

CODENEST: Where Coders Grow and Build

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Abstract –

Domain: Web Development.

Subdomain: Web Development, EdTech

Problem Statement: Many learners struggle to find an engaging, structured platform that allows them to grow as coders while building practical skills. Traditional coding practice websites focus only on problem-solving, lacking personalized feedback, project-building, and AI-based learning paths.

Solution: Codenest is a web-based AI-powered platform designed to help coders grow by solving problems, receiving personalized recommendations, and building projects. It provides a live compiler, AI-driven challenge suggestions, and performance analytics. Codenest encourages growth through coding contests, interactive challenges, and community collaboration.

Key Words: Coding Platform, Artificial Intelligence, Adaptive Learning, Web Application, Skill Development, Online Judge, EdTech

1. INTRODUCTION

In today's fast-paced technological era, coding has become one of the most essential skills for innovation, problem-solving, and career advancement. Programmers, from beginners to professionals, continuously strive to refine their coding abilities, explore new technologies, and keep up with industry trends. However, the journey of learning to code effectively often comes with challenges. Most existing coding platforms focus primarily on competitive programming and ranking based problem-solving, which can sometimes limit a learner's broader understanding of coding concepts, collaboration, and real-world software development.

Many aspiring developers face difficulties in identifying learning paths suited to their skill level, understanding where they stand, and tracking their progress over time. Moreover, these platforms rarely provide detailed or adaptive feedback that helps learners improve conceptually rather than just syntactically. As a result, the overall learning experience remains fragmented and less personalized.

To overcome these challenges, Codenest has been designed as an innovative and adaptive platform that bridges the gap between learning, practice, and practical implementation. The name "Codenest" reflects the vision — a nest for coders where they can grow, collaborate, and build. The system aims to create a nurturing environment that not only enhances coding skills through structured problem-solving but also promotes project-based learning and peer collaboration. Codenest integrates advanced technologies such as Artificial Intelligence (AI) and Machine Learning (ML) to provide users with personalized recommendations, AI-driven feedback, and adaptive challenge suggestions based on individual learning patterns. The platform supports real-time code execution, allowing users to instantly test their logic, analyse performance, and optimize their solutions. Furthermore, Codenest encourages learners to move beyond isolated challenges by engaging in collaborative projects, fostering teamwork, communication, and creativity — essential skills for real-world software development.

2. LITERATURE REVIEW

Online coding platforms, also known as Online Judge (OJ) systems, play a crucial role in improving programming and problem-solving skills. These systems allow users to write, compile, and execute code against predefined test cases, providing immediate feedback. Research shows that such platforms enhance learning through **hands-on practice and iterative improvement**.

Existing platforms like LeetCode, HackerRank, and SPOJ provide large problem sets and support multiple programming languages. However, they often focus more on competitive programming rather than structured learning for beginners.

Recent studies highlight the importance of **problem sequencing, difficulty management, and learning analytics** to improve user understanding. Many modern systems also incorporate tracking of user progress and performance to personalize learning experiences.

CodeNest is designed to address these gaps by providing **structured problem sequences, solution linking, and a learning-focused environment**. It combines the strengths of existing platforms while emphasizing clarity, accessibility, and guided learning.

3. PROPOSED SYSTEM ARCHITECTURE

The proposed system utilizes deep learning and computer vision techniques to automatically detect plant

leaf diseases from uploaded images. It is implemented as a desktop web application that identifies the disease and provides corresponding precautionary measures.

3.1 Architecture



Fig -1: System Architecture Diagram

3.2 Block Diagram

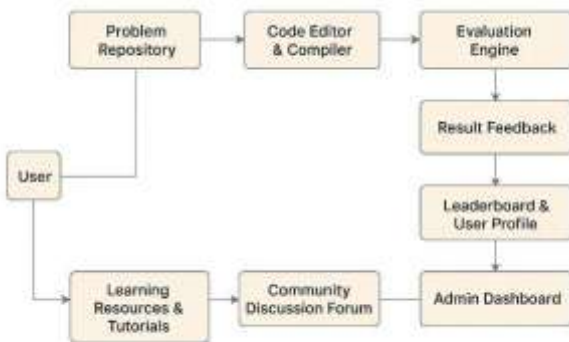


Fig - 2: Block Diagram

Architecture Overview:

1. Frontend Built with ReactJS for an interactive interface.
2. Backend Node.js and Express for scalable APIs.
3. AI Engine Python-based recommendation system using user performance data.
4. Database MongoDB for user progress tracking. Features:
 - AI-driven problem recommendations.
 - Real-time compiler supporting multiple languages.
 - User analytics with difficulty progression.
 - Coding contests and collaborative projects.

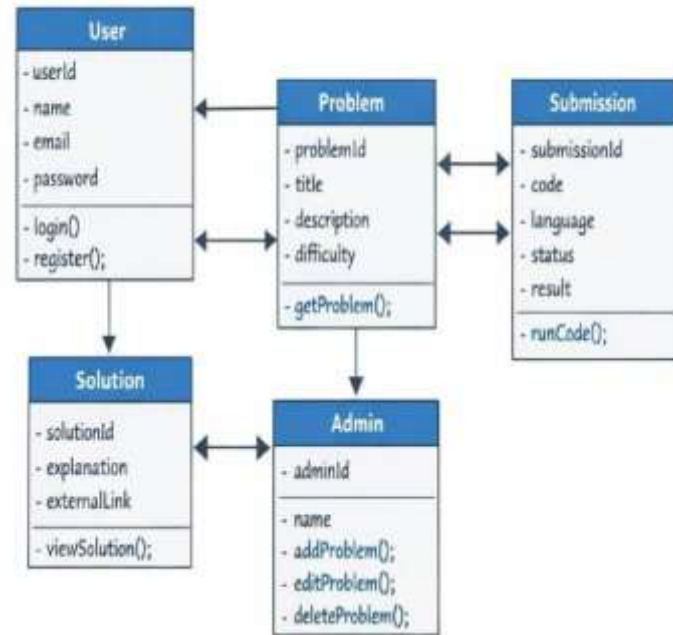
4. METHODOLOGY

Represents functional requirements of a system
Shows interaction between actors (users) and the system

5. TECHNOLOGY STACK

we are using the following technologies in our project.

CodeNest Class Diagram

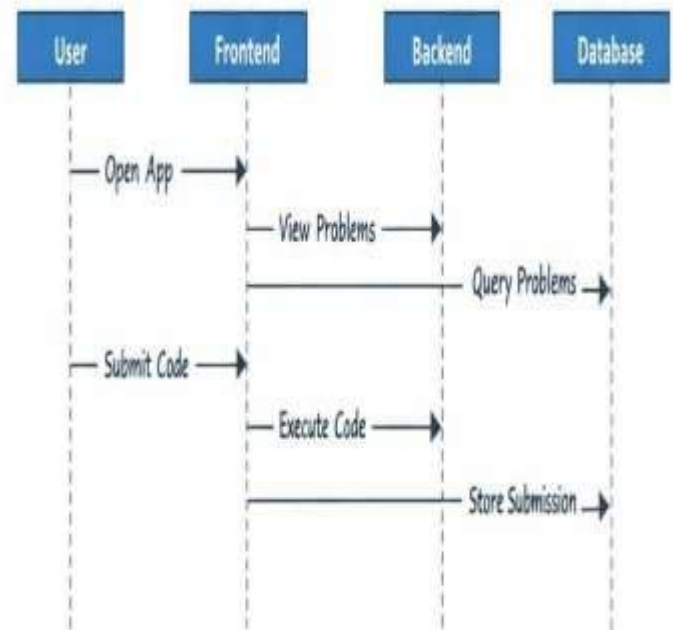


Consists of actors, use cases, and relationships

Actors are external entities like User, Admin

Use cases are system functions like Login, View Problems

CodeNest Sequence Diagram

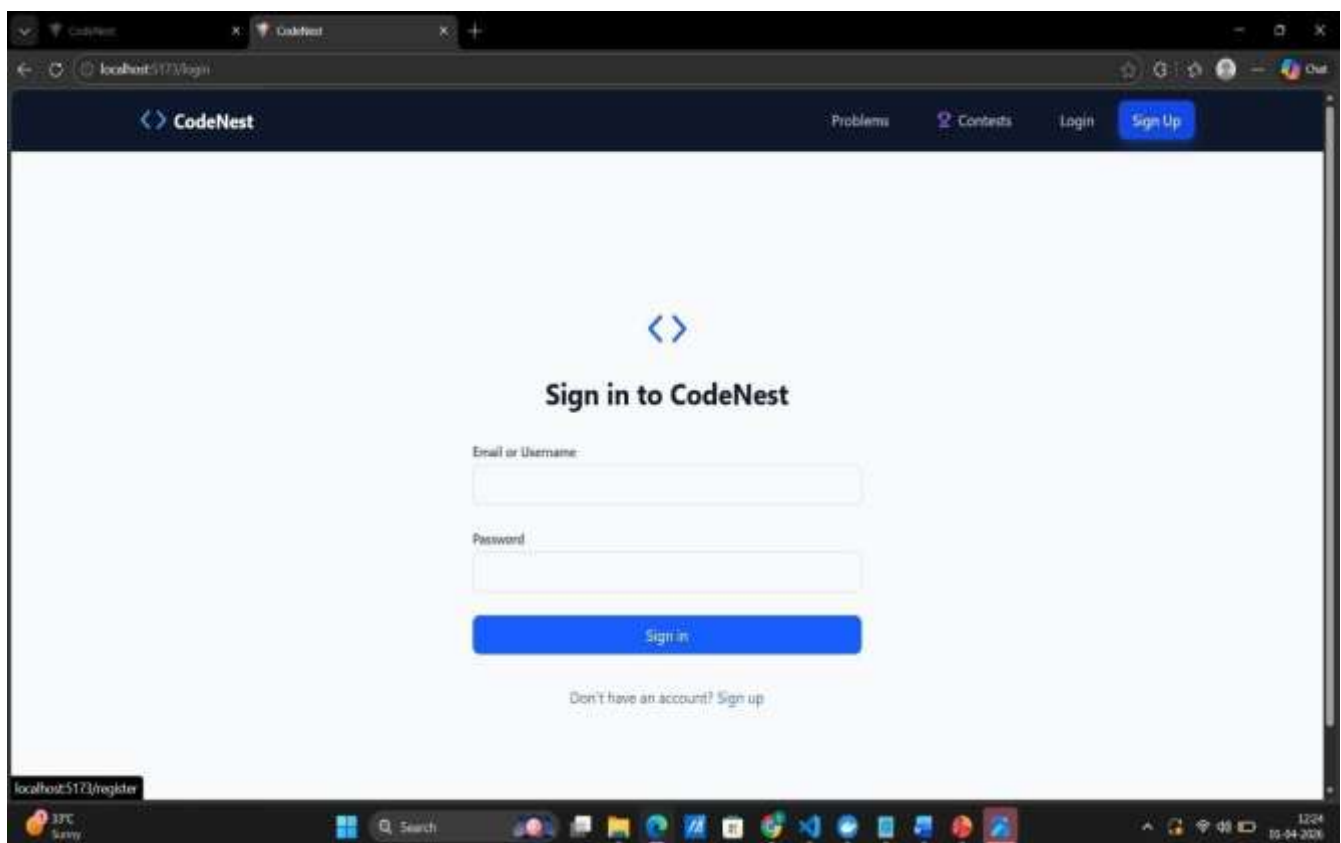
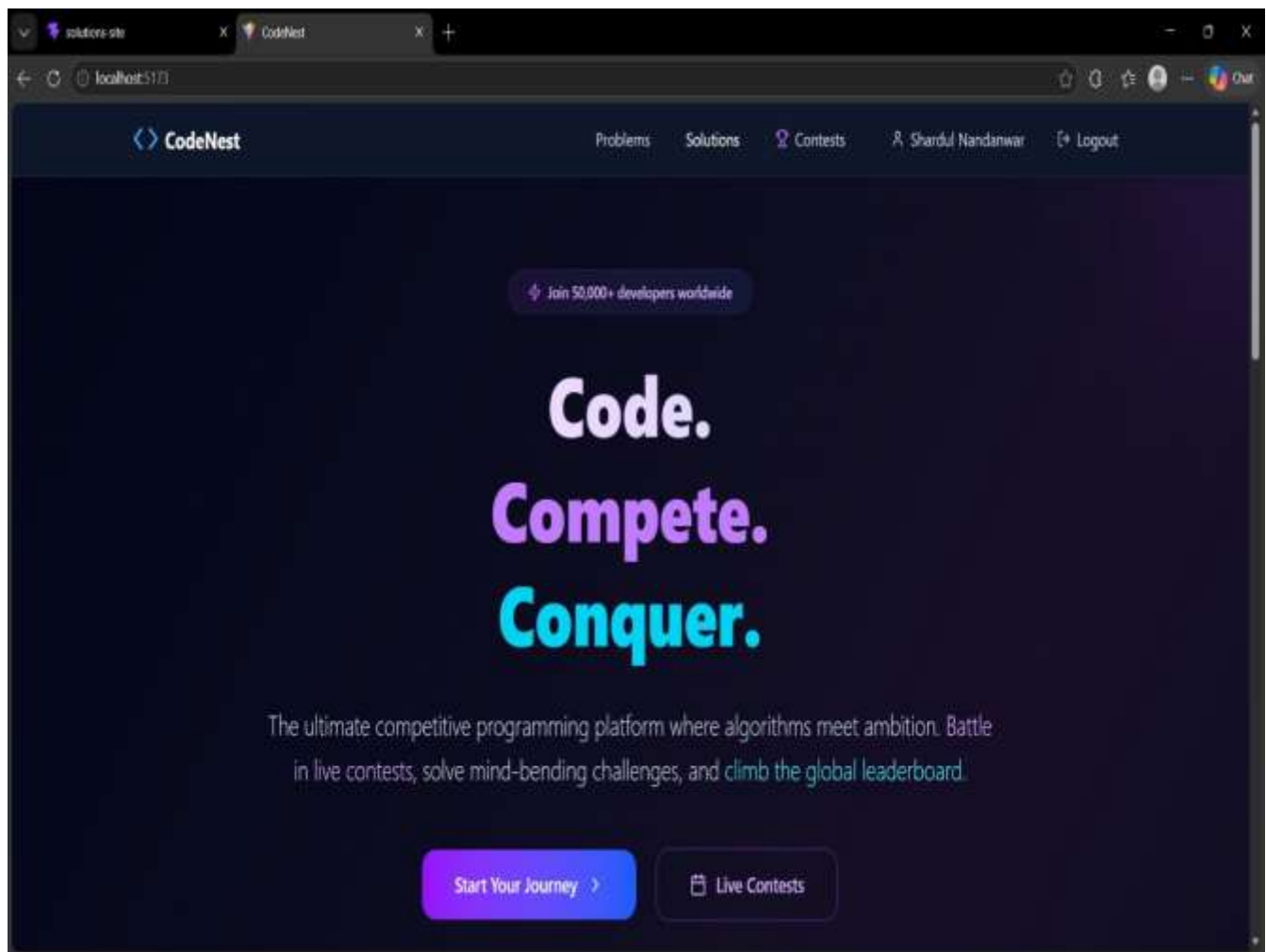


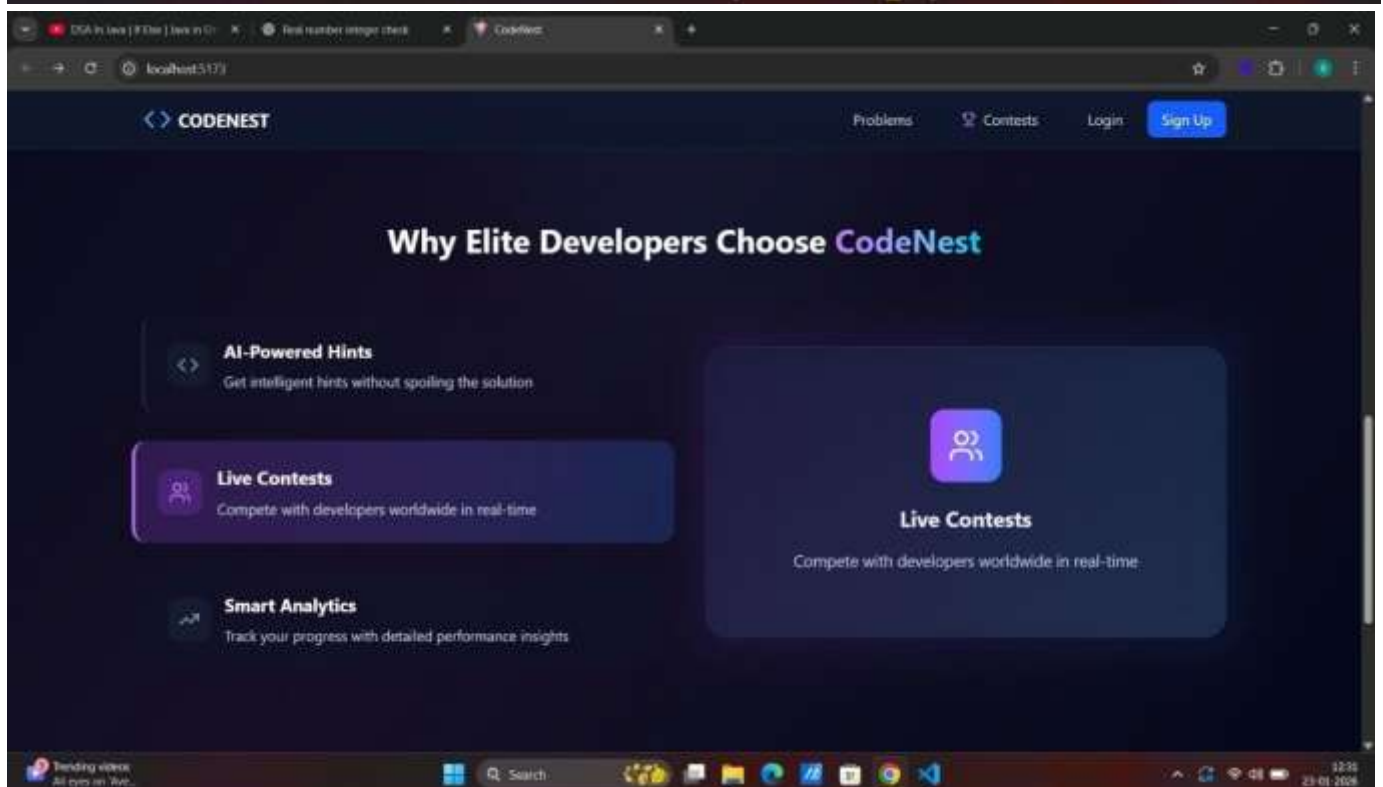
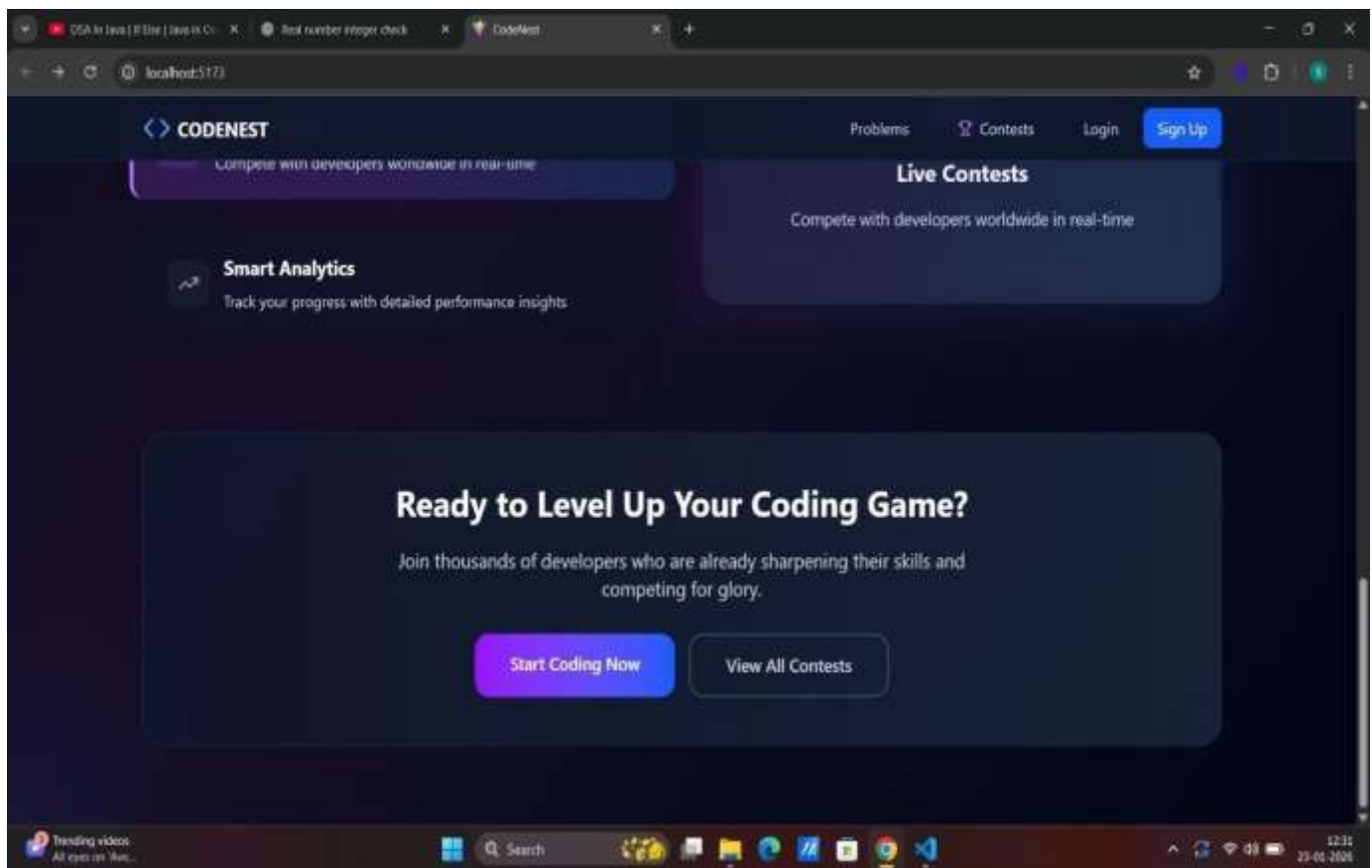
Layer / Category	Technology Used
Frontend	HTML, CSS, JavaScript, React
Backend	Node.js
Database	MySQL
ORM	Prisma

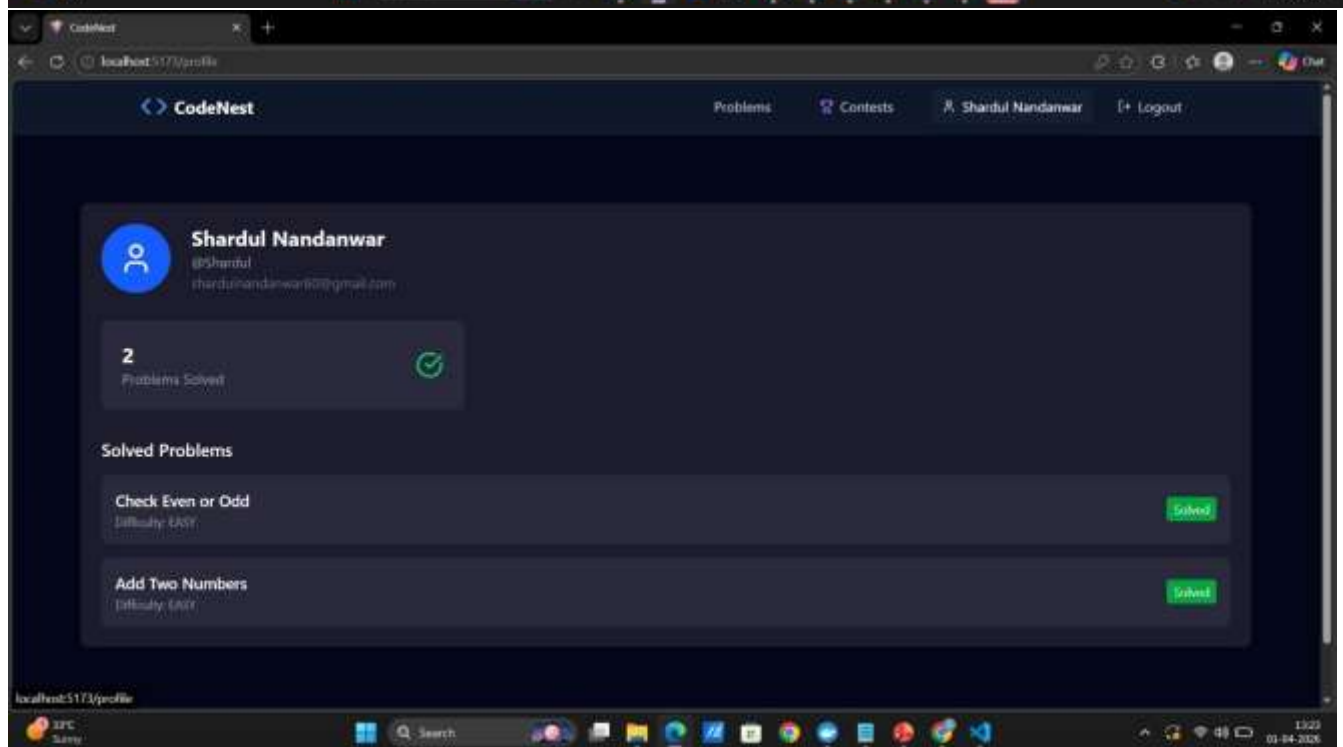
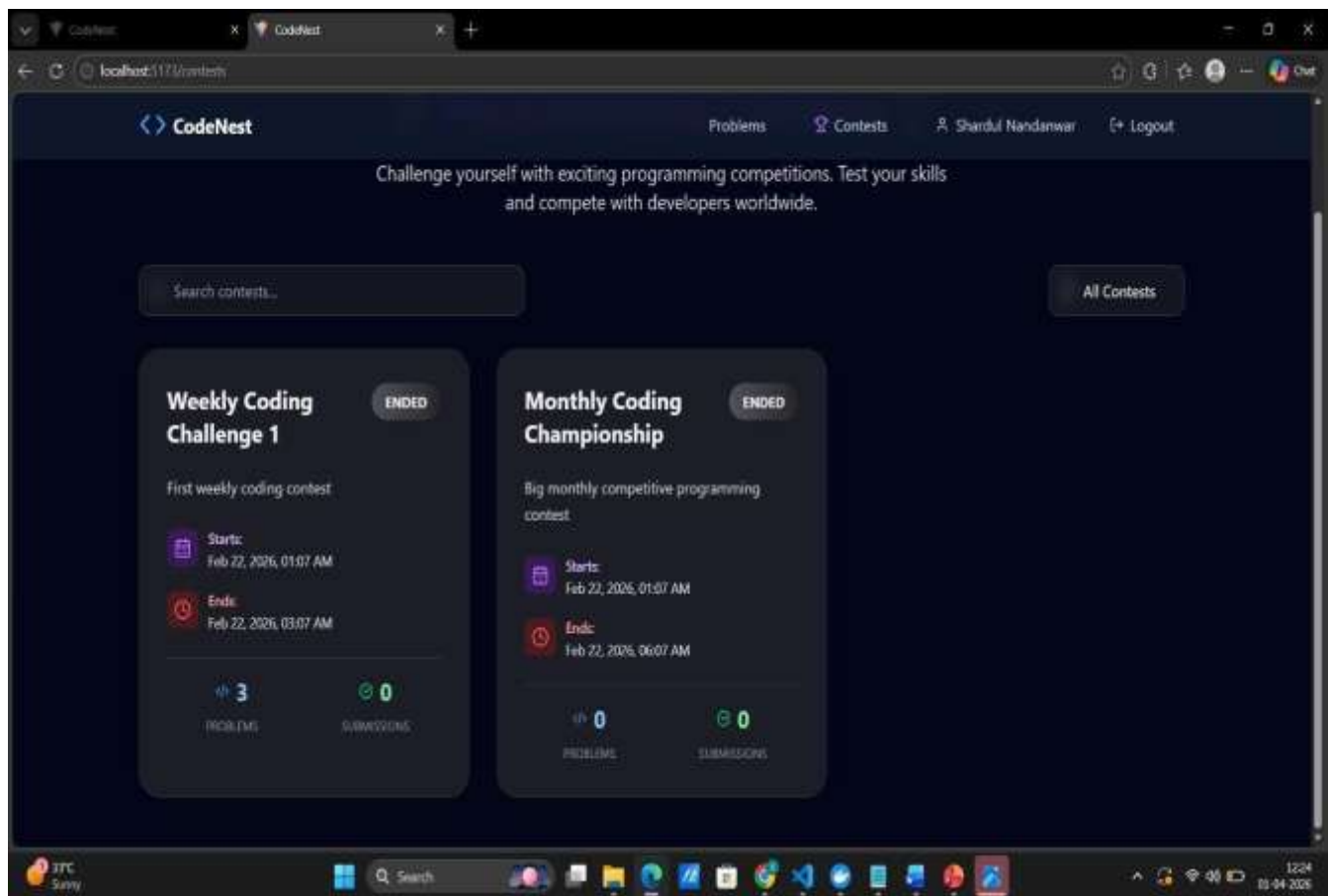
6. OUTCOME

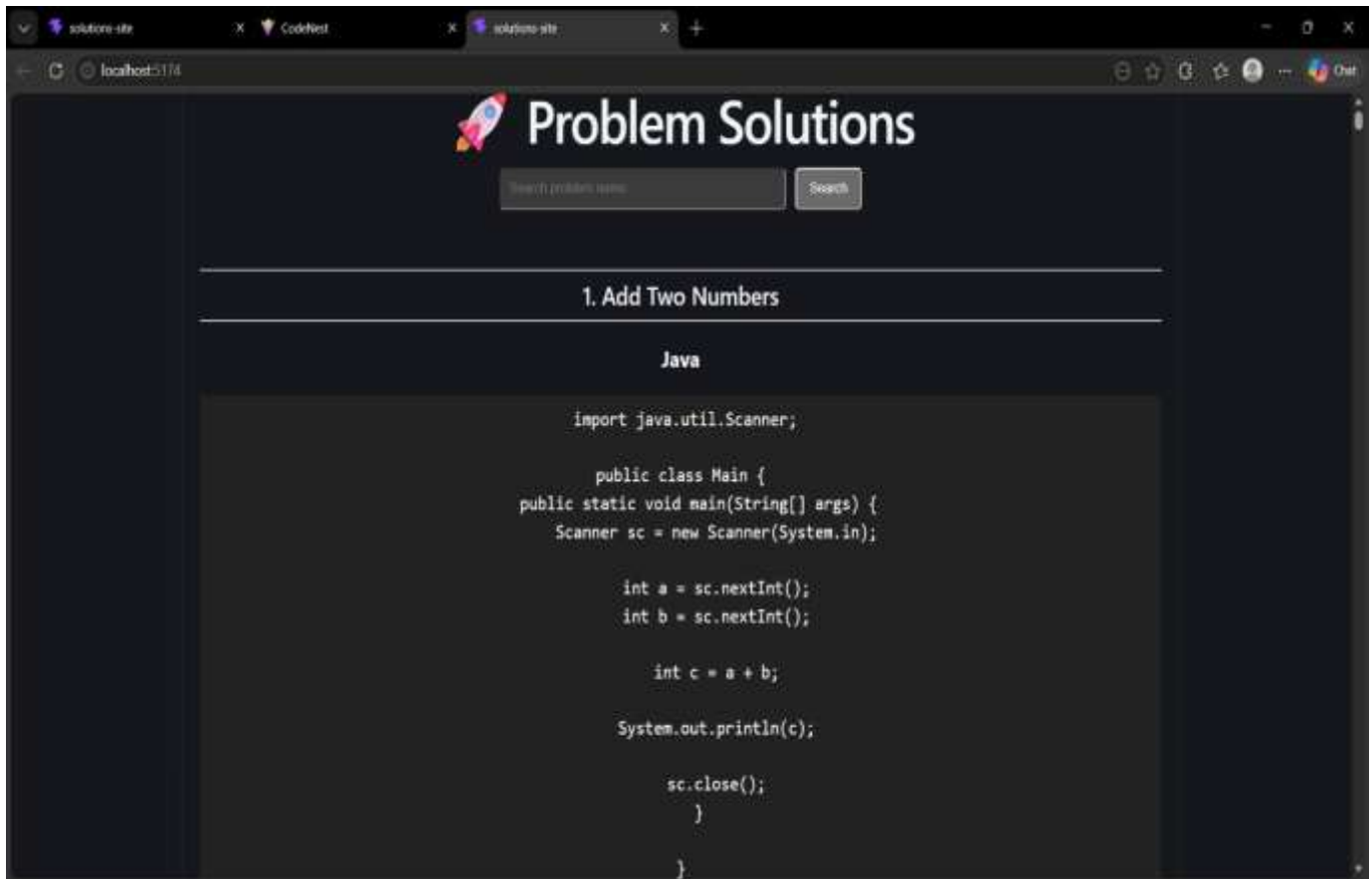
Key Features:

- **Problem Listing** – Displays coding problems in a structured sequence
- **Code Submission** – Users can write and submit code solutions
- **Solution Viewing** – Access detailed solutions for each problem
- **External Link Integration** – Solutions can include links to reference pages
- **User Authentication** – Login and registration system









7. CONCLUSION

The Codenest successfully demonstrates how AI and adaptive learning can transform the developer education ecosystem. By providing a personalized and collaborative environment, Codenest enables coders to grow, build, and engage more meaningfully. The platform focuses not only on solving coding problems but also on shaping developers for real-world challenges.

8. REFERENCES

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