UMASS

UNIVERSITY OF MASSACHUSETTS AMHERST

Spring 1999

Significant BITS

Newsletter of the COMPUTER SCIENCE DEPARTMENT *(formerly* "LOOSE CHANGE"*)*

Multimedia courseware leverages Internet client/server technology

Department's MANIC software serves courses to departments on campus — and over the World Wide Web to100 countries

The multimedia capacity and accessibility of the World Wide Web are proving a fertile territory for developing and refining the concept of making learning available on-line. With that in mind, Department researchers set out to produce software that uses all the technology together to educational advantage.

Thanks to technology developed through a National Science Foundation infrastructure grant to a group of departmental researchers, the Department's MANIC (Multimedia Asynchronous Networked Individualized Courseware) program will be serving up courses for departments campus-wide, says Professor W. Richards Adrion, currently the leader of the MANIC program.

The MANIC project originated in 1996 with Professor Jim Kurose, graduate students Jitu Padhye and Mia Stern, and undergraduates Jesse Steinberg ('97 UMass) and Hu Im Lee ('97 Mount Holyoke). Steinberg and Lee were supported by fellowships from the Research Experience for Undergraduates program of the National Science Foundation.

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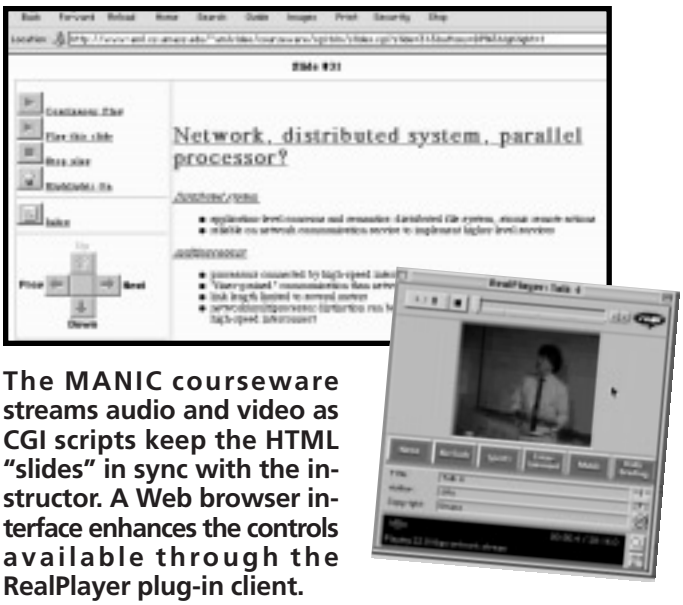

The MANIC courseware streams audio and video as CGI scripts keep the HTML "slides" in sync with the instructor. A Web browser interface enhances the controls available through the RealPlayer plug-in client.

Building a better compiler

ALI, a new Department collaboration, seeks to redefine the path from source to assembly code

The path from high-level programming language to low-level machine language is inherently collaborative. The interplay of hardware and software, and the science of creating and understanding the interrelationships among components, are topics tailor-made for collaboration among research groups with similarly diverse research interests.

Just such a collaboration has recently been undertaken by the leaders of three Department research groups:

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FROM THE CHAIR

A changing 'pipeline'

By Jim Kurose

"Got any good students in the pipeline?"

It's a question that we Computer Science faculty hear quite often from our colleagues in industry and academia. The model of students entering the "pipeline" (our undergraduate or graduate degree programs) and leaving with the skills needed to succeed in their future endeavors is a well-known analogy. Recently, however, activity around the input and output ends of the pipeline has been changing considerably.

As a discipline, computer science faces the challenge of retaining enough of its best and brightest to sustain a healthy educational and academic research environment.

The input to our pipeline has increased significantly. We've seen a jump of more than sixty percent over five years in both the number of computer science undergraduate majors and the number of undergraduate students (major and nonmajor) that we teach. Similar trends have been observed in computer science departments at other major research universities.

At the graduate level, we received nearly 800 applications this winter for approximately 40 incoming positions — a record number of applications. (We've also set a record this year for the highest hit rate of students who have accepted our offers!) Clearly, computer science, information technology, and related subdisciplines are "hot" among undergraduates and graduate students alike.

Activity surrounding the output side of our pipeline has increased significantly as well. We've noted a tremendous increase in recruiting by both industry and academia. These intense recruiting efforts, combined with the lure of exciting (and well-paying!) jobs, are poking some holes in our pipeline, with some students being recruited and leaving the pipeline before finishing their target degree.

What do these changes mean for our Department? The increased undergraduate interest certainly places additional load on our teaching capacity. Our new M.S. degree via the UMass Video Instructional Program adds further to our instructional activity. From a research standpoint, the increased interest in our students, and in students at other institutions, has several consequences.

Because our graduate students now hear the siren call of industry throughout their graduate studies, our perception is that they are more tempted to leave our Ph. D. program after a M.S. degree. Because we compete with industry and other CS departments for the same top undergraduates, we must be more proactive in graduate student recruiting; several years ago, we began flying in many of our accepted graduate students for "Candidates' Weekend" for them to experience the excitement of departmental activities firsthand.

The competition to hire top Ph. D. students into faculty positions is incredible this year. More generally, as a discipline, computer science faces the challenge of retaining enough of its best and brightest to sustain a healthy educational and academic research environment.

Fifteen years ago, the phrase "eating our own seed corn" was used to describe a situation in which the number of graduating students heading into academia was felt to be far below that needed to educate and train the next generation of students. That analogy may once again be appropriate today. SB

ECommerce is focus of joint research project

'Foundations for the Future' Conference set for June 16–18

The Computer Science Department and Isenberg School of Management (ISOM) have announced plans for the Interdisciplinary Center for Electronic Enterprise (ICEE), to be codirected by professors Leslie Ball (from ISOM) and Leon Osterweil. ICEE will be strongly linked to industry and will support a research environment whose goal will be the advancement of the state of the art and practice in electronic commerce, digital government, and virtual enterprises.

ICEE's first initiative is "Electronic Commerce: Foundations for the Future," a unique, highly focused, four-track conference designed to encourage collaboration between academia and business. Participants will plan a road map for people, process, technology, and payment solutions for this fast-paced industry.

The conference will be held from June 16 to 18 at the BankBoston Conference Center in Boston. For more information, please contact Ball (**ball@som.umass.edu**) or Osterweil (**ljo@cs.umass.edu**), or check out our Web site at **icee.cs.umass.edu/ecommerce.**

Join us

The Computer Science Department has several staff openings for qualified individuals interested in working in the Department.

Visit **www.cs.umass.edu/csinfo/join_fac_staff/joinstaff.html** for more information.

PROFILES

Two new research assistant professors

• In studying the grasping motion of infants, Andy Fagg seeks the algorithms of the brain

To understand the human brain, Andy Fagg (**fagg@cs.umass.edu**) is going back to the beginning: studying infants.

By watching the movements and reactions of children from three months to two years of age, Fagg, a research assistant professor in the Department, gleans information about the mind's role in how a child corrects his or her motion and, as a result, how he or she will grab an item the next time.

Fagg's studies in computational neuroscience, with Computer Science Professor Andy Barto and several other University researchers, centers on how the brain learns to perform motor control and how to test those computational principles mechanically through robotics.

That's the link, though there's a large difference between how the brain does motor control and how a robot is programmed to do it. "We look at how individual neurons (in monkeys) are involved in computation related to reaching and grasping," Fagg explains. "We then use this information to build a computer description (a model) of that process."

The distinction is important. Learning plays a significant role in building these computational processes, but it is not (yet) clear how much is hard-wired at birth and what the precise learning mechanisms are.

Fagg earned his M.S. and Ph. D. degrees from the University of Southern California computer science department. From his arrival at the Department in December 1995 until September 1998, when he assumed his current position, Fagg was a senior postdoctoral research associate in the Adaptive Networks Laboratory, where he worked under Barto's direction.

Fagg began his study of artificial intelligence as an undergraduate at Carnegie Mellon University; as a graduate student, he gravitated into the neuroscience connection. "It's exciting to get down to a low level and understand how these complex computations arise from lots of very simple computing elements," Fagg observes. "Building robot implementations of our models gives them 'life' and forces us as modelers to confront the problems that are presented by the real world."

For more information on Fagg and his research, visit **www.cs.umass.edu/~fagg**. SB

Andy Fagg

R. Manmatha

• Manmatha studies databases for images and video — and the text lurking within

Indexing and searching for text has become commonplace. But apply the same demands to collections of graphics, and you get the computing complexity and issues that drive the work of Research Assistant Professor R. Manmatha (**manmatha@cs.umass.edu**).

Manmatha, most recently a postdoctoral research associate who received his Ph. D. degree from the Department in 1997, was appointed to his current position this past fall.

"I'm having fun doing research and dreaming up new things to do," says Manmatha of his continuing work for the Center for Intelligent Information Retrieval (CIIR) research group.

That work involves indexing a database of images, a research topic that speaks to computing efficiency. "Searching a few images doesn't take very long, but bump the number of images into the tens of thousands, and it becomes a much larger problem," Manmatha points out.

Manmatha is involved in a CIIR activity whose goal is to automate the creation of an index for George Washington's handwritten manuscripts, a project that requires matching handwritten words as pictures. Another search system project, this one for the U.S. Patent and Trademark Office, would allow users to search for "similar" trademarks using both image and text search among not only newer electronic records but also 60,000 older records that exist only as images.

Manmatha also is involved in searching video. The number of frames associated with moving images adds several more layers of complexity and scope to the same issues involved in analyzing still images.

Manmatha received his M.S. in electrical engineering from the University of Hawaii and a bachelor's degree in electrical engineering from the Indian Institute of Technology in Kanpur.

For more information, visit Manmatha's Web site at **www.cs.umass.edu/fac-bios/manmatha.html**. SB

Send news items for the next issue of Significant Bits to **bits@cs.umass.edu**

RESEARCH

COMPILER *(from page 1)*

professors Kathryn McKinley (Systems for Advanced Architecture Laboratory), Eliot Moss (Object Systems Laboratory), and Chip Weems (Specialized Parallel Architecture). Comprising the Architecture and Language Implementation (ALI) "supergroup" provides the principals an opportunity to take a holistic look at these relationships. They are doing so through a number of projects, including one that seeks to redefine the relationships among the programming languages that software applications are written in, the machines that run the applications, and compilers.

Formally created last summer, ALI ties together the research areas of computer architecture, computer language design, and compilation.

ALI grew out of the natural collaborative process that routinely occurs among Department laboratories. "We're stretching the paradigm," says Moss, whose research interests include programming language design and implementation and a number of other topics. "Computer architects and compiler folks sometimes do not talk much with one another, or their collaborations may be ad hoc or around a particular project."

"Only a few groups really actively collaborate across architecture and compilers that I know of, and two of them have lost people to industry and thus have been disbanded," McKinley notes.

An evolving compiler framework

Weems's work motivated one of the group's significant research projects, Scale, a compiler framework for heterogeneous architectures. Weems found himself hindered in his Image Understanding Architecture project, since existing compiler optimizations did not work on different data types, McKinley says.

Heterogeneous parallel systems — which McKinley describes as "the systems of the future" — provide high performance for large, diverse applications across multiple machine architectures. With different individual machine architectures, each with its own advantages, at the ready, specific tasks can be targeted to specialized hardware architectures, achieving significant performance advantages. Heterogeneous systems thus require flexibility and the reuse and retargeting of compiler optimizations.

To justify the use of heterogeneous hardware, a programmer must understand and manage the different target machines and customize the application code accordingly.

So while heterogeneous parallel systems can function at high levels, programming them is difficult at best and results in performance compromises at worst. "Coordinating hardware platforms really have had nothing in the way of compiler support," McKinley explains. "Every machine is currently compiled for separately, and if you want them to communicate, they do it through inefficient library calls."

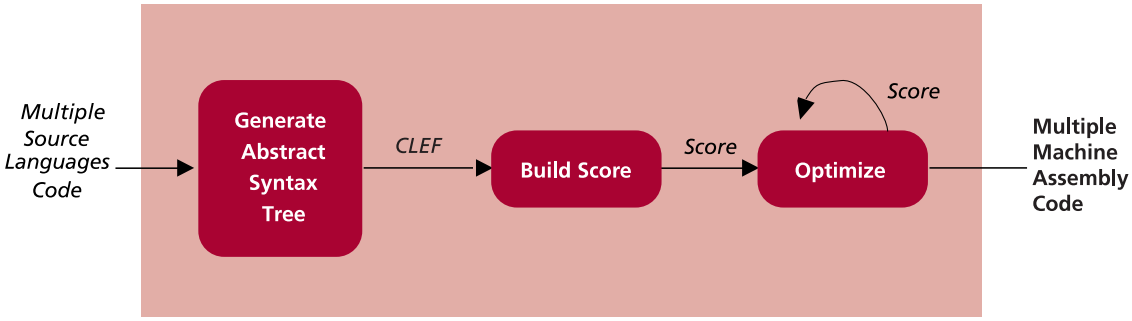
"Only a few groups really actively collaborate across architecture and compilers that I know of, and two of them have lost people to industry and thus have been disbanded."

The result? Scale will create "portable applications with high performance on changing resources," McKinley says. Programmers will be able to write code more flexibly, and the code they do write will perform better.

Compilers generally work on a programmer's source code in a two-step process, creating first an intermediate representation (IR) file, then compiling that intermediate file to the executable application. ALI is also working on Score, Scale's IR component, which provides the flexible and extensible core of the Scale project.

Other projects

The hardware/software interaction comes to play in a number of other projects, all of which capitalize on ALI's principal investigators' individual research strengths. "We are doing a lot of work related to improving memory access performance of programs, both scientific, array-based programs and object-oriented programs. We are applying it at all levels of the memory hierarchy: caches, main memory, and disk," Moss notes. "In addition, we are exploring compiling and designing new architectures to improve memory system performance," adds McKinley.

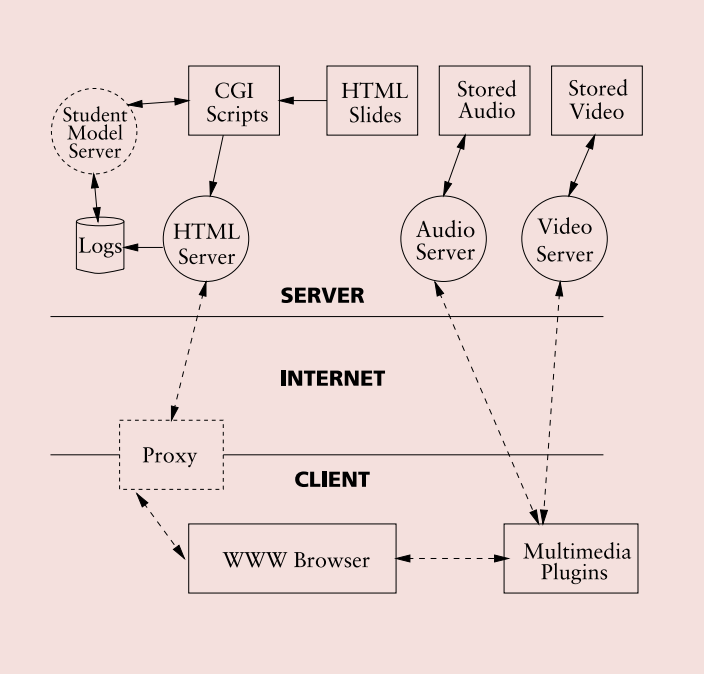


This diagram shows the high-level view of the interrelation of the various components of the Scale compiler framework. Input in the form of multiple high-level programming languages (Java or FORTRAN, for example) gets translated into CLEF, a high-level Abstract Syntax Tree, a form that resembles the original code and lets Scale "easily include interactive user tools and user annotation of program properties to facilitate the quick incorporation of new languages and architectural features," McKinley says. From the resulting data, Scale creates Score, a bi-level intermediate representation, and that data is optimized and compiled into executable machine language.

ALI is producing its own Java Virtual Machine (JVM) as an additional component to support its research, Moss adds. "It complements Scale/Score, and we are in the process of connecting the two. Java addresses some issues of portability and flexibility, but relies even more than its predecessor languages on good optimizing compilers to obtain high performance."

"We also have work under way that uses more dynamic, lower-level, as-you-go techniques to produce good, native code for Java (and possibily other languages), putting together the best of thorough ahead-of-time optimization as performed by Scale with the best of quick 'just-in-time' compilation performed in the UMass JVM," Moss says.

Moss says the group looks forward to continued collaboration "to build significant software artifacts that explore important questions." For more information about ALI, and links to its component groups, visit **celestial.cs.umass.edu.** SB



The network architecture of the MANIC system shows many common Web elements that work together in uncommon ways.

MANIC ..... *(from page 1)*

MANIC parts company from similar networked learning systems by delivering course material asynchronously to each student without regard to others using the software. By taking this approach, the software speaks to individuals at their pace and their level, and students have responded well. "Off-campus students usually prefer MANIC to videotape," Adrion notes. "On-campus students like the ability to go back and review lectures in preparing homework and exams."

For his part, Adrion has replaced about one third of his in-class lectures with "problem-solving sessions" with MANIC content. Honors students in his CMPSCI 521/621 course cover course material that is available only via MANIC.

Common client

MANIC delivers educational content via Web browser technology using the RealPlayer plug-in, Java applets, and CGI scripting. These common technologies, combined with the Web's HTML underpinnings, provide a "slide show," complete with streaming audio, video, graphics, and crafty workarounds that retrofit RealPlayer's controls to let students jump around the audio continuum at points defined by content, not time duration.

MANIC also works behind the scenes, looking at a student's click-through pattern to guess which path in the course sequence the student will take. The implications of this technology are both educational and practical. Not only can this data be used to interject appropriate content, but also the probable pages will be cached, resulting in quicker load time.

MANIC works behind the scenes, looking at a student's click-through pattern to guess which path in the course sequence the student will take.

ACSIOM, the University's technology transfer corporation, is concurrently developing and implementing MANIC technology for UMass-Amherst Continuing Education Outreach, for UMass-Boston School of Management, and for other educational venues. "ACSIOM is also expanding the application to museums and has done a MANIC-like walk-through of the Tweed Art Museum," Adrion says. The Department is packaging the current version of the software for York Technical College and the University of Paris-Orsay.

Both the UMass and ACSIOM versions still support users with slow dial-up connections, Adrion says. The courseware can be configured with low-bandwidth-friendly options. Newer versions of MANIC minimize server activity by using Java applets to animate and display the slidelike HTML pages.

Archived on-line are lectures for six full-credit, semester-long courses as well as selected short tutorial courses, including one from Kurose on socket programming.

"Jim's socket programming course has been accessed by people in 100 countries and appears to be in use by a number of other universities as supplemental/reference material," Adrion notes. Several other courses are currently in production.

Shifting goals

Initially, the MANIC project was focused on technology — building an interactive multimedia server based on emerging streaming media Internet products. The project's goals have expanded in the intervening years.

One longtime project goal is to understand how to best tailor the presentation of content to a given student. A more recent challenge for faculty using MANIC is to understand how to use the software as a teaching tool.

"Now that an instructor has the notes, audio, and video of a full semester's class already available to students on the World Wide Web, what's a teacher to do? Show up the next semester and relecture the same material, or somehow leverage the existing material into a better learning experience for students?" asks Professor Kurose. "That's an important question that all faculty are going to have to wrestle with."

More information about MANIC can be found on-line at **gaia.cs.umass.edu/nmis/manic.html**, a site that has received more than a million hits and has served more than 10 billion bytes of information to 22,000 users in 100 countries. SB

IN MEMORIAM

Caxton Foster, 1929–1999

One of the first Department professors, a scholar of computer architecture

Dr. Caxton C. Foster, a founding faculty member of the Department and a highly regarded scholar of computer architecture, died on April 1 in East Orleans, Mass. He was 70.

Foster was remembered by longtime colleague Professor Ed Riseman as "a colorful, somewhat eccentric character with a sharp wit and fairly strong opinions" who was "well respected in his research community." He was advisor to Professor Chip Weems.

Foster's widow, Mary Lou Foster, painted a fond portrait of her husband as a man of wide-ranging intellectual interests. His activities, she said, spanned beyond computer science to astronomy, the stone circles of the British Isles, stamp collecting, and opera.

"He was a happy person — and most people aren't very happy. He loved life," Mary Lou Foster recalled. The couple had celebrated their fortieth wedding anniversary only shortly before his unexpected death.

Foster was born January 21, 1929, at Fort Bragg, N.C. He received his B.S. in physics from Massachusetts Institute of Technology in 1950, his M.S. in instrumentation engineering from the University of Michigan, and his Ph. D. in 1965 in electrical engineering, also from Michigan.

From 1954 to 1960, he worked as chief electrical engineer developing instrumentation electronics for the Mental Health Institute at the University of Michigan.

From 1964 to 1965, he worked at Goodyear Aerospace Corp., where he participated

Caxton Foster

in the design of the GAC-RADC 2048 Word Associative Memory (an early massively parallel processor), which was the predecessor to the first commercial massively parallel processor, the Goodyear STARAN.

In 1967, he became Computing Center director at UMass, and in 1968, he spent a year at the University of Edinburgh. He retired in 1984 from the Department, at which point he and Mrs. Foster relocated to Cape Cod.

After his retirement he founded a software company, Mount Castor Industries, which until 1992 developed and sold software for class scheduling and recordkeeping in schools.

Foster was the author of *Content Addressable Parallel Processors*, *Computer Architecture*, *Cryptanalysis for Microcomputers, Content Addressable Parallel Processors*, *Programming a Microcomputer: 6502*, and *Real Time Programming: Neglected Topics*. His most recent book, *The Orrery*, a work on the subject of using computers to compute the paths of comets and asteroids, will be published by Wilmann Bell.

Foster was also a founding member and first vice-chairman of the Association for Computing Machinery's special interest group in computer architecture (SIGARCH), as well as the first editor of its newsletter, "Computer Architecture News." He also was a member of the Computer Society of the IEEE.

In addition to his wife, Foster leaves five children and seven grandchildren.

Memorial donations may be made to the Caxton C. Foster Computer Science Graduate Fellowship Memorial Fund, in care of External Relations Coordinator Marla Michel. SB

ALUM PROFILE

A promising career

Lixin Gao (Ph. D. '96) receives NSF CAREER Award for multicast network research

Lixin Gao, an associate professor of computer science at Smith College in Northampton who received her Ph. D. from the Department in 1996, has received a National Science Foundation CAREER award to study video-on-demand systems in multicast networks.

"To tell you the truth, I'm a bit shy about the publicity," notes Gao (**gao@csc.smith.edu**), who completed her undergraduate work at China's University of Science and Technology. She came to the U.S. in 1986.

An advisee of professors Arnold Rosenberg and Ramesh Sitaraman, Gao worked in the TAPADS research group, which studies the design and use of computing systems and computer networks.

"Lixin's doctoral work dealt with theoretical aspects of parallel and distributed systems. More specifically, her work focused on scheduling algorithms for parallel systems," Sitaraman explains. "A scheduling algorithm is a crucial component of a parallel system and is responsible for partitioning and distributing work to the processors. A good scheduling algorithm must ensure that most of the processors are busy doing useful work most of the time.

Lixin Gao

Lixin's work focused on how to perform this complex orchestration of computation and communication to speed up certain classes of parallel tasks."

The three-year, $200,000 grant will fund expanded research described in a paper, "Supplying Instantaneous Video-on-Demand Services Using Controlled Multicast," coauthored by Professor Don Towsley.

Gao's NSF CAREER award, says Sitaraman, is "a clear indication that [Gao] is on the road to a very successful academic career." According to Sitaraman, who received an award from the same program several years ago, the goal of the award is "nurturing bright young faculty members by giv-

ing them long-term grant support for their research." The award is a congressional initiative aimed at keeping junior faculty in academia.

"[The award] is also unique in that it emphasizes a well-rounded approach that includes not just research but educational activities as well," Sitaraman adds.

Gao says she "particularly benefited" from Rosenberg and Sitaraman. "They have not only trained me to do research but also to be a good presenter and writer," she says. That multifaceted approach helps her bring research into the classroom and students to the research.

Gao joined the Smith faculty in 1996. "I enjoy the small class size and the excellent undergraduate students here," she says. "I am currently teaching one or two courses per semester and have been able to bring some of my research topics into the classroom. So far, I have worked with undergraduate women on my research under the support of Smith funding," Gao says.

Gao also hopes that her grant, combined with a recently announced engineering program at Smith, will enable her to work with more women students. Gao, who knew she wanted to teach after she gave her first conference talk to her fellow graduate students, "plans to attract more undergraduate women to major in computer science and mentor women in this field."

Gao's advisors are sharing in her achievement. "It is very gratifying," Rosenberg says. "One tries to give one's students the wherewithal to cope and succeed in the 'real world.' It is only via milestones such as this award that one gets some feedback about the measure to which one has succeeded."

Adds Sitaraman: "There is nothing more exhilarating than seeing one's own students succeed. This is what professors live for!" SB

BOOKSHELF

A new logical framework

Immerman writes on descriptive complexity, a growing theory topic

Descriptive Complexity
Neil Immerman
Springer, 1999
ISBN 0-387-98600-6

"There has been a need for a book that puts the material on descriptive complexity in one place with consistent notation and a consistent point of view," says Professor Neil Immerman (**immerman@cs.umass.edu**) of his book *Descriptive Complexity*.

The book, published by Springer as part of its Graduate Texts in Computer Science series, is the culmination of Immerman's studies in descriptive complexity, which he describes as "a very appropriate methodology for understanding computation."

As a method for "providing much of the theoretical underpinnings for relational database theory," Immerman explains, descriptive complexity analyzes computation using mathematical logic *(see sidebar, right)*. "The idea is that the object being worked on with the computer is a finite logical structure. This is exactly what a relational database is."

The field, which developed from the work of Berkeley professor Ron Fagin in 1974, "had been very slow for many years," Immerman says. "About eight years ago it achieved a certain critical mass and has been progressing more quickly since then."

Immerman describes the current state of this branch of computer science theory as "one of the most active parts of logic in computer science." He estimates that approximately 100 researchers are "actively pushing this research area forward."

Described as a textbook for graduate- and advanced undergraduate-level courses, *Descriptive Complexity* is also a reference work that computer scientists can use to explore this emerging field. Immerman himself uses the book in an every-other-year seminar that he teaches with Professor David Mix Barrington.

The book took shape in Immerman's mind over many years, and a sabbatical at Cornell in 1995–'96 gave him the time to write the main body of the 15-chapter book. Immerman added further refinements and revisions over the next year as colleagues used drafts in seminars. "Their feedback was quite helpful, and there were fewer errors thanks to them," Immerman notes.

For more information about the book and Immerman's work, visit **www.cs.umass.edu/~immerman.** SB

A deeper look at descriptive complexity

Neil Immerman describes his field

Much of what computers do can be thought of as computing properties of inputs. It is not surprising that properties that are hard to compute might be difficult to express and vice versa. Descriptive complexity measures the richness of a logical language necessary to express a given property. All of computational complexity can now be understood from this point of view.

Applications to Database Theory: A relational database is a finite logical structure, and typical query languages such as SQL are essentially first-order logic. We can look at a first-order query syntactically and get a reasonable estimate for how much time and space are needed to evaluate the query. Query optimizers work by translating the query into an equivalent formula that will take less time to evaluate.

Applications to Complexity Theory: Descriptive complexity has helped unlock some of the mysteries of computation. In particular, I've used the methods of descriptive complexity to prove a fundamental theorem about complexity theory. My theorem solved a problem that had been open for twenty-five years and fundamentally changed our understanding of the complexity resource "nondeterministic space." SB

NEWS

Systerhood

Listserv offers support, advice to female computer science students

For female computer science scholars, frustrations in the texture of daily life abound — frustrations that only another woman might understand from experience.

One example? "An undergraduate woman frequently knew the right answers in class but did not get heard by the teacher," Amy McGovern explains. "Instead, she would speak the answer, some young men would repeat it, and the teacher would acknowledge them instead of her."

McGovern (**amy@cs.umass.edu**), a Ph. D. candidate based in the Adaptive Networks Laboratory, focuses most of her time and attention on reinforcement learning and robotics, with "a constant interest in artificial intelligence and machine learning" and a corresponding stream of papers and research. She also runs the "Systers-Students" listserv (**anw.cs.umass.edu/~amy/systers.html**), a global forum for female computer science students to give and receive advice and counsel on topics ranging from the outrageous down to straightforward advice.

The listserv has 250 women student subscribers around the world. Subscribers range from high-school students looking for college advice to doctoral candidates wondering how their salaries measure up.

"The list tries to provide a much larger network to support women and keep them from dropping out of computer science. We provide reassurance, encouragement, and advice in a male-dominated field," she says.

Some subscribers are nontraditional students, women in their 40s and 50s who are pursuing degrees in an effort to return to the workforce. Many are working mothers, McGovern notes. "When someone tells them, 'You don't belong in this field because you're a woman,' we say, 'That's ridiculous. We're here, and you belong here, too.' "

Much of the information exchanged deals with issues related to applying to college, graduate programs, and various internships. The group also shares news of job postings, and several members have posted their résumés on the list. A related list, Systers (**www.systers.org**), is geared toward women professionals in computer science.

The lists are private, with McGovern approving new subscribers, who pledge to adhere to rules that keep Systers-Students a safe environment for its users. "With the current rules, people are more free to talk about what is on their minds and not fear the wrong people hearing about it," McGovern explains.

Administrative duties include approving new subscribers, answering questions that arise on the list, stepping in to "gently remind" posters of inappropriate material, and correcting "glitches." The workload is light and varies with the list activity.

McGovern was a subscriber when the previous list owner gave up the list when she graduated from college; McGovern assumed ownership of the list on her arrival at the Department in the fall of 1996.

Ph.D. candidate Amy McGovern manages the Systers-Students listserv, a resource for more than 250 female current and prospective computer science students.

McGovern, who seeks to enter the space program after graduation, sees serving as list owner and its active promotion, via e-mail announcements and other active promotion, as akin to civic duty.

"I feel strongly about the list," she says. "When I was an undergraduate, a fellow list member suggested I apply to UMass for graduate school, so it's played a big role in my life." SB

Computer Science Campaign seeks funds from industry, alumni

As a shiny new structure is taking shape, the UMass Amherst Development Office is launching a significant new effort to bolster the Department's endowment and resources.

Stephen L. Tanne (**stanne@nsm.umass.edu**), director of development for the College of Natural Sciences and Mathematics, says that the Campaign for Computer Science began last fall in concert with the construction of the Computer Science building.

The campaign seeks support from alumni, friends, corporations, and others to invest in the future of one of the country's leading centers for information technology. A color booklet for prospective donors introduces the Department with eloquence, style, and justifiable pride.

The campaign literature also notes the renewed investment of the University in the Department, citing the $14.5 million building and new faculty approved for the Department "both to maintain research leadership in its current areas of strength and to grow in new directions."

"We're encouraging all our alumni, as well as the industrial sector, to become involved in this crucial effort," Tanne notes.

The campaign promotes named endowments of professorships, lecture series, faculty teaching and research funds, scholarships, research laboratories, and permanent support of some of the new building's facilities.

For more information on development opportunities, contact Tanne, or Marla S. Michel, CS external relations coordinator, at **marla@cs.umass.edu.** SB

Wellfleet Fellowships help to attract the best and the brightest

Thanks to the generosity of Steven Willis ('78), the Wellfleet Fellowships, established in 1998, have made it possible to attract some of the best and brightest students to our graduate program. The fellowships provide an additional stipend beyond the traditional graduate student funding, providing an additional incentive for the Department to get topnotch students in an increasingly competitive arena.

Beginning in the fall 1998 semester, the first two Wellfleet Fellowships were awarded to Jamie Cobleigh and Zachary Eyler-Walker.

Cobleigh, who received his undergraduate degree from Rutgers, the State University of New Jersey, is a graduate student in the Laboratory for Advanced Software Engineering Research (LASER) (**laser.cs.umass.edu/public.html**). His research interests are in software analysis, and he is currently working on FLAVERS, a data flow analyzer for Ada programs developed in the lab. In the future, he expects to extend FLAVERS to analyze Java programs.

Eyler-Walker is a graduate student in the Experimental Knowledge Systems Laboratory (EKSL) (**eksl-www.cs.umass.edu/eksl.html**). He is currently working with EKSL graduate student Tim Oates on a method for language acquisition by situated agents.

Willis wanted to create the Wellfleet Fellowships, named after his start-up company, Wellfleet Networks (which eventually became the core company of BayNetworks, Inc.), to acknowledge the good education he received here in the 1970s. At that time, there was no formal undergraduate degree in Computer Science. Interested students worked with advisors to develop a curriculum and ultimately graduated with a BDIC (Bachelor's Degree with Individual Concentration). Willis found Professor Robbie Moll, got a great education, and has remained friendly with the Department ever since.

The first two Wellfleet Fellows, Zachary Eyler-Walker, who is based in the EKSL, left, and Jamieson Cobleigh of the LASER group, right.

Convincing the top students nationwide that they should enroll in its graduate program is a very high priority for the Department, as competition for these top students is tight. When asked how the Wellfleet Fellowship affected their decision to attend UMass, both recipients smiled and said, "It made it a lot easier." SB

Coming together

Work proceeds apace on the new Computer Science facilities, which are steadily nearing completion.

THE COUNTDOWN continues. According to Steve Cook, the Computer Science building's project manager, the main stairs are in, the steam line is installed, the dug-up roadways and walkways are being replaced, the HVAC system is installed, and the carpeting, tiling, and ceilings are all in. On deck: landscaping, telephone and data wiring, and furniture.

NOTEBOOK

Grupen receives University Outstanding Teacher Award

Grupen

Professor **Rod Grupen** (**grupen@cs.umass.edu**) has been selected as a recipient of the University of Massachusetts, Amherst's Outstanding Teacher Award for the College of Natural Science and Mathematics.

Grupen, the codirector of the Laboratory for Perceptual Robotics, joins two other faculty from the College in receiving the annual award honoring classroom performance.

"Professor Grupen has shown the personal dedication, the creativity, and the tremendous care for his students that are the hallmarks of an outstanding teacher," Department Chair Jim Kurose said.

Rosenberg receives Fulbright award

Rosenberg

Professor **Arnold Rosenberg** (**rsnbrg@cs.umass.edu**) has been named one of eight Fulbright scholars from the U.S. who will be studying in France. The program sponsors international study by U.S. teachers and scholars; it funds approximately 4,200 recipients annually.

Rosenberg will work for three months in the spring 2000 semester with researchers at the University of Paris-South (Orsay) who share his interests. Their project will be "Orchestrating Communication in High-Latency Parallel Computing Environments."

Allan named Lilly Teaching Fellow

James Allan (**allan@cs.umass.edu**) has been named a University of Massachusetts Lilly Teaching Fellow for the 1999–2000 academic year.

Allan

This competitive award program enables promising junior faculty to cultivate teaching excellence in a special yearlong collaboration with the Center For Teaching (CFT) on individual projects that typically involve developing or redesigning a course. Allan's Lilly project will center on modernizing the Department's undergraduate database course, tying in the modernized course's content with the National Science Foundation Research Experience for Undergraduates (REU) activity, with which Allan has been active.

Allan's selection as a Lilly Fellow carries on a grand tradition in the Department of distinguished young researchers who are committed to quality teaching. Previous Lilly Program fellows have been **Eliot Moss** (1991–92), **Jim Kurose** (1993–94), **David Mix Barrington** (1994–95), and **Ramesh Sitaraman** (1996–97).

Faculty News

Professor **Eliot Moss** (**moss@cs.umass.edu**) is on sabbatical from January 1999 through January 2000. During that time, Moss will be doing consulting in his area of expertise — storage management, garbage collection, and optimization for object-oriented languages such as Java — for three major corporations: Intel, IBM, and Oracle.

Professor **David Jensen** (**jensen@cs.umass.edu**) co-chaired the AAAI Fall Symposium on AI and Link Analysis (**eksl.www.cs.umass.edu/aila/**) last October.

Professor **Paul Cohen** (**cohen@cs.umass.edu**) will be one of three U.S. academic representatives attending the "DARPA Workshop on Knowledge-Based Planning for Coalition Forces," in Edinburgh, Scotland, in May. Cohen is also either the invited speaker or keynote speaker at several conferences this summer: The Workshop on Mixed Initiative Intelligence, Sixteenth National Conference on Artificial Intelligence in Orlando, Fla., in July; The Third Symposium on Intelligent Data Analysis in Amsterdam, the Netherlands, in August; The Workshop on Empirical AI, Sixteenth International Joint Conference on Artificial Intelligence in Stockholm, Sweden, in August.

Professors **David Mix Barrington** (**barring@cs.umass.edu**), **Neil Immerman** (**immerman@cs.umass.edu**), and **Ramesh Sitaraman** (**ramesh@cs.umass.edu)** were nominated for the University of Massachusetts campus-wide Distinguished Teaching Award.

The Federal Addendum to the President's 1999 Budget Request, called the "Blue Book," detailing IT activities, has a highlight section on the STIMULATE program (**www.ccic.gov/pubs/blue99/stimulate.html**) for which CIIR Professors **James Allan** and **Raghavan Manmatha** are PI and Co-PI, respectively. UMass was cited, along with Rutgers and Columbia, from 15 universities funded under this program.

Professor **Allen Hanson** (**hanson@cs.umass.edu**) is general chair of the Computer Vision and Pattern Recognition (CVPR) Conference (**http://www.cs.colostate.edu/~cvpr99/index.html**) in Fort Collins, Colo., from June 23 to 25, 1999.

Lab News

The Department's Computer Networks Research Group has an unprecedented 12 papers in the IEEE Conference on Computer Communications, Infocom '99. Held jointly by the Computer Communications Technical Committees of the IEEE Computer and IEEE Communications Societies, this annual conference addresses key topics and issues related to computer communications, with emphasis on traffic management and protocols (**www.comm.utoronto.ca/~infocom99/**).

Postdoctoral News

Mark Sanderson (**sanderso@cs.umass.edu**) is going to take a faculty position at the University of Sheffield in the United Kingdom in the Information Studies department. He'll be continuing his research interests in information retrieval with a view to exploring speech recognition and information extraction and how they might apply to IR.

Jinxi Xu (**xu@cs.umass.edu**) is going to the BBN Technologies research lab in Cambridge, Mass. His research interests include Information

Retrieval, Digital Libraries and Natural Language Processing.

Student News

CMPSCI graduate student **Victor Wu** won third place in the Ph. D. category of the 1998 AT&T/Regional ACM Student Research Contest. This annual symposium is a forum for students to give poster presentations on their research and be judged by a panel of professional researchers from AT&T and other laboratories (**www.research.att.com/~lorrie/researchday/1998/**). Finalists were invited to attend the international ACM Student Research Contest. Wu, a Ph. D. candidate in the CIIR, received recognition for his dissertation work, "Textfinder: An Automatic System to Detect and Recognize Text in Image."

Chris Holmes's paper was accepted as a poster paper at the fifth Annual Undergraduate Conference on Undergraduate Research, Scholarly, Creative, and Public Service Activities, Boston, April 30, 1999. The title of the paper is "Gathering and Creating Accurate Database of Photogrammetric Parameters from Aerial Field Sensors," coauthored with professors **Howard Schultz** and **Ed Riseman** and Research Fellow **Dana Slaymaker**.

Heddi Plumb, graduate student in the Computer Vision Research Laboratory, has been awarded the prestigious NSF Graduate Research Fellowship for the academic year 1999–2000. She will pursue her research in computer vision, recovering three-dimensional models of scenes from aerial imagery. "We are happy for Heddi that she received this highly competitive fellowship," says advisor Al Hanson. "She is an outstanding student with great potential, and she richly deserves the honor."

Alumni News

Ross Beveridge ('93) and **Bruce Draper** ('93), two former Ph. D. students under Professor **Allen Hanson** and now at Colorado State University, are on the Program Committee and hosting the Computer Vision and Pattern Recognition (CVPR) Conference in Fort Collins, Colo., from June 23 to 25, 1999. (**www.cs.colostate.edu/~cvpr99/index.html**).

University of Michigan Professor **Elliott Soloway** ('78), one of Professor Ed Riseman's first Ph. D. students, returned to UMass this year as part of the Department's Seminar Series. The title of his talk: "They're Giving Us Techies The Ball: Time to Step Up!"

Alexander Specker (specker@acm.org), an exchange student in the Department in 1996–97, received a diploma last fall from the University of Ulm, Germany. He is now working as a software developer in a CORBA project at NorCom Software and Consulting, Munich.

Dan Suthers ('93) is an assistant professor in the department of information and computer sciences at the University of Hawaii at Manoa. His advisor was Edwina Rissland, and he worked closely with Bev Woolf.

Adele Howe ('93), associate professor of computer science at Colorado State University, has been awarded tenure.

Staff News

External Relations Coordinator **Marla S. Michel** (**marla@cs.umass.edu**), who began work this spring, will be working on The Campaign for Computer Science *(article, page 8)*, industry outreach and interaction, alumni, publications, Web presence, and public events. Prior to joining the Department, Marla worked at AT&T Bell Laboratories.

Per-Oddvar Osland, visiting researcher, is working with the Computer Networks Research Group.

GIFTS

Thanks for your support

THE FOLLOWING ALUMNI AND FRIENDS have actively supported the Computer Science Department since November 1998. Such financial support is greatly appreciated and helps maintain a world-class instructional and research program. Contributions of alumni and friends help to fund important special activities that are not supported through the state budget.

Those interested in helping the Department should send a check made out to the University of Massachusetts to the Alumni Office, Memorial Hall, Box 35410, University of Massachusetts, Amherst, MA 01003-5410. Please state that your gift is *restricted to Computer Science.*

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Significant Bits

NEWSLETTER of the
DEPARTMENT OF COMPUTER SCIENCE
at the UNIVERSITY OF MASSACHUSETTS

Lederle Graduate Research Center, Box 34610
University of Massachusetts
Amherst, MA 01003-4610

"Significant Bits" is published twice a year by the Department of Computer Science, University of Massachusetts Amherst (**www.cs.umass.edu**). Your news, suggestions, comments, and contributions are welcome. Please mail them to the address above or send them electronically to the editor at **bits@cs.umass.edu**.

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LOGOUT

What might have been...

It had to happen *sometime*.

The former name of this newsletter has left more than a few people puzzled in recent years. *Loose Change*, a pun based on the former Department acronym COINS (COmputer and INformation Science), has served this newsletter well but has finally been retired. So we put a call for a new name out to the Department.

Renaming a newsletter truly makes people ponder the issue of how to embody a place and a discipline in one phrase — especially when there's a $100 prize ("Win a dinner for two" was the official pitch) attached to the effort. And in a true Department collaboration, we went through two rounds of consideration, giving us two sets of winners.

Congratulations to the winners: Michele Roberts and Chip Weems.

We got so many terrific entries for our name-the-newsletter contest that we're tipping our hat here to the other entries we considered. Here are only some of them (we've condensed similar entries) with some of the entrants' annotations. Thanks to all who participated. Enjoy!

/dev/umass/cs
/newpage (a LaTex command)
Abacus
Bits 'n' Bytes
The BROWSER
Cache Flow (This one carries on the legacy of COINS)
CmpSci Comme si, Comme ca
CmpSci Diff (from a UNIX command)
CompScape
Compsci News Compiler
Computer Science Monitor
Computivities
Connections
Core Dump
Corners, Lines, and Pixels
CS Interface
CS News Processor
CS Scan
CS Source Code
CS Spooler
cs.umass.edu
cs.umass/news
The Exception — a computing term. Also, as in "exception to the rule" (in this case, the rule that newsletters are often not very interesting).
I/O
Input & Output
The Inquirer
Interconnections
(ir)Relevant Bytes
The Keyboard
Linkages
Mass Storage
MassParallelism
New Bits
News Nybbles
news.cs.umass.edu
Offline
Quicksort
Recursive Output
Threads-n-Trends
Variable Expressions

>>QuoteUnquote

"I assume you'll accept multiple entries for the contest. These were all generated by my wife and me during one of those 'why-don't-we-go-out-to-eat-at-fancy-restaurants-anymore' conversations."
—*Robbie Moll*