

Cole Schlesinger

Programming languages, type systems, operational semantics, program logics, compilers, network programming and verification.

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EXPERIENCE

Akita Software, Palo Alto, CA — *Founding Research Engineer*

APR 2020 - PRESENT

Designed and implemented advanced API analysis features by innovating on research in specification mining, automated testing, and program analysis. Owned and delivered features end to end, including backend infrastructure, frontend/UI, and documentation. Spearheaded a UI redesign with React, Material UI, and Typescript.

Amazon Web Services, Cupertino, CA — *Senior Applied Scientist*

JUL 2018 - PRESENT

Designed, implemented, and launched an internal service detecting vectors for privilege escalation exposed due to misconfigurations of AWS Identity and Access Management (IAM) policies, extending the Zelkova policy analysis engine, which encodes the semantics of IAM policies to SMT. Worked with internal and external customers to gather feedback, drive adoption, and build partner integrations. Launched IAM Access Analyzer, a service that helps customers understand who can access their AWS resources.

Barefoot Networks, Santa Clara, CA — *Software Engineer*

NOV 2016 - JUL 2018

Led a team to design and implement novel resource allocation algorithms for compiling P4 programs to Barefoot programmable switching hardware. Contributed to P4 language design as a Barefoot-appointed member of the P4 Language Consortium. Helped design and implement a scalable P4 verifier for automatically checking pipeline safety properties.

Samsung Research America, Mountain View, CA — *Research Engineer*

JUN 2015 - NOV 2016

Developed new tools, analyses, and optimizations for JavaScript, home automation for the Internet of Things, and software-defined networks that had practical internal impact as well as academic publications.

GrammaTech, Inc., Ithaca, NY — *Software Engineer*

JUN 2005 - JUN 2009

Designed and implemented research prototypes leveraging GrammaTech's static-analysis platform under grants from the US government's SBIR program. Assisted in drafting funding proposals for developing static-analysis technologies

into marketable tools.

EDUCATION

Princeton University, Princeton, NJ — *PH.D.*

MAY 2011 - JUN 2015

Studied programming languages, advised by David Walker. Dissertation: Abstractions for Software-defined Networks.

Princeton University, Princeton, NJ — *M.A.*

SEP 2009 - MAY 2011

Ithaca College, Ithaca, NY — *B.S.*

SEP 2001 - MAY 2005

Dual degree: B.S., computer science, and B.S. television-radio.

PUBLICATIONS

One-Click Formal Methods. John D. Backes, Pauline Bolignano, Byron T. Cook, Andrew Gacek, Kasper Søe Luckow, Neha Rungta, Martin Schäf, Cole Schlesinger, Rima S. Tanash, Carsten Varming, Michael W. Whalen. IEEE Software, 2019.

p4v: Practical Verification for Programmable Data Planes. Jed Liu, William Hallahan, Cole Schlesinger, Milad Sharif, Jeongkeun Lee, Robert Soulé, Han Wang, Călin Cascaval, Nick McKeown, and Nate Foster. ACM SIGCOMM Conference on Applications, Technologies, Architectures, and Protocols for Computer Communications (SIGCOMM), 2018.

Iota: A Calculus for Internet of Things Automation. Julie L. Newcomb, Satish Chandra, Jean-Baptiste Jeannin, Cole Schlesinger, Manu Sridharan. ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software (Onward!), 2017.

Correct by Construction Networks using Stepwise Refinement. Leonid Ryzhyk, Nikolaj Bjørner, Marco Canini, Jean-Baptiste Jeannin, Cole Schlesinger, Douglas B. Terry, and George Varghese. USENIX Conference on Networked Systems Design and Implementation (NSDI), 2017.

Type Inference for Static Compilation of JavaScript. Satish Chandra, Colin Gordon, Jean-Baptiste Jeannin, Cole Schlesinger, Manu Sridharan, Frank Tip, Yong-Il Choi. ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2016.

A Practical Framework for Type Inference Error Explanation. Calvin Loncaric, Satish Chandra, Cole Schlesinger, Manu Sridharan. ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2016.

Transparent, Live Migration of a Software-defined Network. Soudeh Ghorbani, Cole Schlesinger, Matthew Monaco, Eric Keller, Matthew Caesar, Jennifer Rexford, David Walker. ACM Symposium on Cloud Computing (SoCC), August 2015.

Concurrent NetCore: From Policies to Pipelines. Cole Schlesinger, Michael Greenberg, and David Walker. Proceedings of the 19th ACM SIGPLAN international conference on Functional programming (ICFP), September 2014.

Programming Protocol-Independent Packet Processors. Pat Bosshart, Dan Daly, Martin Izzard, Nick McKeown, Jennifer Rexford, Cole Schlesinger, Dan Talayco, Amin Vahdat, George Varghese, and David Walker. <http://arxiv.org/abs/1312.1719v2>.

NetKAT: Semantic Foundations for Networks. Carolyn Jane Anderson, Nate Foster, Arjun Guha, Jean-Baptiste Jeannin, Dexter Kozen, Cole Schlesinger, and David Walker. ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL), 2014.

Towards JavaScript Verification with the Dijkstra State Monad. Nikhil Swamy, Joel Weinberger, Cole Schlesinger, Juan Chen, and Ben Livshits. ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2013.

Languages for Software-defined Networks. Nate Foster, Arjun Guha, Mark Reitblatt, Alec Story, Michael J. Freedman, Naga Praveen Katta, Christopher Monsanto, Joshua Reich, Jennifer Rexford, Cole Schlesinger, David Walker, and Rob Harrison. IEEE Communications Magazine, Vol. 51, No. 2. February 2013.

Abstractions for Network Update. Mark Reitblatt, Nate Foster, Jen Rexford, Cole Schlesinger, and David Walker. ACM SIGCOMM 2012 conference on Applications, technologies, architectures, and protocols for computer communication (SIGCOMM), August 2012.

Splendid Isolation: A Slice Abstraction for Software-defined Networks. Stephen Gutz, Alec Story, Cole Schlesinger, Nate Foster. Hot Topics in Software-defined Networks (HotSDN), August 2012.

Modular Protections against Non-control Data Attacks. Cole Schlesinger, Karthik Pattabiraman, Nikhil Swamy, David Walker, and Benjamin Zorn. Computer Security Foundations Symposium (CSF), July 2011.

TEACHING EXPERIENCE

Princeton University, Princeton, NJ — *Teaching Assistant*

SPRING 2011

COS 333: Advanced Programming Techniques.

Princeton University, Princeton, NJ — *Teaching Assistant*

FALL 2010

COS 217: Introduction to Programming Systems.

W.E.B. DuBois Scholarship Institute, Princeton, NJ — *Instructor*

SUMMER 2010

Taught a condensed version of a freshman-level, introductory computer science course, covering basic hardware and software systems, basic algorithms and data structures, and programming in Java.

SERVICE

Program committees: NSDI 2020, NSDI 2019, ESEC/FSE 2018 (Industry Track), NSDI 2018, PLDI 2017 (SRC), ITC 2017. Workshop on Network Verification co-chair, 2017. PLDI P4 Tutorial organizer, 2017.

HONORS AND AWARDS

Siebel Scholar (2013), President's Scholarship (2001--2005), Phi Kappa Phi (2005), Oracle Society (2005), Upsilon Pi Epsilon (founding member, 2005).