

JIAJUN MAO

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EDUCATION

University of Chicago

Sept 2020 - August 2024 (Expected)

BS/MS Joint Degree in Computer Science, System Specialization

Courses: Machine Learning for System, Advanced Operating Systems, Unsupervised Learning, Mathematical Toolkit, Intro to Database, Fundamentals of Deep Learning

Georgia Institute of Technology

Aug 2019 - Aug 2020 (Transferred)

B.S. in Computer Science, Intelligence and System Arch. Concentration

Courses: Computer Organization and Architecture, Data Structure and Algorithms, Machine Learning

ACADEMIC EXPERIENCES

Investigate Storage Characteristics of DP, and RAID and SODP in MLEC

March 2023 - June 2023

Multi-Level Erasure Coding Project, UCARE ◇ Advanced OS Course Term Project.

Chicago, IL

- Implementing **Single Overlapped Distributed Parity** as another policy module in the MLEC Simulator. Studying its characteristics against other placement scheme such as **MLEC, Azure LRC, distributed parity, and RAID.**
- Implementing SODP as the placement scheme for MLEC's local and network layer. Studying its performance and durability characteristics against MLEC-RAID and MLEC-DP.
- Collected over 500 data points through simulations to study characteristics such as system durability, average cross-rack bandwidth consumption, and number of priority repairs for differently configured storage systems. Results are presented in the paper "*Design Considerations and Analysis of Multi-Level Erasure Coding in Large-Scale Data Centers*"

Math Modeling and Implementation of NetDP in MLEC-Sim

Aug 2023 - Jan 2023

Multi-Level Erasure Coding Project, UCARE

Chicago, IL

- Used combinatorics to calculate the percentage of on-disk data that is damaged due to disk failures to correctly implement priority repair for network level distributed parity. Modeled failure percentage for up to 3 disk failures.
- Implemented the math model in Python in MLEC Simulator, and implemented **network distributed parity** as one of MLEC-Sim's placement scheme.

Development and Maintenance of MLEC Simulator

Jan 2022 - Present

Multi-Level Erasure Coding Project, UCARE

Chicago, IL

- Developed and maintained a complicated, policy-based, Monte-Carlo simulator that is capable of simulating different data center layout and erasure code schemes.
- Used Python's multiprocessing library to parallelize and accelerate the simulation speed so that we can simulate systems with durability up to 5 number of nines.
- Implemented network bandwidth module to simulate network bandwidth bottleneck effect on network level parity repairs, and collect metrics regarding cross-rack and intra-rack bandwidth consumption during repair.

PUBLICATIONS

Design Considerations and Analysis of Multi-Level Erasure Coding in Large-Scale Data Centers

Meng Wang, **Jiajun Mao**, Rajdeep Rana, John Bent, Garrett Wilson Ransom, Anjus George, Jun Li, Haryadi S. Gunawi. **Supercomputing, 2023.**

INDUSTRY EXPERIENCES

AWS Data Protection, Amazon Web Services

May 2022 - Aug 2022, June 2023 - Aug 2023

Software Development Intern

Seattle, WA

- Designed and developed a **distributed system** for analyzing runtime metrics for AWS Backup services, required to handle more than **50 million** entry ingest for every 8 hours.

- Authored and peer reviewed **system design** documents that detailed on how to achieve scalability, data consistency, and maintainability for the aforementioned system.
- Built an end-to-end data visualization pipeline around the system to display collected metrics through AWS CloudWatch dashboards and widgets. Setup alarms to automate the ticketing and DevOps process.
- The system is built on top of DynamoDB, S3, CloudWatch, and Lambda

Intelligrated, Honeywell

Jan 2022 - April 2022

Machine Control Business Logic SDE Intern

Mason, Ohio

- Designed and developed microservices based on **Java** and **RabbitMQ** that reliably manages and executes business logics for logistical distribution centers.
- Interfaced with **C++** code and Programmable Logic Controller (**PLC**) to manipulate motors, scanners, and printers to execute proper logic with decision time less than **30ms**
- Cooperated with a team of 2 to develop and deliver a full suite conveyor solution that helps customer process 30+ cartons per minute.
- Contributed to the business logic Java library by implementing a pub-sub structured file modification watcher.

Shepherd Money

Nov 2022 - Present

Founding Engineer, Backend Lead

San Francisco, CA (Remote)

- Implemented the deployment infrastructure and pipelines through **Docker** and **Kubernetes**. Automated and standardized quality and coverage testing through **JUnit** and **Jest**.
- Implemented HA and load-balancing for the website frontend through **Nginx**.
- Lead a team of 4 to re-architect and implement the backend software stack. Responsible for managing the transition from **JavaScript** backend to **Java** backend.
- Product managed release cycles and feature roadmaps. Working toward a MVP launch at the end of December 2023. Demo can be accessed at <https://www.shepherdmoney.com>

PERSONAL PROJECTS

IunGo

March 2022 - Present

Founder, Developer

- Working with 2 other developers in developing a social app that aimed to provide centralized academic/community resources and informations to university students.
- Spring Boot, **Hibernate** and **MariaDB** are used for the backend. Backend adopts a microservice architecture with 4 isolated service components communicating through HTTP calls being used RPC.
- **React** and **TypeScript** are used for the frontend development. Nginx is used to service the frontend content and assets.
- Bare-metal Kubernetes are used for both frontend and backend deployment.
- Source code is not open sourced. Demo website can be accessed at <https://web-dev.kube.iungo.ink>

TownyMission

Nov 2022 - Present

Developer

- A fun project to extend the functionality of Minecraft's Towny plugin. Create mechanics and platforms that allow for multi-town and multi-nation peaceful competition.
- Source code can be accessed at <https://git.naturecraft.world/naturecraft-dev/townymission>

TECHNICAL SKILLS

Programming Languages

Java, Python, Java/TypeScript, Rust, C, SQL, \LaTeX

Backend Stacks

Hibernate, Spring Boot, MyBatis, HikariCP

Frontend Stacks

React, Vue.js, Axios, React Native

DevOps & Containerization

Kubernetes, Docker, Docker Swarm, GitLab CI/CD, Jenkins