

Amal Ahmed

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EDUCATION

Princeton University

- Ph.D. Computer Science, 2004
- Dissertation title: Semantics of Types for Mutable State
- 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, Khoury College of Computer Sciences, Boston, MA

- Sy and Laurie Sternberg Interdisciplinary Associate Professor, July 2019 – present
- *Associate Professor*, July 2017 – present
- *Assistant Professor*, Sept 2011 – June 2017

Inria Paris, Prosecco research team, Paris, France

- *Visiting Professor*, 2017 – 2018

Indiana University, School of Informatics and Computing, Bloomington, IN

- *Assistant Professor*, 2009 – 2011

Microsoft Research, Cambridge, UK

- *Visiting Researcher*, July – August 2010

Toyota Technological Institute at Chicago, Chicago, IL

- *Research Assistant Professor*, 2006 – 2009

Harvard University, Division of Engineering and Applied Sciences, Cambridge, MA

- *Postdoctoral Fellow in Computer Science*, worked with Greg Morrisett, 2004 – 2006

Cornell University, Department of Computer Science, Ithaca, NY

- *Postdoctoral Research Associate*, 2003 – 2004

Princeton University, Department of Computer Science, Princeton, NJ

- *Assistant in Instruction and Research Assistant*, 1998 – 2003

AT&T Labs, Middletown, NJ

- *Member of Technical Staff*, 1995 – 1998

RESEARCH INTERESTS

Correct and secure compilation across the software-hardware stack and safe language interoperability, including design of sound foreign-function interfaces (FFIs) and richly typed compiler intermediate languages to support safe mixing. More generally: use of semantics and type systems for reasoning about imperative code, multi-language systems, security, concurrency, compiler transformations, provenance.

HONORS / AWARDS

- NSF CAREER Award, 2015
- Google Faculty Research Award, 2014
- George Van Ness Lothrop Fellowship in Engineering (University Honoric Fellowship), Princeton University, 2002 – 2003

FUNDING

- DARPA V-SPELLS: *POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-Driven Replacements and Programmatic Hooks*. Prime: GALOIS; Northeastern PI: Amal Ahmed. \$514k. Apr 2021-Mar 2025.
- CRA Computing Innovation Fellows (CIFellows) Postdoc award for Zoe Paraskevopoulou. \$254k. Jan 2021-Dec 2022.
- NSF SHF: *Semantic Foundations for Gradual Typing*, CCF-1910522. PI: Amal Ahmed, Co-PI: Daniel Licata (Wesleyan). \$500k. Oct 2019-Sep 2022.
- IARPA HECTOR: *ACHILLES: Assured CryptographiC Integration of muLtiplE Languages for Encrypted Systems*. PI: abhi shelat, Co-PIs: Amal Ahmed, Daniel Wichs, Vinod Vaikuntanathan, Adam Chlipala, Ran Canetti, Azer Bestavros, Andrei Lapets, Alley Stoughton, Muthu Venkitasubramaniam. \$12m. Jun 2019-May 2024.
- NSF SHF: *Principled Compiling and Linking for Multi-Language Software*, CCF-1816837. PI: Amal Ahmed. \$450k. Oct 2018-Sep 2021. (REU Supplements 2019-2020: \$16k)
- NSF SHF: *Small: Foundations of Just-in-Time Compilation*, CCF-1618732. PI: Jan Vitek, Co-PI: Amal Ahmed. \$450k. Sep 2016-Aug 2019.
- NSF CAREER: *Verified Compilers for a Multi-Language World*, CCF-1453796. PI: Amal Ahmed. \$508k. May 2015-Apr 2020. (REU Supplements, 2017-2019: \$32k)
- NSF SHF: *Small: Secure Compilation of Advanced Languages*, CCF-1422133. PI: Amal Ahmed. \$500k. Aug 2014-Jul 2017. (REU Supplement, 2017: \$8k)
- Google Faculty Research Award, *Verified Compilers for a Multi-Language World*. \$60k. Feb 2014.
- NSF SHF: *Small: Effectful Software Contracts*, CCF-1203008. PI: Amal Ahmed, Co-PI: Amr Sabry (Indiana University). \$440k. Aug 2011-Jul 2014.

ADVISING

Former Post-doctoral Advisees

- Gabriel Scherer. Jan 2016 – Jul 2017.
First position: Permanent Researcher, Inria.

Graduated Ph.D. Students

- Max S. New, PhD 2020. Thesis: *A Semantic Foundation for Gradual Typing*
First position: Assistant Professor, University of Michigan, Ann Arbor, starting Fall 2021
- William Bowman, PhD 2018. Thesis: *Compiling with Dependent Types*.
First position: Assistant Professor, University of British Columbia (UBC).

Current Post-doctoral Advisees

- Zoe Paraskevopoulou, since Oct 2020. *CRA Computing Innovation Fellow, 2020*
Topic SILC-Wasm: A Platform for Secure Language Interoperability leveraging CHERI Hardware Architecture

Current Ph.D. Students

- Daniel Patterson, since Mar 2016 – Semantic Soundness for Language Interoperability
- Aaron Weiss, since Sep 2017 – *NSF GRFP recipient* – Rust Semantics and Certified Compilation
- Olek Gierczak, since Aug 2019
- Nate Yazdani, since Sep 2019
- Andrew Wagner, since Jun 2020
- Lucy Amidon, since Sep 2020

Graduated M.S. Students

- Hyeyoung Shin, graduated May 2019
- Phillip Mates, graduated Dec 2014
Topic: Verified Compositional Closure Conversion with Mutable State Under Control
- James T. Perconti, graduated Apr 2014
Topic: Verifying an Open Compiler using Multi-Language Semantics

Ph.D. Dissertation Committees

- Akram El-Korashy, Max Planck Institute for Software Systems, 2021 (anticipated)
- Ben Greenman, 2020
- Zoe Paraskevopoulou, Princeton University, 2020
- Justin Slepak, 2020
- Raimil Cruz, University of Chile, 2019
- Jonathan Schuster, 2019
- Mitesh Jain, Mar 2018
- Ezgi Cicek, Max Planck Institute for Software Systems, Jan 2018
- Nada Amin, EPFL, Aug 2016
- Paul Stansifer, Apr 2016
- Stephen Chang, May 2014
- Aaron Turon, Feb 2013 (won 2014 ACM SIGPLAN John C. Reynolds Doctoral Dissertation Award)
- Christos Dimoulas, Dec 2012
- Roshan James, Indiana University, 2012
- Michael Adams, Indiana University, 2011

M.S. Thesis Committees

- Fabian Muehlboeck, Apr 2013

Undergraduate Research Advising

- Michael Fitzgibbons, Jan 2020 – present
- Dustin Jamner, Jan 2016 – May 2020. Now Ph.D. student at MIT
- Peter Amidon (UCSD), Jul – Sep 2019. Now Ph.D. student at Northeastern
- Jay Kruer (Reed College), Jan – Jun 2019
- Nick Rioux, Sep 2013 – Aug 2018. Now Ph.D. student at U.Penn.
- Matthew Kolosick, Sep 2013 – Aug 2018. Now Ph.D. student at UCSD
- Durward Benham, Sep 2013 – Sep 2014

Awards Won by my PhD Students

- Aaron Weiss, 1st Place Winner, Graduate Category, Student Research Competition at POPL 2019
Submission: *Oxide: The Essence of Rust*
- Daniel Patterson, *NSF Graduate Research Fellowship – Honorable Mention*, Apr 2018
- William J. Bowman, 1st Place Winner, Graduate Category, Student Research Competition at POPL 2017
Submission: *Towards Type-Preserving Compilation of Coq*
- Max S. New, 3rd Place Winner, Graduate Category, Student Research Competition at POPL 2017
Submission: *Gradual Type Precision as Retraction*

Awards Won by my Undergraduate Students

- Dustin Jamner, *NSF Graduate Research Fellowship*, Apr 2020
- Dustin Jamner, Summer Scholars Independent Research Fellowship, Northeastern Univ, 2019 (\$4700)
- Nick Rioux, *NSF Graduate Research Fellowship*, Apr 2018
- Nick Rioux, *CRA Undergraduate Research Award – Honorable Mention*, Feb 2018
- Nick Rioux, 3rd Place Winner, Undergraduate Category, Student Research Competition, POPL 2017
Submission: *Naturality Despite Nontermination: A Logical Relation for Linear Types and Polymorphism*
- Dustin Jamner, Provost’s Undergraduate Research Award, Northeastern University, 2016 (\$2100)
- Durward Benham, Scholars Independent Research Fellowship, Northeastern University, 2014 (\$4000)
- Nick Rioux, Scholars Independent Research Fellowship, Northeastern University, 2014 (\$4000)

TEACHING

Northeastern University

- CS 2500: Fundamentals of CS: Intro to Programming and Computing (Accelerated).
Fall 2018, Fall 2019, Fall 2020.
- CS 2500: Fundamentals of CS: Intro to Programming and Computing.
Fall 2011, Fall 2012, Fall 2013, Spring 2014, Fall 2014, Fall 2016, Fall 2020
- CS 7480: Special Topics in Programming Languages: Gradual Typing and Principled Language Interoperability. Spring 2019
- 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, Spring 2017, Spring 2020.
- 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

UNIVERSITY SERVICE

Northeastern University

- Faculty Mentoring Committee (Chair), Khoury College of Computer Sciences, 2019 – 2021
- Faculty Hiring Committee, Khoury College of Computer Sciences, 2018 – 2019
- Undergraduate Committee, College of Computer & Information Science, 2016 – 2017
- Faculty Hiring Committee, College of Computer & Information Science, 2013 – 2016
- Ph.D. Committee, College of Computer & Information Science, 2011 – 2013
- Ph.D. Open House Co-organizer, CCIS, Spring 2012, Spring 2013, Spring 2017

Indiana University

- Graduate Program Committee, Computer Science Program, Fall 2010
- Faculty Affairs Committee, Division B, School of Informatics and Computing, 2010

Princeton University

- Computer Science Graduate Committee, 1998 – 2003.
- Computer Science Representative to the Graduate Engineering Council, School of Engineering and Applied Sciences (SEAS), 2001 – 2002.

PROFESSIONAL ACTIVITIES & SERVICE

- Editorial Board, Journal of Functional Programming (JFP), Jan 2017 – present
- Editorial Board, Mathematical Structures in Computer Science (MSCS), Jan 2016 – Dec 2020
- Member, IFIP WG 2.8, Working Group on Functional Programming, Aug 2014 – present
- Steering Committee Chair: SIGPLAN Programming Languages Mentoring Workshop (PLMW) Jan 2019 – Jan 2020. Currently: Past Chair.
- Deputy Steering Committee Chair: SIGPLAN PL Mentoring Workshop(PLMW), Jan 2018 – Jan 2019
- Co-organizer: SIGPLAN Programming Languages Mentoring Workshop (PLMW)
 - PLMW @ ICFP 2016 (with Robby Findler and Atsushi Igarashi), Sep 2016
 - PLMW @ POPL 2014 (with Benjamin Pierce and Alan Schmitt), Jan 2014
- Co-organizer: Oregon Programming Languages Summer School (OPLSS)
 - OPLSS 2017 (with Dan Licata)
 - OPLSS 2014 (with Greg Morrisett)
 - OPLSS 2013 (with Benjamin Pierce, Frank Pfenning, and Bob Constable)
- Invited Speaker: ECOOP Summer School: *Compiler Verification for a Multi-Language World*, 2017 & 2018
- Invited Speaker/Panelist: MIT Path of Professorship Workshop 2016
- Invited Career Awardee talk, NSF CISE CAREER Workshop 2016
- Invited Lecturer: Oregon Programming Languages Summer School, 2011, 2012, 2013, 2015, 2016, 2017, 2019
- Invited as Visiting Researcher: Institut Henri Poincare (IHP) thematic trimester on Semantics of Proofs and Certified Mathematics, Paris, France, May – Jul 2014
- Invited Lecturer: Ph.D. School preceding the IHP trimester on Semantics of Proofs and Certified Mathematics, held at Centre International de Recontres Mathematiques (CIRM), Marseilles, France, Apr 2014

- Invited Speaker: Programming Languages Mentoring Workshop (PLMW)
 - PLMW @ SPLASH 2020: *Ask Me Anything*, Oct 2020
 - PLMW @ ICFP 2020: *Managing Your Research, Your Advisor, Your PhD*, Aug 2020
 - PLMW @ PLDI 2020: *Compositional Compiler Correctness*, Jun 2020
 - PLMW @ ICFP 2019: *Managing Your Research, Your Advisor, Your PhD*, Aug 2019
 - PLMW @ ICFP 2017: *Compositional Compiler Correctness*, Sep 2017
 - PLMW 2013: *Logical Relations: A Powerful Hammer for your Research Toolbox*, Jan 2013
 - PLMW 2012 (with Steve Zdancewic): *Work-Life Balance for Computer Scientists*, Jan 2012
- Workshop organizer:
 - Dagstuhl Seminar 18201: *Secure Compilation*, May 2018
 - Dagstuhl Seminar 10351: *Modeling, Controlling and Reasoning About State*, Sep 2010
 - Dagstuhl Seminar 08061: *Types, Logics and Semantics for State*, Feb 2008
- Invited Participant:
 - IFIP Working Group (WG) 2.8, *Functional Programming*, observer, 2007, 2012, 2013, 2014
 - Dagstuhl Seminar 18172: *Algebraic Effect Handlers Go Mainstream*, Apr 2018
 - Dagstuhl Seminar 16131: *Language-Based Verification Tools for Functional Programs*, Mar 2016
 - Dagstuhl Seminar 12011: *Foundations for Scripting Languages*, Jan 2012
- NSF Proposal Review Panelist, 2011, 2012, 2015, 2017, 2019.
- Journal reviewing: *Journal of the ACM (JACM)*, *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*.

Program Chair (conference)

- 27th European Symposium on Programming (ESOP) 2018

Program Chair (workshop)

- *Secure Compilation Meeting (SCM)*, co-located with *POPL*, 2017
- 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 Committee Member (conference)

- *ACM Symposium on Principles of Programming Languages (POPL)* 2022
- *ACM Conference on Object-Oriented Programming, Systems, Languages, & Applications*, 2020
- *ACM Conference on Programming Language Design and Implementation (PLDI)*, External PC, 2020
- *ACM Conference on Programming Language Design and Implementation (PLDI)* 2019
- *Intl. Conference on Types for Proofs and Programs (TYPES)* 2018
- *ACM/IEEE Symposium on Logic in Computer Science (LICS)* 2016

- ACM International Conference on Functional Programming (ICFP) 2015
- ACM Symposium on Principles of Programming Languages (POPL) 2015
- ACM/IEEE Symposium on Logic in Computer Science (LICS) 2013
- Asian Symposium on Programming Languages and Systems (APLAS) 2012
- ACM SIGPLAN Haskell Symposium, 2012
- Conference on Mathematical Foundations of Programming Semantics (MFPS) 2011
- Foundations of Software Science and Computation Structures (FOSSACS) 2011
- European Symposium on Programming (ESOP) 2010
- ACM International Conference on Functional Programming (ICFP) 2009
- ACM Symposium on Principles of Programming Languages (POPL) 2008

Program Committee Member (workshop)

- Principles of Secure Compilation (PriSC) 2021
- ACM SIGSAC Workshop on Programming Languages and Analysis for Security (PLAS) 2020
- Workshop on Gradual Typing (WGT) 2020
- Workshop on Syntax and Semantics of Low-Level Languages (LOLA) 2019
- Interconnecting Code Workshop (ICW) 2019
- Workshop on Speculative Side-Channel Analysis (WoSSCA) 2018
- Principles of Secure Compilation (PriSC) 2018
- Symposium on Trends in Functional Programming (TFP) 2016
- Workshop on Script to Program Evolution (STOP) 2015
- Workshop on Dependently Typed Programming (DTP) 2014
- Workshop on Syntax and Semantics of Low-Level Languages (LOLA) 2014
- IEEE Workshop on Theory and Practice of Provenance (TaPP) 2013
- ACM SIGPLAN Workshop on Programming Languages meets Program Verification (PLPV) 2012
- ACM SIGPLAN Workshop on ML, 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
- ACM Workshop on Programming Languages and Analysis for Security (PLAS) 2006
- Workshop on Semantics, Program Analysis, and Computing Environments for Memory Management (SPACE) 2006

External Review Committee Member (conference/symposium)

- ACM International Conference on Functional Programming (ICFP) 2018
- ACM International Conference on Functional Programming (ICFP) 2016
- ACM Conference on Programming Language Design and Implementation (PLDI) 2013
- ACM Conference on Programming Language Design and Implementation (PLDI) 2011

Steering Committee Member

- ESOP (European Symposium on Programming), 2016 – present
- ETAPS (European Joint Conferences on Theory and Practice of Software), 2017 – 2019
- ICFP (ACM International Conf. on Functional Programming), Member at large, 2008 – 2012
- TLDI (ACM Workshop on Types in Language Design and Implementation), 2009 – 2012

KEYNOTES & INVITED TALKS

- *Secure Compilation: Challenges for the Next Decade*
Keynote, Symposium on Computer Security Foundations (CSF), Boston, Massachusetts, June 2020.
- *Semantic Foundations for Gradual Typing*
Keynote, Intl. Symposium on Principles and Practice of Declarative Programming (PPDP), Porto, Portugal, October 2019.
- *Compiler Verification: The Next Generation*
Invited Speaker, PURPL Fest, Purdue Center for Programming Principles and Software Systems, West Lafayette, Indiana, September 2019.
- *Compositional Compiler Verification for a Multi-Language World*
Keynote, Thirty-Fifth Conference on the Mathematical Foundations of Programming Semantics (MFPS), London, UK, June 2019.
- *Compositional Compiler Correctness for a Multi-Language World*
Keynote, Asian Symposium on Programming Languages (APLAS), Wellington, New Zealand, December 2018.
- *All the Languages Together*
Keynote, Strange Loop, St. Louis, Missouri, September 2018.
- *Formal Approaches to Secure Compilation*
Journées Nationales 2018, Pré-GDR Sécurité Informatique, Paris, France, May 2018.
- *Compositional Compiler Verification for a Multi-Language World*
-- Logic & Semantics Seminar, Univ. of Cambridge Computer Laboratory, Cambridge, UK, June 2018
-- PPLV Seminar, University College London, London, UK, June 2018
-- Seminar, Department of Computing, Imperial College London, London, UK, June 2018
-- Computer Science Departmental Seminar, Oxford University, Oxford, UK, June 2018
-- Institute Colloquium, Max Planck Institute for Software Systems (MPI-SWS), Saarbrücken, Germany, January 2018
-- LFCS Seminar, University of Edinburgh, Edinburgh, Scotland, October 2017
-- Gallium and Prosecco Seminar, Inria Paris, Paris, France, September 2017
- *Compositional Compiler Correctness*
Invited speaker, Programming Languages Mentoring Workshop (PLMW @ICFP), Oxford, UK, September 2017.
- *Compiler Verification for a Multi-Language World*
Invited speaker, European Conference on Object-Oriented Programming (ECOOP) Summer School, Barcelona, Spain, June 2017.
- *Fully Abstract Compilation via Universal Embedding*
IFIP Working Group 2.8 (Functional Programming), Lake Placid, New York, July 2016.
- *Correct and Secure Compilation for a Multi-Language World*
Secure Compilation Meeting, Paris, France, August 2016.
- *Compositional Compiler Verification for a Multi-Language World*
Keynote, International Conference on Formal Structures for Computation and Deduction (FSCD), Porto, Portugal, June 2016.
- NSF CISE CAREER Workshop, Invited Speaker (Career Awardee talk), Arlington, Virginia, April 2016
- *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: A Powerful Hammer for your Research Toolbox*
Invited Speaker, Programming Languages Mentoring Workshop (PLMW), January 2013.
- *Work-Life Balance for Computer Scientists*
Programming Languages Mentoring Workshop (PLMW), January 2012.
- *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.
 - 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.
- *L³: 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.

INVITED LECTURE SERIES

- *Secure Compilation* (4 lectures)
18th Annual Oregon Programming Languages Summer School (OPLSS), June 2019.
- *Correct and Secure Compilation for Multi-Language Software* (4 lectures)
16th Annual Oregon Programming Languages Summer School (OPLSS), July 2017.
- *Logical Relations and Compiler Verification* (4 lectures)
15th Annual Oregon Programming Languages Summer School (OPLSS), June 2016.
- *Logical Relations* (5 lectures)
14th Annual Oregon Programming Languages Summer School (OPLSS), June 2015.
- *Syntax and Semantics of Low-Level Languages* (4 lectures)
Ph.D. School at CIRM, summer school preceding the Institut Henri Poincare (IHP) trimester on Semantics of Proofs and Certified Mathematics, April 2014.
- *Logical Relations* (6 lectures)
12th Annual Oregon Programming Languages Summer School (OPLSS), July-August 2013.
- *Logical Relations* (5 lectures)
11th Annual Oregon Programming Languages Summer School (OPLSS), July 2012.
- *Logical Relations* (5 lectures)
10th Annual Oregon Programming Languages Summer School (OPLSS), June 2011.

REFEREED PUBLICATIONS

- [1] Max S. New, Dustin Jamner, and Amal Ahmed.
Graduality and Parametricity, Together Again for the First Time.
In *ACM SIGPLAN Symposium on Principles of Programming Languages (POPL '20)*,
New Orleans, Louisiana, January 2020.
- [2] Phillip Mates, Jamie Perconti, and Amal Ahmed.
Under Control: Compositionally Correct Closure Conversion with Mutable State.
In *21st International Symposium on Principles and Practice of Declarative Programming (PPDP '19)*,
Porto, Portugal, October 2019.

- [3] Daniel Patterson and Amal Ahmed.
The Next 700 Compiler Correctness Theorems (Functional Pearl).
In *24th ACM SIGPLAN International Conference on Functional Programming (ICFP '19)*,
Berlin, Germany, August 2019.
- [4] Marco Patrignani, Amal Ahmed, and Dave Clarke.
Formal Approaches to Secure Compilation: A Survey of Fully Abstract Compilation and Related
Work.
ACM Computing Surveys, 51(6):125.1-125:36, February 2019.
- [5] Max S. New, Daniel R. Licata, and Amal Ahmed.
Gradual Type Theory.
In *ACM SIGPLAN Symposium on Principles of Programming Languages (POPL '19)*,
Lisbon, Portugal, January 2019.
- [6] Max S. New and Amal Ahmed.
Graduality from Embedding-Projection Pairs.
In *23rd ACM SIGPLAN International Conference on Functional Programming (ICFP '18)*,
St. Louis, Missouri, September 2018.
- [7] William J. Bowman and Amal Ahmed.
Typed Closure Conversion for the Calculus of Constructions.
In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI '18)*,
Philadelphia, Pennsylvania, June 2018.
- [8] Gabriel Scherer, Max S. New, Nick Rioux, and Amal Ahmed.
FabULous Interoperability for ML and a Linear Language.
In *21st Intl. Conference on Foundations of Software Science and Computation Structures (FoSSaCS '18)*,
Thessaloniki, Greece, April 2018.
- [9] William J. Bowman, Youyou Cong, Nick Rioux, and Amal Ahmed.
Type-Preserving CPS Translation of Σ and Π Types is Not Not Possible.
In *ACM SIGPLAN Symposium on Principles of Programming Languages (POPL '18)*,
Los Angeles, California, January 2018.
- [10] Olivier Fluckiger, Gabriel Scherer, Ming-ho Yee, Aviral Goel, Amal Ahmed, and Jan Vitek.
Correctness of Speculative Optimizations with Dynamic Deoptimization.
In *ACM SIGPLAN Symposium on Principles of Programming Languages (POPL '18)*,
Los Angeles, California, January 2018.
- [11] Amal Ahmed, Dustin Jamner, Jeremy Siek, and Philip Wadler.
Theorems for Free for Free: Parametricity With and Without Types.
In *22nd ACM SIGPLAN International Conference on Functional Programming (ICFP '17)*,
Oxford, UK, September 2017.
- [12] Daniel Patterson, Jamie Perconti, Christos Dimoulas, and Amal Ahmed.
FunTAL: Reasonably Mixing a Functional Language with Assembly.
In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI '17)*,
Barcelona, Spain, June 2017.
- [13] Daniel Patterson and Amal Ahmed.
Linking Types for Multi-Language Software: Have Your Cake and Eat it Too.
In *SNAPL: Summit on Advances in Programming Languages (SNAPL'17)*,
Asilomar, California, May 2017.

- [14] Max S. New, William J. Bowman, and Amal Ahmed.
Fully Abstract Compilation via Universal Embedding.
In *21st ACM SIGPLAN International Conference on Functional Programming (ICFP '16)*,
Nara, Japan, September 2016.
- [15] 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.]
- [16] 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.
- [17] 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.
- [18] James T. Perconti and Amal Ahmed.
Verifying an Open Compiler Using Multi-Language Semantics.
In *23rd European Symposium on Programming (ESOP '14)*, Grenoble, France, April 2014.
- [19] Umut Acar, Amal Ahmed, James Cheney, and Roly Perera.
A Core Calculus for Provenance.
Journal of Computer Security, 21(6): 919-969, 2013.
- [20] 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.
- [21] Umut Acar, Amal Ahmed, James Cheney, and Roly Perera.
A Core Calculus for Provenance.
In *Conference on Principles of Security and Trust (POST '12)*,
pages 410-429, Tallinn, Estonia, March 2012.
- [22] 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.
- [23] 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.
- [24] 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.

- [25] 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.
- [26] 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.
- [27] 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.
- [28] 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.
- [29] 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.
- [30] 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.
- [31] 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.
- [32] 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.]
- [33] 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.
- [34] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
L³: A Linear Language with Locations.
Fundamenta Informaticae, 77(4): 397-449, June 2007.
- [35] 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.

- [36] 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.
- [37] 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.
- [38] 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.
- [39] Greg Morrisett, Amal Ahmed, and Matthew Fluet.
L³: 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.
- [40] 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.
- [41] 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.
- [42] 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.
- [43] 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 & IN PREPARATION

- [1] Paulette Koronkevich, Ramon Rakow, Amal Ahmed, and William Bowman.
ANF Preserves Dependent Types up to Extensional Equality, submitted March 2021.
- [2] Daniel Patterson and Amal Ahmed.
Semantic Soundness for Foreign Function Calls, submitted February 2021.
- [3] Aaron Weiss, Olek Gierczak, Daniel Patterson, Nicholas D. Matsakis, and Amal Ahmed.
Oxide: The Essence of Rust, submitted July 2020.
- [4] Max S. New, Daniel Licata, and Amal Ahmed.
Gradual Type Theory, submitted February 2020.

- [5] Michael Fitzgibbons, Zoe Paraskevopoulou, and Amal Ahmed.
Richly Typed WebAssembly: Safe Shared-Memory Interoperability between Languages with Automatically and Manually Managed Memory. In preparation.

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, Youyou Cong, Nick Rioux, and Amal Ahmed.
Type-Preserving CPS Translation of Σ and Π Types is Not Not Possible (Technical Report). (35 pages)
Available at: <http://www.ccs.neu.edu/home/amal/papers/cpscc-tr.pdf>, November 2017.
- [2] Amal Ahmed, Dustin Jamner, Jeremy Siek, and Philip Wadler.
Theorems for Free for Free: Parametricity, With and Without Types (Technical Appendix). (69 pages)
Available at: <http://www.ccs.neu.edu/home/amal/papers/thmfree-tr.pdf>, February 2017.
- [3] Daniel Patterson, Jamie Perconti, Christos Dimoulas, and Amal Ahmed.
FunTAL: Reasonably Mixing a Functional Language with Assembly (Technical Appendix). (148 pages)
Available at: <http://www.ccs.neu.edu/home/amal/papers/funtal-tr.pdf>, November 2016.
- [4] Max S. New, William J. Bowman, and Amal Ahmed.
Fully Abstract Compilation via Universal Embedding (Technical Appendix). (56 pages)
Available at: <http://www.ccs.neu.edu/home/amal/papers/facue-tr.pdf>, July 2016.
- [5] William J. Bowman and Amal Ahmed.
Noninterference for Free. (61 pages) Available at: <https://perma.cc/RJ9N-B5ZQ>, June 2015.
- [6] 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.
- [7] 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.
- [8] 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.
- [9] James Cheney, Umut Acar, and Amal Ahmed.
Provenance Traces.
Available at: <http://arxiv.org/abs/0812.0564>, July 2008.
- [10] 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.
- [11] 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.

- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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.
- [16] Amal Ahmed, Matthew Fluet, and Greg Morrisett.
L³: A Linear Language with Locations. (73 pages)
Harvard Computer Science Technical Report TR-24-04, Harvard University, July 2004.
- [17] 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.
- [18] Amal Ahmed, Andrew W. Appel, and Roberto Virga.
An Indexed Model of Impredicative Polymorphism and Mutable References. (15 pages)
Unpublished, January 2003.