Ashwin Balaji

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Education

The University of Pennsylvania, Philadelphia, PA ***(MSE in Computer Science)*** August 2024 – January 2026
The University of Pennsylvania, Philadelphia, PA ***(BSE in Computer Science)*** August 2021 – January 2026

- *Dean's List 2021 – 2022 | SAT 1570/1600*
- **Relevant Coursework:** Operating Systems, Applied Machine Learning, Data Structures & Advanced Algorithms, Discrete Math, Cloud Computing, Advanced Probability and Statistics
- **Societies***:* Penn Quant Trading and Research Club (Portfolio Manager), Penn Sargam (Percussionist), Penn Dhamaka (Dancer)

Technical Skills

Languages: Python, C++, Java, C, JavaScript, OCaml, HTML & CSS, SQL, MATLAB, YAML, Bash
Packages: AWS, Node, React, Linux, Git, Ansible, Cucumber, Pandas, MongoDB, Locust, Docker

Professional Experience

MongoDB | New York City, New York June 2024 - August 2024
Software Engineering Intern – Performance, Core Server

- Developed a comprehensive test workload using Python and Locust to simulate user interaction on an ecommerce platform, achieving a 30% query speed improvement over CosmosDB.
- Integrated a 3-Node Replica Set Intel AWS Variant into the testing suite, enhancing testing coverage and system robustness ≈ 5%.
- Implemented and documented four comprehensive files containing factory classes for generating Locust workloads that populate multiple databases, saving approximately 10-15 hours per new workload.

Chicago Mercantile Exchange (CME Group) | Chicago, IL May 2023 – August 2023
Software Engineering Intern – Trade Execution Systems

- Developed Java-based option-spread pricing algorithm for Calendar spreads with legs in different price units.
- Built latency prediction model in Python to predict latency of orders across time-series data in options and futures markets.
- Detected 98% of latency spikes on real-time match engine orders across various 10-minute intervals in all markets.
- Placed 2nd at the CME Intern Trading Challenge out of 70+ interns.

Michigan State University | East Lansing, MI September 2020 – July 2021
Computer Science Research Assistant – Department of Computer Science and Mathematics

- Analyzed graph based semi-supervised machine learning algorithms against traditional methods in Python.
- Tested graph-based adaptation of Merriman-Bence-Osher Scheme in comparison with 4 supervised classification algorithms – yielded consistent 99 percent accuracy with $1/6^{th}$ of required training data on MBO adaptation.
- First author of research article published in Scientific Peer-Reviewed Journal – JEI.

Projects

PennOS (Group Project – 4 Members) November 2023 – December 2023
C, Ucontext

- Designed a User-level UNIX-like Operating System, running as a single process on host OS.
- Implemented a basic round-robin priority scheduler, simulating multiprocessing, using the ucontext library.
- Added support for foreground/background processes, redirection, synchronous child waiting, and built-ins (sleep, cat, touch, busy, etc.)

Facebook Clone (Group Project – 4 Members) Jan 2022 – Feb 2022
Javascript, Node.js/Apache Spark, Apache Livy, HTML/CSS/Boostrap, AWS DynamoDB/EC2, Socket.IO | GitHub Repository

- Created a Facebook clone, allowing users to log in, post status updates, view friends' homepages, and start chats.
- Designed a Spark-based adsorption algorithm to recommend news articles to users based off their current interests.
- Hosted application on an EC2 instance, with backend data storage in DynamoDB and a functioning chat page in Socket.IO.

LC3 Assembler / Reverse Assembler April 2023 – May 2023
C, Assembly

- Designed a compiler in C for the LC3 assembly language that generated executable binary files from assembly language.
- Updated a CPU machine struct in C by parsing binary files and modifying registers, cache, and all memory segments.
- Constructed a reverse assembler to generate assembly files from encoded binary files.