KIRBY LINVILL

kirby.linvill.net github.com/klinvill

EDUCATION

PhD: Computer Science, *University of Colorado Boulder* **August 2020 to Present**
MS: Computer Science, *University of Colorado Boulder* **May 2022 (anticipated)**
Advisor: Gowtham Kaki, **Areas: Formal Methods and Security**,
GPA: 4.00, Honors: Dean's Fellowship

BS: Computer Science and Engineering, *Santa Clara University* **September 2011 to June 2015**
GPA: 3.87**,** Honors: Magna Cum Laude, TBΠ Engineering Honor Society, UPE Computing Honor Society

CURRENT RESEARCH PROJECTS

Automated Framework for Protocol Indistinguishability Proofs — July 2022 to Present

- Allows protocol designers and developers to easily check if their protocol guarantees indistinguishability (probability of generating any particular message trace is equivalent)
- Extension of my TLS ECH formal analysis project to easily prove similar properties using F* and Z3

TLS Encrypted Client Hello (ECH) Formal Analysis — September 2021 to Present

- Developed a formal specification of the draft IETF TLS Encrypted Client Hello extension specification
- Discovered a known bug with the latest draft of the specification: server messages must also be padded
- Formally verified that a fixed version of the specification meets its primary security goal: that connection establishment to different backend servers is indistinguishable to an outside observer

SELECT INDUSTRY EXPERIENCE

Curative Inc., *Software Engineer Consultant* — August 2020

- Built features, fixed bugs, and provided support for new web-based in-house lab management software used for COVID-19 diagnostic testing

Accenture Labs, *Systems & Platforms Researcher* — August 2017 to August 2020

- Led quantum computing and heterogeneous computing work within Accenture Labs
- Managed 3 teams of 3 developers across projects
- Designed and architected 2 different offerings: a system to track files throughout an enterprise and a system to automate intelligent data cleaning and validation
- Developed 4 demo applications of quantum computing and 1 of secure multi-party computing
- Evaluated 4 quantum development kits leading to redesigns and improvements

Teradata, *Big Data Consultant* — June 2015 to August 2017

- Developed a near real-time system to ingest and process 20 million customers' call detail records
- Stabilized a high-profile runaway project by working to prioritize features and set transparent timelines
- Presented design patterns and best practices to prospective clients and 150+ senior architects

SKILLS

Technologies (proficient): F*, Rust, Python, C, JavaScript, Linux, Spark, Hadoop, SQL
Technologies (experience with): Z3, Coq, TLA+, PlusCal, Scala, Java
Techniques: Formal Methods, Application Security, Application Development
Foundational Knowledge: Static Analysis, Dynamic Analysis, Machine Learning

PUBLICATIONS

A Quantum-Inspired Method for Three-Dimensional Ligand-Based Virtual Screening
Maritza Hernandez, Guo Liang Gan, Kirby Linvill, Carl Dukatz, Jun Feng, and Govinda Bhisetti
Journal of Chemical Information and Modeling 2019 59 (10), 4475-4485
DOI: 10.1021/acs.jcim.9b00195

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PATENTS

- Quantum computation for optimization in exchange systems (US Patent 10,592,816)

OTHER SELECT PROJECTS

Abstract Interpreter Static Analysis Library for Rust **August 2022 to Present**

- Personal project to build an abstract interpreter in and for Rust (working on the MIR layer)
- Currently supports interval and boolean abstract domains

Web Skimmer Detection **August 2020 to January 2021**

- Adapted a Chromium-based forensics engine (JSGraph) to detect client-side web credit card skimmers
- Investigated use of taint tracking on webpages to detect client-side web skimmers
- Hooks into the Blink rendering engine to record DOM manipulations and interactions with V8

+1 CURRENT EXTRACURRICULAR ACTIVITIES

Vice President: CU Boulder Cybersecurity Club

SERVICE

Participated in reviews and committees at the following venues:

- CAV 2022 - Artifact Evaluation Committee
- USENIX Security 2021 - Sub-reviewer