

Garrett Gu

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WORK EXPERIENCE

Jan 2024 –
present
Austin, USA

Cloudflare, Systems Engineer

Workers Runtime - A serverless runtime written in C++ serving millions of requests per second

- Core developer on Python Workers, authoring several tech specifications on type binding generation and ultra-fast package loading at massive scale
- Sped-up local package loading by a factor of over 30x using a custom in-memory file system
- Co-authored blog post and co-presented talk at PyCon 2024
- Performed debugging and root-cause analysis on multiple runtime bugs, tracing two back to bugs in the V8 JavaScript runtime (C++)
- Migrated 10 kLoC runtime glue code to TypeScript, fixing several undiscovered bugs
- Rolled out three security-critical mitigations for memory safety and isolation

Vectorize - a vector database for AI applications written in Rust and distributed across the globe

- In Rust, implemented ranged metadata filtering, integrating with existing IVFPQ vector search
- Added Prometheus metrics, vastly improving o11y & enabling health-mediated deployments
- Onboarded a new service to k8s with Helm, Argo rollouts, and automated deployments
- Developed structured threat model to inform design of petabyte-scale data warehousing auth

May 2023 –
Aug 2023
SF, USA

Apple, Information Security Intern

- Reduced human time on an internal process by 87.5% by evaluating and implementing NLP algorithms to analyze security literature using Python, SpaCy, and scikit-learn
- Proposed and implemented a prototype code security feature for internal Apple developers using Flask, JavaScript, and prompt engineering

Oct 2022 –
Dec 2022
Liège, BE

Hex-Rays, Research Intern

- Built IDA Pro decompiler feature to simplify obfuscated malware using C++, state-of-the-art research algorithms and SMT solvers (shipped in IDA v8.3)
- Achieved superior success rates and 68-93% reduced runtime compared to previous cutting-edge solutions through C++ performance optimizations and heuristics

May 2022 –
Aug 2022
SF, USA

Plaid, Data Security, Software Engineer Intern

- Reduced microservice certificate validity period by 50% by automating AuthN/AuthZ certificate rotation in AWS IAM using a Kubernetes CronJob in Go
- Enhanced company-wide product security for years to come by designing and implementing cryptographic signing within a key-management service (KMS) using Go, Python, and Node.js

EDUCATION

Aug 2018 –
Dec 2023

B.S./M.S. Computer Science (Honors), B.S. Mathematics, University of Texas at Austin

- **GPA:** 3.99, member of Turing Scholars Honors Program
- **TA:** Computer Security (x3), Honors OS (x2), Honors Computer Architecture

OPEN SOURCE

May 2024 –
Feb 2025

CPython Tail-Calling Interpreter, Rewriting Bytecode Dispatch for Performance

- Implemented first prototype fork of CPython to take advantage of new LLVM-19 features
- Achieves 10-40% faster performance mainly due to improved register allocation/pinning
- Implementation ideas were incorporated and shipped in Python 3.14

Jun 2021 –
May 2022

Ghidra-Wasm, Open-Source Reverse-Engineering for WebAssembly

- Developed the first fully-featured WebAssembly plugin for Ghidra, a reverse-engineering framework developed by the NSA, enabling full decompilation for the first time
- Difficulties included context-dependent control flow and implicit stack maintenance

Sep 2020 –
Sep 2021

Constant-Time WebAssembly, Verified Side-Channel Resistant High-Performance Cryptography

- Modified existing Rust WebAssembly JIT compiler to compile high-performance cryptography at zero overhead with verifiable security
- Implemented Ghidra verifier to formally verify security of AArch64 machine code
- Presented and successfully defended new extension proposal to Wasm Spec Group for voting

SKILLS AND AWARDS

Languages

C, C++, JavaScript, TypeScript, C#, SQL, Java, Rust, bash, Python, WebAssembly, Go, x64+ARM64 asm

Tools

gdb, docker, k8s, Ghidra, IDA Pro, PyTorch, scikit-learn

Competitions

1st - CCDC (Cyber-Defense) SW Regional 2021
USACO Platinum Qualifier
2nd - BSidesSF CTF 2022
1st - TAMUHack CTF 2022
1st - SunshineCTF 2019