Emmett Witchel

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Education

2004 **Ph.D. in Electrical Engineering and Computer Science**, *Massachusetts Institute of Technology*, Cambridge, MA
Dissertation: *Mondriaan Memory Protection*
Committee: Prof. Krste Asanović (advisor), Prof. Frans Kaashoek, Prof. Barbara Liskov

1994 **M.S. in Computer Science**, *Stanford University*, Palo Alto, CA

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

1992 **B.A. in Philosophy**, *Stanford University*, Palo Alto, CA

Professional Experience

2016–present **Professor of computer science**, *The University of Texas at Austin*, Austin, TX

2019–2023 **Principal engineer and founding member of Katana Graph**, *Katana Graph*, Austin, TX

2010–2016 **Associate professor of computer science**, *The University of Texas at Austin*, Austin, TX

Summer 2014 **Visiting researcher**, *Microsoft Research Silicon Valley (MSR-SVC)*, Mountain View, CA

Spring 2013 **Visiting scholar**, *Columbia University, computer science department*, New York, NY

2004–2010 **Assistant professor of computer science**, *The University of Texas at Austin*, Austin, TX

Research interests

My group and I are interested in low-level systems including operating systems, architecture and security. Most of my current research is about security, high-performance and concurrent systems.

Awards

2023 ACM Fellow. For contributions to high-performance, concurrent and secure systems. `https://awards.acm.org/award-recipients/witchel_4520342`

2021 Best Paper Award for Jongyul Kim, Insu Jang, Weleed Reda, Jaeseong Im, Marco Canini, Dejan Kostić, Youngjin Kwon, Simon Peter, Emmett Witchel. "LineFS: Efficient SmartNIC Offload of a Distributed File System with Pipeline Parallelism." 28th ACM Symposium on Operating Systems Principles (SOSP), October, 2021. https://sosp2021.mpi-sws.org/awards.html

2018 Best Paper Award for Yige Hu, Zhiting Zhu, Ian Neal, Youngjin Kwon, Tianyu Cheng, Vijay Chidambaram, Emmett Witchel. "TxFS: Leveraging File-System Crash Consistency to Provide ACID Transactions." 2018 USENIX Annual Technical Conference (ATC), July 2018. https://www.usenix.org/conference/atc18/presentation/hu

2016 Jay Lepreau Best Paper Award for Tyler Hunt, Zhiting Zhu, Yuanzhong Xu, Simon Peter, and Emmett Witchel. "Ryoan: A Distributed Sandbox for Untrusted Computation on Secret Data." 12th USENIX Symposium on Operating System Design and Implementation (OSDI), November 2016. https://www.usenix.org/conference/osdi16/technical-sessions/presentation/hunt

2013 Runner-up Award for Outstanding Research in Privacy Enhancing Technologies for Alan M. Dunn, Michael Z. Lee, Suman Jana, Sangman Kim, Mark Silberstein, Yuanzhong Xu, Vitaly Shmatikov, and Emmett Witchel, "Eternal Sunshine of the Spotless Machine: Protecting Privacy with Ephemeral Channels." 10th USENIX Symposium on Operating System Design and Implementation (OSDI), October 2012. https://petsymposium.org/2013/award/

2013 Runner-up best paper for Mark Silberstein, Bryan Ford, Idit Keidar and Emmett Witchel, "GPUfs: Integrating a File System with GPUs." Proceedings of the Eighteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), March 2013. http://asplos13.rice.edu/

2011 Donald E. Porter wins Bert Kay Outstanding Dissertation Award from the Computer Science Department at The University of Texas at Austin.

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

2007 NSF Career award CNS-0644205, "Operating System Support For Transactional Memory: Construction and Performance Scalability of Parallel Programs".

2004 Honorable mention ACM dissertation award.

2004 Winner of the George M. Sprowls award for outstanding thesis from the M.I.T. Electrical Engineering and Computer Science department.

Publications

As of June 2024, Google Scholar reports Witchel's h-index is 44 and i10-index is 69. His work has 9,429 citations.

All publications are refereed and peer reviewed.

Most entries have a page length (Xp). Most entries for conference papers have the acceptance rate of the conference (X%)

Journal Publications

[1] Yige Hu, Zhiting Zhu, Ian Neal, Youngjin Kwon, Tianyu Cheng, Vijay Chidambaram, and **Emmett Witchel**. TxFS: Leveraging file-system crash consistency to provide ACID transactions. volume 15, May 2019.

[2] Tyler Hunt, Zhiting Zhu, Yuanzhong Xu, Simon Peter, and **Emmett Witchel**. Ryoan: A distributed sandbox for untrusted computation on secret data. *ACM Transactions on Computer Systems*, 35(4), 2018.

[3] Youngjin Kwon, Hangchen Yu, Simon Peter, Christopher J. Rossbach, and **Emmett Witchel**. Ingens: Huge page support for the OS and hypervisor. *Operating Systems Review*, 51(1):83–93, 2017.

[4] Mark Silberstein, Sangman Kim, Seonggu Huh, Xinya Zhang, Yige Hu, Amir Wated, and **Emmett Witchel**. GPUnet: Networking abstractions for GPU programs. *ACM Transactions on Computer Systems*, 34(3), September 2016. Xp.

[5] Mark Silberstein, Bryan Ford, and **Emmett Witchel**. GPUfs: The case for operating system services on GPUs. *Communications of the ACM (CACM)*, 57(12), December 2014. 9p.

[6] Donald E. Porter, Michael D. Bond, Indrajit Roy, Kathryn S. McKinley, and **Emmett Witchel**. Practical fine-grained information flow control using laminar. *ACM Transactions on Programming Languages and Systems*, 37(1), November 2014. 51p.

[7] Mark Silberstein, Bryan Ford, Idit Keidar, and **Emmett Witchel**. GPUfs: Integrating a file system with GPUs. *ACM Transactions on Computer Systems*, 32(1), February 2014. 31p.

[8] 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.

[9] 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.

Conference Publications

[10] Henrique Fingler, Zhiting Zhu, Esther Yoon, Zhipeng Jia, **Emmett Witchel**, and Christopher J. Rossbach. DGSF: disaggregated gpus for serverless functions. In *IEEE International Parallel and Distributed Processing Symposium, IPDPS*, 2022.

[11] Zhipeng Jia and **Emmett Witchel**. Boki: Stateful serverless computing with shared logs. In *Proceedings of the 28th ACM Symposium on Operating Systems Principles (SOSP)*, October 2021. 17p.

[12] Jongyul Kim, Insu Jang, Weleed Reda, Jaeseong Im, Marco Canini, Dejan Kostić, Youngjin Kwon, Simon Peter, and **Emmett Witchel**. LineFS: Efficient smartnic offload of a distributed file system with pipeline parallelism. In *Proceedings of the 28th ACM Symposium on Operating Systems Principles (SOSP)*, October 2021. 16p.

[13] Zhipeng Jia and **Emmett Witchel**. Nightcore: Efficient and scalable serverless computing for latency-sensitive, interactive microservices. In *Proceedings of the International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, April 2021. 15p.

[14] Thomas E Anderson, Marco Canini, Jongyul Kim, Dejan Kostić, Youngjin Kwon, Simon Peter, Waleed Reda, Henry N Schuh, and **Emmett Witchel**. Assise: Performance and availability via client-local NVM in a distributed file system. In *Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation. (OSDI)*, November 2020. 16p 18%.

[15] Tyler Hunt, Zhipeng Jia, Vance Miller, Ariel Szekely, Yige Hu, Christopher J. Rossbach, and **Emmett Witchel**. Telekine: Secure computing with cloud gpus. In *17th USENIX Symposium on Networked Systems Design and Implementation (NSDI 20)*, Santa Clara, CA, February 2020. USENIX Association.

[16] Yige Hu, Zhiting Zhu, Ian Neal, Youngjin Kwon, Tianyu Cheng, Vijay Chidambaram, and **Emmett Witchel**. Txfs: Leveraging file-system crash consistency to provide acid transactions. In *Proceedings of the USENIX Annual Technical Conference (ATC)*, June 2018.

[17] Youngjin Kwon, Henrique Fingler, Tyler Hunt, Simon Peter, **Emmett Witchel**, and Thomas Anderson. Strata: A cross media file system. In *Proceedings of the 26th ACM Symposium on Operating Systems Principles (SOSP)*, Shanghai, China, October 2017.

[18] 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. 17p 18%.

[19] Tyler Hunt, Zhiting Zhu, Yuanzhong Xu, Simon Peter, and **Emmett Witchel**. Ryoan: A distributed sandbox for untrusted computation on secret data. In *Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation. (OSDI)*, Savannah, GA, November 2016. 16p 18%.

[20] Youngjin Kwon, Alan Dunn, Michael Lee, Owen Hofmann, Yuanzhong Xu, and **Emmett Witchel**. Sego: Pervasive trusted metadata for efficiently verified untrusted system services. In *Proceedings of the Twenty First International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, April 2016. 14p 22%.

[21] Yuanzhong Xu, Tyler Hunt, Youngjin Kwon, Martin Georgiev, Vitaly Shmatikov, and **Emmett Witchel**. Earp: Principled storage, sharing, and protection for mobile apps. In *Proceedings of the 7th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, April 2016. 16p 17%.

[22] Yuanzhong Xu and **Emmett Witchel**. Maxoid: Transparently confining mobile applications with custom views of state. In *Proceedings of the 10th ACM European Conference on Computer Systems (EuroSys)*, Bordeaux, France, April 2015. 16p 21%.

[23] Sangman Kim, Seonggu Huh, Yige Hu, Xinya Zhang, Amir Watad, **Emmett Witchel**, and Mark Silberstein. GPUnet: Networking abstractions for GPU programs. In *Proceedings*

of the 11th USENIX Symposium on Operating Systems Design and Implementation. (OSDI), Broomfield, CO, October 2014. 16p 22%.

[24] Yuanzhong Xu, Alan M. Dunn, Owen S. Hofmann, Michael Z. Lee, Syed Akbar Mehdi, and **Emmett Witchel**. Application-defined decentralized access control. In *Proceedings of the USENIX Annual Technical Conference (ATC)*, June 2014. 13p 18%.

[25] Michael Z. Lee, Alan M. Dunn, Jonathan Katz, Brent Waters, and **Emmett Witchel**. Anon-Pass: Practical anonymous subscriptions. In *Proceedings of the IEEE Symposium on Security and Privacy (Oakland)*, May 2013. 15p 12%.

[26] Owen S. Hofmann, Alan M. Dunn, Sangman Kim, Michael Z. Lee, and **Emmett Witchel**. InkTag: Secure applications on an untrusted operating system. In *Proceedings of the Eighteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2013. 14p 23%.

[27] Mark Silberstein, Bryan Ford, Idit Keidar, and **Emmett Witchel**. GPUfs: Integrating a file system with GPUs. In *Proceedings of the Eighteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2013. 13p 23%.

[28] Alan M. Dunn, Michael Z. Lee, Suman Jana, Sangman Kim, Mark Silberstein, Yuanzhong Xu, Vitaly Shmatikov, and **Emmett Witchel**. Eternal sunshine of the spotless machine: Protecting privacy with ephemeral channels. In *Proceedings of the 10th USENIX Symposium on Operating Systems Design and Implementation. (OSDI)*, Hollywood, California, December 2012. 15p 12%.

[29] Sangman Kim, Michael Lee, Alan Dunn, Owen S. Hofmann, Xuan Wang, **Emmett Witchel**, and Donald E. Porter. Improving server applications with system transactions. In *Proceedings of the 7th ACM European conference on Computer systems (EuroSys)*, Bern, Switzerland, April 2012. 14p 14%.

[30] Chistopher 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%.

[31] Alan Dunn, Owen S. Hofmann, Brent Waters, and **Emmett Witchel**. Cloaking malware with the trusted platform module. In *Proceedings of the 20th USENIX Security Symposium (USENIX Security)*, 2011. 16p 17%.

[32] Owen S. Hofmann, Alan Dunn, Sangman Kim, Indrajit Roy, and **Emmett Witchel**. Ensuring operating system kernel integrity with OSck. In *Proceedings of the Sixteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2011. 12p 21%.

[33] Indrajit Roy, Srinath Setty, Ann Kilzer, Vitaly Shmatikov, and **Emmett Witchel**. Airavat: Security and privacy for MapReduce. In *Proceedings of the 7th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, April 2010. 16p 17%.

[34] Donald E. Porter and **Emmett Witchel**. Understanding transactional memory performance. In *Proceedings of the 2010 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, March 2010. 15p 34%.

[35] 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%, Reported in the New York Times `http://www.nytimes.com/2009/09/22/science/22decode.html`.

[36] 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%.

[37] 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%.

[38] Indrajit Roy, Donald E. Porter, Michael D. Bond, Kathryn S. McKinley, and **Emmett Witchel**. Laminar: Practical fine-grained decentralized information flow control. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, June 2009. 12p 21%.

[39] 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%.

[40] Hany E. Ramadan, Indrajit Roy, Maurice Herlihy, and **Emmett Witchel**. Committing conflicting transactions in an STM. In *Proceedings of the 14th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, February 2009. 12p 24%.

[41] 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%.

[42] Jonathan Wildstrom, Peter Stone, and **Emmett Witchel**. Carve: a cognitive agent for resource value estimation. In *The Fifth International Conference on Autonomic Computing (ICAC)*, June 2008. 9p 38%.

[43] 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%.

[44] Justin Brickell, Donald E. Porter, Vitaly Shmatikov, and **Emmett Witchel**. Privacy-preserving remote diagnostics. In *ACM Conference on Computer and Communications Security*, Alexandria, VA, 2007. 10p 18%.

[45] Hany E. Ramadan, Christopher J. Rossbach, Donald E. Porter, Owen Hofmann, Aditdya 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%.

[46] 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%.

[47] Jonathan Wildstrom, Peter Stone, **Emmett Witchel**, and Mike Dahlin. Machine learning for on-line hardware reconfiguration. In *The Twentieth International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, India, January 2007. 8p 16%.

[48] 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%.

[49] **Emmett Witchel**, Jungwhan Rhee, and Krste Asanović. Mondrix: Memory isolation for Linux using Mondriaan memory protection. In *Proceedings of the 20th ACM Symposium on Operating Systems Principles (SOSP)*, October 2005. 14p 13%.

[50] Andrew Ayers, Chris Metcalf, Junghwan Rhee, Richard Schooler, Anant Agarwal, and **Emmett Witchel**. TraceBack: First fault diagnosis by reconstruction of distributed control flow. In *Proceedings of the ACM SIGPLAN 2005 Conference on Programming Language Design and Implementation (PLDI)*, Chicago, USA, June 2005. 12p 21%.

[51] Jonathan Wildstrom, Peter Stone, **Emmett Witchel**, Raymond J. Mooney, and Mike Dahlin. Towards self-configuring hardware for distributed computer systems. In *The Second International Conference on Autonomic Computing (ICAC)*, June 2005. 9p 21%.

[52] **Emmett Witchel**, Josh Cates, and Krste Asanović. Mondrian memory protection. In *Proceedings of the Tenth ACM International Conference on Architectural Support for Programming Lnaguages and Operating Systems (ASPLOS-X)*, October 2002. 13p 18%.

[53] Samuel Larsen, **Emmett Witchel**, and Saman Amarasinghe. Increasing and detecting memory address congruence. In *Proceedings of the 11th International Conference on Parallel Architectures and Compilation Techniques (PACT)*, September 2002. 12p 21%.

[54] **Emmett Witchel**, Sam Larsen, C. Scott Ananian, and Krste Asanović. Direct addressed caches for reduced power consumption. In *Proceedings of the 34th Annual International Symposium on Microarchitecture (MICRO-34)*, December 2001. 11p 20%.

[55] David Mazières, Michael Kaminsky, M. Frans Kaashoek, and **Emmett Witchel**. Separating key management from file system security. In *Proceedings of the 17th ACM Symposium on Operating Systems Principles (SOSP)*, 1999. 14p 21%.

[56] **Emmett Witchel** and Mendel Rosenblum. Embra: Fast and flexible machine simulation. In *ACM Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, pages 68–79, 1996. 12p 22%.

[57] Mendel Rosenblum, Edouard Bugnion, Stephen A. Herrod, **Emmett Witchel**, and Anoop Gupta. The impact of architectural trends on operating system performance. In *Proceedings of the 15th ACM Symposium on Operating Systems Principles (SOSP)*, December 1995. 14p 26%.

[58] Mendel Rosenblum, Stephen A. Herrod, **Emmett Witchel**, and Anoop Gupta. Complete computer simulation: The SimOS approach. In *IEEE Parallel and Distributed Technology*, 1995. 10p.

Workshop and Other Publications

[59] Henrique Fingler, Zhiting Zhu, Esther Yoon, Zhipeng Jia, Emmett Witchel, and Christopher J. Rossbach. Disaggregated gpu acceleration for serverless applications. *SIGOPS Oper. Syst. Rev.*, 57(1):10–20, jun 2023.

[60] Tyler Hunt, Zhipeng Jia, Vance Miller, Christopher J. Rossbach, and **Emmett Witchel**. Isolation and beyond: Challenges for system security. In *Proceedings of the 16th Workshop on Hot Topics in Operating Systems (HotOS)*, Bertinoro, Italy, 2019.

[61] Tyler Hunt, Congzheng Song, Reza Shokri, Vitaly Shmatikov, and **Emmett Witchel**. Chiron: Privacy-preserving machine learning as a service. `https://arxiv.org/abs/1803.05961`.

[62] Yige Hu, Youngjin Kwon, Vijay Chidambaram, and **Emmett Witchel**. From crash consistency to transactions. In *Proceedings of the 16th Workshop on Hot Topics in Operating Systems (HotOS)*, Whistler, Canada, 2017.

[63] Zhiting Zhu, Sangman Kim, Yuri Rozhanski, Yige Hu, **Emmett Witchel**, and Mark Silberstein. Understanding the security of discrete gpus. In *Proceedings of the General Purpose GPUs (GPGPU)*, Austin, TX, February 2017.

[64] 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%.

[65] 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.

[66] **Emmett Witchel**. Considerations for mondriaan-like systems. In *The 8th Annual Workshop on Duplicating, Deconstructing, and Debunking (WDDD)*, 2009. 7p.

[67] Donald E. Porter and **Emmett Witchel**. Operating systems should provide transactions. In *The 12th Workshop on Hot Topics in Operating Systems (HotOS)*, 2009. 6p 26%.

[68] Hany E. Ramadan and **Emmett Witchel**. The xfork in the road to coordinated sibling transactions. In *Proceedings of the 4th Workshop on Transactional Computing (TRANSACT)*, Raleigh, NC, February 2009. 11p 39%.

[69] Owen S. Hofmann, Donald E. Porter, Christopher J. Rossbach, Hany E. Ramadan, and **Emmett Witchel**. Solving difficult HTM problems without difficult hardware. In *Proceedings of the 2nd Workshop on Transactional Computing (TRANSACT)*, Portland, OR, August 2007. 11p 48%.

[70] Donald E. Porter, Owen S. Hofmann, and **Emmett Witchel**. Is the optimism in optimistic concurrency warranted? In *The 11th Workshop on Hot Topics in Operating Systems*, 2007. 6p 22%.

[71] 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.

[72] **Emmett Witchel** and Krste Asanović. Hardware works, software doesn't: Enforcing modularity with mondriaan memory protection. In *The 9th Workshop on Hot Topics in Operating Systems (HotOS)*, 2003. 6p 22%.

[73] Krste Asanović, Mark Hampton, Ronny Krashinsky, and **Emmett Witchel**. Energy-exposed instruction sets. In R. Graybill and R. Melhem, editors, *Power Aware Computing*. Kluwer Academic/Plenum Publishers, 2002. 21p.

[74] **Emmett Witchel** and Krste Asanović. The span cache: Software controlled tag checks and cache line size. In *Workshop on Complexity-Effective Design, held with ISCA-28*, June 2001. 12p.

[75] **Emmett Witchel** and M. Frans Kaashoek. Using software-extended architectures for software simultaneous multithreading. Technical report MIT-LCS-TR-878, MIT, 1997/2003.

Software

Witchel's group hosts its public code on GitHub `https://github.com/ut-osa/`.

Funding

01/23–01/28 The PRISM center in JUMP 2.0, a semiconductor research corporation (SRC) program sponsored by DARPA. PI and co-director of the system theme.

09/20–08/23 NSF CNS-2008321, "CNS Core: Small: Operating Systems Abstractions for Serverless Computing" PI $500,000.

09/19–08/23 NSF CNS-1900457, "CNS Core: Medium: Collaborative Research: Cross Layer File Systems" with Simon Peter, PI. $755,000.

09/16–08/19 NSF CNS-1618563, "CSR:Small:Performance and Fairness with Multiple Page Sizes," with Christopher J. Rossbach, PI. $500,000.

02/16 Google Research Award. Verifying and Confining Computational Pipelines Using SGX. $51,500.

09/13–08/17 NSF CCF-1333594, "XPS:CLCCA:Collaborative Research:Harnessing Highly Threaded Hardware for Server Workloads," Also with Alvin R. Lebeck (Duke University). $341,617.

09/12–08/16 NSF CNS-1228843, "TWC: Medium: Collaborative: Trustworthy Programs Without A Trustworthy Operating System," Also with Donald E. Porter. $500,000.

01/12–12/15 NIH R01 LM011028-01 from the National Library of Medicine "Secure Sharing of Clinical History & Genetic Data: Empowering Predictive Personalized Medicine," Also with C. David Page (University of Wisconsin, PI), Somesh Jha (University of Wisconsin), Jeffery Naugton (University of Wisconsin), Justin B Starren (Marshfield Clinic Research Foundation), Vitaly Shmatikov $2,741,987.

09/10–09/11 NVIDIA Research Award. $25,000.

09/10–09/13 NSF CNS-1017785, "CSR: Small: Operating System Abstractions for GPU-Accelerated Interactive Applications," Also with Christopher J. Rossbach $500,000.

1/10–12/12 Google Research Award. New privacy and security mechanisms for the MapReduce framework. Also with Vitaly Shmatikov $50,000.

09/09–09/13 NSF CNS-0905602, "TC: Medium: Collaborative Research: Securing Concurrency in Modern Systems," Also with Vitaly Shmatikov and Jedidiah Crandall (University of New Mexico) $799,998.

03/08–03/09 DARPA Computer Science Study Group, RA07-43. Phase 1. "Programming Parallel Architectures," Top Secret security clearance held by the Institute for Defense Analyses (IDA). $100,000.

01/08 Sun Microsystems OpenSPARC program, T2000 server, $21,495.

12/07 Multicore architecture support for operating systems and real-time 3D graphics. Also with William R. Mark. Intel Equipment Grant 48395. $40,000.

1/07–1/12 NSF Career award CNS-0644205, "Operating System Support For Transactional Memory: Construction and Performance Scalability of Parallel Programs," $400,000.

8/06–8/09 CNS-0615104 "Autonomic Systems: Integrating Machine Learning with Computer Systems," Also with P. Stone, R. Mooney, Y. Zhang, V. Shmatikov. $880,000.

4/05–4/06 Microsoft Corporation, "Navel: Automating software support using traces of software behavior," $49,500.

9/04–6/06 DARPA, "Architectures for Cognitive Information Processing," Co-PI with Prof. Peter Stone, also with S. Keckler, R. Mooney, R. Mikkulainen, and D. Burger. $450,000.

Patents

2007 7,287,140 System and Technique for Fine-Grained Computer Memory Protection. Krste Asanović and Emmett Witchel. U.S. Patent, filed July 27, 2004, granted October 23, 2007.

2004 6,748,584 Method for Determining the Degree to which Changed Code has been Exercised. Emmett Witchel, Chris Metcalf, Andy Ayers. U.S. Patent, filed December 29, 1999, granted June 8, 2004.

Professional Service

2024 Co-chair for SOSP, Symposium on operating systems principles.

2019 Program co-chair for ASPLOS, Architectural support for programming languages and operating systems.

2018 Chair of SIGOPS Dennis M. Ritchie Award doctoral dissertation award committee.

2016 Program co-chair for SYSTOR 2016, the ACM international systems and storage conference.

2016 Chair, ASPLOS debate: "Programmer Productivity in a World of Mushy Interfaces: Challenges of the Post-ISA Reality."

2015 Chair of SIGOPS Dennis M. Ritchie Award doctoral dissertation award committee.

2014 Panel member at ASPLOS debate: "Resolved: Specialized architectures, languages, and system software should largely supplant general-purpose alternatives within the next decade."

2008 Panel member at TRANSACT, ACM SIGPLAN Workshop on Transactional Computing.

2007 Organized and moderated panel discussion at the Workshop on the Interaction between Computer Architecture and Operating Systems (WIOSCA) at ISCA-34. Participants: Konrad Lai (Intel) Beng-Hong Lim (VMware) Chuck Moore (AMD) Burton Smith (Microsoft) James Smith (Wisconsin) Michael Swift (Wisconsin) Yuanyuan Zhou (UIUC)

Program committee membership

2024 USENIX ATC, the USENIX Annual Technical Conference.

2024 EuroSys

2024 ASPLOS, Architectural support for programming languages and operating systems.

2024 ASPLOS Distinguished reviewer. `https://www.asplos-conference.org/asplos2024/distinguished-reviewers/`

2023 SOSP, Symposium on operating systems principles.

2023 USENIX ATC, the USENIX Annual Technical Conference.

2022 ASPLOS, Architectural support for programming languages and operating systems.

2020 OSDI, Operating systems design and implementation.

2020 IEEE Security and Privacy.

2020 ASPLOS, Architectural support for programming languages and operating systems.

2019 SOSP, Symposium on operating systems principles.

2017 ASPLOS, Architectural support for programming languages and operating systems.

2017 IEEE Security and Privacy.

2016 ASPLOS, Architectural support for programming languages and operating systems.

2015 SOSP, Symposium on operating systems principles.

2015 SYSTOR, the ACM international systems and storage conference.

2014 OSDI, Operating systems design and implementation.

2014 USENIX ATC, the USENIX Annual Technical Conference.

2014 ASPLOS, Architectural Support for Programming Languages and Operating Systems.

2013 ASPLOS, Architectural support for programming languages and operating systems.

2012 USENIX ATC, the USENIX annual technical conference.

2011 SOSP, Symposium on operating systems principles.

2010 OSDI, Operating systems design and implementation.

2010 ASPLOS, Architectural support for programming languages and operating systems.

2009 MICRO, the IEEE/ACM international symposium on microarchitecture.

2009 ISCA, the international symposium on computer architecture.

2008 USENIX ATC, the USENIX annual technical conference.

2008 PLDI, Programming langugages, design and implementation.

2008 ASPLOS, Architectural support for programming languages and operating systems.

2006 ICAC, the international conference on autonomic computing.

External review committees

2015 MICRO, the IEEE/ACM international symposium on microarchitecture.

2015 ISCA, the international symposium on computer architecture.

2015 ASPLOS, Architectural support for programming languages and operating systems.

2012 MICRO, the IEEE/ACM international symposium on microarchitecture.

Workshop program committees

2014 APSys, the ACM Asia-Pacific workshop on systems.

2008 TRANSACT, ACM SIGPLAN Workshop on transactional computing.

2007 HotOS, the Workshop on hot topics in operating systems.

2006 Workshop on introspective architectures, held with HPCA.

2006 SysML, the first workshop on tackling computer systems problems with machine learning techniques, held with SIGMETRICS.

Post-doctoral Researchers

2011–2013 Mark Silberstein, Assistant Professor, Technion – Israel Institute of Technology.

2009–2010 Christopher J. Rossbach, Microsoft Research, Silicon Valley (MSR-SVC).

Current Doctoral Students

Zhiting Zhu (expected graduation 2024)

Newton Ni (expected graduation 2028)

Yibo Huang (expected graduation 2029)

Haowei Chen (expected graduation 2030)

Graduated Graduate Students

All doctoral students unless noted.

Students listed with post-graduation affiliation.

2022/05 Zhipeng Jia "Designing Systems for Emerging Serverless Applications" SystemsResearch@Google.

2020/12 Yige Hu "File system designs on low-latency storage devices," Katana Graph.

2020/08 Tyler Hunt "Private Computation on Public Clouds," Katana Graph.

2018/08 Youngjin Kwon "Designing Systems for Emerging Memory Technologies," Korea Advanced Institute of Science and Technology (KAIST).

2016/08 Yuanzhong Xu "Platform-level Protection for Interacting Mobile Apps," Facebook.

2015/08 Sangman Kim "Networking Abstractions for GPU Programs," Pure Storage.

2014/08 Alan M. Dunn "Private Environments for Programs," Google.

2013/12 Owen S. Hofmann. "Rethinking Operating System Trust," Google.

2010/12 Donald E. Porter. "Operating System Transactions," Assistant Professor at Stony Brook University. Bert Kay Outstanding Dissertation Award from the Computer Science Department at The University of Texas at Austin.

2010/08 Indrajit Roy. "Protecting Sensitive Information from Untrusted Code," Researcher at HP Labs, Palo Alto.

2009/08 Christopher J. Rossbach. "Hardware Transactional Memory: A Systems Perspective" (Ph.D. 08/09), post-doctoral researcher at UT Austin, Researcher at Microsoft Research, SVC.

2009/08 Hany E. Ramadan. "Transactional Memory Concurrency: New Models and Systems," Assistant Professor at King Abdullah University of Science and Technology (KAUST).

2008/06 Jason V. Davis. "Mining Statistical Correlations with Applications to Software Analysis," co-advised with Inderjit Dhillon.

2005/06 Junghwan Rhee (Masters, doctoral student at Purdue)

Dissertation committees

2023/09 Soujanya Ponnapalli (advisor: Vijay Chidambaram) Minimizing I/O Bottlenecks to Achieve Scalable and High-Throughput Systems

2023/03 Seyed Ali Fakhrzadehgan, (advisor: Mattan Erez) Practical Integrity Protection Mechanisms for Large-Scale Memory Systems

2021/08 Jayashree Mohan (advisor: Vijay Chidambaram) Accelerating Deep Learning Training : A Storage Perspective

2021/04 Ben Lin, (advisor: Yale Patt) Mitigating Bank Conflicts in Main Memory via Selective Data Duplication and Migration

2020/12 Hangchen Yu (advisor: Christopher J. Rossbach) Accelerating Virtualization of Accelerators

2019/05 Tayler Hetherington (advisor: Tor Aamodt, University of British Columbia) "Software-Hardware Co-design for Energy Efficient Datacenter Computing"

2018/08 Sebastian Angel (advisor: Michael Walfish, NYU) Unobservable communication over untrusted infrastructure

2017/08 Trinabh Gupta (advisor: Michael Walfish, NYU) Toward practical and private online services

2016/07 Chao Xie (advisor: Lorenzo Alvisi) "High-performance Trasactional Storage"

2015/10 Ivan Jibaja (advisor: Kathryn McKinley) "Exploiting Hardware Heterogeneity and Parallelism for Performance and Energy Efficiency of Managed Languages"

2015/06 Joshua Leners (advisor: Michael Walfish) "A New Approach to Detecting Failures in Distributed Systems"

2015/04 Donald Nguyen (advisor: Keshav Pingali) "Galois: A System for Parallel Execution of Irregular Algorithms"

2014/12 Yang Wang (advisor: Lorenzo Alvisi) "Separating Data from Metadata for Robustness and Scalability"

2014/12 Manos Kapritsos (advisor: Lorenzo Alvisi) "Replicating Multithreaded Services"

2014/12 Sangmin Lee (advisor: Mike Dahlin) "Towards A Privacy-preserving Platform for Apps"

2014/05 Jeremy Andrus (advisor: Jason Nieh, Columbia University) "Multi-Persona Mobile Computing"

2013/08 Ioannis Rouselakis (advisor: Brent Waters) "Attribute-Based Encryption: Robust and Efficient Constructions"

2012/12 David L. Rager (advisor: Warren A. Hunt Jr.) "Parallelizing an Interactive Theorem Prover: Functional Programming and Proofs with ACL2"

2012/05 Prince Majahan (advisor: Michael Dahlin) "Highly Available Storage with Minimal Trust"

2011/08 Boris Grot (advisor: Stephen W. Keckler) "Network-on-Chip Architectures for Scalability and Service Guarantees"

2010/12 Allen Clement (advisor: Lorenzo Alvisi) "New Models for State Machine Replication"

2010/08 Jennifer B. Sartor (advisor: Kathryn McKinely) "The Limits of Heap Data Compression"

2009/12 Jungwoo Ha "Scaling Managed Runtime Systems for Future Multicore Hardware" (advisor: Kathryn McKinley)

2009/05 Justin Lee Brickell (advisor: Vitaly Shmatikov) "Privacy-Preserving Computation for Data Mining"

2009/01 Maria Jump (advisor: Kathryn McKinley) "Dynamic, Instance-Based Object Analysis for Optimization"

2008/12 Michael Bond (advisor: Kathryn McKinley) "Detecting and Tolerating Software Bugs after Deployment"

2008/08 Jiandan Zheng (advisor: Michael Dahlin) "Universal Data Replication Architecture"

2008/05 Jeffrey Napper (advisor: Lorenzo Alvisi) "Robust Multithreaded Applications"

2007/12 Moinuddin Qureshi (advisor: Yale Patt) "Adaptive mechanisms to manage capacity caches in high performance systems"

2006/12 Amol Nayate (advisor: Michael Dahlin) "Transparent Replication"

Invited lectures

2024/04 "Challenges and Opportunities for Systems Using CXL Memory," Keynote address at ASPLOS, Architectural support for programming languages and operating systems in San Diego.

2022/12 "Stateful Serverless Applications on Distributed Logs," Presented at Cornell University in Ithaca, NY.

2022/10 "Stateful Serverless Applications on Distributed Logs," Presented at UC Berkeley systems colloquium

2022/10 "Stateful Serverless Applications on Distributed Logs," Presented in the Distinguished Lecture Series at Texas A&M University-Kingsville (TAMUK)

2018/09 "Hardware Support for Security." Presented at Cornell Tech in New York City and Cornell University in Ithaca, NY.

2017/09 Security and Privacy Roundtable. Disruptive Technology Conference, The University of Texas Department of Electrical and Computer Engineering.

2015/11 "Securing Personal Data in Modern App Ecosystems," Presented at Georgia Tech, Atlanta, GA.

2014/11 "Trust Your Computer Less: Trusted Services From an Untrusted OS," Presented at Rice University, Houston, TX.

2014/06 "Trust Your Computer Less: Trusted Services From an Untrusted OS," Presented at Microsoft Research Silicon Valley, Mountain View, CA.

2013/05 "InkTag: Trusted Applications Without A Trusted Operating System," Presented at Google, New York, NY.

2013/05 "InkTag: Trusted Applications Without A Trusted Operating System," Presented at Stony Brook University, Stony Brook, NY.

2013/02 "Rethinking OS Trust," Presented at Columbia University, New York, NY.

2012/11 "Trust Your Computer Less," Presented at The University of California, Berkeley, Berkeley, CA.

2012/06 "ACID: The Wrong Way to Think About Concurrency," Keynote address, The 5th International Conference in Storage and Systems (SYSTOR) 2012, Haifa, Israel.

2011/12 "Operating System Support For GPUs," Presented at Columbia University, New York, NY.

2011/04 "Operating system transactions," Presented at Texas State University, San Marcos, TX.

2010/11 "Operating system abstractions for GPU processors," Presented at the Univerity of Wisconsin, Madison, Madison, WI.

2009/04 "Making Transactions Work One Systems Problem at a Time," Presented at the University of California at Berkeley, Berkeley, CA.

2008/03 "Transactional Memory and the Operating System," Presented at the University of Washington, Seattle, WA.

2008/01 "Transactional Memory and the Operating System," Presented at Stanford University, Stanford, CA.

2008/01 "Transactional Memory and the Operating System," Presented at MIT, Cambridge, MA.

2007/12 "Transactional Memory and the Operating System," Presented at Columbia University, New York, NY.

2007/10 "Transactional Memory and the Operating System," Presented at Microsoft research, Seattle, WA.

2007/08 "Transactional Memory Research Directions," Panelist at the ACM TRANSACT workshop, Portland OR.

2005/10 "Mondrix: Memory Isolation for Linux using Mondriaan Memory Protection." Presented at the ACM Symposium on Operating Systems Principles, Brighton, UK.

2005/06 "Navel: Automating software support using traces of software behavior." Presented at the Microsoft Phoenix compiler research workshop.

2005/06 "Traceback: First fault Diagnosis by reconstruction of distributed control flow." Presented at the ACM Conference on Programming Language Design and Implementation, Chicago.

2004/01 "Mondriaan Memory Protection." Presented to Microsoft research, and University of Washington.

2003/10 "Painting Kernel Permissions with Mondriaan Memory Protection." Presented at IBM Research Austin.

2003/03-04 "Mondriaan Memory Protection." Presented at Harvard University, University of Pennsylvania, Brown University, University of Southern California, University of Texas at Austin, Rotchester University, University of California at Davis, University of California at Santa Barbara, and University of Colorado.

Outreach lectures

2015/05 "Computer Security: A Practical Introduction," Presented at Liberal Arts and Science Academy (LASA), Austin, TX.

2006/07 "Yay, Computer Science," lead presentation to First Bytes computer camp for High School women seniors.

2005/06 "Yay, Computer Science," presentation to First Bytes computer camp for High School women seniors, and High School seniors admitted to UT-Austin's computer science honors program—the Turing Scholars.

2004/08 "How to Get a Top-10 Job." Presented to UT graduate students.