Graduating summer 2025
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Lef Ioannidis

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Education

PhD in Computer Science, *University of Pennsylvania*, Philadelphia, PA
Thesis: *"Compilers for hardware acceleration of zero-knowledge proof systems"* in DSL.
Advised by Sebastian Angel & Steve Zdancewic. Graduation in summer 2025.

MEng in Computer Science, *Massachusetts Institute of Technology*, Cambridge, MA
Thesis: *"Compiling formally verified Coq to C++"* in PDOS.

Bsc in Computer Science, *Massachusetts Institute of Technology*, Cambridge, MA
Thesis: *"Parallel extensions to the LLVM language for polyhedral optimizations"* in Commit.

Employment

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 scalable **type inference** algorithm for Cedar including singleton and capability types.

2018 - 2019 Investment Engineer, Bridgewater Associates, Westport, CT
- Implemented multithreaded, high-performance **big-data** analytics **libraries** for quantitative research
- and multithreaded risk-control **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
- Implemented a GPU-based TensorFlow **Machine Learning** service for high-throughput inference (*3000 req/sec*).
- Designed and implemented a **microservice** based **back-end** on **AWS** (*20 services*).

2015 - 2016 Software Security Engineer, Apple, Cupertino, CA
- Contributed to the **LLVM compiler**, focus on compiler optimizations for performance and security.

Technologies and Languages

Languages:	C++, Rust, Haskell, OCaml, Coq, Go, Javascript.
Software:	LLVM, TensorFlow, Linux, Docker, AWS, Azure, Z3.
General:	Compilers, Performance engineering, Language Design, Formal verification, Cryptography, Distributed systems, Microservices.

Patents & Publications

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. "Privacy-preserving system for machine-learning training data". US Patent 10,601,786.
Mar. 2020. "Scala DSLs for Domain-specific quantitative logic." In: *NEScala 2020.*
Nov. 2019. "Extracting and optimizing formally verified code for systems programming". In: *NASA Formal Methods: 11th International Symposium.*
Apr. 2017. "Auto-scalable microservices for Machine Learning with Docker". In: *Dockercon 2017.*