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

- Byun, Chakarov, **Cohen***, et al. "Formally Verified Cloud-Scale Authorization". In: *47th IEEE/ACM International Conference on Software Engineering (ICSE 2025)*. To appear. 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*. 2024
- **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*. 2022
- 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

Talks

- *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