

Publications

2018

- [Parallel Sparse Flow-Sensitive Points-to Analysis](#). Jisheng Zhao, Michael G. Burke, Vivek Sarkar. Proceedings of the 2018 International Conference on Compiler Construction (CC 2018), February 2018.
- Modeling the Conflicting Demands of Multi-Level Parallelism and Temporal/Spatial Locality in Affine Scheduling. Oleksandr Zinenko, Chandan Reddy, Sven Verdoolaege, Jun Shirako, Tobias Grosser, Vivek Sarkar, Albert Cohen. Proceedings of the 2018 International Conference on Compiler Construction (CC 2018), February 2018.



2017

- [Optimizing Web Virtual Reality](#). Rabimba Karanjai. M.S. Thesis, December 2017.
- [Exploration of Supervised Machine Learning Techniques for Runtime Selection of CPU vs. GPU Execution in Java Programs](#). Gloria Kim, Akihiro Hayashi, Vivek Sarkar. Fourth Workshop on Accelerator Programming Using Directives (WACCPD), November 2017. (co-located with SC17)
- [Chapel-on-X: Exploring Tasking Runtimes for PGAS Languages](#). Akihiro Hayashi, Sri Raj Paul, Max Grossman, Jun Shirako, Vivek Sarkar. Third IEEE Workshop on Extreme Scale Programming Models and Middleware (ESPM2), November 2017. (co-located with SC17)
- [Deadlock Avoidance in Parallel Programs with Futures: Why parallel tasks should not wait for strangers](#). Tiago Cogumbreiro, Rishi Surendran, Francisco Martins, Vivek Sarkar, Vasco T. Vasconcelos, and Max Grossman. In ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA). ACM, 2017.
- [DAMMP: A Distributed Actor Model for Mobile Platforms](#). Arghya Chatterjee, Srdjan Milakovic, Bing Xue, Zoran Budimlic, Vivek Sarkar. 14th International Conference on Managed Languages & Runtimes (ManLang'17), September 2017. [\[slides\]](#)
- [Distributed Communication Middleware for an Selector Model](#). Bing Xue. M.S. Thesis, August 2017.
- [Optimizing Convolutions in State-of-the-art Convolutional Neural Networks on Intel Xeon Phi](#). Ankush Mandal. M.S. Thesis, July 2017
- [Exploring Tradeoffs in Parallel Implementations of Futures in C++](#). Jonathan Sharman. M.S. Thesis, July 2017 [\[slides\]](#)
- [Enhanced Data and Task Abstractions for Extreme-scale Runtime Systems](#). Nick Vrvilo. PhD Thesis, July 2017. [\[resource page\]](#)
- [A Marshalled Data Format for Pointers in Relocatable Data Blocks](#). Nick Vrvilo, Lechen Yu and Vivek Sarkar. In Proceedings of the 2017 ACM SIGPLAN International Symposium on Memory Management (ISMM). June 2017.
- [Dyna: Toward a self-optimizing declarative language for machine learning applications](#). Tim Vieira, Matthew Francis-Landau, Nathaniel Wesley Filardo, Farzad Khorasani, and Jason Eisner. In Proceedings of the First ACM SIGPLAN Workshop on Machine Learning and Programming Languages, June 2017.
- [Performance Evaluation of OpenMP's Target Construct on GPUs](#). Akihiro Hayashi, Jun Shirako, Ettore Tiotto, Robert Ho, Vivek Sarkar. International Journal of High Performance Computing and Networking (IJHPCN), June 2017.
- Preparing an Online Java Parallel Computing Course. Vivek Sarkar, Max Grossman, Zoran Budimlic and Shams Imam. 7th NSF/TCPP Workshop on Parallel and Distributed Computing Education (EduPar-17). May 2017.
- [A Pluggable Framework for Composable HPC Scheduling Libraries](#). Max Grossman, Vivek Kumar, Nick Vrvilo, Zoran Budimlic, Vivek Sarkar. The Seventh International Workshop on Accelerators and Hybrid Exascale Systems (ASHES). May 2017. [\[slides\]](#)
- [Formalization of Habanero Phasers using Coq](#). Tiago Cogumbreiro, Jun Shirako, and Vivek Sarkar. Journal of Logical and Algebraic Methods in Programming (JLAMP), March 2017.
- [Extending the Polyhedral Compilation Model for Debugging and Optimization of SPMD-style Explicitly-Parallel Programs](#). Prasanth Chatarasi. M.S. Thesis, April 2017 [\[slides\]](#).
- [Enabling Distributed Reconfiguration in an Actor Model](#). Arghya Chatterjee. M.S. Thesis, April 2017.
- [Debugging, Repair, and Synthesis of Task-Parallel Programs](#). Rishi Surendran. Ph.D. Thesis, March 2017.
- [Productive Programming Systems for Heterogeneous Supercomputers](#). Max Grossman. Ph.D. Thesis, February 2017.
- [Optimized Two-Level Parallelization for GPU Accelerators using the Polyhedral Model](#). Jun Shirako, Akihiro Hayashi, Vivek Sarkar. Proceedings of the 2017 International Conference on Compiler Construction (CC 2017), February 2017 [\[slides\]](#).

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- PIPES: A Language and Compiler for Task-Based Programming on Distributed-Memory Clusters. Martin Kong, Louis-Noël Pouchet, P. Sadayappan, Vivek Sarkar. The Conference on High Performance Computing, Networking, Storage and Analysis (SC16), November 2016.
- [Static Cost Estimation for Data Layout Selection on GPUs](#). Yuhan Peng, Max Grossman, Vivek Sarkar. 7th International Workshop in Performance Modeling, Benchmarking, and Simulation of High Performance Computer Systems (PMBS16, co-located with SC16). November 2016.

- [Fine-grained parallelism in probabilistic parsing with Habanero Java](#). Matthew Francis-Landau (Johns Hopkins University), Bing Xue (Rice University), Jason Eisner (Johns Hopkins University), and Vivek Sarkar (Rice University). In Proceedings of the Sixth Workshop on Irregular Applications: Architectures and Algorithms (IA3, co-located with SC16), November 2016 [slides].
- [Exploring Compiler Optimization Opportunities for the OpenMP 4.x Accelerator Model on a POWER8+GPU Platform](#). Akihiro Hayashi, Jun Shirako, Ettore Tiotto, Robert Ho, Vivek Sarkar. Third Workshop on Accelerator Programming Using Directives (WACCPD, co-located with SC16), November 2016.
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- [Pedagogy and Tools for Teaching Parallel Computing at the Sophomore Undergraduate Level](#). Max Grossman, Maha Aziz, Heng Chi, Anant Tibrewal, Shams Imam, Vivek Sarkar. Journal of Parallel and Distributed Computing Special Issue on Parallel, Distributed, and High Performance Computing Education. 2016.
- [OpenMP as a High-Level Specification Language for Parallelism](#). Max Grossman, Jun Shirako, Vivek Sarkar. International Workshop on OpenMP (IWOMP), October 2016.
- [An Extended Polyhedral Model for SPMD Programs and its use in Static Data Race Detection](#). Prasanth Chatarasi, Jun Shirako, Martin Kong, Vivek Sarkar. The 29th International Workshop on Languages and Compilers for Parallel Computing (LCPC), September 2016 [slides].
- [The Open Community Runtime: A Runtime System for Extreme Scale Computing](#). Timothy G. Mattson, Romain Cledat, Vincent Cave, Vivek Sarkar, Zoran Budimlic, Sanjay Chatterjee, Josh Fryman, Ivan Ganev, Robin Knauerhase, Min Lee, Benot Meister, Brian Nickerson, Nick Pepperling, Bala Seshasayee, Sagnak Tasirlar, Justin Teller, Nick Vrvilo. In 2016 IEEE High Performance Extreme Computing Conference (HPEC '16).
- [Dynamic Determinacy Race Detection for Task Parallelism with Futures](#). Rishi Surendran and Vivek Sarkar. 16th International Conference on Runtime Verification (RV'16), September 2016.
- [Declarative Tuning for Locality in Parallel Programs](#). Sanjay Chatterjee, Nick Vrvilo, Zoran Budimlic, Kathleen Knoke, Vivek Sarkar. The 45th International Conference on Parallel Processing (ICPP-2016), August 2016. (slides)
- [Integrating Asynchronous Task Parallelism with OpenSHMEM](#). Max Grossman, Vivek Kumar, Zoran Budimlic, Vivek Sarkar. OpenSHMEM Workshop, August 2016.
- [A Distributed Selectors Runtime System for Java Applications](#). Arghya Chatterjee, Branko Gvoka, Bing Xue, Zoran Budimlic, Shams Imam, Vivek Sarkar. 13th International Conference on the Principles and Practice of Programming on the Java Platform: virtual machines, languages, and tools (PPPJ'16), August 2016 [slides].
- [Design and verification of distributed phasers](#). Karthik Murthy, Sri Raj Paul, Kuldeep S. Meel, Tiago Cogumbreiro, and John M. Mellor-Crummey. 23rd International European Conference on Parallel and Distributed Computing (EuroPAR), August 2016.
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- [SWAT: A Programmable, In-Memory, Distributed, High-Performance Computing Platform](#). Max Grossman, Vivek Sarkar. International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC), May 2016.
- [Efficient Checkpointing of Multi-Threaded Applications as a Tool for Debugging, Performance Tuning, and Resilience](#). Max Grossman, Vivek Sarkar. IEEE International Parallel and Distributed Processing Symposium (IPDPS), May 2016.
- [Formalization of phase ordering](#). Tiago Cogumbreiro, Jun Shirako, Vivek Sarkar. Programming Language Approaches to Concurrency- and Communication-centric Software (PLACES 2016), April 2016 [resource page].
- [Automatic Data Layout Generation and Kernel Mapping for CPU+GPU Architectures](#). DeepakMajeti, KuldeepMeel, RajBarik and Vivek Sarkar. 25th International Conference on Compiler Construction (CC 2016), March 2016.
- [Static Data Race Detection for SPMD Programs via an Extended Polyhedral Representation](#). Prasanth Chatarasi, Jun Shirako, Vivek Sarkar. 6th International Workshop on Polyhedral Compilation Techniques (IMPACT 2016), January 2016 [slides].

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- [Efficient Static and Dynamic Memory Management Techniques for Multi-GPU System](#). Max Grossman, Mauricio Araya-Polo. Workshop on Runtime Systems for Extreme Scale Programming Models and Architectures. November 2015.
- [Distributed, Heterogeneous Scheduling Techniques Motivated by Production Geophysical Applications](#). Max Grossman, Mauricio Araya-Polo. Workshop on Many-Task Computing on Clouds, Grids, and Supercomputer. November 2015.
- [Concurrent Collections](#). Kathleen Knoke, Michael G. Burke, and Frank Schlimbach. Programming Models for Parallel Computing, Chapter 11, pages 247-280. Pavan Balaj, editor. The MIT Press, November 2015.
- [Auto-Grading for Parallel Programs](#). Maha Aziz, Heng Chi, Anant Tibrewal, Max Grossman, Vivek Sarkar. Workshop on Education for High-Performance Computing (EduHPC, co-located with SC15). November 2015.

- [LLVM-based Communication Optimizations for PGAS Programs](#). Akihiro Hayashi, Jisheng Zhao, Michael Ferguson, Vivek Sarkar. The 2nd Workshop on the LLVM Compiler Infrastructure in HPC (LLVM, co-located with SC15), November, 2015.
- [Model Checking Task Parallel Programs using Gradual Permissions](#). Eric Mercer, Peter Anderson, Nick Vrvilo, and Vivek Sarkar. 30th IEEE/ACM International Conference on Automated Software Engineering (ASE), New ideas category, Lincoln, Nebraska, November, 2015. [[paper](#)]
- [Optimized Event-Driven Runtime Systems for Programmability and Performance](#). Sagnak Tasirlar. Ph.D. Thesis, October 2015.
- [Extending Polyhedral Model for Analysis and Transformations of OpenMP Programs](#). Prasanth Chatarasi, and Vivek Sarkar. PACT ACM Student Research Competition, October 2015. [accepted as poster with accompanying extended abstract][[poster](#)].
- [Polyhedral Optimizations of Explicitly Parallel Programs](#). Prasanth Chatarasi, Jun Shirako, and Vivek Sarkar. 24th International Conference on Parallel Architectures and Compilation Techniques (PACT), October 2015. **One of four papers selected for Best Paper session** [[slides](#)].
- [Compiling and Optimizing Java 8 Programs for GPU Execution](#). Kazuaki Ishizaki, Akihiro Hayashi, Gita Koblenz, Vivek Sarkar. 24th International Conference on Parallel Architectures and Compilation Techniques (PACT), October 2015.
- [Exploiting Parallelism in Mobile Devices](#). Arghya Chatterjee, Timothy Newton, Tom Roush, Hunter Tidwell, Vivek Sarkar. SPLASH 2015 Poster Session, October 2015. [accepted as poster with accompanying extended abstract][[paper](#)].
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- [Polyhedral Optimizations for a Data-Flow Graph Language](#). Alina Sbirlea, Jun Shirako, Louis-Noel Pouchet, Vivek Sarkar. The 28th International Workshop on Languages and Compilers for Parallel Computing (LCPC), September 2015.
- [HJlib-CL: Reducing the Gap Between the JVM and Accelerators](#). Max Grossman, Shams Imam, Vivek Sarkar. 12th International Conference on the Principles and Practice of Programming on the Java Platform (PPPJ'15), September 2015. [[paper](#)]
- [Machine-Learning-based Performance Heuristics for Runtime CPU/GPU Selection](#). Akihiro Hayashi, Kazuaki Ishizaki, Gita Koblenz, Vivek Sarkar. 12th International Conference on the Principles and Practice of Programming on the Java Platform: virtual machines, languages, and tools (PPPJ'15), September 2015.
- [A Composable Deadlock-free Approach to Object-based Isolation](#). Shams Imam, Jisheng Zhao, Vivek Sarkar. 21st International European Conference on Parallel and Distributed Computing (Euro-Par'15), August 2015. [[paper](#)]
- [Elastic Tasks: Unifying Task Parallelism and SPMD Parallelism with an Adaptive Runtime](#). Alina Sbirlea, Kunal Agrawal, Vivek Sarkar. 21st International European Conference on Parallel and Distributed Computing (Euro-Par'15), August 2015.
- [Data Layout Optimization for Portable Performance](#). Kamal Sharma, Ian Karlin, Jeff Keasler, James McGraw, Vivek Sarkar. 21st International European Conference on Parallel and Distributed Computing (Euro-Par'15), August 2015.
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- [HadoopCL2: Motivating the Design of a Distributed, Heterogeneous Programming System With Machine-Learning Applications](#). Max Grossman, Mauricio Breternitz, Vivek Sarkar. IEEE Transactions on Parallel and Distributed Systems (TPDS), 2015.
- [High-level execution models for multicore architectures](#). Alina Sbirlea. Ph.D. Thesis, July 2015.
- [The Eureka Programming Model for Speculative Task Parallelism](#). Shams Imam, Vivek Sarkar. 29th European Conference on Object-Oriented Programming (ECOOP), July 2015. [[paper](#)]
- [Race Detection in Two Dimensions](#). Dimitar Dimitrov, Martin Vechev, Vivek Sarkar. 27th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2015.
- [Heterogeneous Habanero-C \(H2C\): A Portable Programming Model for Heterogeneous Processors](#). Deepak Majeti, Vivek Sarkar. Programming Models, Languages and Compilers for Manycore and Heterogeneous Architectures (PLC), 25th May 2015, Hyderabad, India. Co-located with IPDPS 2015.
- [Cooperative Execution of Parallel Tasks with Synchronization Constraints](#). Shams Imam. Ph.D. Thesis, May 2015.
- [Memory and Communication Optimizations for Macro-dataflow Programs](#). Dragos Sbirlea. Ph.D. Thesis, May 2015.
- [Portable Programming Models for Heterogeneous Platforms](#). Deepak Majeti. Ph.D. Thesis, May 2015.
- [JPF Verification of Habanero Java Programs using Gradual Type Permission Regions](#). Peter Anderson, Nick Vrvilo, Eric Mercer, and Vivek Sarkar. 2015. *SIGSOFT Softw. Eng. Notes* 40, 1 (February 2015), 1-5. [[doi](#)]
- [Parallelizing a Discrete Event Simulation Application Using the Habanero-Java Multicore Library](#). Wei-Cheng Xiao, Jisheng Zhao, and Vivek Sarkar. The 6th International Workshop on Programming Models and Applications for Multicore and Manycores (PMAM 2015), Feb 2015.
- [Polyhedral Transformations of Explicitly Parallel Programs](#). Prasanth Chatarasi, Jun Shirako, Vivek Sarkar. 5th International Workshop on Polyhedral Compilation Techniques (IMPACT 2015), January 2015. [[slides](#)]

- [Oil and Water Can Mix: An Integration of Polyhedral and AST-based Transformations](#). Jun Shirako, Louis-Noel Pouchet, Vivek Sarkar. IEEE Conference on High Performance Computing, Networking, Storage and Analysis (SC'14), November 2014. [[slides](#)] **One of eight Best Paper Finalists in conference.**
- [HabaneroJPC++: a Compiler-free PGAS Library](#). Vivek Kumar, Yili Zheng, Vincent Cave, Zoran Budimlic, Vivek Sarkar. 8th International Conference on Partitioned Global Address Space Programming Models (PGAS14), October 2014. [[slides](#)]
- [HJ-Viz: A New Tool for Visualizing, Debugging and Optimizing Parallel Programs](#). Peter Elmers, Hongyu Li, [Shams Imam](#), Vivek Sarkar. SPLASH 2014 Poster Session, October 2014. [accepted as poster with accompanying extended abstract]. [[paper](#)]
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- [Habanero-Java Library: a Java 8 Framework for Multicore Programming](#). [Shams Imam](#), Vivek Sarkar. 11th International Conference on the Principles and Practice of Programming on the Java Platform: virtual machines, languages, and tools (PPPJ'14), September 2014. [[paper](#), [slides](#)]
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- [Bounded Memory Scheduling of Dynamic Task Graphs](#). Dragos Sbirlea, Zoran Budimlic, Vivek Sarkar. International Conference on Parallel Architectures and Compilation Techniques (PACT), August 2014.
- [DFGR: an Intermediate Graph Representation for Macro-Dataflow Programs](#). Alina Sbirlea, Louis-Noel Pouchet, Vivek Sarkar. Fourth Workshop on Dataflow Execution Models for Extreme Scale Computing - in conjunction with PACT 2014 (DFM 2014)
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- [Test-Driven Repair of Data Races in Structured Parallel Programs](#). Rishi Surendran, Raghavan Raman, Swarat Chaudhuri, John Mellor-Crummey, and Vivek Sarkar. 35th ACM Conference on Programming Language Design and Implementation (PLDI), June 2014.
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- [A Case for Cooperative Scheduling in X10's Managed Runtime](#). [Shams Imam](#), Vivek Sarkar. The 2014 X10 Workshop (X10'14), June 2014. [[paper](#), [slides](#)]
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- [Automatic Detection of Inter-application Permission Leaks in Android Applications](#). Dragos Sbirlea, Michael G. Burke, Salvatore Guarnieri, Marco Pistoia, Vivek Sarkar. IBM Journal of Research and Development (Volume:57 , Issue: 6), November - December 2013.
- [Runtime Systems for Extreme Scale Platforms](#) . Sanjay Chatterjee. Ph.D Thesis, December 2013.
- [Isolation for Nested Task Parallelism](#) . Jisheng Zhao, Roberto Lubliner, Zoran Budimlic, Swarat Chaudhuri, Vivek Sarkar. The 29th International Conference on the Object-Oriented Programming, System, Languages and Application (OOPSLA), October 2013.
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- [The Flexible Preconditions Model for Macro-Dataflow Execution](#) . Dragos Sbirlea, Alina Sbirlea, Kyle B. Wheeler, Vivek Sarkar. The 3rd Data-Flow Execution Models for Extreme Scale Computing (DFM), September 2013.
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- [Oil and Water can mix! Experiences with integrating Polyhedral and AST-based Transformations](#) . Jun Shirako, Vivek Sarkar. 17th Workshop on Compilers for Parallel Programming (CPC), July 2013.
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