

# Kelly Shiptoski

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## Experience

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**Senior Software Engineer**, Bolt Labs Inc. Aug 2023 – Present

- Engineered zero trust secure computing component for digital asset management system, using AWS Nitro enclave technology to cryptographically guarantee the security of transactions computed within the trusted execution environment.
- Developed verifiable key generation, signing, export, and deletion features for multi-tenant key management system, using Axum for RESTful APIs and tonic for gRPC services.
- Spearheaded design and implementation of SDK for end-user integration that provides cryptographic and attestation utility functionality and documentation, leading to easier integration of new customers into the system.
- Devised step-by-step process for continuous integration of security upgrades, effectively clearing the backlog of dependency upgrades and maximizing security coverage of code.

**Doctoral Researcher**, University of Pennsylvania – Philadelphia, PA Aug 2017 – Aug 2023

- Researched, designed, and implemented two systems from scratch (both of which are now open-source): ProcessCache, a system for automatic caching of arbitrary Linux programs at the process level, and DetTrace, a container system for Linux which guarantees reproducibility for unmodified Linux programs.
- Explored asynchronous runtime and future-based design, integration testing infrastructure, and design patterns for safe mutability across async tasks to implement Rust async wrappers around low-level synchronous Linux APIs.
- Coordinated and led all weekly meetings, focusing on project design and scope and conceptualizing short-term and long-term milestones, task breakdowns, and planned deadlines.
- Implemented integration, unit, and end-to-end testing to detect and handle regressions in correctness and performance.
- Identified real-world systems across many disciplines to construct a realistic benchmark suite to analyze speed and space performance and to verify the correctness of the system.

**Research Software Engineer Intern**, VMware June 2020 – Aug 2020

- Designed and implemented a distributed communication API for Differential Datalog, a novel domain-specific language for automatic incremental updates to software-defined networking control planes.
- Adapted existing APIs of the Differential Datalog language engine to employ the observer pattern, allowing for dynamic reconfiguration of nodes within the network and providing robust fault-tolerance.
- Implemented integration and unit tests to maintain backwards compatibility and ensure correctness of new features.

## Skills

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**Programming Languages:** Rust, C, C++, Java, C#, Golang, Python

**Development Tools:** Docker, AWS, Bash, Git

**Technologies and Systems:** Axum (RESTful APIs), PostgreSQL, AWS Nitro Enclave technology, Linux systems programming

## Education

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**University of Pennsylvania** – PhD in Computer Science Dec 2023

**University of Pennsylvania** – MS in Computer Science Dec 2019

**Drexel University** – BS in Computer Science, BA in Mathematics June 2017