful candidate will have a strong record of excellence in research and teaching and a commitment to diversity in both the faculty and the student body.

Applications should include a letter of application, a curriculum vitae, and the names and contact information of three references. Applications should be submitted to:

Professor Peter Gibbons
Chair, Department of Computer Science
Oregon Graduate Institute of Science and Technology
Portland, OR 97201

Review of applications will begin April 15, 1999. More information about the position can be found at: http://www.ogi.edu/positions.

Purdue University
School of Electrical and Computer Engineering

Send a resume, including a statement of research and teaching interests, to: Dr. Kevin J. Cox, Chair, Department of Computer Science, 480 Northwestern Avenue, West Lafayette, Indiana 47907-2088. Applications will be considered until the position is filled.

University of Central Arkansas

Computing and Information Science

Applications for a new tenure-track faculty position are now being accepted. The position is available for Fall 1999. Applicants must be able to provide evidence of excellence in both research and teaching. The successful candidate will be expected to teach undergraduate and graduate courses in computer science, and to engage in scholarly activities that will contribute to the department's mission.

Applications should include a letter of application, a curriculum vitae, and the names and contact information of three references. Applications should be submitted to:

Dr. Curt Stoddard
Chair, Department of Computer Science
University of Central Arkansas
Conway, AR 72035

Review of applications will begin April 15, 1999. More information about the position can be found at: http://www.uca.edu/cse/.

University of California, Berkeley

Department of Electrical Engineering and Computer Science

Tenure-track and Visiting Faculty Positions

The Department of Electrical Engineering and Computer Science at the University of California, Berkeley, invites applications for tenure-track and visiting faculty positions in the areas of computer science and computer engineering. The successful candidate will be expected to develop an active research program and to teach effectively at both the undergraduate and graduate levels.

Applications should include a letter of application, a curriculum vitae, and the names and contact information of three references. Applications should be submitted to:

Professor Susan H. Graham
Chair, Department of Electrical Engineering and Computer Science
University of California, Berkeley
Berkeley, CA 94720-1770


University of North Dakota
Department of Computer Science

Chair

The Department of Computer Science at the University of North Dakota invites applications for the position of chair. The successful candidate will have a strong record of excellence in research and teaching and a commitment to diversity in both the faculty and the student body.

Applications should include a letter of application, a curriculum vitae, and the names and contact information of three references. Applications should be submitted to:

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University of Illinois at Urbana-Champaign

Beckman Institute for Advanced Science and Technology

Research Scientists - The Artificial Intelligence Group at the Beckman Institute for Advanced Science and Technology is seeking one full-time research scientists, with expertise in knowledge-based expert systems, uncertain reasoning, and machine learning. The Artificial Intelligence Group is the primary center at the University of Illinois for research in Artificial Intelligence. The group is located in the largest portion of the Beckman Institute, the Artificial Intelligence Laboratory. The Artificial Intelligence Laboratory is a research, teaching, and learning facility that provides a variety of research, teaching, and learning environments for both undergraduate and graduate students.

The Artificial Intelligence Group is currently seeking a Research Scientist to work in the area of artificial intelligence. The Research Scientist will be expected to (1) conduct research in the area of artificial intelligence, (2) teach courses in artificial intelligence, and (3) participate in the ongoing activities of the Artificial Intelligence Group.

Applications are invited for a full time, open rank position with a start date as soon as possible. The successful candidate will be expected to teach courses in artificial intelligence, and to conduct research in the area of artificial intelligence. The successful candidate will also be expected to participate in the ongoing activities of the Artificial Intelligence Group.

University of British Columbia

Department of Computer Science

Winnipeg, Manitoba, Canada

Applications are invited for four full time tenure track positions subject to budgetary approval. The position is available for a start date of January 1, 1999 or as soon as possible thereafter. Minimum qualifications are: a Ph.D. in Computer Science or a closely related field, and evidence of a strong research potential in computer science. Prospective candidates are strongly encouraged to apply. The University of Manitoba is an Affirmative Action / Equal Opportunity Employer.

University of Minnesota

Department of Computer Science

Winnipeg, Manitoba, Canada

Applications are invited for four full time tenure track positions subject to budgetary approval. The position is available for a start date of January 1, 1999 or as soon as possible thereafter. Minimum qualifications are: a Ph.D. in Computer Science or a closely related field, and evidence of a strong research potential in computer science. Prospective candidates are strongly encouraged to apply. The University of Manitoba is an Affirmative Action / Equal Opportunity Employer.

University of Wisconsin-Madison

Computer Science and Engineering

Applications are invited for four full time tenure track positions subject to budgetary approval. The position is available for a start date of January 1, 1999 or as soon as possible thereafter. Minimum qualifications are: a Ph.D. in Computer Science or a closely related field, and evidence of a strong research potential in computer science. Prospective candidates are strongly encouraged to apply. The University of Wisconsin-Madison encourages applications from qualified women and men, including members of visible minorities, aboriginal peoples and persons with disabilities. Priority consideration will be given to Canadian citizens and permanent residents.

University of Victoria

Computer Science

Applications are invited for four full time tenure track positions subject to budgetary approval. The position is available for a start date of January 1, 1999 or as soon as possible thereafter. Minimum qualifications are: a Ph.D. in Computer Science or a closely related field, and evidence of a strong research potential in computer science. Prospective candidates are strongly encouraged to apply. The University of Victoria is an Affirmative Action / Equal Opportunity Employer.

Computer Science & Engineering

University of Michigan

Applications are invited for four full time tenure track positions subject to budgetary approval. The position is available for a start date of January 1, 1999 or as soon as possible thereafter. Minimum qualifications are: a Ph.D. in Computer Science or a closely related field, and evidence of a strong research potential in computer science. Prospective candidates are strongly encouraged to apply. The University of Michigan is an Affirmative Action / Equal Opportunity Employer.

Computer Science

University of Minnesota

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Computer Science

University of Wisconsin-Madison

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Computer Science

University of Michigan

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Computer Science

University of Minnesota

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Computer Science
Jobs from Page 11

University of Texas at El Paso
Department of Computer Science
The University of Texas at El Paso seeks applicants and nominations for the position of Chair of the Department of Computer Science. The successful candidate must have a strong research record and the ability to lead the department in its research and educational activities. Applicants must hold a Ph.D. in Computer Science and have a record of significant teaching, research, and service contributions. Applicants should submit a detailed resume and the names of at least four references to Michael Gelfond, UTEP, Department of Computer Science, El Paso, Texas 79968 (email: mgelfond@utep.edu). The university of Texas at El Paso does not discriminate on the bases of race, color, national origin, sex, age, religious belief, disability in employment or the provision of services.

University of Utah
Department of Computer Science
The Department of Computer Science seeks applicants for tenure-track faculty positions in the areas of computer graphics/scientific visualization, and artificial intelligence, and databases. Applicants should have a Ph.D. in Computer Science or a closely related field.

Budget from Page 1

was chosen to lead this group since it is the only agency that supports research in all three thrusts of the initiative. The working group has been charged with preparing research plans and budgets for the entire effort, ensuring that the research projects reflect the major thrusts of the initiative. The work resulting from this effort is considered the "research agenda" for the initiative. The working group is focused on developing a balanced research portfolio. High priority has been placed on ensuring that the agency funds are distributed in an open, competitive process aimed at supporting the best possible ideas. A determination in official estimates is that at least 60% of the funding will go to universities.

Policy from Page 3

working in concert with government science agencies and private sector users. There are many strategies and actions that could be taken. The community has to develop its own agenda reflecting its own style—here are two suggestions:

Create and promote a legislative package.

I know, I know. The agencies will say they are already working on legislation, that any expansion of computing research support can be done within the framework of their current legislation and that is true. But there are several reasons why developing and pushing a legislative package is important:

1. It is a useful exercise for the community. It is one thing to say, “Our field needs more support” and quite another to say what it means. For example, what five actions would the reader like to see written into law to support computing research? It provides a focus for advocacy.

2. It is useful in mobilizing the public. The public needs to understand that there are not enough dollars in the budget and that the field is in competition with other agencies or projects. The public needs to understand that the field is in competition with other agencies or projects.

3. It needs the support of the industry and the end-user community— the beneficiaries of research. It also needs the continued good government and general support of the public.

A coalition requires effort to build and sustain, they are essential. For the academic community, it means broadening programs to encompass a wider range of concerns. It also means that others will want a voice in setting research priorities.

In Conclusion

The ideas generated in our initial workshops represent technology that could have a positive impact on women’s lives. The workshops also impact on the participants. Explicit surveys indicate that the non-technical participants see technology differently—in particular, at something in which they might participate more actively than they had imagined. The participants all find it a new way of connecting the work they do to real human needs. Both were encouraging outcomes. The research and computing initiatives are long-term and still be determined, and will depend on both our follow-up efforts and the result of the broad computing community to consider new ways to think about the role of science.

www.cs.utah.edu

Research from Page 6

be improved by studying the distribution of network traffic and developing network traffic management algorithms. Web-based applications will benefit greatly from modeling, experimentation, design, and analysis. Algorithms for large, compute-intensive tasks will allow scientists to perform much larger simulations of complex problems by focusing the computational work where it is needed. These and many other issues offer important opportunities to advance industrial research communities to advance our understanding of computing by focusing on the computational in problem solving on the challenging problems arising in the context of new applications. It is very much in the interest of the nation that we learn about the best practices and what they mean.