

Albert Cao

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Education

University of Michigan, *BSE in Computer Science & Math Minor* – GPA: 3.65/4 Aug 2022 – May 2026

- **Computer Science Coursework:** Operating Systems, Distributed Systems, Machine Learning, Web Systems, Computer Security, Computer Systems Architecture, Data Structures and Algorithms, Theory of Computer Science
- **Math Coursework:** Discrete Mathematics, Linear Algebra, Multi-Variable Calculus, Combinatorics, Probability, Statistics

Experience

Software Engineer Intern, *Mad4Chip* – Sorrento, IT May 2023 – Aug 2023

- Designed and tested five libraries/drivers in C for ADC/DAC/EEPROM chips for microcontroller classes STM32/ESP32
- Developed an Arduino driver to evaluate the accuracy and reliability of water level sensors used in a water pump system

Projects

Network File Server Dec 2024

- Designed a hierarchical network file system that supports create, delete, read, and write requests, using upgradeable reader locks from Boost C++ library to provide optimal concurrency and ensure data consistency across multiple clients
- Implemented error handling techniques to make server resilient to malformed requests and unauthorized accesses

Virtual Memory Manager Nov 2024

- Designed pager to provide virtual address space abstraction across multiple processes enabling efficient memory management
- Implemented fork()-like system call for address space creation and LRU-based clock algorithms for handling page evictions

Thread Library Oct 2024

- Designed CPU, thread, mutex, and condition variable libraries for concurrent programming in multiprocessor environments
- Used RAII-programming techniques to enable/disable interrupts and acquire/release guard variable to ensure thread safety

Search Engine Apr 2024

- Built scalable search engine in Python/React, using TF-IDF and PageRank to enhance the rankings/relevance of search results
- Wrote MapReduce programs to construct inverted index of web-crawled Wikipedia data for use in TF-IDF calculations

MapReduce Framework Mar 2024

- Implemented MapReduce framework in Python with job scheduling, data partitioning, and fault tolerance mechanisms
- Used TCP to ensure reliable communication between manager and worker threads and UDP for heartbeat messages

Computer Security Jan 2024 - Apr 2024

- Conducted buffer overflow attacks in a simulated environment to circumvent DEP and variable stack position defenses
- Executed SQL Injection, XSS, CSRF, and Length Extension attacks to expose vulnerabilities in simulated websites

Activities

Software Engineer, *Traders at Michigan* – Ann Arbor, MI Nov 2023 – Present

- Taught new members core software concepts, mentoring them in algorithmic problem solving & interview preparation
- Designed and tested software in Python for quantitative trading games played in club-hosted competitions
- Learned quantitative trading problem solving techniques such as Markov's Chain, Kelly Criterion, and Bayes' Theorem

Swimmer, *Michigan Club Swimming* – Ann Arbor, MI Sept 2022 – Present

- Competed in the 200 Fly, 500 FR, and 400 IM at the 2023 and 2024 National Club Swimming Championships Meet

Technologies

Languages: C++, C, Python, SQL, JavaScript, HTML, CSS, MatLab, R

Libraries: React, Flask, Matplotlib, NumPy, PyTorch, Django

Developer Tools: Git, Docker, AWS, VSCode, LLDB, Valgrind, NPM