Dakota Bryan

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EDUCATION

Bachelor of Science, St. Lawrence University, Canton, NY Majors: Computer Science (honors), Mathematics Cumulative GPA: 3.94/4.00

PhD in Computer Science, University of Colorado Boulder, Boulder, CO Current Cumulative GPA: 4.00/4.00

RESEARCH & PROJECTS

Bi-versional Hoare Logic

- Developed the syntax and semantics of bi-versional IMP, a simple imperative language to represent two • versions of the same program. The semantics operates over two states, "old" and "new"; the single program transforms the two states, resulting in a concise representation of a program revision.
- Extended relational Hoare logic to handle the bi-versional semantics, resulting in a sound and relatively ٠ complete logic.
- Implemented an interpreter for bi-versional IMP, proof rules for the logic, many meta-theoretic proofs, • and examples of execution and Hoare logic triples for various programs in the proof assistant Coq.
- Authored a research report, blog post, and presentation of this work. ٠

Fractal Voyager, CS Honors Thesis

September 2022 - May 2023 https://fractalvoyager.github.io/ (Tip: enter "iterate z^2+c until z escapes." into the script text box for the Mandelbrot set. Click on the fractal for Julia sets.)

- Developed a web application to fill a void in web-based fractal generating software, an essential aspect • of complex dynamics research. It supports point orbit visualizations and parameter customizations to allow for the exploration of any area of the complex plane.
- Crafted a grammar definition and source-to-source compiler to create a domain-specific scripting • language. It enables users to generate fractals based on iterated functions and conditions, in both the parameter and dynamical plane.
- Made use of WebAssembly to allow this computationally intensive technology to be run on the web • efficiently by compiling all time-consuming aspects of the app to WebAssembly, some while in the browser.
- Authored an extensive research report that outlines the research involved in, and contributions of, . Fractal Voyager. I also presented findings via a poster presentation.

Sudoku Graph Theory Web App

https://dbryan17.github.io/sudokuGraph/

- Investigated the graph representation of sudoku, and created a web application that generates valid • puzzles and allows the user to solve them in both grid and graph form.
- Implemented graph coloring algorithms to auto-solve the puzzle, complete with animations to illustrate ٠ how they work.
- Developed many algorithms that represent human-solving strategies, allowing for an advanced help ٠ feature which reveals solving methods to the user.
- Delivered a detailed report on the sudoku graph and the implementation of my application. Presented the • work via an oral presentation.

Mountain Project Climbing Database & Web Scraper

Designed and provisioned a relational database to hold data from a social media-driven rock climbing guidebook.

November 2022 - December 2022

November 2022 - December 2022

November 2024 - December 2024

August 2019 - May 2023

August 2024 - Present

- Created a web scraper that collected approximately ten percent of all the data on the guidebook • application, corresponding to over one million rows in one of the tables.
- Wrote complex SQL queries to gain insights on climbing communities and areas based on the data.

WORK EXPERIENCE

CU Boulder CS Department, CSCI 3155 Teaching Assistant

- Delivered three 75-minute lectures to the entire class of 120+ students, creating all slides and content. • Topics included judgments, static type checking, and mutable state.
- Led the creation of two new problem sets by developing interesting, relevant, and appropriately challenging exercises. Collaborated with the professor through an iterative process to refine the problem sets until eventual release.
- Developed material for, and led, weekly recitations. Held four office hours per week. ٠

IBM

Software Engineer, Full-Time

May 2022 - April 2025 June 2023 - April 2025

August 2024 - Present

- Led full-stack development of a new access management application by planning development and • architecture, while contributing the bulk of the application code. The application used Next.js, React with IBM Carbon, Java Spring Boot with Hibernate/JPA, IBM DB2, and Cirrus Cloud.
- Met with design teams, end-users, and upper management to capture business and user needs, translating • them into a viable and user-friendly product.
- Aided in the development and testing of UAWeb, the previous access management solution which was being replaced. The application supported over 50 internal IBM tools (10 of which are financially significant), including all IBM SAP systems.

Frontend Software Developer, Intern & Co-op

Developed and maintained the frontend of the IBM iERP SAP Security Dashboard which displays SAP • user group and system metrics, along with data visualization over multiple landscapes. The application makes routine checks more efficient.

Peterson Quantitative Resource Center, Peer Mentor, St. Lawrence University August 2021 - May 2023

Tutored fellow students on Math, Computer Science, and Statistics classes by talking through problems, explaining content, and doing practice problems so students improve understanding.

Swahilipot Hub, Technology Department Intern, Mombasa. Kenya

- Worked on a team to rewrite the foundation's website to include member-only content and change the tech stack from Python, Django to Node.js, Express, MongoDB, and React.
- Wrote an analytical paper on technology/entrepreneurship "hubs" in East Africa, utilizing my experience at this non-profit as a case-study.

Awards and Honor Societies

Summa Cum Laude, St. Lawrence University	May 2023
• Distinction upon graduation for students earning above a 3.85 GPA.	
Phi Sigma Tau Society, St. Lawrence University	April 2023
Philosophical honor society.	
Phi Beta Kappa Society, St. Lawrence University	March 2023
• National honor society for liberal arts and sciences undergraduates.	
Pi Mu Epsilon Society, St. Lawrence University	October 2021
Mathematics honor society.	
Pi Mu Epsilon Award, St. Lawrence University	April 2021
• Award for student(s) who have excelled in mathematics through sophomore year.	

May 2022 - June 2023

April 2022 - May 2022

Community Engagement & Global Experience

Outing Club, Guide and Treasurer, St. Lawrence University

- Managed the club's \$40,000 budget by making decisions on proper spending and tracking all • expenditures.
- Led initiatives to allocate our budget in ways which create a more welcoming and diverse outdoor space, including a collaborative effort to create a BIPOC gear grant where BIPOC-identifying students could receive funding for gear purchases.

Outdoor Program, St. Lawrence University

Guide

January 2020 - May 2023 August 2021 - May 2023

- Led frequent trips (including overnights, biking, skiing, climbing, canoeing, and hiking) for the campus
- community to get more students interested in outdoor experiences and their enjoyment.

Climbing Wall Staff

January 2020 - December 2021

• Taught guests proper belay techniques, supervised the wall, and set new climbing routes of varying difficulty.

Kenya Semester Program, Nairobi Kenya

January 2022 - May 2022

Studied abroad in Kenya for a semester with a rural and urban homestay component, while taking • classes that provided context for these experiences.

August 2020 - May 2023