Sajal Kumar

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Education

CMR Institute of Technology **Dec. 2022 – June 2026**
Bachelor of Engineering in Information Science & Engineering, CGPA: ***8.5/10*** *Bengaluru*

Relevant Coursework

- Data Structures
- Software Engineering
- Algorithms Analysis
- Database Management
- Distributed Systems
- Computer Organization
- Operating Systems
- Computer Networks

Projects

STRbook | *React, Node.js, PostgreSQL* | STRbook **May 2024 – Present**

- Developed **STRbook** to digitize student transformation records, replacing traditional physical record books reducing manual data entry using **React** for the frontend and **Node.js** with **Express.js** for the backend, for use by college.
- Implemented a robust user authentication system using **JSON Web Tokens (JWT)**, ensuring secure access to the application for both students and teachers while adhering to best security practices.
- Designed **RESTful APIs** for CRUD operations on student data, ensuring scalability and efficient data management.
- Integrated a **PostgreSQL** database to store student records, optimizing queries for performance and efficiency.
- Automated **CI/CD pipelines** using **GitHub Actions**, enabling smooth deployment and high system availability, while implementing performance optimizations in the backend system to ensure scalability and operational efficiency for student data

ordo | *Go, Docker SDK, BoltDB, RESTful API* | ordo **Oct. 2024**

- Built a distributed **container orchestration** system, to manage large-scale applications across clusters, focusing on scalability and fault tolerance.
- Implemented a modular architecture with Go interfaces, enabling customizable scheduling algorithms, including a custom-built Enhanced **PVM (Parallel Virtual Machine)** scheduler for optimized resource allocation.
- Designed and implemented **RESTful APIs** for both worker and manager nodes, enabling programmatic control and interaction with the orchestration system via standard HTTP clients.
- Migrated from an in-memory datastore to **BoltDB** for persistent data storage, enhancing **data integrity** and ensuring reliable system recoverability post-restart.

raftly | *Java, Maven* | raftly **Nov. 2024**

- Implemented the fault-tolerant **Raft Consensus Algorithm** in Java for reliable log replication and leader election across distributed nodes, ensuring high availability and consistency in distributed systems.
- Created a state machine to apply commands from replicated logs, ensuring consistent operations across the cluster.
- Developed efficient inter-node communication protocols to handle **RPCs (Remote Procedure Calls)** and log entries, enhancing cluster reliability.
- Conducted thorough **testing** to validate algorithm performance under network partitions and node failures.
- Set up monitoring with **Prometheus & Grafana**, gathering metrics for node health, leader status & visualizing cluster performance

EndlOS | *C, x86 Assembly* | EndlOS **April 2024**

- Developed a minimalist operating system from scratch in **C** and **x86 Assembly** with a custom bootloader, transitioning from **16-bit to 32-bit** modes and implementing memory management.
- Built a priority-based task scheduler for managing concurrent processes and enabling low-level inter-process communication.
- Designed a modular graphics and window management system with object-oriented design, utilizing **QEMU** for cross-platform testing and a **Makefile**-based build system for efficient compilation.

Experience

Core Technical Team **Aug 2023 – Nov 2024**
Google Developer Student Club, CMRIT *Bengaluru*

- Developed a minimal website for the club using **React**, **Golang**, and **Firebase**, enabling seamless updates for club activities.
- Organized events, including **"Introduction to Golang"** and **"Introduction to Web Security"**, to introduce club members to modern programming languages and foundational security concepts.

Extracurricular Activities

Competitive programming: Solved 150+ problems; consistently ranked in the top 20% and 7% on Leetcode and GeeksforGeeks.
Hackathons: Won two college-level hackathons, collaborated with team members to solve real-world problems.
Homelab: Managing a home lab environment for running multiple virtual machines, Kubernetes clusters, Prometheus for monitoring, and Nginx for reverse proxying.
Linux Ricing: Active in Linux ricing, customizing and optimizing Linux environments to enhance system performance, usability, and aesthetics through advanced configurations and scripting.

Technical Skills

Languages: C/C++, Java, Go, Python, Bash, JavaScript, HTML/CSS, SQL
Frameworks & Libraries: React, Node.js, Express.js
Developer Tools: Unix, Linux/WSL, Docker, Kubernetes, Git/GitHub, Firebase

Certifications

AWS Cloud Practitioner Essentials
October 2024, Coursera

Network Automation Professional Certificate
November 2024, Arista Networks