

Jason Mars



CONTACT INFORMATION

Jason Mars
2000 Jefferson Park Ave, #12
Charlottesville, Virginia 22903 USA

(434) 242-3920
jom5x@cs.virginia.edu
<http://www.jasonmars.com>

RESEARCH INTERESTS

Online adaptive systems in both software and hardware, datacenter and warehouse-scale computer architecture, and software / hardware co-design focused on native application performance, energy efficiency, and system utilization, particularly in the context of the latest innovations in microarchitectural design, runtime systems, and cloud computing.

EDUCATION

The University of Virginia, Charlottesville, Virginia USA

Ph.D , Computer Science, May 2012

- Thesis Topic: Rethinking the Architecture of Warehouse-Scale Computers: On-line Adaptation for Efficiency and Utilization
- Advisor: [Professor Mary Lou Soffa](#)
- Area of Study: Runtime Systems, Datacenters, Compilers, Architecture

M.S., Computer Science, May 2008

- Thesis Topic: General Pattern Based Prediction For Online Optimizations and Runtime Adaptation
- Advisor: [Professor Mary Lou Soffa](#)

The University of Pittsburgh, Pittsburgh, Pennsylvania USA

B.S., Computer Science, May 2005

HONORS AND AWARDS

CGO Best Paper Award 2012

- International Symposium on Code Generation and Optimization (CGO), 2012

Best Papers from Computer Architecture Letters!

- High Performance Computer Architecture (HPCA), 2012

IEEE Micro's Top Picks "based on novelty and long-term impact" 2012

- IEEE Micro, 2012

Work Selected as *Spotlight Feature* by Editorial Board

- IEEE Computer Architecture Letters, 2011

Excellent Paper Recognition

- Featured on Google's Official Research Blog, 2011

Google PhD Fellowship for Compiler Technology

- Funding for up to 3 years / \$105k (2011-2013)

Best Presentation Award

- International Symposium on Code Generation and Optimization (CGO), 2010

Ford Pre-Doctoral Fellowship

- Funding for three years / \$60k (2006-2009)

UNCF Scholarship

- \$5,000 Award, 2007

RESEARCH LAB /
INDUSTRY
EXPERIENCE

Intel Labs, Santa Clara, California USA

Architecture Research Intern, Intel Labs

Summer 2011 - Winter 2011

- Designed and prototyped adaptive extension to Transmeta-like hw/sw co-designed processors to achieve more efficient hardware atomicity.
- Can improve performance (IPC) by 1.4x over current state-of-the-art solutions.
- Under Submission.

Google, Mountain View, California USA

Infrastructure Research Intern, Infrastructure Division **Spring 2011 (part-time)**

- Designed and prototyped an approach, Bubble-Up, to enable “safe” co-locations and ultimately improve utilization in warehouse scale computers.
- Can precisely predict the QoS impact of cross-core interference between co-running jobs with *sim1%* error.
- Published, Patent Filed.

Runtime Technology Research Intern, Platforms Division

Summer 2010

- Designed and prototyped a runtime approach to exploit the platform heterogeneity in current datacenters.
- Improved datacenter efficiency by up to 16% on real datacenter workloads in production datacenters.
- Published.

Runtime Technology Research Intern, Platforms Division

Summer 2009

- Designed and prototyped contention aware runtime environment to detect and respond to contention due to co-scheduling.
- Utilization improvements of up to 30% on select benchmarks.
- Published, Patent Filed.

Compiler Technology Research Intern, Platforms Division

Summer 2008

- Designed and prototyped compiler technology to dynamically apply aggressive optimizations
- Performance improvement of up to 12% on select benchmarks.
- Published, Patent Filed.

ACADEMIC
EXPERIENCE

The University of Virginia, Charlottesville, Virginia USA

Research Assistant

June 2007 to present

- Published 16 papers on the topics of online optimization, binary translation, and adaptive runtime solutions.

Teaching Assistant

September 2006 to May 2007

- Teaching Assistant for Intro to Graphics (Fall 2006)
- Teaching Assistant and Guest Lecturer for E-Commerce (Spring 2007)
- Teaching Assistant and Guest Lecturer for Advanced Computer Architecture (spring 2007)
- Guest Lecturer for Theory of Computation (2008)

REFEREED
JOURNAL AND
CONFERENCE
PUBLICATIONS

1. Kristen Walcott-Justice, Jason Mars, Mary Lou Soffa. THEME: A System for Testing by Hardware Monitoring Events. *In proceedings of the 21st International Symposium on Software Testing and Analysis (ISSTA) 2012*
Acceptance Rate: 28%
2. Jason Mars, Naveen Kumar. BlockChop: Dynamic Squash Elimination for Hybrid Processor Architecture. *In proceedings of the 39th annual International Symposium on Computer Architecture (ISCA) 2012*
Acceptance Rate: 17%
3. Jason Mars, Lingjia Tang, Robert Hundt, Kevin Skadron, Mary Lou Soffa. Increasing Utilization in Warehouse Scale Computers Using Bubble-Up! *IEEE Micro, 2012*
Top Picks Acceptance Rate: 15%
4. Wei Wang, Tanima Dey, Jason Mars, Lingjia Tang, Jack Davidson, Mary Lou Soffa. Performance Analysis of Thread Mappings with a Holistic View of the Hardware Resources. *In proceedings of the International Symposium on Performance Analysis of Systems and Software (ISPASS) 2012*
5. Lingjia Tang, Jason Mars, Mary Lou Soffa. Compiling For Niceness: Mitigating Contention for QoS in Warehouse Scale Computers. *In proceedings of the ACM/IEEE International Symposium on Code Generation and Optimization (CGO) 2012*
Acceptance Rate: 24%
Best Paper Award!
6. Jason Mars, Lingjia Tang, Robert Hundt, Kevin Skadron, Mary Lou Soffa. Bubble-Up: Increasing Utilization in Modern Warehouse Scale Computers via Sensible Co-locations. *In Proceedings of The 44th Annual IEEE/ACM International Symposium on Microarchitecture (MICRO) 2011*
Acceptance Rate: 21%
Selected as IEEE MICRO Top Picks from 2011!
7. Jason Mars, Lingjia Tang, Robert Hundt. Heterogeneity in Homogeneous Warehouse-Scale Computers: A Performance Opportunity. *IEEE Computer Architecture Letters 2011*
Acceptance Rate: 24%
Selected as the spotlight feature by the editorial board!
HPCA 2012 “Best Papers from Computer Architecture Letters!”

8. Lingjia Tang, Jason Mars, Neil Vachharajani, Robert Hundt, Mary Lou Soffa. The Impact of Memory Subsystem Resource Sharing on Datacenter Applications. *In proceedings of the 38th annual International Symposium on Computer Architecture (ISCA) 2011*
Acceptance Rate: 19%
Recognized as one of the Excellent Papers from 2011 by Google

9. Jason D. Hiser, Daniel Williams, Wei Hu, Jack W. Davidson, Jason Mars, Bruce R. Childers. Evaluating Indirect Branch Handling Mechanisms in Software Dynamic Translation Systems. *ACM Transactions on Architecture and Compiler Optimization (TACO) 2011*

10. Mary Lou Soffa, Kristen Walcott, Jason Mars. Exploiting Hardware Advances for Software Testing and Debugging. *In proceedings of the 33rd ACM/IEEE International Conference on Software Engineering (ICSE) 2011*
NIER Track - Acceptance Rate: 23%

11. Jason Mars, Lingjia Tang, Mary Lou Soffa. Directly Characterizing Cross Core Interference Through Contention Synthesis. *In proceedings of the International Conference on High Performance Embedded Architectures and Compilers (HiPEAC) 2011*
Acceptance Rate: 23%

12. Jason Mars, Neil Vachharajani, Robert Hundt, Mary Lou Soffa. Contention Aware Execution: Online Contention Detection and Response. *In proceedings of the ACM/IEEE International Symposium on Code Generation and Optimization (CGO) 2010*
Best Presentation Award
Excellent Paper Recognition by Google

13. Jason Mars, Robert Hundt. Scenario Based Optimization: A Framework for Statically Enabling Online Optimizations. *In proceedings of the ACM/IEEE International Symposium on Code Generation and Optimization (CGO) 2009*

14. Daniel Williams, Aprotim Sanyal, Dan Upton, Jason Mars, Sudeep Ghosh, Kim Hazelwood. A Cross-Layer Approach to Heterogeneity and Reliability. *In proceedings of the ACM/IEEE International Conference on Formal Methods and Models for Co-Design (MEMOCODE) 2009*

15. Jason D. Hiser, Daniel Williams, Wei Hu, Jack W. Davidson, Jason Mars, Bruce R. Childers. Evaluating Indirect Branch Handling Mechanisms in Software Dynamic Translation Systems. *In proceedings of the ACM/IEEE International Symposium on Code Generation and Optimization (CGO) 2007*

16. Jason Mars, Mary Lou Soffa. Loaf: A Framework and Infrastructure for Creating Online Adaptive Solutions. *ACM SIGPLAN 1st International Workshop on Adaptive Self-Tuning Computing Systems for the Exaflop Era (EXADAPT) @*

REFEREED
 WORKSHOP
 PUBLICATIONS

PLDI 2011

17. Lingjia Tang, Jason Mars, Mary Lou Soffa. Contentiousness vs. Sensitivity: Improving Contention Aware Runtime Systems on Multicore Architectures *ACM SIGPLAN 1st International Workshop on Adaptive Self-Tuning Computing Systems for the Exaflop Era (EXADAPT) @ PLDI 2011*
18. Jason Mars, Mary Lou Soffa. Synthesizing Contention. *In proceedings of the Workshop on Binary Instrumentation and Applications (WBIA) @ MICRO 2009*
19. Jason Mars, Daniel Williams, Dan Upton, Sudeep Ghosh, Kim Hazelwood. A Reactive Unobtrusive Prefetcher for Multicore and Manycore Architectures. *In proceedings of the Workshop on Software and Hardware Challenges of Manycore Platforms (SHCMP) @ ISCA 2008*
20. Jason Mars, Mary Lou Soffa. MATS: Multicore Adaptive Trace Selection. *In proceedings of the Third Workshop on Software Tools for MultiCore Systems (STMCS) @ CGO 2008*

PATENTS FILED

1. A Bubble-based Mechanism for Improving Datacenter Utilization
Google Inc.
GP-11890-00-US
2. Adaptive Thread-to-Core Mapping
Google Inc.
GP-11897-00-US
3. Detecting and Responding to Cross-Core Interference
Google Inc.
GP-4895-00-US
4. Scenario Based Optimization.
Google Inc.
GP-2380-00-US

INVITED TALKS

1. Attacking Rigidity and Cross-layer Oblivion in the Cloud.
Stanford University 2011
Invited Talk
2. Jumping in to Multicore Research.
CRA-W Workshop on Multicore Systems @ Architectural Support for Programming Languages and Operating Systems (ASPLOS) 2011
Invited Talk

3. Online Adaptation For Application and Datacenter Efficiency and Performance.
IBM Thomas J. Watson Research Center, Yorktown Heights, NY
Invited Talk (Architecture Highlights 2010)
4. Introduction of Peter Norvig.
Google 2010
Invited Introduction

POSTERS, MISC

1. Jason Mars, Mary Lou Soffa. Poster on Continuous Hardware Reconfiguration
International Symposium on Code Generation and Optimization (CGO) 2009
2. Jason Mars, Mary Lou Soffa. Poster on Scenario Based Optimization. *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) 2009*
3. Jason Mars, Mary Lou Soffa. Poster on Multicore Adaptive Trace Selection.
International Symposium on Code Generation and Optimization (CGO) 2008
4. Jason Mars, Shukang Zhou, Mary Lou Soffa. Poster on Offloading Dynamic Optimization on Multicore. *ACM Conference on Programming Language Design and Implementation (PLDI) 2007*

RESEARCH
GRANTS
AWARDED

- Google Research Grant (Dec 2011) \$70k Awarded
- *A Performance Aware re-Design of Modern Cloud Platforms*
 - **Primary Author: Jason Mars** (PI: Kunle Olukotun)
- Google Research Grant (Dec 2010) \$80k Awarded
- *Adaptive Scheduling in the Heterogeneous Datacenter*
 - **Primary Author: Jason Mars** (PI: Mary Lou Soffa)
- Google Research Grant (Dec 2009) \$55k Awarded
- *Contention Awareness in the Cloud*
 - **Primary Author: Jason Mars** (PI: Mary Lou Soffa)
- Google Research Grant (Dec 2008) \$80k Awarded
- *Scenario Based Optimization: Enabling Reactive Online Optimizations*
 - **Primary Author: Jason Mars** (PI: Mary Lou Soffa)

SERVICE

- Conference / Workshop Organization**
- Member of ACM SIGMICRO Executive Committee (Web Chair)
 - Co-organizer of EXADAPT 2012 (co-located with ASPLOS 2012)
 - Part of Organizing Team for CGO 2012 (Web Chair)
 - Co-organizer of EXADAPT 2011 (co-located with PLDI 2011)

REVIEWER

- Academic Community**
- Official Reviewer for TACO 2012

- External Reviewer for PACT 2012
- External Reviewer for HPCA 2012
- Official Reviewer for IJPEDES 2011
- External Reviewer for CGO 2011
- External Reviewer for PLDI 2010

DIVERSITY

Community Outreach

- Invited talk at the CRA-W Workshop on Multicore Systems Architectures, Runtime Systems and Software Development (2011)
- Organizer of Google Disadvantaged Teen Outreach (2009)