

Rastislav Bodik

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RESEARCH INTERESTS

Software systems: static and dynamic program analysis, software synthesis, code mining, dynamic compilation, program specialization.

Computer architecture: bottleneck analysis, hardware-supported algorithms for program analysis and compilation.

EDUCATION

MS, PhD in Computer Science **1994, 1999**
University of Pittsburgh, Pittsburgh, PA

Diploma in Computer Engineering **1992**
Technical University, Kosice, Slovakia

POSITIONS

Assistant Professor **August 2002 – present**
Computer Science, University of California, Berkeley

Academic Visitor **August 2002 – December 2002**
IBM T.J. Watson Research Center, Hawthorne, NY

Assistant Professor **November 1999 – July 2002**
Computer Sciences, University of Wisconsin–Madison

AWARDS

- **Best Paper Award, PLDI 2005** **2005**
- **Hellman Family Faculty Fund Award, UC Berkeley** **2005**
- **HPC Software Challenge (Honorable Mention), Supercomputing** **2004**
- **Okawa Research Grant** **2004**
- **IEEE Top Pics from Computer Architecture Conferences** **2004, 2006**
- **20 Years of PLDI** for paper “Complete Removal of Redundant Expressions” **2002**
- **Students’ Choice Professor of the Year Award, UW, Computer Sciences** **2001**
- **NSF CAREER** **2001**
- **ACM SIGPLAN Doctoral Dissertation Award** **2001**
- **Carolyn Rosner Excellent Educator Award, UW, Computer Sciences** **2000**
- **IBM Faculty Partnership Award** **2000 to 2002**
- **Taulbee Award for Teaching and Research Excellence, Un. of Pittsburgh, C.S.** **1996**
- **Mellon Predoctoral Fellowship, University of Pittsburgh** **1994 and 1995**

PUBLICATIONS

Journal papers

- Brian A. Fields, Rastislav Bodik, Mark D. Hill, and Chris J. Newburn, “Interaction Cost: For when event counts just don’t add up,” *IEEE Micro Special Issue: Micro’s Top Picks from Microarchitecture Conferences*, Volume 24, Issue 6, Pages 57–61, November–December 2004.
- Brian A. Fields, Rastislav Bodik, Mark D. Hill, Chris J. Newburn, “Interaction Cost and Shotgun Profiling,” *ACM Transactions on Architecture and Code Optimization (TACO)* Volume 1, Issue 3, pages 272–304, September 2004.
- Rastislav Bodik, Rajiv Gupta, “Array Data-Flow Analysis for Load-Store Optimizations in Fine-Grain Architectures,” *International Journal of Parallel Programming*, Vol. 24, No. 6, pages 481–512, 1996.

Refereed conference and workshop papers

- PLDI '07 AJ Shankar, Rastislav Bodik, “Ditto: Automatic Incrementalization of Data Structure Invariant Checks,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'07)*, San Diego, CA, June 2007.
- PLDI '07 Armando Solar-Lezama, Gilad Arnold, Liviu Tancau, Rastislav Bodik, Vijay Saraswat, Sanjit Seshia, “Sketching Stencils,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'07)*, San Diego, CA, June 2007.
- PLDI '07 Manu Sridharan, Rastislav Bodik, Stephen Fink, “Thin Slicing,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'07)*, San Diego, CA, June 2007.
- ASPLOS '06 Armando Solar-Lezama, Liviu Tancau, Rastislav Bodik, Vijay Saraswat and Sanjit Seshia, “Combinatorial Sketching for Finite Programs,” in *12th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2006)*, San Jose, CA, October 2006.
- ASPLOS '06 Min Xu, Rastislav Bodik and Mark D. Hill, “A Regulated Transitive Reduction for Longer Memory Race Recording,” in *12th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2006)*, San Jose, CA, October 2006.
- PLDI '06 Manu Sridharan and Rastislav Bodik, “Refinement-Based Context-Sensitive Points-To Analysis for Java” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2006)*, Ottawa, Canada, June 10–16, 2006.
- OOPSLA '05 AJ Shankar, S.Subramanya Sastry, Rastislav Bodik, James E. Smith, “Runtime Specialization With Optimistic Heap Analysis,” in *20th Annual ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA '05)*, San Diego, CA, October 2005.
- OOPSLA '05 Manu Sridharan, Denis Gopan, Lexin Shan, Rastislav Bodik, “Demand-Driven

- Points-to Analysis for Java,” in *20th Annual ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA '05)*, San Diego, CA, October 2005.
- PLDI '05 David Mandelin, Lin Xu, Rastislav Bodik, Doug Kimelman, “Mining Jungles: Helping to Navigate the API Jungle,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'05)*, Chicago, IL, June 2005.
- PLDI '05 Armando Solar-Lezama, Rodric Rabbah, Rastislav Bodik, Kemal Ebcioglu, “Programming by Sketching for Bitstreaming Programs,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'05)*, Chicago, IL, June 2005.
- ▶ *Best Paper Award.*
- PLDI '05 Min Xu, Rastislav Bodik, Mark D. Hill, “Serializability Violation Detector for Shared-Memory Server Programs,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'05)*, Chicago, IL, June 2005.
- P-PHEC '04 Armando Solar-Lezama, Rastislav Bodik, “Templating Transformations for Bitstream Programs,” in *HPCA Workshop on Productivity and Performance in High-End Computing (P-PHEC 2004)*, Madrid, Spain, February, 2004.
- MICRO '03 Brian Fields, Rastislav Bodik, Mark D. Hill, C.J. Newburn, “Microarchitectural bottleneck analysis using interaction costs,” in *The 36th Annual IEEE/ACM International Symposium on Microarchitecture*, San Diego, CA, December 2003.
- ▶ Selected to *2004 IEEE Top Pics from Computer Architecture Conferences.*
 - ▶ Invited to a special issue of the *ACM TACO Journal.*
- PLDI '03 Glenn Ammons, David Mandelin, Rastislav Bodik, James Larus, “Debugging Temporal Specifications with Concept Analysis,” in *ACM SIGPLAN Conference on Programming Language Design and Implementation*, San Diego, CA, June 2003.
- ISCA '03 Min Xu, Rastislav Bodik, Mark D. Hill, “A “Flight Data Recorder” for Enabling Full-system Multiprocessor Deterministic Replay,” in *ACM SIGARCH 30th Annual International Symposium on Computer Architecture*, San Diego, CA, June 2003.
- ISCA '02 Brian Fields, Rastislav Bodik, Mark D. Hill, “Slack: Maximizing Performance under Technological Constraints,” in *ACM SIGARCH 29th Annual International Symposium on Computer Architecture*, Anchorage, Alaska, May 2002.
- POPL '02 Glenn Ammons, Rastislav Bodik, James R. Larus, “Mining Specifications,” *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, Portland, OR, January 2002.
- POPL '02 Shai Rubin, Trishul Chilimbi, Rastislav Bodik, “An Efficient Profile-Analysis Framework for Data Layout Optimizations,” *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, Portland, OR, January 2002.
- ISCA '01 Brian Fields, Shai Rubin, Rastislav Bodik, “Focusing Processor Policies via Critical-Path Prediction,” *ACM SIGARCH 28th Annual International Sympo-*

- sium on Computer Architecture*, Göteborg, Sweden, June 2001.
- ISCA '01 Subbu Sastry, Rastislav Bodik, James E. Smith, "Rapid Profiling via Stratified Sampling," *ACM SIGARCH 28th Annual International Symposium on Computer Architecture*, Göteborg, Sweden, June 2001.
- FDDO '00 Subbu Sastry, Rastislav Bodik, James E. Smith, "Characterizing Coarse-Grain Reuse of Computations," *Proc. 3rd ACM Workshop on Feedback-Directed and Dynamic Optimization (FDDO-3)*, pp. 1-10, December 2000.
- PLDI '00 Rastislav Bodik, Rajiv Gupta, Vivek Sarkar, "ABCD: Eliminating Array Bounds Checks on Demand," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, pp. 321-333, Vancouver, June 2000.
- PLDI '99 Rastislav Bodik, Rajiv Gupta, Mary Lou Soffa, "Load-Reuse Analysis: Design and Evaluation," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, Atlanta, May 1999.
- CC '99 Rajiv Gupta, Rastislav Bodik, "Register-Pressure-Sensitive Redundancy Elimination," to appear in *International Conference on Compiler Construction*, Amsterdam, Netherlands, March 1999.
- PLDI '98 Rastislav Bodik, Rajiv Gupta, Mary Lou Soffa, "Complete Removal of Redundant Expressions," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, Montreal, June 1998.
- POPL '98 Rastislav Bodik, Sadun Anik, "Path-Sensitive Value-Flow Analysis," *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, San Diego, January 1998.
- FSE '97 Rastislav Bodik, Rajiv Gupta, Mary Lou Soffa, "Refining Data Flow Information using Infeasible Paths," *ACM SIGSOFT Symposium on Foundations of Software Engineering*, Zurich, Switzerland, September 1997.
- PLDI '97 Rastislav Bodik, Rajiv Gupta, "Partial Dead Code Elimination using Slicing Transformations," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, Las Vegas, June 1997.
- PLDI '97 Rastislav Bodik, Rajiv Gupta, Mary Lou Soffa, "Interprocedural Conditional Branch Elimination," *ACM SIGPLAN Conference on Programming Language Design and Implementation*, Las Vegas, June 1997.
- SPDP '95 Rajiv Gupta, Rastislav Bodik, "Adaptive Loop Transformations for Scientific Programs," *IEEE Symposium on Parallel and Distributed Processing*, San Antonio, October 1995.
- LCPC '95 Rastislav Bodik, Rajiv Gupta, "Array Data-Flow Analysis for Load-Store Optimizations in Superscalar Architectures," *The Eighth Annual Workshop on Languages and Compilers for Parallel Computing*, Columbus, August 1995.
- Invited for special submission to *International Journal of Parallel Programming*.

Other refereed publications and presentations

- Rastislav Bodik, Rajiv Gupta, Mary Lou Soffa, "A retrospective on 'Complete Removal

of Redundant Expressions’,” in *Best of PLDI: 20 Years of the ACM SIGPLAN Conference on Programming Language Design and Implementation 1979-1999, A Selection*, ACM SIGPLAN Notices Volume 39 , Issue 4 (April 2004)

- Armando Solar-Lezama, Rastislav Bodik, Kemal Ebcioglu, Rodric Rabbah, Vivek Sarkar, “Highly Productive Collaborations in Bit-Streaming Applications,” presented as part of HPC Software Challenge, SC2004, Pittsburgh, PA, 2004
 - ▶ 2004 HPC Software Challenge, honorable mention.

GRANTS (GOVERNMENT)

- Principal Investigator, *Scalable Compiler Optimizations for Modern Software*, NSF (CA-REER), CCR-0093275, **2000**.
- Co-Principal Investigator (with Mark D. Hill), *Exploiting the Critical Path in the Design and Performance Analysis of Modern Processors*, National Science Foundation (Computer Architecture), CCR-0105721, **2001**.
- Co-Principal Investigator (with Andrea Arpaci-Dusseau and Mikko Lipasti), *Wisconsin DOVE: Distributed Optimizing Virtual Environment*, NSF (Next Generation Software), EIA-0103670, **2001**.
- Principal Investigator, subcontract from IBM, *PERCS (Productive, Easy-to-use, Reliable Computing System)*, DARPA (HPCS Phase II), **2003**
- Co-Principal Investigator (with George Necula *et al*), *Language-Based Software Security*, NSF (ITR Medium), CNS-0326577, **2003**
- Co-Principal Investigator (with George Necula), *Tools for Securing Software Infrastructure*, University of California Microelectronics Innovation and Computer Research Opportunities (UC MICRO Program) **2003, 2004, 2005**
- Principal Investigator, *Implementing Provably Correct High-Performance Ciphers with Sketching*, NSF (CyberTrust), CNS-0524815, **2005**
- co-Principal Investigator (with Sanjit Seshia), *Programmign by Sketching*, NSF (Science of Design, HCER), 0613997, **2006**

PhD STUDENTS, FORMER

- Brian Fields, “Using Criticality To Attack Performance Bottlenecks,” August 2006 (expected), to join nVidia
- Min Xu, “Race Recording for Multithreaded Deterministic Replay Using Multiprocessor Hardware,” (University of Wisconsin, 2006), now at VMware
- Subbu Sastry, “Techniques for transparent program specialization in dynamic optimizers,” (University of Wisconsin, 2003)
- Glenn Ammons, “Strauss: a specification miner,” (University of Wisconsin, 2003), now at IBM T.J. Watson Research Center

PhD STUDENTS, CURRENT

- Gilad Arnold
- David Mandelin
- A.J. Shankar
- Armando Solar-Lezama
- Manu Sridharam

PROFESSIONAL ACTIVITIES

Organizer/Co-organizer

- Workshop and Tutorials Chair, ASPLOS 2006.
- Program Chair, Compiler Construction (CC) 2005.
- Member, Steering Committee of European Joint Conferences on Theory and Practice of Software (ETAPS), 2004–2006.
- Chair, Student Research Forum at ACM SIGPLAN PLDI 2005
- Publications Chair, PACT 2005
- Co-chair, Wild and Crazy Ideas Session at ASPLOS 2002.
- Co-chair, Student Research Forum at PLDI 2002.
- Program Chair, The First ACM OM: Workshop on Optimizing Middleware and Distributed Software, June 2001.

Member of Program Committee

- International Conference on Compiler Construction (CC) 2007.
- Code Generation and Optimization (CGO) 2007.
- Workshop on Partial Evaluation and Program Manipulation (PEPM'07).
- Workshop on Introspective Architectures at HPCA 2006.
- Eclipse Technology eXchange (eTX) Workshop at OOPSLA 2005.
- Symposium on Principles of Programming Languages (POPL) 2005.
- Code Generation and Optimization (CGO) 2004.
- International Conference on Compiler Construction (CC) 2004.
- Symposium on Principles of Programming Languages (POPL) 2003.
- International Conference on Supercomputing (ICS), June 2002.
- International Conference on Compiler Construction (CC-2002), April 2002.
- Third ACM Workshop on Feedback-Directed and Dynamic Optimization (FDDO-3), December, 2001.
- International Conference on Parallel Architectures and Compilation Techniques (PACT), September, 2001.

- 5th Annual Workshop on Interaction between Compilers and Computer Architectures (INTERACT-5), January, 2001.

Member of Review Panel

- NSF Proposal Review Panel, December 2004.
- NSF Proposal Review Panel, March 2003.
- NSF Proposal Review Panel, 2001.