

David Swasey

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Research Interests

Programming language design and implementation, type systems, and type theory.

Logical frameworks, proof assistants, automated deduction, and verification.

Computer security and privacy.

Education

2012–present Max Planck Institute for Software Systems (MPI-SWS) & Saarland University.
Ph.D. student in Computer Science.
Advisors: Deepak Garg and Derek Dreyer.

2006 Carnegie Mellon University.
B.S. in Computer Science with a minor in Mathematical Science and University Honors.

Employment

2006–12 Principal Research Analyst, Carnegie Mellon University CyLab.
Supervisor: Lujjo Bauer.

Contributed to a Proof-Carrying Authorization (PCA) system, Grey, deployed in CyLab and at the University of North Carolina. Grey uses an authorization logic encoded in the logical framework LF and cryptographic certificates (digitally signed statements in that logic) to control access to locked doors and to computers. Grey grants principal A access to resource R if A can prove a challenge mentioning R . Users interact with their view of the overall security policy via an untrusted smartphone application that provides a user interface, participates in a distributed proving algorithm, and signs statements to delegate authority and access resources.

Worked on several questions related to PCA: How do we allow delegation between institutions that use different authorization logics? Can we observe access patterns to suggest useful delegations before they're needed?

Helped modularize Grey, making its components and the interfaces between them more robust, promoting reuse in several contexts; assisted with technology transfer; helped teach graduate students about PCA; and developed variants of Grey around other logics.

1998–2002 Research Programmer, 2002–06 Senior Research Programmer, Carnegie Mellon University School of Computer Science.
Supervisor: Robert Harper.

Contributed to the ConCert and Fox projects, focusing primarily on the TILT compiler for Standard ML (SML). TILT translates a source program to an executable through a series of transformations on Typed Intermediate Languages. By preserving types, TILT can check its work (by type-checking intermediate code), target Typed Assembly Language, and employ tag-free garbage collection.

Investigated separate and incremental compilation for SML. Developed (with several students) an automatic theorem prover for first-order intuitionistic logic to explore the impact of tabling techniques on the search space of Tableaux provers.

Performed regular capital equipment audits, assisted in preparation of the Fox project's quarterly reports, and prepared its annual and final reports.

1994–96 Research Assistant, 1996–98 Research Programmer, Carnegie Mellon University School of Computer Science.

Supervisor: Roger Dannenberg.

The JITL project focused on distance learning: A “Just-in-Time Lecture” is a flexible and low-cost way of disseminating presentations. Wrote JITL's software, designed a lecture description language and compiler to simplify production, wrote training materials, and taught short courses on JITL production.

Contributed to technical development of intelligent tutors based on the systems approach to instructional design: The IDEAS system included a formal model for curriculum design and analysis as well as algorithms to adapt a curriculum to individual variations in skill and learning style. Wrote curriculum analysis software and a user interface.

1993–1994 Programmer, Visual Symphony, Inc., Pittsburgh, PA.

Supervisor: Peter Capell.

Prototyped user interfaces. Developed a framework for multimedia applications and digital video extensions to Authorware. For a sister company, Thar Designs, developed a real-time spectrum analysis tool for use by chemical engineers. Project Leader during development of the award-winning Federal Railroad Administration FRALSS training software for CSX.

Publications

Conference and Workshop Publications

1. David Swasey, Deepak Garg, and Derek Dreyer. Robust and compositional verification of object capability patterns. To appear in *OOPSLA 2017: Proceedings of the 2017 ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications*.
2. Ralf Jung, David Swasey, Filip Sieczkowski, Kasper Svendsen, Aaron Turon, Lars Birkedal, and Derek Dreyer. Iris: Monoids and invariants as an orthogonal basis for concurrent reasoning. In *POPL 2015: 42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, pages 637–650, Mumbai, India, January 2015.
3. Elli Fragkaki, Lujo Bauer, Limin Jia, and David Swasey. Modeling and enhancing Android's permission system. In *Computer Security — ESORICS 2012 — 17th European Symposium on Research in Computer Security*, pages 1–18, Pisa, Italy, September 2012. Springer LNCS 7459.

4. Lujo Bauer, Limin Jia, Michael K. Reiter, and David Swasey. xDomain: Cross-border proofs of access. In *Proceedings of the 14th ACM Symposium on Access Control Models and Technologies*, pages 43–52, Stresa, Italy, June 2009.
5. David Swasey, Tom Murphy VII, Karl Crary, and Robert Harper. A separate compilation extension to Standard ML. In *Proceedings of the 2006 ACM SIGPLAN Workshop on ML*, pages 32–42, Portland, Oregon, September 2006.

Technical Reports

6. Elli Fragkaki, Lujo Bauer, Limin Jia, and David Swasey. Modeling and enhancing Android's permission system. Technical Report CMU-CyLab-11-020, CyLab, Carnegie Mellon University, April 2012. Extended version of [3].
7. Lujo Bauer, Limin Jia, Michael K. Reiter, and David Swasey. xDomain: Cross-border proofs of access. Technical Report CMU-CyLab-09-005, CyLab, Carnegie Mellon University, March 2009. Extended version of [4].
8. David Swasey, Tom Murphy VII, Karl Crary, and Robert Harper. A separate compilation extension to Standard ML (revised and expanded). Technical Report CMU-CS-06-104R, School of Computer Science, Carnegie Mellon University, September 2006. Extended version of [5].
9. David Swasey, Tom Murphy VII, Karl Crary, and Robert Harper. A separate compilation extension to Standard ML (working draft). Technical Report CMU-CS-06-104, School of Computer Science, Carnegie Mellon University, January 2006. Superseded by [8].

Electronic copies of all of the papers cited above are available online at <http://www.mpi-sws.org/~swasey/>

Professional Memberships

ACM & ACM SIGPLAN, 1999–2013.

ACM SIGACT, 1999–2000.

Society for Applied Learning Technology (SALT), 1997–98.

Professional Activities and Service

External reviewer, POPL 2017, CSF 2015, ESOP 2015, ICFP 2014, AsiaCCS 2013, Oakland 2013, TDSC 2012, PPDP 2000.

Technical support, ICFP 2002 and PPDP 2002, Pittsburgh, PA, October 3–8, 2002.

Local organizer, CADE-17, Pittsburgh, PA, June 17–20, 2000.

Technical support, ICFP 1999, Paris, France, September 27–29, 1999.

Attendee, TYPES Summer School, *Theory and Practice of Formal Proofs*, Giens, France, August 30–September 10, 1999.

JITL presentation, United States Army, Combined Arms Support Command, Fort Lee, VA, March 24–27, 1997.

Guest lecturer, graduate course 15–820B *Advanced Topics in HCI: User Interface Software*, Carnegie Mellon University, 1996.

Poster Sessions

Meeting of the MPI-SWS Scientific Advisory Board, September 2015 & December 2013.

Carnegie Mellon CyLab Partners Conference, Pittsburgh, PA, October 2009 & 2008.

SALT Interactive Multimedia Conference, Arlington, VA, August 1997.

10th Annual Expanding Your Horizons In Science and Mathematics Conference, Duquesne University, Pittsburgh, PA, March 15, 1997.

56th Annual ERAPPA Meeting and Educational Conference, October 1996.

Lectures on JITL Production

Singapore, February 16–19, 1998.

Schaumburg, IL, November 10–14, 1997.

Schaumburg, April 22–24, 1997.

Schaumburg, December 1–6, 1996.

Scottsdale, AZ, 1996.