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President's Budget Includes Increases for Fundamental Research, Computing

By Peter Harsha

Despite several years of relatively flat or declining budgets, several federal science agencies, including four crucial to computing researchers, are poised for healthy increases in funding after President George W. Bush included the agencies in a surprising new budget initiative aimed at improving future U.S. competitiveness.

Citing a need to maintain the U.S. position as the world's dominant economic and technological power, the President used his annual State of the Union address to unveil his American Competitiveness Initiative (ACI), a three-pronged plan—fostering innovation, improving education, and reforming workforce and immigration issues—for ensuring U.S. leadership in an increasingly competitive world. As part of the innovation package, Bush called for a doubling of the federal government's investment in fundamental research over the next ten years.

The move comes after House Democrats unveiled a similar plan last December and on the heels of a bipartisan push in the Senate to accomplish the same goal. It marks a reversal for an Administration that, until now, had claimed that U.S. leadership was not at risk from a declining investment in fundamental research, especially in the physical sciences, computing, mathematics and engineering. The President's plan would reverse that trend by providing increases to the FY 2007 budgets for the National Science Foundation, the National Institute of Standards and Technology, and the Department of Energy's Office of Science programs.

In his FY 2007 budget request, the President asked for an increase of 7.8 percent, or $440 million, over FY 2006 to the NSF budget; 19 percent, or $72 million, for NIST; and 14 percent, or $505 million, for DOE's Office of Science.

Computing research would also fare well under the President's plan, with the government-wide Networking and Information Technology Research and Development (NITRD) program slated for a 9.4 percent increase overall—$239 million in new funding—including healthy increases at the three agencies of most concern for computing researchers: NSF, DOE Office of Science, and the Department of Defense.

Only a year after the President proposed a 4.5 percent cut to NITRD programs, his FY 2007 proposal would boost NSF's share of the program by $94 million, a 12 percent increase; increase the Department of Defense share (essentially programs at DARPA and in the Office of the Secretary of Defense) by $47 million, a 6 percent boost; and provide $96 million more for the DOE Office of Science, a 33 percent increase. Only the National Institutes of Health would see IT R&D spending decrease in FY 2007 under the President's plan. The agency's share of NITRD in the request decreases 2.7 percent, or $15 million, in FY 2007.

Though the President emphasized a priority on "supercomputing" in his State of the Union message, the budget includes increases across the board for computing research.

National Science Foundation

NSF would continue to be the lead agency in the NITRD program in the President's plan, making the largest contribution at $904 million in FY 2007. NSF's Computer and Information Science and Engineering directorate (CISE) would continue to be home to the largest share of that investment with a budget request of $527 million, an increase of 6.1 percent over CISE's FY 2006 current plan. The CISE investment is spread relatively equally between its Computing and Communication Foundations activity ($123 million in the request, an increase of 16.5 percent over FY 2006), Computer and Network Systems ($163 million, an increase of 15.2 percent), and Information and Intelligent Systems ($119 million, an increase of 15.1 percent). The double-digit increases to these programs are made possible by both the 6.1 percent overall increase for the directorate and funding freed up as grants under the old Information Technology Research (ITR) program—which officially ended in FY 2004—continue to expire. ITR expenditures in FY 2007 would decline by 17 percent to $122 million under the current plan.

Also included in the CISE budget request in FY 2007 is $10 million for the agency's new Global Environment for Networking Innovations (GENI) program (detailed elsewhere in this issue

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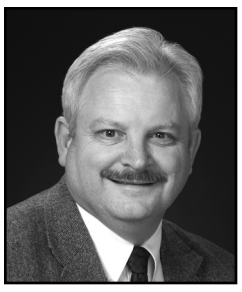
Inside CRN

Pacific Northwest National Laboratory Computational and Information Sciences

By George S. Michaels



This is another in a series of CRN articles describing the activities of CRA's industry laboratory members. Others are posted at: http://www.cra.org/reports/labs.

At Pacific Northwest National Laboratory, computational science is the foundation upon which this Department of Energy research and development laboratory depends to solve some of the greatest challenges our nation faces in national security, the environment and life sciences.

That's a tall order. But that's what we do at PNNL. And that work would be impossible without the Computational and Information Sciences Directorate (CISD). CISD provides the tools, and the computing and networking infrastructure, our scientists and engineers rely on to be successful. Whether the tools address climate modeling, handling huge data flows in biology and proteomics or modeling the impact of new energy systems, computation is an integral piece of delivering science-based solutions.

About CISD

CISD was formed in fall 2004 to centralize pockets of expertise in computational sciences that were scattered across the laboratory. With our computational power consolidated and aligned with specific areas of research, we are better able to use computation to advance the sciences and serve our clients.

CISD specializes in high-performance, data-intensive computing; bioinformatics and complex pattern recognition; intrinsically secure computing; information analytics; and knowledge foundations. These core research capabilities enable PNNL to provide the next generation of discovery and innovation to the Department of Energy (DOE), the U.S. Department of Homeland Security (DHS) and other clients in government, industry and academia.

Since 2004 we have recruited and hired more than 80 new researchers, bringing CISD'S total to 510 staff members. Many have experience in academia or industry, making them quick to understand the significance of projects and the need for cost-effective solutions. Together they comprise a formidable team, supporting all of the laboratory's mission areas.

Among our new staff is the renowned mathematician, Benoit Mandelbrot. Dr. Mandelbrot is working with us to mature the strategy for our advanced mathematics program. Known as the father of fractal geometry, his unique ability to think freely and unconventionally lends itself to creating new methods for solving the kinds of computational conundrums that science is currently confronting.

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Expanding the Pipeline

Geographic Shackles and the Academic Careers of Women

By Dina Q. Goldin

Introduction

Last spring, three of my women friends compared life stories at our 20th college reunion. They had all chosen the academic path in mathematics and computer science. While seemingly successful, it turned out that each felt unsatisfied to some degree.

The first had left her tenured position because she hated the atmosphere; a tenured position at another university requires a move, so she has settled for being an independent researcher and consultant. The second had an exhausting commute; she was pessimistically contemplating her options in finding work closer to home. The third was happy in her job at a prestigious department, but she had yet to get tenure; and, as the tenure-track rat race took precedence over her biological clock, she was still childless in her early forties.

Such stories are unfortunately not atypical. The situations of women in academia, particularly in the sciences, have attracted much attention recently; the metaphor of the shrinking (or leaking) pipeline is used to illustrate the problem. While various factors have been put forth in trying to explain the shrinking pipeline, this article discusses one that has received somewhat less attention: the overall greater lack of mobility by women. I refer to this lack of mobility as *geographic shackles*.

While family and career roles for each gender are viewed more flexibly in North America today than in previous generations, unfortunately, however, it still seems to be more common that men are able to initiate a family move when their career calls for it than women are. Geographic shackles are related to the *two-body problem* where both partners have careers, necessitating dual job searches.

But the two problems are distinct. The geographic shackles are not necessarily caused by a partner with a career. In my informal surveys, I found women who have no partner, and some without any immediate family, who still find that geographic ties prevent them from "casting a broad net" when job searching. For example, women who are single parents or have primary custody of children may feel tied to a location, as would women who have taken on caregiver responsibilities for their elderly parents. In general, the support networks that women tend to build around them, including extended family members, friends, doctors, and babysitters, can also act as deterrents to moving. Whereas the two-body problem makes it more difficult to *find a new location* satisfying the demands of both careers, geographic shackles can also make it more difficult to *decide to look for a new location* in the first place.

Geographic shackles can provide a unifying explanation for many of the known disparities in academic career success between the genders, such as the shrinking pipeline, the prevalence of childlessness among the academic elite women, the prevalence of women at lower-paying and less prestigious institutions, and so on. The aim of this article is to raise awareness of this little-recognized issue, to encourage appropriate studies, and to start working towards solutions.

Obstacles to a Successful Career

The trajectory of a successful academic career is common to men and women. They find a position as an assistant professor after they graduate; they may have to change jobs if their position does not work out for some reason; they take on visiting assignments that increase their visibility; finally, they may be lured away for a prestigious position as endowed chair or center director elsewhere.

Academics with strong geographic constraints face obstacles at every step along this trajectory:

- During a job search, their choice of open positions is greatly limited, increasing the chance that they will settle for lower status or lower-paying jobs, or that they may leave academia altogether. (The latter is particularly likely in computing, given the lure of industry.)
- It can be difficult to gracefully recover from tenure denial or other termination of a pre-tenured position; how many other research universities in a given locale and in a given year will have an open tenured position in a given specialty?
- They cannot always move when a given job provides a bad fit, so they find themselves stuck in less-productive or dead-end positions.
- They find it much more difficult (or impossible) to accept high-profile visiting assignments that might further boost their careers.
- They cannot grab opportunities for prestigious positions as chairs or center directors when those open up elsewhere.
- They cannot use outside job offers to gain negotiating leverage with their current institution in matters of promotions or pay raises; this tactic works only if the threatened job change is believable.

Tenure denial is a particularly disruptive event. Because the tenure review process is inevitably a combination of objective and subjective factors, it can unfortunately be susceptible to gender bias [Valian]. The hoped-for outcome is that a deserving computer scientist, if denied tenure at one school, will find another tenured position elsewhere. When geographic shackles are involved, however, recovery from tenure denial is more difficult, if not impossible.

While any one obstacle listed above may not bring down the career of a researcher with geographic constraints, their accumulation over time may result in a career trajectory that is less likely to place her in a leadership position in her field, and more likely to lead to a dead-end or low-prestige position or to leaving academia altogether.

Discussion

There is nothing in the preceding list of scenarios that is, by definition, unique to women. I raise the issue, however, to put forward the conjecture that perhaps the broader set of geographic shackles—beyond dual-career issues and into issues of child custody, parental care, etc.—can help to explain some of the pipeline and gender diversity issues that have eluded explanation thus far.

The broad impact of geographic constraints on research careers is not well understood. Statistical evidence is hard to come by because geographic shackles have been little recognized and studied even less. However, there is some evidence that this problem is real. Consider, for example, this item from the 2003 CRA report, *Recruitment and Retention of Faculty in Computer Science and Engineering:* "When seeking faculty positions out of graduate school, the report found that women tend to apply to fewer schools than men: 6 vs. 25." The report also found that women listed geography as one of four main factors in choosing where to apply. In contrast, geography did not make the major list of factors for new male Ph.D.s in job searching.

The potential cumulative effect of the shackles on the population of academic women deserves more research attention and study. It has been shown that even small gender-related differences in the case of individual women translate into significant statistical differences at the level of the whole population [Valian]. For example, one experiment described by Valian set up a model that built in a tiny bias in favor of promoting men; after a while, 65 percent of top-level employees were male.

On an anecdotal level, it is not difficult to think of academics whose career trajectory was hindered by their geographic constraints. Without more information, however, it is

Geographic Shackles Continued on Page 6

Industrial-Academic Agreement on Open Collaboration

By J Strother Moore

A coalition of computing research companies and universities recently announced an agreement on 'Open Collaboration' principles designed to facilitate open source distribution of research results. The parties to the agreement intend this model to be used to handle intellectual property rights arising from certain software-related collaborations between the industrial and academic partners. It is hoped that the existence of this template for IP agreements will expedite sponsored research agreements.

The industrial partners are Cisco, HP, IBM and Intel, and the academic partners are Carnegie Mellon University, Georgia Institute of Technology, Rensselaer Polytechnic Institute, Stanford University, University of California at Berkeley, University of Illinois, Urbana-Champaign, and The University of Texas at Austin. The initiative was co-sponsored by IBM and the Ewing Marion Kauffman Foundation.

The major product of the group is a document entitled "Open Collaboration Principles," which may be found at: http://www.developer.ibm.com/university/scholars/downloads/OpenCollaborationPrinciples_December2005.pdf. The document describes the basic principles of an agreement called "Free Public Commons." In the future, the participants may, at their option, enter into collaborations under this agreement; they reserve the right to enter into more conventionally negotiated IP agreements. A few of the important aspects of the Free Public Commons agreement are briefly sketched below.

According to the agreement, the intellectual property created by such collaboration must be made available to the public free of charge for certain uses, including open source software and software-related industry standards. If a participant owns or controls patents necessary to implement the contribution, it is expected, if possible, to make the patents available to the public without charge for implementing such software or standards. A member of the public's right to use the IP may be terminated if it uses its IP to mount a legal challenge to the implementation of the Public Commons.

While the adoption of the Free Public Commons model is optional in any given collaboration between the industrial and academic partners, some of the partners expect this to be a widely used model in future collaborations. Furthermore, the general trend exemplified by this agreement—of hammering out a template for industrial/academic IP agreements in advance of a particular project—is expected to continue. The partners felt that an open source template was perhaps the easiest to settle upon, and that is why they worked on this one first. They are now discussing additional templates.

The development of templates for industrial/academic IP agreements could dramatically speed up the negotiation of industrially sponsored university research agreements. As noted in the CRA's Best Practices paper on IP (see http://www.cra.org/reports/ip/bestpractices.html) and its supporting material, time-to-market is so crucial in the computing business that lengthy negotiations can simply kill a technical project of interest to the technical people on both sides. This hurts all parties, especially the university researchers denied research funding and access to industrial data. Having a variety of commonly used IP agreements for computing-related research could therefore be an enormous help.

J Strother Moore *is Professor and Chair of the Department of Computer Sciences at the University of Texas at Austin, and a member of the CRA Board of Directors.* ∎

Musings from the Chair
The Future of American Innovation: The Gathering Storm

By Dan Reed, CRA Board Chair

In response to a Congressional request and stimulated by a set of earlier studies (notably the National Innovation Initiative's "Innovate America" report), the National Academies recently issued a report entitled "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future."[1] This report was produced in response to growing concern that a weakening of U.S. leadership (and, by extension, North American leadership) in science and technology would jeopardize future prosperity. This concern was based on the fact that a major fraction of economic growth in recent decades has been a direct consequence of prior investment in basic research.[2] The report committee was asked to address two questions:

1. What are the top 10 actions, in priority order, that federal policymakers could take to enhance the science and technology enterprise so the United States can successfully compete, prosper and be secure in the global community of the twenty-first century?

2. What implementation strategy, with several concrete steps, could be used to implement each of those actions?

Based on interviews, review of other documents and reports, and deliberations, the committee produced four recommendations, each backed by a more detailed set of implementation plans:

1. *Increase America's talent pool by vastly improving K-12 science and mathematics education.*

2. *Sustain and strengthen the nation's traditional commitment to long-term basic research that has the potential to be transformational to maintain the flow of new ideas that fuel the economy, provide security, and enhance the quality of life.*

3. *Make the United States the most attractive setting in which to study and perform research so we can develop, recruit, and retain the best and brightest students, scientists, and engineering from within the United States and throughout the world.*

4. *Ensure that the United States is the premier place in the world to innovate; invest in downstream activities such as manufacturing and marketing; and create high-paying jobs that are based on innovation by modernizing the patent system, realigning tax policies to encourage innovation, and ensuring affordable broadband access.*

Although one may debate the recommendation details, there is little doubt that global competition is rising and that the competitive pressures are real. Many of us live in regions whose traditional economic base has been reshaped by global trade. In computing, we have seen shifting trends in graduate student enrollment, flat to only slightly rising research budgets, and declining proposal success rates for research funding.

In his January 2006 State of the Union address, President Bush announced the American Competitiveness Initiative, which would increase the number of trained secondary-school teachers in advanced mathematics and science. He also called for a doubling of federal investment in basic research in the physical sciences, which includes information technology. Bipartisan bills have also been introduced in the U.S. Congress to increase investment in education and research.

As part of a group of professional societies, industry-academic partnerships and universities, CRA is working to support increased funding for long-term basic research, greater investment in scientific education, and mechanisms to broaden the base of participation in information technology. I encourage you to follow these activities on the CRA blog (www.cra.org/govaffairs/blog). Get involved—talk to your colleagues, raise awareness, and make a difference! In a knowledge economy, a trained workforce and basic research are the enablers.

Notes:

[1] The report can be ordered and excerpts read at: http://books.nap.edu/catalog/11463.html.

[2] See the famous CSTB "tire tracks" diagram for details (www.cra.org/govaffairs/images/handout2.pdf).

Dan Reed, *CRA's Board Chair, is the Chancellor's Eminent Professor and Vice-Chancellor for Information Technology at the University of North Carolina at Chapel Hill. He also directs the interdisciplinary Renaissance Computing Institute (RENCI).* ∎

Correction: In the November 2005 issue of *Computing Research News* (Vol. 17/No. 5), in the article "Results of CRA's 2004 Salary Survey of Computing Research Staff in Industrial Labs" appearing on page 3, Table 2 and its accompanying text comparing 2004 to 2002 salaries have been revised. The corrected version can be seen at: http://www.cra.org/CRN/articles/nov05/waters.html.

GENI and *Your* Research

By Peter A. Freeman, Assistant Director of NSF for CISE

GENI (Global Environment for Networking Innovations) is an advanced experimental infrastructure and accompanying research program being planned by CISE to explore new capabilities that will advance innovations in many areas.[1]

GENI responds to an urgent and important challenge of the 21st century to ensure that the future Internet will be worthy of our trust, able to continue to grow robustly, and capable of supporting even more innovation in all areas of activity than the current Internet has enabled.[2] Ultimately, achieving this goal will depend on a large number of factors—including legal, regulatory, policy, commercial and technical—but it begins with exploring new networking and distributed system architectures that can respond to the demands of the future.

Nonetheless, this effort will ultimately touch many areas of computer science and engineering (CS&E) research. Because GENI has the potential to touch your research and perhaps change it fundamentally in the long run, and because it will be a major undertaking for CISE, I want you to be fully aware of what is being done and of the potential for you and the field.

We intend that it will provide a platform for innovative research in a number of CS&E fields beyond networking and distributed systems, including databases, operating systems, languages, interfaces, CS and communications theory, robotics, ubiquitous computing, sensor networks, and so on. While we at NSF can't spell out exactly what those opportunities will be—that is your responsibility—we can outline the characteristics of a project such as GENI that from previous experience we are confident will create these opportunities.

First, as you will see if you look at the GENI conceptual design posted on www.geni.net, the GENI facility is itself a complex system. While the conceptual development to date indicates that the GENI facility can be realized without major research activity, designing and constructing it over the next seven or eight years will undoubtedly uncover compelling research topics in a number of areas.

Second, as GENI is used to experiment with new networking and distributed system architectures at scale, new services and applications will follow very rapidly. These, in turn, will require or uncover new fundamental developments in CS&E, and enable new generations of research in CS&E fields like robotics and artificial intelligence that may not be directly involved with the underlying systems research.

Third, and most importantly in my opinion, GENI will enable and encourage a return to large-scale experimentation—a research modality that was dominant and highly productive in the early years of our field but has waned in recent years.[3] Initially, this will be experimentation in networking and closely related fields, but the nature of the GENI facility is such that it will also permit experimentation in other areas, such as distributed databases, as well.

Beyond the instrumental use of the GENI facility, we believe this project will demonstrate the importance and effectiveness of large-scale experimentation in CS&E in general. This will then pave the way for experimentation (and the infrastructure necessary to support it) in other areas such as computer and system architecture.

Even at this early stage we are already seeing another laudable and highly valuable development—the involvement of theoreticians along with the experimentalists.[4] CS&E has never really had the virtuous cycle of observation-theorizing-experimentation followed by more observing, theorizing, and experimentation that other sciences have had. We believe the field has matured to the point where it must employ this modality vigorously; GENI and, ultimately, other efforts, will afford this modality.

Another and more mundane issue regarding GENI and your research is that of funding. Constructing the GENI facility will be expensive, and the first question that you might ask is, "Why not spend that money on more research like that which is already being supported—small grants?" The first and most important thing you need to understand is that money appropriated for GENI construction, if approved, may not be used to support research grants. And CISE funds currently supporting research grants will not be redirected to support GENI construction. While CISE certainly plans to devote future networking research budgets to research conducted using the GENI facility, other programs will not be impacted unless they determine that it is in the interest of their fields to leverage GENI capabilities.

A second important thing to understand is that the nature of science funding—indeed of funding for projects in general—is that it is the ambitious, paradigm-shifting projects that capture the attention of those responsible for appropriating funds. The result is often a general infusion of money into a field that has many positive benefits that are ancillary to the original project.

This country is facing serious challenges in the area of innovation and economic development. CS&E has clearly shown its relevance to innovation (and thus to economic competitiveness) in many ways, but much of the current innovation occurs not in the research community but in the commercial arena.

While this is clearly the desired end result, those innovations are invariably based on fundamental ideas and inventions that were developed—usually many years ago—in our labs. We must re-energize the type of activity that a generation ago produced most of the fundamental concepts that fuel today's commercial innovations.

We will be asking the broad CS&E research community, not just networking and distributed systems, to form a community consortium to guide the scientific and administrative development of the GENI facility and then its usage. Over time, this representative proxy for the CS&E research community will have the opportunity to propose other major projects to support our research. I encourage you to cooperatively support the formation and operation of this consortium. It will enable us to speak clearly and effectively as a community about what we can do and what it will take to move forward.

GENI is the first in what I hope will be a series of major efforts to rekindle fundamental invention in our field. Our nation's innovative posture depends on it.

I look forward to hearing from you. Please send general comments to me at pfreeman@nsf.gov, or comments specific to GENI to geni-info@nsf.gov.

Peter A. Freeman is Assistant Director of NSF for CISE.

Notes:

[1] See www.cra.org/CRN/articles/nov05/freeman.html for a high-level description. Consult www.geni.net for current and more complete technical information. For NSF plans and announcements, see www.nsf.gov/cise/geni/.

[2] Two recent and influential reports (*National Innovation Initiative Interim Report* www.compete.org/nii/ and *Rising Above the Gathering Storm* www.books.nap.edu/catalog/11463.html) have stressed the essential role of innovation to our nation, and the absolutely necessary role of research and education. It is becoming widely understood that the Internet has already enabled a surge of innovation, but it is clear to those most knowledgeable that this cannot continue without some fundamentally new research. This effort, then, is intended to address this situation and to help enable the innovation being called for nationally.

[3] The reasons for this are varied and need not be debated here. A return, however, to a modality in which the field includes, but not exclusively, a strong experimental activity is generally considered to be essential for the vitality of computer science and engineering.

[4] See ToNC and www.comsoc.org/livepubs/surveys/public/2005/dec/index.html ("News from NSF"), for example. ■

Collaborative Research Experiences for Undergraduates (CREU)

Application Deadline: May 19, 2006

Sponsored by CRA's Committee on the Status of Women in Computing Research (CRA-W) and the Coalition to Diversify Computing (CDC), the CREU program is geared toward increasing the number of women and minorities who go on to CS&E graduate programs. Students have the opportunity to conduct research with a small team at their home institution during the academic year. Students receive a stipend for their work. Each team also receives $500 to be used for supporting materials and activities or as an honorarium for the sponsoring faculty member(s).

See: http://www.cra.org/craw/creu

Making Waves

Grace Hopper Celebration of Women in Computing 2006 Conference

October 4-7, 2006
San Diego, California

Details:
http://www.gracehopper.org/

Drop in CS Bachelor's Degree Production

By Jay Vegso

CRA's Taulbee Survey of Ph.D.-granting Computer Science (CS) and Computer Engineering departments in North America has been conducted annually since 1974. Results from the most recent survey were provided to participants and CRA members in February. They will be published on CRA's website (www.cra.org/statistics/) and in *Computing Research News* in May. Due to widespread interest, CRA releases data on undergraduate degrees early.

This article reports on CS bachelor's degree enrollments and production among Ph.D.-granting departments in the United States since the late 1990s. In order to limit the effect of variations in response rates, data are reported in both total numbers and medians per department. Results from the Taulbee Survey should be compared with data produced by the National Science Foundation (NSF), which surveys all institutions that grant CS degrees. NSF's most recent data are from academic year (AY) 2000/2001. Traditionally, the Taulbee Survey's Ph.D.-granting schools have produced a little less than 30 percent of the undergraduate CS degrees reported by NSF.

According to UCLA/HERI, the percentage of incoming undergraduates among all degree-granting institutions who indicated they would major in CS declined by 70 percent between fall 2000 and 2005.[1] Unsurprisingly, the number of students who declared their major in CS among the Ph.D.-granting departments surveyed by CRA also has fallen (Figure 1). After five years of declines, the number of new CS majors in fall 2005 was half of what it was in fall 2000 (15,958 vs. 7,952). As a result, the number of students enrolled in CS has fallen for several years (Figure 2).

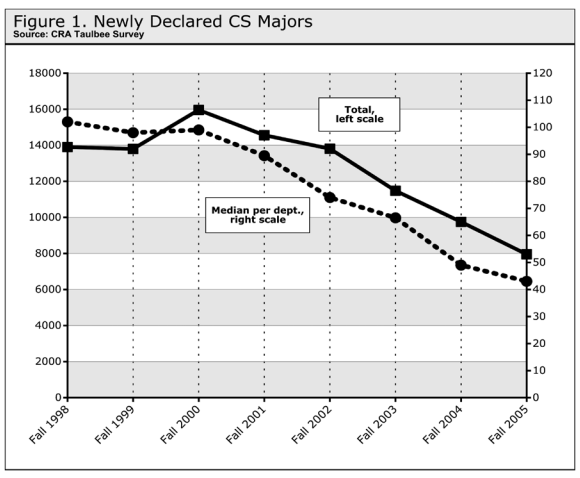
These declines have now shown up further down the pipeline. Following several years of increases, the total number of bachelor's degrees granted in CS fell 17 percent between AY 2003/2004 and 2004/2005, to 11,808 (Figure 3). The median number of degrees granted per department declined by 14 percent (to 59). In light of the sustained drop in students interested in CS as a major, it seems reasonable to assume that degree production numbers will continue to drop in the near term.

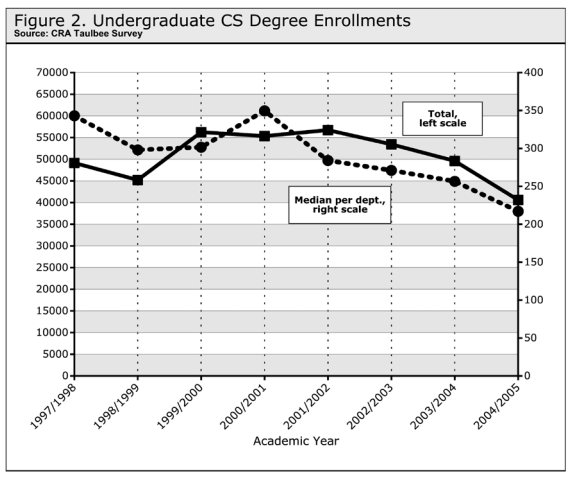
It is important to note that a steep drop in degree production among CS departments has happened before. According to NSF, between 1980 and 1986 undergraduate CS production nearly quadrupled to more than 42,000 degrees. This period was followed by a swift decline and leveling off during the 1990s, with several years in which the number of degrees granted hovered at around 25,000. During the late 1990s, CS degree production again surged to more than 43,000 in 2001.[2] In light of the economic downturn and slow job growth during the early 2000s, another decline in CS degree production was foreseeable.

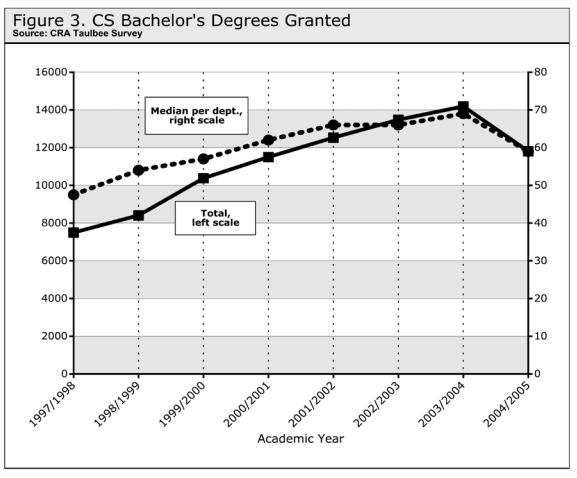
Notes:

[1] HERI/UCLA's "CIRP Freshman Survey" is an annual survey of the characteristics of students attending colleges and universities as first-time, full-time freshmen: www.gseis.ucla.edu/heri/freshman.html.

[2] See www.cra.org/info/education/us/bs.html and Table 46 at www.nsf.gov/statistics/nsf04311/sectb.htm. ■







President's Budget from Page 1

by Peter Freeman, NSF Assistant Director for CISE). The GENI proposal—a plan for a $300 million computer science facility and a $40 million research program—faces an internal NSF design review on February 22, 2006. The results of that review will determine whether the project stays on track for presentation to the National Science Board in the coming year, with the aim of securing approval for consideration for inclusion in the FY 2009 budget request.

The overall NSF contribution to Cybersecurity and Information Assurance would also grow significantly under the President's plan. The budget request boosts NSF's Cyber Trust program by $10 million, to $35 million, in FY 2007, bringing NSF's total contribution to information assurance research to $97 million (an increase of 26 percent).

Proposed investments in NSF's Office of Cyberinfrastructure (to be headed by University of Michigan professor and computer scientist Daniel Atkins) account for $182 million of NSF's NITRD share in FY 2007, an increase of $55 million, or 44 percent, over FY 2006. The great bulk of that increase—$50 million—would begin the acquisition of a new "petascale" computing system.

The remainder of NSF's investments in NITRD programs would come from the other research directorates that received, on average, about the same level of overall increase as did CISE (about 6 percent vs. FY 2006). One notable exception is the Engineering Directorate, which would grow 8.0 percent in the President's request, largely due to the establishment of a new $20 million Improvised Explosive Device Detection research program. Freeman said that program should provide opportunities for computer science researchers, especially those in artificial intelligence and sensors, to compete for funding.

Department of Energy, Office of Science

The Department of Energy's contribution to the NITRD effort would grow to $387 million in FY 2007 in the President's plan, an increase of nearly 33 percent over FY 2006. The focus of much of the DOE SC investment will be on "leadership-class" computing efforts. The President's budget calls for $103 million in DOE SC towards the goal of deploying petascale computing systems by the year 2010. The Advanced Scientific Computing Research Program would be funded at $319 million in FY 2007, an increase of $84 million, or 36 percent, over FY 2006.

DARPA

Computing research at DARPA would grow significantly under the President's plan, gaining back ground lost in the FY 2006 Defense Appropriations process when $55 million was cut from the agency's Cognitive Computing program (for more information, see "Congress Provides Symbolic Increase for NSF," *CRN*, Vol. 18, No. 1, January 2006). DARPA's two main computing research efforts, the Information and Communications Technology account and the Cognitive Computing Systems account, are both slated for substantial gains in the President's budget. ICT would grow $47 million to $243 million in FY 2007, an increase of 24 percent. Cognitive Computing Systems would grow $57 million to $220 million in FY 2007, an increase of 35 percent.

Overall, DARPA would see its budget increase by $400 million to $3.3 billion in FY 2007, a 14 percent increase. Basic research would grow to $151 million, which is more than the FY 2006 level of $133 million, but still under the $165 million spent in FY 2005. DARPA applied research would increase to $1.5 billion (vs. $1.4 billion in FY 2006), and advanced technology development would grow to $1.6 billion (vs. $1.4 billion in FY 2006).

Outlook

The budget request is just the first step in the year-long appropriations process. Next, House and Senate budget leaders will attempt to craft a Congressional Budget Resolution that will guide the congressional appropriations committees in their work. But unlike previous years, the President's FY 2007 budget request has provided congressional appropriators some fiscal "head-room" for providing increases to the federal science agencies that are part of the American Competitiveness Initiative, meaning that the odds are much better that the increases proposed could find their way into appropriations. As CRA Chair Dan Reed discusses elsewhere in this issue, there's a strong bipartisan sentiment in Congress that these investments in fundamental research are a necessary part of ensuring America's continued leadership in an increasingly competitive world. While there likely will be rancor around other portions of the President's budget, the need to support an "innovation agenda" like the President has proposed appears to have few serious critics and many strong champions in both parties.

For the latest on the progress of the initiative and additional in-depth coverage of the funding levels proposed in the President's budget, visit CRA's Computing Research Policy Blog at http://www.cra.org/govaffairs/blog/.

Peter Harsha *(harsha@cra.org) is CRA's Director of Congressional Affairs.* ■

PNNL Computational from Page 1

Among these challenges are managing, measuring and making sense of vast amounts of data generated by proteomics research, information analytics and cyber security. One aspect of Dr. Mandelbrot's work at PNNL is establishing a more advanced curriculum in fractal mathematics in high schools.

The new capabilities available to our staff are a virtual research laboratory for evaluating key technology components and newly emerging systems for data-intensive computing. Additionally, developing capabilities include an information analytics laboratory for advancing technologies that enable powerful visual methods for acquiring, analyzing and presenting information.

Solving Information Overload—A New Approach

Advances in computing technology have enabled scientists to collect massive amounts of data over the past two decades. However, the ability to extract valuable knowledge from multiple types of data obtained from multiple sources and scales in real time continues to be a major challenge.

Many government agencies, including DOE, the National Institutes of Health, DHS, the Department of Defense and the intelligence community, need computational capabilities well beyond the current state of the art to solve problems involving large, complex data sets.

Bringing large data sets together for analysis requires a different computing approach; it requires tools for transforming data into information that we can use. This type of approach—data-intensive computing—is one of CISD's specialties. Our researchers work on every step of the development pathway from real-time data gathering, analysis and management to developing analytics approaches that provide added value to the data.

Our expertise in designing tools that make huge data sets meaningful has led to significant contributions to the data-intensive sciences, including predictive biology and energy sciences, nanoscience, and energy conversions. For example, The Morning Report is an advanced, proactive aviation safety and systems monitoring tool that can be extended to other domain applications to monitor massive amounts of data. The results enable domain experts to monitor complex systems by identifying typical patterns and atypical events. This tool received the 2005 R&D 100 Award and *R&D Magazine's* Editor's Choice Award.

In another example, PNNL scientists are using computer modeling of proteins found in bacteria membranes to discover new methods of fighting infections. They currently are developing a computer model of the cell wall of an aggressive bacterium, Pseudomonas aeruginosa, which infects the respiratory systems of cystic fibrosis sufferers. By modeling the cell wall, scientists hope to discover how the membranes and proteins enable the bacterium to elude treatment by traditional antibiotics, potentially leading to new treatment strategies.

Knowledge Centers—Informational Tools for Visual Analysis

Another way to address information overload is visual analysis. CISD has created three types of knowledge centers—science-based, technology-based and mission-based—to tackle the daunting tasks of collecting, managing, visualizing and analyzing massive data accumulation using unique software products.

For example, the National Visualization and Analytics Center (NVAC™) is a science-based knowledge center at PNNL, established by DHS to develop the next generation of tools and scientists for creating visual methods of analyzing and conveying complex information. NVAC has been tasked with establishing the nation's research agenda in this area and taking visual technologies to new levels.

Through NVAC, we are organizing a consortium of stakeholders—made up of multiple government agencies, academia and industry—to ensure relevant research, integration and interoperability resulting in deployable systems for defending our nation. We recently held the first consortium meeting at PNNL, which was attended by leaders of more than 40 of the nation's leading computing and analytical companies. As a result, industry leaders formed the first Industrial Visual Analytics Center (IVAC), which is now in the early stages of development.

In addition, we are developing partnerships with universities to advance the science, including establishing regional visualization and analytics centers (RVACs) to bring academic expertise to the task of discovering information that may forewarn officials of a terrorist attack. RVACs include University of North Carolina at Charlotte and Georgia Institute of Technology; Purdue University and Indiana University School of Medicine; Pennsylvania State University; and University of Washington and Stanford University.

Beyond developing innovative technologies, NVAC will stimulate the talent required for both invention and operation of the field's new suite of tools. This means a steady flow of staff exchanges, building new curriculums, and hosting interdisciplinary workshops and conferences among academia, industry and other laboratories.

Changing the Game

CISD aims to deliver the highest-end computing capability for the nation. To achieve this goal, we are partnering with industry and academia to drive the development of new computing paradigms in both supercomputing architectures and scalable software.

In supercomputing, we are developing a fundamentally new approach to discovery through sciences using high-performance computing based on informatics rather than only physics. This approach addresses the need to produce, collect, store, explore, analyze and quickly share huge amounts of scientific information. Much of the effort is centered on creating algorithms, software, operating systems and new computational and storage systems to solve a broad set of problems involving large, complex heterogeneous data.

On the software side, we are creating new scalable data-analysis tools and new tools for discovering patterns in large heterogeneous databases and for integrating data across different space and time scales. For example, we demonstrated the feasibility of high throughput access to remote file systems in a computational chemistry simulation that received the StorCloud Award at the 2005 Supercomputing Conference.

PNNL also finished second in the Bandwidth Challenge, transferring 41 Gigabits per second during the challenge test. At the low end, this equals transferring and processing a full DVD of video every second. Both demonstrations operated over the recently established PNNL Regional Optical Network and UltraScience Network to move data between a Hewlett-Packard parallel file system located at the conference in Seattle and an Itanium compute cluster located at the laboratory.

The PNNL team is taking on global and national challenges. We invite others interested in making immediate as well as long-term impacts to join us in conducting research and developing technology in the computational and information sciences that will drive changes in computing over the next decade.

For more information about CISD see the CISD Web site at: http://computing.pnl.gov/.

Dr. George S. Michaels *(george.michaels@pnl.gov) is Associate Laboratory Director of Pacific Northwest National Laboratory's (PNNL) Computational and Information Sciences Directorate. A pioneer in bioinformatics, Dr. Michaels founded one of the nation's first doctoral programs in computational sciences while teaching at George Mason University in Fairfax, Virginia. Much of his career has focused on computational analysis and applying statistical models to life science research.* ■

Geographic Shackles from Page 2

difficult to understand the different geographic influences in enough detail to know how to address them. Though I expect that the shackles will always be with us to some degree, I believe that steps can be taken to loosen their hold.

For example, flexible sabbatical policies might help. At some schools, taking a "local" sabbatical is frowned upon or given low priority, impacting those who are geographically constrained. Salary policies are also an issue. Some schools encourage job-shopping as a way of getting raises, which disadvantages those who are known to be geographically restricted.

Finally, we must recognize that for everyone today, career decisions that entail moving involve serious family considerations, but that this may be especially true for a woman. Therefore, her champions need to work with the whole family to arrive at a positive decision, rather than expecting her to shoulder the work of convincing the rest.

I admit: it would work on me. Were a top west coast university to offer me a job today, I would answer that I am not leaving New England; my family is happy here. But if someone were to co-opt my husband and children so they suddenly developed a passion for California, then New England would lose its grip on me.

Notes:

[1] Virginia Valian, *Why so Slow? The Advancement of Women*. MIT Press, 1998.

[2] John Stankovic and William Aspray, *Recruitment and Retention of Faculty in Computer Science and Engineering*, Computing Research Association, 2003.

Dina Q Goldin, Ph.D. *(dina.goldin@uconn.edu) is an Assistant Professor of Computer Science & Engineering at the University of Connecticut.* ■

Transitions

Daniel Atkins has been named Director of the National Science Foundation's new Office of Cyberinfrastructure, effective June 5. Dr. Atkins is a professor in the School of Information and in the Department of Electrical and Computer Engineering at the University of Michigan, Ann Arbor.

CRA Board Member **David Tennenhouse** is the new Chief Executive Officer of A9.com, Inc., a subsidiary of Amazon.com, Inc. Dr. Tennenhouse was formerly Vice President of the Corporate Technology Group and Director of Research at Intel.

Professional Opportunities

CRN Advertising Policy

See http://www.cra.org/main/cra.jobshow.html

Allegheny College

Department of Computer Science

Tenure-Track Position

The Department of Computer Science invites applications for a tenure-track position beginning Fall 2006, pending approval. Qualifications include a Ph.D. in computer science or a related area. The Department seeks candidates with interests in all areas of computer science.

Applicants must provide evidence of ability to teach effectively at the undergraduate level, commitment to liberal arts education, and continuing contribution to the discipline. Responsibilities include teaching and advising undergraduates, guiding students in senior research projects, and contributing to the college-wide freshman/sophomore seminars that emphasize speaking and writing. Salary will be competitive; start-up funds are available. Rank will be commensurate with credentials and experience.

Allegheny College is a selective liberal arts college with an emphasis on teaching. Information about the Department and its traditional and applied computing majors is available on the Web at http://www.allegheny.edu/academics/compsci/.

Send letter of application, vitae, statement of teaching and research interests, applicable transcripts, and arrange to have three letters sent from references, at least one of whom can comment on teaching, to:

Dr. Robert S. Roos
Associate Professor and Chair
Department of Computer Science
Allegheny College
Meadville, PA 16335
Email: robert.roos@allegheny.edu

Review of applications will begin immediately.

Allegheny College is an Equal Opportunity Employer, Women and minorities are especially encouraged to apply.

Biotechnology High Performance Computing Software Applications Institute

Computer Science & Bioinformatics

Technical Staff and Postdoctoral Positions

Technical staff and postdoctoral positions are available to support the Biotechnology High Performance Computing Software Applications Institute in Frederick, Maryland. Applicants should have a Ph.D. in statistics, mathematics, computer science, engineering, or related discipline, and be interested in pursuing research in the development of computational tools to support life science research, such as in bioinformatics, computational biology, and systems biology. In particular, analysis tools, in the form of machine-learning algorithms, data mining, and statistical pattern recognition algorithms, need to be developed to provide insight and analysis of physiologic, genomic and proteomic data.

Background and/or experience in high performance computing and development of analysis tools for bioscience applications are desirable but not essential. The scientist will work in an interdisciplinary environment and in close collaboration with life scientists and other physical scientists.

Please submit resume to:
Jaques Reifman, Ph.D.
Senior Research Scientist
U.S. Army Medical Research and Materiel Command
Ft. Detrick, MD 21702-5012
E-mail: reifman@tatrc.org
Phone: 301-619-7915

Network Computing Services, Inc. (NCSI)

AHPCRC

Staff Scientist in High Performance Computing/Bioinformatics

Network Computing Services, Inc. (NCSI), the Support Infrastructure contractor for the Army High Performance Computing Research Center (AHPCRC), is recruiting for a Staff Scientist in High Performance Computing / Bioinformatics. This position will be located at the Department of Defense's Biotechnology High Performance Computing Software Applications Institute (BHSAI). BHSAI research involves the development of software systems to warehouse, manage, and analyze genomic and proteomic data. The successful candidate will be expected to apply the high performance computing (HPC) resources of the AHPCRC to enable the BHSAI to solve larger problems more quickly. The candidate should have experience in parallel HPC applications development, experience in developing statistical and/or mathematics-based algorithms, machine-learning algorithms (e.g., artificial neural networks, support vector machines), and statistical pattern recognition algorithms, and will be expected to help provide insight and analysis of physiologic, genomics, and proteomics data.

This position is located at Fort Detrick, MD.

Education/Certifications:

A PhD degree or equivalent in computer science or computational science and 3 years experience using and developing parallel HPC applications is required. U.S. Citizenship and the ability to get a DoD Secret clearance are required. For more information and to apply for the position, please visit: http://www.netaspx.com/careers/index.html.

Northwestern University

Department of Electrical Engineering and Computer Science and Department of Managerial Economics and Decision Sciences

Faculty Position

Northwestern University invites applications for a faculty position in Theoretical Computer Science. All professorial ranks will be considered.

The position requires strong interest in Game Theory and will be joint between the Department of Electrical Engineering and Computer Science in the McCormick School of Engineering and Applied Science and the Department of Managerial Economics and Decision Sciences in the Kellogg School of Management.

Successful applicants must have a strong commitment to teaching as well as a demonstrated ability to pursue innovative research. Applications from qualified underrepresented minorities and women are encouraged. Compensation and start-up packages will be competitive.

Applicants should send a curriculum vitae, a statement of research and teaching interests, and at least three references for junior applicants and five for senior applicants, by email to theorysearch@eecs.northwestern.edu or by regular mail to:

Faculty Search Committee for Theoretical
Computer Science Department of Electrical Engineering and Computer Science
Northwestern University
2145 Sheridan Road
Evanston, IL 60208

To ensure full consideration, applications should be received by February 15, 2006. Preference will be given to early applications, and interviews may start in January 2006 but no offer will be made prior to mid-February 2006.

Further information about the hiring departments and the University is available at http://www.eecs.northwestern.edu, http://www.kellogg.northwestern.edu/meds/ and http://www.northwestern.edu.

Northwestern University is an Affirmative Action/Equal Access/Equal Opportunity employer. Women and minorities are encouraged to apply. Hiring is contingent upon eligibility to work in the United States.

Old Dominion University

Department of Computer Science

Assistant Professor

The Department invites applicants for one or more track-track assistant professor positions to begin in August 2006. A PhD in CS or in a closely related field augmented by research in CS is required. Candidates will be evaluated on their ability to perform faculty duties that include developing a funded research program, thesis supervision, and teaching. We will consider applicants with expertise in any area of CS but preference will be given to candidates whose research provides a synergistic complement to ongoing programs in the areas of Information Services and Security, Wireless Communications or Bioinformatics and Computational Science. We offer a generous compensation package commensurate with a candidate's qualifications and accomplishments.

The University is located in Tidewater Virginia, on the Elizabeth River, adjacent to the Chesapeake Bay near the Atlantic Ocean. The department offers B.S., M.S., and Ph.D. degrees in CS. We provide an environment and teaching load that encourages and demands research productivity. Opportunities for collaboration exist across departments and colleges. NASA Langley, Thomas Jefferson National Laboratory, Virginia Modeling Analysis and Simulation Center, Eastern Virginia Medical School, and the United States Joint Forces Command all provide opportunities that are less than an hour from campus.

Applications should include curriculum vitae and the names of three references. We will begin interviewing and hiring March 10, 2006 and continue until open positions are closed. Applications via email are encouraged.

Send applications to:
Larry Wilson, Chair of Recruiting
Computer Science Department
Old Dominion University
Norfolk, VA 23529
Email: wilson@cs.odu.edu

ODU is an equal opportunity, affirmative action employer and requires compliance with the Immigration Reform and Control Act of 1986.

Palo Alto Research Center (PARC)

Intelligent Systems Lab, Embedded Reasoning Area

We invite applications from candidates with research interests in artificial intelligence or intelligent control. Relevant areas include machine learning, reasoning under uncertainty, distributed control, knowledge representation and reasoning, hybrid systems, planning and scheduling, state estimation, and motion planning. A PhD or substantial relevant experience is required. For more information, please see:

www.parc.com/employment and
www.parc.com/era.

A subsidiary of Xerox, PARC offers a multidisciplinary environment for pursuing both basic and applied research. Our funding comes from both corporate sources and government agencies.

PARC is an Equal Employment Opportunity company committed to workforce diversity.

Plum Island Animal Disease Center (PIADC)

PIADC Research Participation Program

Computational Biologist/Bioinformatics

The Department of Homeland Security at the Plum Island Animal Disease Center, Orient Point, NY is seeking a computational biologist, Bioinformatics expert to support efforts within the Disease Threat and Assessment/Forensics Unit.

The desired candidate will have a PhD in bioinformatics, microbiology, immunology, computational science or related field with a strong emphasis of host-pathogen interactions and the genetic basis of microbial virulence.

For more information about the program and application materials visit:

www.orau.gov/piadc/.

Polytechnic University

Computer and Information Science Department

Professor of Computer Science in Cyber Security

Polytechnic University invites applications who will take on a leadership role in the area of cyber security. The candidate is expected to obtain research and education grants, develop industry relationships, and be active in publishing. The position requires a strong demonstrated research capability with the ability to teach advanced topics. Both senior and junior professors will be considered for this position. The individual will join the research group on cyber security which has been very successful in obtaining research and education grants.

The cyber security initiatives at Polytechnic University have grown to over $10M dollars in the last few years. The school is an NSA Center of Excellence in Information Assurance Education and has received two rounds of funding in the Scholarship for Service (SFS) program. Currently 20 students at the BS and MS level are in this program in addition to an extensive number of additional students taking security courses. Over a dozen security courses are offered regularly and an on-line graduate level cyber security certificate program is also available. A state of the art laboratory in Information Systems and Internet Security has been developed, and used by both undergraduate and graduate students for research and education. Current research focus of the program at the MS and PhD level is on trusted hardware, trusted software systems, digital forensics, multimedia security, biometrics, application security, network security, etc.

The Computer and Information Science Department (CIS) of Polytechnic University has a strong faculty with a vibrant research program and strong course offerings in a wide area of computing.

Polytechnic University is an equal opportunity/ affirmative action, equal access employer and especially encourages applications from minorities, women & individuals w/disabilities.

Please submit a CV, Research Statement and the names of three references to:

Professor Stuart Steele
Cyber Search Committee
Polytechnic University
Six Metro Tech Center
Brooklyn, NY 11201

You may also send the information electronically – securitysearch@poly.edu.

State University of New York, Binghamton

Computer Science Department

Post-Doctoral Research Associate

A postdoctoral position is available immediately for systems research in sensor networks. The project is for the development and deployment of a Chemical/Biological detection sensor network for homeland defense. We have a multi-disciplinary team of scientists (developing chemical and biological sensors), mechanical engineers (developing micro-models for plume dispersion for deployment pre-planning and on-line decision making) and computer scientists (developing and evaluating an energy efficient reliable sensor network). Successful candidate will play a leading role in the sensor network design and development as well as conduct research in sensor networks and systems.

A US Citizenship or permanent residency is required. The project is funded for two years. Please send applications (CV, contact information for two references, and a copy of your best related paper) to:

Nael Abu-Ghazaleh, CS Dept.
State Univeristy of New York
Binghamton, New York 13902
or by email:
nael@cs.binghamton.edu.

University of Alabama

Department of Computer Science

Faculty Position

The University of Alabama, Department of Computer Science, invites applications for a faculty position at the Full Professor level to begin August 16, 2006.

Candidates must have an earned Ph.D. in computer science or a related field, with solid evidence of superior research and scholarship accomplishments, as well as quality teaching abilities. Applicants from all areas of computer science will be considered. Those who specialize in software engineering, database systems, operating systems, or networking are particularly encouraged to apply.

Professional Opportunities

The Department of Computer Science currently has 20 faculty (14 tenured/tenure-track), over 200 undergraduates in an ABET accredited B.S. degree, and over 50 M.S. and Ph.D. students. Areas of current research emphasis include algorithms, database systems, human-computer interface, networking, operating systems, programming languages, and software engineering. The University of Alabama is a charter member of Internet2.

Outstanding applicants should send curriculum vitae and the names and addresses of at least three references to:

Faculty Search Committee
Department of Computer Science
Box 870290
The University of Alabama
Tuscaloosa, AL 35487-0290

For additional information, please visit http://cs.ua.edu or contact the Search Committee at faculty.search@cs.ua.edu.

Review of applications will begin January 20, 2006 and will continue until the position is filled.

The University of Alabama is an equal opportunity/affirmative action employer. Women and minorities are particularly encouraged to apply.

University of Chicago

Computer Science Department
Faculty Position

The Department of Computer Science at the University of Chicago is recruiting faculty at the junior level. The Department is particularly interested in exceptional candidates in theoretical computer science. The University of Chicago has the highest standards for scholarship and faculty quality, and encourages collaboration across disciplines. The Computer Science Department's charge and goal is substantial growth through appointments that will enhance the quality and prestige of our University.

The Chicago metropolitan area provides a diverse and exciting environment. The local economy is vigorous, with international stature in banking, trade, commerce, manufacturing, and transportation, while the cultural scene includes diverse cultures, vibrant theater, world-renowned symphony, opera, jazz, and blues. The University is located in Hyde Park, a pleasant Chicago neighborhood on the Lake Michigan shore.

Please send nominations or applications to:
Professor David B. MacQueen, Chairman
Department of Computer Science
The University of Chicago
1100 E. 58th Street
Ryerson Hall
Chicago, IL 60637-1581
or to: recruit@cs.uchicago.edu
(attachments can be in pdf, postscript, and Word)

Please quote ref. # 071744 "Asst. Prof. Theory."

Complete applications consist of (a) a curriculum vitae, including a list of publications, (b) three letters of reference (including one which addresses teaching ability), (c) a research and teaching statement which discusses both past research and future plans. Applicants must have completed, or will soon complete, a doctorate degree. Applications must arrive by April 15, 2006.

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

University of Houston

Department of Computer Science
Faculty Positions

The Computer Science Department at the University of Houston (www.cs.uh.edu) invites applications for two tenure-track faculty positions starting in August 2006. A wide range of research interests within Computer Science will be considered with an emphasis on computer graphics, databases, software engineering, human-computer interaction, robotics, systems and theory. Preference will be given to candidates at the Assistant/Associate Professor level but exceptional candidates at all levels will get full consideration. Candidates should hold a Ph.D. in Computer Science, Computer Engineering, or a closely related field.

The Department has strong research programs in Computational Life Sciences (biomedical image analysis, computational biomedicine, bioinformatics, biometrics), Computer Systems (high performance computing, networks, real-time systems, security) and Data Analysis (information retrieval, data mining, machine learning). The Department places strong emphasis on basic and applied research, teaching, and interdisciplinary programs, and maintains close ties with the Texas Medical Center and several local and national industrial partners. At present, the Department has 23 tenure-track faculty members and is expected to add several more positions in the next 4 years.

Houston offers an outstanding environment for research and professional opportunities for growth and collaboration. It is host to NASA Johnson Space Center and the largest medical center in the country. Houston is also the epicenter of world's energy industry.

Applicants should submit their curriculum vitae, a statement of research and teaching goals, and up to two representative publications. Junior candidates should arrange for at least three professional references while senior candidates for at least six. All application materials should be submitted on-line at:
http://www.cs.uh.edu/positions.

Review of applications will begin immediately and will continue until the positions are filled.

The University of Houston is an equal opportunity/affirmative action employer. Minorities, women, veterans, and persons with disabilities are encouraged to apply.

University of Kentucky

Department of Computer Science
Assistant Professor

The University of Kentucky Computer Science Department invites applications for a tenure-track position beginning August 16, 2006 at the Assistant Professor level. Candidates should have a PhD in Computer Science or a related discipline.

Consideration and interviewing of qualified applicants will begin on or about February 9, 2006. Potential candidates must apply online at http://www.uky.edu/UKjobs. Click 'Online Employment for Job Seekers'. Then 'Search Postings' then enter SL511231 under 'Requisition Number'. Or you may use the following link to go directly to the job listing: ukjobs.uky.edu/applicants/Central?quickFind=190446.

For any questions related to the application process, please contact:
HR/Employment
112 Scovell Hall
Lexington, KY 40506-0046
Phone: 859-257-9555, press "2"
or
by email at ukjobs@email.uky.edu.

We are interested in candidates with expertise in networking. Appointed individuals will be expected to conduct innovative research and participate in the Department undergraduate and graduate instructional programs.

The University of Kentucky is the flagship graduate degree-granting institution in Kentucky, strongly committed to the goal of maintaining research and teaching excellence and high national visibility.

Application deadline is February 9, 2006 but may be extended if necessary. The University of Kentucky is an equal-opportunity employer and especially encourages applications from women and minority candidates.

University of Saskatchewan

Department of Computer Science
Tenure-Track Position

Applications are invited for one tenure-track and one five-year term position, both at the Assistant Professor level. Applicants should have a Ph.D. in Computer Science or equivalent.

Tenure-Track: We are seeking an outstanding entry-level faculty candidate with a strong research record in the area of programming languages, software engineering, hardware systems/computer engineering, theory, management information systems, and database systems.

Term: We are seeking an outstanding entry-level female faculty candidate in the area of multi-agent systems, peer-to-peer systems, on-line communities, AI in education, on-line learning systems, user modelling, and user adaptive systems. The successful candidate will also work with the Department's Cameco NSERC Prairie Chair for Women in Science and Engineering.

The friendly, supportive and collegial environment, combined with our excellent research reputation, makes the Department an ideal place to launch and develop a successful academic career. Our Department offers graduate programs at the M.Sc. and Ph.D. levels and has a vibrant undergraduate program.

Please consult http://www.cs.usask.ca/employment/faculty.shtml for more information.

University of Waterloo

Department of Electrical and Computer Engineering
Faculty Positions

The Department of Electrical and Computer Engineering invites applications for faculty positions in most areas of computer engineering, software engineering, and nanotechnology engineering, and in VLSI/circuits, information security, photonics, MEMS, control/mechatronics, signal/image processing, and quantum computing. The University has been named the "Best Overall" university by reputation in Canada.

For more information and online application, please visit:
https://eceadmin.uwaterloo.ca/DACA.

Wright State University

Department of Computer Science and Engineering
Lecturer Position

The Department of Computer Science and Engineering at Wright State University seeks applicants for non tenure-track position as Lecturer. The Department resides in the College of Engineering and Computer Science and offers B.S., M.S. and Ph.D. degrees both in Computer Science and Computer Engineering.

Candidates for this position are expected to have an earned Ph.D. in computer science, computer engineering, or a closely related area. We will also consider candidates with a graduate degree in CS or CE, who have extensive experience in a closely related field. Successful candidates will be expected to participate fully in the life of the university through teaching and service. Teaching experience and the ability to contribute to the research mission of the department would be desirable. All high quality applicants will be considered regardless of their field of specialization.

Wright State University is an AA/EEOC and has a strong institutional commitment to diversity. Therefore, we are particularly interested in receiving applications from a broad spectrum of people, including underrepresented minorities, women, persons with disabilities and veterans.

Applicants should provide a brief statement of their teaching experiences and research interests. They should include a complete vitae with names, addresses, telephone numbers and e-mail addresses of at least three references, documentation of teaching abilities, plus any additional supporting information. Salaries are highly competitive. Address applications and supporting information to:

Chair, Lecturer Search Committee
Department of Computer Science & Engineering
3640 Col. Glenn Hwy
Wright State University
Dayton, OH 45435

Consideration of candidates starts April 1, 2006 and continues each month until the position is filled. For details and information you may call 937-775-5134 or contact Forouzan Golshani, NCR Distinguished Professor and Chair, at golshani@wright.edu.

Wright State University is an equal opportunity/affirmative action employer.