Amal Ahmed

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RESEARCH INTERESTS

Programming languages, particularly the use of semantics and type systems for reasoning about imperative code, concurrency, security, compiler transformations, and provenance.
Current focus: correct and secure compilation, gradual typing, and safe language interoperability.

EDUCATION

Princeton University
- Ph.D. Computer Science, 2004
- Dissertation title: Semantics of Types for Mutable State
- Advisor: Andrew Appel
- George Van Ness Lothrop Fellow, 2002 – 2003

Stanford University
- M.S. Computer Science, emphasis in Databases, 1995

Brown University
- A.B. Computer Science and Economics, 1993

EMPLOYMENT

Northeastern University, Boston, MA
- *Assistant Professor*, Sep 2011 – present

Indiana University, Bloomington, IN
- *Assistant Professor*, 2009 – 2011

Microsoft Research, Cambridge, UK
- *Visiting Researcher*, Jul – Aug 2010

Toyota Technological Institute at Chicago, Chicago, IL
- *Research Assistant Professor*, 2006 – 2009

Harvard University, Cambridge, MA
- *Postdoctoral Fellow*, worked with Greg Morrisett, 2004 – 2006

Cornell University, Ithaca, NY
- *Postdoctoral Research Associate*, 2003 – 2004

Princeton University, Princeton, NJ
- *Assistant in Instruction* and *Research Assistant*, 1998 – 2003

AT&T Labs, Middletown, NJ
- *Member of Technical Staff*, 1995 – 1998

Brown University, Providence, RI
- *Lab Consultant,* Department of Computer Science, 1992 – 1993
- *Research Assistant* in Artificial Intelligence, Department of Computer Science, Summer 1992
- *Teaching Assistant,* Department of Computer Science, 1991 – 1992
- *Recitation Instructor* for Financial Accounting, Department of Economics, 1990 – 1991

HONORS / AWARDS

- NSF CAREER Award, 2015
- Google Faculty Research Award, 2014
- George Van Ness Lothrop Fellowship in Engineering (University Honorific Fellowship), Princeton University, 2002 – 2003
- Travel awards and fellowships:
  CRA-W Travel Award, 2003
  Award from Princeton University Dean's Fund for Scholarly Travel, 2003
  Association of Princeton Graduate Alumni Summer Travel Fellowship, 2002
  Margaret Goheen Travel Fellowship, 2001
  National Science Foundation Travel Grant, 2001

RESEARCH FUNDING

- CAREER: Verified Compilers for a Multi-Language World (PI). NSF CCF-1453796. May 2015-Apr 2020.
- SHF: Small: Secure Compilation of Advanced Languages (PI). NSF CCF-1422133. Aug 2014-Jul 2017.
- Google Faculty Research Award: Verified Compilers for a Multi-Language World. Feb 2014.
- SHF: Small: Effectful Software Contracts (PI; co-PI: Amr Sabry). NSF CCF-12 03008. Aug 2011-Jul 2014.

PROFESSIONAL ACTIVITIES

- Member of Editorial Board, Mathematical Structures in Computer Science (MSCS), Jan 2016 – present
- Member, IFIP WG 2.8, Working Group on Functional Programming, Aug 2014 – present
- Co-organizer: Programming Languages Mentoring Workshop, PLMW @ ICFP 2016
- Co-organizer: Programming Languages Mentoring Workshop (PLMW 2014), co-located with POPL
- Co-organizer: Oregon Programming Languages Summer School (OPLSS 2013 & 2014)
- Invited Lecturer, Oregon Programming Languages Summer School:

  14th OPLSS on Types, Logic, Semantics, and Verification (OPLSS 2015)

  12th OPLSS on Types, Logic, and Verification (OPLSS 2013)

  11th OPLSS on Logic, Languages, Compilation, and Verification (OPLSS 2012)

  10th OPLSS on Types, Semantics, and Verification (OPLSS 2011)
- Invited Speaker:

  Workshop on Certification of High-level and Low-level Programs, Institut Henri Poincare (IHP) thematic trimester on Semantics of Proofs and Certified Mathematics, July 2014.

  Programming Languages Mentoring Workshop (PLMW 2013)

  Programming Languages Mentoring Workshop (PLMW 2012)

  Plenary Address, 26th Conference on the Mathematical Foundations of Programming Semantics (MFPS 2010)

- Invited Lecturer:

  PhD School at CIRM, summer school preceding the Institut Henri Poincare (IHP) trimester on Semantics of Proofs and Certified Mathematics, Apr 2014.
  Topic: Syntax and Semantics of Low-Level Languages.

- Invited Participant:

  Institut Henri Poincare (IHP) thematic trimester on Semantics of Proofs and Certified Mathematics, visiting researcher, Paris, France, May – July 2014.

  IFIP Working Group (WG) 2.8, Functional Programming, observer, 2007, 2012, 2013, 2014

  Dagstuhl Seminar 12011: Foundations for Scripting Languages, January 2012

- Co-organizer: Dagstuhl Seminar 10351: Modeling, Controlling and Reasoning About State, September 2010.
- Co-organizer: Dagstuhl Seminar 08061: Types, Logics and Semantics for State, February 2008.
- Panelist for NSF funding programs in 2011, 2012, 2015.

- Program Chair:

  1st ACM SIGPLAN Workshop on Higher-Order Programming with Effects (HOPE) 2012

  3rd Workshop on Syntax and Semantics of Low-Level Languages (LOLA) 2012

  ACM Workshop on Types in Language Design and Implementation (TLDI) 2009

- Program Committees:

  Symposium on Trends in Functional Programming (TFP) 2016.

  ACM International Conf. on Functional Programming (ICFP) 2016, external review committee.

  ACM/IEEE Symposium on Logic in Computer Science (LICS) 2016.

  Workshop on Script to Program Evolution (STOP) 2015.

  ACM International Conf. on Functional Programming (ICFP) 2015.

  ACM Symposium on Principles of Programming Languages (POPL) 2015.

  Workshop on Dependently Typed Programming (DTP) 2014.

  Workshop on Syntax and Semantics of Low-Level Languages (LOLA) 2014.

  ACM/IEEE Symposium on Logic in Computer Science (LICS) 2013.

  IEEE Workshop on Theory and Practice of Provenance (TaPP) 2013.

  ACM Conference on Programming Language Design and Implementation (PLDI) 2013, external review committee.

  Asian Symposium on Programming Languages and Systems (APLAS) 2012.

  Haskell Symposium, 2012.

  ACM SIGPLAN Workshop on Programming Languages meets Program Verification (PLPV) 2012

  ACM SIGPLAN Workshop on ML, 2011.

  Conference on Mathematical Foundations of Programming Semantics (MFPS) 2011.

  ACM Conference on Programming Language Design and Implementation (PLDI) 2011, external review committee.

  Foundations of Software Science and Computation Structures (FOSSACS) 2011.

  Workshop on Script to Program Evolution (STOP) 2011.

  Theory Workshop of Verified Software: Theories, Tools and Experiments (VSTTE) 2010.

  Workshop on Syntax and Semantics of Low-Level Languages (LOLA) 2010.

  European Symposium on Programming (ESOP) 2010.

ACM International Conf. on Functional Programming (ICFP) 2009.

ACM Symposium on Principles of Programming Languages (POPL) 2008.

ACM Workshop on Programming Languages and Analysis for Security (PLAS) 2006.

Workshop on Semantics, Program Analysis, and Computing Environments for Memory Management (SPACE) 2006.

- Steering Committee Member:

  ACM SIGPLAN Programming Languages Mentoring Workshop (PLMW), 2014 –present

  ACM International Conf. on Functional Programming (ICFP), Member at large, 2008 – 2012

  ACM Workshop on Types in Language Design and Implementation (TLDI), 2009 – 2012

- Journal reviewing: ACM Transactions on Programming Languages and Systems (TOPLAS), Journal of Functional Programming (JFP), Logical Methods in Computer Science (LMCS), Theoretical Computer Science (TCS), Information and Computation (I&C), Higher-Order and Symbolic Computation (HOSC).
- Conference and workshop reviewing: POPL, PLDI, LICS, ICFP, ESOP, ECOOP, ISMM, PPDP, TLDI, APLAS, MFPS, FOOL, IFL, FLOPS, LPAR.

UNIVERSITY SERVICE

- Faculty Hiring Committee, CCIS, Northeastern University, 2013 – 2016.
- PhD Committee, College of Computer & Information Science, Northeastern University, 2011 – 2013
- PhD Open House Co-organizer, CCIS, Northeastern University, Spring 2012 & 2013.
- Graduate Program Committee, Computer Science Program, Indiana University, Fall 2010.
- Faculty Affairs Committee, Div. B, School of Informatics and Computing, Indiana University, 2010.
- Computer Science Graduate Committee, Princeton University, 1998 – 2003.
- Computer Science Representative to the Graduate Engineering Council, School of Engineering and Applied Sciences (SEAS), Princeton University, 2001 – 2002.
- Graduate Women in Science and Engineering, Princeton University, 1998 – 2003.
- Meiklejohn Academic Advisor, Brown University, 1992 – 1993.

CURRENT PH.D. STUDENTS & POSTDOCS

- William Bowman (Ph.D.), supervised since Sep 2012
- Max New (Ph.D.), supervised since Sep 2014
- Gabriel Scherer (postdoc), supervised since January 2016

M.S. STUDENTS

- Phillip Mates, graduated Dec 2014
  Topic: Verified Compositional Closure Conversion in the Presence of Mutable State
- James T. Perconti, graduated Apr 2014
  Topic: Verifying an Open Compiler using Multi-Language Semantics (ESOP'14)

PH.D. DISSERTATION COMMITTEES

- Mitesh Jain, Ph.D., (anticipated) 2017
- Paul Stansifer, Ph.D., (anticipated) 2016
- Nada Amin, Ph.D., EPFL, (anticipated) 2016
- Stephen Chang, Ph.D., 2014

- Christos Dimoulas, Ph.D., 2012
- Aaron Turon, Ph.D., 2013 (won 2014 ACM SIGPLAN John C. Reynolds Doctoral Dissertation Award)
- Roshan James, Ph.D., Indiana University, 2012
- Michael Adams, Ph.D., Indiana University, 2011

M.S. THESIS COMMITTEES

- Brian LaChance, M.S., 2016
- Fabian Muehlboeck, M.S., 2013

UNDERGRADUATE RESEARCH ADVISING

- Dustin Jamner, Jan 2016 – present
- Nicholas Rioux, Sep 2013 – present
- Matthew Kolosick, Sep 2013 – Dec 2014
- Durward Benham, Sep 2013 – Sep 2014

AWARDS WON BY MY STUDENTS

- Durward Benham, Scholars Independent Research Fellowship, Northeastern University, 2014 ($4000)
- Nicholas Rioux, Scholars Independent Research Fellowship, Northeastern University, 2014 ($4000)

TEACHING

Northeastern University
- CS 2500: Fundamentals of CS: Intro to Programming and Computing, Fall 2011, Fall 2012, Fall 2013, Spring 2014, Fall 2014
- CS 7480: Special Topics in Programming Languages: Types, Contracts, Gradual Typing, and Compiler Correctness, Fall 2015
- CS 7400: Intensive Principles of Programming Languages, Spring 2015, Spring 2016
- CS 4410/6410: Compilers, Spring 2013
- CS 7480: Special Topics in Programming Languages: Type Systems, Spring 2012

Indiana University
- CSCI B629: Integrating Static and Dynamic Typing, Fall 2010
- CSCI B629: Language-Based Approaches to Security, Spring 2010
- CSCI B522: Programming Language Foundations, Fall 2009

University of Chicago
- CMCS 336: Type Systems for Programming Languages (co-taught with Umut Acar), Winter 2008

Princeton University, Assistant in Instruction
- COS 495: Medical Informatics (taught by Dr. Bill Hanson), Spring 2002
- COS 226: Algorithms and Data Structures (taught by Robert Sedgewick), Spring 1999
- COS 217: Introduction to Programming Systems (taught by J.P. Singh), Fall 1998

Brown University, Teaching Assistant
- CS 002: Introduction to CS & Applications (taught by Franco Preparata), Spring 1992
- CS 011: Programming & Problem-Solving in CS (taught by Andries van Dam), Fall 1991
- CS 004: Introduction to Programming (taught by Pascal van Hentenryck), Spring 1991

Brown University, Recitation Instructor
- EC 079: Financial Accounting, Fall 1990 and Spring 1991

INVITED TALKS

- *Compositional Compiler Verification for a Multi-Language World Relations*
  1st International Conference on Formal Structures for Computation and Deduction (FSCD), Invited Speaker (plenary address), Porto, Portugal, June 2016.
- NSF CISE CAREER Workshop, Invited Speaker (Career Awardee talk), Arlington, Virginia, April 2016.
- *Logical Relations*
  14th Annual Oregon Programming Languages Summer School (OPLSS), Invited Lecturer (5 lectures), held at University of Oregon, Eugene, Oregon, June 2015.
- *CPS Translation of Dependent Types*
  IFIP Working Group 2.8 (Functional Programming), Kefalonia, Greece, May 2015.
- *Compositional Compiler Verification for a Multi-Language World*
  POPL'15 PC Workshop, Princeton, NJ, September 2014.
- *Fully Abstract Closure Conversion in the Presence of State and Effects*
  IFIP Working Group 2.8 (Functional Programming), Estes Park, Colorado, August 2014.
- *Compositional Compiler Verification for a Multi-Language World*
  Workshop on Certification of High-level and Low-level Programs, Institut Henri Poincare (IHP) thematic trimester on Semantics of Proofs and Certified Mathematics, July 2014.
- *Verifying Compilers using Multi-language Semantics*
  IFIP Working Group 2.8 (Functional Programming), Aussois, France, October 2013.
- *Verifying an Open Compiler from System F to Assembly*
  IFIP Working Group 2.8 (Functional Programming), Annapolis, Maryland, November 2012.
- *Logical Relations*
  12th Annual Oregon Programming Languages Summer School (OPLSS), Invited Lecturer (6 lectures), held at University of Oregon, Eugene, Oregon, July-August 2013.
- *Logical Relations: A Powerful Hammer for your Research Toolbox*
  Programming Languages Mentoring Workshop (PLMW), January 2013.
- *Logical Relations*
  11th Annual Oregon Programming Languages Summer School (OPLSS), Invited Lecturer (5 lectures), held at University of Oregon, Eugene, Oregon, July 2012.
- *Logical Relations*
  10th Annual Oregon Programming Languages Summer School (OPLSS), Invited Lecturer (5 lectures), held at University of Oregon, Eugene, Oregon, June 2011.
- *Stepping into the Future: Logical Relations Beyond Toy Languages*
  Plenary Address, Twenty-Sixth Conference on the Mathematical Foundations of Programming Semantics (MFPS), Ottawa, Canada, May 2010.
- *Logical Relations: A Step Towards More Secure and Reliable Software*
  -- Computer Science Colloquium, Indiana University, Bloomington, Indiana, May 2009
  -- Colloquium, IMDEA Software, Madrid, Spain, April 2009
  -- Computer Science Colloquium, Cornell University, Ithaca, New York, April 2009
  -- MIT EECS Special Seminar, Massachusetts Institute of Technology, Cambridge, Massachusetts, March 2009
  -- Institute Colloquium, Max Planck Institute for Software Systems (MPI-SWS), Saarbrücken, Germany, March 2009
- *Gradual Typing with Polymorphism and Blame*
  Harvard University, Cambridge, Massachusetts, October 2008.

- *All for Nothing: Gradual Typing with Polymorphism and Blame*
  NU Programming Languages Seminar, Northeastern University, Boston, Massachusetts, October 2008.
- *Gradual Typing with Polymorphism and Blame*
  Princeton University, Princeton, New Jersey, October 2008.
- *Step-Indexed Logical Relations*
  Dagstuhl Seminar 08061: Types, Semantics and Logics for State, Wadern, Germany, February 2008.
- *Equivalence-Preserving Compilation*
  IFIP Working Group 2.8 (Functional Programming), Reykjavik, Iceland, July 2007.
- *Hoare Type Theory*
  Workshop on Proof-Carrying Code (PCC 2006), held in conjunction with IEEE Symposium on Logic in Computer Science (LICS), Seattle, Washington, August 2006.
- *Taming Mutable State*
  Toyota Technological Institute, Chicago, Illinois, April 2006.
- *Taming Mutable State*
  New York University, Department of Computer Science, New York, NY, April 2006.
- *Program Equivalence using Step-Indexed Logical Relations*
  Microsoft Research, Cambridge, UK, December 2005.
- *Substructural State: The Interplay of Uniqueness, Sharing, and References*
  Sun Labs, Burlington, Massachusetts, November 2005.
- *L^3: A Linear Language with Locations*
  Church Project Seminar, Boston University, Boston, Massachusetts, February 2005.
- *Reasoning about Hierarchical Storage*
  Fourth Annual Programming Languages Day, IBM T. J. Watson Research Center, Hawthorne, NY, April 2003.
- *Reasoning about Hierarchical Storage*
  Penn Logic and Computation Seminar, Univ. of Pennsylvania, Philadelphia, PA, February 2003.
- *Foundational Proof-Carrying Code*
  Yale University, New Haven, Connecticut, April 2001.
- *Mutable Fields in a Semantic Model of Types*
  Workshop on Proof-Carrying Code (PCC 2000), held in conjunction with IEEE Symposium on Logic in Computer Science (LICS) and Static Analysis Symposium, Santa Barbara, California, June 2000.

PUBLICATIONS

[1] William J. Bowman and Amal Ahmed.
Noninterference for Free.
In *20th ACM SIGPLAN International Conference on Functional Programming (**ICFP '15**)*,
pages 101-113, Vancouver, British Columbia, Canada, September 2015.
[PC paper, held to a higher standard for acceptance.]

[2] Amal Ahmed.
Verified Compilers for a Multi-Language World.
In *SNAPL: The Inaugural Summit on Advances in Programming Languages (**SNAPL'15**)*,
Asilomar, California, May 2015.

[3] James Cheney, Amal Ahmed, and Umut Acar.
Database Queries that Explain their Work.
In *16th International Symposium on Principles and Practice of Declarative Programming (**PPDP '14**)*,

Canterbury, UK, September 2014.

[4] James T. Perconti and Amal Ahmed.
Verifying an Open Compiler Using Multi-Language Semantics.
In Zhong Shao, editor, *23rd European Symposium on Programming (**ESOP '14**)*,
Grenoble, France, April 2014.

[5] Umut Acar, Amal Ahmed, James Cheney, and Roly Perera.
A Core Calculus for Provenance.
Journal of Computer Security, 21(6): 919-969, 2013.

[6] Aaron Turon, Jacob Thamsborg, Amal Ahmed, Lars Birkedal, and Derek Dreyer.
Logical Relations for Fine-Grained Concurrency.
In *40th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (**POPL '13**)*,
Rome, Italy, January 2013.

[7] Umut Acar, Amal Ahmed, James Cheney, and Roly Perera.
A Core Calculus for Provenance.
In *1st Conference on Principles of Security and Trust (**POST '12**)*,
pages 410-429, Tallinn, Estonia, March 2012.

[8] James Cheney, Amal Ahmed, and Umut Acar.
Provenance as Dependency Analysis.
*Mathematical Structures in Computer Science (**MSCS**),* 21, pages 1301-1337, Special Issue on Programming Language Interference and Dependence, December 2011.

[9] Amal Ahmed and Matthias Blume.
An Equivalence-Preserving CPS Translation via Multi-Language Semantics.
In *16th ACM SIGPLAN International Conference on Functional Programming (**ICFP '11**)*,
pages 431-444, Tokyo, Japan, September 2011.

[10] Derek Dreyer, Amal Ahmed, and Lars Birkedal.
Logical Step-Indexed Logical Relations.
Logical Methods in Computer Science (LMCS), 7 (2:16), June 2011.
Special Issue for LICS'09, invited submission.

[11] Amal Ahmed, Robert Bruce Findler, Jeremy Siek, and Philip Wadler.
Blame for All.
In *38th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (**POPL '11**)*,
Austin, Texas, January 2011.

[12] Amal Ahmed, Andrew W. Appel, Christopher Richards, Kedar Swadi, Gang Tan, and Daniel Wang.
Semantic Foundations for Typed Assembly Languages.
*ACM Transactions on Programming Languages and Systems (**TOPLAS**)*, 32(3):7.1-7.67, March 2010.

[13] Derek Dreyer, Amal Ahmed, and Lars Birkedal.
Logical Step-Indexed Logical Relations.
In *24th Annual IEEE Symposium on Logic in Computer Science (**LICS '09**)*,
Los Angeles, California, August 2009.

[14] Amal Ahmed, Robert Bruce Findler, Jacob Matthews, and Philip Wadler.
Blame for All.
In *1st International Workshop on Script to Program Evolution (**STOP '09**)*,
Genova, Italy, July 2009.

[15] Amal Ahmed, Derek Dreyer, and Andreas Rossberg.
State-Dependent Representation Independence.
In *36th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (**POPL '09**)*, pages 340-353, Savannah, Georgia, January 2009.

[16] Amal Ahmed and Matthias Blume.
Typed Closure Conversion Preserves Observational Equivalence.
In *13th ACM SIGPLAN International Conference on Functional Programming (**ICFP '08**)*, pages 157-168, Victoria, British Columbia, Canada, September 2008.

[17] Jacob Matthews and Amal Ahmed.
Parametric Polymorphism through Run-time Sealing: or, Theorems for Low, Low Prices!
In Sophia Drossopoulou, editor, *17th European Symposium on Programming (**ESOP '08**)*, pages 16-31, Budapest, Hungary, March 2008.

[18] Umut Acar, Amal Ahmed, and Matthias Blume.
Imperative Self-Adjusting Computation.
In *35th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (**POPL '08**)*, pages 309-322, San Francisco, California, January 2008.
[PC paper, held to a higher standard for acceptance.]

[19] James Cheney, Amal Ahmed, and Umut Acar.
Provenance as Dependency Analysis.
In *11th International Symposium on Database Programming Languages (**DBPL '07**)*, pages 138-152, Vienna, Austria, September 2007.

[20] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
L^3: A Linear Language with Locations.
Fundamenta Informaticae, 77(4): 397-449, June 2007.

[21] Aleksandar Nanevski, Amal Ahmed, Greg Morrisett, and Lars Birkedal.
Abstract Predicates and Mutable ADTs in Hoare Type Theory.
In Rocco De Nicola, editor, *16th European Symposium on Programming (**ESOP '07**)*, pages 189-204, Braga, Portugal, March 2007.

[22] Amal Ahmed.
Step-Indexed Syntactic Logical Relations for Recursive and Quantified Types.
In Peter Sestoft, editor, *15th European Symposium on Programming (**ESOP '06**)*, pages 69-83, Vienna, Austria, March 2006.

[23] Matthew Fluet, Greg Morrisett, and Amal Ahmed.
Linear Regions are All You Need.
In Peter Sestoft, editor, *15th European Symposium on Programming (**ESOP '06**)*, pages 7-21, Vienna, Austria, March 2006.

[24] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
A Step-Indexed Model of Substructural State.
In *10th ACM SIGPLAN International Conference on Functional Programming (**ICFP '05**)*, pages 78-91, Tallinn, Estonia, September 2005.

[25] Greg Morrisett, Amal Ahmed, and Matthew Fluet.
L^3: A Linear Language with Locations.
In Pawel Urzyczyn, editor, *Typed Lambda Calculi and Applications: 7th Intl. Conference (**TLCA '05**)*, *Nara, Japan, April 21-23, 2005, Proceedings*, volume 3461 of *Lecture Notes in Computer Science,* pages 293-307, Springer 2005.

[26] Amal Ahmed, Limin Jia, and David Walker.
Reasoning about Hierarchical Storage.
In *18th Annual IEEE Symposium on Logic in Computer Science (**LICS '03**)*,
pages 33-44, Ottawa, Canada, June 2003.

[27] Amal Ahmed and David Walker.
The Logical Approach to Stack Typing.
In *ACM SIGPLAN Workshop on Types in Language Design and Implementation (**TLDI '03**)*,
pages 74-85, New Orleans, Louisiana, January 2003.

[28] Amal Ahmed, Andrew W. Appel, and Roberto Virga.
A Stratified Semantics of General References Embeddable in Higher-Order Logic.
In *17th Annual IEEE Symposium on Logic in Computer Science (**LICS '02**)*,
pages 75-86, Copenhagen, Denmark, July 2002.

[29] Amal Ahmed, Diane Litman, Anil Mishra, Peter F. Patel-Schneider, Johannes P. Ros.
Modeling Collections of Changing Interdependent Objects.
Chapter 14 of *Implementing Application Frameworks: Object-Oriented Frameworks at Work*, Mohamed E. Fayad, Douglas C. Schmidt, Ralph Johnson (Editors), John Wiley & Sons, September 1999.

UNDER REVIEW

[30] Max S. New, William Bowman, and Amal Ahmed.
Secure Compilation via Mediated Embedding. November 2015

DISSERTATION

[1] Amal Jamil Ahmed. *Semantics of Types for Mutable State.* PhD thesis, Princeton University, July 2004.
Available as Technical Report TR-713-04, Dept. of Computer Science, Princeton University, 2004.

TECHNICAL REPORTS

[1] William J. Bowman and Amal Ahmed.
Noninterference for Free. (61 pages)
Available at: `https://perma.cc/RJ9N-B5ZQ`, June 2015.

[2] James T. Perconti and Amal Ahmed.
Verifying an Open Compiler Using Multi-Language Semantics. (132 pages)
Available at: `http://www.ccs.neu.edu/home/amal/voc`, January 2014.

[3] Aaron Turon, Jacob Thamsborg, Amal Ahmed, Lars Birkedal, and Derek Dreyer.
Logical Relations for Fine-Grained Concurrency (Technical Appendix). (33 pages)
Available at: `http://www.ccs.neu.edu/home/amal/papers/relcon-appendix.pdf`,
July 2012.

[4] Amal Ahmed and Matthias Blume.
An Equivalence-Preserving CPS Translation via Multi-Language Semantics (Technical Appendix).
(58 pages) Available at: `http://www.ccs.neu.edu/home/amal/papers/epc`, July 2011.

[5] James Cheney, Umut Acar, and Amal Ahmed.
Provenance Traces.
Available at: `http://arxiv.org/abs/0812.0564`, July 2008.

[6] Amal Ahmed, Derek Dreyer, and Andreas Rossberg.
State-Dependent Representation Independence (Technical Appendix). (71 pages)
Available at: `http://www.ccs.neu.edu/home/amal/papers/sdri`, August 2008.

[7] Amal Ahmed and Matthias Blume.
Typed Closure Conversion Preserves Observational Equivalence. (50 pages)
Technical Report TR-2008-07, Dept. of Computer Science, University of Chicago, July 2008.

[8] Umut Acar, Amal Ahmed, and Matthias Blume.
Imperative Self-Adjusting Computation. (77 pages)
Technical Report TR-2007-18, Dept. of Computer Science, University of Chicago, November 2007.

[9] Aleksandar Nanevski, Amal Ahmed, Greg Morrisett, and Lars Birkedal.
Abstract Predicates and Mutable ADTs in Hoare Type Theory. (44 pages)
Harvard Computer Science Technical Report TR-16-06, Harvard University, September 2006.

[10] Amal Ahmed.
Step-Indexed Syntactic Logical Relations for Recursive and Quantified Types. (169 pages)
Harvard Computer Science Technical Report TR-01-06, Harvard University, March 2006.

[11] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
A Step-Indexed Model of Substructural State. (203 pages)
Harvard Computer Science Technical Report TR-16-05, Harvard University, February 2005.

[12] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
L^3: A Linear Language with Locations. (73 pages)
Harvard Computer Science Technical Report TR-24-04, Harvard University, July 2004.

[13] Amal Jamil Ahmed. *Semantics of Types for Mutable State.* PhD thesis, Princeton University, July 2004.
Available as Technical Report TR-713-04, Dept. of Computer Science, Princeton University, 2004.

[14] Amal Ahmed, Andrew W. Appel, and Roberto Virga.
An Indexed Model of Impredicative Polymorphism and Mutable References. (15 pages)
Unpublished, January 2003.