ONLINE JUDGE

The core problem statement that we have is to develop a platform where programmers tackle algorithmic challenges by writing code in multiple programming languages. Users submit their solutions, which are subsequently compiled and evaluated against predefined input/output benchmarks to assess their accuracy. Based on these test results, participants receive scores. The platform offers immediate feedback on code execution, aiding programmers in enhancing their problem-solving abilities and understanding of algorithms. Examples include Codechef, Leetcode, Hackerearth etc.

Features

- User can set alarm for upcoming contests and get notified for it.

- They can register for it till half an hour into the contest.

- They can submit their code directly by writing code in editor or submit a file from local device

- They will be able to see a leaderboard at all times .

- They will have the option of letting go of some points to get hints for solution.

- They will have the option of attempting the contest as a virtual contest after the contest has ended.

- They will be provided with testcases they are failing on after the contest is done.
- They will have the option of sharing their progress on Linkedin.

PROBLEMS

- A user can overwhelm the server by repeatedly submitting the same code, potentially causing a denial of service.
- High traffic during peak times can lead to slow response times or server crashes.
- Users may attempt to cheat by copying solutions from others or using unauthorized resources.

SOLUTIONS

- Prior to processing a new submission, verify if the identical code has been recently submitted by the same user. If a duplicate submission is found within a short timeframe, either reject the duplicate or place it in a queue for delayed processing
- To avoid traffic issues we can give them access to clone websites. For eg. Codeforces often faces this issue and deals with it the same way.
- There are various algorithms on internet to detect the similarity of codes.We will use them to deal with it.

HIGH LEVEL DESIGN

Frontend

The Home Page serves as the landing page and features a navigation bar with links such as Log In/Sign Up, ProblemSet, and Contest buttons, among others. This page introduces users to the platform and provides quick access to the main sections.

The Login Page allows users to enter their credentials to access their accounts. It includes a login form with fields for email and password, a Log In button, and a link to the Sign Up page for new users who haven't registered yet.

The Sign Up Page is designed for new users to register by providing their personal details. It includes a sign-up form with fields for name, email, password, confirm password, and an optional referral code input. There is also a Sign Up button to complete the registration process.

The Contest Page displays ongoing and upcoming contests along with their details. Users can view a list of contests, each showing the contest name, date, time, and a registration button if applicable. There are also links to detailed contest information and the associated problems.

The ProblemSet Page lists all the available problems that users can attempt to solve. Each problem entry displays the problem name, difficulty level, relevant tags, and a link to the specific problem page for more details and to submit solutions.

The Specific Problem Page provides detailed information about a particular problem. It includes the problem statement,

constraints, input/output format, and sample inputs/outputs. Users can select their preferred programming language from a dropdown menu and write their code in a provided code editor. This page also features Run and Submit buttons to execute and submit the code, respectively. Additionally, there are sections for custom input, displaying output, and showing the verdict of the code submission (e.g., Accepted, Wrong Answer, Time Limit Exceeded).

BACKEND

The backend will manage user authentication and determine whether they are signed in or not.

Backend verifies credentials creates a session for the user and redirects to user dashboard.

For signup page it makes a new user record if not already signed up.

Lists and notifies user of the upcoming contests.

Provides problem details and manage user submissions

They handle code submissions and run code against test cases if output is same they pass else fail

DATABASE

User:

User ID: String

Email: String

Password: String

Full Name: String

Problem :

Problem ID: String

Name: String

Statement: String

Editorial: String

Difficulty: String

TestCases:

TestCase ID: String

Problem ID: String

Input/Output: String

Submission:

User ID: String

Problem ID: String

TestCase ID: String

Code: String

Verdict: String

Language: String

Submission Time: Date

Execution Time: Number (ms)

Memory Used: Number (KB)

PLAGARISM

We can use inbuilt libraries machine learning models.

TLE AND MLE

We have set time limits and memory limits for each problem.