David H. Liu

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Education

Princeton University, Princeton, NJ
Ph.D. in Computer Science 2018-2023 (expected)
Advisor: Amit Levy
Thesis: A Serverless Architecture for Application-level Orchestration

Duke University, Durham, NC
B.S.E. in Electrical and Computer Engineering
Minor in Math May 2015

Interests

I am broadly interested in systems and security, with research and work experience in serverless computing, virtualization, information flow control and Linux device drivers.

Research Papers

Doing More with Less: Orchestrating Serverless Applications without an Orchestrator
David H. Liu, Amit Levy, Shadi Noghabi, Sebastian Burckhardt
Proc. 20th Symposium on Networked Systems Design and Implementation (NSDI '23), Boston, MA, April 2023

How Low Can You Go? Practical cold-start performance limits in FaaS
Yue Tan, David H. Liu, Nanqinqin Li, Amit Levy
ArXiv Technical Report:2109.13319, Sept. 2021

Pyronia: Intra-Process Access Control for IoT Applications
Marcela S. Melara, David H. Liu, Michael J. Freedman
ArXiv Technical Report:1903.01950, March 2019

SandTrap: Tracking Information Flows On Demand with Parallel Permissions
Ali Razeen, David H. Liu, Alvin R. Lebeck, Alexander Meijer, Valentin Pistol, Landon P. Cox
The 16th ACM International Conference on Mobile Systems, Applications, and Services (MobiSys '18), June 2018

Projects

Unum
A serverless orchestration system for large-scale applications that supports exactly-once execution guarantees, fault-tolerance, portability across platforms and customization. Unum can run on AWS with AWS Lambda and DynamoDB, or Google Cloud with Google Cloud Functions and Firestore and significant reduces latency and costs compared with existing orchestrators.

SnapFaaS
A light-weight virtual machine based on Firecracker that leverages VM snapshots to reduce cold-start latency.

Larp
A CPU scheduler that avoids side-channels from provisioning decisions.

SandTrap
A dynamic information-flow tracking system on Android that performs native code taint tracking while imposing improved overheads

Work Experience

PhD Student in Computer Science — 2018 - present
Princeton University

Research Engineer — 2017 - 2018
Princeton University

Software Engineer — 2015 - 2017
Nimble Storage, Inc.
Linux device driver development for Fibre Channel protocols

Teaching Experience

Teaching Assistant — 2019-2020
Princeton University
COS 461 Computer Networks
COS 316 Principles of Computer System Design

Teaching Assistant — 2012-2015
Duke University
Recitation and lab teaching assistant

Honors

Gordon Y.S. Wu Fellowships in Engineering (Princeton) — 2018

Mathematical Contest in Modeling (MCM) Meritorious — 2014

Eta Kappa Nu — 2014

PRUV Fellowship in Mathematics — 2013