How will election affect R&D community?

By Fred W. Weingarten

A wave of concern swept across the R&D community immediately after the November election. The concern was, in part, a normal reaction to an unexpected and traumatic upset of the existing conditions for science policy. It was not so much that Democrats were being replaced by Republicans, but that an entirely new and unknown batch of players will be setting the rules and deciding budgets.

A natural and immediate question when political control changes hands, even within the same party, is “How will this affect me and the program I care about?” Couple that with the magnitude of the change and the underlying sense of a deeper change in voter attitudes, and the question becomes even more urgent.

In the absence of good tea leaves to read and clear astrological indicators, the scientific community was left to dig for signs in the Republican

Few newly elected members of the House have science and technology backgrounds, and even fewer have any experience with S&T issues.

“Contract With America,” a document signed a few weeks before the election by most Republican candidates for House seats. Because the contract said nothing about R&D directly, particular attention was given to an addendum prepared by Republican House Budget Committee staff members listing possible budget cuts, many of which would affect higher education and research. For example, the addendum proposed to eliminate the National Institute of Standards and Technology’s Advanced Technology Program (ATP). It also proposed a 20% cut in the High-Performance Computer and Communications (HPCC) program and a 1% cut in the National Science Foundation’s growth.

Judging from some of the early reaction of the scientific community, one might conclude that the Republicans already had declared war on science and higher education. It is foolish to make these kinds of political judgments now. An overly hasty call to arms could create an unnecessary and destructive backlash.

As a political prescription, the contract and its addendum present their own problems. When the contract was announced, it was not clear how seriously it would be taken. The national press did not give it much attention because it seemed to be a rehash of old proposals, and because the promise of tax cuts and budget balancing did not seem to add up. Aiso, the possibility of a Republican takeover of the House became apparent only in the last week before the election.

After the election, the contract became a principal focus of the press, pointed to by victorious Republicans and by Republican leadership as their action agenda. Many House members feel compelled to take it seriously as their legislative mission.

Republicans are by no means as unified as they may have appeared to the president when they were in the minority. Cracks have already begun to appear. But Republicans as a party need to respond quickly to what could be a brief opportunity given by an impatient electorate and show that they can govern in Congress.

Developing an action agenda from scratch that all could agree on would have been difficult. The contract gave them a start. However, all the contract promises a vote in the House within 100 days. It did not promise to pass legislation, or that the Senate would pass it or that the president would sign it. Because of the structure and culture of the House of Representatives, which stresses majority control and discipline, the promise does have some chance of being met. Even in the House, not all parts of the contract are being

Continued on Page 10
Opinions

Public deserves share of blame

By Fred W. Weingarten

CRA Staff

When the 103rd Congress went home in October it left behind a lot of unfinished business. (It did return in lame-duck session to consider GATT in December.) It was difficult, even for a long-time observer of Congress, to watch the bitter, partisan fighting on the Senate floor and see many important bills signed to the trash can. The real question seemed to be, “Can these computers do anything right?”

Crime, health care reform and two bills of particular interest to the computing research community—telecommunications reform and High-Performance Computer and Communications (HPCC) II—did not pass. (The crime bill was resuscitated after a loud public outcry, but the political credibility of Congress and the White House have already been damaged.)

We have a tiresome and embarrassing display of bitterness, partisan- ship and stalemate. Now that some time has passed and one can view the proceedings with more objective detachment, it is reasonable to ask if this apparent failure of the process was due to lack of political leadership (or, as important, followship). My conclusion is that, although Congress deserves its share of blame, it also reflected the political confusion, uncertainty and conflict in US society. The enemy probably is us.

Though CRN usually focuses on the narrower issues of R&D and information policy, it is useful to look at broader political events. We need to gain insight into political processes and the larger environment in which science and technology issues are considered.

Compared to the thousands of bills considered and the hundreds passed by Congress each year, few major legislative initiatives capture the public’s attention. The ones that do attract widespread debate are covered on the nightly news, divide parties and mobilize large stakeholder groups. They form what we might call the “political agenda.”

My theory is that passage of agenda legislation usually depends on three conditions:

1) There is a broad public sense that a problem exists, is critical and needs to be addressed politically. The problem is talked about in political campaigns, by the president and by Congress. People want something done about the issue.

2) A set of alternative policy approaches needs to be on the table, so the general outlines of a solution can be hammered into a consensus. Much of the art of legislation is the search for lines of compromise.

3) There is a general agreement, even if it is grudging or reluctant, among major stakeholders that the bill is acceptable. Changes in important areas of policy can create big winners and losers. For better or worse, these groups have significant interests that cannot be ignored—and they express them loudly.

Let’s see how the four bills mentioned earlier measure up against these conditions.

Crime

A public bashed with daily reports of violent crime put crime high on its agenda. The legislation was a high-mash of preventative and punitive pieces, each intended to buy the support of one side and deeply offend the opposite side. The resulting compromise seemed less a movement toward the middle than an attachment of programmatic pieces on each ideological end—“three strikes” and increased use of the death penalty on one side and midnight basketball and gun control on the other.

There was much in the bill for both sides to hate and, more importantly, to use as a public excuse for opposition. The campaign benefits from attacking the bill’s defects began to outweigh the benefits of passing it (or so it seemed to the members). Finally, although organized groups such as law enforcement, cities and the incarceration industry

Clipper: Another point of view

(O n occasion, Computing Research News prints the views of the different sides in the Clipper debate.)

By Susan Landau

Communications technology has shrunk distances in a way unimaginable a generation ago. As we increasingly use telephone, fax and E-mail for personal and business communications, cryptography has emerged as the most effective way to ensure the authenticity, integrity and confidentiality once provided by signatures and sealed envelopes. But unlike envelopes, cryptography presents a significant impediment to legally authorized access. How do we balance the need for privacy against the need for effective law enforcement?

The question only appears to be a technical one. The solution will have broad social implications. Twenty-one months ago the Clinton administration introduced the Encrypted Standard (EES)—Clipper—an encryption scheme in which users’ private keys are available to the government.1 This proposal has encountered strong public opposition. The choices the United States makes about confidentiality of communications will reverberate across the globe. These are not just technical or policy issues to be made lightly.

Ever since the EES announce- ment, the debate on cryptography in general, and Clipper in particular, has seen hyperbole and many misstate- ments of fact. The issues are serious and important. They deserve careful thought and discussion. Twenty-one months ago the Clinton administration invited the intelligence community to develop a Clipper-like cryptography for public use; the latter was the harbinger of widespread development of cryptographic algorithms in the public realm.

The release of DES was a mixed success. DES proved enormously successful in providing US businesses with a technique to ensure secure communications. But its use to be made lightly.

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Graduate information for women in CS&E

CRA Committee on the Status of Women in Research on the CRA home page. This article includes excerpts from the kit, which discusses each of the following topics in detail.

Why graduate school?
A tending graduate school facilitates your ability to advance the state of the art in your chosen area through cutting-edge research. Having an advanced degree adds depth and breadth to your academic background, which may improve your chances of obtaining a job or improve your job performance if you already are employed. A n advanced degree gives you more flexibility in choosing projects and provides you with the expertise needed for increased levels of responsibility. A n advanced degree is viewed as a distinguishing criterion for separating job seekers in the applicant pool, and it provides research and writing experiences vital for launching a career onto the fast track. T hroughout your career, these are the attributes that often make the critical difference in job satisfaction and lifetime earnings. A lso, some jobs require an advanced degree for example, if you plan to teach or do research at an academic institution, a Ph.D. usually is required (and a master’s certainly is).

Choosing the right school
O nce you decide to attend graduate school, there are many factors to consider when determining what school is right for you. Y ou should make a realistic assessment of your abilities and determine the CS&E areas that most interest you. You may not be able to make a realistic assessment of your own abilities, yet some women tend to underestimate their abilities. G et to know as many of your undergraduate-course professors as possible, particularly in the technical areas that interest you. I t may be possible to conduct research with a professor while an undergraduate. Research Experiences for Undergraduates and the CRA Distributed Mentor Project are examples of programs sponsoring this type of activity.

Look into these programs and take advantage of the opportunities they offer. Experience gained from this type of activity can be a major selling point when applying to graduate school. A lso, the supervising professor will be able to more readily assess your ability to do research.

Questions you should ask yourself about the graduate program include:
• What are my financial needs?
• Does the faculty exhibit special strengths and research qualities through their graduate advisers, published works and funded research?
• Are the libraries, laboratories, computers and other research facilities adequate for my education needs?
• Are graduates of the program sought by recruiters? Does the department of interest offer sufficiently large and varied curriculum to allow a broad offering of courses and options?
• How is the admission process handled? How do they make their selection? How do I apply?
• How long will it take for me to complete my program?
• Are study spaces and office hours available for graduate students?

Who do you work with and how do you work with them? I n the past, women have found women to be more likely to succeed. This may be due to the graduate school experience so they can seek advice from the graduate programs. I n the future, this may be awkward and difficult for some women, it is imperative that you know who positive letters of recommendation are included in your total application.

Financing graduate study
F unds for graduate study are available. H owever, you must be diligent in searching for and applying to the various programs. T here are numerous sponsorship, research, institution and fellowship dollars available. M ake a list of all available graduate funding programs. S eek advice from the career counseling and placement center and the graduate financial aid office at your undergraduate institution. Y ou also can seek advice from the graduate financial aid offices of the schools to which you apply. Read graduate study announcements and department bulletin boards, and talk to faculty. G o to the reference section of your school’s library or your local public library. Y ou should gather information about graduate aid during your junior year or the summer preceding your senior year. M any programs have

Continued on Page 16
Expanding the Pipeline

Increasing the number of minorities in CS

By David Bellin and Joseph Monroe

North Carolina A & T State University has developed a model to increase the number of minority students graduating in computer science, enhance the educational achievements of these students and increase the number of these students who attend graduate school and pursue careers in computer science.

Our approach has three main components:

• Recruiting: attracting outstanding precollege, high school and junior college students to our undergraduate computer science program.
• Mentoring: guiding and graduating all of our students so they are equipped with a firm foundation in computer science.

This article focuses on the development of the human infrastructure necessary to increase the stream of minority and female computer scientists rather than on equipment infrastructure. We have three significant benefits from following this model:

1) NC A & T's computer science program is growing in support, thereby increasing the number of underrepresented minorities obtaining undergraduate and graduate degrees in computer science.
2) Links with education enrichment programs currently supported by state and federal funds are more effective.
3) Other universities can use this model to increase their production of underrepresented minorities in the discipline.

Historic role

NC A & T has had an enormous national impact on the number of minority engineers and computer scientists that graduate each year. For the past five years, for example, the School of Engineering has been one of the top producers of black engineers in the nation. In addition, a steadily increasing female enrollment (currently 34% and 24% for undergraduate and graduate programs, respectively) solidifies the school's position as a leader in the production of female engineers. Now that the computer science program is housed in the School of Engineering, a major goal is to enhance the program's means for recruiting, retaining, educating and graduating its students.

The department offers a B.S. degree in computer science, and, in collaboration with the Department of Electrical Engineering, offers an M.S. in software engineering.

A key retaining David Bellin as

Table 1: Enrollment in B.S. Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Fresh</th>
<th>Soph.</th>
<th>Jr.</th>
<th>Sr.</th>
<th>Total B.S.</th>
<th>Total B.S. Grads</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987-88</td>
<td>156</td>
<td>83</td>
<td>68</td>
<td>52</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>1988-89</td>
<td>177</td>
<td>91</td>
<td>68</td>
<td>52</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>1989-90</td>
<td>128</td>
<td>73</td>
<td>68</td>
<td>52</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>1990-91</td>
<td>121</td>
<td>74</td>
<td>68</td>
<td>52</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>1991-92</td>
<td>198</td>
<td>56</td>
<td>58</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Athough 80% of our computer science graduates are hired by industry, only a handful of the remaining 20% attend graduate school. The major contributing factors here are not scholastic aptitude. Instead, inadequate preparation upon entering and external conditions during the undergraduate experience do not promote scholastic excellence. Our analysis suggests that the major contributing factors are:

• Many of our undergraduate computer science majors do not devote adequate time to studying because they work many hours off campus. A nd 80% of our majors hold part-time jobs unrelated to academic pursuits.
• Most of our majors come from the middle third of their high school classes, rather than the top third as measured by their high school GPA s and SAT scores.

Solution-oriented approach

Although the problems associated with the production of underrepresented minority computer scientists may appear to be overwhelming, they can be solved without invention or discovery. They do, however, require a well-managed approach from recruitment until graduation. The solutions also require a broad perspective of the problems in the context of the total life cycle of student progression through graduation. A cordingly, managing all the components of student progression, instead of focusing on a single aspect, forms the basis of our proposed solution.

We also are concerned that once students are recruited for graduate study, appropriate attention continues to be paid to mentoring, including attention to study and research skills and the students' ability to devote full-time attention to schoolwork. This is often overlooked as a source of loss of minority students from the pipeline into higher degrees in the sciences. The following components should be used to accomplish the proposed goal of increasing the number of computer science graduates, recruitment enhancement, mentoring program enhancement and graduate study.

Recruitment enhancement

Of over 80% of our students from the top 10% of their class receive some form of financial aid. With climbing enrollment and a relative decrease in funding available from all sources, it is imperative that this department increases its scholarship funding base to attract and retain outstanding high school graduates as computer science majors. Thus, an essential aspect of the department's effort to enhance its ability to produce high-quality computer science graduates is strengthening its ability to offer competitive scholarship support to outstanding computer science students. A corollary, funding support is a major element of this component.

We are establishing recruitment links with education enrichment programs currently supported by state and federal funds. We plan to establish recruitment links with high schools in every county in North Carolina and with all 56 community colleges in the state. If funding is available, we plan to offer scholarships to outstanding students.

Mentorship program

The mentorship program is the central operational component of our approach, and it supports recruitment enhancements. The objective of the mentorship program is to produce qualified, competitive minority candidates for graduate programs in computer science. This will be accomplished by working with minority students from undergraduate recruiting through completion of the B.S. in computer science. We already offer release time to faculty members to assist in the program.

Each student who receives a scholarship will be guaranteed at least one summer research experience at our institution. The mentorship program is designed to provide a supportive and nurturing experience to enhance the academic, professional, intellectual and personal development of all computer science majors.

This component of our model allows us to encourage students, fuel the desire to succeed, guide students, enhance achievement, assist in making academic and career choices and assist in addressing and solving academic or personal problems that may impede academic progress. Our experience is becoming the largest producer of African-American engineers in the nation has taught us that mentoring is crucial to the success of aspiring engineers from underrepresented groups.

A mentorship program should be coordinated by a faculty member responsible for Total Quality Management. We support that programs be organized as follows:

• Each faculty mentor should be responsible for mentoring a subset of
Workshop for new faculty

A part of its workshop series, the Computing Research Association is sponsoring Effective Teaching in Computer Science and Engineering: A Workshop for New Faculty, June 7-9, 1995, in Snowbird, UT.

The workshop is intended for new faculty members teaching college and university courses in computer science and engineering. However, if space is available, experienced faculty are welcome to attend.

The purpose of the workshop is to help new faculty members teach more effectively. T his highly interactive workshop includes theoretical material on educational objectives and learning styles, and practical tips on effective lecturing, course organization, creative problem solving and collaborative learning.

Attendees are asked to bring a syllabus and an examination from one of their courses. Participants will actively participate as individuals, in pairs and in small groups. Each person will receive a booklet of readings and a bibliography on effective college teaching.

The workshop leaders are Michael C. Loui of the University of Illinois at Urbana-Champaign and Michael B. Pausen of the University of New Orleans. For more information about the workshop, contact Kimberly Peaks of CRA at tel. 202-234-2111 or via E-mail at kpoe@craft.org. Space is limited.

Board nominees sought

The Computing Research Association is seeking nominations for its Board of Directors. Every spring, CRA’s member organizations elect about a third of our board members. However, candidates are not restricted to CRA members. Our nominating committee, chaired by Richard A. dorin of the University of Massachusetts at Amherst, is seeking nominations. It is important that the CRA Board represent the interests of the entire computing research community, and it is our policy to solicit a broad range of candidates.

Please contact the person you are nominating before submitting his or her name. Nominations will receive information on CRA and its activities.

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

- Planning the biennial CRA Conference at Snowbird.
- Conducting the annual CRA Tau Beta Pi Survey.
- Coordinating the Grace Hopper Celebration of Women in Computing and increasing the participation of women in computing research with the help of the National Science Foundation grants.

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

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

To receive a copy of the nomination form, contact [John Bass of CRA at tel. 202-234-2111 or E-mail: jbass@cra.org. The deadline for submitting nominations is March 3.]

Mentoring from Page 4

The undergraduates and be assisted by two graduate students.

- Each graduate assistant should be a mentor for two undergraduate seniors.
- Each senior should be a peer adviser and a role model for up to 10 undergraduate students.
- All faculty mentors, graduate-student mentors and peer advisers should meet with their mentees each week of the academic year in a non-credit colloquium for mentoring purposes.

A mentoring center should be established and managed by a part-time faculty member coordinator responsible for operating the center, acquiring material, setting up programs and scheduling student activities.

The mentoring center should consist of a workstation network and multimedia-enabled interactive presentator stations with screen project-display capability. Software should be provided for student tracking. Systems should be provided for self study (in areas such as GRE preparation, math skills enhancement and computer science skills enhancement). Seminars should be conducted throughout the year on subjects such as teacher effectiveness, GRE preparation, math skills enhancement and computer science skills enhancement.

Seminars should be conducted throughout the year on subjects such as teacher effectiveness, GRE preparation, math skills enhancement and computer science skills enhancement. Network access should be provided for computer science research.

Mentoring process

Students are assigned from the feeder programs and departments. Students should be assigned to a faculty member, a graduate-student mentor and a peer adviser.

- During the freshman year, skills development in mathematics and computer applications are emphasized, giving students the tools needed to excel in the program. The freshman experience culminates with a summer job opportunity at a national research laboratory or industry site where students will be motivated to research.
- During the sophomore year, presentation skills are emphasized. The summer experience should be an internship.
- During the junior year, project management skills and presentation of papers at conferences are emphasized. The summer experience is research work with a faculty member in an area where the student desires to pursue graduate work.
- During the senior year, technical writing skills are emphasized. Students will develop tutoring skills through the role of peer advisers. If graduating seniors enroll in the M.S. program at N.C. A&T, the students have the option of continuing to work on research projects with faculty members during the summer.
- Under the supervision of faculty mentors, graduate students will focus on developing skills in teacher effectiveness and mentoring. If they work with peer advisers and undergraduate students, conduct seminars in the mentoring center and assist students in the lab, peer advisers will develop tutoring skills.

Graduate study

Throughout the overall number of students graduating with a Ph.D. in computer science has increased dramatically over the past decade,
1993-94 CRA Taubbee Survey

CRA improving quality of Taubbee Survey

Salary information from the 1993-94 CRA Taubbee Survey on the Production and Employment of Ph.D.s and Faculty in Computer Science and Computer Engineering

For 24 years, the Computing Research Association and its predecessor—the Computer Science Board—have been charting the growth of Ph.D. production and employment of computer scientists and computer engineers in North America. The CRA Taubbee Survey has changed this year in response to requests for more complete and accurate data on the supply and demand of Ph.D.s and faculty in the computing field. The new survey contains many new questions and refinements of old questions.

The new survey includes new questions on bachelor’s, master’s and Ph.D. student enrollment and the specialty areas of those awarded Ph.D.s. The survey also was restructured in two major areas: 1) It now distinguishes between computer science and computer engineering as separate programs in each department, and 2) It uses a system for categorizing minorities similar to that used by the Education Department.

The title of the survey honors the late Orrin E. Taubbee of the University of Pittsburgh, who conducted these surveys for the Computer Science Board from 1970 until 1984.

The field has become much larger and more complex in its structure. There are more responses to verify and respondents for us to track down. At the same time, the demands for new data and analyses from our own community and from policy makers have made the job of filling out the survey more time consuming.

Because of these delays—and to ease the reporting burden on our respondents—we have decided to publish the survey results in two parts. This month’s CRN carries statistics on faculty salaries because there is a high demand for making this data available in January and because the data is published as statistical averages that are less likely to be affected by incomplete responses.

The complete survey will be published in the March issue of CRN.

Table 1. Nine-Month Salaries, 110 Responses of 137 US CS Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Reported Salary Maximums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>548 of 555</td>
<td>$30,200</td>
<td>$49,815</td>
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<td>$52,583</td>
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<tr>
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<tr>
<td>Full</td>
<td>873 of 895</td>
<td>$39,940</td>
<td>$66,633</td>
<td>$103,000</td>
<td>$81,931</td>
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</table>

Table 2. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 13-24

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
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<tr>
<td>Assistant</td>
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<td>$50,000</td>
<td>$52,548</td>
<td>$59,900</td>
<td>$54,971</td>
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<tr>
<td>Associate</td>
<td>93 of 93</td>
<td>$53,183</td>
<td>$59,876</td>
<td>$69,200</td>
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<tr>
<td>Full</td>
<td>132 of 133</td>
<td>$58,904</td>
<td>$72,122</td>
<td>$95,500</td>
<td>$91,959</td>
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</table>

Table 3. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 1-12

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Reported Salary Maximums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
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<tbody>
<tr>
<td>Assistant</td>
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<td>$48,855</td>
<td>$52,616</td>
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<td>$54,553</td>
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<td>$38,940</td>
<td>$65,652</td>
<td>$75,050</td>
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Table 4. Nine-Month Salaries, 11 Responses of 11 US CS Departments Ranked 13-24

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<tr>
<th>Faculty Rank</th>
<th># Reporting</th>
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<th>Reported Salary Maximums</th>
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Table 5. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 1-12

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<th>Faculty Rank</th>
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<th>Reported Salary Maximums</th>
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<td>$48,855</td>
<td>$52,616</td>
<td>$60,000</td>
<td>$54,553</td>
</tr>
<tr>
<td>Associate</td>
<td>92 of 92</td>
<td>$49,100</td>
<td>$57,750</td>
<td>$63,500</td>
<td>$62,988</td>
</tr>
<tr>
<td>Full</td>
<td>142 of 145</td>
<td>$38,940</td>
<td>$65,652</td>
<td>$75,050</td>
<td>$86,431</td>
</tr>
</tbody>
</table>

Table 6. Nine-Month Salaries, 11 Responses of 12 US CS Departments Ranked 1-12

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Reported Salary Maximums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
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<tbody>
<tr>
<td>Assistant</td>
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<td>$50,000</td>
<td>$52,548</td>
<td>$59,900</td>
<td>$54,971</td>
</tr>
<tr>
<td>Associate</td>
<td>93 of 93</td>
<td>$53,183</td>
<td>$59,876</td>
<td>$69,200</td>
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<tr>
<td>Full</td>
<td>132 of 133</td>
<td>$58,904</td>
<td>$72,122</td>
<td>$95,500</td>
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### Table 4. Nine-Month Salaries, 10 Responses of 12 US CS Departments Ranked 25-36

<table>
<thead>
<tr>
<th>Faculty Rank</th>
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<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
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</thead>
<tbody>
<tr>
<td>Assistant</td>
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<td>$35,000</td>
<td>$51,263</td>
<td>$61,600</td>
<td>$54,911</td>
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<tr>
<td>Associate</td>
<td>48 of 50</td>
<td>$56,000</td>
<td>$61,880</td>
<td>$71,400</td>
<td>$66,373</td>
</tr>
<tr>
<td>Full</td>
<td>60 of 63</td>
<td>$65,500</td>
<td>$71,508</td>
<td>$86,100</td>
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</table>

### Table 5. Nine-Month Salaries, 78 Responses of 102 US CS Departments Ranked Higher than 36

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Salary Data</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
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<tbody>
<tr>
<td>Assistant</td>
<td>383 of 385</td>
<td>$30,200</td>
<td>$48,916</td>
<td>$56,400</td>
<td>$51,727</td>
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<tr>
<td>Associate</td>
<td>514 of 522</td>
<td>$36,641</td>
<td>$53,312</td>
<td>$65,800</td>
<td>$59,046</td>
</tr>
<tr>
<td>Full</td>
<td>539 of 554</td>
<td>$43,500</td>
<td>$65,489</td>
<td>$103,000</td>
<td>$78,413</td>
</tr>
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</table>

### Table 6. Nine-Month Salaries, 11 Responses of 24 US CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Salary Data</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>58 of 59</td>
<td>$44,076</td>
<td>$46,918</td>
<td>$56,450</td>
<td>$50,955</td>
</tr>
<tr>
<td>Associate</td>
<td>65 of 67</td>
<td>$46,573</td>
<td>$55,141</td>
<td>$62,000</td>
<td>$59,365</td>
</tr>
<tr>
<td>Full</td>
<td>80 of 82</td>
<td>$53,418</td>
<td>$65,052</td>
<td>$82,500</td>
<td>$76,368</td>
</tr>
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</table>

### Table 7. 12-Month Salaries, 12 Responses of 15 Canadian CS Departments (Canadian Dollars)

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Salary Data</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant</td>
<td>67 of 70</td>
<td>$31,639</td>
<td>$49,424</td>
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<tr>
<td>Associate</td>
<td>154 of 165</td>
<td>$40,841</td>
<td>$54,221</td>
<td>$68,884</td>
</tr>
<tr>
<td>Full</td>
<td>143 of 145</td>
<td>$52,748</td>
<td>$72,312</td>
<td>$87,956</td>
</tr>
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</table>

### Table 8. Nine-Month Salaries, 121 Responses of 161 US CS and CE Departments

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Salary Data</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
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<tr>
<td>Assistant</td>
<td>606 of 614</td>
<td>$30,200</td>
<td>$49,827</td>
<td>$61,600</td>
<td>$52,413</td>
</tr>
<tr>
<td>Associate</td>
<td>812 of 824</td>
<td>$36,641</td>
<td>$55,060</td>
<td>$71,400</td>
<td>$60,657</td>
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<tr>
<td>Full</td>
<td>953 of 977</td>
<td>$38,940</td>
<td>$66,487</td>
<td>$103,000</td>
<td>$81,429</td>
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</table>

### Table 9. Salaries of Newly Appointed Faculty, 54 Responding CS & CE Departments

<table>
<thead>
<tr>
<th>Dept. Rank</th>
<th>Salary Data</th>
<th># Reporting</th>
<th>Reported Salary Minimums</th>
<th>Avg. of all Salaries</th>
<th>Reported Salary Maximums</th>
</tr>
</thead>
<tbody>
<tr>
<td>US: CS 1-12</td>
<td>6 of 6</td>
<td>$49,000</td>
<td>$51,900</td>
<td>$55,500</td>
<td>$52,440</td>
</tr>
<tr>
<td>CS 13-24</td>
<td>10 of 10</td>
<td>$50,000</td>
<td>$51,664</td>
<td>$53,500</td>
<td>$50,092</td>
</tr>
<tr>
<td>CS 25-36</td>
<td>4 of 4</td>
<td>$54,000</td>
<td>$54,500</td>
<td>$55,000</td>
<td>$54,500</td>
</tr>
<tr>
<td>CS Other</td>
<td>52 of 52</td>
<td>$34,000</td>
<td>$47,636</td>
<td>$56,000</td>
<td>$48,513</td>
</tr>
<tr>
<td>CS/CE</td>
<td>81 of 81</td>
<td>$34,000</td>
<td>$48,674</td>
<td>$54,998</td>
<td>$49,748</td>
</tr>
<tr>
<td>Canadian: CS/CE 13 of 13</td>
<td>$27,500</td>
<td>$45,704</td>
<td>$55,000</td>
<td>$48,984</td>
<td></td>
</tr>
</tbody>
</table>

### Bottom line: Gridlock from Page 2

The NII most people probably had never heard of HPCP. Except for cold fusion, R&D programs rarely are the topic of Ted Koppel’s “Nightline” discussions. But HPCP had been tied by Congress and administration to things high on the agenda, notably economic growth and industrial policy. (In the Senate, it literally was tied to economic growth by being folded into S 4, a much broader bill focusing on industrial policy.) In some sense, it was interesting that so few people noticed the bill or its failure. The Clinton administration apparently was unable to make the connection in the public’s mind between future economic security and investment in education, infrastructure and research.

There was fairly good consensus on what should be done. The HPCP bills that passed each house were reasonably convergent and HPCP always had received bipartisan support. Even when Congress and the White House were controlled by different parties, administration HPCP plans and congressional legislation looked very similar. However, some industry groups have become more than a little cool to the program, even though they supported it earlier, bought into the
GAO urges shift in HPCC
By Juan Antonio Osuna
CRA Staff
The General Accounting Office, an investigative arm of Congress, urged the Clinton administration to shift its $1.1 billion High-Performance Computing and Communications (HPCC) program into high gear, saying the program can no longer remain the "loosely coordinated, scientifically oriented research effort" it once was.

Specifically, this 40-page report, released in N ovember, urged the administration to produce a detailed agenda of technical priorities, develop consistent guidelines for budget reporting, work more closely with industry and increase emphasis on software tools.

Such a technical agenda, according to the GAO, would ensure that the shift toward the so-called "National Challenges" is more than just cosmetic. At the start of the Clinton administration, HPCC was expanded to meet a set of National Challenges that address education, health care, and other broad economic and social needs. To do this, the administration added a new component to HPCC called "Information Infrastructure Technology and A plications."

However, the report said, “Both participants and outside observers have questioned the extent to which the program is actually shifting its emphasis toward N II technology issues, given that the level of funding for IITA projects to develop applications in areas such as education and health care is minimal compared with funding for hardware systems development.”

Funding levels for each of HPCC’s five components may not reflect reality, the GAO said, as each agency has its own informal guidelines for deciding which activities fall under HPCC and which components of HPCC fund the activities.

For example, the report noted that the National Science Foundation includes four supercomputer centers under HPCC but no supercomputing at all. The National Center for Atmospheric Research (NCAR) has no supercomputing at all.

In another example, GAO said hardware spending normally falls under the High-Performance Computing Systems component but also shows up in the Advanced Software Technology and Algorithms and Basic Research and Human Resources components, depending on the judgment of agency HPCC managers.

One of the inconsistent classifications, it is difficult to determine what areas HPCC is really emphasizing,” the GAO said, adding that better reporting procedures along with a prioritized, technical agenda would allow more strategic planning of limited HPCC funds.

Finally, the report relayed comments from industry officials that the program has neglected their needs. To remedy this, the report said the director of the White House Office of Science and Technology Policy would allow more strategic planning of limited HPCC funds.

The Clinton administration has said it wants to retain flexibility in modifying its encryption policy and Clipper program in response to changing circumstances and does not seek legislation authorizing Clipper or any other key escrow standards.

However, the administration’s desire for flexibility “contrasts with the public statement to Clipper,” Brown said. For this reason alone, the public is unlikely to ever accept Clipper chip in its present form.”

In September, the Office of Technology Assessment issued the report, Information Security and Privacy in Network Environments, which recommended congressional involvement as a way of making the process more accountable to various public sectors.

Encryption bill introduced
Rep. George Brown (D-CA), chair of the House Committee on Science, Space and Technology, introduced a bill October 6 authorizing federal development of escrow encryption standards such as the Clipper chip, already implemented by the Clinton administration.

The Encryption Standards and Procedures Act of 1994 sought to govern the development and use of key-escrow encryption technology for unclassified information. Brown said he introduced the bill in the final days of the 103rd Congress to send a signal that he is seriously pursuing similar legislation at the start of the year’s 104th Congress.

The encryption legislation would authorize the National Institute of Standards and Technology to develop and issue federal encryption standards for both the government and private sectors, impose new legal requirements for key-escrow agents, establish an R&D program at NIST and authorize for both the government and private sectors, impose new legal requirements.

The project will benefit researchers in the academic community and the private sector by providing a more widespread involvement in the emerging National Information Infrastructure and the national ability to address business and scientific needs.

T new these awards will allow the technologies of high-performance computing, so long the focus of of only nationally funded centers, to penetrate into local and regional activities,” said Rep. George Brown, assistant director of NSF’s Computer and Information Science and Engineering Directorate. “They will allow K-12 in agricultural extension services for high-performance computing. For example, they will allow the technology to be used [...], to allow a new generation of students to acquire the skills that will be necessary for economic competitiveness in the 21st century.”

The six recipients are:

• California Institute of Technology, Los Angeles Regional Gigabit Environment ($1.2 million); This alliance will provide high-speed computer network access for industrial and educational partners and selected academic research groups in Southern California, it will focus on helping industrial partners access large-scale computing and communications facilities of the NSF Metacenter and Caltech. These industrial partners include users of high-performance computing systems and independent software vendors that may use the NSF Metacenter as a test bed for high-performance systems.

Contact Robert O’Rourke at tel. 818-396-2194 or E-mail: robert.orourke@stanford.edu.

• University of Illinois at Champaign-Urbana and Comprising N I L Metacenter A (Civilian) ($1.3 million); This alliance, known as the Virtual Reality Alliance, will bring together the NSF Metacenter, the Software Technologies Research Center at the University of Illinois at Champaign-Urbana and the Champaign Manufacturing Center. The metacenter will offer a high-end virtual test bed for manufacturing product design and rapid prototyping to large companies and a consortium of smaller ones.

Partners also include Caterpillar, General Motors, the National Center for Supercomputing Applications and the San Diego Supercomputer Center.

Contact Richard A. Martin, 312-996-8277 or E-mail: U39733@uicvm.uic.edu.

• M C N C , Stimulating and Enhancing Domestic Technology Development ($1.4 million); T his North Carolina alliance is designed to nurture the development of computational knowledge by small businesses.

The center will focus on businesses in North Carolina in the first year, later expanding to include one additional state in the region for each of the next two years. The program is a partnership among M C N C ’s North Carolina Supercomputing Center, the Southern Technology Council (a division of the Southern Growth Policies Board), nine North Carolina small businesses, seven research organizations, IBM Corp., the Cornell Theory Center, the National Center for Supercomputing Applications and the Pittsburgh Supercomputing Center.

Contact Eileen Saro at tel. 919-248-1827 or E-mail: eileen@mcnc.org.

• M C N C , Regional Training Center for Parallel Processing ($922,000). This center is being developed by the North Carolina Supercomputing Center at M C N C and North Carolina State University. Participating partners include the University of North Carolina at Chapel Hill, Ral, which will provide a self-paced education environment covering all aspects of parallel processing.

Contact Eileen Saro at tel. 919-248-1827 or E-mail: eileen@mcnc.org.

NSF awards $6.5 million to supercomputing subcenters
The National Science Foundation awarded $6.5 million to six supercomputer centers that will provide access to advanced computing and communications (H PC C) tools. These centers form what are called M etacenter Regional Alliances (MRAs), which are agreements among existing supercomputing centers to increase availability and use of HPCC capabilities.

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Contact Eileen Saro at tel. 919-248-1827 or E-mail: eileen@mcnc.org.

• M C N C , Supercomputer Center, M etacenter A lliance to Expand Industrial and Scientific Parallel Processing ($440,000); This alliance will allow the Pittsburgh Supercomputing Center, A rtic Region Supercomputing Center and O hio Supercomputer Center to focus on common issues associated with parallel processing on a R ayt 3D computer. A ll three centers have similar hardware architectures and application software, allowing them to address common challenges in using new massively Parallel processing supercomputer systems. T he alliance will concentrate on developing and testing key production-quality applications running on M P machines.

Contact Kevin Timson at tel. 713-285-5922 or E-mail: ktimson@cs.rice.edu.

• M C N C , Regional Training Center for Parallel Processing ($922,000). This center is being developed by the North Carolina Supercomputing Center at M C N C and North Carolina State University. Participating partners include the University of North Carolina at Chapel Hill, Ral, which will provide a self-paced education environment covering all aspects of parallel processing.

Contact Kevin Timson at tel. 713-285-5922 or E-mail: ktimson@cs.rice.edu.
strong non-escrowed encryption could make wiretaps useless to law enforcement agencies. The FBI argued for a form of encryption that would enable law enforcement agents to decrypt communications whenever equipped with legal authorization to do so.

Because wiretaps play a crucial part in this story, it is worth a brief detour into their legal history. In the landmark 1928 case of Olmstead v. United States, defendants argued that wiretaps were a violation of the Fourth Amendment's prohibition against unreasonable search. The Supreme Court disagreed, ruling that the Fourth Amendment protects "the person," regardless of the manner in which communications are conducted. A warrant was necessary for a wiretap.

An effective tool

WIRETAPS are searches that leave no trace, and thus are a particularly invasive form of surveillance. Law enforcement had found wiretaps too effective a tool to readily give them up. In 1968, Congress passed Title III of the Omnibus Crime Control and Safe Streets Act and established the set of circumstances under which wiretap orders could be issued. The crimes had to be serious and indictable and there had to be probable cause that the communications device was being used to facilitate the crime. Other investigative tools had to have been tried and found wanting; only certain crimes could warrant a wiretap. A about 1,000 electronic surveillance orders are issued under federal and corresponding state statutes annually; about three-quarters of these orders are for wiretaps.

From the point of view of law enforcement, the Clinton administration proposal of an encryption method with escrowed keys fits the bill perfectly. Keys are split and the halves are escrowed with two executive branch agencies: Treasury's Automated Services Division and NIST. Under legal authorization, the keys for domestic users of the technology are available to law enforcement agents. The algorithm is classified to limit the spread of strong encryption techniques. Although these measures have satisfied the perceived needs of the US government for an algorithm that provides strong cryptography domestically without making it available internationally, the solution was an anathema to many others.

Many objected to a civilian cryptography standard that used a classified algorithm, arguing that cryptographic methods need public scrutiny to prove their strength. The National Security Agency, as the designer of cryptographic algorithms for military and diplomatic purposes, developed the algorithm. A about 1,000 wiretap orders could be issued under federal and corresponding state statutes annually; about three-quarters of these orders are for wiretaps.

Policy News

For many of the high-profile cases in which electronic surveillance played a role, electronic bugs—not wiretaps—led to the convictions.

Gridlock from Page 7

NII vision and stood to benefit from the work that was funded. But the groups felt the program was drifting and unreponsive to their concerns. A recent General Accounting Office report criticized the administration for not making more of an effort to coordinate management and provide opportunities for outside input to program plans and priorities—something industry had been pushing for some time.

Few tears were shed when the bill went down, but there should have been. The failure does not bode well for the future, and I believe the failure was necessary.

Bottom line. There was a reasonable consensus on the bill, but lack of strong incentive to move it forward because of strong public or industry support turned this legislation into the political roadkill in the final partisan days of the legislative session.

I do not qualify for a free subscription.
CHEERED BY REPUBLICANS. For example, now that Republicans are the majority party, term limits look less interesting. W hatever it does to finally win a long fight for control if the first thing you do is vote yourself out of office.

Senate Republicans were not part of the contract and do not feel any compulsion to follow its dictates. The Senate is a different type of institution, no matter which party runs it. And few elected politicians in Congress officially signed on to the list of proposed cuts.

Science traditionally has fared well under Republicans, who always have supported civilian and military research. T hey have shown more skepticism toward applied technology programs and so may be expected to push programs back to longer-term and basic research. (T hat does not mean they do not share in the general sense that R&D needs to be linked to specific social goals and purposes.)

Some Republicans did join in the anti-university rhetoric that accompanied the Defense research cuts, but it is not clear that research is a partisan issue in Defense policy. A key problem will be that some computer- and communications-related programs have been politici-

ized by being identified with administration initiatives such as the National Information Infrastructure, HPCC and various technology initiatives. H ow that will affect their support in a Republican Congress remains to be seen. We are, however, unlikely to see any new initiatives or major expansion of existing ones.

If the campaign suggests anything, it is that Republicans may be more sensitive to the potential of the Interne t and new electronic information technologies than their liberal counterparts. T he conservative community actively used computer networking and the panoply of electronic communication systems for organizing and to energize their constituencies. T he contract is a case in point. It has been posted widely on the network. It is a brief, text-oriented format that is amenable to public electronic access. A t the Computing Research Association, which made the contract available on our World Wide Web home page, we tried—in the name of bipartisanship—to add some Democratic response. W e could not find any on the network.

W hen we finally found some thing on paper, it was long, rambling and filled with tables. It was not amenable to getting it online quickly in a form that would be usable to anyone without high-capacity access to the Internet.

Some predictions
- T here will be severe pressures on R&D budgets, but they are likely to be structural, not partisan. Lawmakers were going to be much tougher this year, even under a Democratic Congress. If taxes are cut, the pressures will be even greater.
- T oday, any American can purchase an encryption system in which an encryption system in which electronic surveillance played a role, electronic bugs—not wire taps—led to the convictions. That was the case with the Gotti conviction in N ew York, for example.

Finally, it is worth noting that while computer technology, in the form of advanced telecommunication s switching or encryption, may impede the execution of wiretaps, computer technology also has greatly enhanced crime-fighting techniques. Electronic surveillance, in the form of video cameras in public places, is widespread. M odern telephone signaling systems provide much more information, revealing in real time the origination and destination of the call. Electronic database information, whether for fingerprints or more mundane records, makes many searches effective when paper files did not. A ll of these are tradi tions above 1968, when the federal wiretap statute was enacted.

A decision to be made

This nation is experiencing fundamental transformations in the way people and organizations communicate. T he National Information Infrastructure will only accelerate the changes. C onfidentiality of electronic communications is a serious technical and policy issue facing society. W hile cryptography best accommodates national needs for secure communications and privacy, industry success, effective law enforcement and national security? Ultimately, the choice will be one of values: H ow important is protecting society from potential attacks by criminals versus how important is protecting personal privacy from all threats of eavesdropping—including by the govern ment? T his debate will rest on facts, so it is important to get those facts right.

SUSAN LANDAU is a research associate professor in the Computer Science Department at the University of Massachusets and the author of the "U.S. ACM study, Codes, Keys and Conflicts: Issues in U.S. Crypto Policy."

Footnotes
1EES is a voluntary Federal Information Processing Standard (FIPS). A ny agency that chooses to protect the communication of sensitive but unclassified information (e.g., Social Security records or IRS returns) could choose to use EES in any other FIPS cryptographic scheme. However, the other FIPS approved for encrypting electronic communication is the Data Encryption Standard (DES) and there is a good chance that DES will be shelved at its next review later this decade.
3EES was designed by IBM C o. and was voted by the National Security G acy.
Roth: Clipper lacks support

A aide to Sen. William V. Roth (R-DE), the incoming chair of the Senate Governmental Affairs Committee, said the senator plans to take a hard look at the Clinton administration's Clipper key escrow encryption policies as well as other issues that may threaten privacy.

"There is a crisis in government," a LEGIS fellow on Roth's staff, told members of the National Institute of Standards and Technology's Computer System Security and Privacy Advisory Board that the Clipper initiative suffers from a lack of support from industry that will hinder its success. Consequently, the advisory board may seek changes, he said.

"The Clipper chip had no buy-in from industry," Koscinski said. "Clearly whatever we do in the future will require the cooperation of industry.

He added that Roth also plans to reconsider the government's process of creating Federal Information Processing Standards (FIPS) for security products. He said the FIPS "may not serve any purpose," and standards may be best developed cooperatively by industry and government. He criticized the Clipper standard and said it was developed by the National Security Agency in a classified environment that did not allow industry and the general public to participate in the process.

Koscinski said the committee will hold hearings on Clipper and other issues early this spring. "Privacy is the senator's number one concern," he said. "This is a view and the public's perception of government as big brother and a lack of attention to the issue of privacy makes government vulnerable to security breaches," he told the board.

"Lack of management attention, training and security focus make government vulnerable to security breaches," he told the board.

He said personnel at the Office of Management and Budget are "assessing what the government and industry need to do to protect their  information," and will hold hearings on Clipper and other issues. He said the committee will hold hearings on Clipper and other issues. He added that Roth also plans to reconsider the government's

number of African-American men and women earning the degree has remained dismal low. The number of African-American and Ph.D. recipients accounts for less than 1% of the doctorates granted each year, for an average of 0.6% of the total for the past 20 years. This has occurred at the same time that the number of foreign students earning a Ph.D. in computer science has increased from 32% in 1981 to 35% in 1991. The total graduate population of Africa and American with a Ph.D. degree in computer science is 5% or less, according to figures from the Department of Education.

Success at the undergraduate level has not resulted in substantive progress at the graduate level.

Mentoring from Page 5

mentoring to hire faculty and industry has attempted to diversify the work force. A according to the 1992-93 CRA Talbou survey, at the 13 universities in North America that grant computer science Ph.D. degrees, only 0.69% of the faculty are African-American.

Clearly, the rate of retention and production of minority computer scientists must be improved.

The most promising undergraduate students must be encouraged to engage in further study. Our approach will likely have to continue at the graduate level. Graduate scholarships and mentoring as opposed to adversity are not only appropriate, but necessary.

At the graduate level, research activity is the center of the educational experience. Encouragement, mentoring and funding of research activities and articles are key parts of the program. The advanced degree component is critical to the fact that the doctoral program of study should be made part of the mission of at least one HBCU in the nation.

The next step is to develop a program in the nation.

We propose to begin planning for this project at the Department of Computer Science. Such a program could, by itself, dramatically increase the supply of minority and female computer scientists in the nation.

David Bellin is director of graduate studies in the Department of Computer Science, North Carolina A & T State University.

How should ‘obscenity’ be defined in cyberspace?

By Juan Antonio Osuna

ORF Staff

A thorough study of the society's obscenity courts because of entrainment implications. For each count, the couple now faces a maximum of five years in prison and $250,000 in fines.

What was especially disturbing to Godwin was that the Memphis postal inspector was the only person in Tennessee with an account on the BBs, and still the court imposed Tennessee standards for obscenity on a BBS located in California. The judge ruled that "obscene" material is defined in cyberspace.

A Memphis jury convicted the Tennessee couple of obscenity charges but acquitted them on the child-porn count because of entrainment implications. For each count, the couple now faces a maximum of five years in prison and $250,000 in fines.

But despite this, Godwin (11 observations) have been triggered by the removal of mainstream media to pursue the question of whether the community standards doctrine makes sense anymore.

"Godwin's concern is more than just theoretical. He is quick to mention the case of Robert and Carleen Thomas of M. BSG, a company that makes the "Mater AOLUMN BBS," offering adult forums and sexually explicit graphics.

A Tennessee postal inspector, working with an assistant U.S. attorney in Memphis, joined the Tennessee BBS and later downloaded sexually oriented images, ordered a videotape by mail and sent the couple an unsolicited child-porn video.

"Godwin had suggested that it is appropriate for a company or university to allow students or employees to use limited computer resources to browse sexually explicit graphics requiring high-bandwidth.

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what is? Godwin suggested that "we should focus on empowering individuals to make their own choices.

But the issue is not so simple. How does society go about empowering certain users with the choice of not having access to or throwing children's material away? Is it appropriate for a company or university to allow students or employees to use limited computer resources to browse sexually explicit graphics requiring high-bandwidth.

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"Godwin is even more disturbed by the Internet's hottest issue now."
**Auburn University**

Department of Computer Science and Engineering

The Department of Computer Science and Engineering at Auburn University seeks to add a second-level faculty position beginning September 1995. A Ph.D. is required. Applicants must demonstrate excellence in research and teaching in the areas of computer networks and high-performance computing. Departmental research includes a network of Sun workstations linked to the College of Engineering network and the Internet. Parallel computing research is supported by a CM-5 parallel computer and a network of 36 8-Transputers. Auburn University, with more than 21,000 students, is a land-grant university located 100 miles southwest of Atlanta.

**Cornell University**

Department of Computer Science

A full professor or a full professor rank is available to begin September 1995, and continue until the position is filled. The department of computer science is an active and equal opportunity employer; women and minorities are encouraged to apply.

**University of Maryland, Baltimore County**

Department of Computer Science

The department of computer science at the University of Maryland, Baltimore County invites applications for a tenure-track position at the associate professor rank. The department has a strong research and teaching record in computer science, applied mathematics, artificial intelligence, computer networks, software engineering, computer security, and systems engineering. Women and minorities are encouraged to apply.

**Virginia Tech**

Department of Computer Science

The department of computer science at Virginia Tech is located in a vibrant and fast-growing city in the Blue Ridge Mountains. Women and minorities are encouraged to apply. Applications are invited for the position of Tenure-Track Assistant Professor.

**University of Arizona, Tucson**

Department of Computer Science

Tenure-track faculty positions are available at the Assistant Professor level. Women and minorities are encouraged to apply. The department is located on the University of Arizona campus in the southwest United States.

**University of Illinois, Urbana-Champaign**

Department of Computer Science

An endowed professorship at the University of Illinois is available for a researcher in the area of computer science. Women and minorities are encouraged to apply. The position is available immediately.

**University of Southern California**

Department of Computer Science

The department of computer science at the University of Southern California is seeking a faculty member at the rank of Assistant Professor. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.

**University of California, Berkeley**

Department of Computer Science

The department of computer science at the University of California, Berkeley is seeking a faculty member at the Assistant Professor level. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.

**University of Illinois at Chicago**

Department of Computer Science

The department of computer science at the University of Illinois at Chicago is seeking a faculty member at the rank of Assistant Professor. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.

**University of Washington**

Department of Computer Science

The department of computer science at the University of Washington is seeking a faculty member at the rank of Assistant Professor. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.

**University of California, Irvine**

Department of Computer Science

The department of computer science at the University of California, Irvine is seeking a faculty member at the rank of Assistant Professor. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.

**University of California, Los Angeles**

Department of Computer Science

The department of computer science at the University of California, Los Angeles is seeking a faculty member at the rank of Assistant Professor. Women and minorities are encouraged to apply. Applications are due by September 15, 1995.
Professional Opportunities

Levine Science Research Center, a state-of-the-art facility, offers the opportunity for substantial research in computer science, environmental science, biomedicine and engineering and medicine research.

The Duham, NC, area, rated by Move over the Experimet Neighborhoods as one of the United States to live and work, offers a wide variety of recreational, cultural and recreational activities.

Applications should include a curriculum vitae, a description of work and/or research facilities and a list of the most important publications. A Ph.D. in computer science or a closely related field is required. Applicants should also request at least four letters of recommendation be sent to the faculty search chair. To guarantee full consideration, applications and letters of reference should be sent by Feb. 1, 1995, to Professor Carla Ellis, Faculty Search Chair, Department of Computer Science, Duke University, Durham, NC 27708-0329.

Duke University is an affirmative action, equal opportunity employer.

Ohio State University

Department of Computer and Information Science

Staff positions are available in the group. The Department of Computer Science is an equal opportunity, affirmative action employer. Women and minorities are encouraged to apply.

If you have any questions, please contact the search committee at applications@cis.ohio-state.edu, with the subject line “Applications.”

Washington State University

Department of Computer Science

We are seeking outstanding candidates in all areas of computer science and related fields; a doctorate is preferred. In addition, the department welcomes applications from women and underrepresented minority candidates.

We are particularly interested in candidates in artificial intelligence, compilers, computer graphics, computer-aided design, computer vision, databases, distributed systems, numerical analysis, parallel architectures and computer programming languages, robotics, software engineering and computer vision.

University of Nebraska, Lincoln

Department of Computer Science and Engineering

A position is available for an anticipated tenure-track position in CSE starting August 1995. Fillings of this position are contingent upon the availability of funding. Applications are invited in candidates in VLSI design, distribution systems and distributed computing. Rank and salary will be commensurate with experience. Nominations are invited of qualified individuals for these positions. Nominations should be sent to Professor Richard Cole, Chair, Department of Computer Science, University of Nebraska, Lincoln, NE 68588-0129. University is an equal opportunity employer. Women and minorities are encouraged to apply.

University of Wyoming

Department of Computer Science

Applications are invited for one tenure-track position in computer science at the assistant professor rank or at the associate professor rank from candidates in computer science or computer engineering.

A successful candidate will teach and advise undergraduate and graduate students. He or she will participate in curriculum revision and in research and funding and research. A Ph.D. in computer science or computer engineering with research experience in computer science or computer engineering is required.

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Job opportunities from Page 13

**College of William and Mary**
Department of Computer Science Applications are invited for a tenure-track faculty position in computer science for fall 1995 at the assistant or associate professor level. A Ph.D. is required in computer science or computing science. A position at the assistant level requires that the candidate hold a Ph.D. at the time of appointment and demonstrate strong interests in both research and teaching. A position at the associate level requires a documented record of sustained excellence in both research and teaching. We are particularly interested in individuals with research expertise in one of the following areas: scientific databases, parallel computing, high-performance systems, and parallel and distributed numerical algorithms. A demonstrated interest in multidisciplinary applied research is highly desirable.

The department currently consists of 12 faculty members who support B.S., M.S. and Ph.D. programs, enrolling approximately 25 Ph.D. and 40 M.S. 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" or to the gopher server "gopher.wm.edu".

The department maintains a network of Sun, Sun-clone, SGI and RS6000 Unix workstations used for both teaching and research and a 3,024-node MPP/MPF-2. Opportunities exist for joint research activity with scientists and engineers at the nearby NASA Langley Research Center and DOD's Continuous Electron Beam Accelerator Facility (CEBAF).

A resume and a statement of research and teaching interests should be sent to: Faculty Search Committee, Department of Computer Science, College of William and Mary, PO Box 8795, Williamsburg, VA 23187-8795. Candidates should also have three letters of recommenda-
tion sent to the same address.

E-mail questions to search@cs.wm.edu. Review of applications will begin Feb. 15, 1995, and continue until the position is filled.

The College of William and Mary is an equal opportunity, affirmative action university. Members of underrepresented groups (including people of color, persons with disabilities, Vietnam veterans and women) are encouraged to apply.

**University of Missouri-Rolla**
Department of Computer Science The Department of Computer Science invites applications for a tenure-track assistant or associate professor position in the area of software and high-performance systems. The department is particularly interested in candidates with expertise in one of the following areas: operating systems, parallel and distributed computing, high-performance systems, and operating systems programming languages and software engineering.

Preference will be given to candidates at the assistant professor level. Qualifications for the assistant professor level include a Ph.D. in computer science. The department has strong research programs in artificial intelligence, computer architecture, and high-performance computing.

Applications are invited for a faculty position in the area of software and systems. The department is particularly interested in candidates in the areas of database, distributed systems, networks, operating systems, and software engineering.

Applications postmarked before March 1 are eligible for consideration. Earlier applications will receive first consideration. A position can begin as early as August 1995.

The University of Missouri at Columbia strongly supports the principle of diversity. We are particularly interested in receiving applications from women, ethnic minorities, disabled persons, veterans and veterans of the Vietnam era.

**University of Delaware**
Department of Computer and Information Sciences The University of Delaware, centrally located on the East Coast, within day-trip distance of New York, Philadelphia, Baltimore and Washington, D.C., invites applications for one tenured-track assistant professor position in the Department of Computer and Information Sciences beginning Sept. 1, 1995. Excellent candidates are sought in systems-related areas including operating systems, parallel and distributed computing, computer architecture and compilers. Responsibilities of the position include a Ph.D. granting departments. More information about the department and the college can be obtained by connecting to the Web server "http://www.cs.umr.edu" or to the gopher server "gopher.wm.edu".

The department maintains a network of Sun, Sun-clone, SGI and RS6000 Unix workstations used for both teaching and research and a 3,024-node MPP/MPF-2. Opportunities exist for joint research activity with scientists and engineers at the nearby NASA Langley Research Center and DOD's Continuous Electron Beam Accelerator Facility (CEBAF).

A resume and a statement of research and teaching interests should be sent to: Faculty Search Committee, Department of Computer Science, University of Missouri-Rolla, Rolla, MO 65401, Tel. 314-341-4492; E-mail: csdept@cs.umr.edu.

For additional information about the department, you may access the department's home page via Mosaic at http://www.cs.umr.edu.

U.M-Rolla is an equal opportunity, affirmative action employer and especially encourages applications from both minorities and women.

**University of Colorado, Boulder**
Department of Computer Science Applications are invited for a faculty position in the area of software and systems. The department is particularly interested in candidates in the areas of database, distributed systems, networks, operating systems, programming languages and software engineering. Preference will be given to candidates at the assistant professor level.

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**Wayne State**
Department of Computer Science

Wayne State .5 pt rules print

Office of Computing Research Newsletter
Professional Opportunities

University of Pennsylvania Department of Computer and Information Science

The University of Pennsylvania invites applications for tenure-track assistant professor positions in the Department of Computer and Information Science. The university has an anticipated need for the 1995-96 academic year. Candidates for the chair should have qualified to communicate with the academic rank of full professor at the University of Pennsylvania. In particular, the chair should possess:

- research ability—demonstrated by major articles appearing in highly respected conferences or journals,
- research ability—demonstrated by having received an HPC or-related significant contributions in an area of interest to the departmental culture,
- a commitment to teaching—demonstrated by having received departmental recognization in high-quality courses,
- current research and teaching experience and abilities.

Applications must be received by the chair, Professor R.W. Hakala, Chair, Computer and Information Sciences, 301 S.C.E., University of Pennsylvania, Philadelphia, PA 19104-6389. Preference will be given to candidates whose research interests lie in the areas of operating systems, networks, parallel and distributed computing and artificial intelligence.

The department is an equal opportunity employer and encourages applications from women and minorities. Non-US citizens must include all required documentation on request. Finalists cannot be deferred on request.

Governors State University

The Department of Computing and Information Sciences invites applications for tenure-track positions beginning in Fall 1995. Applicants should have a Ph.D. in computer science or in a closely related field with a demonstrated ability in relevant research. Of particular interest are applicants whose research interests lie in the areas of operating systems, networks, parallel and distributed systems or artificial intelligence. The department is an equal opportunity employer and encourages applications from women and minorities.

The University of Wisconsin at Madison has active research projects in a broad area of research projects in a broad area of computer science, computer architectures and VLSI, database systems, mathematical programming modeling and analysis of computer systems, networking and distributed systems, numerical analysis, operating systems, parallel computer program design and development environments and the theory of computation.

The department has received three NSF Coordinated Experimental Research (CER) awards. The previous two projects emphasized lossy and lossy coupled parallel computing. The current project, PRISM, addresses parallel processing on machines that use collective credit paths to beating competition. Tenure-track positions are available for the 1995-96 academic year. Women and minorities are strongly encouraged to apply. Applicants should submit a curriculum vitae and the names of at least three references to Chair, Professor R.W. Hakala, Chair, Computer and Information Sciences, 301 S.C.E., University of Pennsylvania, Philadelphia, PA 19104-6389. Preference will be given to candidates whose research interests lie in the areas of operating systems, networks, parallel and distributed systems or artificial intelligence.

University of California, Riverside College of Engineering

The Marlan and Rosemary Bourne College of Engineering at the University of California at Riverside is conducting a worldwide search to attract an outstanding candidate for the John A. Chiang Chair in Intelligent Systems. A applications and nominations are solicited in all areas related to intelligent systems, neural networks, artificial intelligence, computational logic, natural language processing, pattern recognition and cognitive science. The college is seeking an individual who can lead an international program in intelligent systems and contribute to developing a doctoral program in intelligent systems. Candidates for the chair should have qualitative research and teaching abilities in the academic rank of full professor at the University of California. In particular, the candidate should possess:

- research ability—demonstrated by articles appearing in highly respected conferences or journals,
- research ability—demonstrated by having received an HPC or-related significant contributions in an area of interest to the departmental culture,
- a commitment to teaching—demonstrated by having received departmental recognization in high-quality courses,
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Purdue University

Applications are invited for tenure-track assistant professor positions in the Department of Computer and Information Science, beginning January 1995. The department is seeking an outstanding candidate who is committed to excellence in both teaching and research. Women and minorities are strongly encouraged to apply. Applicants should submit a curriculum vitae, including three letters of reference, to Dr. Virgil Smith, Professor and Director, Department of Computer and Information Science, 244 N. Chisolm Hall, Manhattan, KS 66506. The deadline for applications is January 31, 1995. The university is an affirmative action, equal opportunity employer.

Northwestern University

Applications are invited for tenure-track assistant professor positions in the Department of Computer Science, beginning Fall 1995. Scholars with a strong commitment to research and teaching are particularly encouraged to apply.

The University of California, Riverside is conducting a worldwide search to attract an outstanding candidate for the John A. Chiang Chair in Intelligent Systems. A applications and nominations are solicited in all areas related to intelligent systems, neural networks, artificial intelligence, computational logic, natural language processing, pattern recognition and cognitive science. The college is seeking an individual who can lead an international program in intelligent systems and contribute to developing a doctoral program in intelligent systems. Candidates for the chair should have qualitative research and teaching abilities in the academic rank of full professor at the University of California. In particular, the candidate should possess:

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Canadian News

Canadian researchers explore privacy issues

By Douglas Powell

A s electronic transactions and records become central to everything from commerce and tax records to health care and even basic research, new concerns arise for the security and privacy of prepared information. These concerns, if not properly resolved, threaten to limit networking’s full potential in terms of participation and usefulness, according to a U.S. Office of Technology Assessment report, Information Security and Privacy in Network Environments, released in September.

While a vigorous and public debate has developed in the United States, Canada has been relatively quiet, although the same issues challenge the Canadian research community. However, the nascent electronic privacy debate in Canada has been kicked off by the formation of Electronic Frontiers Canada (EFC) and a recent conference that grappled with the sometimes competing interests of freedom of speech and individual privacy.

Computer science professors David Johns of McMaster University and Jeffrey Shallit of the University of Toronto formed EFC last January to protect Canadian rights and freedoms on the information highway. Richard Rosenzweig of the University of British Columbia joined the Board of Directors in September.

In November, EFC and several other organizations brought together some of Canada’s best-known pundits to weigh the issues and move the debate onto the larger public stage.

Computer users (noticeably more libertarian than the general public) clamor for complete freedom of communication, sometimes without recognizing the accompanying responsibilities, Shallit said. Others have legitimate worries about the new technology exacerbating society’s existing inequities. A survey conducted by EFC in June found 54% of Canadians found that the country increasingly is divided into the information haves and have-nots.

Computer pornography is spreading and the potential for computer crime and terrorism is increasing. Worse, the Canadian Charter of Rights and Freedoms, enacted in the Constitution Act of 1982, is conflicting with the Internet.

“Do we control the medium or does the medium control us?” asks the report, The OTA report, appropriate safeguards must account for—and anticipate—technical, institutional and social changes that increasingly shift responsibility for safeguarding information to the end users.

Law currently governing commercial transactions, data privacy and intellectual property largely were developed for a time when telegraphs, typewriters and mimeographs were the commonly used office technologies, and business was conducted with paper documents sent by mail. Technologies and business practices have changed dramatically, but the law has been slow to adapt.

The Canadian Human Rights Tribunal in September of 1994 took up the case of John Sopinka of the Supreme Court of Canada said at the conference the Charter of Rights and Freedoms protects freedom of expression. But he added that there is no specific protection for privacy, although the Supreme Court has hinted several times there should be.

“T he more that technology affords opportunities to reach wide audiences, the more society may come to resent any attempts to restrict free speech,” Sopinka said. “It will not be easy searching for an appropriate middle ground.”

Jay Weston, a professor of mass communications at Carleton University and a founder of the Ottawa Freenet, said that community networks nudge along the process of democratic self-representation, where more groups and individuals gain a public voice.

“With media is content-driven, where the Internet is relationship-driven,” Weston said. He also said some bars at the Canadian Network for the A Displacement of Research, Industry and Education (CAN A RIE), which is establishing itself as the national electronic backbone.

“CAN A RIE, as its name implied, assumed there were no people in Canada,” he said.

But with more people on the Net, there are more opportunities for electronic tinkering. H enry Spencer, an independent consultant and author who worked for many years as a Unix systems programmer at the University of Toronto, said that although it is increasingly difficult for the government to monitor private conversations (through programs such as PGP—pretty good privacy), most electronic communications are not going to use it and remain exposed.

Spencer, whose system was the first Unix set in Canada and the first outside the United States, said freedom of the press exists as long as the media does not make the government too angry. “T he pre-supposition of innocence gives us a corner where organizations usually blow it,” he said in reference to several cases where electronic commerce may be monitored or confiscated. “Your employer expects more control over than governments, with a whole lot less in the way of due process.”

That view was expanded by Canadian journalist Parker Barash Donham, who said universities, with newsgroup bannings and speech codes, “have become the most censorious institutions in our society.” Repeatedly the discussion returned to newsgroup bannings and other electronic restrictions imposed by university administrators.

Shallit noted the similarities between the banned discussion of details surrounding the Paul Teale and Karla Homolka murder trials and the 100-year-old murder of Reginald Birchall. Banned discussions of the Teale and Homolka trials were easily circumvented using the hotline, newsgroups and then listerves. In the Birchall case, an entrepreneur installed a microphone above the judge’s bench in the Woodstock, Ontario, courtroom, and the trial proceedings were relayed by telephone to his home, where patrons could listen in at the rate of 25 cents an hour.

A “we decide on what policies are best for the communications world of the future,” Shallit said, “let us reflect seriously on the mistakes and successes of the past.”

Ursula Franklin, professor emeritus at the University of Toronto where she taught in the Department of Computing and Mathematical Sciences, proposed a public health model to regulate—in the same way cigarette smoking is regulated in public spaces—when and where potentially offensive material such as pornography could be viewed.

“The information age is an environment,” Franklin said. “One that needs regulations and management, like the green environment.” That suggestion brought a sharp rebuttal from several speakers. “Human expression is not the moral equivalent of smoking and toxic waste,” Donham said.

For more information about Electronic Frontiers Canada, send E-mail to efc@graceland.uwaterloo.ca. D ouglas Powell is a graduate student at the University of Guelph in Ontario.