

Tyler Sondag

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Summary

My research interests are in program analysis and optimization. Specifically, as part of my PhD research I have looked at techniques to more efficiently utilize multi-core and many-core systems. In order to efficiently utilize these systems, several problems must be solved. These problems include **optimizing** workloads for the target **architecture** (complex **cache** architectures, **heterogeneity**, shared resources, etc) and correctly **crafting parallel workloads**. To solve the first problem, I have developed novel **program analysis and optimization** techniques. To solve the second problem, I have worked on new parallel programming languages and parallelizing compilers.

To support these efforts, I have developed a thorough understanding of architectural details and **program behavior**. Further, I have gained familiarity with many program analysis techniques including their **practical use**. Finally, I have designed and developed large software tools to analyze and optimize programs written in a variety of languages for **modern and emerging architectures**.

Education

Ph.D., Computer Science	Iowa State University	2011
<i>Thesis: Phase-based Tuning: Better Utilized Performance Asymmetric Multicores</i>		
<i>Committee: Hridesh Rajan (adviser), Srinivas Aluru, Jack Lutz, Morris Chang, Soma Chaudhuri</i>		
M.S., Computer Science	Iowa State University	2009
<i>Thesis: Phase-based Tuning for Better Utilization of Performance-Asymmetric Multicore Processors</i>		
Summer Institute for Training in Biostatistics	University of Wisconsin – Madison	2006
B.S., Computer Science and Mathematics	McKendree College	2007

Selected Publications and Presentations

Tyler Sondag and Hridesh Rajan. Phase-based Tuning for Better Utilization of Performance-Asymmetric Multicore Processors. **CGO '11**: International Symposium on Code Generation and Optimization, April 2011

Tyler Sondag and Hridesh Rajan. Phase-based Tuning for Better Utilization of Performance-Asymmetric Multicore Processors. Invited talk at **SMART '11** workshop, April 2011

Tyler Sondag and Hridesh Rajan. A More Precise Abstract Domain for Multi-level Caches for Tighter WCET Analysis. **RTSS '10**: 31st Real-Time Systems Symposium, November 2010

Yuheng Long, Sean L. Mooney, Tyler Sondag, and Hridesh Rajan. Implicit Invocation Meets Safe, Implicit Concurrency. **GPCE '10**: 9th International Conference on Generative Programming and Component Engineering, October 2010

Tyler Sondag, Kian L. Pokorny and Hridesh Rajan. Frances: A Tool For Understanding Code Generation. **SIGCSE '10**: Technical Symposium on Computer Science Education, March 2010

Selected Awards and Honors

Graduate

National Science Foundation Graduate Research Fellowship Honorable Mention, April 2008

SIGSOFT CAPS award, March 2009

Professional Advancement Grant, October 2010, February 2009, and October 2007

Undergraduate First Presentation Honors, 2006 Sigma Zeta National Convention

Honor Societies Phi Kappa Phi, Upsilon Pi Epsilon, Golden Key, Sigma Zeta

Related Work Experience

- Intel Labs Santa Clara, CA
Software Engineer *November 2011 - Current*
 - Hardware software co-design and binary translation research and development.
- Iowa State University Ames, IA
Research Assistant *May 2007 - November 2011*
 - Investigated static and dynamic techniques to improve utilization of multi-core processors.
 - Created static binary analysis, translation, and instrumentation framework (C++, >37kloc).
 - Developed a thorough understanding of multi-core and many-core architectures.
 - Gained a thorough understanding of cache architectures (multi-level, coherency, etc).
 - Developed an abstract interpretation framework for binaries with novel analysis techniques.
 - Designed and implemented novel automatic parallelization techniques for Java.
 - Developed novel static and dynamic program visualization techniques.
 - Mentored junior graduate students.
- Intel Corporation Santa Clara, CA
Graduate Intern *July 2010 - January 2011*
 - Designed and developed novel debug techniques and tools for graphics driver development.
 - Quickly ramped up on large software project enabling almost immediate contributions.
 - Multiple software engineering enhancements to graphics driver.
- Iowa State University Ames, IA
Teaching Assistant *August 2007 - August 2008*
 - Object-Oriented Analysis and Design, Advanced Programming Techniques, Programming 1
 - Received excellent student evaluations.
- McKendree College Lebanon, IL
Computer Science Department Lab Worker and Tutor *May 2005 - May 2007*
 - Setup, maintained, and programmed for Computer Science Dept. computer cluster
 - Setup and maintained campus wireless network

Professional Services

Reviewer – Journals: TPDS – IEEE Transactions on Parallel and Distributed Systems
External Reviewer – Conferences: OOPSLA '09, AOSD '11-'09, Onward! '10, GPCE '10
External Reviewer – Workshops: ACP4IS '08
Student Volunteer: OOPSLA '09

Selected Service and Mentoring

Co-mentor for James Mueller as part of the Freshman Honors Program at Iowa State University
James was Awarded Freshman Honors Mentor Grant

Member of Alpha Phi Omega (ΑΦΩ) service fraternity (2007-current) (Positions held: Co-Vice
President of Scouting and Youth Services and Corresponding Secretary / Webmaster)

Assistant bowling coach for Althoff Catholic High School (2005-2007)

Eagle Scout (and Assistant Scoutmaster / Volunteer Lifeguard)