Joshua M. Cohen

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Research Interests

Formal Verification, Proof Assistants, Functional Programming, Algorithms

Education

Princeton University Princeton, NJ

- PhD in Computer Science, Advisor: Andrew W. Appel 2020 – 2025
- Thesis: A Foundationally Verified Intermediate Verification Language

University of Pennsylvania Philadelphia, PA

- MSE in Computer Science, GPA: 4.0/4.0 2018 – 2020
- BA in Mathematics and Computer Science (*summa cum laude*), GPA: 3.98/4.0 2016 – 2020

Employment

Sandia National Laboratories - Formal Methods R&D Intern Summer 2022 – Present

- Developing formal semantics for the Why3 intermediate verification language.

AWS - Applied Scientist Intern Summer 2021

- Proved correctness theorems about the IAM policy evaluator using Dafny.

AWS - Software Development Engineering Intern Summer 2019

- Developed internal tools for AWS Key Management Service HSM team.
- Used several cryptography libraries to interface with Yubikeys.

KPMG - Data & Analytics Intern Summer 2018

- Developed Microsoft Office add-in for automated document generation using Javascript.

Publications

- **Joshua M. Cohen**. “A Mechanized First-Order Theory of Algebraic Data Types with Pattern Matching”. In: *ITP 2025: 16th International Conference on Interactive Theorem Proving.* To appear. 2025

- Aleks Chakarov, Jaco Geldenhuys, . . ., **Joshua Cohen***, . . ., and Yongwei Yuan. “ Formally Verified Cloud-Scale Authorization ”. In: *2025 IEEE/ACM 47th International Conference on Software Engineering (ICSE).* IEEE Computer Society, May 2025, pp. 703–703

- **Joshua M. Cohen**. “Implementing OCaml APIs in Coq”. In: *CoqPL 2025: The Eleventh International Workshop on Coq for Programming Languages.* Jan. 2025

- **Joshua M. Cohen** and Philip Johnson-Freyd. “A Formalization of Core Why3 in Coq”. In: *Proceedings of the ACM on Programming Languages* 8. POPL (Jan. 2024)

- **Joshua M. Cohen** and Andrew W. Appel. “Specifying and Verifying a Real-World Packet Error-Correction System”. In: *Verified Software. Theories, Tools and Experiments: 15th International Conference, VSTTE 2023, Ames, IA, USA, October 23–24, 2023, Revised Selected Papers.* Springer-Verlag, 2023, pp. 44–63

- **Joshua M. Cohen**, Qinshi Wang, and Andrew W. Appel. “Verified Erasure Correction in Coq with MathComp and VST”. in: *CAV 2022: 34th International Conference on Computer-Aided Verification*. Springer International Publishing, 2022, pp. 272–292

- Joachim Breitner, Antal Spector-Zabusky, Yao Li, Christine Rizkallah, John Wiegley, **Joshua Cohen**, and Stephanie Weirich. “Ready, Set, Verify! Applying hs-to-coq to Real-World Haskell Code”. In: *Journal of Functional Programming* 31 (2021)

* Authors listed alphabetically by affiliation

Talks

- *A Foundationally Verified Intermediate Verification Language.* Portland State University Programming Languages and Verification Seminar. November 2024.

- *Towards a Verified Intermediate Verification Language.* IFIP Working Group 2.3 Programming Methodology. May 2024.

- *A Formalization of Why3 in Coq.* New Jersey Programming Languages and Systems Seminar (NJPLS). May 2023.

- *Verified Erasure Correction in Coq with MathComp and VST.* New Jersey Programming Languages and Systems Seminar (NJPLS). May 2022.

Teaching

Teaching Assistant - Princeton University

• Programming Languages (COS 510)	Spring 2023
• Theory of Algorithms (COS 423)	Fall 2022

Teaching Assistant - University of Pennsylvania

• Introduction to Algorithms (CIS 320)	Fall 2019, Spring 2020
• Programming Languages and Techniques I (CIS 120)	Spring 2018, Fall 2018, Spring 2019

Service

Artifact Evaluation Committee: ICFP 2024, POPL 2025

Honors and Awards

Gordon Wu Fellowship in Engineering - Princeton University
Benjamin Franklin Scholar - University of Pennsylvania
IEEE Eta Kappa Nu Honor Society Member - University of Pennsylvania

Skills

Verification - Coq, VST, Dafny, Why3, VeriFast, Liquid Haskell
Programming - OCaml, C, Java, Python, Haskell