THIRTY-FIFTH 35 ANNIVERSARY

Queen's UNIVERSITY

SCHOOL OF COMPUTING

A WORLD OF OPPORTUNITIES

DIRECTOR'S MESSAGE

I am pleased to present the inaugural issue of the Queen's School of Computing newsletter. This annual newsletter will keep you informed of the School's activities and issues.

Pat Martin
acting director, school of computing

These have been exciting times since the Department of Computing and Information Science became the School of Computing two years ago. One of our goals as the School of Computing is to emphasize the multidisciplinary nature of computing, and as a result, new faculty with research interests in areas such as biomedical computing, human computer interaction (HCI) and software engineering have joined us. We've also expanded the undergraduate programs offered by the School to include programs in Computing Science, Cognitive Science, Software Design and Biomedical Computing. Our Computing Science and Software Design programs were recently accredited by CIPS, Canada's Association of Information Technology Professionals.

In September 2004, more than 500 undergraduates and 150 graduates will be enrolled in the School. Our students also continue to excel academically as demonstrated by our programming team, who won a bronze medal won at this year's ACM Collegiate Programming Contest sponsored by IBM.

School of Computing professors have enjoyed great success in both research and education, and have received funding from government agencies in the sciences, the humanities and medicine, and have established strong research collaborations with industry partners such as IBM Canada and Bell Canada. Our professors have also received both national and international recognition. Janice Glasgow and Randy Ellis were awarded Queen's Research Chairs and Roel Vertegaal's work in HCI has appeared in venues such as Good Morning America, the Discovery Channel and Quirks and Quarks. On the education side, Selim Akl was named this year's recipient of our Howard Staveley Award for teaching excellence and Robin Dawes was recently named the new Director of Enrichment Studies for the Faculty of Arts and Science.

I am looking forward to my coming year as Acting Director while Jim Cordy is away on sabbatical leave. In addition to our usual activities in teaching and research, plans are underway for the 35th anniversary of Computing at Queen's. We will keep you informed as our plans mature and encourage you to become involved in the celebration. We are always glad to hear from you and I encourage you to contact us directly with any news you might like to share.

Pat Martin, ACTING DIRECTOR, SCHOOL OF COMPUTING

Sukhjeen Nandra

compsa president, 2004-2005

Hello Queen's Alumni!

It is a privilege to be addressing the esteemed audience of Queen's Computer Science graduates. On behalf of the Computing Students Association I would like to extend a warm greeting to you and your families.

Exciting changes have been taking place with regard to student representation in the School of Computing. As the department has grown into the School of Computing, so too has the Student Council evolved into the Computing Students Association (COMPSA). After two years of hard work in establishing our own constitution and structuring our own government, COMPSA now has representatives on AMS and ASUS assemblies, giving computing students a stronger presence at Queen's. COMPSA provides both academic and social services to a growing body, from organizing the tutoring service to running the weekly Coffee with Profs.

September 2004 will mark the first ever Computing Orientation Week. Incoming students will be placed in groups with fellow computing students and led by enthusiastic upper year Computer Science students, affectionately named Techs.

This academic year will also be the first for our Undergraduate Lecture Series, in which Computer Science graduates return to Queen's to enlighten current students on the employment options available to them after they obtain their degree. Should you be interested in contributing your time and giving students a fantastic opportunity to ask questions and hear about your skills in action, please contact us at compsa@cs.queensu.ca.

To keep up to date on COMPSA events and activities, please visit our website at www.cs.queensu.ca/home/compsa. We wish you all the best in your current and future endeavours!

Cheers, Sukhjeen Nandra, COMPSA PRESIDENT, 2004-2005

School of Computing Innovation Council – Bridging Industry with Academics

BY WENDELL BROWN, PRESIDENT AND COO, VMA MEDICAL INC

Within the under-funded yet highly competitive environment that universities now operate, industry partnerships have become important allies in the never-ending quest for the best students, the finest faculty and continually innovative research. In late 2000, Queen's Department of Computing and Information Science (CISC) acknowledged this need for an improved and more formalized relationship with industry. Properly structured, such a relationship could benefit both the university and industry.

By May 2001, the Department's initiative to improve its relationship with industry had resulted in the inaugural meeting of the CISC Innovation Council. Membership consisted of industry executives with ties to Queen's and an interest in assisting the Department achieve the goals set forth in its newly published strategic plan. In the three years since its inception, much of the 2001 strategic plan has now been accomplished including the very significant restructuring and transformation of the Department of Computing and Information Science into The School of Computing. Members of the School's faculty, as well as Queen's University Administration, are applauded for these remarkable accomplishments in such a relatively short period of time.

In the same three years, the Innovation Council has met at least semi-annually with the School's faculty and university administration, providing industry insight on issues of importance to the School. The Innovation Council is proud of its contributions to date. Looking forward, the development of opportunities for increased industry/academic research collaboration is now our highest priority. Most assuredly, the Innovation Council will rise to this challenge. Current members are as committed to the success of the Queen's School of Computing as was the initial Council in 2001. We are confident that we will reflect upon the School's successes in the years to come with the knowledge that this Innovation Council continues to make a difference.

Homecoming Weekend 2004
will take place on October 22, 23 & 24.

Call us or visit http://homecoming.queensu.ca/
for updates on the celebrations!

A WORLD-CLASS FINISH IN COMPUTING COMPETITION

Queen's is top Canadian team at ACM

Queen's ACM team members celebrate their success with others at the recent Association for Computing Machinery (ACM) International Collegiate Programming Contest World Finals in Prague. Front row, from left: Gary Linscott, Bartholomew Furrow, Daniel Trang. Second row: Maria Klawe, dean of Engineering at Princeton University and President of ACM, Amber Simpson, Christopher Wolfe, Thomas Tang. Back row: Queen's alumni Tim deBoer, IBM programmer, Douglas Heintzman, Director of Technical Strategy IBM, Software Group, Kelly Lyons, Head of Centers of Advanced Studies, IBM Software Group. photo courtesy queen's acm team

Queen's University was the only Canadian team to make top rankings in the Association for Computing Machinery (ACM) International Collegiate Programming Contest World Finals, solving five out of 10 complex computational problems and earning the bronze medal for finishing 12th.

Russia's St. Petersburg Institute of Fine Mechanics and Optics took first place in the 28th-annual international competition, which drew 73 teams consisting of three members each from 31 countries. The competition took place in Prague, Czech Republic.

St. Petersburg, which solved seven problems, was followed by KTH Royal Institute of Technology in Sweden and Belarusian State University, which solved six problems each.

Founded in 1947, ACM is a major force in advancing the skills of information technology professionals and students worldwide.

The team competed in a field of more than 100,000 students worldwide, surviving local, preliminary and regional contests. The original field had 3,150 teams from 75 countries on six continents.

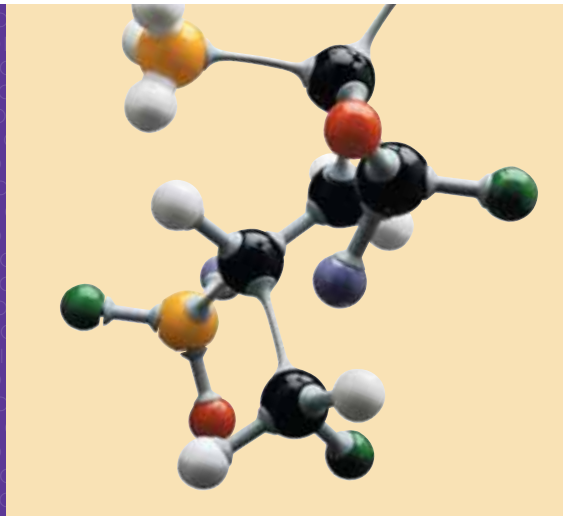
Team members were Bartholomew Furrow, Gary Linscott and Daniel Trang. Student coaches were Amber Simpson, Thomas Tang and Christopher Wolfe.

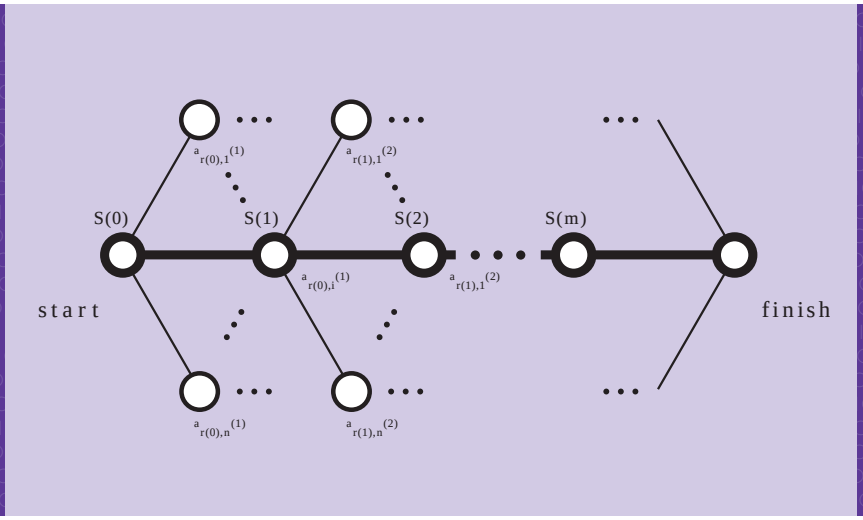
An excerpt from the International Collegiate Programming Contest fact sheet states: "The contest pits teams of three university students against eight or more complex, real-world problems, with a gruelling five-hour deadline. Huddled around a single computer, competitors race against a clock in a battle of logic, strategy and mental endurance. Teammates collaborate to rank the difficulty of the problems, deduce the requirement, design test beds and build software systems that solve the problems under the intense scrutiny of expert judges.

"For a well-versed computer science student, some of the problems require precision only. Others require a knowledge and understanding of advanced algorithms. Still others are simply too hard to solve – except of course, for the world's brightest problem-solvers."

Complete standings can be found at icpc.baylor.edu/icpc/finals/finals.html. For more information about the contest, go to icpc.baylor.edu/icpc.

[This article appeared in the Queen's Gazette on May 17, 2004.]





Biomedical Computing: From Genes To Images

by Parvin Mousavi

Many disorders and diseases, including cancer, have inheritable components. It is believed that predispositions to such disease are genetic and can be passed from one generation to the next. In the last few years, with the gradual completion of the human genome project and with the developments in highly specialized imaging techniques, a wealth of medical information from molecular data to images has become available. As a result of this accelerating data generative era, new data analysis challenges and opportunities have emerged.

The goal of my research group is to apply our knowledge of feature extraction, pattern recognition and classification techniques to develop intelligent systems for disease inference and diagnosis using data from multiple modalities. These modalities range from micro-arrays that provide gene expression data to florescence microscopes that provide cell and chromosome imaging capabilities to ultrasound and MRI systems for organ imaging. Currently we are collaborating with Kingston General Hospital on improving prostate cancer diagnosis and prognosis. We are also involved with the Cancer Research Institute at Queen's on studies of certain genetic pathways involved in breast cancer. We've also enjoyed an ongoing successful collaboration with the University of California at San Francisco and Biosystemix Ltd. on Multiple Sclerosis. In this collaboration, time-series gene expression data from MS patients treated with a certain therapeutic drug is being studied. We are applying mathematical models to identify genetic pathways underlying the patients' responses to therapy. Furthermore, we have been successful in identifying potential markers to predict whether or not patients will have a good response to this particular therapy before the start of the therapy. With only one year at the School of Computing, the group is expanding rapidly and will have several new members in fall of 2004.

The Parallel Computation Laboratory

by Selim G. Akl

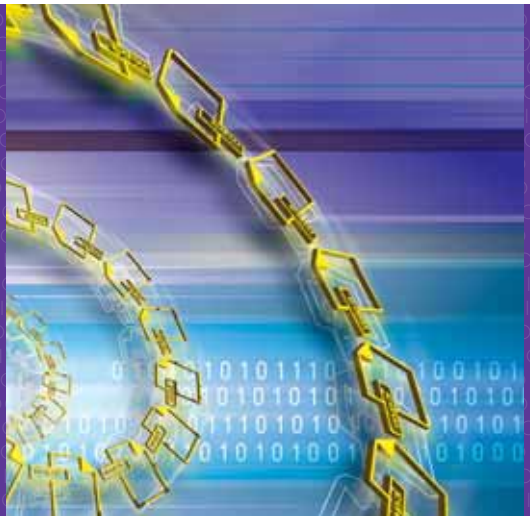
Parallel computation is a form of information processing whereby a large number of processors cooperate to solve a computational problem by working on it simultaneously. The expectation is that this approach speeds up computations that would otherwise require an inordinate amount of time if performed sequentially. There are numerous applications requiring such speeds, including virtual surgery, air-traffic control, the analysis of satellite data, the design of complex engineering structures, and the management of very large databases.

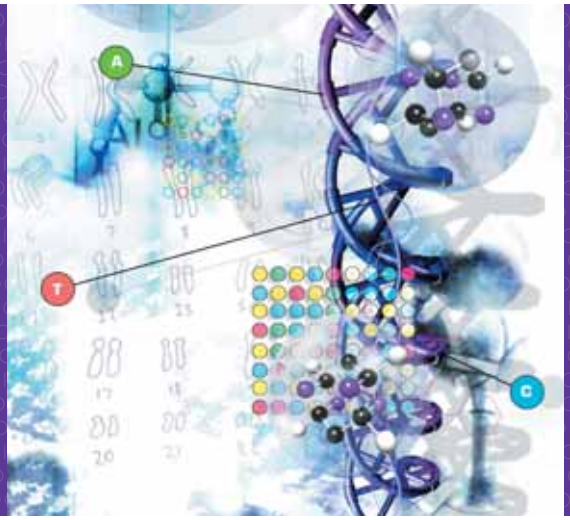
Since 1980, considerable progress has been achieved to fulfill the promise of parallel computation. Results, both in theory and in practice, were obtained to demonstrate that, in fact, significant improvements are possible, not only in the speed with which a solution is delivered, but also in the quality of the solution itself.

The purpose of the research conducted in the Parallel Computation Laboratory is to better understand a number of fundamental issues pertaining to the use of parallel computers, with a particular emphasis on models and methods. The guiding principle has been that parallel computation is a worthwhile endeavor, not only for being faster and better, but also because it offers fresh insights into most computational problems, regardless of their origin and complexity, and inspires novel algorithmic techniques for their solution. Recently, this work has uncovered three general computational paradigms within which parallel computation leads to an improvement in performance that grows more than linearly with the number of processors used. These new paradigms, namely, computing in real time, computing within the bounds of laws of nature, and computing subject to mathematical constraints, are growing in presence within theoretical computer science. As well, they are increasingly applied in society, with pervasive, ubiquitous, and embedded computing devices, for example, becoming more prevalent. This lends timeliness and importance to our results.

Postdoctoral Fellows, Ph.D. candidates and MSc. students are associated with the Parallel Computation Laboratory. During the summer, they are joined by undergraduate research assistants who are usually NSERC award winners. The Lab fosters an atmosphere of camaraderie and collaboration conducive to the production of excellent research, providing unique opportunities to explore a diversity of original applications of parallel computation.

For more information: http://www.cs.queensu.ca/Parallel/index.html





Applying Data Mining To Counterterrorism

by David Skillicorn

The threat of a terrorist attack has become a world-wide concern, whether from al Qaeda and its loose collection of allies, or from domestic terrorist groups. One response to fighting terrosim has been to collect large amounts of data in the hope of detecting the patterns or traces of terrorist groups in time to thwart possible attacks. This makes for a huge challenge – not like looking for a needle in a haystack; but rather like looking for a needle in a stack of needle pieces.

David Skillicorn is investigating whether such patterns can be detected in large datasets, especially against the background of normal people doing normal things. Terrorists face one big problem: it is very hard to decide how to act normally when you're doing something you don't want noticed. Customs officers know that smugglers don't get angry as quickly as innocent people do when they are pressed. This abnormal normality seems to be part of the pattern of terrorist behaviour too.

David Skillicorn has published several papers looking at the pattern of terrorist signatures in travel data and in messages such as email or cell phone conversations. He is co chairing a workshop next year that will allow researchers to try their techniques on the very large set of Enron emails made public by the U.S. Department of Justice.

Document Image Analysis – Smoothing The Way From Paper To Electronic Documents

by Dorothea Blostein

People use paper documents and electronic documents for many purposes. Predictions of a 'paperless office' are not coming true, and although the role of paper may be changing. we are using more paper than ever. Dorothea Blostein and her students work in document image analysis, an essential technology for smoothing the interface between paper documents and electronic documents. They put particular emphasis on the treatment of diagram notations, such as music notation, math notation, UML notation, and maps. Research goals include:

- better characterization of document recognition problems,
- developing a general technology for constructing document recognizers
- handling uncertainty in symbol identity, in symbol position, in symbol segmentation, in notational constraints
- exploiting the relationship between document recognition and document generation.

Ongoing research projects include recognition of math notation, tables, and maps; recognition and internet-based validation of information on business cards; development of a compiler approach to document recognition; and development of algorithms for classifying documents.

The Molecular Scene Analysis/Computation Imagery Lab

by Janice Glasgow

A primary focus of this lab is on the application of artificial intelligence techniques to complex problems in molecular biology.

One of the areas of activity is the determination of three-dimensional protein structure, a long-term project which has involved the automated analysis of crystal data for protein reconstruction.

Recent research, evolving from collaborative work with Rita Casadio and the Bioinformatics Group at the University of Bologna, includes the reconstruction of protein structure from contact maps. This is part of a larger project (with the Italian group) on structure prediction from protein sequence data.

The lab is also actively collaborating with Igor Jurisica and other researchers at the Ontario Cancer Institute on projects for the planning of protein crystallization experiments and the analysis of micro-array data.

Much of the research in bioinformatics has a basis in the visual/spatial reasoning projects of the computational imagery group. Recent research in this area includes the development of artificial intelligence techniques for the representation and data mining of motifs that can be used in design problems. Two application areas for this work are drug design and park design. This work is being carried out in collaboration with Susan Epstein at Hunter College in New York. The group is welcoming a new postdoctoral fellow, Jim Davies, who recently graduated from Georgia Technical University, this fall.

CONSORTIUM FOR SOFTWARE ENGINEERING RESEARCH AT QUEEN'S UNIVERSITY

The Software Technology Laboratory at Queen's participates in the Canada-wide Consortium for Software Engineering Research (CSER) initiative in software engineering sponsored by NSERC and a host of industrial partners. At present our CSER project, in collaboration with the University of Toronto, the University of Waterloo, the University of Alberta and the University of Windsor under project leader Prof. John Mylopoulos, includes three specific subprojects of the CSER initiative in Software Reengineering for Network-Centric Computing sponsored by Bell Canada and IBM Canada.

Projects

Three specific projects are currently underway at Queen's under the direction of Professor James Cordy of the School of Computing and Professor Thomas Dean of the Department of Electrical and Computer Engineering:

THE WHOLE WEBSITE UNDERSTANDING PROJECT (WWSUP)

J.R. CORDY, T.R. DEAN, XINPING GUO, MYKYTA SYNYTSKYY, SCOTT GRANT, ARIEL LI

The Whole Website Understanding Project (WWSUP) explores the analysis and design-level understanding of entire websites from their source code. The project seeks to automate an understanding that transcends boundaries between languages (HTML, style sheets, Visual Basic, JavaScript, Java, Perl, etc.), and technologies (client, server, database). The goal is to allow exploration of improvements to the architecture and abstract design of websites using refactorings that cross language and technology boundaries in order to improve website maintainability and long term evolution.

This is a long term project with many facets and interesting challenges. Current work involves the integrated parsing of client side source languages (HTML, Visual Basic, JavaScript), client side clone detection and refactoring, and Java applet design recovery, analysis and migration.

THE SOFTWARE DESIGN ONTOLOGY PROJECT

J.R. CORDY, T.R. DEAN, DEAN JIN

The Software Design Ontology Project is aimed at the problem of interoperability of legacy software system understanding, analysis and migration toolsets. While many different practical systems for software system understanding and analysis have been demonstrated, each uses it own unique format, technology and schema to represent recovered software design information. Using a constructive approach to deriving a shared "domain ontology" for software design concepts that can be used as a bridge between different formats, schemas and tools.

Current work on this project has derived a taxonomy of styles of schema use in software understanding systems, and is in the process of analyzing a range of software understanding and analysis tools. By partitioning the interaction of these tools with their databases into a set of conceptual transactions, we hope to constructively derive domain ontology for software understanding that can be used, for example, to adapt one tool's software analysis services to another tool's software understanding database.

THE TRANSFORMATION ENGINEERING TOOLKIT FOR ECLIPSE

J.R. CORDY, DEREK SHIMOZAWA, ADRIAN THURSTON

The goal of this project is to make it possible for instructors to more rapidly bring state of the art transformation techniques into the undergraduate curriculum with a minimum of overhead. Transformations are playing an increasingly important role in industrial solutions. By removing barriers to learning about them by providing a custom workbench for understanding and authoring transformations couched in the familiar Eclipse environment, TETE will help to make it possible for more students and instructors to discover and explore this important new technology, and for experienced practitioners to more effectively exploit and explore source transformation as a primary software manipulation technology.

Data Systems Laboratory

BY WENDY POWLEY

Database management systems are a key component in many businesses today. With the growth of the internet, and the virtual explosion in the amount of data collected on a daily basis, research in the database area has taken on a new importance.

The main focus of the Database Systems Laboratory has been on Autonomic Database Management Systems. Autonomic systems are those that are self-managing, self-tuning, self-optimizing and self-healing. Our research examines ways to add these capabilities to database management systems. We have studied how self-managing technology can be applied to specific problem areas such as buffer pool management, capacity planning, maintenance scheduling and performance tuning. Our current focus is examining how a DBMS will perform in an on-demand computing environment.

We are now investigating how key principles and techniques for self-management can be integrated into a framework for building self-managing Web Services.

The Database Systems Laboratory is headed by Dr. Pat Martin and managed by Wendy Powley. The lab is always filled to capacity with undergraduate students completing 4th year projects, MSC students, PHD students, and usually one or two summer employees. We have also been hosts for several international scholars who have enhanced their careers by spending time in the Queen's School of Computing.

Susan Bartlett, BA'02 (English)/BScH'03 (Software Design), 2003 Rhodes Scholar

Women in the School of Computing

Women are greatly under-represented in the technology related disciplines. Most universities report that women make up between 10 and 20 percent of their undergraduate programs. These numbers drop significantly for graduate programs. The School of Computing at Queen's is above average with women comprising approximately 25 percent of our undergrad population. Nonetheless, there is room for growth, and certainly a need to support the women currently enrolled in our programs.

The Women in the School of Computing (WISC) group was formed in 2004 and was met with much enthusiasm. The goals of WISC are to:

» provide support and encouragement to both our undergraduate and graduate female students,

» encourage women to pursue graduate degrees and,

» reach out to young women in the community to demonstrate that computer science can lead to interesting and rewarding careers for women.

Plans for the coming academic year include speakers, workshops, and social events to promote networking and mentoring opportunities. We would appreciate hearing from any alumni who are interested in returning to Queen's to share your experiences as a woman in the high tech industry or in academia. Please contact Wendy Powley at wendy@cs.queensu.ca for more information.

Advancement News

BY ARIG GIRGRAH AND PATTY MCHENRY

You may know that the School of Computing works in consultation with the Office of Advancement to support alumni relationships that continue to make a difference to the spirit and accomplishments at Queen's. By communicating regularly with alumni and friends, inviting you to events, offering meaningful volunteer opportunities, and recognizing your loyal philanthropic support, we build strong relationships that will meet your interests while strengthening the Department's academic and research programs.

As new Development Officers with the Faculty of Arts and Science, we look forward to working with School of Computing alumni in initiatives such as the Innovation Council and we invite you to contact us if you are interested in volunteering or contributing to the School's many important programs. Please visit our website at www.queensu.ca/atrsci/alumni or contact us by phone:

Arig Girgrah, 613.533.6000 EXT 75501

Patty McHenry, 613.533.6000 EXT 75646

THE SCHOOL OF COMPUTING NEWSLETTER IS PUBLISHED ANNUALLY. PLEASE FEEL FREE TO CONTACT US.

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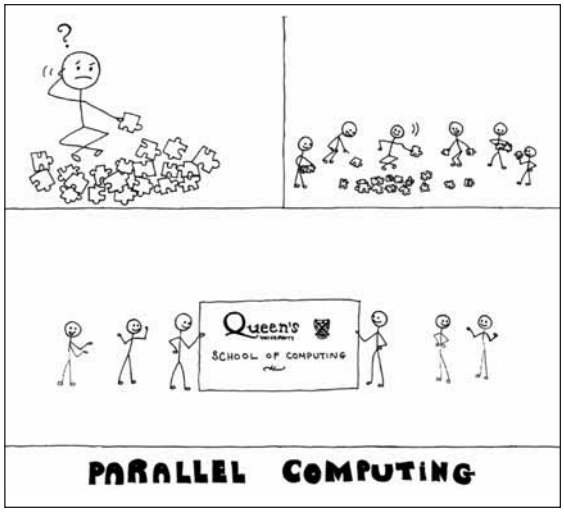
FACULTY PROFILES

Jürgen Dingel's research interests span the theory and application of formal methods to the design, analysis and verification of complex software systems. Within three years of existence, his Applied Formal Methods (AFM) group has forged collaborations and contacts with researchers at renowned institutions such as MIT, CMU, University of Pennsylvania, and IBM Rational Software in Ottawa. Current research projects include software model checking and the foundations of model-driven development.

Dr. Mohammad Zulkernine's research focuses on an emerging discipline called software security engineering, which involves the addressing of the security issues in all stages of software system development life cycle to provide reliable and secured software systems. His primary research interests include specification-based automatic intrusion detection and software monitoring. More specifically, Dr. Zulkernine is working on security requirements specifications, and attempts to detect network intrusions automatically using those security requirements. He is cross-appointed in the Department of Electrical and Computer Engineering of Queen's University.

Dr. Zulkernine is a licensed professional engineer in the province of Ontario.



QUIP

open the door to experience

Looking for flexibility in meeting customer demands? Find it difficult and costly to attract and retain skilled employees? Suffering from too many deadlines, too much work, too few staff? Queen's Interns can be your problem-solvers!

Queen's University invites your participation in co-operative education through Queen's Undergraduate Internship Program – QUIP. Now in its sixteenth year of operation, our program has continuously matched bright and talented students from Queen's with employers for 12 or 16-month work terms.

For more information, please contact:

Barb Mundell, Coordinator,
Employment Programs Internship (QUIP), Career Services,
Queen's University, Kingston, ON K7L 3N6
613-533-6000 Ext. 74042 fax: 613-533-2535
http://careers.queensu.ca/quip

WHO'S ON FIRST? EXACTLY!

A small group of computer scientists, including graduate and undergraduate students and staff, have joined together to form an intramural competitive softball team in the Queen's Coed Summer Softball League. The league is slow pitch designed to maximize fun and has proven to break the geek stereotype so often given to computing people. At the same time, it offers a spirited atmosphere to get to know one another as well as people from other departments at Queen's. Last year, the competitive team placed second in the season-end tournament. This year thoughts of doing one better are second to thoughts of the post-game barbeques. Informal softball practices add to the fun by bringing people out that have never played softball before. Truly a worthwhile summer experience to add to the amazing atmosphere Queen's University provides.

The COMMON ROOM @ Queen's
www.commonroom.queensu.ca
Connecting alumni, parents, and friends

Get connected and find out

www.commonroom.queensu.ca

Join 100,000 others in the Common Room, Queen's new web portal for alumni, parents and friends. Connect with an exciting new community and search for friends, post a note, get a permanent Queen's e-mail address and much more.

Across the country or around the globe, the Common Room will keep you connected to Queen's like never before.

Check out www.commonroom.queensu.ca today!