Budget message mixed for computing research

By Fred W. Weingarten
CRA Staff

President Clinton's fiscal 1996 budget request was released February 11. As has been the case in recent years, it contained a mixed message for the computing research community. Of the modest increments in funding proposed, computing research received a higher than average share, which indicates its steady rise in importance within the government's R&D portfolio. Although it may seem ironic to carp in the face of such endorsement, many observers still ask whether the budget reflects the importance of R&D to the nation's future economic health. Some question whether the budget even reflects the president's political rhetoric.

In terms of political rhetoric, this would seem to be a promising budget year for computer science and engineering. Last December the president announced the Next Generation Internet (NGI) program, a new initiative of the National Science and Technology Council (NSTC). Clinton repeated his support of the new initiative in his State of the Union Address.

Aiso, education and educational technology have become major themes in the administration. A nod, at least in Washington, computers and the Internet have loomed large in any discussion of education. The administration has for a long time extolled the benefits to education of access to information technology (IT), particularly the World Wide Web. There was a major push last year to get the Federal Communications Commission to direct deeply discounted or in some case free communication services to schools and libraries.

The administration also argued that technological change, in particular the information revolution, is creating new challenges for education at all levels, including adult job training and literacy. A side stream from serving as an educational tool across many disciplines, experience with IT and of itself is educational value.

The problem with NGI and educational technology is not simply one of implementing or deploying better existing technology. To build a faster, more reliable and more capable Internet will require substantial research, as will making IT a powerful tool for education.

It seems reasonable to ask whether, in the face of these two priorities, the $100 million increase in high-performance computing and communications (HPC) funding is appropriate. A nod regarding of funding levels, does the distribution of these funds makes sense in terms of the goals?

NSF

Until fiscal 1996, NSF funding for computing research tended to increase significantly each year, pushed in part by the HPCC initiative. Over the last two years, the Computer and Information Science and Engineering Directorate as a whole saw much smaller increases. In 1996 the CISE budget increased a mere $4 million, and it increased only $11 million (4%) for 1997. This year, the above-average upward trend has resumed, with a proposed $21 million increase. This 7.6% increase is more than twice the 3.4% overall increase in NSF's research line.

The three research divisions of CISE—Computer and Computation Research (CCR), Microelectronic Information Processing Systems (MIPS), and Information, Robotics and Intelligent Systems (IRIS)—are budgeted for increases. According to NSF plans, CCR plans increased emphasis in two areas: distributed, multi-agent computing systems capable of adapting to changing conditions of use and configuration; and high-confidence systems capable of reliable and secure operation in an open, networked computing environment.

In these examples, budget information is sketchy at best. Researchers thinking about submitting proposals should visit the CISE home page at cise.nsf.gov.

Copyright treaty not discussed by WIPO

By Louise Arnehim

The last time representatives to the United Nations' World Intellectual Property Organization (WIPO) gathered—in 1971—the Star Wars trilogoy had yet to debut in movie theaters, much less materialize in videocassette form. In fact, videocassettes—as a home entertainment staple—had yet to materialize.

Back then the Bell System was still whole, and the ARPAnet was still a long way from evolving into the Internet as we know it today. And when delegates to the 1996 WIPO met in Geneva, Switzerland, last December, much of the intellectual property (software, CDs, videocassettes and so on) as well as the actual or potential means of redistributing that intellectual property had never been discussed at a full diplomatic conference of this UN agency.

And given the 25-year interval between WIPO meetings, the stakes were high for many players.

Table 1. CISE Program Funding (in millions of dollars)

<table>
<thead>
<tr>
<th>Program Area</th>
<th>1996 Actual</th>
<th>1997 Planned</th>
<th>1998 Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer &amp; Computation Res.</td>
<td>42.2</td>
<td>42.9</td>
<td>46.4</td>
</tr>
<tr>
<td>Info., Robotics &amp; Intelligent Sys.</td>
<td>32.9</td>
<td>35.1</td>
<td>39.6</td>
</tr>
<tr>
<td>Microelecs. Info. Processing Sys.</td>
<td>26.3</td>
<td>28.1</td>
<td>30.4</td>
</tr>
<tr>
<td>Advanced Scientific Computing</td>
<td>80.4</td>
<td>80.0</td>
<td>80.0</td>
</tr>
<tr>
<td>Net. &amp; Commun. Res. Infrastr.</td>
<td>55.0</td>
<td>55.7</td>
<td>62.3</td>
</tr>
<tr>
<td>Cross-Disciplinary Activities</td>
<td>27.5</td>
<td>31.6</td>
<td>27.5</td>
</tr>
<tr>
<td>Total CISE Funding</td>
<td>262</td>
<td>273</td>
<td>294</td>
</tr>
</tbody>
</table>

From December 2-20, delegates from 160 countries, including the United States, considered three treaty proposals covering books, electronic databases, sound recordings and other creative works. Of the three proposals, the one generating the most controversy in the United States was the Treaty on Intellectual Property Rights in Respect of Databases. A proposal of the treaty would have given database owners the right to control "utilization and extraction" of their material. (Currently, copyright protection is extended only to databases where the owner has exerted a creative effort either in the selection or compilation of data.) Parties contesting the treaty argued that basic "facts" in the public domain would no longer be accessible. Concern ranged from mild alarm over the possible unavailability of certain sports statistics to considerable anxiety regarding the future of scientific research.

A few months before WIPO, the US Patent and Trademark Office had circulated a draft proposal for public comment. But Congress did not have the opportunity to consider the proposal, a matter which further incensed many players—library groups, the scientific research community and legal scholars, among others—that already opposed the treaty.

As it turned out, the controversial treaty, although on the agenda, was never discussed. But member nations did pass a resolution suggesting that "an extraordinary session of the competent WIPO Governing Bodies" be convened in early 1997 to decide on a work schedule for developing such a treaty.

Was there not enough time to discuss the treaty? Was the absence of discussion essentially a defeat?

"The treaty was not defeated. It wasn’t even considered," said Dan Duncan, vice president of government relations for the Information Industry Association.

However, Aadam Eisgrau, legislative counsel for the American Library Association, viewed the outcome differently. According to Eisgrau, members deliberated avoided discussion of the treaty, thus sending a clear message to treaty sponsors, "The world put its foot down" with regard to the electronic database treaty, he said, and it didn’t happen." Eisgrau attended the meeting on behalf of two nongovernment organizations that opposed the treaty.

The fact that WIPO meets so
Expanding the Pipeline

By Robert “Corky” Cartwright

The Association of Computing Machinery’s Computer Science and Engineering Deans at Minority Institutions (A D M I) has invited the Computing Research Association to organize a fair on opportunities in Computing Research at the A D M I 97 symposium on May 31 in Washington, D.C. The fair will offer programs for minority students at the graduate, undergraduate and high school levels.

• Minority graduate students will have the opportunity to network, explore employment opportunities in academia and industry, and participate in panel discussions on how to become more successful researchers. Particular attention will be paid to the specific obstacles minority students must overcome. This program will be organized by a committee of minority graduate students from research institutions under the supervision of Richard Tapia, the Noah Harding Professor of Applied Mathematics at Rice University.

•Minority undergraduates will attend a recruiting fair, where representatives from computer science and engineering departments from across the nation will provide information on opportunities for minority students in their respective programs. Minority undergraduates also will have the opportunity to talk to minority graduate students about their personal experiences in various graduate programs.

• Minority high school students from the Washington, D.C., metropolitan area will attend a recruiting fair focusing on opportunities for under-graduate study in CS&E. The Washington area has some outstanding programs in computing for high school students, notably Jesse Bemley’s Joint Educational Facilities program. Last year, four students from JEF published the only papers written by high school students in the A D M I 97 symposium.

• CRA member institutions are encouraged to send minority graduate and departmental representatives to participate in the fair. Each participating department will staff a table where prospective undergraduate and graduate students can ask questions and gather information. CRA members from corporate research laboratories and corporate legal staffs interested in participating should contact Robert Cartwright (corky@rice.edu) before April 1, so sufficient space for the fair can be reserved.

• A D M I 97 will host more than 30 institutions with large minority enrollments, many of which are historically black colleges and universities. The mission of the organization is to strengthen education and research in CS&E at minority institutions, to enhance educational opportunities in CS&E for minority students and to foster the professional development of minority faculty. A part of their mission, A D M I 97 annually sponsors the Symposium on Computing at Minority Institutions. The theme of this year’s symposium, A D M I 97, is “Increasing Diversity in Research and Education.” A D M I 97 will be held May 29 to June 1 at the Hyatt Regency near Capitol Hill. The program will include:

• A CRA fair on Opportunities in Computing Research for minority students.

The symposium will also include an entertaining program of social activities. Last year, participants at Puerto Rico-Mayaguez, Puerto Rico, included a midnight boat ride to see luminous dolphins (phosphorescent plankton) in the Caribbean.

The symposium is being chaired by Don Coleman, chair of the Department of Systems and Computer Science at Howard University. The technical program is being assembled by a committee chaired by Forrester Wall from the University of Kentucky.

The ADMI 97 program will be held May 29 to June 1 at the Hyatt Regency near Capitol Hill. The program will include:

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control over original works and alter copyright law that would allow consideration of a similar issue by September. A decision on the electronic database learned that WIPO officials are approved at the formal meeting would during the 104th Congress. Created in 1967, WIPO is a special agency of the United Nations. Its mission, according to the U.N. home page, is to “promote the protection of intellectual property throughout the world, through cooperation among States, and to ensure administrative cooperation among the U.N.” WIPO also helps developing nations by “promoting creative intellectual property” and “facilitating the transfer of technology related to industrial property” to such countries. The other two treaties discussed (and adopted) in Geneva were the WIPO Copyright Treaty, which pertains to books and other works, and the WIPO Performances and Phonograms Treaty, which covers sound recordings. Further information regarding all three treaties may be found at http://www.wipo.org

Transitions

Tomasz Imieliński became chair of the Department of Computer Science at Rutgers University in July 1996. John A. Stankovic has been appointed the B. A. America Professor and chair of the Department of Computer Science at the University of Virginia, effective January 1.

Daniel A. Reed became head of the Department of Computer Science at the University of Illinois at Urbana-Champaign last May.

James H. Cross II was appointed chair of the Department of Computer Science and Engineering at Auburn University in July 1996.

Prith Banerjee joined NorthwesBank University in September 1996 as Walter and Murphy Chair Professor of Electrical and Computer Engineering and director of the Center for Parallel and Distributed Computing.

Stephen B. Seidman became chair of the Department of Computer Science at Colorado State University in July 1996.

Thomas J. LeBlanc became acting dean of the University of Rochester's College at the University of Illinois at Urbana-Champaign, where he is a professor of electrical and computer engineering. He has been appointed the BP America Professor and chair of the Department of Computer Science at the University of Illinois at Urbana-Champaign last May.

Michael C. Loui has been appointed associate dean of the Graduate College at the University of Illinois at Urbana-Champaign, where he is a professor of electrical and computer engineering. He has changed jobs, been promoted or appointed to a key committee or task force? For example, we are interested in listing the new chairs of C.S. E or related areas, or the new director of a college; new chairs of research laboratories; or key changes in granting agency personnel. Send announcements to ccrn@cra.org.

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Telecommunications law: one year later

By Louise Arnheim

When it was signed into law last year, the Telecommunications Reform Act of 1996 was hailed as the most comprehensive set of changes to the nation's telecommunications laws in over half a century. The simplicity of the act's brief introduction, however, belied the number, volume and complexity of the regulatory proceedings it set into motion. Public Law 104-104 (110 Stat. 56) states that its purpose is to "promote competition and reduce regulation in order to secure lower prices and higher-quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies." Consumers would benefit from lower rates, more choices and the availability of advanced services.

But a year's time may be insufficient to gauge the impact of the new law, particularly because many of the rules have only recently been placed into effect. And while the Federal Communications Commission (FCC) is still working its way through a challenging implementation schedule, here is a snapshot of what has happened since President Clinton signed the act in February 1996:

• According to the United States Telephone Association (USTA), more than 300 interconnection agreements have been signed between local exchange carriers (LECs) and new entrants.
• TV sets are now required to include V-chips to help parents better select viewing for children, and a new ratings system is in effect.
• Four out of seven Baby Bells have announced plans to merge (Pacific Telesis with SBC Communications and Bell Atlantic with NYNEX).

The act directed the FCC to undertake more than 80 regulatory proceedings. Those proceedings covered matters such as alarm monitoring services, manufacturing protocols of Bell Operating Companies, cable reform, interconnection, pole attachments, radio and TV broadcast station ownership, spectrum matters and telecommunications accounting. Noting the commission's success in meeting all its deadlines to date, National Cable Television Association (NCTA) President Decker A. Anstrom recently gave the FCC "high marks." However, some parties think the FCC may have overstepped its authority in setting certain pricing rules for local interconnection, and successfully sought a stay of those rules. The pricing rules were part of the larger matter of interconnection: that is the direct or indirect connection of a requesting entrant's facilities and equipment with the incumbent LEC's network. The telecommunications act required LECs and new entrants to voluntarily negotiate interconnection arrangements in "good faith." That incentive led to the FCC's ratemaking agreement was the hope of offering in-region long-distance services. In fact, LECs had to notify a point competitive checklist of conditions set by Congress in order to qualify to offer such services.

To prevent breakdowns in negotiations, the act allowed any party to the negotiation—135 days to 180 days after the request was filed—to seek arbitration from the state public utility commission. By statute, state utility commissions had to resolve matters within nine months to the day the entrant filed its request. The FCC was charged with crafting the guidelines for these and related matters.

Shortly after the FCC released its order last August, the LECs, several states and even some members of Congress argued that the FCC had overstepped its authority in setting competitive pricing rules. A U.S. Court of Appeals agreed and stayed the pricing rules last December. Oral arguments on the matter were presented January 16, and parties are now awaiting the court's decision. Although the stay casts some doubt over the future of the rules, interconnection negotiations and arbitrations are continuing nationwide. "For one year out, we think that things are going well," said Mary M. C. Berman, vice president at USTA. But long-distance companies disagree. According to Carol A. N. Bischoff, vice president of regulatory and legislative affairs for CompTel, "just because agreements have been signed doesn't mean there's competition out there." CompTel is the trade association representing competitive long-distance providers.

In January, CompTel sponsored a congressional briefing on local competition to date. A long with member companies as well as several competitive LECs, CompTel argued that local competition was not a reality. "The primary goal of the act was to promote local competition," Bischoff said, "and that has not happened." If the emergence of competition in the local exchange has been slower than anticipated, NCTA's Anstrom said at a recent press conference, it can be attributed to three factors. One factor was local telephone company efforts to thwart competition. The other two factors, Anstrom said, were cities' attempts to extend their jurisdiction into telecommuni-

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Continued on Page 9

Washington Update

Clinton creates new committee to advise on HPCC technologies

President Clinton recently announced that Ken Kennedy, director of the Center for Research on Parallel Computation at Rice University, will co-chair a new committee to advise the government on computing and communications research. The Advisory Committee on High-Performance Computing and Communications, Information Technology and the Next-Generation Internet will provide advice to the National Science and Technology Council on "all areas of high-performance computing, communications and information technologies," Clinton said.

At the press time the other co-chair had not been named, and some members had not been selected. Members who were announced are:

• Eric A. Benhamou, 3com Corp.
• Vinton Cerf, MCI Communications
• Ching Chin Chen, Simmons College
• David Cooper, Lawrence Livermore National Laboratory
• Steven D. Dorfman, Hughes Electronics Corp.
• Robert Ewald, Cray Research Inc. and Silicon Graphics Inc.
• David J. Farber, University of Pennsylvania
• Sherrilynne S. Fuller, University of Washington
• Hector Garcia-Molina, Stanford University
• Susan Graham, University of California at Berkeley
• James N. Gray, Microsoft Corp.
• W. David Hillis, Thinking Machines Corp.
• David C. Nadel, AT&T Labs
• Raj Reddy, Carnegie Mellon University
• Edward H. Shortliffe, Stanford University
• Larry Smarr, University of Illinois at Urbana-Champaign
• Leslie Vadasz, Intel Corp.
• Andrew J. Viterbi, Qualcomm Inc.
• Steven J. Wallace, Hewlett-Packard Co. and Convex Computer Corp.

Katz from Page 2

traditional metrics of academic success—fame and reputation—although financial support for the research group is also a consideration. Staff programs actually have fewer rights than students; because they work "for hire," their rights are paced to the institution. It seems unfair that students lose their authorship rights when they become staff.

The third break-out group focused on the fundamental principle underlying intellectual property rights. They recommended that all intellectual property be treated in a consistent manner by university policies, whether protected by patents, copyrights or other forms of

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Continued on Page 9
Grad, undergrad student enrollments up

By Gregory R. Andrews
Chair, CRA Surveys Committee

The accompanying tables present the results of the 26th annual CRA Taulbee Survey of Ph.D.-granting departments of computer science (CS) and computer engineering (CE) in the United States and Canada. Information was gathered during the fall and early winter. The tables include all responses received by the first week of February.

An innovation this year is that the survey could be submitted online or on paper. About half of the respondents used the online form for at least part of their input.

Information on degree production and enrollment applies to the previous academic year (1995-96). Information on faculty applies to the current academic year (1995-96). Faculty salaries reflect those in effect as of Jan. 1, 1997. Readers should keep in mind that survey results are from Ph.D.-granting departments only; there are hundreds more departments that only award bachelor’s and master’s degrees.

This article draws attention to the most significant results of the survey, especially results that are substantially different from last year.

The first notable difference is that the response rate was much lower (81% versus 91% a year ago). This is surprising, because we simplified the survey form and provided both hard copy and online versions. Part of the reason may be that we held to a firm deadline for responding. The major reason is probably that we made fewer follow-up calls than last year. However, the response rate is certainly high enough for the results to be meaningful.

Degree production (Figures 1 and 2; Tables 1-7)

The tables and graphs show that a total of 915 Ph.D. degrees were awarded in 1996 by the 130 responding departments. We believe that about 100 degrees were awarded by the other 30 Ph.D.-granting departments. This estimated total of 1,015 degrees is down somewhat from last year. But as Figure 2 shows, Ph.D. production has been essentially flat for six years.

Production should hold steady next year as well, based on the predicted number of new Ph.D.s (Table 1) less the usual correction of about 150 for overly optimistic predictions by departments. Longer-range predictions are harder to make. Enrollment of new Ph.D. students was down about 300 students last year, and about 100 fewer students passed their Ph.D. qualifying exam this year than last. On the other hand, enrollment of new Ph.D. students rose back to the level of two years ago (see next section).

Table 5 shows the areas of specialization and types of first appointments for last year’s Ph.D. recipients. The table has been changed in two ways relative to last year. First, there are 10 columns for specializations rather than six, and the columns have more descriptive headings. Second, there are now several rows rather than just one for the positions taken by new Ph.D.s who were hired by Engineering (CE) in the United States and Canada. Information was gathered during the fall and early winter. The tables include all responses received by the first week of February.

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Table 5 shows the areas of specialization and types of first appointments for last year’s Ph.D. recipients. The table has been changed in two ways relative to last year. First, there are 10 columns for specializations rather than six, and the columns have more descriptive headings. Second, there are now several rows rather than just one for the positions taken by new Ph.D.s who were hired by
1996 CRA Taulbee Survey

Table 3. Gender of Ph.D. Recipients

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>CE</th>
<th>CS &amp; CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>736</td>
<td>63</td>
<td>799 (87%)</td>
</tr>
<tr>
<td>Female</td>
<td>101</td>
<td>6</td>
<td>107 (12%)</td>
</tr>
<tr>
<td>Total</td>
<td>843</td>
<td>72</td>
<td>915*</td>
</tr>
</tbody>
</table>

Table 4. Gender of Bachelor's and Master's Recipients

<table>
<thead>
<tr>
<th></th>
<th>Bachelor's</th>
<th>Master's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6,692 (80%)</td>
<td>3,318 (78%)</td>
</tr>
<tr>
<td>Female</td>
<td>1,336 (16%)</td>
<td>852 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>8,441*</td>
<td>4,170*</td>
</tr>
</tbody>
</table>

Table 5. Employment of New Ph.D. Recipients by Specialty

<table>
<thead>
<tr>
<th>Specialty</th>
<th>New Ph.D.s in Ph.D.-Granting Depts.</th>
<th>New Ph.D.s, Other Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure-Track</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Researchers</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Postdocs</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>Instructors</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>172</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 6. Ethnicity of Ph.D. Recipients

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>CS</th>
<th>CE</th>
<th>CS &amp; CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>283 (34%)</td>
<td>37 (51%)</td>
<td>320 (35%)</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>10 (1%)</td>
<td>1 (1%)</td>
<td>11 (1%)</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>5 (1%)</td>
<td>0 (0%)</td>
<td>5 (1%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>130 (15%)</td>
<td>13 (18%)</td>
<td>143 (16%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>24 (3%)</td>
<td>3 (4%)</td>
<td>27 (3%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>336 (40%)</td>
<td>14 (19%)</td>
<td>350 (38%)</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>24 (3%)</td>
<td>0 (0%)</td>
<td>24 (3%)</td>
</tr>
<tr>
<td>Did Not Indicate</td>
<td>31 (4%)</td>
<td>4 (6%)</td>
<td>35 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>843(100%)</td>
<td>72(100%)</td>
<td>915(100%)</td>
</tr>
</tbody>
</table>

Table 7. Ethnicity of Bachelor's and Master's Recipients

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Bachelor's</th>
<th>Master's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>626 (17%)</td>
<td>1,499 (35%)</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>207 (2%)</td>
<td>51 (1%)</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>12 (0%)</td>
<td>45 (1%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>1,029 (12%)</td>
<td>730 (17%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>182 (3%)</td>
<td>279 (11%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>4,086 (49%)</td>
<td>1,387 (33%)</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>110 (1%)</td>
<td>58 (2%)</td>
</tr>
<tr>
<td>Did Not Indicate</td>
<td>2,159 (26%)</td>
<td>411 (10%)</td>
</tr>
<tr>
<td>Total</td>
<td>8,441 (100%)</td>
<td>4,260 (100%)</td>
</tr>
</tbody>
</table>

Table 8. New Students in Fall 1996

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US CS Ranked 1-12</td>
<td>2,037</td>
<td>185.2</td>
<td>596</td>
<td>49.7</td>
<td>280</td>
<td>23.3</td>
</tr>
<tr>
<td>US CS Ranked 13-24</td>
<td>1,014</td>
<td>92.2</td>
<td>325</td>
<td>29.5</td>
<td>217</td>
<td>19.7</td>
</tr>
<tr>
<td>US CS Ranked 25-36</td>
<td>1,051</td>
<td>95.5</td>
<td>177</td>
<td>16.1</td>
<td>147</td>
<td>13.4</td>
</tr>
<tr>
<td>US CS Other</td>
<td>7,275</td>
<td>97.5</td>
<td>1,679</td>
<td>223.4</td>
<td>560</td>
<td>7.6</td>
</tr>
<tr>
<td>Canadian CS</td>
<td>2,267</td>
<td>226.7</td>
<td>253</td>
<td>21.1</td>
<td>63</td>
<td>5.25</td>
</tr>
<tr>
<td>US CE</td>
<td>595</td>
<td>59.5</td>
<td>324</td>
<td>32.4</td>
<td>78</td>
<td>7.8</td>
</tr>
<tr>
<td>Total</td>
<td>14,239</td>
<td>111.2</td>
<td>3,354</td>
<td>25.8</td>
<td>1,345</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Footnotes

All ethnicity tables: “Asian or Pacific Islander” includes people originating from the Pacific Islands, China, Japan, Korea, the Philippines, Samoa, India and Vietnam; “White, Non-Hispanic” includes people originating from Europe, North Africa and the Middle East.

All tables with rankings: Statistics sometimes are given according to departmental rank. Schools are ranked only if they offer a CS degree and according to the quality of its CS program as determined by reputation. Those that only offer CE degrees are not ranked, and statistics are given on a separate line, apart from those in the rankings. In Table 1, the “Ph.D.s Produced” column shows the number of CS and CE degrees produced throughout the rankings. While CE degrees are not ranked, and statistics are given on a separate line, apart from those in the rankings. In Table 1, the “Ph.D.s Produced” column shows the number of CS and CE degrees produced throughout the rankings. While CE degrees are not ranked, and statistics are given on a separate line, apart from those in the rankings.

Nonresident Faculty: A small percentage of faculty were nonresident aliens when they were hired to work in fiscal 1996-97. In many cases, these new employees were gaining residency based on their new employment prospects. All faculty tables: The survey makes no distinction between faculty specializing in CS versus CE programs. We tried to minimize inclusion of any faculty in electrical engineering.

Survey text from Page 5

Ph.D.-granting CS or CE departments. Despite these improvements, the number of unknown degree specializations and unknown types of first positions are much too large (10% to 20%). We plan to investigate why in hopes of having more accurate data next year.

The gender and ethnicity percentages remain relatively stable. The notable exception is that the number of master’s and Ph.D. degrees earned by Native Americans or Alaskan Natives is way up—from three to 45 for master’s degrees and from one to five for Ph.D. degrees.

Student enrollment (Tables 8-12)

To put it succinctly: Enrollments are up dramatically, the number of new Ph.D. students is up from 10,099 to 11,224, which is also about the level it was two years ago. The number of new master’s students rose back to the level of two years ago. The number of new bachelor’s students is up from 10,099 to 11,224, which is also about the level it was two years ago.

Text continued on Page 7
Faculty demographics (Tables 13-18)

Table 13 illustrates current and predicted numbers of full-time-equivalent faculty members, with rows this year for different faculty ranks, including researchers and postdoctorates. We also include a table that presents faculty data by different groups of departments.

For some reason, departments are pessimistic about next year but then predict a slow growth back to this year’s total number of faculty. By contrast, past surveys have always predicted growth and have been overly optimistic.

As expected, the gender and ethnicity percentages for faculty remain almost the same as last year. Of note, however, are the differences between percentages in Table 6 (ethnicity of new Ph.D.s) and Table 19 (ethnicity of newly hired faculty); a much smaller percentage of nonresident aliens are hired into tenure-track positions than are awarded Ph.D.s. And a much larger percentage of white, non-Hispanics are hired into tenure-track positions than are awarded Ph.D.s.

Faculty salaries (Tables 20-28)

Faculty salaries again rose about 3% in all ranks relative to a year ago. (The overall averages in Table 20 are slightly higher than those reported in January.) This year, salaries for newly reported faculty are listed by type of position (tenure-track, researcher, postdoctorate and other) rather than by groups of departments.

Rankings

For tables that group computer science departments by the rank of 1-12, 13-24 and 25-36, we based our ranking on information released in the 1995 assessment of research-doctorate programs in the United States done under the auspices of the National Research Council.

Our top 12 schools 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 25-36 are Brown University, Yale University, the University of California at Los Angeles, the University of Maryland at College Park, New York University, the University of Massachusetts at Amherst, Rice University, the University of Southern California, the University of Michigan, the University of California at San Diego, Columbia University and the University of Pennsylvania.

The departments ranked 25-36 are Brown University, Yale University, the University of California at Los Angeles, the University of Maryland at College Park, New York University, the University of Massachusetts at Amherst, Rice University, the University of Southern California, the University of Michigan, the University of California at San Diego, Columbia University and the University of Pennsylvania.

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The departments ranked 25-36 are Brown University, Yale University, the University of California at Los Angeles, the University of Maryland at College Park, New York University, the University of Massachusetts at Amherst, Rice University, the University of Southern California, the University of Michigan, the University of California at San Diego, Columbia University and the University of Pennsylvania.

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### 1996 CRA Taulbee Survey

#### Table 16. Gender of Newly Hired Faculty

<table>
<thead>
<tr>
<th>Tenure-Track</th>
<th>Researcher</th>
<th>Postdoc</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>95 (83%)</td>
<td>28 (80%)</td>
<td>56 (86%)</td>
</tr>
<tr>
<td>Female</td>
<td>17 (15%)</td>
<td>7 (20%)</td>
<td>9 (14%)</td>
</tr>
<tr>
<td>Total</td>
<td>112*</td>
<td>35</td>
<td>65</td>
</tr>
</tbody>
</table>

#### Table 17. Ethnicity of Professors

<table>
<thead>
<tr>
<th>Assistant</th>
<th>Associate</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresident Alien</td>
<td>27 (5%)</td>
<td>4 (0%)</td>
</tr>
<tr>
<td>African American, Non-Hispanic</td>
<td>7 (1%)</td>
<td>9 (1%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>1 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>117 (22%)</td>
<td>173 (21%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>12 (2%)</td>
<td>19 (2%)</td>
</tr>
<tr>
<td>White, Non-Hispanic</td>
<td>315 (59%)</td>
<td>547 (66%)</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>15 (3%)</td>
<td>6 (1%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>494 (92%)</td>
<td>758 (91%)</td>
</tr>
<tr>
<td>Did Not Indicate</td>
<td>42 (8%)</td>
<td>76 (9%)</td>
</tr>
<tr>
<td>Total</td>
<td>536 (100%)</td>
<td>834 (100%)</td>
</tr>
</tbody>
</table>

#### Table 18. Gender of Professors

<table>
<thead>
<tr>
<th>Assistant</th>
<th>Associate</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>434 (61%)</td>
<td>750 (90%)</td>
</tr>
<tr>
<td>Female</td>
<td>102 (19%)</td>
<td>84 (10%)</td>
</tr>
<tr>
<td>Total</td>
<td>536</td>
<td>834</td>
</tr>
</tbody>
</table>

#### Table 19. Faculty Losses

<table>
<thead>
<tr>
<th>Died</th>
<th>Retired</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>33</td>
<td>165</td>
</tr>
</tbody>
</table>

#### Table 20. Nine-Month Salaries, 98 Responses of 131 US CS Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>413</td>
<td>$33,155 - $53,353</td>
<td>$55,360</td>
<td>$61,721 - $113,259</td>
</tr>
<tr>
<td>Associate</td>
<td>653</td>
<td>$37,871 - $58,477</td>
<td>$64,307</td>
<td>$71,250 - $134,507</td>
</tr>
<tr>
<td>Full</td>
<td>815</td>
<td>$39,300 - $70,755</td>
<td>$87,604</td>
<td>$100,000 - $163,900</td>
</tr>
<tr>
<td>Teacher</td>
<td>63</td>
<td>$50,500 - $65,633</td>
<td>$64,704</td>
<td>$67,000 - $76,400</td>
</tr>
<tr>
<td>Other</td>
<td>156</td>
<td>$39,300 - $70,431</td>
<td>$80,000</td>
<td>$100,000 - $163,900</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$39,300 - $70,755</td>
<td>$87,604</td>
<td>$100,000 - $163,900</td>
</tr>
</tbody>
</table>

#### Table 21. Nine-Month Salaries, 12 Responses of 12 US CS Departments Ranked 1-12

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>44</td>
<td>$54,000 - $65,543</td>
<td>$63,650</td>
<td>$67,000 - $76,400</td>
</tr>
<tr>
<td>Associate</td>
<td>75</td>
<td>$54,247 - $63,376</td>
<td>$68,647</td>
<td>$67,000 - $75,135</td>
</tr>
<tr>
<td>Full</td>
<td>139</td>
<td>$61,911 - $74,018</td>
<td>$89,600</td>
<td>$116,600 - $132,992</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$54,000 - $65,543</td>
<td>$63,650</td>
<td>$67,000 - $76,400</td>
</tr>
</tbody>
</table>

#### Table 22. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 13-24

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>47</td>
<td>$53,000 - $55,234</td>
<td>$57,770</td>
<td>$57,521</td>
</tr>
<tr>
<td>Associate</td>
<td>63</td>
<td>$57,948 - $61,989</td>
<td>$69,000</td>
<td>$64,654</td>
</tr>
<tr>
<td>Full</td>
<td>89</td>
<td>$65,574 - $73,625</td>
<td>$90,300</td>
<td>$91,233</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$53,000 - $55,234</td>
<td>$57,770</td>
<td>$57,521</td>
</tr>
</tbody>
</table>

#### Table 23. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 25-36

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>259</td>
<td>$33,155 - $52,131</td>
<td>$68,000</td>
<td>$54,029</td>
</tr>
<tr>
<td>Associate</td>
<td>440</td>
<td>$37,871 - $56,870</td>
<td>$82,500</td>
<td>$82,804</td>
</tr>
<tr>
<td>Full</td>
<td>422</td>
<td>$47,871 - $69,920</td>
<td>$95,000</td>
<td>$84,299</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$33,155 - $52,131</td>
<td>$68,000</td>
<td>$54,029</td>
</tr>
</tbody>
</table>

#### Table 24. Nine-Month Salaries, 69 Responses of 95 US CS Departments Ranked Higher than 36 or Unranked

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>24</td>
<td>$49,396 - $53,225</td>
<td>$58,976</td>
<td>$55,787</td>
</tr>
<tr>
<td>Associate</td>
<td>56</td>
<td>$55,659 - $59,357</td>
<td>$66,273</td>
<td>$64,928</td>
</tr>
<tr>
<td>Full</td>
<td>55</td>
<td>$57,000 - $72,124</td>
<td>$80,900</td>
<td>$85,460</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$49,396 - $53,225</td>
<td>$58,976</td>
<td>$55,787</td>
</tr>
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</table>

#### Table 25. Nine-Month Salaries, 8 Responses of 13 US CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>24</td>
<td>$49,396 - $53,225</td>
<td>$58,976</td>
<td>$55,787</td>
</tr>
<tr>
<td>Associate</td>
<td>56</td>
<td>$55,659 - $59,357</td>
<td>$66,273</td>
<td>$64,928</td>
</tr>
<tr>
<td>Full</td>
<td>55</td>
<td>$57,000 - $72,124</td>
<td>$80,900</td>
<td>$85,460</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$49,396 - $53,225</td>
<td>$58,976</td>
<td>$55,787</td>
</tr>
</tbody>
</table>

### Survey text from Page 7

University, Rutgers—the State University of New Jersey, Duke University, the University of North Carolina at Chapel Hill, the University of Rochester, the State University of New York at Stony Brook, the Georgia Institute of Technology, the University of Arizona, the University of California at Irvine, the University of Virginia and Indiana University.

### Acknowledgments

Juan O. Luna drafted the survey and prepared the online version. Phillip Louis collected data and handled follow-up e-mail and telephone calls. Andy Goldstein prepared the accompanying tables. Joan Bas coordinated production and layout.

### Telecom from Page 4

C ommunications via “new, costly regulatory regimes” and the “fickleness” of financial markets.

And yet, the interconnection rules have only been in place since August, and two related FCC proceedings are still unfolding: universal service and access charge reform.

Universal service. Today, nearly 94% of Americans have access to basic affordable telephone service.

Given the advent of competition in the local exchange, Congress wanted to ensure the perpetuation of universal service, particularly in high-cost and rural areas, and guarantee access to certain advanced telecommunications services by schools, some health care providers and libraries. To assist with policy making related to these and other issues, Congress directed the FCC to establish a Federal/State Joint Board on Universal Service.

In November the joint board issued its recommendations (a hefty 457 pages). The FCC is now considering those recommendations as well as the many

Continued on Page 9
Table 26. 12-Month Salaries, 9 Responses of 16 Canadian Departments (Canadian Dollars)

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimun</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>48</td>
<td>$42,000</td>
<td>$50,392</td>
<td>$60,000</td>
</tr>
<tr>
<td>Associate</td>
<td>100</td>
<td>$49,432</td>
<td>$59,476</td>
<td>$68,086</td>
</tr>
<tr>
<td>Full</td>
<td>118</td>
<td>$52,664</td>
<td>$75,451</td>
<td>$90,507</td>
</tr>
</tbody>
</table>

Table 27. Nine-Month Salaries, 106 Responses of 144 US CS and CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimun</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>437</td>
<td>$33,155</td>
<td>$53,344</td>
<td>$68,000</td>
</tr>
<tr>
<td>Associate</td>
<td>709</td>
<td>$37,871</td>
<td>$58,543</td>
<td>$64,353</td>
</tr>
<tr>
<td>Full</td>
<td>870</td>
<td>$39,300</td>
<td>$70,868</td>
<td>$87,427</td>
</tr>
</tbody>
</table>

Table 28. Salaries for Newly Appointed Faculty, 17 Responding US CS and CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting Salary Data</th>
<th>Reported Salary Minimun</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure-Track</td>
<td>46</td>
<td>$45,000</td>
<td>$54,739</td>
<td>$62,500</td>
</tr>
<tr>
<td>Researcher</td>
<td>12</td>
<td>$35,000</td>
<td>$55,541</td>
<td>$71,412</td>
</tr>
<tr>
<td>Postdoc</td>
<td>24</td>
<td>$29,397</td>
<td>$37,921</td>
<td>$54,756</td>
</tr>
<tr>
<td>Other/Not Listed</td>
<td>25</td>
<td>$35,000</td>
<td>$42,671</td>
<td>$51,000</td>
</tr>
</tbody>
</table>

Katz from Page 4

legal protection. Incentives for those involved in the development, protection and transfer of intellectual property should be structured to achieve the institution's desired goals. For example, university licensing offices are all too often measured by the licensing fees they earn rather than the successful university-industry linkages they have facilitated. The result is a narrow focus on finding the next home run piece of intellectual property, such as the NCSA Mosaic browser. Benefits should be shared fairly among all individuals and organizations who have contributed to development of the intellectual property. Because time can be of the essence in disseminating the ideas embodied in software, licensing decisions must be expedited. A iso, the university should not forget to reserve educational research access to its licensed intellectual property. Faculty and students must be better educated about the changing nature of intellectual property. The final break-out group focused on the issues of multi-university, multi-industry consortium agreements. The group examined the various kinds of consortia: affiliates programs and sponsored research agreements involving different numbers of universities and industry sponsors. Affiliates are the simplest, with modest expectations in terms of research funding and access to intellectual property. Arrangements that involve many participants, especially when they span multiple institutions, are especially difficult because of the complexities of reaching a uniform licensing agreement. For example, the concepts of ownership and control vary at different universities. At some, ownership and control rest with the faculty creator, while at others the institution owns the intellectual property, but the creator controls it. The key challenge is to set up consistent rules within consortium agreements.

In summary, the workshop participants thought it very important to take the broad view of the university's mission with respect to industrial interaction and intellectual property. They encouraged the formulation of uniform policies that maximize the value received for university intellectual property, including patents, copyrights and trade secrets. Such policies should recognize the many facets of the university mission: disseminating knowledge, fostering industry relationships, and enhancing the fame and reputation of the institution. Recurring royalties are but one measure of successful technology transfer. The workshop participants committed themselves to work toward making a difference in the intellectual property rights policies at their institutions.

With the help of Rick Adrion, Peter Bostrom, Bill Green and Kaz Kazmaier, we are in the process of drafting a comprehensive workshop report and set of recommendations. A raw form of the workshop notes can be found at http://www.cs.berkeley.edu/~randy/CRA.WS.html.

Katz is a CRA Board member and professor of computer science at the University of California at Berkeley.

Telecom from Page 8

comments filed in response. It is required to issue a report in May.

Interstate access charges. The FCC has just started looking at what it calls the "third in a trilogy of actions" (the first two being interconnection and universal service) related to the competitive future: the system of interstate access charges.

In December it released a Notice of Proposed Rulemaking (NPRM) requesting comment. A counties are the fees paid by long-distance carriers to local exchange providers for the costs of using the local network in originating and terminating calls. Part 69 of the FCC's rules ensure that these rates are "just, reasonable and nondiscriminatory."

Those rules, as the NPRM notes, were developed about the same time as divestiture and with the emerging competitive long-distance (interexchange) market in mind. "While our Part 69 rules expressly contemplated competition in the interexchange market, they were not designed to address the potential effects of competition in the local exchange and exchange access markets."

To address this disparity and related matters, the FCC is requesting comment on 3) a market-based approach that would let actual and potential competition drive prices toward economic cost; 2) a "prescriptive" approach that would allow the FCC to set the "nature and timing of the charges to existing rate levels" (both increases and decreases) in the NFRM; or 3) a combination of the two approaches.

The NPRM raises the new issue of whether access charges should be paid by another group of parties that make use of the local network to provide local services i.e., information service providers and Internet access providers (what the FCC refers to collectively as "enhanced service providers"). Local telephone companies contend that the flat monthly business line rate Internet access providers pay does not cover the costs they incur meeting burgeoning demand. Internet service providers argue that the revenue telephone companies are now getting from customers ordering second phone lines as well as current rates more than covers their costs.

In raising the specter of possible rules regarding Internet services, the FCC was almost apologetic, writing that: "...we have long sought to avoid unnecessary regulation of information services. A usage charge to them, such services may have an increasingly significant effect on the public switched network. Therefore, as part of this comprehensive proceeding, we must consider how our rules can provide incentives for investment and innovation in the underlying networks to support the Internet and other information services."

While the FCC tentatively concluded that information service and Internet access providers should not have to pay access charges (as currently constituted), it issued a related Notice of Inquiry (NOI) along with the NPRM to address related issues.

In its NOI, the FCC explained why growing residential usage of Internet services may require attention: "Virtually all residential users today connect to the Internet—a packet-switched data network—through incumbent LEC switching facilities designed for circuit-switched voice calls. The end-to-end dedicated channels created by circuit switches are unnecessary and even inefficient when used to connect an end user to an ISP [Internet service provider]."

For more information on both the NFRM and NOI, see http://www.fcc.gov. Although the comment and reply dates for the NPRM have passed, the commission is now accepting comments on the NOI. Informal comments may be sent to lipg@ftcc.gov until March 24 (Specify FCC Docket No. 96-263). Reply comments are due April 23.
CRN Advertising Policy

Send copy and payment for Professional Opportunities advertisements to:

C O M P U T I N G R E S E A R C H N E W S
March 1997

Committee on Computing Research
National Science Foundation
4200 Wilson Boulevard
Arlington, VA 22230

Professional Opportunities

The Computing Research News is published five times per year: in January, March, May, September and November. Professional Opportunities ads will be accepted until the positions are filled. The deadline for a Professional Opportunities display ad is April 1. Ads for electronic distribution only may be submitted at any time.

Purdue University
School of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering seeks outstanding candidates for one or more tenure-track positions at all ranks. Qualifications include a Ph.D. (or equivalent) in electrical engineering or a closely related field. Candidates should have a strong record of research and teaching. The university is committed to affirmative action, equal opportunity and affirmative action employment.

University of Michigan
Division of Computer Science and Engineering

Applications are solicited for several faculty positions to be filled as part of the Computing (CSE) Division at all ranks. Qualifications include a Ph.D. (or equivalent) in computer science or computer engineering. Particular areas of interest include multimedia, computer networking, software and network research. Applicants should send resume and names of five references to Professor F. T. Leighton, Chair, Department of Computer Science and Engineering, University of Michigan, 1300 Beal Ave., Room 4341, Ann Arbor, MI 48109-2122.

Clemson University
Department of Computer Science

The Department of Computer Science at Clemson University invites applications for two assistant professor level tenure-track positions in computer science. Applicants should have at least one year's experience in computer science at the Ph.D. level. Applicants should have at least one year's experience in computer science at the Ph.D. level. Applicants should be committed to excellence in teaching and research. Clemson University is an equal opportunity, affirmative action employer.

University of Houston
Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering at the University of Houston invites applications for tenure-track positions at all ranks. The successful candidate will have a Ph.D. in electrical or computer engineering or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Electrical and Computer Engineering at the University of Houston is available on the World Wide Web at http://www.ece.uh.edu.

University of Saskatchewan
Department of Computer Science

Applications are invited for a tenure-track position in the area of computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding research and teaching. The Department of Computer Science at the University of Saskatchewan is a major Western Canadian university with a wide range of academic programs and approximately 10,000 full-time students. The Department of Computer Science is located in one of Canada's largest urban universities and is a dynamic and internationally recognized department with outstanding undergraduate and graduate programs. The Department has more than 300 undergraduate majors and more than 100 graduate students, and offers a number of professional programs.

Clemson University in the land-grant, university of South Carolina and has an enrollment of more than 17,000. Clemson, SC, is a small town located on Lake Hartwell at the edge of the Blue Ridge Mountains.

Applications should be addressed to Professor R. Bruce Thomas, Chair, Department of Computer Science, University of Saskatchewan, 45435, 3010 College Avenue, Saskatoon, SK, Canada.

Bowdoin College
Department of Computer Science

Applications are invited for a tenure-track position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science at Bowdoin College is available on the World Wide Web at http://www.cs.bowdoin.edu.

University of North Carolina, Chapel Hill
Department of Computer Science

The University of North Carolina at Chapel Hill seeks an outstanding computer science professor to become Chair of the Department of Computer Science. The Department, with 200 faculty members, is a major research and teaching unit with significant educational, public service and regional economic impacts. The department is home to approximately 1,000 undergraduate students and 50 graduate students, and is an integral part of the university's multidisciplinary research and education programs. The Department of Computer Science at the University of North Carolina at Chapel Hill is an equal opportunity, affirmative action employer.

Bowie State University
Department of Computer Science

Applications are invited for a position in the Department of Computer Science at Bowie State University (BSU). The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science at Bowie State University is available on the World Wide Web at http://www.cs.bowiestate.edu.

University of Central Connecticut
Information Technology Research Institute

Applications are invited for a Postdoctoral Research position in the Information Technology Research Institute, an R&D organization within the College of Engineering, Computer Science and Business at Eastern Connecticut State University. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding research and teaching. Further information about Eastern and the department is available on the World Wide Web at http://www.cs.uea.edu.

University of Dayton
Department of Computer Science

Applications are invited for a visiting assistant professor position in computer science. The successful candidate will have a Ph.D. in computer science and be committed to teaching and research. Further information about the Department of Computer Science at the University of Dayton is available on the World Wide Web at http://www.cs.udayton.edu.

Eastern Connecticut State University
Department of Computer Science

Applications are invited for a visiting assistant professor position in computer science. The successful candidate will have a Ph.D. in computer science and be committed to teaching and research. Further information about the Department of Computer Science at Eastern Connecticut State University is available on the World Wide Web at http://www.cs.uea.edu.

Eastern Connecticut State University
Department of Mathematics and Computer Science

Tenure-track assistant professor position in computer science. Applicants must have a Ph.D. in computer science and be committed to outstanding teaching and research. Further information about the Department of Computer Science at Eastern Connecticut State University is available on the World Wide Web at http://www.cs.uea.edu.

New England College
Department of Information Technology

Applications are invited for a full-time, tenure-track position in the Department of Information Technology. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding research and teaching. Further information about the Department of Information Technology at New England College is available on the World Wide Web at http://www.nec.edu.

The Ohio State University
Department of Computer Science and Engineering

The Ohio State University seeks applications for an assistant professor position in computer science and engineering with a focus on high-performance computing. The successful candidate will be expected to teach and to contribute to the curriculum. The Department of Computer Science and Engineering at The Ohio State University is housed in the Engineering East Building and is home to 200 full-time faculty members, 850 graduate students, nearly 1,000 undergraduate students, and approximately 35,000 students enrolled in the Computer Science and Engineering courses. Further information about the Department is available on the World Wide Web at http://www.cs.ohio-state.edu.

Brown University
Department of Computer Science

Applications are invited for a tenure-track position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science at Brown University is available on the World Wide Web at http://www.cs.brown.edu.

University of Southern California
Information Sciences Institute

Applications are invited for a postdoctoral position in information science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding research and teaching. Further information about the Information Sciences Institute is available on the World Wide Web at http://www.isi.edu.

Howard University
Department of Computer Science

Applications are invited for a tenure-track position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science at Howard University is available on the World Wide Web at http://www.cs.howard.edu.

The University of Texas at Austin
Department of Computer Science

Applications are invited for a position in the Department of Computer Science. The successful candidate will be expected to be a teacher, researcher and collaborator with faculty and students in the areas of computer science and computing. Further information about the Department of Computer Science at The University of Texas at Austin is available on the World Wide Web at http://www.cs.utexas.edu.

University of Virginia
Computer Science

Applications are invited for a position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science is available on the World Wide Web at http://www.cs.virginia.edu.

University of Wisconsin, Madison
Department of Computer Science

Applications are invited for a tenure-track position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science is available on the World Wide Web at http://www.cs.wisc.edu.

Georgia Institute of Technology
Department of Computer Science

Applications are invited for a position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science is available on the World Wide Web at http://www.cc.gatech.edu.

University of California, Riverside
Department of Computer Science

Applications are invited for a position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science is available on the World Wide Web at http://www.cs.ucr.edu.

University of Southern California
Department of Computer Science

Applications are invited for a position in computer science. The successful candidate will have a Ph.D. in computer science or a closely related field and be committed to outstanding teaching and research. Further information about the Department of Computer Science is available on the World Wide Web at http://www.cs.usc.edu.
University of Southern California Department of Electrical Engineering-Systems

The Department of Electrical Engineering Systems of the University of Southern California invites applications from outstanding candidates for tenure-track faculty positions at all faculty levels in three areas:

1) Communication/networks.
2) Computer architecture with emphasis on parallel and distributed computing.
3) Computer vision and related areas.

These areas reflect the Department's strong commitments to research and teaching in these fields, and to the development and study with expertise in a broad spectrum of the design, implementation, and applications of information systems and applications to multimedia, natural language processing, computer vision, and artificial intelligence.

The successful candidate will complement the current faculty strengths in communications and signal processing, computer programming languages and software design and development, and computer vision. The Department has strong connections with many scientific areas, including information science/sytems, databases, networks and operating systems, as well as electrical engineering and computer science.

New York University Department of Computer Science

The Department of Computer Science at New York University invites applications at the assistant professor rank. Desired research areas include software and distributed computing, and computer security.

Candidates should have a Ph.D. in computer science, or a closely related field. Demonstrated excellence in both research and teaching is required. The Department has a strong commitment to the principle of diversity and, in that spirit, seeks a broad range of expertise and experience in the applicant pool. Women and minorities are strongly urged to apply.

To ensure full consideration, please submit your application by March 1, 1997. For further information, see our Web pages at http://www.cs.nyu.edu.

Continued on Page 12
Jobs from Page 11

It is located in metropolitan Toronto, and is within easy reach of downtown Toronto.

A applications, with curriculum vitae and the names of three references, should be sent to Professor S. Suresh, Department of Computer Science, University of Waterloo, 200 University Avenue West, Waterloo, ON N2L 3G1. The application deadline is March 15, 1997, although later applications received will be considered if positions are still available.

University of Southwestern Louisiana

The Networking and Communication Research Infrastructure will receive a 11% boost after three years of flat funding. The NRCIR is linked to its role

Professional Opportunities

University of California, Davis

The Department of Computer Science announces several full and part-time lecturer positions available for the 1997-98 academic year. A brief description of the qualifications and application instructions can be found at http://www.cs.ucdavis.edu/position_list.html.

West Texas State University

The Department of Computer Science and Statistics is seeking a tenure-track assistant professor to begin Fall 1997. Applications are invited for a tenure-track assistant professor position to begin Fall 1997. Applicants must have, or be nearing completion of, a Ph.D. in computer science, or a closely related discipline. Additional qualifications and experience in the area of software engineering are especially desirable. The University of California at Davis is an affirmative action, equal opportunity employer.

Southwest Texas State University

The Department of Computer Science and Statistics is seeking a tenure-track assistant professor to begin Fall 1997. A Ph.D. in computer science or a closely related discipline is required. The University of California at Davis is an affirmative action, equal opportunity employer.

Computus International

The CS Department invites applications from qualified candidates for a Ph.D. in computer science or a closely related discipline. CG is an equal opportunity/affirmative action employer.

Budget from Page 1

Table 2. HPCCI Funding (in millions of dollars)

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<tr>
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</tr>
<tr>
<td>Energy</td>
<td>111</td>
<td>117</td>
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<td>EPA</td>
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<td>HIM (NH)</td>
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<td>NASA</td>
<td>116</td>
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<td>NSF</td>
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<tr>
<td>Transportation</td>
<td>23</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Veterans Affairs</td>
<td>21</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Total HPCCI Funding</td>
<td>1,023</td>
<td>1,025</td>
<td>1,128</td>
</tr>
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Estimated: Includes $100 million for Next-Generation Internet initiative corresponding to the $100 million N G I program that has been put into the HPCCI budget.

In terms of absolute increase in funding, the departments of Energy and Commerce are the big winners, with NSF coming in third. This has raised some questions, because NSF has played a major role in past Internet developments. NSF participation in HPCCI has dropped to less than 1% after the last three years, and even the increase for 1998 does not bring NSF up to the 1995 level.

Some NSF officials explain these numbers as reprogramming, and no doubt to some extent, that is still going on. Yet the symbolism to the outside world, that the Federal Research Council, may be more negative. Some congressional staff have questioned whether NSF’s move to the Virginia suburbs represents an administrative as well as physical move to the margins of science and technology policy.

So, does the budget contain good news or bad news? The good news is that computing research clearly is still as R & D priority in the public and political minds. Despite threats and continuing concerns about the effects of budget balancing, science seems to be holding its own, at least for now.

As for the future, as Rep. George Brown, the ranking Democrat on the House Science Committee and a longtime observer of science policy, said when the budget plan was released: “President’s strong State of the Union comments in support of science, technology and education were extremely encouraging. Overall, however, his budget plan is a bit short of what needs to be done.”

IT & R&D, particularly computing research, is an important part of the nation’s future well-being, we believe and say, then it is time to get serious about improving the funding picture in a dramatic way. A n D NSF has to help lead the way.