

# COMPUTING RESEARCH NEWS

Serving the Computing Research Community

March 2000 Vol. 12/No. 2

## \$85.3 Billion Requested for R&D in FY 2001

By Lisa Thompson

The Administration's FY 2001 budget proposal, introduced on February 7, 2000, contains a wealth of new spending on health, human resources, access to technology, environment, infrastructure, and R&D initiatives and programs—an expansion of the federal sector designed to secure the President's historical legacy. As the budget would exceed the caps currently imposed on discretionary spending, the President is expected to submit proposed legislation to remove those caps, a move that no longer entails the political risks it did in previous budget cycles. Reaction from the more vocal Republicans on Capitol Hill was predictable: "Too much spending, not enough tax relief."

### Overall Research and Development

The request features \$85.3 billion for research and development, including facilities and equipment. This figure is about 3 percent above the estimated R&D

spending in FY 2000, although civilian basic and applied research

Fund, a subset of overall R&D that encompasses the research budgets of

proposed in... The R&D... the following... initiatives:

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- Against 21st...

The nanc... bioenergy ini... for FY 2001... defense again... continued fu... Infrastructure... initiative (se... page 4).

### Information

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### Budget

**Table 1. R&D Funding by Sector Type**  
in millions of US dollars

	FY 1999 Actual	FY 2000 Estimate	FY 2001 Proposed	FY 00-01 % change
<b>Civilian</b>				
Basic Research	\$16,340	\$17,808	\$19,054	7%
Applied Research	11,551	12,405	13,274	7%
Development	8,522	8,818	8,981	2%
<b>Defense</b>				
Basic Research	1,128	1,219	1,274	5%
Applied Research	4,364	4,788	4,752	-1%
Development	35,780	35,253	35,340	--
<b>Total</b>				
Basic Research	17,468	19,027	20,328	7%
Applied Research	15,915	17,193	18,026	5%
Development	44,302	44,071	44,321	1%
Facilities & Eqpt.	2,657	2,453	2,658	8%
<b>Total R&amp;D</b>	<b>\$80,342</b>	<b>\$82,744</b>	<b>\$85,333</b>	<b>3%</b>

would each increase by 7 percent under the plan.

### R&D Themes & Crosscuts.

When the President talks about his R&D budget, he is more likely to refer to the 21st Century Research

the primary science agencies. (Don't be confused by the use of the word "fund"—it is not tied to a particular revenue stream, nor does it entail any additional management structures.) Collectively, the programs included in the fund would total \$43 billion in FY 2001, an increase of \$2.8 billion (or 7 percent) over the current level; the White House uses the label "Science and Technology Initiative" to refer to the

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## InterTrust's STAR Lab

By J. J. Horning

The second in a series of CRN articles describing the activities of

the question is: "InterTrust believes that it cannot afford *not* to have a first-class research lab."

Before I expand on that answer, I

market, EPR spent its first six years preparing for a market that it believed would eventually be vast. Shear, trained as a sociologist,

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## Expanding the Pipeline

# Gender Differences in Learning to Program

By Janet Carter and Tony Jenkins

The teaching (or, perhaps more accurately, the learning) of programming is a problem that few teachers of programming in higher education would deny. Indeed, most would agree that there is an alarmingly high proportion of graduates who are unable to "program" in any meaningful sense. The experience of the School of Computer Studies at the University of Leeds is no exception. Students often approach their final year project work determined to avoid programming at all costs, presumably because they either cannot program or believe that they cannot.

Our cohort comprises a mixture of novice and experienced students, and approximately 20 percent are female. We have worked, over several sessions, on innovative approaches to supporting the novice students. In the 1997-98 session a particular change was introduced—additional tutorial classes were provided for those students who approached staff and asked for additional support. We insisted that the classes were available only to students who applied; we wanted to keep the class sizes as small as possible. All students were made aware of the classes, and were told to approach a member of the teaching staff if they wished to join; in this way, we hoped to limit the classes to motivated students who were in difficulty.

This additional class was initially seen as a success. The staff saw a significant number of students who had clearly been struggling attend these classes, and eventually achieve creditable, if unspectacular, results. It was apparent, though, that the vast majority of the students attending were women—in the first year, 16 out of 20 were women. This

reasonable decision since they were clearly of great benefit to the students who attended them. We decided, however, to investigate students' attitudes and approaches to the learning of programming so that we might understand why mainly women attended the classes. This investigation would be complemented by a similar exercise at the University of Kent, where no such additional classes were available. A comparison with a different institution seemed preferable to a comparison with a different module at Leeds. We were particularly interested in how students approached programming, and there was no suitable alternative programming module at Leeds. The study involved a simple questionnaire, which was presented to students in a lecture. The students were presented with a series of seven statements, and were asked to respond on a scale of 1 through 5, where 1 meant "strongly disagree" and 5 meant "strongly agree."

The statements used were:

- I find programming easy.
- I prefer to work alone.
- When I get stuck I will always approach a lecturer for help.
- When I get stuck I prefer to ask my friends for help first.
- When I get stuck I prefer to work out the answer myself.
- In general, men are better than women at programming.
- The lecturers are more willing to help female students than male.

The main analysis would be the calculation of average "opinions" and comparisons of the responses from Leeds and Kent. The students were also asked to indicate their gender and whether they were "mature" (which we defined as aged over 21 on entry to the university).

Obviously, our main interest was in the answers to the final question and, in particular, whether students of both genders agreed with this.

answers to the question. It is clear that the mean (mean 2.0) in this statement at Leeds (with 16 more incoming students that it is the age of 21 at Leeds. I believe this with 2.3 for t age 21).

The only difference between the programming teaching at the two universities provides the are available seems reasonable these classes differences w course, many The possibility ing the modu biased toward (perhaps bec ity) cannot b would certai this. It is also the usefulness among friend first year wor made more fe first weeks. A would be tha the prospect was almost e intimidating underlying is the extra clas

A further apparent from Responses w 56 students i have been at (the class tak afternoon— Of these 56 s women. In th 31 women re of the women equivalent a men is 46 per

# CRA Conference at Snowbird 2000

It's time once again to begin thinking about Snowbird! Mark your calendars for CRA's biennial conference scheduled for **July 9-11, 2000** in Snowbird, Utah.

This is CRA's flagship conference for chairs of Ph.D.-granting departments of computer science and computer engineering, as well as leaders from U.S. industrial and government computing research laboratories. A number of other senior people from research groups, government, academia, and professional societies also attend.

The Snowbird Committee has been working since last fall to put together a strong program to address the conference's major theme—"Computer Science in the New Millennium." What will computer science departments, research, and teaching look like? What are the potential issues that may arise, and how will they be addressed?

The President of the National Academy of Engineering, William A. Wulf, will set the stage by addressing the group on the topic, "Some Challenges for Computer Science as it Enters the 21st Century." Three plenary sessions, two of which are joint industry/academic sessions, include: 1) Important Research Areas for the New Millennium; 2) Impact of the Economic Development Imperative on the Universities; and 3) Educational Challenges for the New Millennium. The program also will offer a workshop for new department chairs, as well as a

workshop for deans (new this year).

Industrial research directors will attend regular conference sessions and events, including two joint industry/academic plenary sessions (mentioned above) and one joint workshop, "University Venture Capital/Incubation Initiatives." Other workshops are specifically oriented toward issues of concern to industry, such as: "Using Spin-offs and Venture Capital to Market New Ideas" and "Managing Industrial Research Labs."

The opportunity to network with peers is one of the most valuable aspects of the conference, and it comes around only once every two years. So make your plans to escape to the mountains in July and join the crowd for several days of stimulating discussion about the future of computer science and engineering research.

This year's program committee is co-chaired by Jack Stankovic (University of Virginia) and Frances Allen (IBM T. J. Watson Research Center). Members include: James Foley (Georgia Tech and the Yamacraw Mission); David S. Johnson (AT&T Labs—Research); James Kurose (University of Massachusetts, Amherst); Eric Manning (University of Victoria); and Barbara Ryder (Rutgers University).

For details about the program, accommodations, and registration, please visit the CRA Web site at: <http://www.cra.org/>.

## CRA Industrial Careers Effective Teaching Academic Careers Workshops

June 19-20, 2000  
San Diego Marriott Hotel  
San Diego, California

in conjunction with the USENIX Annual  
Conference June 18-23, 2000

CRA is again offering its highly successful series of workshops for men and women who study or work in computing research. These workshops provide practical guidance for advanced graduate students and professionals who choose or begin their careers.

**New!** The **Industrial Careers Workshop** (June 19), organized by David S. Johnson (Transmeta Corp.), is targeted at computing researchers considering a career in industry. Topics include the nature of industry work that can be expected and how to prepare for it, conducting research and publishing, and the non-academic skills required in industry.

The **Effective Teaching in Computer Science and Engineering Workshop** (June 19), organized by Tim Finin (University of Virginia), is a highly interactive workshop that includes sessions on learning styles and instructional objectives, practical teaching and lecturing, creative problem-solving, and collaborative learning.

The **Academic Careers Workshop** (June 20), organized by David Schnabel (University of Colorado at Boulder), is targeted at beginning years of their careers and senior graduate students considering an academic career. Potential topics include time management, tenure issues, the tenure process, selecting and managing a research program, and getting funding.

Further details about the workshops and registration information are available on the CRA website at <http://www.cra.org>.

## Ph.D. in Software Engineering: A New Degree Program at Carnegie Mellon

By David Garlan, Phil Koonman, William Scherlis

computing, software architecture, software adaptation and assurance

which unreliable and unstable software cannot be tolerated:

• Requiring

# Administration Proposes New Information Security R&D

On January 7, 2000 President Clinton launched a National Plan for Information Systems Protection, and announced new budget proposals for initiatives to strengthen America's defenses against the emerging threats posed to critical infrastructure, computer systems, and networks.

The FY 2001 budget request features a Critical Infrastructure Protection R&D initiative in which 10 agencies participate. Its funding would grow from \$461 million to

\$606 million in FY 2001, a 31 percent increase.

The plan includes beefing up federal R&D and workforce activities:

- Building on the work of a science advisory panel, the Administration proposes to create a \$50 million Information Infrastructure Institute that would combine federal and private sector efforts to fill the gaps in critical infrastructure R&D that are not currently

being filled by the private sector or the Department of Defense. It would also provide demonstration and development support in key areas like benchmarks and standards and curriculum development. The institute would be funded through the National Institute for Standards and Technology.

- The plan also calls for improved recruitment, training, and retention of federal IT experts. The FY 2001 budget request will include

\$25 million for the Information Services Training initiative coordinated with an ROTC-like program in government (at the BS and MS level) in exchange for a graduate program to educate and certify the IT workforce. This program is led by the Office of Information Management and Science Founda-

# Commerce Announces Streamlined Encryption Export Re

On January 14, 2000, the U.S. Department of Commerce Bureau of Export Administration (BXA) issued new encryption export regulations that implement the new approach announced by the Clinton Administration in September 1999.

The new approach permits U.S. companies to export any encryption product around the world to commercial firms, individuals, and other non-government end-users under a license exception (i.e., without a license). In addition, "retail" encryption products that are widely available in the market can now be exported to any end-user, including foreign governments. In most cases, a one-time product review by BXA continues to be required. Post-reporting requirements are reduced to track industry business models.

"This policy helps business and promotes e-commerce by adjusting our regulations to marketplace realities that U.S. companies face

when they try to sell their products overseas. We've also worked very hard to address privacy concerns and to ensure that our law enforcement and national security concerns are met," said Commerce Secretary William M. Daley at the press conference announcing the change.

For source code, the regulation reduces controls further than announced in September 1999. Commercial encryption source code, encryption toolkits, and components can now be exported under license exception to businesses and non-government end-users for internal use and customization and for the development of new products. In addition, the regulations relax restrictions on publicly available encryption source code, including by posting on the Internet.

The regulation further streamlines requirements for U.S. companies by permitting exports of any encryption item to their foreign

subsidiaries without a prior review. Foreign employees of U.S. companies working in the United States no longer need an export license to work on encryption.

The guidelines also implement agreements reached by the Wassenaar Arrangement in December 1998 by decontrolling 64-bit mass market products, 56-bit encryption items, and 512-bit key management products. The changes do not affect restrictions on terrorist-supporting states (Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria), their nationals, and other sanctioned entities.

In developing this regulation, the Administration worked closely with stakeholders to continue a balanced approach. The government will review the workability of the regulation, receiving public comments for 120 days. A final revised rule will be issued shortly thereafter.

The regulations will address the need for new encryption legislation in Congress—t

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dom through the Export Administration Act (H.R. 85). The bill encourages the Administration to Encourage Congress to Encourage Congress (PROTECT) to encourage congressional bills will be introduced in the Administration

## 1998-1999 Taulbee Survey

# Ph.D. Enrollment Levels Off; M.S. and Undergrad Continu

By Mary Jane Irwin and Frank Friedman

This article and the accompanying tables and figures present the results of the 29<sup>th</sup> annual CRA Taulbee Survey<sup>1</sup> 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 the Computing Research Association to document trends in student enrollment, employment of graduates, and faculty salaries.

Information is gathered during the fall and early winter. The period the data covers varies from table to table. Degree production (Ph.D., Master's, and Bachelor's) and total Ph.D. enrollments refer to the previous academic year (1998-99). Data for new students in all categories and total enrollments for Master's and Bachelor's refer to the current academic year (1999-2000). Projected student production and information on faculty salaries and demographics also refer to the current academic year. Faculty salaries are those effective January 1, 2000. Responses received by January 14, 2000 are included in the tables.

The survey results are from Ph.D.-granting departments only. Two hundred and three departments were surveyed, compared with 182 departments last year. This increase was due to wider canvassing by CRA staff to get a more complete picture of the set of schools awarding CS and CE doctorates, and the addition of a few newly formed departments. Through last-minute telephone calls to departments that had not responded to the survey, we were able to obtain Ph.D. production numbers from 84% of the schools (compared with 77% last year).

**Figure 1. Number of Respondents to Faculty Salary Questions**

Year	US CS Depts.	US CE Depts.	Canadian
1995	110/133 (83%)	9/13 (69%)	11/16 (69%)
1996	98/131 (75%)	8/13 (62%)	9/16 (56%)
1997	111/133 (83%)	6/13 (46%)	13/17 (76%)
1998	122/145 (84%)	7/19 (37%)	12/18 (67%)
1999	132/156 (85%)	5/24 (21%)	19/23 (83%)

the number of departments that responded to the survey/number of schools polled for the faculty section of the survey from 1995 to 1999.

This article presents the most significant results of the survey, with particular attention to those that differ markedly from last year or that appear to indicate long-term trends. The continued low response rate for CE departments (21% this year, 37% last year) makes trend analysis for CE risky. Overall, the set of schools that responded this year was very similar to last, and the response rate was essentially the same. The high rate of return this year for Canadian schools (83% compared with 67% last year) must be considered when trying to determine trends with respect to Canadian data.

The survey form itself is modified slightly each year to ensure as high a rate of return as possible (by simplifying and clarifying), while continuing to capture the data necessary to understand trends in the discipline and also reflect changing concerns of the computing research community.

This year two questions were dropped from the survey. One question, added just last year, asked how many years it takes a student to complete the Ph.D. program (5.014 years reported last

from a five-year to a two-year window, since data further out than two years is probably unreliable.

One question was added on the number of students passing the Ph.D. preliminary/comprehensive (thesis proposal) exam. This was an attempt to fill in the gap in the Ph.D. production pipeline between passing the Ph.D. qualifying exam and graduation, in the hope that we could learn more about when students are leaving their graduate degree programs. The question on the number of Bachelor's students enrolled was expanded to capture both the number of majors and premajors (those students who have declared, but have not yet been officially admitted into the department), in the hope of forecasting future undergraduate loads more accurately.

This year, the faculty demographic and salary data on Instructors and Lecturers was combined into one category—non-tenure-track teaching faculty. As in previous surveys, differentiating between CS and CE counts for graduate students for those departments with combined programs (CSE) continued to be a problem this year.

## Degree (Tables

As shown, 944 Ph.D. degrees were produced in 1999 by the departments.

While the number of Ph.D. degrees produced fell from the 933 in 1998, only 1,000 departments responded last year, compared with virtually all departments producing last year. The survey data; however, responding to the survey marginally to the survey shows the Ph.D. production from 1989 to 1999.

The previous survey that was conducted would be awarded a Ph.D. degree, usually, over the course of the same "of" as we used last year. The number of Ph.D. degrees produced for next year was 922 new Ph.D. degrees, a decrease for a number of schools. The number of Ph.D. degrees produced (14%) from last year.

Table 4 shows the distribution of degree production versus

Taulbee

**Figure 2. Ph.D. Production 1989-1999**

## 1998-1999 Taulbee Survey

### Taulbee from Page 5

pointments for Ph.D. recipients in 1999. While similar to 1998, there was a small increase (from 35% to 38%) this year in the percentage of recipients taking positions in Ph.D.-granting

departments. This increase came at the expense of recipients taking positions in government, industry, and abroad.

The number of Master's degrees awarded (Tables 5 and 6, CS plus CE), which increased by 4.3% in 1997 with 130 (80%) departments

reporting, and by 11.1% in 1998 with 141 (77%) departments reporting, was up again by 13.1% in 1999 with 156 (77%) departments reporting.

The significant increase in Master's degrees in 1999 probably explains the decrease in the number of students taking the Ph.D. qualifier. Due to the excellent job market and companies that are now willing to hire Master's graduates with H1-B visas, students who originally planned to pursue a Ph.D. are leaving academia with only a Master's degree. The number of Master's degrees for 1999-2000 is projected to be up an additional 3%.

The growth in Master's enrollments over the years continues to be a significant indicator of the number of Ph.D.s awarded (see Table 1). Historically, the number of departments awarding Ph.D.s is approximately 10% of the nation's Bachelor's and CE. The number awarded in 1998 was 13,883 Bachelor's

**Table 2. Gender of Ph.D. Recipients by Type of Degree**

	CS	CE	CS & CE
Male	642 (85%)	86 (91%)	728 (85%)
Female	115 (15%)	9 (9%)	124 (15%)
<b>Total have Gender Data for</b>	<b>757</b>	<b>95</b>	<b>852</b>

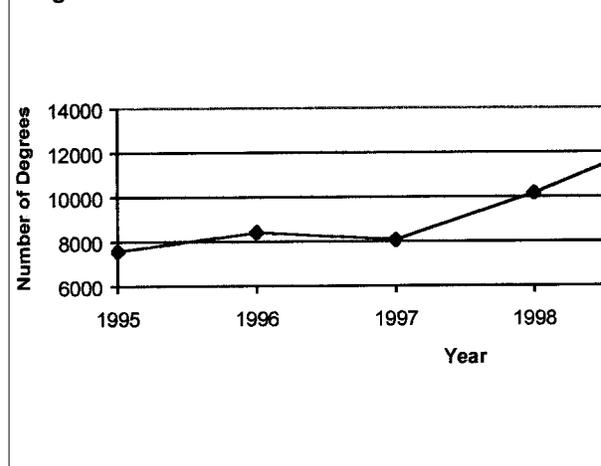
**Table 3. Ethnicity of Ph.D. Recipients by Type of Degree**

	CS	CE	CS & CE
Nonresident Alien	300 (41%)	44 (56%)	344 (42%)
African American, Non-Hispanic	15 (2%)	2 (3%)	17 (2%)
Native American or Alaskan Native	0 (0%)	1 (0%)	1 (0%)
Asian or Pacific Islander	66 (9%)	9 (7%)	75 (9%)
Hispanic	14 (2%)	4 (1%)	18 (2%)
White, Non-Hispanic	324 (44%)	20 (33%)	344 (42%)
Other/Not Listed	16 (2%)	3 (0%)	19 (2%)
<b>Total have Ethnicity Data for</b>	<b>735</b>	<b>83</b>	<b>818</b>
Ethnicity/Residency Unknown	22	12	34
<b>Total</b>	<b>757</b>	<b>95</b>	<b>852</b>

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

New Ph.D.s in Ph.D. Granting Depts.	Artificial Intelligence/Robotics	Hardware/Architecture	Numerical Analysis/Scientific Computing	Programming Languages/Compilers	OS/Networks	Software Engineering	Theory/Algorithms	Graphics/Human Interfaces	Databases/Information Systems
Tenure-Track Researchers	30	17	4	15	22	21	18	16	12
Postdocs	7	11	3	6	3	2	3	5	4
Teaching Faculty	16	2	2	1	4	2	8	3	2
<b>New Ph.D.s, Other Categories</b>	7	2	1	2	3	1	5	1	2

**Figure 3. B.S. Production 1995-2000**



## 1998-1999 Taulbee Survey

**Table 6. Ethnicity of Bachelor's and Master's Recipients**

	Bachelor's			Master's	
	CS	CE	Total	CS	CE
Nonresident Alien	623 (9%)	81 (6%)	704 (8%)	2,032 (45%)	370 (65%)
African American, Non-Hispanic	257 (4%)	70 (5%)	327 (4%)	61 (1%)	3 (1%)
Native American or Alaskan Native	23 (0%)	6 (0%)	29 (0%)	13 (0%)	- (0%)
Asian or Pacific Islander	1,580 (22%)	275 (19%)	1,855 (21%)	792 (18%)	75 (13%)
Hispanic	295 (4%)	87 (6%)	382 (4%)	47 (1%)	3 (1%)
White, Non-Hispanic	4,286 (59%)	885 (61%)	5,171 (60%)	1,341 (30%)	118 (21%)
Other/Not Listed	156 (2%)	56 (4%)	212 (2%)	223 (5%)	4 (1%)
<b>Total have Ethnicity Data for</b>	<b>7,220</b>	<b>1,460</b>	<b>8,680</b>	<b>4,509</b>	<b>573</b>
Ethnicity/Residency Unknown	3,589	423	4,012	446	51
<b>Total</b>	<b>10,809</b>	<b>1,883</b>	<b>12,692</b>	<b>4,955</b>	<b>624</b>

**Table 7. New Undergraduate Students in Fall 1999 by Department Type and Rank**

Department, Rank	CS			CE		
	Premajor	Major	Ave. Major per Dept.	Premajor	Major	Ave. Major per Dept.
US CS Ranked 1-12	-	1,604	146	205	66	6
US CS Ranked 13-24	-	1,655	138	-	399	33
US CS Ranked 25-36	174	1,203	109	20	-	-
US CS Other	474	9,191	103	-	1,732	19
Canadian CS	2,149	3,773	199	583	409	22
US CE	1,434	283	40	-	472	67
<b>Total</b>	<b>4,231</b>	<b>17,709</b>	<b>118.9</b>	<b>808</b>	<b>3,078</b>	<b>20.7</b>

**Table 8. New Master's Students in Fall 1999 by Department Type and Rank**

Department, Rank	CS		CE		Total
	Total	Ave. per Dept.	Total	Ave. per Dept.	
US CS 1-12	631	52.6	0	0.0	631
US CS 13-24	540	45.0	38	3.2	578
US CS 25-36	255	23.2	0	0.0	255
US CS Other	2,799	30.4	267	2.9	3066
Canadian	442	23.3	37	1.9	479
US CE	178	25.4	154	22.0	332
<b>Total</b>	<b>4,845</b>	<b>31.7</b>	<b>496</b>	<b>3.2</b>	<b>5,341</b>

**Table 9. New Ph.D. Students in Fall 1999 by Department Type and Rank**

Department, Rank	CS		CE		Total
	Total	Ave. per Dept.	Total	Ave. per Dept.	
US CS 1-12	0	0.0	0	0.0	0
US CS 13-24	0	0.0	0	0.0	0
US CS 25-36	0	0.0	0	0.0	0
US CS Other	0	0.0	0	0.0	0
Canadian	0	0.0	0	0.0	0
US CE	0	0.0	0	0.0	0
<b>Total</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0</b>

## 1998-1999 Taulbee Survey

**Table 11. Master's Degree Total Enrollment by Department Type and Rank**

Department, Rank	CS	CE	CS & CE
US CS 1-12	1,027 (8%)	0	1,027
US CS 13-24	1,179 (9%)	85	1,264
US CS 25-36	516 (4%)	0	516
US CS Other	8,367 (67%)	696	9,063
Canadian	1,118 (9%)	119	1,237
US CE	225 (2%)	498	723
<b>Total</b>	<b>12,432</b>	<b>1,398</b>	<b>13,830</b>

**Table 12. Ph.D. Degree Total Enrollment by Department Type and Rank**

Department, Rank	CS	CE	CS & CE
US CS 1-12	1,432 (22%)	0 (0%)	1,432 (20%)
US CS 13-24	1,019 (15%)	88 (16%)	1,107 (15%)
US CS 25-36	833 (13%)	0 (0%)	833 (12%)
US CS Other	2,858 (43%)	264 (47%)	3,122 (44%)
Canadian	431 (7%)	51 (9%)	482 (7%)
US CE	24 (0%)	160 (28%)	184 (3%)
<b>Total</b>	<b>6,597</b>	<b>563</b>	<b>7,160</b>

**Table 13. Gender of Ph.D. Program Total Enrollment**

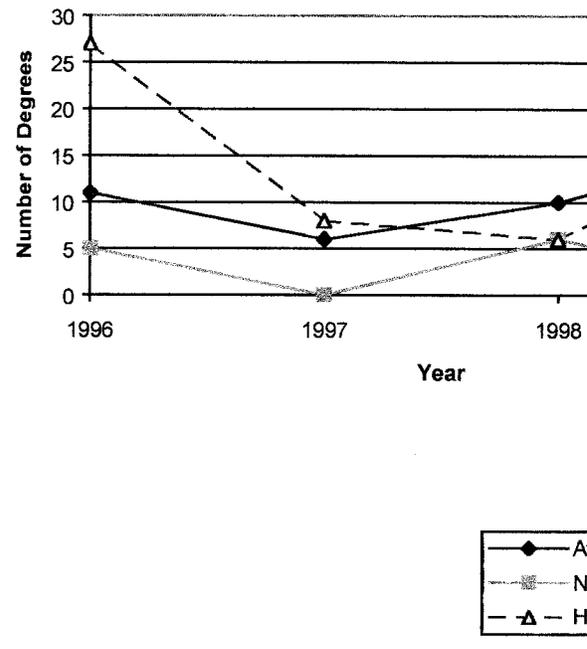
	CS	CE	CS & CE
Male	5,418 (83%)	465 (83%)	5,883 (83%)
Female	1,142 (17%)	92 (17%)	1,234 (17%)
<b>Total have Gender Data for</b>	<b>6,560</b>	<b>557</b>	<b>7,117</b>
Unknown	37	6	43
<b>Total</b>	<b>6,597</b>	<b>563</b>	<b>7,160</b>

**Table 14. Ethnicity of Ph.D. Program Total Enrollment**

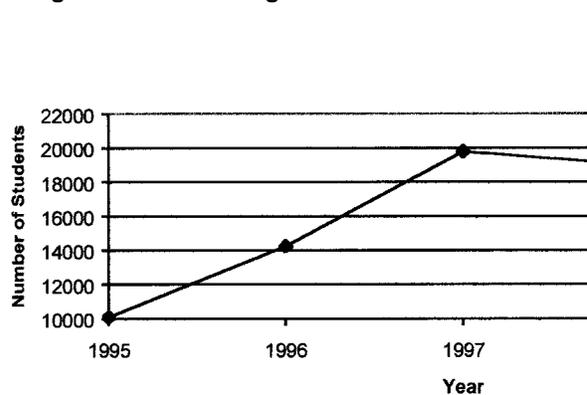
	CS	CE	CS & CE
Nonresident Alien	2,601 (44%)	263 (56%)	2,864 (45%)
African American, Non-Hispanic	125 (2%)	12 (3%)	137 (2%)
Native American or Alaskan Native	3 (0%)	1 (0%)	4 (0%)
Asian or Pacific Islander	593 (10%)	31 (7%)	624 (10%)
Hispanic	93 (2%)	6 (1%)	99 (2%)
White, Non-Hispanic	2,360 (40%)	156 (33%)	2,516 (39%)
Other/Not Listed	127 (2%)	0 (0%)	127 (2%)
<b>Total have Ethnicity Data for</b>	<b>5,902</b>	<b>469</b>	<b>6,371</b>

Ethnicity/Residency

**Figure 4. Number of Ph.D.s granted to Three Underrepresented Minorities 1996-1999**



**Figure 5. New Undergraduate Enrollment 1995-1997**



Taulbee from Page 6

awarded in the academic year 2000 (up an additional 9%). Figure 3 shows the B.S. production rate (CS plus CE) from 1995 to 2000. The largest rate of growth, 45%, was in the CE programs. However, this number does include the CE Bachelor's degrees awarded by a number of departments in the

than last year 24%. Total (Table 12) is 1% from last year points together of Ph.D. enrollment. New enrollment programs (Table 12) up 26%, implying increase of 2 US CE new

## 1998-1999 Taulbee Survey

**Table 17. Anticipated Faculty Size by Position**

	1999-2000	2000-2001	2001-2001	Ex
Tenure-Track	3,183	3,166	3,388	
Researcher	298	306	345	
Postdoc	250	241	274	
Teaching Faculty	505	496	538	
Other/Not Listed	109	106	122	
<b>Total</b>	<b>4,344</b>	<b>4,315</b>	<b>4,667</b>	

**Table 18. Anticipated Faculty by Department Type and Rank**

Department, Rank	1999-2000	2000-2001	2001-2001	Ex
US CS 1-12	582	644	690	
US CS 13-24	435	497	540	
US CS 25-36	390	388	414	
US CS Other	2,130	1,962	2,127	
Canadian	632	646	721	
US CE	176	178	175	
<b>Total</b>	<b>4,344</b>	<b>4,315</b>	<b>4,667</b>	

**Table 19. Gender of Newly Hired Faculty**

	Tenure-Track	Researcher	Postdoc	Teaching Faculty	Other
Male	285 (87%)	44 (92%)	73 (87%)	110 (77%)	9 (75%)
Female	42 (13%)	4 (8%)	11 (13%)	32 (25%)	3 (25%)
<b>Total</b>	<b>327 (53%)</b>	<b>48 (8%)</b>	<b>84 (14%)</b>	<b>142</b>	<b>12 (2%)</b>

**Table 20. Ethnicity of Newly Hired Faculty**

	Tenure-Track	Researcher	Postdoc	Teaching Faculty	Other
Nonresident Alien	46 (15%)	9 (19%)	32 (38%)	12 (9%)	1 (8%)
African American, Non-Hispanic	3 (1%)	1 (2%)	0 (0%)	5 (4%)	0 (0%)
Native American or Alaskan Native	2 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)
Asian or Pacific Islander	63 (20%)	11 (23%)	13 (15%)	13 (9%)	0 (0%)
Hispanic	3 (1%)	2 (4%)	0 (0%)	2 (1%)	0 (0%)
White, Non-Hispanic	182 (58%)	14 (30%)	34 (40%)	105 (75%)	9 (75%)
Other/Not Listed	14 (4%)	10 (21%)	5 (6%)	2 (1%)	2 (17%)
<b>Total have Ethnicity Data for</b>	<b>313</b>	<b>47</b>	<b>84</b>	<b>140</b>	<b>12</b>
Ethnicity/Residency Unknown	14	1	0	2	0
<b>Total</b>	<b>327</b>	<b>48</b>	<b>84</b>	<b>142</b>	<b>12</b>

**Table 21. Gender of Current Faculty**

## 1998-1999 Taulbee Survey

**Table 23. Faculty Losses**

	Total
Died	5
Retired	53
Took Academic Position Elsewhere	75
Took Nonacademic Position	54
Remained, Changed to Part Time	11
Other	10
Unknown	3
<b>Total</b>	<b>211</b>

### Taulbee from Page 8

the end of their sophomore year. Undoubtedly some departments included such premajors in their major counts in previous survey years. Looking at major counts only, total undergraduate enrollment for CS was down slightly (less than 1%), while total enrollment for CE was up 12% over last year.

Reversing earlier trends of a slow but steady increase in the percentage of women enrolled in CS Ph.D. programs, the number declined this year to 1,142 (down to 17%, see Table 13), compared with 1,247 last year. There were no significant changes in the ethnicity of CS Ph.D. students (Table 14). The percentage of nonresident alien CE Ph.D. students went up slightly this year from 53% to 56% and the percentage of African Americans jumped from less than 1% to 3%, balanced with a decline in the percentage of Asians and Pacific Islanders from 11% last year to 7% this year.

### Faculty Demographics (Tables 17-23)

The number of faculty in tenure-track positions (Table 17) increased by 206 (7%) over last year. But the most interesting change in faculty demographics is the large increase in Canadian faculty sizes to 632 (see Table 18),

(from 1 to 8) in the number of Native American assistant professors (see Table 22).

### Faculty Salaries (Tables 24-31)

Average increases in salary levels at US institutions (CS only) ranged from 2.5% to 6.3%, with the smallest increase at the full professor level and the largest at the assistant professor level (Table 24). The increase at the assistant level is higher than last year, but the increase at the full professor level is slightly lower. Canadian salaries posted larger increases ranging from 5.4% for full professors to 9.6% at the assistant professor level (see Table 29). Salaries reported for US institutions are 9-month salaries reported in US dollars; those for Canadian institutions are 12-month salaries reported in Canadian dollars. The overall mean salaries reported in the center column in Tables 24 through 31 are unweighted means, calculated by averaging the mean salaries reported by each department. They are *not* weighted by the number of CS and CE faculty at each institution.

Average salaries for new tenure-track and researcher Ph.D.s in US CS and CE departments rose approximately 6%. On the other hand, average salaries for non-tenure teaching faculty and postdocs dropped

schools in this ranking participated in the survey this year. One department declined to submit faculty salary information.

CS departments ranked 13-24 are: Brown, Yale, University of California at Los Angeles, University of Maryland at College Park, New York University, University of Massachusetts at Amherst, Rice, University of Southern California, University of Michigan, University of California at San Diego, Columbia, and University of Pennsylvania.<sup>2</sup> All schools in this ranking participated in the survey this year.

CS departments ranked 25-36 are: University of Chicago, Purdue, Rutgers, Duke, University of North Carolina at Chapel Hill, University of Rochester, State University of New York at Stony Brook, Georgia Institute of Technology, University of Arizona, University of California at Irvine, University of Virginia, and Indiana. All schools in this ranking participated in the survey this year. One department provided faculty salary data only.

CS departments ranked above 36 or unranked that responded to the survey include: Arizona State, Auburn, Case Western Reserve, City University of New York, Clemson, William and Mary, Colorado School of Mines, Colorado State, Dartmouth, DePaul, Drexel, Florida Atlantic, Florida Institute of Technology, Florida International, Florida State, Iowa State, Johns Hopkins, Kansas State, Kent State, Lehigh, Louisiana State, Michigan State, Michigan Technological, Mississippi State, Naval Postgraduate School, North Carolina State, North Dakota State, Northeastern, Northwestern, Oakland, Ohio State, Oklahoma State, Old Dominion, Oregon Graduate Institute, Oregon State, Pennsylvania State, Rensselaer Polytech-

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### Acknowledgments

Stacy Ch  
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Michael Co  
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### Endnotes

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## 1998-1999 Taulbee Survey

**Table 24. Nine-Month Salaries, 132 Responses of 155 US Computer Science Departments**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum
Non-Tenure Teaching Faculty	429	\$24,000	\$43,439	\$98,131	\$48,609	\$29,500	\$100,000
Assistant	600	\$40,000	\$61,065	\$75,500	\$64,244	\$54,583	\$100,000
Associate	841	\$42,616	\$65,767	\$90,000	\$72,177	\$57,677	\$100,000
Full	1107	\$45,600	\$77,150	\$109,650	\$95,526	\$63,400	\$100,000

**Table 25. Nine-Month Salaries, 11 Responses of 12 US Computer Science Departments Ranked 1-12**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum
Non-Tenure Teaching Faculty	59	\$24,470	\$56,943	\$98,131	\$65,273	\$48,434	\$100,000
Assistant	84	\$55,650	\$64,992	\$68,800	\$69,414	\$67,300	\$100,000
Associate	89	\$51,050	\$71,415	\$90,000	\$79,686	\$77,570	\$100,000
Full	202	\$45,600	\$81,557	\$93,300	\$108,896	\$130,000	\$100,000

**Table 26. Nine-Month Salaries, 12 Responses of 12 US Computer Science Departments Ranked 13-24**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum
Non-Tenure Teaching Faculty	46	\$33,333	\$48,010	\$65,592	\$57,296	\$48,428	\$100,000
Assistant	54	\$61,192	\$65,576	\$70,000	\$69,546	\$67,000	\$100,000
Associate	66	\$61,811	\$72,096	\$82,000	\$80,715	\$80,200	\$100,000
Full	172	\$66,818	\$83,735	\$109,650	\$108,595	\$130,000	\$100,000

**Table 27. Nine-Month Salaries, 12 Responses of 12 US Computer Science Departments Ranked 25-36**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum
Non-Tenure Teaching Faculty	28	\$38,000	\$49,904	\$65,000	\$56,036	\$43,900	\$100,000
Assistant	75	\$58,000	\$64,248	\$71,000	\$67,301	\$62,237	\$100,000
Associate	81	\$60,810	\$70,585	\$83,400	\$77,710	\$70,000	\$100,000
Full	137	\$67,574	\$79,296	\$92,383	\$102,842	\$96,678	\$100,000

**Table 28. Nine-Month Salaries, 96 Responses of 120 US Computer Science Departments Ranked Higher than 36 or Unranked**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum
Non-Tenure Teaching Faculty	296	\$24,000	\$40,470	\$95,000	\$44,693	\$29,500	\$100,000
Assistant	387	\$40,000	\$59,593	\$75,500	\$62,538	\$54,583	\$100,000
Associate	605	\$42,616	\$63,747	\$87,000	\$70,310	\$57,667	\$100,000
Full	596	\$52,898	\$75,933	\$100,000	\$91,164	\$63,400	\$100,000

**Table 29. Twelve-Month Salaries, 19 Responses of 23 Canadian CS & CE Departments (Canadian Dollars)**

Faculty Rank	Number of Faculty	Reported Salary Minimum			Average of all Salaries	Reported	
		Minimum	Mean	Maximum		Minimum	Maximum

**Budget from Page 1**

Performance Computing and Communications program (HPCC), the Next Generation Internet initiative (NGI), and the short-lived Information Technology for the 21st Century initiative (IT<sup>2</sup>). (Also, a portion of the Department of Energy's Accelerated Strategic Computing Initiative [ASCI], and some base computing research programs not formerly counted as HPCC or IT<sup>2</sup>, are now included under the IT R&D umbrella.) Collectively, IT R&D programs would receive nearly \$600 million in new funding; the aggregate FY 2001 budget, \$2.3 billion, would be about \$1 billion more than FY 1999 spending.

IT R&D priorities for FY 2001 include: teams to exploit advances in computing; infrastructure for advanced computational modeling and simulation; more reliable software; storing, managing, and preserving data; intelligent machines and networks of robots; ubiquitous computing and wireless networks; managing and ensuring the security and privacy of information; future generations of computers; broadband optical networks; social, economic, and workforce implications of IT; and educating and training a new generation of researchers.

Given the new classification, it is expected that the Administration will consolidate the various inter-agency coordination mechanisms for IT R&D programs.

Following are descriptions of the budget requests of the major players in federal IT R&D efforts.

**National Science Foundation**

The National Science Foundation budget request for FY 2001 is \$4.6 billion, an increase of \$675 million, the largest requested dollar increase in the agency's history and more than 17 percent above current

**NSF Research.** NSF's total support for research would be expanded by nearly 20 percent, to \$3.54 billion in FY 2001. While the increases for the focused initiatives account for about \$490 million of NSF's overall proposed budget increase, for the first time in many years a portion of the funding increment would be used to strengthen investments in core disciplinary research, including computing research.

In another notable development, the current plans for FY 2000 and FY 2001 would catapult CISE over Biological Sciences and Engineering as the NSF's third largest research directorate.

**Computer and Information Science and Engineering.** The budget request for the CISE Directorate is \$529.1 million, an increase of \$140.7 million (or 36 percent) over estimated FY 2000 spending. Most of the increase, \$100 million, would be for the Information Technology Research program; an additional \$40 million would be distributed among the traditional divisions and activities.

CISE's Information Technology Research (ITR) activity supports broad thematic, large-scale, long-term, basic computer science research, including research that entails a higher risk than that prevailing in established areas. Priority areas include: building "no-surprise," performance-engineered software and infrastructure systems; realizing broadband Internet access for tetherless devices; understanding, modeling, and predicting the behavior of networks; hardware/software co-design; multiplying individuals' physical and mental capabilities; meeting, working, and collaborating in cyberspace; building a ubiquitous content infrastructure for seamless retrieval of available information; and empowering computational discovery.

With the proposed FY 2001 increment, CISE would expand ITR to include support for connectivity

**Table 2. Information Technology R&D Funding**  
in millions of US dollars

	FY 2000 Estimate
<b>National Science Foundation</b>	517
<b>Department of Energy</b>	517
Office of Science	120
Accelerated Strategic Computing Initiative	397
<b>Department of Defense</b>	282
Defense Advanced Research Projects	195
National Security Agency	77
University Research Initiatives	10
<b>Dept. of Health and Human Services</b>	191
National Institutes of Health	183
Agency for Healthcare Research & Quality	8
<b>NASA</b>	174
<b>Department of Commerce</b>	36
<b>Environmental Protection Agency</b>	4
<b>Total, IT R&amp;D</b>	<b>1,721</b>

**Table 3. National Science Foundation Budget**  
in millions of US dollars

	FY 1999 Actual	FY 2000 Estimate
Research & Related Activities	2,821.6	2,958.5
Education & Human Resources	662.5	690.9
Major Research Equipment	56.7	93.5
Administrative Expenses	149.5	154.3
<b>Total R&amp;D</b>	<b>3,690.5</b>	<b>3,897.2</b>

**Table 4. NSF Focused Initiative Budgets**  
in millions of US dollars

	FY 2000 Estimate
Information Technology Research	126.0
Nanoscale Science and Engineering	97.3
Biocomplexity in the Environment	50.0
21st Century Workforce	73.7

**Table 5. NSF Research Directorate Budgets**

**Table 6. NSF Computer and Information Science & Engineering Budgets**

in millions of US dollars

	FY 1999 Actual	FY 2000 Estimate	FY 2001 Proposed	FY 00-01 % change
Computer-Communications Research	60.34	60.16	69.16	15.0%
Information & Intelligent Systems	41.22	41.62	53.70	29.0%
DevExperimental & Integrative Activities	57.57	57.62	63.32	9.9%
Advanced Computational Infrastructure	69.05	70.83	75.83	7.1%
Advanced Computational Research	9.00	7.27	8.32	14.4%
Advanced Networking Infrastructure	42.27	43.90	45.40	3.4%
Advanced Networking Research	19.11	17.42	23.37	37.3%
Information Technology Research	0.00	90.00	190.00	111.0%
<b>Total CISE</b>	<b>298.55</b>	<b>388.42</b>	<b>529.10</b>	<b>36.2%</b>

**Budget from Page 12**

or chemical-based techniques; fundamental research on networking to address needs such as increased users, new types of services, increased complexity of protocols, and wireless networked devices; research in biological applications such as genome sequencing and database tools, protein motif recognition, biomolecular computing, computational biology, and hydrology and ecosystems modeling.

Another budget item slated for growth is research in support of the interagency Critical Infrastructure Protection R&D initiative. CISE would increase its contribution by \$4 million (most expected to come from the ITR activity) to a total of \$29 million in FY 2001. This initiative provides for research in networking, high performance computing, and software that will enable computer and communications systems to be safer, more reliable, and free from intrusions.

Across its programs, CISE intends to increase the average size of awards by 10 percent and the average duration of awards to 3.3 years to meet NSF-wide objectives for FY 2001.

**The Department of Defense**

The Department of Defense's FY 2001 budget request for research,

for computing and communications R&D (see below); 2) \$80 million for the National Security Agency's Advanced Research and Development Activity (ARDA), a joint effort of the Defense Department and the intelligence community to support long-term research on problems and enabling technologies relevant to intelligence and information security; and 3) \$10 million for fundamental IT research within the DOD-wide University Research Initiative, a competitive program managed through the office of the Director of Defense Research and Engineering.

DOD also participates in the Critical Infrastructure Protection R&D initiative; the National Security budget would be \$463 million in FY 2001, up from current spending of \$418 million.

**Defense Advanced Research Projects Agency.** While support for RDT&E would decrease at each of the service branches, DARPA's budget request, at just under \$2.0 billion, is 4 percent more than the estimated FY 2000 budget. There are three DARPA line items related to computing: Computing Systems and Communications Technology, with an FY 2001 budget of \$377 million, 17 percent more than current funding; Next Generation Internet, whose budget would shrink

**Department of Energy**

The Department of Energy's theme for FY 2001 is "Strength Through Science," and indeed, R&D programs would grow by 8 percent, from \$7.1 to \$7.7 billion, under its budget plan. More than half of this R&D supports DOE's defense and nuclear weapons mission. Spending on civilian R&D programs, conducted through the Office of Science, would grow to \$3.2 billion, up from \$2.8 billion in FY 2000, an increase of 13 percent. The office will emphasize a number of thrusts in FY 2001, including non-defense scientific supercomputing; nanoscale discovery, as part of the National Nanotechnology Initiative; and life sciences and bioengineering.

DOE's two computing programs—the Advanced Scientific Computing Research (ASCR) activity in the Office of Science and the Accelerated Strategic Computing Initiative (ASCI), a component of the Nuclear Stockpile Stewardship program—would both see healthy budget increases in FY 2001.

The ASCR budget would grow from \$127.9 million to \$182.0 million, a 42-percent increase. Under the FY 2001 plan, ASCR would emphasize computer modeling and simulation R&D in several key areas of basic science, including

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**Other Agencies**

**National Institutes of Health.** The NIH budget would increase by \$1 billion in FY 2001, to \$5.5 billion (or 5.5 percent). The year's funding would be budget thrusts in plinary Resear... new Biomed... Science and... (BISTI). For... been emphasi... biomedical r... expertise fro... beyond the t... biology and... computing a... expertise. BI... address these... support for N... Excellence in... ing Support;... tools and tec... increasing an... data; training... specialists to... research need... Excellence in... portion of BI... million in FY... part of the IT

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InterTrust from Page 13

on what I learned from nearly twenty years of closely observing Bob Taylor at Xerox PARC and DEC/SRC, adapted to the very different environment at InterTrust and to Shear's vision for the new laboratory. Working closely with John Guttag, I wrote draft Roles, Principles, and Charter documents and had them reviewed by several people.

The proposed mission of the lab was to conduct research and related activities that would ultimately benefit InterTrust. More specifically, it was to:

- Maintain and increase InterTrust's lead in relevant technologies;
- Invent and discover technologies that would create new business opportunities;
- Track the state-of-the-art and advise InterTrust on its strategic implications;
- Ensure that relevant technology became part of InterTrust's practice and products;
- Consult with all parts of InterTrust on issues related to technology; and
- Demonstrate that InterTrust could govern its own technological destiny.

InterTrust's executives accepted

my proposal with only minor modifications. Large parts of it are still on our website (<http://www.star-lab.com/details.html>) and form the continuing basis of our operation.

InterTrust established the Strategic Technologies and Architectural Research Laboratory in February 1997. We believe it was the first lab fully devoted to research in digital rights management and related electronic commerce technologies. At that time, the company had about 60 employees, and the lab had two members. Since then, the company has grown more than three-fold, and STAR Lab has grown to 14 members, including Susan Owicki, Bob Tarjan, Jim Donahue, Andrew Goldberg, and younger members with "STAR potential." With strong support from management, we expect substantial continued growth, limited mainly by our ability to recruit people of the requisite quality, talents, and interests.

STAR Lab is intentionally colocated with the rest of the company, physically closest to advanced development and product development. We also have surprisingly strong ties to marketing and business development, and try to minimize

barriers to interaction with all parts of InterTrust. Not being in a large company helps. More importantly, the lab is populated by researchers who have a keen interest in doing research that changes the world and who are willing to put extra effort into communicating their ideas.

STAR Lab spans the spectrum from theoretical to applied research. However, on another spectrum, from strategy-driven to curiosity-driven, most of its projects are near the strategic end. That is, they are motivated more by potential needs of InterTrust than by "a pure sense of wonder." In Donald E. Stokes's classification,<sup>1</sup> STAR Lab works in "Pasteur's Quadrant" and "Edison's Quadrant," rather than "Bohr's Quadrant." STAR Lab's most valued results are those that inform and influence InterTrust's business and technical strategies.

STAR Lab members are working in a variety of areas, including: languages for electronic contracts; theory of auctions for digital goods; secure databases; system security and cryptography; software self-defense; code obfuscation; secure hardware; and digital watermarking. We will be starting work in a number of related areas, when they meet the following three criteria:

1. The result could be important to InterTrust.
2. We have, or can obtain, the necessary expertise.

Ph.D. from Page 4

software design and programming experience as a member of a system team, is a strong asset. We expect that students entering the program will have experience equivalent to three or more years with an industrial software development team. Students with less quantity or quality of experience will spend more time during the program gaining practical experience through internships, practicums, and other engagements. Extensive, high-quality software development experience may

performance, nearly ubiquitous computing and communication, especially systems that the public depends on for services provided through the electronic marketplace. The research approach for each project will be selected to match the needs of the project. Approaches appropriate to Ph.D. theses include (but are not limited to):

- Novel methods for software development;
- Automated support for software activities;
- Descriptive models that generalize from practical examples;
- Empirical models with predic-

Gender from Page 2

single-sex schools. If our students map their own values onto their expectations of others they may well find it difficult to reconcile what is, to them, unexpected behavior.

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<sup>1</sup> Donald E. Stokes's *Basic Science in Innovation*, Brookings Institution Press, 1984.

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### Bucknell University Department of Computer Science

Applications are invited for one or more one year entry-level visiting assistant professor positions beginning mid-August, 2000. A Ph.D. in Computer Science or Computer Engineering is preferred, but individuals with substantial progress towards such a degree will be considered. A demonstrated interest in and promise of excellence in teaching is important. All research areas will be considered, but networks and operating systems are particularly desirable. Salary and fringe benefits are competitive.

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Applications will be considered as received

reprints of publications. Applications should be mailed to:

CS Search  
Caltech, MC 256-80  
Pasadena, CA 91125

In addition, applicants are requested to fill out an online summary of their application at <http://www.cs.caltech.edu/search>.

Questions about the application process may be directed to: [search@cs.caltech.edu](mailto:search@cs.caltech.edu).

Caltech is an Equal Opportunity/Affirmative Action Employer. Women, minorities, veterans, and disabled persons are encouraged to apply.

### Carnegie Mellon University School of Computer Science

Carnegie Mellon University's School of Computer Science seeks applicants for junior

action/equal opportunity employer and we invite and encourage applications from women and minorities.

### College of William & Mary Department of Computer Science Faculty Position

Applications are invited for a tenure-track faculty position in Computer Science to begin either Fall 2000, Spring 2001 or Fall 2001 at either the assistant or associate level. Applicants must hold a Ph.D. in computer science or computational science. Appointment at the assistant level requires that the applicant must hold a Ph.D. at the time of appointment and demonstrate strong interests in both research and teaching. Appointment at the associate level requires a documented record of sustained excellence in both research and teaching. We are primarily interested in individuals with research expertise in one of the following areas: high performance systems, parallel computing, parallel and distributed numerical algorithms, networks, visualization, and scientific databases. However, applicants from all areas of computer science or computational science will be considered. A demonstrated interest in multi-disciplinary applied research is highly desirable.

The department currently consists of fifteen faculty members who support B.S., M.S. and Ph.D. programs graduating approximately 40 B.S. students annually and enrolling approximately 40 M.S. and 35 Ph.D. students. Teaching loads and salary are consistent with those in other Ph.D. granting departments. More information about the department and the College can be obtained by connecting to the Web server <http://www.cs.wm.edu/>.

The department maintains a contemporary computing environment for both teaching and research and is currently supported by a competitive NSF Major Research Instrumentation grant for several high performance computing research projects. Opportunities exist for joint research activity within the department, with members of the Computational Science Cluster, and with scientists and engineers at the nearby NASA Langley Research Center, ICASE, and the DOE's Thomas Jefferson National Accelerator Facility.

A resume, the names and addresses of three references, and any supporting documents should be sent to:

Faculty Search Committee  
Department of Computer Science  
College of William & Mary  
P.O. Box 8795  
Williamsburg, VA 23187-8795

Questions can be e-mailed to [search@cs.wm.edu](mailto:search@cs.wm.edu). Review of candidates will begin immediately and continue until the position is filled. The College is an EEO/AA employer.

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## Professional Opportunities

### Florida Atlantic University Department of Computer Science and Engineering College of Engineering

The Department of Computer Science and Engineering seeks applications for at least one tenure-track faculty position at the Assistant/Associate Professor level. A doctorate in computer science, computer engineering, or a closely related field is required. The appointments will begin from August 2000. Review of applications will begin from February 1, 2000 and will continue until the positions are filled. Salary, fringe benefits, and teaching load are competitive.

The Department has several well-equipped laboratories. It interacts closely with many high-tech companies located in the area, which have helped provide state-of-the-art facilities. We have an active research program, with both federal and industrial sponsors. More information about the Department can be accessed through the World-Wide Web at <http://www.cse.fau.edu>.

Applicants should send a resume, including the names, phone numbers, and email addresses of at least three professional references, along with a cover letter specifying teaching and research interests, to Faculty Search Committee, Department of Computer Science and Engineering, Florida Atlantic University, 777 West Glades Road, Boca Raton, Florida 33431. Electronic mail communications should be addressed to [searchcomm@cse.fau.edu](mailto:searchcomm@cse.fau.edu).

Florida Atlantic University is an equal opportunity/access/affirmative action institution.

### Harvard University Postdoctoral Position in Statistical Natural- Language Processing

A postdoctoral position is available to work on a project to improve upon current statistical natural-language processing through lexico-grammatical methods, including work on statistical language modeling and parsing. Candidates must have a Ph.D. in computer science with specialization in statistical modeling of language. Initial appointment will be for one year, with possible extension to a second year. Harvard is an Equal Opportunity/Affirmative Action employer and encourages applications from women and members of minority groups.

Principal investigator: Stuart M. Shieber, Harvard University <http://www.eecs.harvard.edu/~shieber>. Interested applicants should send a CV and three letters of reference to:

Ronda Scott  
Division of Engineering and Applied  
Sciences  
Harvard University  
33 Oxford Street, room 247  
Cambridge, MA 02138  
[ronda@deas.harvard.edu](mailto:ronda@deas.harvard.edu).

### Harvard University Postdoctoral Position on Collaborative Human-Computer Interface Design Project

design leading to a set of design principles enabling system designers to construct software elements that communicate well in multiple modalities; and implementation of specific collaborative interfaces in a range of domains. The postdoctoral position includes both theoretical research and systems development activities. Candidates must have a Ph.D. in computer science with specialization in human-computer interfaces or artificial intelligence. Significant implementation experience is desirable.

Initial appointment will be for one year, with possible extension to a second year. Harvard is an Equal Opportunity/Affirmative Action employer and encourages applications from women and members of minority groups.

Principal Investigators: Barbara J. Grosz and Stuart M. Shieber, Harvard University  
<http://www.eecs.harvard.edu/~grosz/>  
<http://www.eecs.harvard.edu/~shieber/>  
Interested applicants should send a CV and

three letters of reference to:

Ronda Scott  
Maxwell Dworkin 247  
Division of Engineering and Applied  
Sciences  
Harvard University  
Cambridge MA 02138  
[ronda@deas.harvard.edu](mailto:ronda@deas.harvard.edu)

### Harvard University Computer Science

In September 1999, Harvard's computer science faculty added two new members and moved to the new Maxwell Dworkin Laboratory. These changes mark the beginning of a period of extensive growth of the faculty, with a corresponding increase in the size of the graduate program. The computer science program benefits from its outstanding undergraduate and graduate students, an excellent location, significant industrial support, and substantial support from the Division of Engineering and Applied Sciences.

We are currently inviting applications and nominations for a tenure-track faculty position in Computer Science, at the level of Assistant Professor, to begin in the fall of 2000. We are seeking candidates with interests in one of two target areas, to be broadly construed:

Cryptography and computer security  
Data mining and large-scale and distributed data systems

Candidates should have an outstanding research record and a strong commitment to undergraduate teaching and graduate training. Applicants must have completed a Ph.D. by September 1, 2000. Information about Harvard's current faculty, research, and educational programs is available at <http://www.deas.harvard.edu/csece>.

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

CS Search Committee  
Division of Engineering and Applied  
Sciences  
Maxwell Dworkin 247  
33 Oxford Street  
Cambridge, MA 02138

### The University of Texas at Arlington Computer Science and Engineering I

The University of Texas at Arlington (UTA), Computer Science Department invites applications for a tenure-track faculty position with expertise in the following areas are preferred; telecommunication networks and multimedia and systems including distributed computing. UTA, part of The University of Texas System, is a rapidly growing Dallas/Fort Worth area, the nation's third largest with a flourishing industrial base and excellent opportunity for collaboration. The CSE Department ([url: www-cse.uta.edu](http://www-cse.uta.edu)) currently has 12 members with 438 undergraduate and 362 graduate students and \$1.5 million in external funds. Applicants for an assistant professor position must have an earned doctorate in computer science, computer engineering, and a commitment to teaching and scholarly research. Applicant must have demonstrated an excellent record of professional achievement in their field of expertise. The faculty opening is anticipated for fall 2000, pending final budget approval. Screening of applications will begin as positions continue until all positions are filled. Interested persons should send reference letters to Chair of Search Committee, Department of Computer Science and Engineering, P.O. Box 19015, Arlington, TX 76019-0015. FAX: 817-272-3070. Email: [search@cse.uta.edu](mailto:search@cse.uta.edu).

*The University of Texas at Arlington is an Equal Opportunity/Affirmative Action Institution.*

### University of New York Department of Computer Science

The rapidly expanding Computer Science Department at Hunter College CUNY seeks an outstanding teacher to fill the position of Lecturer, effective September 2000. Candidates should have a Masters degree in Computer Science or a closely related field; some doctoral work is preferred. A minimum of three years experience in undergraduate teaching is required, along with an exceptional record of classroom instruction.

Candidates must be capable of teaching a wide range of introductory, lower division, and upper division courses in the undergraduate curriculum. Duties also include course coordination for multi-section courses, curriculum development, and curriculum innovation. Lecturers are expected to teach seven to nine courses per year.

The salary range is \$29,997 - \$49,714, commensurate with expertise and experience. Hunter is a predominantly undergraduate institution with a longstanding commitment to excellence in teaching. Qualified applicants should send a letter of application, a detailed resume, and three letters of reference to:

Chair, Department of Computer Science  
Hunter College CUNY  
695 Park Avenue  
New York, N.Y. 10021  
Preference will be given to applications received by March 1, 2000.

Hunter College is an AA/EEO employer. Minorities and women are encouraged to apply.

### Illinois Institute of Technology

Assistant Professor, tenure track. Begins August, 2000. 3 courses per semester, undergraduate/graduate. The applicant must be prepared to teach courses in web page and site

degree programs in information systems, or related systems. An earned master's degree in computer science, or related field, is preferred. Salary is competitive. A strong record of professional achievement and women in industry are strongly encouraged. KSU is an equal opportunity employer. Applications: Candidates should send application address, qualifications, telephone numbers, scholarship activities, names, address, and at least three reference transcripts to:

Dr. Martha M. Kennesaw State University  
[mmyers@kennesaw.edu](mailto:mmyers@kennesaw.edu)  
1000 Chastain  
Kennesaw, GA  
[### Northern Michigan Computer Science](http://scienc</a></p>
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The Department of Computer Science at Northern Michigan University invites applications for a tenure-track position in the rank of Assistant Professor. The 2000-2001 academic year applicant must possess a Ph.D. in Computer Science or closely related field prior to employment. A wide range of courses and curriculum and development become an effective scholar. Applications

## Professional Opportunities

Marquette, Michigan 49855-5340  
(906) 227-2020  
E-mail Address: dzalewsk@nmu.edu  
For additional information see <http://www.nmu.edu/>.

Applicant review will continue until the position is filled.

NMU is an equal opportunity, affirmative action employer and is strongly committed to increasing the diversity of its faculty.

### Old Dominion University Computer Science Department

The Department of Computer Science invites applications for a tenure track position at the Assistant/Associate Professor level beginning Fall 2000. A Ph.D. in Computer Science, or a related field augmented by research experience in computer science is required. Potential for external funding is also required. Appointment at the Associate Professor level requires several years of university teaching experience and a record of substantial external funding and research. Areas of interest include high performance computing and communication, mobile computing, 3-D visualization, and networking. The position involves teaching, research, and grants.

The department awards the BS, MS, and Ph.D. degree. We provide an environment that encourages and supports research. Collaborative opportunities exist across departments and colleges, as well as with other institutions in the area. The Eastern Virginia Medical School, NASA Langley Research Center, Thomas Jefferson National Laboratory, and Virginia Modeling, Analysis and Simulation Center are within thirty minutes of campus. The department has extensive computational facilities, including access to a 32-processor Sun Starfire HPC 10000 for on campus parallel computing. The department has funded initiatives to develop high performance solvers on Teraflop-flop parallel computers (an ASCI level-2 grant from DOE) and for delivering our degree program using modern instructional technology.

To apply, send a curriculum vitae and the names, addresses and telephone numbers of three references to:

Larry Wilson  
Chair Recruiting Committee  
Department of Computer Science  
Old Dominion University  
Norfolk, VA 23529-0162  
Fax (757) 683-4900

Review of applications will begin March 15, 2000 and continue until the position is filled. Old Dominion University is an Affirmative Action/Equal Opportunity Employer and requires compliance with the Immigration Reform and Control Act of 1986.

### Oregon State University Department of Computer Science Corvallis and Bend Faculty

The Dept. of Computer Science at OSU seeks to hire two full-time, fixed term instructors. One position is at the main campus in Corvallis; the second is in Bend.

Review of applications will begin March 1, 2000. Positions will remain open until filled.

OSU is an Affirmative Action/Equal Opportunity Employer and has a policy of being responsive to dual-career couples.

### Purdue University School of Electrical and Computer Engineering

Purdue University, School of Electrical and Computer Engineering, seeks outstanding candidates in computer engineering for research and teaching in the following areas: artificial intelligence, compilers, computer architecture, computer networks, distributed computing, multimedia systems, operating systems, software engineering, VLSI and CAD. Strong candidates in all areas of computer engineering are encouraged to apply. Openings are for tenure-track faculty at all levels.

Send a resumé, including a statement of research and teaching interests and a list of at least three references, to:

Head, School of Electrical and  
Computer Engineering  
Purdue University  
1285 EE Building  
West Lafayette, IN 47907-1285

Applications will be considered as they are received. Purdue University is an Equal Opportunity/Affirmative Action employer.

### Rensselaer Polytechnic Institute

Electrical, Computer, and Systems Engineering Department invites applications for several open tenure-track positions in Computer Engineering starting in Fall 2000. All areas of computer engineering are of interest. The candidates must have a Ph.D. in Computer Engineering or equivalent. While we are looking for primarily Assistant Professors, appointment of candidates with outstanding academic or industrial research experience and leadership at the Associate and Full Professor levels will also be considered. Rensselaer has identified Information Technology and Biotechnology as two key research areas for new investment. The candidates are expected to play key roles in these two areas.

The ECSE Department offers programs in Electrical Engineering and Computer and Systems Engineering. Our major strengths are in microelectronics technology and design, computer communication networks, digital signal and image processing, control and automation, and electromagnetics. The department is growing and has three other ongoing faculty searches in controls, microelectronics, and the department chair position. New faculty will receive attractive start-up arrangements including summer support, equipment, graduate student support and reduced teaching loads to encourage the development of successful research and teaching programs. Letters of application and resumes (including a list of references) should be sent to:

Dr. Joe H. Chow, Acting Chair

## DEAN School of Engineering and Applied Sciences The George Washington University

The George Washington University is seeking nominations for the position of Dean of the School of Engineering and Applied Sciences. The School is a leading private research institution with enrollment of over 20,000 students distributed across three campuses: the Foggy Bottom Campus in Washington, DC and two other campuses, as well as a research center in Arlington, VA. The University is situated in one of the nation's most rapidly growing metropolitan areas and is a leader in innovation and technology. The information technology and telecommunications industry in the Washington metropolitan area is the fastest growing business sector, exceeding that of the Federal government. It currently generates more than \$1 billion in revenue and leads the nation in Internet services. Located in close proximity to major federal, international government and economic development institutions, the School is part of a diverse, multicultural technological community of faculty, graduate and undergraduate students. The School has close ties with numerous government and industry research labs and offers programs in aerospace, civil, computer, electrical, environmental, mechanical, and software engineering as well as in computer science and engineering management. The School is located at a number of off-campus sites.

The Dean is charged with providing the vision and leadership necessary to develop and enhance the quality of the undergraduate and graduate programs, to promote areas of selective excellence, and to coordinate the School's activities with other universities and colleges, local industry, and government agencies. As a member of the central management team of the University, the Dean is expected to work closely with the faculty and the administration to promote the goals of the School and to provide leadership for the School's 75 faculty members and approximately 500 undergraduate students. Equally important is the ability to represent the School to the technology community in the Washington metropolitan area, especially in the areas of research and development. The Dean is responsible for the overall faculty and program development and general administration of the School.

Qualified candidates for the position should have a Ph.D. and demonstrated leadership and administrative skills demonstrated by one or more significant positions in an academic, industrial or government organization. Qualifications include a degree in engineering or related scientific field, a distinguished scholarly record in research and education, and credentials commensurate with the position. The Dean is expected to encourage faculty development and creativity; lead fund-raising efforts; sponsor research and cultivating corporate and private support; and oversee the development of educational programs, including international and distance learning.

The George Washington University is an Equal Opportunity/Affirmative Action institution committed to cultural diversity. Review of applications will begin on February 1, 2000. Applications should include a letter of interest that describes your qualifications for the position in addition to a curriculum vita. The mailing address and nominations is:

Sara Bonthuis  
Staff, SEAS Dean Search Committee  
Office of the Vice President for Academic Affairs  
Rice Hall - 8th floor  
The George Washington University  
Washington, DC 20052

Further information can be obtained at  
<http://www.seas.gwu.edu/dean-search/>



university governance. Participation in research is encouraged.

The Department offers the BA, BS, MS, and PhD degrees, with programs in both computer science and computer engineering. We currently have 19 tenure-line faculty and 4 Lecturers. In support of undergraduate teaching, the department has four undergraduate laboratories, containing Sun workstations running Solaris 7, and Intel-based workstations running Windows NT. Programming languages in use in the department include C, C++, Java, ML, and Common Lisp.

The University at Buffalo is New York's largest and most comprehensive public

Texas A&M national leaders in education. Today's engineering education is one of the top institutions in the national poll.

The Department is one of the fastest growing in the College. In a strong national poll of its faculty and students.

The Department offers Ph.D. degrees in computer science with the Department

## Professional Opportunities



Research Center

United Technologies Research Center (<http://www.utrc.utc.com/>) has a broad research program with the objective of developing novel concepts that enhance the characteristics of United Technologies Corporation's (<http://www.UTC.com/>) products. These well known products include Otis elevators, Carrier air conditioners, Pratt & Whitney jet engines, Sikorsky helicopters, International Fuel Cell and Hamilton Sundstrand aerospace systems.

The Information, Computer & Communication Technology department at UTRC is expanding its activities in the areas of:

- **Embedded Computing Architectures R&D**

This activity involves defining, developing, and evaluating hardware, software, and communication architectures that address performance, redundancy, availability, fault detection/isolation, and graceful degradation while enhancing the control and communication of embedded computing products. (Refer to Job # *ICCT-3030-0007*)

- **Signal Processing, Communications, and Diagnostics R&D**

This activity involves developing, running, and evaluating computer routines that do linear/non-linear signal processing, communication system design and analysis, and diagnostics and prognostics. (Refer to Job # *ICCT-3035-0006*)

Both activities are fundamental to UTC's R&D programs. Additional job duties include interacting with technical managers, experimental technicians, computer architects, and control engineers. Job responsibilities include the design of technical approaches, the communication of technical information to a diverse audience, and the efficient use of modern computer tools.

Distributed/Internet Software. Applicants for junior positions must demonstrate evidence of their ability to perform research and have had prior involvement in group research activities and hold an earned Ph.D. by the appointment start date. Applicants for senior positions must have a demonstrated record of research and funding emphasizing research team leadership as the principal investigator. The successful candidate will be expected to contribute to the Departmental research effort. All applicants must show a commitment to quality teaching.

The Department grants the BS, MS and Ph.D. degrees. The Ph.D. program has been active since 1977. The Department has an aggressive young faculty with growing levels of funded research. Interdisciplinary research activities exist in the UMR Intelligent Systems Center and faculty members in the Department may become Research Investigators in this Center.

The University of Missouri-Rolla is the primary science and engineering campus of the University of Missouri system; it currently has an enrollment of 4500 students. UMR is situated in the beautiful non-urban environment of the Ozarks. St. Louis is 1 1/2 hours away via interstate highway. Salary is competitive with Big-10/Big-12 universities. Position will remain open until filled.

Please submit application and vitae to:  
Human Resource Services  
Reference Number: R50072  
University of Missouri-Rolla  
1202 North Bishop  
1870 Miner Circle  
Rolla, MO 65409-1050

UMR is an AA/EEO employer. Females, minorities and persons with disabilities are encouraged to apply.

### University of Utah Department of Computer Science

The University of Utah's Department of Computer Science seeks applicants for a non-tenured teaching-track faculty position at the instructor, assistant, or associate professor level. Over the next three years, the Department intends to greatly increase the number of undergraduate majors, establish programs targeted toward working professionals, develop introductory computing classes appropriate for students from across the campus, and increase its staff of teaching-track faculty from two to four. The ideal candidate will have a strong academic background in computer science or allied field (Ph.D. strongly preferred), practical experience in the computer industry, a demonstrated proficiency in teaching, and a keen interest in curriculum development.

A teaching appointment in the Department of Computer Science is a separate career path from the regular tenure track. The successful applicant will work with two other faculty members on the teaching track who have been on the Computer Science faculty for 18 and 13 years, respectively. The University of Utah is located in Salt Lake City, the hub of a large metropolitan area with excellent cultural facilities and unsurpassed opportunities for outdoor recreation only a few

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## Professional Opportunities

# University of South Carolina Department of Computer Science and Engineering Department Chair

The University of South Carolina invites applications and nominations for the position of Chair, Department of Computer Science and Engineering (CSE). CSE is one of five departments with accredited degree programs in the College Engineering and Information Technology. It was formed in October 1999 through the merger of the Computer Science and Computer Engineering programs. The department currently has 18 full-time faculty members; it is scheduled to grow to about 50 within 5 years with additional support from a planned \$40 million state-of-the-art "innovation center". It offers Bachelors, Masters and Doctoral degrees in Computer Science and Computer Engineering and a BS degree in Computer Information Systems; it anticipates establishing additional masters-level degree programs in Software Engineering, Network Engineering, and Information Systems Engineering. The department faculty have research strengths in artificial intelligence, communications, computational science, software engineering, and advanced database technology.

The position requires an individual with exceptional leadership and research skills who can effectively lead the new department during a period of high growth and expansion. Candidates should have a Ph.D. in computer science, computer engineering, or a closely related field and credentials appropriate for appointment at the rank of tenured full professor. The candidate will also be expected to work with industrial leaders to foster economic development of computing within the state



UNIVERSITY OF  
**SOUTH  
CAROLINA**

of South Carolina. The successful candidate will have a commitment to the mission of a public university, the capacity for creating a new department and the ability to build and lead a new department. Strong experience in the current environment of information technology is highly desirable. Significant management experience in academic or government is also highly desirable.

The University of South Carolina is a public university serving 26,000 students in its capital city, within a metropolitan area of 450,000 residents.

Please send applications, nominations, and letters of reference to: Dr. Larry Druffel, Chair, CSE Chair Search Committee, Department of Engineering and Information Technology, University of South Carolina, Columbia, SC 29208; or e-mail: richards@enr.sc.edu. The search committee will be pleased to receive nominations or letters of reference by mail. A curriculum vitae should accompany the letter of nomination, along with the names of three references. No reference will not be sought until authorized by the search committee. Initial screening of applicants and nominees. Foreign candidates are encouraged to apply. Foreign national candidates must have current US immigration status. The committee will review all applications upon receipt and will continue to receive applications until the position is filled. USC is an affirmative action/equal opportunity employer.

University of Alberta, in Edmonton, the capital of Alberta. We have eight established research laboratories, including Algorithmics, Artificial Intelligence and Cognitive Science, Database Management, Graphics, Networks and Communications, Parallel and Distributed Systems, Software Engineering, and Vision and Robotics. We have abundant computing facilities, and our department leads broadly-based multidisciplinary research within the Multimedia and Advanced Computational Infrastructure (MACI) project, and the Research Institute for Multimedia Systems (RIMS). In addition to the standard computational research facilities, we also have a large SGI Origin 2000, and a 3D immersive

Find further details about us at [www.cs.ualberta.ca](http://www.cs.ualberta.ca) and send your curriculum vitae and the names and addresses of three referees to:

Iris Everitt  
Administrative Assistant  
Department of Computing Science  
University of Alberta  
Edmonton, Alberta, Canada  
T6G 2H1  
or [everitt@cs.ualberta.ca](mailto:everitt@cs.ualberta.ca)

The records arising from this competition will be managed in accordance with provisions of the Alberta Freedom of Information and Protection of Privacy Act (FOIPPA).

The University of Alberta hires on the

Department of Computer Science  
The University of Arizona  
PO BOX 210077  
Tucson, AZ 85721-0077

We will continue to consider applicants until the positions are filled, subject to availability of funds. The University of Arizona is an EEO/AA employer - M/W/D/V.

### University of Nevada, Reno Department of Computer Science

Applications are invited for a tenure track Assistant or Associate Professor position beginning in August, 2000. A Ph.D. in Computer Science or Computer Engineering is

Science or a related field. Candidates should demonstrate excellent research and teaching skills at senior levels. We have an excellent record of scholarship and research interests in all areas of computer science. All qualified candidates will be considered, but those with a strong interest in teaching, compilers, and operating systems.

Our department has a strong reputation for internal and external funding. We are conducting research involving students and faculty. We are interested in close-knit and collaborative research environments.

## Professional Opportunities

Professor Derek Eager  
 Department of Computer Science  
 University of Saskatchewan  
 Saskatoon SK S7N 5A9  
 Canada  
 eager@cs.usask.ca.

Applications should include curriculum vitae and the names and addresses of three references, and will be accepted until the positions are filled.

These positions have been cleared for advertising at the two-tier level. Applications are invited from qualified individuals regardless of their immigration status in Canada. The University is committed to Employment Equity. Members of Designated Groups (women, aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their applications.

### University of South Carolina Faculty Positions in Computer Science and Engineering

Applications are invited for at least two tenure-track positions in computer science and engineering at the Assistant Professor level. Target research areas include software engineering, computer networks, distributed information systems, computer architecture, forensic computing, computer security, computational science, bioinformatics, computer graphics, and visualization; however, exceptional candidates in all areas will be considered.

Candidates should have a doctorate in computer science, computer engineering, or a closely related discipline. They are expected to have strong research potential as well as interest in teaching at both the undergraduate and graduate levels.

These positions are in a new department created by the merger of the Department of Computer Science and the Computer Engineering Program of the Department of Electrical and Computer Engineering. The Department is located within the College of Engineering and Information Technology. The Department has about 700 undergraduate majors and 300 graduate students; it offers BE, BS, ME, MS, and Ph.D. degrees. The University of South Carolina has an enrollment of more than 26,000 students and is the comprehensive graduate institution in South Carolina. Columbia is the state capital and is the technology center of the state. For more information, see <http://www.cs.sc.edu> and <http://www.ece.sc.edu>.

Applicants should submit a curriculum vitae along with the names and addresses of three references to: Dr. Caroline M. Eastman, Chair, Faculty Search Committee, Department of Computer Science, University of South Carolina, Columbia, SC 29208. Electronic applications should be sent to [eastman@cs.sc.edu](mailto:eastman@cs.sc.edu). Applicants will be accepted until positions are filled. Foreign nationals should indicate current US immigration status.

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

### University of Toronto

Responsibilities include undergraduate teaching, managing teaching assistants, developing course materials, and curriculum development. In addition, all faculty, including lecturers have some responsibility for student recruitment and departmental administration.

Initial appointments are for one-year terms. Under university policy, appointments to the teaching stream may be eligible for continuing positions at the rank of Senior Lecturer after five years. We are seeking candidates who are interested in establishing a long-term teaching career in the Department. The department currently has five Lecturers and Senior Lecturers, who enjoy a stimulating and collegial work environment.

Successful applicants will be joining a group of excellent Lecturers and Senior Lecturers, who enjoy a collegial and stimulating work environment. Toronto is a vibrant and cosmopolitan city, one of the most desirable in the world in which to work and live. It is also a major centre for advanced technology and the computer industry with which the department enjoys strong interactions.

Applications, which should include a curriculum vitae, statement of teaching objectives, evidence of teaching excellence, and the names and addresses of at least three references, should be sent by email (text, postscript or PDF only, please) to [lecturer-search@cs.toronto.edu](mailto:lecturer-search@cs.toronto.edu) or, if that is not possible, by post to

Lecturer Recruiting Committee Chair  
 Department of Computer Science  
 University of Toronto  
 Toronto, Ontario M5S 3G4  
 Canada

The deadline for applications is March 15, 2000 or until the position is filled. We will consider applications as they arrive and we encourage early applications.

The University of Toronto is committed to employment equity and especially encourages applications from women, members of visible minorities, native persons and persons with disabilities. Canadians and non-Canadians are encouraged to apply.

### University of Virginia Department of Computer Science General Teaching Faculty

The Computer Science Department at the University of Virginia invites applications for outstanding teachers to serve as general teaching faculty. Duties include teaching University-wide service courses such as Computer Literacy and undergraduate courses for CS majors. An active interest in being in a research oriented department as well as in innovation in education is highly desired. These positions are ideal for faculty interested in teaching excellent undergraduates within an innovative curriculum. While these positions are not tenure track, there is a long term commitment to these positions. Initial appointments will be for 9 month academic year appointments for a three year period. Additional possibilities exist for summer employment either in research, teaching, or both. A Ph.D. in Computer Science is required. Women and minorities are encouraged to apply.

### Philosophy, Psychology and Cognitive Science

The Department of Philosophy, Psychology and Cognitive Science at Rensselaer Polytechnic Institute seeks outstanding scientists for three tenured positions. Rank is open. These scholars should be able to contribute to the theme of applied cognitive science. We maintain a broad definition of cognitive science, including at least the following areas of research: the interface between cognitive science and other disciplines, particularly human factors; industrial/organizational psychology; cognitive neuroscience; psychopharmacology; artificial intelligence; information processing; and complex systems.

The department integrates these research areas to explore a wide range of applications. Example topics include studying how information processing in training programs and classroom instruction, impacts workplace performance; the design of systems (human factors), contributes to the development of user interface technology, allows for advances in entertainment and gaming, and improves human representation and reasoning. We are not as interested in the field of education of potential new faculty as we are in the quality of the research. Successful candidates for these positions must have a doctorate with evidence of outstanding scholarship commensurate with their rank and have grants to help finance their scholarly activities or show the ability to obtain grant support.

The department currently offers B.S. degrees in psychology and philosophy, and degrees in these two fields and in cognitive systems engineering. We offer a Ph.D. in Information Technology and AI in collaboration with the Department of Information Technology. We also enjoy collaborative arrangements with other granting units, including the Department of Decision Sciences and the Center for Systems. Rensselaer is a private, non-sectarian nationally ranked university. With 350 faculty serving approximately 4,000 undergraduates and 2,000 graduate students. Founded in 1824, Rensselaer is the oldest technological university in the United States. Rensselaer is located in Troy, New York, one of the three cities in the Capital District. Troy is located on the historic Hudson River within a short distance of New York City, Boston, Montreal, as well as the Adirondack and Catskill mountains.

Application materials should include a cover letter, c.v., selected references, and letters of recommendation and be directed to: Search Committee, Department of Philosophy, Psychology and Cognitive Science; 305 Carnegie Hall, 110th Street; Rensselaer Polytechnic Institute; Troy, NY 12180-2590. E-mail: [bestlj@rpi.edu](mailto:bestlj@rpi.edu).

Screening of candidates will begin immediately and continue until positions are filled. Applications from women and minorities are especially invited. Rensselaer is an equal opportunity/affirmative action employer.



excellent cultural facilities and unsurpassed opportunities for outdoor recreation only a few minutes drive away. Additional information about the department can be found at <http://www.cs.utah.edu>.

Please send Curriculum Vitae, a research goals statement, a teaching goals statement, and names and addresses of at least four references to:

Faculty Recruiting Committee  
 c/o Shawn Darby  
 Department of Computer Science  
 50 So. Central Campus Drive  
 Rm 3190 MEB  
 University of Utah  
 Salt Lake City, UT 84112-0305

algorithms. The department offers 12 courses per year.

Candidates must have a Ph.D. in computer science or a related field. Completion by date of application is required. Applicants should submit a curriculum vitae, a 2 page statement of research interests, goals, and contact information, and three references, to:

Dr. Athman Iyengar  
 Department of Computer Science  
 7054 Haycocks Drive  
 Falls Church, VA 22044  
 We invite electronic applications to  
[athman@cs.vt.edu](mailto:athman@cs.vt.edu)