

# Michael D. Adams

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adamsmd@cs.utah.edu  
<http://michaeldadams.org>  
+1-785-969-2431 (Phone)  
+1-801-581-5843 (Fax)

*Home Address:*  
350 S 600 E / Apt. 215  
Salt Lake City, UT 84102

## Research Interests

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

## Academic Degrees

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### 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

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### 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*

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## Funding

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- **PI.** 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)

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## Publications

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### Refereed Journals

1. **Michael D. Adams** and Matthew Might. Restricting grammars with tree automata. **Proceedings of the ACM on Programming Languages**, 1(**OOPSLA ’17**):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/](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.

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## Teaching Experience

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### 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

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## Software

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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

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- 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

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- 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