Mitchell C. Elliott

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ABOUT

I am a recent master's computer science graduate from UC Santa Cruz and an alumnus of the Center for Research in Systems and Storage (CRSS) at UCSC. My research focuses on analyzing the total cost of ownership of carbon in data centers and identifying new methods to improve the energy efficiency of storage systems. I have experience in software engineering, DevOps, cloud computing, and business data analytics.

EDUCATION

University of California, Santa Cruz Sept. 2022 – Dec. 2024
M.S. Computer Science

- **Coursework**: Advanced Operating Systems, A.I., Algorithms, Archival Storage System Design, Computer Architecture, Computer Security, Cryptography, Database Systems, Distributed Systems, Independent Study, Programming Languages

University of California, Santa Cruz Sept. 2018 – June 2022
B.S. Computer Science

- **Coursework**: A.I., Algorithms, Assembly Language, C Programming, Compiler Design, Computer Architecture, Computational Models, Computer Networks, Computer Security, Computer System Design, Data Structures, Database Design, Distributed Systems, Embedded Operating Systems, Functional Programming, Network Programming, SQL, Web Applications
- **Achievements**: UCSC Dean's List (>3.74 quarterly GPA) in Fall 2019, Winter and Spring 2020

WORK EXPERIENCE

University of California, Santa Cruz (Center for Research in Systems and Storage) Dec. 2024 – Present
Research and Development Engineer Santa Cruz, CA

- Designing sustainability-focused hybrid storage architectures to reduce end-to-end carbon impact in data center lifecycles
- Applying life cycle assessment (LCA) to compare storage media by cost, energy consumption, and environmental footprint
- Developing simulation tools to model carbon emissions, performance impacts, and tradeoffs of storage system configurations
- Continuing development of CarbonStream, expanding features and datasets from my M.S. research project

University of California, Santa Cruz (Center for Research in Systems and Storage) Jan. 2024 – Dec. 2024
Graduate Student Researcher Santa Cruz, CA

- Created CarbonStream, an end-to-end total cost of carbon analyzer for data centers (M.S. Project)
- Conducted a comprehensive lifecycle analysis of storage technologies to evaluate their environmental impact
- Developed a decision-making framework integrating cost, performance, and sustainability metrics to optimize data storage
- Identified opportunities for hybrid storage architectures that improved energy efficiency by leveraging workload-specific strategies

Perfectly Snug July 2023 – Sept. 2023
Software Engineer Intern Remote

- Developed a custom MRP system with BOM management using Python, MySQL, Node.js, and React
- Automated manufacturing process management and part tracking
- Developed dashboards and reports using Shopify API data to optimize daily build plans
- Integrated product testing software into a mobile app to streamline the build procedure

ParkourSC, Inc. July 2022 – Sept. 2022
DevOps Engineer Intern Remote

- Redesigned and implemented new alert condition policies for several Kubernetes clusters in New Relic
- Eliminated false-positive alert tickets, which increased engineer productivity and allowed for critical alerts to have higher visibility
- Created a Jira automation to mute all alerts for a cluster during an upgrade using the New Relic NerdGraph API
- Analyzed log files, viewed alert incident data, and wrote NRQL queries to investigate cluster outages

uLab Systems, Inc. June 2021 – Sept. 2021
Software Engineer Intern San Mateo, CA

- Migrated a WordPress website from Amazon Lightsail to EC2
- Designed and implemented a three-stage pipeline to streamline development and testing
- Created a secure private network to authenticate users and filter out unwanted web traffic
- Wrote AWS CLI/API Python scripts to sync data and automate the code pipeline

Nevtec, Inc. June 2019 – Sept. 2019, June 2020 – Sept. 2020
Data Analyst Intern San Jose, CA

- Created a real-time ticket monitoring system using Power BI and SQL to display data from a ConnectWise database
- Wrote Power BI Data Analysis Expressions (DAX) scripts to create calculated columns and transform data
- Analyzed service ticket data to measure engineer performance and compare customer IT requests
- Built dashboards to highlight key data points, including ticket response and closing times, billable hours, and project time utilization

Nevtec, Inc. June 2018 – Sept. 2018
Computer Technician Intern San Jose, CA

- Wrote custom batch scripts to automate and speed up PC setups
- Configured new PCs for customers
- Catalogued enterprise data sets
- Documented the company's internal database

TEACHING EXPERIENCE

University of California, Santa Cruz (Baskin School of Engineering) Jan. 2023 – Dec. 2024
Teaching Assistant Santa Cruz, CA

- 6x Head Teaching Assistant for CSE 130: Principles of Computer System Design (W23, S23, F23, W24, S24, F24)
- Reviewed course material and assisted students with programming assignments and exam prep
- Conducted group discussion sections, created assignments and quizzes, proctored exams, and managed course infrastructure
- Created and maintained an automated CI/CD pipeline for grading programming assignments on GitLab

University of California, Santa Cruz (Baskin School of Engineering) April 2022 – June 2022
Undergraduate Course Tutor Santa Cruz, CA

- Tutor for CSE 130: Principles of Computer System Design (S22)
- Helped students solve problems and debug code in programming assignments
- Reviewed course material and taught useful programming and debugging techniques to students
- Assisted TAs during discussion sections and office hours

PROJECTS

CarbonStream (M.S. Project) Jan. 2024 - Present

- Conducted a comprehensive lifecycle analysis of storage technologies to evaluate their environmental impact
- Developed a decision-making framework integrating cost, performance, and sustainability metrics to optimize data storage
- Identified opportunities for hybrid storage architectures that improved energy efficiency by leveraging workload-specific strategies

Thread-safe Reader-Writer Lock Oct. 2023 - Nov. 2023

- Created a thread-safe reader-writer lock to synchronize access to shared resources
- Allowed for N-Way blocking, enabling up to N reader threads to acquire the lock between waiting writers
- Written as a C library that could be included in a multithreaded web server to support access to files fairly

In-memory File System April 2022

- Built a Unix-style in-memory filesystem with a tree-structured hierarchy in C++
- Program was simulated in a terminal shell environment with support for several GNU Core Utilities commands
- Shell commands modified an inode tree consisting of a root node and mappings to files and directories

Deduplicating Key-Value Store

May 2021 - June 2021

- Designed and built a deduplicating key-value block storage system for FreeBSD in C
- File system mapped 160-bit keys to unique 4 KiB blocks stored on a mounted memory disk
- Utilized a superblock to store the file system metadata and inodes to contain the mappings to data blocks

Unix Shell

April 2021

- Created a custom Unix shell with support for executing single and piped commands, I/O redirection, and built-in commands
- Implemented robust error handling to ensure shell stability, validating return values and preventing crashes from malformed input
- Designed a modular program architecture, including token parsing using flex, process management, and redirection logic

Multithreaded RPC Server

Oct. 2020 - Dec. 2020

- Implemented a multithreaded remote procedure call (RPC) server to perform arithmetic operations and file services in C
- Client requests and server responses were sent in network byte order using a custom protocol
- Server was scalable and supported recursive name resolution for variables, persistent key-value pairs, and fault tolerance

File Compressor

Dec. 2019

- Developed an efficient LZW compression and decompression tool in C, ensuring lossless data compression for text and binary files
- Optimized performance by implementing buffered file I/O, supporting variable-length codes, and ensuring system interoperability
- Implemented a modular design, including ADTs for tries and word tables, a structured I/O system, and endianness handling

Jakes's Hockey Pool

June 2020 – Oct. 2020

- Wrote a live data feed interface and built a map to the undocumented NHL REST API
- Contributed to the data structure and schema designs of the pool and called for architecture review and design specs
- Employed a modular approach to the code design to simplify and speed up development and testing

PRESENTATIONS

CarbonStream: An End-to-End Total Cost of Carbon Analyzer for Data Centers. CRSS Spring IAB Meeting, Santa Cruz, CA, May 2025.

Analyzing the Total Cost of Ownership of Carbon in Data Centers. CRSS Weekly Seminar, Santa Cruz, CA, October 2024.

The Five-minute Rule Thirty Years Later and its Impact on the Storage Hierarchy. CRSS Weekly Seminar, Santa Cruz, CA, October 2023.