Qifa(Richard) Wang

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Objective: An engineering graduate passionate about computer architecture design, SW/HW co-design, HPC, accelerated computing, quantum computing, software engineering and seeking related opportunities

Education

Computer Science & Engineering — ***Master of Science in Engineering*** Aug 2023 - Dec 2024
Rackham Graduate School, University of Michigan GPA: 4.00

Computer Science, minors in Math and Physics — ***Bachelor of Science in Engineering*** Aug 2020 - May 2023
College of Engineering, University of Michigan *Summa Cum Laude, Dean's List, University Honors*, GPA: 3.77

Skills

- **Coursework:** Computer Architecture, Parallel Computing, Compiler Design, Data Sturcture and Algorithms, Operating System, Machine Learning, Web Systems, Quantum Computing and Architecture
- **Programming languages:** C/C++, Python, Java, Verilog, SystemVerilog, CUDA, OpenMP, MPI, Javascript, TypeScript
- **Frameworks and tools:** RISC-V, Qiskit, PyTorch, Tensorflow, React, REST, AWS, Docker, VCS, Verdi, GNU, LLVM, NVCC

Work Experience

EECS 498: Quantum Computing — ***Graduate Student Instructor*** May 2023 - Present
- Redesigned course with lead instructor. Improved project specification and test suites. Taught lab sections and held office hours.

Candela Medical — ***Business Analytics Intern*** May 2022 - Aug 2022
- Evaluated, designed, and implemented internal information platform for information acquisition and sharing.

Werfen — ***Software & Algorithm Development Intern*** May 2021 - Aug 2021
- Drafted roadmaps and formalized criteria and limitations for Mercury Algorithm Prototype (MAP). Engineered pivotal elements of MAP such as backend modules, front-end web tool, and GUI.

Technical Projects

Team Design — ***R10K Out-of-Order Processor Redesign with RISC-V ISA*** Jan 2024 - Present
- Engineered advanced features like GShare-Best branch predictor, branch target buffer, return address stack to reduce instruction fetch latency. Revamped memory hierarchy using prefetching, associative, dual-ported, banked, and non-blocking cache, along with victim caching strategies. Optimized dependent memory operations with load-store queue and data forwarding techniques.
- Implemented and tested pivotal modules like reservation stations, cache, load-store queue. Organized regular project meetings, tracked progress and resolved technical conflict. Communicated with staff members for any foreseen design-relataed uncertainties.

Personal Project — ***Batched Quantum Circuit Simulation on GPU*** Sep 2023 - Present
- Engineered a CUDA framework for efficient parallel simulation of multiple quantum circuits on GPU, focusing on tackling complexities of diverse quantum experiments and integration of dynamic shot-branching techniques.
- Performed extensive performance evaluations, achieving super-linear enhancements in both simulation efficiency and scalability, identifying potential bottleneck areas and proposing corresponding optimization strategies.

Team Design — ***Compiler Optimization for CUDA Memory Coalescing (COALDA)*** Sep 2023 - Dec 2023
- Boosted CUDA program efficiency by optimizing memory access patterns, targeting and restructuring uncoalesced memory accesses. Thorough static analysis and performance evaluations showed a notable reduction in L2 cache bandwidth usage.
- Led the establishment of an NVCC-Clang compilation pipeline, which made CUDA kernel available for IR-level optimization, and drafting an IEEE-style final report.

Team Design — ***Linux-Based Operating System*** Jan 2023 - May 2023
- Developed a custom thread library to simulate multi-cpu, multi-threaded execution using C/C++.
- Implemented a sophisticated kernel pager system for efficient management of applications' virtual memory, encompassing the creation, copying, destruction, and allocation of address spaces.
- Engineered robust, multi-threaded network file server for reliable data exchange. Designed a hierarchical file system with comprehensive access control and fine-grained locking mechanisms to secure file ownership and permissions.

Personal

- Authorized to work for any employer in the US
- Ex-competitive student athlete fencing saber who also loves alpine skiing and playing tennis
- Founder of BeaverWorks engineering club with MIT Lincoln Lab and BAE & System as sponsors
- Multilingual: English, Mandarin, Cantonese, French