

Michael W. Hicks

September 16, 2024

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Education

BS, with honors, Pennsylvania State University 1993 (Computer Science).

MS, University of Pennsylvania 1996 (Computer and Information Science).

PhD, University of Pennsylvania August, 2001 (Computer and Information Science).

Appointments

Senior Principal Applied Scientist (January 2022–present), Amazon Web Services

Professor Emeritus (January 2023–present), Computer Science, University of Maryland.

Chief Technology Officer (September 2018–December 2021), Correct Computation, Inc.

Professor (July 2013–December 2022), Computer Science, University of Maryland.

(Assistant and Associate professor from July 2002–2013.)

Associate Co-Chair for Undergraduate Education (September 2017–December 2021), Department of Computer Science, University of Maryland.

Consultant (August–November 2020) Covington and Burling, LLP.

Consultant (June 2019–July 2020), Stealth Software Technologies, Inc.

Consultant (February 2014–2017), Wilson Sonsini Goodrich and Rosati.

Visiting Researcher (June 2015–Aug. 2015), Microsoft Research, Redmond.

Director (October 2011–2013), Maryland Cybersecurity Center, University of Maryland.

Affiliate Faculty (2005–2011), Electrical Engineering, University of Maryland.

Adjunct (2006–2015), Institute for Defense Analyses Center for Computing Sciences, Bowie, MD.

Visiting Researcher (Sep. 2008–Nov. 2008), Microsoft Research, Cambridge, the United Kingdom.

Post-doctoral Research Associate (2001–2002), Computer Science, Cornell University, Ithaca, New York.

Scientist (1998–1999), NEC Research Institute, Princeton, New Jersey.

Software Engineer (1993–1996), ARINC, Inc.

Scientific Publications

Co-author of 152 peer-reviewed scientific papers

complete list at <https://mhicks.me/papers/mwh.html>

13346 citations and H-index of 55, per Google Scholar

(<https://scholar.google.com/citations?user=Gggzp7UAAAAJ&hl=en>)

Publications, Last 4 Years

(2024)

Joseph W. Cutler, Craig Disselkoen, Aaron Eline, Shaobo He, Kyle Headley, Michael Hicks, Kesha Hietala, Eleftherios Ioannidis, John Kastner, Anwar Mamat, Darin McAdams, Matt McCutchen, Neha Rungta, Emina Torlak, and Andrew Wells. Cedar: A new language for expressive, fast, safe, and analyzable authorization (extended version). In *Proceedings of the ACM Conference on Object-Oriented Programming Languages, Systems, and Applications (OOPSLA)*, April 2024.

Craig Disselkoen, Aaron Eline, Shaobo He, Kyle Headley, Michael Hicks, Kesha Hietala, John Kastner, Anwar Mamat, Matt McCutchen, Neha Rungta, Bhakti Shah, Emina Torlak, and Andrew Wells. How we built cedar: A verification-guided approach. In *Proceedings of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)*, July 2024. Industry papers track.

(2023)

Kesha Hietala, Robert Rand, Liyi Li, Shih-Han Hung, Xiaodi Wu, and Michael Hicks. A verified optimizer for quantum circuits. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, July 2023. Extends POPL'21 paper.

Yuxiang Peng, Kesha Hietala, Runzhou Tao, Liyi Li, Robert Rand, Michael Hicks, and Xiaodi Wu. A formally certified end-to-end implementation of Shor's factorization algorithm. *Proceedings of the National Academy of Sciences*, 120(21), May 2023.

Jie Zhou, John Criswell, and Michael Hicks. Fat pointers for temporal memory safety of C. In *Proceedings of the ACM Conference on Object-Oriented Programming Languages, Systems, and Applications (OOPSLA)*, April 2023.

Haowei Deng, Yuxiang Peng, Michael Hicks, and Xiaodi Wu. Automating NISQ application design with meta quantum circuits with constraints (MQCC). *ACM Transactions on Quantum Computing (TQC)*, 4(3), April 2023.

Zenong Zhang, George Klees, Eric Wang, Michael Hicks, and Shiyi Wei. Fuzzing configurations of program options. *ACM Transactions on Software Engineering and Methodology (TOSEM)*, 32(2), March 2023. A shorter version appeared at the 2022 Fuzzing Workshop.

Michael Coblenz, April Porter, Varun Das, Teja Nallagorla, and Michael Hicks. A multimodal study of challenges using Rust. In *Proceedings of the Workshop on the Evaluation and Usability of Programming Languages and Tools (PLATEAU)*, February 2023.

Ian Sweet, David Darais, David Heath, Ryan Estes, Bill Harris, and Michael Hicks. Symphony: Expressive secure multiparty computation with coordination. *⟨Programming⟩*, 7(14), February 2023.

Finn Voichick, Robert Rand, and Michael Hicks. Qunity: A unified language for quantum and classical computing. In *Proceedings of the ACM Conference on Principles of Programming Languages (POPL)*, January 2023.

(2022)

Liyi Li, Finnegan Voichick, Kesha Hietala, Yuxiang Peng, Xiaodi Wu, and Michael Hicks. Verified compilation of quantum oracles. In *Proceedings of the ACM Conference on Object-Oriented Programming Languages, Systems, and Applications (OOPSLA)*, December 2022.

Aravind Machiry, John Kastner, Matt McCutchen, Aaron Eline, Kyle Headley, and Michael Hicks. C to Checked C by 3C. In *Proceedings of the ACM Conference on Object-Oriented Programming Languages, Systems, and Applications (OOPSLA)*, December 2022. **Distinguished Paper.**

Kelsey R. Fulton, Daniel Votipka, Desiree Abrokwa, Michelle L. Mazurek, Michael Hicks, and James Parker. Understanding the how and the why: Exploring secure development practices through a course competition. In *Proceedings of the ACM Conference on Computer and Communications Security (CCS)*, October 2022.

Liyi Li, Yiyun Liu, Deena L. Postol, Leonidas Lampropoulos, David Van Horn, and Michael Hicks. A formal model of Checked C. In *Proceedings of the Computer Security Foundations Symposium (CSF)*, August 2022.

Michael Coblenz, Michelle Mazurek, and Michael Hicks. Does the bronze garbage collector make rust easier to use? a controlled experiment. In *Proceedings of the International Conference on Software Engineering (ICSE)*, May 2022. **Distinguished Paper Award Nominee.**

(2021)

- Kelsey Fulton, Anna Chan, Dan Votipka, Michael Hicks, and Michelle Mazurek. Benefits and drawbacks of adopting a secure programming language: Rust as a case study. In *Proceedings of the Symposium on Usable Privacy and Security (SOUPS)*, August 2021.
- Zenong Zhang, Zach Patterson, Michael Hicks, and Shiyi Wei. Fixreverter: A realistic bug injection methodology for benchmarking fuzz testing. In *Proceedings of the USENIX Security Symposium (USENIX SEC)*, August 2022. **Distinguished Paper.**
- Souvik Bhattacharjee, Gang Liao, Michael Hicks, and Daniel J. Abadi. Bullfrog: Online schema evolution via lazy evaluation. In *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD)*, June 2021.
- Kesha Hietala, Liyi Li, Akshaj Gaur, Aaron Green, Robert Rand, Xiaodi Wu, and Michael Hicks. Applying and expanding the VOQC toolkit. In *Informal Proceedings of the Workshop on Programming Languages and Quantum Computing (PLanQC)*, June 2021.
- Kesha Hietala, Robert Rand, Shih-Han Hung, Liyi Li, and Michael Hicks. Proving quantum programs correct. In *Proceedings of the Conference on Interactive Theorem Proving (ITP)*, June 2021.
- Ian Sweet, David Darais, David Heath, Ryan Estes, William Harris, and Michael Hicks. Symphony: A concise language model for MPC. In *Informal Proceedings of the Workshop on Foundations on Computer Security (FCS)*, June 2021.
- Finn Voichick and Michael Hicks. Toward a quantum programming language for higher-level formal verification. In *Informal Proceedings of the Workshop on Programming Languages and Quantum Computing (PLanQC)*, June 2021.
- Zenong Zhang, George Klees, Eric Wang, Michael Hicks, and Shiyi Wei. Fuzzing configurations of program options. In *Proceedings of the International Fuzzing Workshop*, April 2022.
- Kesha Hietala, Robert Rand, Shih-Han Hung, Xiaodi Wu, and Michael Hicks. A verified optimizer for quantum circuits. In *Proceedings of the ACM Conference on Principles of Programming Languages (POPL)*, January 2021. **Distinguished Paper.**

Other Notable Publications

- Daniel Votipka, Kelsey Fulton, James Parker, Matthew Hou, Michelle L. Mazurek, and Michael Hicks. Understanding security mistakes developers make: Qualitative analysis from Build It, Break It, Fix It. In *Proceedings of the USENIX Security Symposium (USENIX SEC)*, August 2020. **Distinguished Paper Award**
- George T. Klees, Andrew Ruef, Benjamin Cooper, Shiyi Wei, and Michael Hicks. Evaluating Fuzz Testing. In *Proceedings of the ACM Conference on Computer and Communications Security (CCS)*, October 2018. **Winner of the NSA Best Scientific Cybersecurity Paper Competition**
- Chang Liu, Austin Harris, Martin Maas, Michael Hicks, Mohit Tiwari, and Elaine Shi. Ghost rider: A hardware-software system for memory trace oblivious computation. In *Proc. of the International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2015. **Winner of Best Paper Award.**
- Christopher M. Hayden, Karla Saur, Edward K. Smith, Michael Hicks, and Jeffrey S. Foster. Efficient, general-purpose dynamic software updating for C. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, 36(4):13, October 2014.
- Aseem Rastogi, Matthew A. Hammer, and Michael Hicks. Wysteria: A programming language for generic, mixed-mode multiparty computations. In *Proc. of the IEEE Symposium on Security and Privacy (Oakland)*, May 2014.
- Chang Liu, Michael Hicks, and Elaine Shi. Memory trace oblivious program execution. In *Proc. of the Computer Security Foundations Symposium (CSF)*, June 2013. **Winner of the NSA Best Scientific Cybersecurity Paper Competition**

- Yit Phang Khoo, Jeffrey S. Foster, and Michael Hicks. Expositor: Scriptable Time-Travel Debugging with First Class Traces. In *Proceedings of the International Conference on Software Engineering (ICSE)*, May 2013.
- Kin-Keung Ma, Yit Phang Khoo, Jeffrey S. Foster, and Michael Hicks. Directed Symbolic Execution. In Eran Yahav, editor, *Proceedings of the Static Analysis Symposium (SAS)*, volume 6887 of *Lecture Notes in Computer Science*, pages 95-111. Springer, September 2011.
- Saurabh Srivastava, Michael Hicks, Jeffrey S. Foster, and Patrick Jenkins. Modular Information Hiding and Type Safe Linking for C. *IEEE Transactions on Software Engineering (TSE)*, 34(3):1-20, May 2008.
- Nick L. Petroni, Jr. and Michael Hicks. Automated detection of persistent kernel control-flow attacks. In *Proc. of the ACM Conference on Computer and Communications Security (CCS)*, October 2007.
- Nikhil Swamy, Michael Hicks, Greg Morrisett, Dan Grossman, and Trevor Jim. Safe manual memory management in Cyclone. *Science of Computer Programming (SCP)*, 62(2):122–144, October 2006. Special issue on memory management. *Many of the ideas in this paper make up a core part of the Rust programming language.*
- Trevor Jim, Greg Morrisett, Dan Grossman, Michael Hicks, James Cheney, and Yanling Wang. Cyclone: A safe dialect of C. In *Proc. of the USENIX Annual Technical Conference*, June 2002.
- Dan Grossman, Greg Morrisett, Trevor Jim, Michael Hicks, Yanling Wang, and James Cheney. Region-based memory management in Cyclone. In *Proc. of the ACM Conference on Programming Language Design and Implementation (PLDI)*, pages 282–293. ACM, June 2002.
- Michael Hicks. *Dynamic Software Updating*. PhD thesis, Department of Computer and Information Science, University of Pennsylvania, August 2001. **Winner of the 2002 ACM SIGPLAN Doctoral Dissertation award.**

PhDs and Postdoctoral Researcher Advisees

- Liyi Li, Postdoc 2020–2023 (Assistant Professor, Iowa State University)
- Ethan Cecchetti, Postdoc 2021–2022 (Assistant Professor, University of Wisconsin)
- Michael Coblenz, Postdoc 2020–2022 (Assistant Professor, UCSD)
- Kesha Hietala, PhD 2022 (Applied Scientist, Amazon Web Services)
- Ian Sweet, PhD 2022 (Software Research Engineer, Galois)
- Robert Rand, Postdoc 2018–2020 (Assistant Professor, University of Chicago)
- Leonidas Lampropoulos, Postdoc 2018–2020 (Assistant Professor, University of Maryland)
- James Parker, PhD 2020 (Software Research Engineer, Galois)
- Andrew Ruef, PhD 2018
- Chang Liu, PhD 2016 (Researcher, Citadel Securities)
- Shiyi Wei, Postdoc 2015–2017 (Associate Professor, University of Texas at Dallas)
- Aseem Rastogi, PhD 2016 (Principal Researcher, Microsoft Research)
- Luis Pina, PhD 2015 (Assistant Professor, University of Illinois Chicago)
- Matthew Hammer, Postdoc 2013–2015 (First job: Assistant Professor, CU Boulder)
- Karla Saur, PhD 2015 (Principal Research Software Development Engineer, Microsoft)
- Piotr Mardziel, PhD 2015 (First job: Systems Scientist, Carnegie Mellon)
- Khoo Yit Phang, PhD 2013 (Software Engineering Manager, Mathworks)
- Nataliya Guts, Postdoc 2011–2013
- Chris Hayden, PhD 2012 (Senior Software Engineer, Amazon Web Services)
- Stephen Magill, Postdoc 2010–2012 (VP, Product Innovation at Sonatype)
- Justin McCann, PhD 2012 (Principal Software Engineering Manager, Microsoft)

Kin Keung (Martin) Ma, PhD 2011 (Software Engineer, Google)
Saurabh Srivastava, PhD 2010 (CEO, Synthetic Minds)
Pavlos Papageorge, PhD 2008 (Software Engineer, Google (AI))
Nikhil Swamy, PhD 2008 (Senior Principal Researcher, Microsoft)
Iulian Neamtiu, PhD 2008 (Professor, NJIT)
Polyvios Pratikakis, PhD 2008 (Associate Professor, University of Crete, Greece)
Nick L. Petroni, Jr., PhD 2008 (Chief Scientist, Volexity)
Manuel Oriol, Postdoc 2006–2008 (President of Constructor Institute and Professor of Software Engineering)

Synergistic activities

Fellow of the ACM, named January 2023.

ACM SIGPLAN Chair, served 2015–2018; for the next 3 years I served as **Past Chair**. SIGPLAN is one of 30 special interests groups (SIGs) of ACM members, in this case with a focus on programming languages (PLAN). SIGPLAN hosts five high-profile conferences among a slate of 13. There are nearly 3,000 SIGPLAN members.

ACM SIGPLAN Distinguished Service Award, named June 2022, for contributions as SIGPLAN Chair and Past Chair, and for service on program committees and other SIGPLAN activities over the years.

Editor in Chief, *Proceedings of the ACM on Programming Languages (PACMPL)*, November 2022–2025. PACMPL is the journal that publishes the proceedings of the “big four” SIGPLAN conferences (POPL, PLDI, OOPSLA, ICFP).

University of Maryland Distinguished Scholar-Teacher, 2015–2016. This award is given to about five University of Maryland faculty each year, from among the 1,500 across all Departments on campus, who demonstrate remarkable achievement in both research and teaching.

Department of Computer Science Faculty Teaching Award, 2003, 2005, 2007, 2014.

Associate Editor, Transactions on Programming Languages and Systems (TOPLAS), January 2012–2017.

Program committee (PC) member and Chair of high-profile conferences. First Program Chair of IEEE Cybersecurity Development Conference (SecDev), which focuses on building systems security, held November 2016; served on the SC and PC 2017–2019. Co-founder, Workshop on Programming Languages for Quantum Computing (PLanQC), 2020. Other PC memberships include IEEE Computer Security Foundations Symposium (2014, Chair 2015 & 2016), IEEE Symposium on Security and Privacy (PC member 2009, 2015, 2017, 2022, Area Chair 2018), ACM Conference on Computer and Communications Security (PC member, 2008 and 2017, Area Chair 2019), ACM SIGPLAN Symposium on Principles of Programming Languages (PC member 2009, Chair 2012, SC Chair 2018–2021), ACM SIGPLAN Conference on Programming Language Design and Implementation (PC member, 2007, 2013, 2016, Area Chair 2023).

Member of DARPA Information Science and Technology Board (ISAT), September 2009–2012. This panel consists of 30 individuals (largely faculty and researchers) from U.S. institutions which advises DARPA by conducting studies on topics of increasing relevance and impact.

Member, SIGPLAN Committee on Empirical Evaluations. I founded the committee while SIGPLAN Chair, inspired by what I found with my fuzzing work. We produced a checklist of best practices at <http://sigplan.org/Resources/EmpiricalEvaluation/>