Gaurav Ajay Kulhare

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Education

SUNY Stony Brook University — Stony Brook, NY
Masters in Computer Science — *Aug 2023 – May 2025*

Distributed Systems — Data Science Fundamentals — Network Security — Probability and Statistics

Vishwakarma Institute of Technology, Savitribai Phule Pune University — Pune, India
Bachelor of Technology in Computer Science — *Aug 2017 – May 2021*

Advanced Data Structures — Computer Organization and Architecture —Computer Networks — Database Managements Systems — Operating Systems — Algorithms and Complexity — Image Processing — Network Security— Client Server Computing— System Programming

Experience

Research Project Assistant | *Rust, Python, Node.js, Docker, Kubernetes* — Stony Brook, NY
State University of New York Research Foundation — *May 2024 – Aug 2024*

Publications: Hot Storage '24 (Paper), FAST '24 (Poster)

- Developed a Rust crate that provides modules for Local network simulation of servers using multi-threaded async tasks and communication channels to generate interactive and dynamically configured nodes
- Developed a Shamir's Secret Sharing Rust Module that includes Galois Field matrix inversion library for polynomial interpolation for Big Integers in cryptography, Proactive shares refreshing algorithm and Pedersen commitments on a permissioned blockchain for byzantine networks
- Conducting Research on approaches to develop information-theoretic secure encryption methodologies and block-chain based key management schemes
- Actively working on designing and implementing a secure, scalable secret sharing scheme using containerized applications deployed on a Kubernetes cluster. Utilized Docker for containerization and Kubernetes for orchestration, ensuring high availability and efficient data transmission for message reconstruction

Software Developer | *React, Java, PL/SQL, Spring, Hibernate, Jenkins, Maven* — Mumbai , India
LTIMindtree — *Aug 2021 – Jul 2023*

- Developed a React-based frontend for client facing meter data management and billing services serving over 1 million customers across 2 states along with a backend using Spring MVC and Spring Boot, leveraging Java for business logic and RESTful APIs to communicate with the React frontend
- Delivered and maintained a unified dashboard using PL/SQL stored procedures and functions to analyze data from an Oracle database and significantly reducing load and retrieval overhead
- Automated data pipelines using Jenkins to extract, transform, and load (ETL) data from head-end system, meter analytics and logistics team

Machine Learning Research Assistant | *Python, Apache Airflow, AWS* — Pune, India
Clairvoyant Bizinfo Pvt. Ltd. — *Jan 2021 – Jul 2021*

- Designed and implemented scalable ETL pipelines using Apache Airflow on AWS EC2 to collect and transform large datasets from diverse web sources via web scraping scripts and APIs
- Leveraged machine learning expertise to identify the most effective methodologies for sarcasm detection within text data, achieving a top accuracy of 74.49
- Contributed to research on word-embedding generation and training methodologies for supervised and semi-supervised learning models, enhancing their effectiveness

Projects

Fault Tolerant Distributed Systems using RAFT | *C++* — September 2023 - December 2023

- Built a key-value storage service on top of a distributed file storage system implementing Raft, a consensus algorithm based on the replicated state machine approach implementing a load balancing key-sharding service that distributes the keys uniformly across servers and handles data transfer using RPCs
- Added a transaction service that preserves the integrity of data retrieval and manipulation while maintaining atomicity and serializability across async concurrent transactions using 2-Phase Locking and 2-Phase Commit

TCP Jump Proxy | *Golang* — March 2024 - April 2024

- Developed a TCP Proxy that provides protection against network threats like Remote Code Execution/Pre-auth attacks by encrypting transmitted traffic using AES-GCM from a PBKDF2 static key, main use case: SSH
- Features include handling of multiple incoming connections asynchronously using goroutines on server-side, fragmenting traffic for ideal throughput and relaying decrypted traffic to destination port without assumptions on network latency

Technical Skills

Languages: Java, Python, C++, Typescript, Javascript, SQL, JavaScript, Go, Rust, HTML/CSS
Frameworks and Technologies: SpringMVC, Apache Airflow, Express.js, Node.js, AWS : EC2 S3 ,Next.js, Docker, Kubernetes
Libraries and Packages: React.js, Webpack, Babel, nalgebra, ark-ff, tokio, pandas, NumPy, Matplotlib, TensorFlow, OpenCV, keras, fastText, scikit-learn, scrapy, seaborn, beautifulSoup
Operating Systems: Linux (Kali, Ubuntu), Windows