Chang (Kevin) Liu

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EDUCATION

Carnegie Mellon University Pittsburgh, PA
Master of Science in Electrical and Computer Engineering - Applied Program Dec 2022

Wuhan University Wuhan, China
Bachelor of Engineering in Automation May 2020

COURSEWORK

Computer System	Software Technology Fundamentals	Embedded Operating System
C Programming Language	Computer Vision	Machine Learning

SKILLS

Programming Languages: Advance - C, C++; Intermediate - Java, Python, X86 Assembly
Environment and Tools: Git, GDB, SIMD, OpenMP; Maven; Linux, Unix, AWS
Internet Services: Socket, HTTP, FTP, MySQL
Development Software: Visual Studio Code, PyCharm, IntelliJ IDEA

PROJECTS

SIMD Kernel Design and Implementation: SSAA (Carnegie Mellon University) Fall 2021

- Designed supersampling anti-aliasing (SSAA) circle-drawing kernel for x86 architecture using SIMD instructions.
- Analyzed calculation process, identified useful instructions, experimented on their properties (throughput and latency), and designed kernel accordingly.
- Improved performance by hiding instruction latencies, eliminating instruction bubble in pipelines and balancing workload between functional units.
- Implemented design and tested, achieved 6 times improvement in running speed.

Dynamic Memory Allocation Design and Implementation (Carnegie Mellon University) Spring 2021

- Designed and implemented data structures and internal mechanisms for Dynamic Storage Allocator.
- Doubled throughput by implementing segregated list algorithm.
- Applied self-balancing binary search tree on free block searching task to achieve best fit strategy, result in increased memory utilization from 65% to 71%.
- Innovated mini-block strategy to boost memory utilization.

Web Proxy Implementation (Carnegie Mellon University) Spring 2021

- Implemented Web Proxy that can handle HTTP/1.1 GET requests.
- Designed multithreading framework and ensured safe I/O operation.
- Realized caching function for frequently visited web resources with LRU policy and improved local response speed.
- Integrated mutex semaphores to synchronize cache operation, prevent conflicts or race condition.

Backend Development: Bobing Game Server Summer 2021

- Designed, built, and tested a socket-based Java game server from scratch.
- Managed project using Maven and Git.
- Applied Java Thread to support multi-user online gaming, and MySQL to store user information.
- Deployed on AWS and tested all functions with customized client.

FTP Server & Client (Carnegie Mellon University) Spring 2021

- Investigated the FTP protocol and reproduced it in Java, using Java Socket, Thread, Swing, etc..
- Implemented basic functions, including file upload/download/delete, log in/out, select transmission mode (active/passive).
- Designed client GUI and implemented common functions.

Embedded System Development Fall 2020

- Developed embedded system for Automated Mobile Robot (AMR) based on STM32 microcontroller.
- Designed system layout, priority level for tasks and interaction relationship in Interrupts, Semaphore and Message Queue.
- Improved system performance by optimizing system peripherals (DMA, Interrupt) usage and scheduling process.
- Packed peripheral driver library to provided standard API, and documented design for future development.