Kaining Zhong
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EDUCATION

University of Illinois, Urbana Champaign - *Computer Engineering, MEng.* Aug. 2022 – Dec. 2023
The Chinese University of Hong Kong - *Computer Science, BEng.* Sept. 2017 – May. 2021

SKILLS

Programming languages: C++17, Python, Golang, Rust, TypeScript, Swift, SQL
Tools: LLVM Infrastructure, Bazel, CMake, Docker, Git, Linux, Database, Operating System, Distributed System

Work Experience

TikTok - *Software Development Engineer, Client Infrastructure* July., 2021 – July., 2022

LLVM Compiler Infrastructure & Xcode Toolchain

- Improved Xcode debugging experience by optimizing Apple's LLDB, and deployed Xcode toolchain bundled with customized LLDB to multiple iOS APP's development team, including TikTok, Lark, Cloud IDE for iOS, etc. **Reduced debugging time cost for displaying variables & expression evaluation from 200s to 30s** for iOS applications in massive scale such as Lark, which **links more than 600 static frameworks** to a main executable **over 1G size**.
- Replaced Apple's LD64 linker with LLVM's LLD linker for iOS projects including Lark & Toutiao by fixing bugs and customizing certain features; **reduced linking time from 120s to 60s in average**.
- Implemented a LLDB performance analyzing tool by dynamically rebinding exposed C++ Script Bridge API symbols in LLDB bundled in Xcode, using Facebook's FishHook tool. Uploaded the obtained statistics to a backend visualization service using nlohmann's C++ JSON library and Objective-C's CFNetwork library.
- Maintained a backend service implemented by ByteFaaS that managed Xcode toolchains compiled from internal fork of Apple's Swift repository, using TOS as Object Storage Service to store toolchains generated from CI tasks, and deploying customized toolchains automatically via Podfile.
- Published a technical blog explaining iOS15's new dynamic linking mechanism using fixup chain to TikTok's tech blog on WeChat, **receiving 1500+ viewers**.

Bazel Build System

- Collaborated in migrating TikTok and TouTiao's build system from xcodebuild to Bazel and transformed the overall project structure to monorepo, **reducing compilation time cost from 11min to 6min on average**.
- Created a Compilation Database Extractor for Bazel to capture Clang's compile command of TikTok and TouTiao, enabled further static analysis of Objective-C & Swift code.

TikTok - *Intern, Fintech Dept.* Jun., 2020 – Oct., 2020

Haitun Stock

- Using Python3's pytest and requests modules, implemented a **testing program for Haitun Stock's RESTful HTTP APIs with 90% coverage**; generated corresponding reports using Allure for further test-case failure analysis.
- Manipulated TikTok's internal serverless service to implement a chat group bot application in Node.js, which triggers the CI pipeline automatically when received messages and retrieves corresponding testing results & coverage reports.

PROJECTS

LLVM Project Contributor C++

- Reported issues and submitted multiple PRs to the LLVM project, mainly focusing on LLDB debugger and LLD linker of Mach-O port. Implemented features including **thin archive support in LLDB, and Dtrace support in LLD**. All contributions are merged into the main branch of LLVM's repository.

Distributed, Fault-tolerant KV Storage System Golang

- Built a fault-tolerant Key-Value NoSQL database **based on Raft consensus algorithm** using Golang's concurrency & RPC packages, supporting Put, Get, Append operations, and guaranteeing **Consistency & Partition tolerance**.
- Reduced network communication overhead by employing fast log synchronization, and enabled crash recovery by implementing a **Snapshot persistence mechanism**.

Reverse Proxy Server with Asynchronous I\O Rust

- Implemented a reverse proxy server, with concurrency achieved by Rust's crossbeam for message passing and tokio for non-blocking I\O, featuring **load balancing, rate limiting**, and failover with active health check.