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Eleftherios (Lef) Ioannidis

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Education

PhD in Computer Science, *University of Pennsylvania*, Philadelphia, PA
Thesis: *"Correct Programs, Executed Correctly: Verifying Specifications and Executions"* (2025).
Advisors: Sebastian Angel & Steve Zdancewic

MEng in Computer Science, *Massachusetts Institute of Technology*, Cambridge, MA
Thesis: *"Extracting and optimizing low-level bytecode from high-level verified Coq"* (2019).
Advisors: Nickolai Zeldovich & Frans Kaashoek

BSc in Computer Science, *Massachusetts Institute of Technology*, Cambridge, MA
Thesis: *"Parallel annotations for polyhedral optimizations in LLVM"* (2015).
Advisor: Saman Amarasinghe

Employment

2025 - Present Senior Research Software Engineer, Microsoft Research, Redmond, WA
– Working in the RiSE group, focusing on LLM assisted program verification and proof synthesis.

Summer '22 Research Scientist Intern, Amazon, Automated Reasoning Group, Arlington, VA
– Worked in the **formalization** of the Cedar authorization language and the Cedar validator.
– Implemented a novel **type inference** algorithm for Cedar including singleton and capability types.

2018 - 2019 Investment Engineer, Bridgewater Associates, Westport, CT
– Created **APIs** used for **big-data** quantitative research, analytics and **visualization**.
– Implemented complex risk-controls and hedging **algorithms** used daily by Trade Generation.
– Taught the **Scala** and **SQL** programming languages to more than 100 traders and engineers.

2016 - 2018 Principal Software Engineer, UnifyID (acquired by Prove), San Francisco, CA
– Designed and implemented a **microservice** based **back-end** on **AWS** (*20 services*).
– Implemented a real-time **Machine Learning** service, for high-throughput inference (*3000 req/sec*).
– Developed certificate management systems and implemented **end-to-end encryption**.

2015 - 2016 Software Security Engineer, Apple, Cupertino, CA
– Contributed to the **LLVM compiler**, focus on compiler optimizations for program security.
– Implemented **cryptographic algorithms** for end-to-end encryption and DRM.

Patents & Publications

Aug. 2025. "Correct Programs, Executed Correctly: Verifying Specifications and Executions". PhD thesis. University of Pennsylvania.
Oct. 2024. "Cedar: A New Language for Expressive, Fast, Safe, and Analyzable Authorization". In: *Proceedings of the ACM on Programming Languages* OOPSLA.
Dec. 2024. "Choice Trees: Representing and reasoning about nondeterministic, recursive, and impure Programs in Coq". In: *Journal of Functional Programming, Special POPL 2025 edition.*
June 2024. "Reef: Fast Succinct Non-Interactive Zero-Knowledge Regex Proofs". In: *33rd USENIX Security.*
Dec. 2024. "Structural temporal logic for mechanized program verification". In: under submission.
June 2022. "Efficient representation of numerical optimization problems for SNARKs". In: *31st USENIX Security.*
Mar. 2020. "Authorization Policy Validation". US Patent 10,601,786.
Mar. 2020. "Privacy-preserving system for machine-learning training data". US Patent 10,601,786.
Nov. 2019. "Extracting and optimizing formally verified code for systems programming". In: *NASA Formal Methods: 11th International Symposium.*