Sotiris Apostolakis | Curriculum Vitae

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Research Interests

Compilers, Parallelization, Program Analysis, Runtime Systems, Security, Computer Architecture

Education

Ph.D. in Computer Science

Princeton University   *Sep 2015-Dec 2020*
Advisor: Prof. David I. August

M.A. in Computer Science

Princeton University   *Sep 2015-Oct 2017*
Advisor: Prof. David I. August

Diploma in Electrical and Computer Engineering (5-year degree), GPA: 9.30/10

National Technical University of Athens   *Sep 2010-Jul 2015*
Major: Computer Software, Systems & Networks; Minor: Control Systems & Robotics
Thesis: Performance prediction for large-scale parallel applications using machine learning
Advisor: Prof. Nectarios Koziris

Work Experience

Google, New York, NY

Software Engineer   *Dec 2020-Present*
- Performance analysis and compiler optimizations of warehouse-scale workloads,
  under the supervision of David Li and Tipp Moseley

Liberty Research Group, Princeton University

Research Assistant   *Sep 2015-Dec 2020*
Research primarily on compilers, program analysis, and automatic parallelization.
- Design and implementation of *Perspective*, an automatic parallelization framework that mitigates core inefficiencies of prior speculative parallelization systems and fully-automatically yields scalable speedup (23.0x on 28 cores for 12 C/C++ benchmarks), double the performance of the state-of-the-art (ASPLOS '20)
- Design and implementation of *SCAF*, a speculation-aware collaborative analysis framework that dramatically reduces, compared to the best prior approach, the need for expensive-to-validate memory speculation for all 16 evaluated C/C++ SPEC benchmarks by computing the full impact of speculation on memory dependence analysis (PLDI '20)
- Built aforementioned compiler frameworks (∼80K loc in C/C++) on the LLVM compiler infrastructure

Contributed to security and parallelization projects across the software/hardware stack.
- Security, Computer Architecture (ASPLOS '19); Programming languages, Compilers, Runtime Systems, Parallelization (PACT '18); Computer Architecture, Parallelization (ASPLOS '18); Compilers, Runtime Systems, Parallelization (PACT '16)

Facebook, Inc., Seattle, WA

Software Engineer Intern   *Jun 2018-Aug 2018*
- Developed tools for fine-grained comparison of binary functions, *under the supervision of Taewook Oh*

Intel Corporation, Santa Clara, CA

Graduate Technical Intern   *Jun 2017-Sep 2017*
- Research on binary analysis and dynamic binary translation, *under the supervision of Youfeng Wu*

Computing Systems Laboratory, NTUA, Greece

Undergraduate Research Assistant   *Sep 2014-Jul 2015*
- Applied machine learning techniques for performance prediction of high-performance computing systems
- Automatic identification of optimal configurations for large-scale parallel applications

Teaching Experience

Princeton University
Teaching Assistant

○ COS 320: Compiling Techniques (*Prof. David I. August*), Spring 2018
○ COS 126: Computer Science: An Interdisciplinary Approach (*Prof. David I. August*), Fall 2017
○ COS 333: Advanced Programming Techniques (*Prof. Brian Kernighan*), Spring 2017
○ COS 432: Information Security (*Prof. Nick Feamster*), Fall 2016

Publications

[1] A. Matni, E. A. Deiana, Y. Su, L. Gross, S. Ghosh, **S. Apostolakis**, Z. Xu, Z. Tan, I. Chaturvedi, B. Homerding, T. McMichen, D. I. August, and S. Campanoni, "NOELLE Offers Empowering LLVM Extensions," in *Proceedings of the 2022 International Symposium on Code Generation and Optimization (**CGO**)*, 2022.

[2] N. Popescu, Z. Xu, **S. Apostolakis**, D. I. August, and A. Levy, "Safer at Any Speed: Automatic Context-Aware Safety Enhancement for Rust," in *Proceedings of the ACM on Programming Languages, Volume 5, Issue OOPSLA (**OOPSLA**)*, 2021.

[3] **S. Apostolakis**, Z. Xu, Z. Tan, G. Chan, S. Campanoni, and D. I. August, "SCAF: A Speculation-Aware Collaborative Dependence Analysis Framework," in *Proceedings of the 41st ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI**)*, 2020.

[4] **S. Apostolakis**, Z. Xu, G. Chan, S. Campanoni, and D. I. August, "Perspective: A Sensible Approach to Speculative Automatic Parallelization," in *Proceedings of the 25th International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*, 2020.

[5] H. Zhang, S. Ghosh, J. Fix, **S. Apostolakis**, N. P. Nagendra, T. Oh, and D. I. August, "Architectural Support for Containment-based Security," in *Proceedings of the 24th International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*, 2019.

[6] P. Prabhu, R. B. Stephen, **S. Apostolakis**, A. Zaks, and D. I. August, "MemoDyn: Exploiting Weakly Consistent Data Structures for Dynamic Parallel Memoization," in *Proceedings of the 27th International Conference on Parallel Architectures and Compilation Techniques (**PACT**)*, 2018.

[7] J. Fix, N. P. Nagendra, **S. Apostolakis**, H. Zhang, S. Qiu, and D. I. August, "Hardware Multithreaded Transactions," in *Proceedings of the 23rd International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*, 2018.

[8] J. Huang, P. Prabhu, T. B. Jablin, S. Ghosh, **S. Apostolakis**, J. W. Lee, and D. I. August, "Speculatively Exploiting Cross-Invocation Parallelism," in *Proceedings of the 25th International Conference on Parallel Architectures and Compilation Techniques (**PACT**)*, 2016.

Awards

○ **Siebel Scholars Award**, 2021
○ **Qualcomm Innovation Fellowship Finalist**, 2018
○ **3rd place in CITP & Siemens Corporate Technology FutureMakers Challenge**, 2018
○ **Student Travel Grant Awards**, ASPLOS '20, CGO '19, PACT '18, ASPLOS '18
○ **Princeton University Graduate Fellowship**, 2015-2016
○ **Stanley J. Seeger Hellenic Studies Prize**, 2015
○ **Kary Award nomination** for excellent academic performance, NTUA ECE department, 2013-2014, 2014-2015
○ **Thomaidio Award** for top ranking among students at NTUA ECE department for the academic year 2013-2014
○ **EUROBANK scholarship** for top ranking in the nationwide university entrance exams, 2010
○ **Greek Mathematics Society Award** for top ranking in the national mathematics contests "Thales" and "Euclid", 2007

Technical Skills

C/C++, LLVM, Assembly (x86, RISC-V, ARM), Java, Python, gem5, OCaml, MPI, OpenMP, CUDA, SQL

Academic Service

○ Program Committee, PACT 2021

Other Activities

○ Vice President of Hellenic Students' Association of Princeton University, 2017-2020
○ Participated in the European Parliament Simulation at University of Piraeus Greece (Foreign Affairs Committee), 2013
○ Volunteered as a member of the Administrative Staff of the Athens Model United Nations, 2011
○ Studied French literature and culture, and obtained the Diploma in French language and literature (C2) by Paris-Sorbonne University, 2009
○ Participated in the Deutsche Schule Athen Model United Nations (Human Rights Committee), 2008

Languages

English, Greek (native), French, German