

# BaseMint – Online Coding Platform

## 1. Introduction

BaseMint is an Online Coding Platform designed to help learners master the fundamentals of programming languages by solving structured coding problems. The platform focuses on concept clarity, hands-on practice, and progressive learning through problem-solving.

## 2. Project Objectives

The objective of BaseMint is to help learners master programming fundamentals through regular practice in an interactive coding environment. The platform encourages logical thinking and problem-solving while tracking user progress and growth. It also provides a competitive yet beginner-friendly experience to motivate continuous learning.

- Provide a platform to master programming fundamentals through practice
- Enable users to solve coding problems in an interactive environment
- Encourage logical thinking and problem-solving skills
- Track user progress and learning growth
- Create a competitive yet beginner-friendly learning experience

## 3. Technology Stack

| Layer          | Technology       | Purpose                                    |
|----------------|------------------|--|
| Frontend       | React.js         | User interface and client-side interaction |
| Backend        | Java Spring Boot | Business logic and REST API handling       |
| Database       | PostgreSQL       | Persistent data storage                    |
| Authentication | JWT              | Secure user authentication                 |
| Design Tool    | Excalidraw       | System design and architecture diagrams    |

## 4. System Architecture

The system architecture of **BaseMint** follows a **three-tier architecture** that ensures separation of concerns, scalability, and maintainability. The frontend handles user interaction, the backend manages business logic, and the database is responsible for persistent data storage. The overall workflow of the system is illustrated in the architecture diagram below.

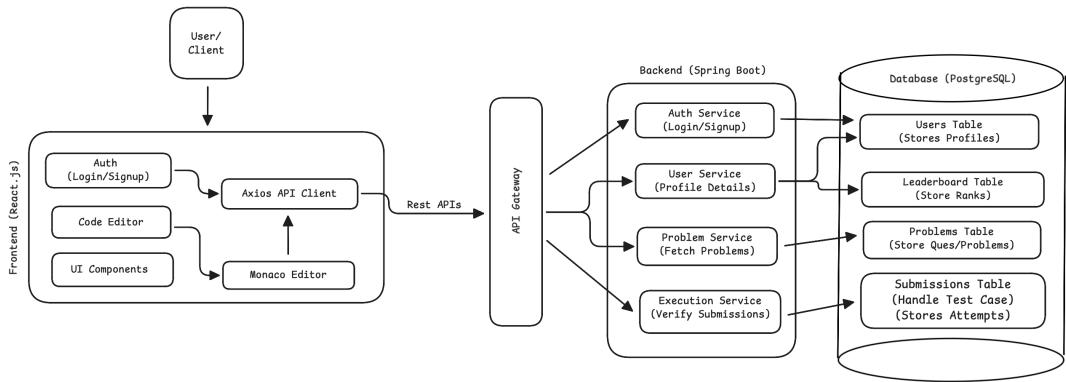


Fig. High-Level System Design

- User interacts with the platform via the React.js frontend
- Frontend communicates with backend using REST APIs
- Backend processes requests and interacts with PostgreSQL database
- Responses are sent back to the frontend

## 5. High-Level Design – Frontend Modules

- i. - Authentication Interface → Login and registration screens
- ii. - Problem Browsing Interface → Displays problem lists and details
- iii. - Code Editor Interface → Allows users to write and test code
- iv. - Submission & Result Interface → Shows results and progress

## 6. High-Level Design – Backend Modules

- i. - Authentication & User Service → Manages user login, signup, and authorization
- ii. - Problem Management Service → Handles creation and retrieval of coding problems
- iii. - Code Execution Service → Executes and evaluates user-submitted code
- iv. - Submission Management Service → Stores submissions and results
- v. - Leaderboard Service → Calculates scores and ranks users

## 7. Database Entities

- i. - User → Stores user account and profile information
- ii. - Problem → Stores coding problems and difficulty levels
- iii. - Test Case → Stores inputs and expected outputs
- iv. - Submission → Stores user attempts and execution results
- v. - Leaderboard → Stores user scores and rankings

## **8. Future Enhancements**

In the future, BaseMint can be enhanced by supporting multiple programming languages to cater to a wider range of learners. The backend architecture can be evolved into a microservices-based design to improve scalability and maintainability. Performance can be further optimized by implementing caching mechanisms for faster data access and asynchronous code execution for handling heavy workloads efficiently. Additionally, deploying the platform on cloud infrastructure will ensure high availability, reliability, and better scalability as the user base grows.

- Support for multiple programming languages
- Microservices-based backend architecture
- Caching for faster data access
- Asynchronous code execution
- Cloud-based deployment

## **9. Conclusion**

BaseMint aims to provide a strong foundation in programming by encouraging consistent practice and problem-solving. With a clean architecture and modular design, the platform is scalable, beginner-friendly, and capable of evolving into a complete coding learning ecosystem.