YUEWEN HOU

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EDUCATION

Bachelor of Engineering in Computer Science, University of Michigan, Ann Arbor   Expected 2024
GPA:3.96/4.00

Minor in Mathematics

Bachelor of Science in Electrical Computer Engineering, Shanghai Jiao Tong University   Expected 2024

PROJECTS

Implementation of R10K style Out of Order CPU Led a group to build a fully synthesizable R10K style of N-way superscalar Out-of-Order CPU using SystemVerilog with advanced features of non-blocking data cache, Gshare branch predictor, and multiport instruction cache.

Thread Library implementation Built a thread library containing thread class, cv, mutex, and barrier on kernel level program in c++20 for multicore processor

Kernel Memory Manager Design a pager that manages process virtual address space to support applications to create, copy, and destroy address spaces and switch between address spaces. Implement a memory faults handler for the memory management unit.

Multithread Network File Server Implement a Linux-based file server that supports socket communication and has good reliability on crash consistency, and use the read-write lock to support synchronization among high concurrency requests;

Web-system related Project Developed an Instagram-like web application using React for the front end, Flask for the back end, and SQLite for the database, supporting features like user sign-in, posts, and comments.

Built a distributed and fault-tolerant MapReduce server in Python which can process user-submitted tasks.

Implemented a search engine from scratch, based on text segmentation, Hadoop MapReduce indexing, and tf-idf.

Snake language compiler Used rust to build a working compiler including lexical analysis, parsing, liveness analysis, register allocation, and code generation to x86 assembly. Supporting language features include closure, floating point operation, static analysis, and dynamic analysis.

Improving qubit movement scalability of Neutral Atom Array Quantum computer Architecting full stack neutral atom control architecture with xSFQ technology and delay-line memory to leverage the long coherence-time of neutral atom qubits and the ability to maintain entanglement while being physically separated in the spatial domain. Implement the compression algorithm for the qubit shifting control waveform and decrease the waveform memory requirement to 1.4%.

Memoria Web Game Built a well-documented high-quality single webpage-based game using pure functional language Elm. Applied the agile development strategy during the full development process. [(Github Repo)]

SKILLS

Programming language	C/C++, SystemVerilog, Rust, Python, Prolog, Ocaml, Scheme, RISC-V&x86 Assembly
Software toolkit	Qiskit, Q# , CPLEX Optimization Studio, CUDA, Matlab, Flex

RESEARCH EXPERIENCE

University of Michigan,CSE, CAFQA Lab   Aug 2023 - Present
Advisor: [Gokul Subramanian Ravi]
Dynamic Cloud Resource Management for Variational Quantum Algorithms(submitted to ASPLOS Yarch)

- Improved the accuracy of quantum cloud computer fidelity estimation and thus optimized the scheduling.

- Converted the quantum circuits into Clifford circuits to predict the circuits' fidelity on NISQ machines as a key metric to manage the source allocation.
- Maintain fairness and high efficiency for resource allocation for variational quantum algorithm workload with different resources including fidelity, circuit topology, and device noise.

University of Michigan CSE, ESEF lab   Feb 2023 - Present
Advisor: Baris Kasikci *Data center processor frontend BTB and Branch Predictor Codesign*

- Led the project and found the bottleneck of state-of-art BTB design on modern data center workload with analysis on Reorder Buffer occupancy, branch prediction accuracy, branch reuse distance, etc.
- Design novel branch target buffer coupled with selective victim buffer and branch direction predictor and implement the architecture design on ChampSim trace-based simulator.
- Gain an IPC(Instruction Per Cycle) increase of 4% by greatly decreasing the processor's front stall.

Practical Upperbound analysis tool development for novel general cache system

- Innovated algorithm to solve the optimal general caching problem with variational block size by reducing the problem to a min-flow problem and solved with CPLEX linear solver.
- Implemented the algorithm and a variant version on modern cache system workload and gained a huge decrease in the lower bound of cache latency as well as memory bandwidth cost including micro-operation cache and CDN (content distributed network).

University of Michigan, Nuclear Engineering & Radiological Sciences, NuRAM Lab   Apr 2023 - Aug 2023
Advisor: Brendan Kochunas
University of Michigan Unstructured Mesh Code

- Using numerical methods and parallel algorithms for high-fidelity computational reactor physics. Help to implement a C++ library to simulate the reactor in unstructured meshes by ray tracing.
- Implement ray tracing for poly mesh. Rewrite essential C++ standard library container and algorithm to support GPU programming

TEACHING EXPERIENCE

Teaching Assistant For Quantum Information Science and Engineering   May 2023 - August 2023
Instructor: L Jay Guo

Teaching Assistant For Introduction to Engineering (Software engineering track)   May 2022 - August 2022
Instructor: Manuel Charlemagne

COURSE WORK

Quantum foundation: Linear Algebra, Abstract Algebra, Differential Equation, Electromagnetism, Quantum Information Science

Computer Architecture and System: Computer Architecture, Compiler Construction, Web System, Operation System, Quantum Computer Architecture and System, Programming Paradigm

HONORS AND AWARDS

University of Michigan Dean List   2023

Shanghai Jiao Tong University excellence scholarship   2022

Second Award of Mathematical Model Contest   2022