■ WPI COMPUTER SCIENCE NEWSLETTER ■

SIGNIFICANT BITS

bits@cs.wpi.edu

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HEAD'S REMARKS

by Prof. Bob Kinicki

This is the first issue of the WPI Computer Science Newsletter targeted primarily at CS alumni. Our hope is to publish the newsletter regularly and keep you informed about our activities. Please send us your reactions and let us know how you are doing.

From my vantage point, life in CS moves at warp speed. The faculty and students appear continually in motion, keeping pace with the new CS concepts and technology. Since our move into Fuller Labs in January 1990, we have quickly filled our new laboratories with up-to-date equipment and have improved our course offerings.

At the undergraduate level, we have been wrestling with effective techniques for teaching C to the majority of WPI students. Pascal and Fortran are still around, but C dominates our upper level courses. Recently we approved a change for CS majors whereby Scheme, a LISP variant, was moved from the freshman to the sophomore year. A second C course has been introduced to allow majors to learn data structures in their freshman year.

The graduate program continues to attract high quality full and part-time students. The graduate research groups have blossomed to the point where there are 5 different research seminars scheduled during a typical academic week. The addition of the Center for High Performance Computing (CHPC) to WPI promises exciting research opportunities in distributed systems and high performance computing.

The first annual WPI Research Day was held in April to celebrate research at WPI. CS was well represented, with poster sessions in each of our research labs. One of the highlights of the day was a reunion of Professor Brown's former thesis students in the AI Lab.

Alumni response to the recent mailing of the CS Brochure overwhelmed us. We now have a better system for handling your responses.

We are making preliminary plans to establish a Computer Science Advisory Board. We will be seeking alumni assistance to identify prominent members of the computer science community who would be well-suited for giving advice on the future direction of our department.

Currently Computer Science has 12 faculty and two Instructors. With 8 new faculty in the last 6 years, the Department is full of vitality and new ideas. Come back to visit us when you get the chance!

NEW GRADUATE PROGRAM

by Prof. Matthew Ward

Over the past 2 years, the Computer Science Department's graduate program has undergone several major modifications. The reasoning behind the changes are:

➥ Computer Science as a discipline has been changing dramatically, with many new subdisciplines evolving into major areas of research and development.

➥ Applicants to our program are coming in with much more exposure to computer science. Ten years ago, more than 75% of our applicants had degrees in areas outside of computer science. Today, computer science and computer engineering account for more than 80% of backgrounds for our students.

➥ Scheduling in the past was quite difficult, since there was little in the way of a formal scheme to determine which courses would be offered and when. We also were running 4-8 courses labelled *Special Topics*, which was quite difficult to monitor.

The features of the new program can be summarized as follows:

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COMPUTER SCIENCE DEPARTMENT,
WORCESTER POLYTECHNIC INSTITUTE, WORCESTER, MA 01609, USA.

❐ New Curriculum: We now offer many advanced courses on a biannual basis. These include Expert Systems, Computer Vision, Performance Evaluation, Machine Learning, and Advanced Topics in Software Engineering, Graphics, Database, Compilers, Theoretical Computer Science, and Operating Systems. Other topics taught on a less regular basis depend on faculty interests and scheduling.

❐ New Requirements: We still offer both a thesis and coursework option for the M.S. degree, but the Master's exam has been abolished. We now require students to take courses in 4 core areas (Theory, Design, Analysis, and Systems) instead of the 3 core courses (most of which were routinely waived by applicants with undergraduate CS degrees). There are no longer any distribution requirements beyond the core areas, thus improving the flexibility in course selection.

❐ New Scheduling Policy: We now ensure that within every semester there is at least one offering in every core area. In addition, each course in the curriculum has a fixed (subject to staffing) schedule, so that we can say, in advance, whether a particular course will be offered every semester, every year, or every other year. This makes student and faculty planning extremely easy.

Any questions on the graduate program can be directed to the Department Graduate Coordinator (Prof. Craig Wills) or electronically to graduate@cs.wpi.edu.

FULLER LABS' LABS

Newer and Faster Equipment

If you graduated from WPI more than a few years ago, you'd be really amazed at the new computing equipment the department has. What equipment did you work on? In the Washburn Lab? DG's MV 8000? IBM's Series 1? The three Vaxen, Larry, Curly, and Moe (later joined by Shemp)? PDP-11's? The Convergent machines? All history!

Some of the labs used by our majors are PC-based. No, those are not the 8088 based original IBM PCs, but the 286- and 386-based modern PCs. One general purpose PC lab is used principally by the students in the beginning Pascal courses. Another, equipped with HP Vectra machines, in part provided by a grant from the Hewlett-Packard Company, is used for a two-term course sequence, "Modern Programming Concepts", which is taught in Scheme. And a third PC lab, with machines provided by a grant from the IBM Corporation, provides a general purpose document preparation facility, and is also used by the students in the "Computer Organization and Assembly Language Programming" course.

Increasingly, we have been setting up labs with UNIX workstations. It's very important for us to introduce our students to modern computing environments, and also to provide them with the tools they need for large and complex course projects. Three years ago we set up a lab with 11 DECstations, which is used each term for a junior or senior level course. It's used for the operating systems, networks, and architecture courses, and also for software engineering.

The students in the graphics course can use the graphics lab, which has six Sun-4 workstations, with lots of special purpose software installed. In addition, students involved in specialized MQPs or other advanced work can make use of the large variety of equipment available in the department's research labs. We'll discuss those labs in a future issue.

Providing up-to-date facilities for our students is important, both to expose them to the computing environments they'll meet in the workplace, and also to give them the tools they need for their course projects and MQPs.

We're constantly looking for opportunities to improve our computing facilities. This year, we're creating a workstation lab specifically for students in beginning courses. We're purchasing 20 DECstations for the use of students in our new two course introductory sequence in C. We hope this early exposure to workstations, and to the C programming language, will better prepare the students for the challenges ahead of them.

PROF. RAY SCOTT

The department loses an old friend

The Computer Science Department notes with sorrow and a great sense of loss the passing of our friend and colleague, Ramon C. Scott. Ray, an Associate Professor, died on 24th September 1990 after a three-year struggle with cancer. His contributions to our department and to WPI will be long remembered by all whose lives he touched over his 33 years at WPI.

As a member of the Mathematical Sciences Department, Ray played a major role in the development of the Computer Science program at WPI, and was a cofounder of our department in 1969. He also founded the WPI wrestling team and served as its coach for 10 years.

Ray was a caring teacher who had a special sensitivity toward the problems faced by WPI students. Ray was an active and enthusiastic project advisor. He served as site director of the WPI Project Center at Digital Equipment Corporation for 15 years. His scholarly activity was focused around the area of computer simulation, and he used this expertise to supervise numerous projects and theses connected with WPI's Fire Protection Engineering program.

Always ready to discuss the problems of the day, Ray took seriously his responsibility to offer advice and guidance to young (and not so young) faculty members. He openly offered his friendship to everyone. His down-to-earth approach to complex issues was a constant stabilizing factor for the department. Ray always played a large role in the department's committees. He was a strong proponent of faculty governance, and he tried to convey his belief in the importance of WPI governance to junior faculty members.

We all feel sincere gratitude and admiration for Ray Scott's dedication and outstanding service to our department, to WPI, and to his profession. We miss him.

GLOBAL CHANGE GRANT

Gennert, Hachem & Ward

The CS Department's largest research grant was awarded last spring to Profs. Hachem, Gennert and Ward. The 2 year $315,000 grant from the National Science Foundation is for research into Spatio-Temporal Data Base Management Systems for Global Change Research. Also involved are collaborators from Clark University's School of Geography. The award was a major accomplishment, as only 11 of 115 proposals were funded.

The goal is to develop the next generation of scientific databases: capable of both database access *and* analysis. Time also needs to be incorporated into the database. Existing Geographic Information Systems can only manipulate and display geographic data.

The database system under development has been named *Gaea* (pronounced jee'a), after the Greek goddess of the earth. Gaea will be used to compare and correlate different types of data taken at different times and places to help identify local and global trends. Input data could be rainfall measurements, land use data, census data, or satellite imagery. At present, the quantity of data overwhelms global change researchers and the situation will only worsen when additional satellite systems are brought on-line later this decade.

Gaea will help by providing an object-oriented system that lets users interact more naturally with the data. It will be possible to refer to datasets by describing them — for example, "the rainfall over the Sahara desert during July 1991" — rather than by filename.

An initial prototype is scheduled for completion in August 1993. For more information send email to:

stdbms@cs.wpi.edu.

FACULTY PROFILES

Please welcome ...

Craig Wills

This is my second year at WPI. After receiving my Ph.D. from Purdue University in 1988, I spent a couple of years at AT&T Bell Laboratories before joining the Computer Science faculty.

My teaching and research interests focus on distributed systems, user interfaces, operating systems, and networking. One focus of my current research is the problem of resource location in a distributed environment. Examples of resources are computational services, users, machines, and files. The problem is to efficiently find these resources based on their attributes. We are exploring multicasting for delivering requests to the subset of machines containing the requested resource. Professor Finkel and I have explored the use of multicasting to efficiently locate machine load information for sharing computations between machines in a distributed environment.

In many applications, the interface between the local client and remote server is fixed. We are exploring work that allows the remote interface to be dynamically discovered and imported to the client routine. This approach allows the client to be generic and be able to invoke new remote services as they become available. Other work builds on Remote Procedure Call mechanisms to allow the client to transport variable amounts and types of data to the server, which may reside on a machine with a different architecture.

Another area of interest is how computing systems change as they operate. We are both exploring the general problem of "mutable" computing systems and specific instances of the problem. We have investigated the problem of how users customize their UNIX computing environment and introduced a tool to reduce barriers for customization. We are also exploring how resource location mechanisms should change as they operate.

Kathy Johnson Merck

I joined the computer science department in August 1991 as an instructor. I consider myself to have an unusual background for a CS department instructor. I hold a Bachelor of Music degree from the Hartt School of Music and taught elementary school vocal music before becoming formally involved in the field of computer science.

For my M.S. in Computer Science at the Rochester Institute of Technology, I wrote a thesis entitled "An Expert System to Generate Musical Variations in the Style of George Phillip Telemann". This work was an attempt to tie together my varied background and interests in artificial intelligence and cognitive science by examining the actions and modelling the results of an expert musician in the extemporaneous development of musical variation during performance.

I live with my husband and 3 year old son in Norton, MA and am the daughter of WPI alumnus Robert D. Johnson (ME '52).

Glynis Hamel

I studied for a B.S. in Mathematics from the University of Lowell (1977) and an M.S. in Computer Science from WPI (1986). I have now found my niche as an instructor here at WPI teaching the Intro to Programming course sequences. I feel that these courses are *the* most critical in the career of a programmer — they lay the foundations upon which all future knowledge of programming is built.

I bring to this task a background that includes over a decade of teaching assembly language, Computing I and II, data structures, and operating systems to undergraduates at the University of Lowell and to customers of a Fortune 500 computer manufacturer. I have also worked in OS software development and in technical support for a large computer company. This experience helps me bring a taste of the "real world" to my students as they are learning about the theoretical aspects of program design.

FACULTY BOOKS

Intelligent CAD

Prof. David Brown has just completed editing a book for North-Holland which is the proceedings of an international conference on Intelligent CAD that he organized in October last year.

Brown has also published a book about design problem-solving. Details of these publications are given below:

D. C. Brown & B. Chandrasekaran, *Design Problem Solving: Knowledge Structures and Control Strategies,* Research Notes in Artificial Intelligence, Pitman Publishing, London, 1989.

D. C. Brown, M. Waldron & H. Yoshikawa (Eds.), *Intelligent Computer Aided Design,* Proceedings of the IFIP WG 5.2 International Working Conference on Intelligent CAD, North-Holland, Amsterdam, 1992.

CHPC

by Craig Lund, CHPC.

In February, WPI created its new Center for High Performance Computing. CHPC specializes in research on shared memory parallel processors. It is funded by Government and Industrial sponsorships. The staff comes predominately from Encore Computer Corporation which supported the acquisition of its research staff and DARPA research initiatives by WPI. The Center employes more than 25 computer scientists and product engineers.

Dr. Tom Probert, the former Director of Research at Encore Computer, is the Center Director and Principal Investigator. Prof. David Cyganski (WPI EE) is the Center's Associate Director of Research.

The Center's active projects include:

- A real-time version of the Open Software Foundation's release of the Mach 3.0 microkernel;
- A high density, RISC multiprocessor CPU supercomputer fragment;
- A distributed, heterogenous, shared memory technology that can support thousands of microprocessors; and,
- An integrated family of parallel programming tools.

Current industrial sponsors include: Data General Corporation, Encore Computer Corporation, Mercury Computer Systems, the Open Software Foundation, and the Research Consortium.

CHPC will help WPI establish itself as a leader in the growing areas of high performance computing and communications. CHPC will also give WPI students and faculty access to cutting-edge research equipment and technology in these important areas. Two CHPC employees will be teaching courses at WPI next year.

ALUMNI NEWS

Let us hear from you!

We have received email from the following alumni. We are unable to include their full messages in this newsletter, but we will try to do so in the future. We'd love to hear from other alumni, via email:

bits@cs.wpi.edu

or real mail. We'd like to make CS department alumni news a regular feature of this publication.

- Ed Gordon '74, BData Systems, (formerly Data Systems Associates).
- Steven Davi '85, Banyan Systems Inc, Westboro, MA. Previously at Data General.
- Paul Curtin '89, Digital Equipment Corporation, Software Engineer. VAX/VMS, Alpha/VMS Parallel Processing RTL Project Leader.
- Kevin O'Donnell '88, Digital Equipment Corporation, DECtrade Engineering.
- Mark A. Carpenter '85, IBM, Networking Systems division.
- Ed McColgan '85, Design/implementation engineer, HyperDesk Corporation. Previously at Data General.
- John Arnold '79, Bull Worldwide Information Systems, Billerica, MA.
- Michael McIntyre '86, President, McIntyre Consulting, Inc.

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