

Michael D. Adams

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Research Interests

Programming Languages; Static Analysis; Control-Flow Analysis; Parsing; Compilation and Optimization; Meta-programming and Macros; Generic Programming; Type Systems

Academic Degrees

Indiana University

Doctor of Philosophy in Computer Science
Minor in Logic
Advisor: R. Kent Dybvig

Bloomington, Indiana

October 2011

University of Kansas

Bachelor of Science in Computer Science
Bachelor of Science in Computer Engineering
Minor in Mathematics
Honors and Highest Distinction

Lawrence, Kansas

May 2005

Employment History

University of Utah

Research Assistant Professor

Salt Lake City, Utah

January 2016 – Present

University of Utah

Postdoctoral Research Associate

Salt Lake City, Utah

August 2014 – December 2015

University of Illinois at Urbana-Champaign

Postdoctoral Research Associate

Urbana, Illinois

July 2013 – July 2014

Portland State University

Postdoctoral Research Associate

Portland, Oregon

August 2011 – June 2013

Cadence Research

Independent Contractor (Research)

Bloomington, Indiana

May 2008 – August 2010

Microsoft Research

Intern (Research)

Cambridge, England

April 2007 – June 2007

IBM Research

Intern (Research)

Hawthorne, New York

January 2007 – March 2007

Funding

- **Co-PI and Development Lead.** DARPA BAA-14-60: Space/Time Analysis for Cybersecurity (STAC). “Automated Analysis of Algorithmic Attack Vulnerabilities”: **\$3M (2015–2019)**. AFRL FA8750-15-2-0092.
- **PI.** NSF 17-576: Secure and Trustworthy Cyberspace (SaTC). “Static Analysis of Smart Contracts”: **\$0.5M (2018–2021)**. (Submitted, awaiting review)

Publications

Refereed Journals

1. **Michael D. Adams** and Matthew Might. Restricting grammars with tree automata. **Proceedings of the ACM on Programming Languages**, 1(**OOPSLA**):82:1–82:25, October 2017. ISSN 2475-1421. doi: 10.1145/3133906.
2. William Mansky, Elsa L. Gunter, Dennis Griffith, and **Michael D. Adams**. Specifying and executing optimizations for generalized control flow graphs. **Science of Computer Programming**, 130:2–23, November 2016. ISSN 0167-6423. doi: 10.1016/j.scico.2016.06.003.
3. **Michael D. Adams**, Andrew Farmer, and José Pedro Magalhães. Optimizing SYB traversals is easy!. **Science of Computer Programming**, 112, Part 2:170–193, November 2015. ISSN 0167-6423. doi: 10.1016/j.scico.2015.09.003.

Refereed Conferences

1. Thomas Gilray, **Michael D. Adams**, and Matthew Might. Allocation characterizes polyvariance: A unified methodology for polyvariant control-flow analysis. In Proceedings of the 21st ACM SIGPLAN International Conference on Functional Programming, **ICFP ’16**, pages 407–420. ACM, New York, NY, USA, September 2016. ISBN 978-1-4503-4219-3. doi: 10.1145/2951913.2951936.
2. **Michael D. Adams**, Celeste Hollenbeck, and Matthew Might. On the complexity and performance of parsing with derivatives. In Proceedings of the 37th ACM SIGPLAN Conference on Programming Language Design and Implementation, **PLDI ’16**. ACM, New York, NY, USA, June 2016. doi: 10.1145/2908080.2908128.
3. Thomas Gilray, Steven Lyde, **Michael D. Adams**, Matthew Might, and David Van Horn. Pushdown control-flow analysis for free. In Proceedings of the 43rd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, **POPL ’16**. ACM, New York, NY, USA, January 2016. doi: 10.1145/2837614.2837631.
4. **Michael D. Adams**. Towards the Essence of Hygiene. In Proceedings of the 42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, **POPL ’15**. ACM, New York, NY, USA, 2015. doi: 10.1145/2676726.2677013.
5. **Michael D. Adams**. Principled parsing for indentation-sensitive languages: Revisiting Landin’s offside rule. In Proceedings of the 40th annual ACM SIGPLAN-SIGACT symposium on Principles of programming languages, **POPL ’13**, pages 511–522. ACM, New York, NY, USA, 2013. doi: 10.1145/2429069.2429129.
6. **Michael D. Adams**, Andrew W. Keep, Jan Midtgaard, Matthew Might, Arun Chauhan, and R. Kent Dybvig. Flow-sensitive type recovery in linear-log time. In Proceedings of the 2011 ACM International Conference on Object Oriented Programming Systems Languages

and Applications, **OOPSLA '11**, pages 483–498. ACM, New York, NY, USA, October 2011. ISBN 978-1-4503-0940-0. doi: 10.1145/2048066.2048105.

7. **Michael D. Adams** and R. Kent Dybvig. Efficient nondestructive equality checking for trees and graphs. In Proceeding of the 13th ACM SIGPLAN international conference on Functional programming, **ICFP '08**, pages 179–188. ACM, New York, NY, USA, 2008. doi: 10.1145/1411204.1411230.
8. Peter Gottschling, David S. Wise, and **Michael D. Adams**. Representation-transparent matrix algorithms with scalable performance. In Proceedings of the 21st annual international conference on Supercomputing, **ICS '07**, pages 116–125. ACM, New York, NY, USA, 2007. doi: 10.1145/1274971.1274989.

Refereed Symposia and Workshops

1. **Michael D. Adams** and Ömer S. Ağacan. Indentation-sensitive Parsing for Parsec. In Proceedings of the 2014 ACM SIGPLAN Symposium on Haskell, **Haskell '14**, pages 121–132. ACM, New York, NY, USA, 2014. doi: 10.1145/2633357.2633369.
2. **Michael D. Adams**, Andrew Farmer, and José Pedro Magalhães. Optimizing SYB is easy!. In Proceedings of the ACM SIGPLAN 2014 Workshop on Partial Evaluation and Program Manipulation, **PEPM '14**, pages 71–82. ACM, New York, NY, USA, 2014. doi: 10.1145/2543728.2543730. (Received the **PEPM '14 Best Paper Award**.)
3. **Michael D. Adams** and Thomas M. DuBuisson. Template your boilerplate: Using Template Haskell for efficient generic programming. In Proceedings of the 2012 ACM SIGPLAN Haskell symposium, **Haskell '12**, pages 13–24. ACM, New York, NY, USA, 2012. doi: 10.1145/2364506.2364509.
4. Jan Midtgaard, **Michael Adams**, and Matthew Might. A structural soundness proof for Shivers’s escape technique: A case for Galois connections. In Antoine Miné and David Schmidt, editors, Static Analysis, **SAS '12**, volume 7460 of Lecture Notes in Computer Science, pages 352–369. Springer Berlin / Heidelberg, 2012. doi: 10.1007/978-3-642-33125-1_24.
5. **Michael D. Adams**. Scrap your zippers: A generic zipper for heterogeneous types. In Proceedings of the 2010 ACM SIGPLAN workshop on Generic programming, **WGP '10**, pages 13–24. ACM, New York, NY, USA, 2010. doi: 10.1145/1863495.1863499.
6. Andrew W. Keep, **Michael D. Adams**, Lindsey Kuper, William E. Byrd, and Daniel P. Friedman. A pattern matcher for miniKanren or how to get into trouble with CPS macros. In Proceedings of the 2009 Scheme and Functional Programming Workshop, **Scheme '09**, number CPSLO-CSC-09-03 in California Polytechnic State University Technical Report, pages 37–45. 2009. URL http://digitalcommons.calpoly.edu/csse_fac/83/.
7. **Michael D. Adams** and David S. Wise. Seven at one stroke: Results from a cache-oblivious paradigm for scalable matrix algorithms. In Proceedings of the 2006 workshop on Memory system performance and correctness, **MSPC '06**, pages 41–50. ACM, New York, NY, USA, 2006. doi: 10.1145/1178597.1178604.

Unrefereed

1. **Michael D. Adams** and Matthew Might. Disambiguating grammars with tree automata. In Proceedings of **Parsing@SLE**. ACM, New York, NY, USA, October 2015.
2. **Michael D. Adams**. Flow-Sensitive Control-Flow Analysis in Linear-Log Time. **Ph.D. thesis**, Indiana University, 2011.
3. **Michael D. Adams** and David S. Wise. Fast additions on masked integers. **SIGPLAN Notices**, 41(5):39–45, May 2006. ISSN 0362-1340. doi: 10.1145/1149982.1149987.

4. **Michael D. Adams.** The representation of constraints, annotations and first class patterns over arbitrary data types in Haskell. **Honors Undergraduate Research**, University of Kansas, May 2004.

Teaching Experience

University of Illinois at Urbana/Champaign

Urbana, Illinois

Undergraduate Research Opportunities in Computing

April 2014 – July 2014

- Research Mentor for four undergraduate students

Indiana University

Bloomington, Indiana

Associate Instructor

January 2009 – May 2011

- **Associate Instructor of the Year (2009–2010)** – Computer Science
- CSCI H212: Introduction to Software Systems, Honors: Spring 2011
- CSCI H211: Introduction to Computer Science, Honors: Fall 2010
- CSCI C343/A594: Data Structures: Fall 2009 and Spring 2010
- CSCI C212/A592: Introduction to Software Systems: Spring 2009

Undergraduate Research Opportunities in Computing

January 2011 – May 2011

- Research Mentor for two undergraduate students

Software

I have been involved in the development of a number of languages and compilers, including

- the **Glasgow Haskell Compiler**,
- the **Chez Scheme** compiler,
- the **X10** language,
- the **Habit** compiler,
- the **Hermit** optimization system, and
- the **K Framework**.

I am the principle developer of a number of open source libraries and tools:

- **Jaam: JVM Abstracting Abstract Machine** (Static analysis tool for JVM bytecode)
<http://github.com/Ucombinator/jaam>
- **Derp 3** (Parsing library)
<https://bitbucket.org/ucombinator/derp-3>
- **Hermit SYB** (Optimizer for SYB (Scrap Your Boilerplate) code)
<https://github.com/xich/hermit-syb/>
- **indentation-parsec** (Parsec parser extension for indentation)
<https://hackage.haskell.org/package/indentation-parsec>

- **indentation-trifecta** (Trifecta parser extension for indentation)
<https://hackage.haskell.org/package/indentation-trifecta>
- **Template Your Boilerplate** (Generic programming library)
<https://hackage.haskell.org/package/TYB>
- **Scrap Your Zippers** (Generic zipper library)
<https://hackage.haskell.org/package/syz>

Service

- Principles and Practice of Declarative Programming (PPDP) 2015 – Program Committee
<http://costa.ls.fi.upm.es/ppdp15/> 2015
- Scheme Workshop 2014 – Program Committee
<http://homes.soic.indiana.edu/jhemann/scheme-14/> 2014
- Principles and Practice of Declarative Programming (PPDP) 2014 – Program Committee
<http://users-cs.au.dk/danvy/ppdp14/> 2014
- Scheme Workshop 2012 – Program Committee
<http://users-cs.au.dk/danvy/sfp12/> 2012
- Scheme Workshop 2011 – Program Committee
<http://scheme2011.ucombinator.org/> 2011

Honors and Awards

- PEPM '14 Best Paper Award 2014
- Associate Instructor of the Year – Computer Science, Indiana University 2009 – 2010
- Paul and Virginia B. Miller Scholar – EECS, University of Kansas 2004 – 2005
- School of Engineering Honor Roll – University of Kansas Fall 2000 – Spring 2005
- Tau Beta Pi National Scholar Fall 2004
- Senior Everitt Award – EECS, University of Kansas Spring 2004
- W. Harold Otto National Merit Scholar 2000 – 2004
- May Landis Scholar – Mathematics, University of Kansas 2001 – 2002
- University Scholar Finalist (top 40 sophomores) 2001
- First Place in Archery at Sunflower State Games 1998