ROBERT L. BOCCHINO JR.

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EDUCATION

University of Illinois, Urbana, IL **2003−10**

Ph.D. in Computer Science
Thesis: *An Effect System and Language for Deterministic-by-Default Parallel Programming*
Advisor: Vikram Adve

Harvard Law School, Cambridge, MA **1994−97**

J.D., *cum laude*
Third-year paper: *Towards a Rights-Based Justification for Intellectual Property Protection*
Notes and Comments Editor for the *Harvard Journal of Law & Technology*

Harvard College, Cambridge, MA **1990−94**

A.B., *cum laude* in Mathematics
Honors Thesis: *The Rank Problem of Elliptic Curves and Rational Points on Curves of Genus 2*
Advisor: Noam Elkies

HONORS AND AWARDS

ACM SIGPLAN John C. Reynolds Dissertation Award
David J. Kuck Outstanding Thesis Award from the University of Illinois
CRA/CCC Computing Innovation Fellow
Excellent Teaching Assistant Award for CS 125 at the University of Illinois
Outstanding Teaching Assistant Award for CS 426 at the University of Illinois
First prize in writing competitions at Harvard Law School
National Merit Scholar
Member of Tau Beta Pi and Phi Kappa Phi

RESEARCH INTERESTS

Programming language design and implementation
Static and dynamic reasoning about program correctness
Parallel programming

RESEARCH AND DEVELOPMENT EXPERIENCE

Jet Propulsion Laboratory, Pasadena, CA **2013−Present**

Applications Software Engineer, Advanced Computer Systems and Technologies. I develop new technologies in support of next-generation space flight systems. My recent projects include (1) a programming language that simplifies the verification and parallelization of flight software; (2) a testing framework for flight software; and (3) developing benchmarks for evaluating a next-generation multicore space flight processor.

Carnegie Mellon University, Pittsburgh, PA **2010−13**

Postdoctoral Associate. Working with Professor Jonathan Aldrich, I developed novel combinations of type systems and logical reasoning for checking that high-level parallel programming abstractions are correctly implemented and used. My postdoc was supported in part by a Computing Innovation Fellowship grant from the Computing

Community Consortium.

University of Illinois, Urbana, IL **2004−2010**

Ph.D. Student and Graduate Research Assistant. For my Ph.D. thesis work, I designed, implemented, and evaluated Deterministic Parallel Java (DPJ), an extension of the Java programming language. DPJ uses program annotations called *effects* to ensure that parallelizing a sequential program does not change the program's output, unless the programmer uses explicit and controlled forms of nondeterminism. My thesis won the 2010 ACM SIGPLAN John C. Reynolds Dissertation Award and UIUC's 2012 David J. Kuck Outstanding Thesis Award.

I also designed and implemented the first software transactional memory (STM) for large-scale "shared nothing" clusters. Previous STM research had focused on small-scale, cache-coherent shared memory machines; my design showed good scalability for several HPC benchmarks on a 512-core machine.

OTHER EXPERIENCE

University of Illinois, Urbana, IL **2009−10**

Resident Manager for Family and Graduate Housing. I helped the Complex Director manage several large apartments housing graduate students, university staff, and their families.

Foley Hoag LLP, Boston, MA **1997−2002**

Attorney at one of Boston's top law firms. Represented clients in intellectual property disputes. Co-authored a "friend of the court" brief before the U.S. Supreme Court and an article in a leading journal on trademark law.

PUBLICATIONS

Conferences

R. Bocchino, K. Gostelow, E. Gamble, and R. Some, *Spot: A Programming Language for Verified Flight Software*. In ACM SIGAda High Integrity Language Technology (HILT), Portland, OR, October 2014.

K. Naden, R. Bocchino, J. Aldrich, and K. Bierhoff, *A Type System for Borrowing Permissions*. In ACM SIGACT-SIGPLAN Symposium on Principles of Programming Languages (POPL), Philadelphia, PA, January 2012.

R. Bocchino and V. Adve, *Types, Regions, and Effects for Safe Programming with Object-Oriented Parallel Frameworks*. In European Conference on Object-Oriented Programming (ECOOP), Lancaster, UK, July 2011.

R. Bocchino, S. Heumann, N. Honarmand, S. Adve, V. Adve, A. Welc, and T. Shpeisman, *Safe Nondeterminism in a Deterministic-by-Default Parallel Language*. In ACM SIGACT-SIGPLAN Symposium on Principles of Programming Languages (POPL), Austin, TX, January 2011.

M. Vakilian, D. Dig., R. Bocchino, J. Overbey, V. Adve, and R. Johnson, *Inferring Method Effect Summaries for Nested Heap Regions*. In IEEE/ACM International Conference on Automated Software Engineering (ASE), Auckland, New Zealand, November 2009.

R. Bocchino, V. Adve, D. Dig, S. Adve, S. Heumann, R. Komuravelli, J. Overbey, P. Simmons, H. Sung, and M. Vakilian, *A Type and Effect System for Deterministic Parallel Java*. In ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), Orlando, FL, October 2009.

R. Bocchino, V. Adve, and B. Chamberlain, *Software Transactional Memory for Large Scale Clusters*. In ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), Salt Lake City, UT, February 2008.

R. Bocchino and V. Adve, *Vector LLVA: A Virtual Vector Instruction Set for Media Processing*. In Second International Conference on Virtual Execution Environments (VEE), Ottawa, Canada, June 2006.

Z. Yang, Y. Cui, Z. Anwar, R. Bocchino, N. Kiyanclar, K. Nahrstedt, R. H. Campbell, and W. J. Yurcik, *Real-time 3D Video Compression for Tele-Immersive Environments*. In Multimedia Computing and Networking (MMCN), San Jose, CA, January 2006.

Workshops

R. Bocchino, H. Mehnert, and J. Aldrich, *High-Level Abstractions for Safe Parallelism*. In Workshop on Determinism and Correctness in Parallel Programming (WoDet) Austin, TX, March 2013.

B. Choi, R. Komuravelli, V. Lu, H. Sung, R. Bocchino, S. Adve, and J. Hart, *Parallel SAH k-D Tree Construction*. In High-Performance Graphics, Saarbrücken, Germany, June 2010.

B. Choi, R. Komuravelli, H. Sung, R. Bocchino, S. Adve, and V. Adve, *De Novo: Rethinking Hardware for Disciplined Parallelism*. In USENIX Workshop on Hot Topics in Parallelism (HotPar), Berkeley, CA, June 2010.

R. Bocchino, V. Adve, S. Adve, and M. Snir, *Parallel Programming Must Be Deterministic by Default*. In USENIX Workshop on Hot Topics in Parallelism (HotPar), Berkeley, CA, March 2009.

Book Chapters

R. Bocchino, *Alias Control for Deterministic Parallelism*. In Dave Clarke, James Noble, and Tobias Wrigstad, editors, *Aliasing in Object-Oriented Programming*, Springer 2013.

R. Bocchino, *Deterministic Parallel Java*. In *Encyclopedia of Parallel Computing*, Springer, 2010.

PROFESSIONAL AND COMMUNITY SERVICE

Program Committee member for HILT 2014.

External Review Committee member for ASPLOS 2014 and OOPSLA 2014.

Co-organizer of the Second Workshop on Languages for the Multicore Era (LAME 2013) and the Fourth Workshop on Determinism and Correctness in Parallel Programming (WoDet 2013).

Invited lecturer at the UPMARC Multicore Computing Summer School at Uppsala University in Uppsala, Sweden.

Program committee member for the First Workshop on Languages for the Multicore Era (LaME 2012).

Panel member for the ECOOP 2011 Doctoral Symposium and the SPLASH 2011 panel on multicore, manycore, and cloud computing.

Reviewer or co-reviewer for various publications, including POPL, ECOOP, APLAS, *Information and Computation*, *Software: Practice and Experience*, and *Science of Computer Programming*.

NSF grant review panel member.

Member of the Association for Computing Machinery (ACM) and the ACM Special Interest Group on Programming Languages (SIGPLAN).

Member of the Orchard Downs Input Team (ODIT) at the University of Illinois. ODIT provided input to the university in deciding how to renovate Orchard Downs, a residential community of students from all over the world.

Hiring committee member for Family and Graduate Housing at the University of Illinois.

OTHER SKILLS AND INTERESTS

Sing and perform on the Baroque violin, recorder, and harpsichord. Compose and perform original music in the Baroque style. Design and play fantasy and sci-fi role playing games. Designed and implemented a language for Apple II programming. Follow Major League Baseball (Red Sox, Dodgers). Read literature and philosophy.