

# RAHUL RAMESH

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## EDUCATION

### University of Michigan, Ann Arbor

M.S. Computer Science and Engineering (4.0 GPA)

August 2024 - December 2025 (Expected)

### Duke University

B.S. Mathematics, B.S. Computer Science, Education Minor (3.7 GPA)

August 2017 - May 2021

## SKILLS

*Languages:* Python, Java, C++, C, C#, SQL, R

*Frameworks:* RESTful API, Spring, Springboot, SQLAlchemy, CUDA, OpenMP/MPI, Pytorch, .NET

*Technologies:* Maven, Docker, Jenkins, TeamCity, Snowflake, PostgreSQL, AWS (Solutions Architect)

## WORK EXPERIENCE

### Group One Trading

Chicago, IL

Software Developer Intern

June 2025 - August 2025

- Extended proprietary options market-making infrastructure in C#.NET by exposing previously siloed risk and compliance data to traders with lower latency than existing internal tools

### Capital One

McLean, VA

Software Engineer

August 2021 - August 2024

- Designed Java-based Kafka consumer service to generate customized payment plans for customers in debt recovery (22,000+ new enrollments, Capital One Circle of Excellence award)
- Architected Python library to automatically generate and tailor collections test accounts for live dependency testing. Led design of concurrency model with DynamoDB-based optimistic locking to atomically retrieve, test, and reset accounts (20+ dependent services, 10,000+ accounts)
- Optimized serial Java Spring microservice architecture for calculating collections offers based on user-submitted hardship surveys by introducing parallel-based techniques (10,000+ enrollments, 2x performance improvement)
- Restructured legacy Java-based data publishing pipeline by streamlining with AWS lambda (100+ internal customers)

### Capital One

McLean, VA

Software Engineer Intern

June 2020 - August 2020

- Collected user click-through data with Snowflake on Elasticsearch-based internal API search engine (10,000+ clicks tracked)
- Wrote Python-based pipeline to procedurally train RankBoost machine learning model to improve search relevance ranking. Created Tensorflow-compatible API to extend model with the Learning to Rank plugin (50+% improvement on F1 score)

### Tanium

Morrisville, NC

Software Engineer Intern

May 2019 - August 2019

- Wrote Python library for translating Windows Permission descriptors into human readable formats, memoized in a SQL db. Integrated library into React-based Integrity Monitor platform for tracking changes in file permissions (800+ customers)

### Quantifying Gerrymandering Group, Duke Math Department

Durham, NC

Research Intern

June 2018 - May 2019

- Originated graph-theoretic algorithm to generate random districting plans using weighted spanning tree-based proposals for Markov Chain Monte Carlo (MCMC) sampling using C++ (100,000+ plans per ensemble)
- Scraped 10+ years of precinct-level election data for North Carolina House and Senate elections. Compared outcomes from enacted plans against simulated elections on randomly generated ensembles of plans to evaluate the extent of gerrymandering
- Proposed new metric for evaluating random maps by calculating differences in vote fractions along district borders. Prepared evidence of 50% observed partisan skew in an amicus brief for 2019 NC Supreme Court case *Common Cause v Rucho*

## PROJECTS

### Compiler Phase Ordering Optimization with Reinforcement Learning

April 2025

- Trained a reinforcement learning agent in CompilerGym to compute optimal LLVM phase orderings with 5-10% average reductions in runtime and instruction count on cBench benchmarks

### Parallel N-Body Simulation on GPU

December 2024

- Developed platform using CUDA and C++ for efficiently computing simulations of 100,000+ independent agents with custom interaction rules using quadrees. Optimized for cluster with 52 NVIDIA Tesla V100 and 4 A100 GPUs
- Cross-implemented in serial and distributed memory regimes using MPI, achieved 4-10x framerate speedup over CPU

### Novel Algorithm for Averaging 3D Objects (U.S. Patent 12,277,661)

August 2022

- Designed and implemented a Python pipeline to compute representative averages of 3D objects by leveraging the Marching Cubes algorithm to reconstruct an object from a voxel derived from the features of each object