

Mike Rainey

Projet DeepSea

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Education

2010	Ph.D.	Computer Science	University of Chicago, USA
2007	M.S.	Computer Science	University of Chicago, USA
2004	B.S.	Computer Science	Indiana University, USA
2004	B.S.	Cognitive Science	Indiana University, USA

Academic employment

2014	Researcher at INRIA Rocquencourt in Gallium / DeepSea (to present)
2010	Postdoctoral researcher at Max Planck Institute for Software Systems
2007	Summer internship with Anwar Gluloum at Intel Corp.
2006	Programming project. Extended the MLRISC code generator to support the AMD64. Supported by NSF Grant CRI: Standard ML Software Infrastructure. Principle investigators: David MacQueen and John H. Reppy.
2003	Research assistant at Indiana University with David S. Wise. Designed and evaluated performance of cache-aware and multiprocessor matrix-factoring algorithms. Supported by NSF Grant CRI: A Paradigm of Parallel Programming for Morton Ordered Matrices.

Teaching

2014	PASL University of Puerto Rico Workshop https://sites.google.com/site/paslpr14/home
2009	Teaching Assistant, Implementation of Computer Languages - II, University of Chicago, Spring
2007	Teaching Assistant, CSPP Networks, University of Chicago, Winter
2006	Teaching Assistant, Introduction to Computer Systems, University of Chicago, Spring Teaching Assistant, CSPP Unix Systems Programming, University of Chicago, Fall

Publications by topic

This list is organized by research topic. A number of papers appear under multiple topics, as appropriate. For a list without duplicates, see the list of references at the bottom of this page.

Scheduling parallel computations

Design and implementation of algorithms to map computations generated by parallel programs onto multicore machines: (Acar, Charguéraud, and Rainey 2015; Acar, Charguéraud, and Rainey 2013; Bergstrom et al. 2010; Bergstrom et al. 2012; Rainey 2010; Fluet, Rainey, and Reppy 2008)

Granularity control

Making parallel programs more robust in the face of parallel-specific overheads: (Acar, Charguéraud, and Rainey 2016, Acar, Charguéraud, and Rainey (2015); Acar, Charguéraud, and Rainey 2011, Bergstrom et al. (2010); Bergstrom et al. 2012; Rainey 2010)

Design of parallel programming languages and APIs

Programming languages to raise the level of abstraction of parallel programs: (Fluet et al. 2007; Acar, Charguéraud, and Rainey 2012; Acar et al. 2016)

Data parallelism

Work-efficient algorithm for fast parallel depth-first search of directed graphs: (Acar, Charguéraud, and Rainey 2015)

Compiler optimization to control the layout of parallel-friendly data structures: (Bergstrom et al. 2013)

Algorithms and data structures

Efficient algorithms and data structures that are amenable to parallel programming: (Acar, Charguéraud, and Rainey 2015; Acar, Charguéraud, and Rainey 2014; Wise et al. 2005)

Concurrent data structures: (Acar, Ben-David, and Rainey 2017)

Compiler construction

Engineering the SML/NJ compiler to handle advanced features of foreign-function calls. (Blume, Rainey, and Reppy 2008)

Publications

Acar, Umut A, Naama Ben-David, and Mike Rainey. 2017. “Contention in Structured Concurrency: Provably Efficient Dynamic Nonzero Indicators for Nested Parallel Computation.” ACM. <http://gallium.inria.fr/~rainey/dynsnzi.pdf>.

Acar, Umut A, Arthur Charguéraud, and Mike Rainey. 2011. “Oracle Scheduling: Controlling Granularity in Implicitly Parallel Languages.” In *Proceedings of the 2011 ACM International Conference on Object Oriented Programming Systems Languages and Applications*, 46:499–518. 10. ACM. http://chargueraud.org/research/2011/oracle/oracle_scheduling.pdf.

———. 2012. “Efficient Primitives for Creating and Scheduling Parallel Computations.” In *Declarative Aspects of Multicore Programming*. http://chargueraud.org/research/2012/damp/damp2012_primitives.pdf.

———. 2013. “Scheduling Parallel Programs by Work Stealing with Private Deques.” In *18th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, 48:219–28. 8. ACM. <http://chargueraud.org/research/2013/ppopp/full.pdf>.

———. 2014. “Theory and Practice of Chunked Sequences.” In *The 22nd Annual European Symposium on Algorithms*, 25–36. Springer. <http://deepsea.inria.fr/>

chunkedseq/chunked_seq.pdf.

———. 2015. “A Work-Efficient Algorithm for Parallel Unordered Depth-First Search.” In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, 67:1–67:12. ACM. http://chargueraud.org/research/2015/pdfs/pdfs_sc15.pdf.

———. 2016. “Oracle-Guided Scheduling for Controlling Granularity in Implicitly Parallel Languages.” *Journal of Functional Programming*. Cambridge University Press. <http://gallium.inria.fr/~rainey/jfp-oracle-guided.pdf>.

Acar, Umut A, Arthur Charguéraud, Mike Rainey, and Filip Sieczkowski. 2016. “Dag-Calculus: A Calculus for Parallel Computation.” In *The 26th ACM SIGPLAN International Conference on Functional Programming*. ACM. <http://gallium.inria.fr/~rainey/dag-calculus.pdf>.

Bergstrom, Lars, Matthew Fluet, Mike Rainey, John Reppy, and Adam Shaw. 2012. “Lazy Tree Splitting.” *Journal of Functional Programming* 22 (4-5). Cambridge University Press: 382–438. <http://manticore.cs.uchicago.edu/papers/jfp-lts-submitted.pdf>.

Bergstrom, Lars, Matthew Fluet, Mike Rainey, John Reppy, Stephen Rosen, and Adam Shaw. 2013. “Data-Only Flattening for Nested Data Parallelism.” In *18th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, 48:81–92. 8. ACM. <http://manticore.cs.uchicago.edu/papers/ppopp13-flat.pdf>.

Bergstrom, Lars, Mike Rainey, John Reppy, Adam Shaw, and Matthew Fluet. 2010. “Lazy Tree Splitting.” In *The 20th ACM SIGPLAN International Conference on Functional Programming*, 45:93–104. 9. ACM. <http://manticore.cs.uchicago.edu/papers/icfp10-lts.pdf>.

Blume, Matthias, Michael Rainey, and John Reppy. 2008. “Calling Variadic Functions from a Strongly-Typed Language.” In *Proceedings of the 2008 ACM SIGPLAN Workshop on ML*, 47–58. ACM. <http://gallium.inria.fr/~rainey/articles/ml-varargs.pdf>.

Fluet, Matthew, Mike Rainey, and John Reppy. 2008. “A Scheduling Framework for General-Purpose Parallel Languages.” In *The 13th ACM SIGPLAN International Conference on Functional Programming*, 43:241–52. 9. ACM. <http://manticore.cs.uchicago.edu/papers/icfp08-sched.pdf>.

Fluet, Matthew, Mike Rainey, John Reppy, Adam Shaw, and Yingqi Xiao. 2007. “Manticore: A Heterogeneous Parallel Language.” In *Proceedings of the 2007 Workshop on Declarative Aspects of Multicore Programming*, 37–44. ACM.

Rainey, Mike. 2010. “Effective Scheduling Techniques for High-Level Parallel Programming Languages.” PhD thesis, University of Chicago. <http://manticore.cs.uchicago.edu/papers/rainey-phd.pdf>.

Wise, David S., Craig Citro, Joshua Hursey, Fang Liu, and Michael Rainey. 2005. “A Paradigm for Parallel Matrix Algorithms: Scalable Cholesky.” In *In Euro-Par*

2005 – *Parallel Processing*. http://dx.doi.org/10.1007/11549468_76.