

NIRMA UNIVERSITY
INSTITUTE OF TECHNOLOGY
COMPUTER SCIENCE ENGINEERING
PROJECT ACTIVITY REPORT (PAR)

PAR No - 2

NAME OF THE STUDENT : Kaif Imranuddin Munshi

ROLL NO. : 22bce517

NAME OF THE COMPANY : Grus & Grade Pvt Ltd

Summary

Week 1 :

- During the First week, we were mostly occupied in the Induction Programme meant for the Interns & some Mandatory training that were required.

Week 2 :

- During the Second Week, we were assigned the training in which some of the new technologies and some of the existing ones which we learned during our B-Tech and were required to brush up on that.

Week 3 :

- During the third week, we were required to complete non-technical training on the company's portal, which is mandatory for all new joiners. This training provided a comprehensive overview of the company, including operational risk training, industry overview, clients, and products.

Week 4 :

- During the fourth week, technical learning was structured based on the Microservices domain and MERN Stack assigned to each intern. A designated learning path was provided, which needed to be followed as part of the training. This learning path covered the tools and technologies used by our team for microservices-based product development. To assist us, the reporting manager assigned a buddy or mentor to address our queries.

My training specifically included concepts of Microservices Architecture, Docker, Kubernetes, API Gateway, Event-Driven Architecture with RabbitMQ/Kafka, React.js, Node.js (Express.js), MongoDB, and Terraform for infrastructure as code.

Week 5 :

- During the fifth week, I focused on in-depth research and analysis of IoT-based automated poha handling. I studied existing food handling automation systems and explored IoT integration techniques for real-time monitoring. The research covered key components such as load cells, HX711 amplifiers, NodeMCU ESP8266, and motor drivers. Additionally, I analyzed the workflow of poha collection, weight measurement, and automated transfer using a conveyor system. This research provided a solid foundation for designing the system architecture.

Week 6 :

- In the sixth week, I worked on finalizing the hardware and software requirements for the system. I selected load sensors, motorized bucket mechanisms, and cloud-based monitoring platforms such as Blynk or Arduino Cloud. I also started designing the system flow diagram, ensuring smooth automation of weight detection, bucket transfer, and unloading. The IoT platform selection was finalized to enable real-time data transmission and remote monitoring. This week laid the groundwork for prototype development in the upcoming weeks.

Week 7 :

- During the seventh week, my project topic is the Vehicle Rental System. I have researched the system requirements and, based on my findings, shortlisted the features to implement. I will use microservices in the backend for different services. Additionally, I am preparing the database schema to support the system architecture. The technologies I will use include:
 - Backend: Node.js (Express.js), MongoDB, RabbitMQ/Kafka, Redis
 - Payment Integration: Razorpay
 - Frontend: React.js
 - Containerization: Docker

Week 8 :

- During the seventh week, the focus was on implementing the backend microservices and ensuring inter-service communication. The User Authentication Service was finalized, using JWT for secure authentication and bcrypt for password encryption. Alongside this, a Vehicle Management Service was developed, enabling CRUD operations for vehicles, and a separate Inventory Management Service was implemented to track vehicle availability dynamically. To enhance system responsiveness, Redis caching was integrated for frequently accessed data, reducing database load. RabbitMQ/Kafka was introduced for event-driven communication, allowing microservices to remain independent yet synchronized in their operations.

Week 9 :

- The eighth week was focused on integrating payment processing and handling vehicle bookings. Razorpay was implemented as the payment gateway, enabling users to make secure transactions. A Booking Service was created to manage reservations, ensuring real-time vehicle availability checks before confirming a booking. Webhook listeners were set up to handle payment status updates, ensuring that bookings are confirmed only after successful transactions. Additionally, transaction consistency mechanisms were enforced using message queues and database transactions, preventing booking failures due to unexpected errors.

Week 10 :

- In the ninth week, development efforts shifted towards building the Admin Panel Service and strengthening backend security. The Admin Service was designed to allow administrators to approve vehicle listings, manage bookings, and monitor payments. The API Gateway was introduced, acting as a central point for managing requests between microservices. Furthermore, security enhancements were implemented, including rate limiting, CORS policies, and API authentication layers to prevent unauthorized access. Load testing and performance optimization were also carried out, ensuring that the backend could handle high concurrent requests.

Week 11 :

- The final phase of development, during the tenth week, was dedicated to deployment and final testing. The backend microservices were containerized using Docker and deployed on AWS/GCP using Kubernetes for scalability and fault tolerance. End-to-end testing was conducted to ensure seamless integration between all services, and bugs were identified and fixed before deployment. Additionally, comprehensive documentation covering API endpoints, database structures, and system architecture was prepared. This documentation will serve as a reference for future maintenance and enhancements.

Working Approach:

During the term of our internship, we would be required to attend daily standup meetings in which we would be required to showcase the work we did for the day & what we would be doing for the next day. During this meeting, the doubts regarding our training and project are also being cleared.

Sign of Engineer In-charge / Project

Date: 15 Mar 2025