Wenqing Luo

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Education

University of Illinois at Urbana–Champaign • Urbana, IL — August 2021 – May 2023
Master of Science in Computer Science • GPA: 4.0/4.0

University of Illinois at Urbana–Champaign • Urbana, IL — August 2017 – May 2021
Bachelor of Science in Computer Engineering • GPA: 3.95/4.0 • Highest Honor

Zhejiang University • Hangzhou, China — August 2017 – May 2021
Bachelor of Science in Computer Engineering • GPA: 3.87/4.0

Work Experience

Apple Inc Software Engineer Intern – Internet Technology — May 2022 – Aug 2022
Objective-C, C++, WebKit — Cupertino, CA

- Added new web extension API support for in-memory data storage in Safari and WebKit, the feature was shipped in Safari Technology Preview (release notes) and iOS/macOS beta releases.
- Worked on designing and building Safari core service framework to expose SPI to other system applications.

ByteDance (TikTok) Software Engineer Intern – Network Infrastructure — Feb 2021 – Jul 2021
Linux Kernel, Service Mesh, Virtualization, DPDK, Qemu — Shanghai, China

- Worked on optimizing service mesh (envoy) performance through kernel bypass and user-level TCP stack.
- Built kernel modules to allow VM applications use socket API to access userspace network stack on hypervisor.
- Designed and implemented end-to-end zerocopy sending and receiving APIs for userspace TCP stack, achieved in average **16% CPU improvement** for service mesh sidecars in production system.
- Set up an automated testing pipeline by developing a VM coordination framework using libvirt and consul.

Alibaba Group Software Engineer Intern – Search Infrastructure — Jun 2020 – Dec 2020
C++, Clang, LLVM, Machine Learning System — Hangzhou, China

- Worked on building and optimizing a large-scale distributed search and recommendation system in support of Alibaba's ecommerce websites, including Taobao, TMall, with over **900 million** Monthly Active User (MAU).
- Developed a Just-In-Time (JIT) compilation system on C++ applications by runtime linkage replacement.
- Use libclang and libASTMatchers to give dynamic type hints on feature extractors and generate equivalent high performance static representation for later JIT optimization, which was deployed and validated under **300K peak QPS** during 2020 Double Eleventh Day shopping festival (**$740 billion GMV** in one day).
- Achieved **10% end-to-end performance improvement** on Alibaba's search platform, guaranteed **100ms 99.96% SLA** for the ranking service, saved over **1000 CPU cores** in production environment.

Tencent Inc Software Engineer Intern — Jun 2019 – Aug 2019
Golang, Kubernetes, Python, Protobuf, Message Queue — Shenzhen, China

- Developed a distributed performance testing tool for a RPC framework by providing a JavaScript Runtime and realtime serialization, which later becomes a popular production-grade project used by many teams at Tencent.
- Built medical diagnosis services with Golang as a built-in module for the social app WeChat, deployed services on Kubernetes with auto scaling and CI triggered rolling update.

Projects

Sieve Project – Research Project – [Link] [OSDI'22] — Jun 2021 – Feb 2022
Golang, Kubernetes, Cloud System Reliability

- Developed an automated testing tool, which systematically tests Kubernetes controllers to harden them against scenarios like asynchrony, unexpected failures, networking issues, and controller restarts.
- Implemented instrument to controllers and API server for cluster-wide event tracing and state perturbation.
- Designed and implemented a differential based oracle to detect safety violations under fault injection.
- The project has already discovered (and led to fixes for) more than **40 safety-critical bugs** in popular Kubernetes controllers for Zookeeper, Cassandra, RabbitMQ, MongoDB, XtraDB, etc.
- The work was selected to present at **KubeCon 2021** and published at **OSDI'22**.

WeirdOS – Course Project – [Link] — Oct 2019 – Dec 2019
C, Assemble(x86), Qemu, Operating Systen, Network Stack

- Built a Linux like operating system from scratch by implementing functionalities including: memory paging, read-only filesystem, context switch, Round-robin scheduler, interrupt handlers, system calls.
- Designed and implemented advanced OS features including: dynamic memory allocator (kmalloc), Graphical User Interface (GUI), PCI driver, **TCP/IP network stack** (from NIC to HTTP) and an Internet browser.

Technical Skills

- Programming languages: C/C++, Python, Golang, Rust, JavaScript, TypeScript
- System & Cloud: Kubernetes, Docker, Linux kernel, LLVM, UNIX network programming, Qemu, DPDK
- Web Development: Git, Node.js, Golang, SQL, React.js, Vue.js, MongoDB, Redis, RabbitMQ, Protobuf