Akash Dhiraj

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Education

Cornell University

Ithaca, NY

B.A. in Computer Science & B.A. in Mathematics

August 2021 - December 2024

Organizations	Capra Research Group, Computer Reuse Association
Graduate CS Coursework	Algorithms, Compilers, Distributed Systems, Parallel Computing, Programming Languages
Undergraduate CS Coursework	Computer Architecture, Discrete Structures, Functional Programming, Object Oriented Programming, Operating Systems
Undergraduate Math Coursework	Combinatorics, Complex Analysis, Honors Abstract Algebra, Honors Real Analysis, Linear Algebra, Multivariable Calculus
GPA	3.7/4.0 (Dean's List Recipient)

Experience

Cornell University, Computing and Information Sciences

Ithaca, NY

Research Assistant, Programming Languages and Computer Architecture @ Capra, Advised by Dr. Adrian Sampson *May 2024 – Present*

- Fulltime Researcher from January 2025 – Present
- Developed *Rio*, a domain specific language for describing packet scheduling policies, written in OCaml.
- Wrote a compiler from Rio to Calyx (hardware description language developed at Capra, similar to Verilog).
- Implemented packet scheduling policies in hardware through Calyx.
- Wrote a "topology to topology" compiler to convert between Rio programs, as described by Mohan et al.
- Contributed to the open-source Calyx project.

Teaching Assistant, CS 3410 Computer System Organization, Taught by Dr. Adrian Samspson and Dr. Giulia Guidi *August 2024 – December 2024*

- Held office hours and labs for 6+ hours per week, graded, demoed, and provided feedback for both assignments and labs, and proctored exams.
- Setup infrastructure for automatic grading.

Head Teaching Assistant, CS 3110 Functional Programming, Taught by Dr. Michael Clarkson *August 2023 – May 2024*

- Held office hours and labs for 6+ hours per week, designed, graded, and provided feedback for both assignments and labs, and proctored exams.
- Ran TA meetings to prepare fellow teaching assistants for assignments, labs, and office hours.
- Guided multiple teams of four students in completing their final class project.
- Received a faculty-nominated CS Course Staff Exceptional Service Award!

Cornell University, Math Department

Ithaca, NY

Teaching Assistant, Math 1110 Calculus I *August 2022 – December 2022*

- Held office hours for 2+ hours per week, and graded and provided feedback for weekly homework assignments.

Projects

Multicore Processor

November 2024

Culmination of a semester of CS 4420 Computer Architecture labs.

- Iterative multiplier/divider, 5-stage pipelined processor with stall/bypass logic, direct-mapped cache, and memory network all implemented in Verilog.
- Accompanied by various multithreaded programs to be run on the processor.

Fault-Tolerant Sharded Linearizable Distributed Key-Value Store

May 2024

Key-value store, built over the DSLabs framework for CS 5414 Distributed Computing Principles.

- Keys grouped into "shards", each managed by different replica groups that provide consensus via a custom implementation of multi-Paxos.
- Multi-key transactions handled via the three-phase commit protocol.

Operating System

January 2024

Key parts of EGOS, a miniature operating system designed for CS 4411 Operating System Practicum.

- User space multi-threading package, RISC-V memory protection setup, disk cache, and FAT file system all implemented in C.

Where's My Class

August 2023

Web application for Cornell students to visualize class locations on a map and plot routes between them.

- UI built with ReactJS and application state managed through Redux.
- Course data fetched with Cornell's Course Roster API and updated monthly with Github Actions.
- Map and routing data generated through Mapbox's web services APIs.

View repository or website

Skills

Languages	Bash, C, C++, Java, Javascript/HTML/CSS, LaTeX, OCaml, Python, Rust, SQL, Verilog, English, American Sign Language
Frameworks/Libraries	Node.js, NumPy, Pandas, PyTorch, ReactJS, Redux, Scikit-Learn, Yacc
Tools	Docker, Flask, Git, GitHub CI/CD, Jupyter Notebook, Linux (Arch and Ubuntu), Unix, Vim