Eleftherios "Lef" Ioannidis

Info

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Education

Dec 2017 - Jan 2019 (Expected) Master's of Engineering in Computer Science, *CSAIL MIT*, Cambridge, MA

Thesis: *An implementation of Coq's Gallina in C++17*

Advisors: Frans Kaashoek, Nickolai Zeldovich, Adam Chlipala, CSAIL

Sep 2011 - Jun 2015 Bachelor's in Computer Science, *MIT*, Cambridge, MA

Major: Electrical Engineering and Computer Science

Thesis: *Parallel Instructions for the LLVM Compiler*

Advisors: Saman Amarasinghe, Charles Leiserson, CSAIL

Academic Work

Today Teaching Assistant, MIT, Cambridge, MA

6.828: Operating Systems. Graduate level course, teaching students to build operating systems based on xv6. Taught by Frans Kaashoek, Adam Belay.

6.858: Computer Systems Security. Graduate level course, focused on attacking and defending Computer Systems. Buffer overflows, Return-to-libc, Symbolic Execution, POSIX security, Cryptography, Web Security, Distributed Systems, Blockchain. Taught by Nickolai Zeldovich, Frans Kaashoek.

Today Graduate Researcher, PDOS, CSAIL, Cambridge, MA

Formal Verification of Computer Systems. Building a compiler for the Functional, Verified Language of the Coq Proof Assistant, while formally verifying a Mail Server and a Payment Application.

Sep 2015 - Jan 2016 Teaching Assistant, NTUA, Athens, Greece

Helped develop problem sets for the Cryptography class, taught in the National Technical University of Athens.

Sep 2014 - Jan 2015 Undergraduate Researcher, PL Group, CSAIL, Cambridge, MA

SuperUROP Program for Advanced Undergraduate Research. Year-long research program, worked on developing new parallel extensions for polyhedral Optimizations in LLVM, targeted at the Halide Domain-specific Language
http://www.halide-lang.org/

Jan 2012 - Jan 2015 Class Instructor, SIPB IAP, Cambridge, MA

Taught the *Secure Programming in C* class in MIT, organized by the Student Information Processing Board every January.
https://github.com/elefthei/secure-C

Nov 2010 - Jun 2011 Researcher, Aristotle University of Thessaloniki, Greece

FLOW Walkers, a simulation of human behavior in groups. Using flocking, finite and stochastic State Machines and more, automata walk in a room based on deterministic rules, as well as rules of attraction and repulsion. Generated interesting 3D graphics of human-like walkers in using Matlab and DarkBasic.

Conference Talks

February 2019	Extracting and optimizing low-level bytecode from high-level Coq, NFM 2019, Houston, TX.
July 2018	Making the Rooster fly, DeepSpec 2018, Princeton, NJ.
September 2017	Data aware Nginx for Load Balancing ML data, Nginxconf 2017, Portland, OR.
April 2017	Scalable ML microservices on GPUs, Dockercon 2017, Austin, TX.
February 2017	Secure, Real-time data collection on mobiles, MadCon 2017, Austin, TX.
April 2015	Parallel and Distributed Extensions to LLVM, MIT Undergraduate Research Conference and Journal 2015, Cambridge, MA.

Industry Work

May 2016 - Oct 2017 — Principal Engineer, UnifyID, San Francisco, CA

First Engineer of UnifyID. While working there, the startup won the 2^{nd} place at TechCrunch Disrupt Battlefield 2016, 1^{st} place at the RSA Innovation Sandbox 2017, 1^{st} place in the Security and Privacy Category, SXSW 2017. Designed and implemented the UnifyID back-end for secure, implicit authenticaton. Designed services as a scalable, Distributed microservice back-end, for multiple User & Device authentication. Designed and implemented Data Collection clients and real-time Machine Learning algorithms, designed and implemented all end-to-end encryption protocols. Managed a team of 10 engineers and handled all technical interviews.

Aug 2015 - May 2016 — Security Engineer, Apple, Cupertino, CA

FairPlay and DRM group. Worked on Application Security, Compilers, Reverse Engineering. Ensured the FairPlay daemon and FairPlay DRM suite are immune to static and runtime attacks.

Jun 2014 - Sep 2014 — Graduate Firmware Engineer Intern, Intel, Hillsboro, OR

Internet of Things (IoT) research branch of Intel. Designed and engineered firmware for Intel embedded microprocessors in a wireless mesh network configuration for large-scale Datacenter monitoring. Published a whitepaper in the Intel internal library.

Mar 2013 - Sep 2015 — Systems and Network Administrator, MIT MediaLab, Cambridge, MA

Mobile Experience Lab, Comparative Media Studies Group, MIT. Responsible for the uptime and maintenance of 5 physical servers and over 100 websites. Software stack was Debian and Xen, running Apache, Django, Kerberos, LDAP, SSH, LDAP and more.

Jun 2013 - Aug 2013 — Software Engineer Intern, MokaFive, Redwood City, CA

LiveCloud^{TM}, a cross-platform, secure cloud storage system. Developed a blacklisting system and Peer-to-Peer file transfers.

Nov 2011 - Jun 2012 — Mobile Security Analyst Intern, Securigin, Cambridge, MA

Implemented an automated iOS app penetration testing framework, pen-tested thousands of apps and found hundreds of generic network and memory management vulnerabilities. Selectred for MIT100K enterpeneurship competition.

Patents

March 2018 — Privacy preserving System for ML Training Data (us UFID18-1001)

Privacy-preserving system based on Intel SGX Secure Enclaves. Enables high-performance and GPU computing on anonymized user data for Machine Learning, without exposing the identity of the user to the operator, cloud owner or engineer.

Open Source Projects

February 2019 — MCQC: Extracting static C++17 from Coq's functional specification language

MCQC stands for the Mach Coq Compiler. MCQC compiles Gallina, the functional specification language of Coq, into C++17. The generated C++17 is then compiled with standard clang/gcc into portable assembly, with no requirements for a runtime system or garbage collection. MCQC was accepted in NFM 2019 in Houston, TX.
https://github.com/mit-pdos/mcqc

October 2017 — WebTorch: A Deep Learning web server based on Nginx

WebTorch takes advantage of the versatile LuaJIT compiler to bring together the Nginx web serve and Torch, creating an equivalent system to Tensorflow serve, based on a REST API. Multiple data formats are supported and WebTorch was built with performance and ease-of-use in mind. Presented at Nginxconf 2017.
https://github.com/elefthei/WebTorch

April 2017 — SLOB: Sticky Load Balancer

A Sticky-session Load Balancer using DynDNS for Machine Learning data, proof-of-concept. Presented at Dockercon 2017.
https://github.com/elefthei/slob-poc

July 2016 — Krypto: OpenSSL bindings for Elixir

Krypto is an easy to use, light-weight, crypto implementation for Elixir with native OpenSSL bindings for common crytpographic operations.
https://github.com/elefthei/krypto

October 2016 — Lua Machine Learning Microservice

A waffle based web server written in Lua, that integrates with S3 for storage and Torch for Deep Learning on real-time data. Dokcer container available for fast deployment. https://github.com/elefthei/lua-ml-microservice

September 2016 — Python Machine Learning Microservice

A flask based web server written in Python, that integrates with S3 for storage and Keras/TensorFlow for Deep Learning on real-time data. Docker container available for fast deployment. Presented at Dockercon 2017.
https://github.com/elefthei/python-ml-microservice

May 2015 — Eclipse Orion, an Open-source cloud IDE by Eclipse

Added GIT support for the NodeJS implementation of Eclipse Orion. Worked in a team of four students, with technologies like NodeJS, ConnectJS, NodeGit, Javascript, Mocha. Final project for 6.S194 Open Source Lab, Spring 2015.
https://github.com/eclipse/orion.client

December 2012 — PAL: Progressive Authentication for Linux

The PAL system sets up a progressive authentication scheme for Linux systems. Upon login, users are given a fresh, anonymous user with no privileges, and users can request additional privileges to be given to them on a per-need basis. Final project for 6.858 Computer Systems Security, Fall 2012.
https://github.com/elefthei/PAL--Progressive-Authentication-for-Linux

March 2011 — Logistic Map Cipher

An encryption standard based on the chaotic properties of the logistic map function. Code available for both Matlab and C/C++.
https://github.com/elefthei/lmcipher

Software Engineering

Skills:	Programming Languages, Computer Security, Formal Verification, Functional Programming, Systems, Architecture, Compilers, Performance Engineering.
Interests:	Category Theory, Dependent Types, Hardware Architecture, HPC.
Languages (expert):	Haskell, C/C++, Go, Javascript, Python, SQL, LLVM, x86 ASM, Bash.
Languages (intermediate):	Coq, Elixir, Lua, Swift, LaTeX.
Software:	Linux, Docker, Kubernetes, MongoDB, PostgreSQL, GIT, LLVM, GDB.

Extracurricular Activities

Feb 2018 - Jan 2019 Office Commissar, SIPB, MIT

Office Commissar for the Student Information Processing Board of MIT. The SIPB is the oldest volunteer computing group in the US. Our services include but not limited to; the Athena project, the Scripts Compute cluster, the Debathena Linux distribution and the Hyades compute cluster, all of which are free software and available to MIT students and faculty. As Office Czar I helped renovate the SIPB office and repurpose space for use by current student projects. Contributed code in the development of the Scripts compute cluster, the Debathena Linux distribution and most recently the Hyades compute cluster.

Feb 2016 - Jun 2016 Electric Guitar player, Blue Bear School of Music, San Francisco, CA

Guitar Player in the Blue Bear school of music in San Francisco, CA. Completed all intermediate classes and performed live with a full band in *The Boom Boom Room* in Filmore St.

Sep 2014 - Jan 2015 Social Chair, The No6 Club, MIT

Social chair for the No6 club, a co-ed Independent Living Group in MIT. Organized dinners and social events such as Coffee Hours, where a renowned speaker was invited to give a lecture and discuss with the students. The most notable lecturer was Noam Chomsky.