

# Christopher J. Rossbach

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## Contact

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## Professional Experience

2015–present **Assistant Professor of computer science**, *The University of Texas at Austin*.

2014–present **Senior Researcher**, *VMware Research Group*, Palo Alto, CA.

2010–2014 **Researcher**, *Microsoft Research Silicon Valley (MSR-SVC)*, Mountain View, CA.

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## Education

2010 **Post-doctoral Researcher**, *University of Texas at Austin*, Austin TX.

2009 **Ph.D. in Computer Science**, *University of Texas at Austin*, Austin TX.

Disseration: *Hardware Transactional Memory: A Systems Perspective*

Committee: Prof. Emmett Witchel (advisor), Prof. Mike Dahlin, Prof. Doug Burger, Prof. Yale Patt, Prof. Mark D. Hill

1992 **B.S. in Computer Systems Engineering**, *Stanford University*, Palo Alto, CA.

### Research interests

Operating Systems, Synchronization, Parallel Architectures, GPUs, Parallel Algorithms, Transactional Memory, Virtualization, Cache Coherence, Consistency Models, Programming Models.

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## Awards

2007 IEEE Micro Top Pick award, one of the 10 best architecture papers of 2007 for "MetaTM/TxLinux: Transactional Memory For An Operating System."

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## Publications

All publications are refereed and peer reviewed.

Where provided, each entry has a page length (Xp). Each entry for a conference paper has the acceptance rate of the conference (X%), and the number of citations on Google scholar as of August 2015 (gcite:X).

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## Conference Publications

- [1] Ahmed Khawaja, , Joshua Landgraf, Rohith Prakash, Michael Wei, Eric Schkufza, and **Christopher J. Rossbach**. "Sharing, Protection and Compatibility for Reconfigurable Fabric with AmorphOS". In *OSDI*, 2018.
- [2] Rachata Ausavarungnirun, Vance Miller Joshua Landgraf, Saugata Ghose, Jayneel Gandhi, Adwait Job, **Christopher J. Rossbach**, and Onur Mutlu. "MASK: Redesigning the GPU Memory Hierarchy to Support Multi-Application Concurrency". In *ASPLOS*, 2018.
- [3] Rachata Ausavarungnirun, **Christopher J. Rossbach**, Joshua Landgraf, Vance Miller, Saugata Ghose, Jayneel Gandhi, and Onur Mutlu. "MOSIAC: Transparent hardware-software cooperative memory management for gpus". In *MICRO*, 2017.
- [4] Michael Wei, Amy Tai, **Christopher J. Rossbach**, Scott Lystig Fritchie, Ittai Abraham, Udi Wieder, Maithem Munshed Medhavi Dhawan, Jim Stabile, Steven Swanson, Michael Freedman, and Dahlia Malkhi. "vCorfu: A Cloud-Scale Object Store on a Shared Log". In *Proceedings of the USENIX Symposium on Networked Systems Design and Implementation. (NSDI)*, 2017.
- [5] Youngjin Kwon, Hangchen Yu, Simon Peter, **Christopher J. Rossbach**, and Emmett Witchel. Coordinated and Efficient Huge Page Management with Ingens. In *Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation. (OSDI)*, Savannah, GA, November 2016. Xp 18%.
- [6] John Vilks, David Molnar, Eyal Ofek, **Christopher J. Rossbach**, Benjamin Livshits, Alexander Moshchuk, Helen J. Wang, and Ran Gal. Surroundweb : Mitigating privacy concerns in a 3d web browser. In *IEEE Symposium on Security and Privacy*, May 2015.
- [7] **Christopher J. Rossbach**, Yuan Yu, Jon Currey, Jean-Philippe Martin, and Dennis Fetterly. Dandelion: a compiler and runtime for heterogeneous systems. In *Proceedings of the 22nd ACM Symposium on Operating Systems Principles (SOSP)*, Framhingham, Pennsylvania, October 2013.
- [8] **Christopher J. Rossbach**, Jon Currey, Mark Silberstein, Baishakhi Ray, and Emmett Witchel. PTask: Operating system abstractions to manage GPUs as compute devices. In *Proceedings of the 22nd ACM Symposium on Operating Systems Principles (SOSP)*, Cascais, Portugal, October 2011. 16p 18% gcite:99.
- [9] Scott Wolchok, Owen S. Hofmann, Nadia Heninger, Edward W. Felten, J. Alex Halderman, **Christopher J. Rossbach**, Brent Waters, and Emmett Witchel. Defeating vanish with low-cost sybil attacks against large DHTs. In *Proceedings of the Network and Distributed System Security Symposium (NDSS)*, February 2010. 15p 15% gcite:93, Reported in the New York Times <http://www.nytimes.com/2009/09/22/science/22decode.html>.
- [10] **Christopher J. Rossbach**, Owen S. Hofmann, and Emmett Witchel. Is transactional memory programming actually easier? In *Proceedings of the 15th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, January 2010. 10p 17% gcite:121.
- [11] Donald E. Porter, Owen S. Hofmann, **Christopher J. Rossbach**, Alex Benn, and Emmett Witchel. Operating system transactions. In *Proceedings of the 22nd ACM Symposium on Operating Systems Principles (SOSP)*, Big Sky, MT, October 2009. 14p 16% gcite:75.

- [12] Owen S. Hofmann, **Christopher J. Rossbach**, and Emmett Witchel. Maximum benefit from a minimal HTM. In *Proceedings of the Fourteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2009. 12p 26% gcite:25.
- [13] Hany E. Ramadan, **Christopher J. Rossbach**, and Emmett Witchel. Dependence-aware transactions for increased concurrency. In *Proceedings of the 41st Annual International Symposium on Microarchitecture (MICRO-41)*, November 2008. 12p 19% gcite:88.
- [14] **Christopher J. Rossbach**, Owen S. Hofmann, Donald E. Porter, Hany E. Ramadan, Aditya Bhandari, and Emmett Witchel. TxLinux: Using and managing transactional memory in an operating system. In *Proceedings of the 21st ACM Symposium on Operating Systems Principles (SOSP)*, Stevenson, WA, October 2007. 14p 19% gcite:123.
- [15] Hany E. Ramadan, **Christopher J. Rossbach**, Donald E. Porter, Owen Hofmann, Aditya Bhandari, and Emmett Witchel. MetaTM/TxLinux: Transactional memory for an operating system. In *Proceedings of the 34th International Symposium on Computer Architecture (ISCA)*, San Diego, CA, June 2007. 12p 23% gcite:84.
- [16] Jungwoo Ha, **Christopher J. Rossbach**, Jason V. Davis, Indrajit Roy, Hany E. Ramadan, Donald E. Porder, David L. Chen, and Emmett Witchel. Improved error reporting for software that uses black-box components. In *Proceedings of the ACM SIGPLAN 2007 Conference on Programming Language Design and Implementation (PLDI)*, San Diego, CA, 2007. 11p 25% gcite:50.
- [17] Jason V. Davis, Jungwoo Ha, **Christopher J. Rossbach**, Hany E. Ramadan, and Emmett Witchel. Cost-sensitive decision tree learning for forensic classification. In *Proceedings of the The 17th European Conference on Machine Learning (ECML)*, Berlin, Germany, September 2006. 8p 21% gcite:27.

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## Journal Publications

- [18] **Christopher J. Rossbach**, Hany E. Ramadan, Owen S. Hofmann, Donald E. Porter, Aditya Bhandari, and Emmett Witchel. TxLinux and MetaTM: Transactional memory and the operating system. *Communications of the ACM (CACM)*, 51(9), September 2008. 8p.
- [19] Hany E. Ramadan, **Christopher J. Rossbach**, Donald E. Porter, Owen S. Hofmann, Aditya Bhandari, and Emmett Witchel. MetaTM/TxLinux: Transactional memory for an operating system. In *IEEE Micro Top Picks in Computer Architecture 2007*, January 2008. 6p.

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## Workshop and Other Publications

- [20] Amogh Akshintala, Vance Miller, Donald E. Porter, and **Christopher J. Rossbach**. "Talk to My Neighbors Transport: Decentralized Data Transfer and Scheduling Among Accelerators". In *SFMA*, 2018.
- [21] Arthur Michener Peters, John A. Thywissen, and **Christopher J. Rossbach**. "PorcE: A Deparallelizing Compiler". In *SFMA*, 2018.

- [22] John A. Thywissen, Arthur Michener Peters, and **Christopher J. Rossbach**. "Local Operations Should Appear to Be Remote: Consistent Semantics Enable Transparent Distribution". In *SFMA*, 2018.
- [23] Henrique Fingler and **Christopher J. Rossbach**. "CELDA: Cloud Edge Local Dataflow Architecture". In *SFMA*, 2018.
- [24] Hangchen Yu and **Christopher J. Rossbach**. "Full Virtualization for GPUs Reconsidered". In *WDDD*, 2017.
- [25] Arthur Peters, John Thywissen, William R. Cook, and **Christopher J. Rossbach**. "PITCHFORC: Concurrent programming at rack-scale". In *MaRS*, 2017.
- [26] Michael Wei, **Christopher J. Rossbach**, Ittai Abraham, Udi Wieder, Steven Swanson, Dahlia Malkhi, and Amy Tai. Silver: A scalable, distributed, multi-versioning, always growing (Ag) file system. In *8th USENIX Workshop on Hot Topics in Storage and File Systems, HotStorage 2016, Denver, CO, June 20-21, 2016.*, 2016.
- [27] **Christopher J. Rossbach** and Emmett Witchel. Albatross: Systems Support for Augmented Reality. In *Proceedings of the 5th Workshop on Systems for Future Multicore Architectures*, SFMA 2015, 2015.
- [28] Naila Farooqui, Christopher J. Rossbach, Yuan Yu, and Karsten Schwan. Leo: A profile-driven dynamic optimization framework for GPU applications. In *2014 Conference on Timely Results in Operating Systems, TRIOS '14, Broomfield, CO, USA, October 5, 2014.*, 2014.
- [29] **Christopher J. Rossbach**, Jon Currey, Simon Baker. Supporting iteration in a heterogeneous dataflow engine. In *SFMA 2013. The 3rd Workshop on Systems for Future Multicore Architectures*, April 2013.
- [30] Jean-Philippe Martin, Christopher J. Rossbach, Derek G. Murray, and Michael Isard. Supporting efficient aggregation in a task-based STM. In *Proceedings of the 3rd Workshop on Systems for Future Multicore Architectures*, SFMA 2013, 2013.
- [31] **Christopher J. Rossbach**, Jon Currey, and Emmett Witchel. Operating systems must support GPU abstractions. In *The 13th Workshop on Hot Topics in Operating Systems (HotOS)*, 2011. 5p 25%.
- [32] **Christopher J. Rossbach**, Owen S. Hofmann, and Emmett Witchel. Is transactional memory programming actually easier? In *The 8th Annual Workshop on Duplicating, Deconstructing, and Debunking (WDDD)*, 2009. 9p.
- [33] Hany E. Ramadan, **Christopher J. Rossbach**, and Emmett Witchel. The Linux kernel: A challenging workload for transactional memory. In *Proceedings of the Workshop on Transactional Memory Workloads (WTW)*, June 2006. 6p.

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## Software

Rossbach's group hosts its public code on GitHub <https://github.com/rossbach/>.

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## Funding

- 09/16–08/19 NSF CNS-1618563, “CSR:Small:Performance and Fairness with Multiple Page Sizes,” with Emmett Witchel, PI. \$500,000.
- 09/10–09/13 NSF CNS-1017785, “CSR: Small: Operating System Abstractions for GPU-Accelerated Interactive Applications,” Also with Emmett Witchel, Co-PI \$500,000.

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## Patents

- 2018 9,996,394 Scheduling accelerator tasks on accelerators using graphs. Christopher John Rossbach, Jonathan J. Currey. U.S. Patent, filed August 8, 2013, granted June 12, 2018.
- 2016 9,424,079 Iteration support in a heterogeneous dataflow engine. Christopher John Rossbach, Jonathan J. Currey. U.S. Patent, filed June 27, 2013, granted August 23, 2016.
- 2011 8,661,449 Transactional Computation on Clusters. Christopher John Rossbach, Jean-Philippe Martin, Michael Isard. U.S. Patent, filed February 25, 2011, granted June 17, 2011.
- 2006 8,134,637 Method and system to increase X-Y resolution in a depth (Z) camera using red, blue, green (RGB) sensing. Christopher J. Rossbach, Abbas Rafii, Peiqian Zhao. U.S. Patent, filed June 1, 2006, granted March 13, 2012.

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## Professional Service

### Program committee membership

- 2019 SOSP, Symposium on operating systems principles.
- 2019 Usenix ATC.
- 2019 ASPLOS, Architectural Support for Programming Languages and Operating Systems.
- 2019 VEE, SIGPLAN/SIGOPS Symposium on Virtual Execution Environments (Co-Chair).
- 2018 SoCC, ACM Symposium on Cloud Computing (Co-Chair).
- 2018 Usenix ATC.
- 2018 ASPLOS, Architectural Support for Programming Languages and Operating Systems.
- 2017 SOSP, Symposium on operating systems principles.
- 2017 SoCC, ACM Symposium on Cloud Computing.
- 2017 Usenix ATC.
- 2017 Program co-chair for WWW Conference 2017: Infrastructure and Systems Track.
- 2016 OSDI, Operating systems design and implementation.
- 2016 OSDI Poster Session, (chair).
- 2016 Eurosys, European Systems Conference.
- 2016 PPOPP, Symposium on Principles and Practice of Parallel Programming.
- 2016 VEE, Virtual Execution Environments.
- 2013 IPDPS, IEEE International Parallel and Distributed Processing Symposium.
- 2012 IPDPS, IEEE International Parallel and Distributed Processing Symposium.

### External review committees

- 2017 Eurosys, European Systems Conference.
- 2017 ASPLOS, Architectural Support for Programming Languages and Operating Systems.

2016 ASPLOS, Architectural Support for Programming Languages and Operating Systems.

#### Workshop program committees

2018 SFMA, Workshop on Systems for Future Multicore Architectures (PC-chair).

2017 HotOS, Hot Topics on Operating Systems.

2017 MaRS, Workshop on Multicore and Rack-scale Systems (PC-chair).

2016 MaRS, Workshop on Multicore and Rack-scale Systems (PC-chair).

2015 SFMA, Workshop on Systems for Future Multicore Architectures (PC-chair).

2014 SFMA, Workshop on Systems for Future Multicore Architectures (PC-chair).

2013 SFMA, Workshop on Systems for Future Multicore Architectures (PC-chair).

2012 SFMA, Workshop on Systems for Future Multicore Architectures.

2010 TRANSACT, ACM SIGPLAN Workshop on transactional computing.

#### Journal Editor

2016 Operating Systems Review.

2017 Operating Systems Review.

2018 Operating Systems Review.

2018 Operating Systems Review.

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### Current Doctoral Students

2016 Vance Miller

2016 Joshua Landgraf

2017 Hangchen Yu

2017 Ahmed Khawaja

2016 Arthur Peters

2016 John Thywissen

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### Dissertation committees

2018/09 Chunzhi Su (advisor: Lorenzo Alvisi) "Bringing Modular Concurrency Control to the Next Level"

2018/08 Youngjin Kwon (advisor: Emmett Witchel) "Designing Systems for Emerging Memory Technologies"

2016/09 Sankar Panneerselvam (advisor: Mike Swift) "System Design for Heterogeneous Architectures"

2017/10 Rachata Ausavarignirun (advisor: Onur Mutlu) "Techniques for Shared Resource Management in Systems with GPUs"

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### Invited lectures

2016/04 "Making Reconfigurable Fabric Actually Reconfigurable," Presented at ASPLOS WACI Session, Atlanta Georgia

2016/04 "Sweet Spots and Limits for Virtualization," VEE, Atlanta, GA

2012 Invited Speaker at Microprocessor/SoC Test and Verification (MTV 2012).

2009 Panel member at WDDD, ACM SIGPLAN Workshop on Duplicating, Deconstructing, and Debunking.