

## Research Interests

Programming large-scale, distributed computer systems has some long-standing challenges: 1) processing very large data sets in reasonable amounts of time and 2) developing languages and tools that scale to the needs of such systems. My research has focused on **improving the languages and tools** for writing and debugging applications in this rapidly-growing domain.

## Education

**University of Washington**, Seattle, Washington

Expected degree: PhD in Computer Science (September 2008 – Present)

Advisors: Prof. Magdalena Balazinska and Prof. Dan Grossman

**University of Texas**, Austin, Texas

M.A. in Computer Science (August 2006 - May 2008)

Thesis: *Orc-X: Combining Orchestrations and XQuery*

Advisor: Prof. William Cook

**Rice University**, Houston, Texas

B.A. in Computer Science (August 1999 – December 2002)

**International University Bremen**, Bremen, Germany (*Summer Semester 2001*, German Studies)

## Honors

- 2011 University of Washington College of Engineering Osberg Endowed Presidential Fellowship
- 2010 Google Anita Borg Memorial Scholarship Winner
- 2009 Google Anita Borg Memorial Scholarship Finalist  
Yahoo! Scholarship to attend Grace Hopper 2009  
El Alliance Scholarship to attend Richard Tapia Celebration of Diversity Conference
- 2008 University of Washington Marilyn Fries Fellowship in Computer Science (*awarded for academic excellence*)  
University of Washington College of Engineering Egtvedt Engineering recruiting award
- 2007 Richard Tapia Celebration of Diversity in Computing Conference Scholarship  
University of Texas at Austin David Bruton, Jr. Fellowship (*awarded for academic excellence*)
- 2006 AT&T Labs Graduate Research Fellowship (*awarded to 3 students each year for academic excellence*)  
GEM Intel Graduate Research Fellowship
- 2001 Rice University Mitchell Fellowship in German Studies
- 1999 Kraft Foods Merit Scholarship

## Publications

**K. Morton**, M. Balazinska, D. Grossman, C. Olston. *The Case for Being Lazy: How to Leverage Lazy Evaluation in MapReduce*. In ScienceCloud 2011: 2nd Workshop on Scientific Cloud Computing, San Jose, CA, June, 2011.

**K. Morton**, N. Bruno. *FlexMin: A Flexible Tool for Automatic Bug Isolation in DBMS Software*. In DBTest 2011: 4th International Workshop on Testing Database Systems, Athens, Greece, June 2011.

**K. Morton**, M. Balazinska, D. Grossman. *ParaTimer: A Progress Indicator for MapReduce DAGs*. In ACM SIGMOD Conference on Management of Data (SIGMOD), 2010. (21% acceptance. Presented orally). Fully satisfied both workability and repeatability requirement of experimental results (only 6 of 80 accepted papers fully satisfied this).

**K. Morton**, A. Friesen, M. Balazinska, D. Grossman. *Estimating the Progress of MapReduce Pipelines*. In IEEE International Conference on Data Engineering (ICDE), 2010. (20% acceptance. Presented orally)

M. Fernandez, T. Jim, **K. Morton**, N. Onose, J. Simeon. *Highly Distributed XQuery with DXQ*. In Proceedings of ACM SIGMOD Conference on Management of Data (SIGMOD), 2007. (15% acceptance. Presented orally)

M. Fernandez, T. Jim, **K. Morton**, N. Onose, J. Simeon. *DXQ: A Distributed XQuery Scripting Language*. In Proceedings of the ACM SIGMOD Workshop on XQuery Implementation and Practice (XIME-P), 2007.

**K. Morton**, D. Kitchin, W. Cook. *Orc-X: Combining Orchestrations and XQuery*. The University of Texas at Austin, Department of Computer Sciences, December 2007, Technical Report# TR-07-63.

## Research Experience

**Tableau Software Research Intern**, Seattle, Washington, 6/2011 – present

Managers: Jock Mackinlay and Chris Stolte

Implementing a new software feature for Tableau (data visualization tool) that enables automatic data integration in a federated database system.

**Microsoft Research Intern**, Redmond, Washington, 6/2010 – 9/2010

Manager: Nicolas Bruno

Implemented a software tool to automatically isolate and reproduce bugs in DBMSs. It has successfully found bugs in SQL Server and Analysis Services (MDX). Because the tool uses general techniques, it will continue to evolve at Microsoft and be used to support systems such as Scope/Cosmos. Submitted this work for publication.

**Graduate Research Assistant**, University of Washington, 6/2008 – present

Advisors: Prof. Magdalena Balazinska and Prof. Dan Grossman

Implemented a software tool that estimates time-remaining for MapReduce jobs with 95% accuracy in Hadoop and Yahoo!'s Pig Latin software project. Working to incorporate my tool into latest Hadoop and Pig Latin releases.

**AT&T Labs Fellowship Program Research Intern**, AT&T Labs, Florham Park, NJ, 5/2006 – 8/2006

Managers: Mary Fernandez and Trevor Jim

Extended the XML Query language to support distributed computations. Demonstrated its efficacy by implementing a complex distributed protocol (DNS) using our language extension in less than 100 lines of code (in C this would require ~5000 lines). Published this work in SIGMOD 2007 and XIME-P 2007.

## Full-time Industry Experience

**PowerPC R&D, GNU C Compiler (GCC) Software Developer, Freescale**, Austin, TX, 4/2003 – 5/2006

Experienced in compiler and software performance, ranging from published technical writing to GCC assembler and backend instruction scheduler development and optimization. Implemented performance enhancements in GCC and Linux for various embedded PowerPC architectures. Incorporated software into main GCC release.

### Performance:

- Implemented code size compiler optimization in GCC (peephole optimization)
- Developed code for GNU's PowerPC Simulator to support double-precision, floating-point for PowerQuiccIII processor
- Implemented Linux kernel support for double-precision, floating-point emulation libraries used to test functionality supported in next-generation hardware through the use of existing hardware. Interfaced C++ and C code between two libraries.

### Testing and Verification:

- Wrote a conformance suite for the e200 processor family that tested ABI compliance, linker compliance with relocation types, and new opcode recognition
- Built U-Boot/Linux for bringup on new silicon; used CCS and GDB with PTAP to load onto test boards

### Published Technical Writing:

- Co-authored a Freescale published manual July 2004, entitled *Signal Processing Engine Auxiliary Processing Unit Programming Interface Manual*.

## Internships

**International Internship Program (IIP) through Motorola**, Munich, Germany & Austin, Texas, Summer 2001 & 2002

IIP is a selective program for engineers at Rice who want to master a foreign language and gain valuable experience in a technical field. I was required to take 6 semesters of German and give technical presentations to our IIP group at Rice (including all employers). I participated in two internships with Motorola, one in the US and the other in Germany, as described below.

**Metrowerks Embedded RTOS Tech Writer Intern, Motorola**, Munich, Germany, Summer 2002

Wrote an online training manual published on the Metrowerks *CodewarriorU* website that conceptually explained the OSEK/VDX Real-Time Operating System and outlined how to use OSEKturbo. This manual is available online for internal and external customers and was used as supplemental material for the Motorola University OSEKturbo course.

**PowerPC Applications Engineering Intern, Motorola, Austin, TX, Summer 2001**

Designed a Perl program that extracted and manipulated data from EEMBC benchmarks run on PowerPC processors; ran further internal benchmarks for the semiconductor products sector.

**Systems Admin./ IT Networking and Telecommunications Assistant, Rice University, Summer 2000 - Spring 2001**

Managed and deployed networking equipment and server databases for optimal use around the Rice University campus network.

**Computer Database Consultant, Rice University, Spring 2000**

Managed Rice's Student Schedule Database in MS Access for Registrar's Office.

**Mechanical Engineering Intern, Kraft Foods, Garland, TX, Summer 1999**

Researched, produced reports, and created new ideas for maintaining equipment efficiency. Implemented effective solutions to improve assembly line efficiency. Recognized highly by Kraft Foods Corporate offices for my technical research.

## Teaching Experience

**Teaching Assistant, University of Washington, Spring 2009**

Course: Graduate Implementation of Programming Languages (Compilers)

Instructors: Preston Briggs and Vijay Menon

Advised group projects and assignments on compiler optimizations and algorithms, including CFG Dominators and SSA.

**Research Advisor, Freescale, Austin, Texas, Summer 2004**

Mentored an undergraduate intern on a research project on compiler optimizations for a low-power PowerPC embedded chip.

## Invited Research Talks

**Tableau Software, Seattle, Washington, May 2010**

**CRA-W Graduate Cohort, Seattle, Washington, April 2008**

**AT&T Labs, Florham Park, New Jersey, August 2007**

## Professional Service

**University of Washington Industrial Affiliates Research Day Presenter, University of Washington, October 2009**

**External Paper Reviewer: ACM VEE 2011, ACM SIGMOD 2010, USENIX HotCloud Workshop 2010, IEEE ISPASS 2004**

**ACM POPL Student Volunteer, January 2008**

## Outreach & Department Service

**Graduate Student Panelist for CSE Department 10-Year Review, University of Washington, Winter 2011**

Invited by CSE Department Chair to meet with an external review committee to answer questions about the department (and how to improve it).

**Speaker at the Women in CSE Department Seminar, University of Washington, Fall 2009**

Invited speaker to encourage undergraduate women to major in CS and to provide a perspective on graduate school.

**Graduate Women in CS Lunch Organizer, University of Washington, 2009-2010**

Coordinated quarterly lunches/social events with graduate and undergraduate women in my department.

**Mentor and Representative of Empowering Leadership (EL) Alliance, University of Texas at Austin & University of Washington, 2007 – present**

Participated in e-mentoring program, providing support and advice to two underrepresented minorities in computing (Master's student at Berkeley and undergraduate at the University of Texas at Austin). Worked with leadership at the University of Washington and EL Alliance to establish the University of Washington as a partner institution in the Alliance. The impact of joining EL Alliance is significant, including new mentoring opportunities and additional funding for outreach programs.

**First Bytes Robotics Competition Mentor and Organizer, University of Texas at Austin, June 2007**

Mentored teams and helped organize the robotics competition for the First Bytes outreach program. This program aims to increase both the quality and quantity of female undergraduate computer science students graduating from Texas universities.

Because of First Bytes, the enrollment of women in UT Austin's undergraduate CS program has increased, and it has won two "innovation" awards from the university.

**Mentor in Open Mentoring Program**, University of Texas at Austin, *2006-2008*

Mentored undergraduate Computer Scientists.

**Graduate Women in Computing Advisory Board Member**, University of Texas at Austin, *2006-2008*

Worked with the department outreach coordinator and other graduate women to plan future outreach activities.

**Co-founder of Women in Computer Science (CSters)**, Rice University, *Spring 2002*

Established the first women in CS club at my university. The number of women majoring in CS in my department was abysmal and there was no official support group for encouraging women to join CS. I teamed with a colleague to take our concern to the department, and CSters emerged, providing a much-needed service to the Rice community (including mentoring, outreach, and support for attending conferences like Grace Hopper).

**Department Liaison for Grace Hopper Women in Computing Conference**, University of Texas at Austin & University of Washington *2006-2009*

Participated in recruiting and encouraging talented undergraduate female computer scientists to apply for graduate admissions in my department. At the 2006 conference I participated in initiating the Latinas in Computing group, which has become an officially sanctioned community that is supported by the Anita Borg Institute for Women in Technology.

**Department Liaison for Richard Tapia Celebration of Diversity in Computing Conference**, University of Texas at Austin & University of Washington, *2007& 2009*

Participated in recruiting and encouraging talented, undergraduate minorities in computer science to apply for graduate admissions in my department.

**Department Liaison for CRA-W Grad Cohort Conference**, University of Texas at Austin, *2007& 2008*

#### **Other Activities**

**Drummer and Songwriter in the University of Washington Computer Science and Engineering Band**, *2008 – present*

Write and perform Computer Science themed parody songs at department social and recruiting events such as the Graduate Visit Days and ACM-W TGIF. Our songs can be found on our YouTube channel: <http://www.youtube.com/user/CSEBand>