

# Malcolm Kaplan

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## EDUCATION

### University of Illinois at Urbana-Champaign

Champaign, IL

Bachelor of Science in Computer Science and Anthropology – 3.98 GPA

August 2021 – May 2025

- **Honors:** Dean's List; Phi Beta Kappa; James Scholar; Phi Eta Sigma National Honor Society, Alpha Chapter
- **Relevant coursework:** Data Structures, Algorithms, Machine Learning, Operating Systems, Distributed Systems, Database Systems, Networks, Computer Architecture, Data Science, Statistics and Probability, Linear Algebra
- **Activities:** Association of Computing Machinery (ACM), Treasurer of Illini Classics Club

## EXPERIENCE

### Software Engineering Intern

Summer 2022, Summer 2023, Summer 2024

AvTech Corp.

Des Plaines, IL

- Developed novel full-stack solutions across the aviation industry, including the following:
  - \* An interactive map web console in TypeScript to display real-time locations of buses as well as a backend service in C# to parse location information from a database and calculate estimated arrival times
  - \* An app in Python, MicroPython, Java, and JavaScript to efficiently and securely communicate with proximity beacons via LoRaWAN technology, allowing for remote access and modification of transmitted data
  - \* A VBA program to algorithmically assign van drivers to service flights given a set of constraints, including shift times and weight capacities, saving hours of manual work for airport staff each day
  - \* A server in Python for parsing and storing ADS-B data containing the locations of nearby planes obtained from a Raspberry Pi, as well as a Javascript web application to display the planes on a map in real-time
  - \* An Android user-interface for bus drivers to efficiently scan passengers and keep track of upcoming services
- Thoroughly debugged and tested new features on existing applications prior to public releases
- Actively communicated with clients to ensure that the company's programs met their exact criteria
- Wrote detailed project reports to submit to clients, guiding users through the setup and running of the programs

### Undergraduate Course Assistant

January 2023 – May 2023, January 2024 – May 2024

University of Illinois at Urbana-Champaign

Champaign, IL

- Held office hours to guide students through CPU design and optimization projects in C, C++, Assembly, and Verilog
- Taught students topics in computer optimization, including pipelining, caching, parallelism, and virtual memory
- Taught students fundamental computer science topics including algorithm analysis, boolean algebra, and recursion

## PROJECTS

### Linux-Like Kernel | C, x86 Assembly, GDB, GitLab

March 2024 – April 2024

- Led 4 engineers to develop a Linux-like monolithic operating system, consisting of over 13,000 lines of code
- Engineered infrastructure for running and switching between multiple processes seamlessly, including scheduling, system calls, and interrupt handling
- Implemented features to ensure security and speed, including virtualized memory and file system abstractions
- Developed comprehensive device drivers for keyboard, terminal, real-time clock, and timer

### Distributed Stream Processing Framework | Golang, Bash, GitLab

August 2024 – December 2024

- Developed a fault-tolerant, parallel stream processing framework from scratch, consisting of over 4,600 lines of code
- Engineered a fault-tolerant distributed file system for safely and efficiently storing input and output data
- Included support for arbitrary and customizable operations on the input data
- Implemented the SWIM protocol for efficient and complete failure detection among nodes in the cluster

### Primate Guessing Game | TypeScript, HTML, CSS, GitHub

October 2024 – December 2024

- Developed an educational game that challenges users to identify primates based on traits and hints from prior guesses
- Built robust algorithms, including a dynamic programming-based autocorrect system, to efficiently validate user input, correct errors, and generate tailored hints, enhancing both learning reinforcement and user experience

### Elden Ring Speedrun Optimizer | C++, Python, Matplotlib, Make, GitHub, Docker

May 2023

- Created a program to read in locations from the Elden Ring video game and calculate an optimal speedrun route
- Developed modifications of Dijkstra's algorithm and the Floyd-Warshall algorithm to find shortest paths while simultaneously accounting for the intricacies of the game and enforcing a strict ordering of certain pathways
- Achieved calculated route times within 5% of actual speedrun world records, indicating high accuracy
- Visualized results by drawing a path on an image of the Elden Ring map using Python and Matplotlib

## SKILLS

**Languages:** C, C++, Python, Java, Go, JavaScript/TypeScript, CSS, HTML, SQL, Assembly, VBA, C#, Verilog, Haskell

**Tools, Frameworks, and Libraries:** Git, GitHub, GitLab, Azure DevOps, GDB, Bash, PowerShell/Command Prompt, Docker, NumPy, SciPy, Pandas, scikit-learn, React, jQuery, Node.js, Make, XML, SQLite, Entity Framework

**Multimedia Software:** Photoshop and Sony Vegas, creating projects amassing over 1,000,000 total views on YouTube