Harshana Lakshara Fernando

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GitHub Profile — Hugging Face Profile — Replit Profile — LinkedIn Profile
Portfolio Website

Summary

Dynamic and results-driven Computer Science undergraduate at the University of Moratuwa, specializing in building scalable, cloud-native applications with expertise in full-stack development, microservices architecture, and event-driven systems using Java (Spring Boot), Go, and modern tools. Passionate about Generative AI, with hands-on experience in RAG pipelines, LLM integration, Web3, and DevOps. Proven track record in distributed systems design, system performance optimization, and innovative projects like AI-driven travel assistants and blockchain governance platforms. Currently pursuing CKA and AWS Solutions Architect certifications to advance cloud-native proficiency.

Education

B.Sc. (Hons) in Engineering – Computer Science and Engineering *2021 – Present*
University of Moratuwa, Sri Lanka
Relevant Coursework: Object-Oriented Programming, Databases, Statistics, Data Structures and Algorithms, Operating Systems, Computer Networks, Programming Languages, Introduction to AI, IoT Devices, Software Engineering, Image Processing, Computer Architecture

High School *2006 – 2019*
St. John's College, Panadura, Sri Lanka

Experience

Software Engineer Intern *Dec 2024 – May 2025*
Information Systems Associates (Pvt) Ltd — Aviation Technology Company

- Contributed to both AeroOrder, a modern, microservices-based revamp of the company's core product, and AeroMart, the complex, monolithic legacy Passenger Service System (PSS) it replaces. My work involved debugging the legacy Java 8 codebase of AeroMart to ensure seamless integration and backward compatibility during the phased migration to AeroOrder.
- As part of the AeroOrder team, focused on system design and R&D for a distributed unique ID generator for Passenger Name Records (PNRs), incorporating aviation domain knowledge such as GDS-compliant rules (e.g., 6-character alphanumeric format excluding 'I' and 'O' for readability); ensured uniqueness, security, and conflict-free assignment across horizontally scaled instances using a Kafka-backed PNR pool model with state transitions (AVAILABLE → PROCESSING → USED/REJECTED), gaining skills in backend engineering, distributed systems, secure service design, and asynchronous communication.
- Optimized PNR generation service to achieve 25+ PNRs/sec throughput per node in a distributed environment, with low-latency retrieval (¡100ms) and high concurrency; performed soak, load, stress, and spike testing to validate performance using Apache JMeter, simulating production-like spikes in staging and production environments, confirming no duplicates or reordering under stress; also conducted unit testing with JUnit, achieving passing SonarQube code coverage and quality gates.
- Resolved production issues in the PNR system, including Kafka consumer lag and offset resetting due to infrastructure failures (e.g., broker downtime or memory leaks); implemented fixes like proper consumer shutdown hooks and enhanced retry mechanisms to ensure fault tolerance and recoverability.

- Integrated gRPC client and a Kafka consumer into the legacy AeroMart system to enable communication with AeroOrder; added dynamic fallback logic to revert to Oracle DB sequence-based generator during timeouts or errors, converting numeric sequences to predictable base-34 alphanumeric PNRs using hash and permutation algorithms.
- Implemented configurable feature toggles via an application parameter table in AeroMart's Oracle database, allowing granular control over PNR routing (e.g., by sales channel, airport, or hub); enabled smooth hybrid integration for phased rollout in production, minimizing risk with options for full cutover or fallback while maintaining eventual consistency.
- Led R&D for asynchronous order flow load testing between AeroMart and AeroOrder; set up Prometheus for metric collection (e.g., queue time, processing time, latency) and Grafana dashboards for real-time monitoring.
- Investigated and refactored Kafka Streams processing in production to address consumer lag caused by inefficient validation logic; compared Kafka Producer-Consumer model with Streams framework, built a demo project to explore concepts like stateless/stateful transformations and exactly-once semantics, reducing lag and improving overall system stability.
- Refactored logging mechanism to implement structured JSON logging across services, removing dependencies like MessageSource for better efficiency.
- Authored comprehensive documentation on Confluence, including PNR service design (with ER/sequence diagrams), integration/cutover plans, and logging guidelines; conducted knowledge transfer sessions, demos, and presentations to the AeroOrder team for seamless handover.
- Participated in agile ceremonies, including daily stand-ups, sprint planning, retrospectives, backlog grooming, and code reviews via Jira and Bitbucket; collaborated with cross-functional teams to prioritize tasks, resolve blockers, and deliver production-ready features.

Keywords: Java 18, Java 8, Spring Boot, Spring Security, Ant, gRPC, Kafka, React, Protobuf, REST API, Couchbase, Oracle DB, Oracle SQL, PostgreSQL, JMeter, Gatling, Ant Design, Docker, Docker Compose, Gradle, Prometheus, Grafana, Kibana, Confluence, Jira, Bitbucket, Microservices, Kafka Streams, JSON

Significant Projects

Employee Management System (EMS)

Designed and built a comprehensive, cloud-native microservices application for employee and department management, featuring a full-stack architecture with a React/TypeScript frontend and Spring Boot backend.

- Architected a distributed system with independent microservices for employees, departments, and configuration, using **Spring Cloud** for service discovery (**Eureka**), centralized configuration, and an API gateway.
- Implemented both synchronous inter-service communication with **Feign Clients** and asynchronous messaging with **RabbitMQ**.
- Established a robust observability stack, integrating **Zipkin/Sleuth** for distributed tracing, the **ELK Stack** for centralized logging, and **Prometheus/Grafana** for real-time metrics and monitoring.
- Containerized all services using **Docker** and orchestrated local deployments with **Docker Compose**.
- Designed and managed a CI/CD pipeline using **Jenkins**, with **ArgoCD** for GitOps-based deployments to a production-like **Kubernetes (OKE)** cluster.

Keywords: Java 17, Spring Boot, Spring Cloud, React, TypeScript, Vite, Nginx, RabbitMQ, Resilience4j, MySQL, Docker, Kubernetes, Jenkins, ArgoCD, Prometheus, Grafana, ELK Stack, Nexus, GHCR

GoTogether – Intelligent Travel Companion for Sri Lanka

Developed and deployed a full-stack travel assistant platform tailored for Sri Lankan tourism, offering AI-based itinerary generation, real-time transport data, and social interaction features through a cloud-native microservices architecture.

- Led development of the web frontend using **Next.js** with secure authentication, session handling via HTTP-only cookies, SSR/CSR hybrid rendering, and route protection for role-based access.
- Designed and implemented the **User Service (Spring Boot)** to manage profiles, preferences, and social connections, integrating securely with **Keycloak** for identity management.
- Built a dedicated **Auth Service using Keycloak**, managing OAuth2/OIDC flows, token issuance, and automated realm/client boot-time import scripts.
- Solved startup dependency issues between services by writing a custom wait script to delay the user service until Keycloak initialization completed, improving reliability.
- Configured **HTTPS for production with NGINX + Certbot + DuckDNS**, ensuring compatibility with Vercel's secure API policies.
- Refactored the Social Media Service, improving modularity, adding pagination, and enhancing error handling for REST APIs.
- Optimized container builds using .dockerignore and multi-stage Docker builds; manually built JARs outside Docker to reduce image size and speed up builds.
- Created a robust **deploy.sh script** to support local builds, selective service orchestration, and GitHub Actions-based CI/CD.
- Migrated backend infrastructure from **AWS EC2 to Oracle Cloud Free Tier**, improving stability, memory headroom, and deployment speed.

Keywords: Next.js, React Native, Go, Spring Boot, Kong, PostgreSQL, Cloudflare, Vercel, NGINX, Certbot, DuckDNS, Gemini API

Food Delivery Application

Built a scalable, event-driven food delivery platform inspired by systems like Uber Eats, using a modern microservices architecture. As part of the core team, I focused on designing and developing the Restaurant Service.

- Developed the Restaurant Module with secure sign-up/login using **Spring Security** and **JWT** (with extended claims).
- Built CRUD APIs for menu and item management; integrated **Redis caching** to improve performance and reduce database load, with appropriate cache invalidation strategies.
- Enabled order sync via **Kafka**: when an order is placed, an event is published to the 'order_created' topic, which the restaurant service consumes to update order details.
- Implemented real-time order state updates through Kafka's publish/subscribe model to keep restaurant and rider services in sync.
- Integrated **WebSockets** for real-time restaurant notifications (e.g., new orders, rider assignments).
- Built a secure "Forget Password" flow using time-sensitive tokens for authentication recovery.
- Implemented robust exception handling and API protection through middleware guards and JWT verification.

- Dockerized all components (frontend, backend, Kafka, Redis, PostgreSQL) and managed them via **Docker Compose**.
- Worked in Agile sprints using **Jira** for task tracking and **Bitbucket** for version control.

Keywords: Java, Spring Boot, gRPC, Kafka, Redis, PostgreSQL, WebSocket, Docker, React.js, Ant Design

Serverless Auction Platform

A capstone project built using AWS, following a microservices architecture with an event-driven, serverless (FaaS) design.

- Architected an event-driven system with independently deployable microservices for auctions, authentication, and notifications.
- Leveraged a full suite of AWS services, including **Lambda**, **API Gateway**, **DynamoDB**, **SQS**, **SNS**, and **SES**.
- Implemented secure, token-based authentication using **JWT** and a custom **Lambda Authorizer**.
- Utilized the **Serverless Framework** for streamlined deployment and infrastructure management on AWS.

Keywords: Node.js, Serverless Framework, AWS Lambda, API Gateway, DynamoDB, SQS, SNS, SES, JWT

Automated AI Shorts Video Creator

An open-source project to automate the creation of short-form videos using a powerful combination of AI tools and workflow automation.

- Orchestrated a video creation pipeline using **n8n** as the central workflow engine.
- Integrated various AI services for script generation, text-to-speech, and content preparation, including **Together AI**, **OpenRouter**, and **ElevenLabs**.
- Containerized the entire stack using **Docker Compose** for one-click local deployment.
- Implemented notifications via **Telegram** to monitor the automation workflow.

Keywords: n8n, Docker, AI, Workflow Automation, Video Generation

Other Projects

E-Commerce Platform – Admin

Cloud-native admin system for managing products, orders, and inventory.

- Developed a Next.js frontend with ShadCN UI, and a backend with Prisma and Supabase.
- Integrated Sanity as a Headless CMS and used architectural patterns like CQRS and the Repository Pattern.

Keywords: Next.js, Sanity CMS, Supabase, Prisma, CQRS

Virtual Me – 3D Animated AI Chatbot

Created an interactive 3D virtual assistant with lifelike animations and AI-driven conversations.

- Integrated Hugging Face (Mixtral) for dialogue and Eleven Labs for TTS.
- Built an immersive 3D interface with React and Three.js.

Keywords: React, Three.js, Node.js, Hugging Face, Eleven Labs

Governance DAO – Token-Weighted Voting DApp

Developed a decentralized governance platform with token-weighted voting using Solidity smart contracts.

- Implemented an ERC-20 token with a faucet system and a VotingDAO contract for proposals and voting.
- Deployed and tested contracts on the Ethereum network using Hardhat.

Keywords: Ethereum, Solidity, Web3.js, Hardhat, OpenZeppelin

Go gRPC GraphQL – Multi-Tenant Microservices

Architected a polyglot, multi-tenant microservices platform with a focus on scalability and unified data access.

- Developed backend services in Go using gRPC and Protobuf for inter-service communication.
- Implemented a GraphQL API Gateway and designed multi-tenant data storage with PostgreSQL and Elasticsearch.

Keywords: Go, gRPC, GraphQL, Protobuf, PostgreSQL, Elasticsearch

PaperMind – AI Research Assistant

Developed a lightweight, RAG-powered platform for intelligent querying of academic papers.

- Enabled PDF uploads and arXiv integration for paper retrieval.
- Designed a LangChain pipeline with ChromaDB and Sentence Transformers for fast, context-aware lookups.

Keywords: Streamlit, LangChain, ChromaDB, Sentence Transformers, Gemini API

RPAL Interpreter – Functional Language Compiler

Engineered a complete compiler and interpreter for the RPAL language from scratch.

- Developed a Lexical Analyzer, AST/ST generator, and a CSE Machine for evaluation.
- Built a robust testing framework with Pytest covering over 168 test cases.

Keywords: Python, Pytest, GitHub Actions, Makefile

Content-Aware Meme Generator

An automated system for generating contextually relevant memes from any URL, leveraging LLMs and the Memegen.link API.

- Orchestrated a multi-step meme generation workflow using LangGraph.
- Utilized Llama 3.3 (via Groq API) for content analysis and text creation.

Keywords: Streamlit, LangGraph, Llama 3.3, Groq

AI Blog Post Generator

A multi-agent system that uses specialized AI agents to generate professional, well-structured, and well-researched blog posts.

- Built with the Agno Framework for its beginner-friendly approach to multi-agent workflows.
- Designed for provider flexibility, with easy switching between OpenAI, Gemini, Claude, and Groq models.

Keywords: Streamlit, Agno Framework, Pydantic

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- Orchestrated a video creation pipeline using **n8n** as the central workflow engine.
- Containerized the entire stack using **Docker Compose** for one-click local deployment.

Keywords: n8n, Docker, AI, Workflow Automation, Video Generation

Certificates (All Credentials)

- **Certified Kubernetes Administrator (CKA)** – KodeKloud, Apr 2025 Skills: Kubernetes, Helm Credential: `https://www.udemy.com/certificate/UC-246987b5-df13-4f9b-a53f-d74d9de0d221/`
- **AWS Certified Solutions Architect – Associate** – Udemy, May 2025 Skills: AWS, DynamoDB, Serverless, Lambda, VPC, CloudFormation, S3, EC2, RDS, Load Balancing, Auto Scaling, Security Groups Credential: `https://www.udemy.com/certificate/UC-b1ef5d20-5c70-472f-a936-96567f299af7/`
- **Implementing Software Architecture for Large-Scale Systems** – Udemy, Apr 2025 Skills: System Architecture, Cassandra, Nginx, GCP, Kubernetes, Docker, Docker Compose, Redis Credential: `https://www.udemy.com/certificate/UC-2a562ca8-a9e3-4ee0-b2c3-e7a432ac4529/`
- **Ultimate DevOps Project Implementation** – Udemy, Apr 2025 Skills: Kubernetes, ArgoCD, Terraform, GitHub Actions, CI/CD Credential: `https://www.udemy.com/certificate/UC-df041293-1840-4aa3-8a`
- **Apache Kafka Series (v3)** – Udemy, Mar 2025 Skills: Apache Kafka, Event-Driven Architecture Credentials: `https://www.udemy.com/certificate/UC-ec3b908f-9983-4510-bdb1-bc1fb5567a2d/`, `https://www.udemy.com/certificate/UC-6c2275bc-4236-441a-9cb6-de7ada31a3c8/`, `https://www.udemy.com/certificate/UC-1e1e34e9-0ba4-4c9d-bf10-3b5b16ee6f10/`
- **Advanced OAuth Security** – Udemy, Mar 2024 Skills: OAuth 2.0, JWT, API Security Credential: `https://www.udemy.com/certificate/UC-57aa3ba1-44be-4d7d-ab4b-e232f489411d/`
- **Hugging Face Agents** – Hugging Face, May 2025 Skills: AI Agents, RAG, LLM, LangChain, Vector Databases
- **Functions, Tools and Agents with LangChain** – DeepLearning.AI, Dec 2024 Skills: AI Agents, RAG, LLM, LangChain, Vector Databases Credential: `https://learn.deeplearning.ai/accomplishments/ff5ea4aa-efb5-4707-a786-f1fdeacece00?usp=sharing`
- **Prompt Engineering with LLaMA 2 & 3** – DeepLearning.AI, Dec 2024 Skills: Prompt Engineering, LLaMA Credential: `https://learn.deeplearning.ai/accomplishments/a5c92d11-faf8-4a76-8d70-6f20a167usp=sharing`
- **Web3 Development Essentials** – Udemy, Jul 2025 Skills: Web3, Ethereum, Solidity, Smart Contracts Credential: `https://www.udemy.com/certificate/UC-270e9bc1-f944-4e12-ab56-07a125d3b401/`

Skills

Languages: Java, Go, Python, TypeScript, Solidity, Node.js
Backend: Spring Boot, Spring Cloud, Spring Security, Express.js, Gin, Hibernate, Resilience4j
Frontend: React, Next.js, React Native, Ant Design, ShadCN UI, Three.js, Vite
APIs & Protocols: REST, GraphQL, gRPC, tRPC, WebSockets, Protobuf, JWT, OAuth 2.0, Kong
Generative AI: LangChain, LangGraph, Agno Framework, RAG, LLMs (Gemini, Llama 3.3), Hugging Face, Groq, Eleven Labs, Vector DBs (ChromaDB), Sentence Transformers, Streamlit
Databases & Caching: PostgreSQL, MySQL, Oracle DB, Oracle SQL, DynamoDB, Redis, Elasticsearch, Cassandra, Couchbase, Supabase, Prisma
Cloud & DevOps: AWS (Lambda, API Gateway, SQS, SNS, SES), OCI, Docker, Docker Compose, Kubernetes, Helm, Terraform, ArgoCD, GitHub Actions, Jenkins, Serverless Framework, Nginx, Nexus, GHCR, Certbot, DuckDNS
Messaging: Kafka, Kafka Streams, RabbitMQ
Blockchain: Ethereum, Solidity, Hardhat, Web3.js
Tools & Concepts: Git, System Design, Distributed Systems, Microservices, Event-Driven Architecture, Jira, JMeter, Gatling, Gradle, Ant, Confluence, Bitbucket, Pytest, Makefile, Postman, Pydantic, Beautiful Soup, FFmpeg, Rhubarb, JSON, CLI

References available upon request.