

Bin Ren

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RESEARCH INTERESTS

- Programming systems and compiler support for parallel computing
- Parallelization for data-intensive and compute-intensive applications
- Runtime scheduling strategies for SIMD and multi-core systems
- Programming models for irregular applications

EDUCATION

9/2008-	The Ohio State University	Columbus, OH
5/2014	Ph.D., Computer Science and Engineering Major: Systems, Minor: Software Engineering, Database Systems Adviser: Prof. Gagan Agrawal	GPA: 4.0/4.0
9/2006-	Beihang University	Beijing, China
6/2008	M.S., Software Engineering Major: Software Engineering	GPA: 3.8/4.0
9/2002-	Beihang University	Beijing, China
6/2006	B.S., Software Engineering Graduated with Distinction	GPA: 3.6/4.0

RESEARCH EXPERIENCE

8/2016-	College of William and Mary	
present	Assistant Professor	
5/2014-	Pacific Northwest National Laboratory	
7/2016	Postdoctoral Research Associate Mentor: Dr. Sriram Krishnamoorthy Working with Dr. Sriram Krishnamoorthy, Prof. Milind Kulkarni, and Prof. Kunal Agrawal on designing general programming models to parallelize recursive task-parallel programs on architectures with both SIMD and multi-core parallelism.	
9/2008-	The Ohio State University	
5/2014	Graduate Research Associate Worked with Prof. Gagan Agrawal on my dissertation research: supporting applications involving dynamic data structures and irregular memory access on emerging parallel platforms.	
5/2013-	NEC Laboratories America	
8/2013	Research Internship Mentor: Dr. Nishkam Ravi, Dr. Yi Yang Worked with Dr. Nishkam Ravi, Dr. Yi Yang, Dr. Min Feng, and Dr. Srimat Chakradhar on automatic data communication strategies between CPUs and many-core coprocessors.	
6/2011-	Microsoft Research, Redmond	
9/2011	Research Internship Mentor: Dr. Todd Mytkowicz Worked with Dr. Todd Mytkowicz, Prof. James R. Larus, and Dr. Wolfram Schulte on parallelizing irregular applications on SIMD architectures.	

PUBLICATIONS

Peer-Reviewed Journals and Conferences

- [1] **[PPoPP'17] Bin Ren**, Sriram Krishnamoorthy, Kunal Agrawal, Milind Kulkarni, "Exploiting Vector and Multicore Parallelism for Recursive, Task-Parallel Programs," *The 22nd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, February, 2017. (Acceptance Rate: $29/132 = 22\%$)
- [2] **[TACO'17] Mehmet Can Kurt**, Sriram Krishnamoorthy, Gagan Agrawal, **Bin Ren**, "An Automated Store Recycling Approach for Dynamic Task Graph Schedulers," *ACM Transactions on Architecture and Code Optimization*, January, 2017. (Original work, invited to **HiPEAC'17**)
- [3] **[PACT'16] Junqiao Qiu**, Zhijia Zhao, **Bin Ren**, "MicroSpec: Fine-Grained Speculative Parallelization for FSM Computations", *The 25th International Conference on Parallel Architecture and Compilation Techniques*, September, 2016. (Acceptance Rate: $31/119 = 26\%$)
- [4] **[ICPP'16] Jeff Daily**, Sriram Krishnamoorthy, Ananth Kalyanaraman, **Bin Ren**, "On the Impact of Widening Vector Registers on Sequence Alignment," *The 45th International Conference on Parallel Processing*, August, 2016. (Acceptance Rate: $53/251 = 21.1\%$)
- [5] **[PLDI'15] Bin Ren**, Youngjoon Jo, Sriram Krishnamoorthy, Kunal Agrawal, Milind Kulkarni, "Efficient Execution of Recursive Programs on Commodity Vector Hardware," *The 36th annual ACM SIGPLAN conference on Programming Language Design and Implementation*, June, 2015. (Acceptance Rate: $58/303 = 19\%$)
- [6] **[IPDPS'15] Linchuan Chen**, Xin Huo, **Bin Ren**, Surabhi Jain, Gagan Agrawal, "Efficient and Simplified Parallel Graph Processing over CPU and MIC," *The 29th IEEE International Parallel & Distributed Processing Symposium*, May, 2015. (Acceptance Rate: $108/496 = 21\%$)
- [7] **[ICS'14] Xin Huo**, **Bin Ren**, Gagan Agrawal, "A Programming System for Xeon Phi with Runtime SIMD Parallelization," *The 28th ACM International Conference on Supercomputing*, June, 2014. (Acceptance Rate: $34/162 = 21\%$)
- [8] **[TACO'14] Bin Ren**, Todd Mytkowicz, Gagan Agrawal, "A Portable Optimization Engine for Accelerating Irregular Data-Traversal Applications on SIMD Architectures," *ACM Transactions on Architecture and Code Optimization*, February, 2014.
- [9] **[CGO'13] Bin Ren**, Gagan Agrawal, James R. Larus, Todd Mytkowicz, Tomi Poutanen, Wolfram Schulte, "SIMD Parallelization of Applications that Traverse Irregular Data Structures," *The 2013 International Symposium on Code Generation and Optimization*, February, 2013 (**Best Paper Award, SIGPLAN Research Highlight, Nominated for CACM Research Highlight**). (Acceptance Rate: $33/117 = 28\%$)
- [10] **[PACT'11] Bin Ren**, Gagan Agrawal, "Compiling Dynamic Data Structure in Python to Enable the Use of Multi-core and Many-core Libraries," *The 20th International Conference on Parallel Architectures and Compilation Techniques*, October, 2011. (Acceptance Rate: $36/221 = 16\%$)

Peer-Reviewed Workshops and Posters

- [1] **[PPoPP'16 Poster] Mehmet Can Kurt**, **Bin Ren**, Sriram Krishnamoorthy, Gagan Agrawal, "An Automated Store Recycling Approach for Dynamic Task Graph Schedulers," *The 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, March, 2016.

- [2] [LCPC'15] **Bin Ren**, Nishkam Ravi, Yi Yang, Min Feng, Gagan Agrawal, Srimat Chakradhar, “Automatic and Efficient Data Host-Device Communication for Many-Core Coprocessors,” *The 28th International Workshop on Languages and Compilers for Parallel Computing*, September, 2015.
- [3] [LCPC'15] Mehmet Can Kurt, **Bin Ren**, Gagan Agrawal, “Low-Overhead Fault-Tolerance Support using DISC Programming Model,” *The 28th International Workshop on Languages and Compilers for Parallel Computing*, September, 2015.
- [4] [ICS'14 Poster] **Bin Ren**, Nishkam Ravi, Yi Yang, Min Feng, Gagan Agrawal, Srimat Chakradhar, “Automating and Optimizing Data Transfers for Many-core Coprocessors,” *The 28th ACM International Conference on Supercomputing*, June, 2014..
- [5] [PACT'12 Poster] **Bin Ren**, Gagan Agrawal, James R. Larus, Todd Mytkowicz, Tomi Poutanen, Wolfram Schulte, “Fine-Grained Parallel Traversals of Irregular Data Structures,” *The 21th International Conference on Parallel Architectures and Compilation Techniques*, October, 2012.
- [6] [IPDPSW'11] **Bin Ren**, Gagan Agrawal, Brad Chamberlain, Steve Deitz, “Translating Chapel to Use FREERIDE: A Case Study in Using an HPC language for Data-intensive Computing,” *The 16th International Workshop on High-Level Parallel Programming Models and Supportive Environments(HIPS) held in conjunction with IPDPS*, May, 2011.

Papers Under Submission/Preparation

- [1] [TOPC'16] **Bin Ren**, Shruthi Balakrishna, Youngjoon Jo, Sriram Krishnamoorthy, Kunal Agrawal, Milind Kulkarni, “Extracting SIMD Parallelism from Recursive Task-Parallel Programs,” *ACM Transactions on Parallel Computing*, 2016.

PATENT

[US20150067225 A1] Nishkam Ravi, Yi Yang, Srimat Chakradhar, **Bin Ren**, “Automatic Communication and Optimization of Multi-dimensional Arrays for Many-core Coprocessor using Static Compiler Analysis”

SOFTWARE RELEASE

The code “VectorCilk” for PLDI'15 is publicly available at <https://engineering.purdue.edu/plcl/vectorcilk/index.php>

PROPOSAL EXPERIENCE

Participated in the preparation of an NSF SHF Small Core Collaborative Research proposal as an unfunded collaborator, January, 2015 (PIs: Prof. Bo Wu, Colorado School of Mines, and Prof. Xu Liu, College of William and Mary)

TALKS

- “Challenging the Irregularity: Unleashing the Power of Modern SIMD Architectures”,
 - 1) Computer Science Department at Missouri University of Science and Technology, Rolla, Missouri, USA, January, 2016;
 - 2) Department of Computer Science and Software Engineering at Auburn University, Auburn, Alabama, USA, February, 2016;
 - 3) Department of Electrical and Computer Engineering at University of Delaware, Newark, Delaware, USA, February, 2016;
 - 4) Computer Science Department at College of William and Mary, Williamsburg, Virginia, USA, February, 2016;
 - 5) Department of Electrical, Computer & Biomedical Engineering at University of Rhode Island, Kingston, Rhode Island, USA, March, 2016;

- 6) Department of Computer Science at Illinois Institute of Technology, Chicago, Illinois, USA, March, 2016;
- 7) Computer Science Department at Rensselaer Polytechnic Institute, Troy, New York, USA, March, 2016;
- 8) Pacific Northwest National Laboratory, Richland, Washington, USA, April, 2016
- “Low-Overhead Fault-Tolerance Support using DISC Programming Model”, LCPC, Raleigh, North Carolina, USA, September, 2015
 - “Automatic and Efficient Data Host-Device Communication for Many-Core Coprocessors”, LCPC, Raleigh, North Carolina, USA, September, 2015
 - “Efficient Execution of Recursive Programs on Commodity Vector Hardware”, 1) PNNL, Richland, Washington, USA, June, 2015, and 2) PLDI, Portland, Oregon, USA, June, 2015
 - “Automatic and Efficient Data Host-Device Communication for Many-Core Coprocessors”, NEC Lab, Princeton, New Jersey, USA, August, 2013
 - “SIMD Parallelization of Applications that Traverse Irregular Data Structures”, MSR, Redmond, Washington, USA, September, 2011
 - “Compiling Dynamic Data Structure in Python to Enable the Use of Multi-core and Many-core Libraries”, 1) MSR, Redmond, Washington, USA, August, 2011, and 2) PACT, Galveston Island, Texas, USA, October, 2011

PROFESSIONAL SERVICES

- **PC Member:** HPC16/15, ICPADS16, WOLFHPC16, HIPS16/15, ICPP15, HiPC15
- **Journal Reviewer:** JPDC16/15/14/13, IJPP16, TKDE14
- **Conference Reviewer:** IPDPS16/15, PPOPP15, PACT15, CCGrid15, NPC15/14
- **Proposal Reviewer:** DoE Advanced Scientific Computing Research (ASCR)
- **College Committee Service :** Graduate Admissions Committee, Computer Science Department, College of William and Mary 2016-2017

TEACHING EXPERIENCE

Instructor

- AU16 CS680 Compiler Optimization for High Performance Computing
- AU13 CSE2421 Systems I: Introduction to Low-Level Programming and Computer Organization
4-credit Core Course
- SP13 CSE2421 Systems I: Introduction to Low-Level Programming and Computer Organization
- SU10 CSE459.22 Programming in C++; CSE459.23 Programming in Java
- SP10 CSE459.22 Programming in C++
- WI10 CSE459.23 Programming in Java

Grader

- SP14 CSE6441 Introduction to Parallel Computing
- WI12 CSE721 Introduction to Parallel Computing
- AU11 CSE621 High Performance Computing
- SP11 CSE756 Compiler Design and Implementation
- WI11 CSE721 Introduction to Parallel Computing
- AU10 CSE621 High Performance Computing
- AU09 CSE621 High Performance Computing

HONORS AND AWARDS (SELECTED)

- Best Paper Award, CGO 2013
- SIGPLAN Research Highlights, 2013
- Student Travel Awards, PACT, 2011, 2012
- University Fellowship, The Ohio State University, 2008-2009