

DATABASE PROJECT - COMPETITIVE CODING PLATFORM

Project Scenario Description

Group Members:-

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Objective:

Our aim is to implement a database for an online competitive coding (programming) platform where users can solve coding challenges, participate in contests, and contribute with problems and solutions. The platform will support multiple programming languages and maintain user rankings based on performance.

Application Users :

1. Unregistered User
2. Logged-In User
 - a. Coder
 - b. Contributor

(Note: We are now treating coders and contributors as separate entities to discuss each category's use case. However, any user may fulfill both roles)

3. Admin

Use Cases - Unregistered Users

Unregistered users are those who visit the coding platform without creating an account or logging in. They have **limited access** to platform features but can still explore some functionalities.

1. **Browsing problems** - Can view problem statements, constraints, and sample test cases.
2. **Searching problems** - Can search problems via title, tags, difficulty level , contributor, and contest name (user cannot submit or run code as they are not registered.)
3. **Viewing Leaderboards, Contests, and Rating** - Can see past contest results, leaderboards of competitions and rating charts.
4. **Registering / Signing Up** - Can create an account to unlock more features (like submitting solutions, participating in contests, and tracking progress).

Use Cases - Logged In Users

This refers to the users who have created an account and are using the platform with their account logged in.

A) Use Cases - Coder

1. Register (Sign-Up) => Profile Creation
2. Edit Profile
3. Viewing profile
4. Search and view Problems
5. Add Solution(s) to problems
6. View Status and other submissions(Track progress)
7. Add problem to favourites
8. Participate in contest
9. View checklist
10. View Leaderboard
11. View Rating

(Blogs, Talks and discussions can also be considered.)

Register (Sign-Up)

Both coders and contributors must register (or create a profile) to work on the platform. Registration includes entering name, id, email, phone number and password. The id remains unique throughout the users. Editing profile is also permitted.

Moreover, users can view profiles of other users showing contributions, submissions, contests, last time the site was visited and other details

Problems & Solutions

Coders can search and view problems by problem no., name and sort/select them by difficulty, no. of successful submissions, tags and contests.

They can further add and submit solutions to the problems in any language.

(Note: The verification and correction of the uploaded solution will require a compiler, which is out of our scope of DBMS. Thus, we have assumed that this part is performed by an external component. And we, as admin, will just upload the solution status: 'accepted' or 'rejected' as input, based on the result given by the compiler on test cases.

We can display the test case results to the coder, provided to us by the compiler.)

Track Progress

The users can track progress by viewing submission status showing whether the submitted solution is accepted or not, including runtime, memory, timestamp, language and other specifics.

A list of all previous submissions made and contests participated in by the user is also maintained.

They can also view the statistics of submissions made by other users.

Favourites

They can add the problems they wish to refer later to the Favourites section.

Contests

Coders can participate in contests (solve the questions) and view the leaderboard also.

Rating

The entire rating table can be viewed with user name, rank, number of participations and can be sorted (and displayed) based on country and organization.

Checklist

Coders can list all the problems which they aim to do on a daily basis.

B) Use Cases - Contributor

A contributor is a registered user who submits coding problems and/or solutions to the platform.

1. Contributor Registration & Approval from admin
 2. Submitting a New Problem
 3. Track problems
 4. Modify and edit problems
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1. **Contributor Registration & Approval from admin:** Users must **apply** to become contributors. They provide details like: name , email , rank , id and other relevant details.
 2. **Submitting a New Problem:** Can create a problem by providing: title, problem statement , difficulty level , tags , time and space constraints , sample test cases and other specifics.

3. **Track problems** Can see how many users attempted the problem and also the success rate which tells percentage of accepted submissions.
4. **Modify and edit problems** Can modify problems before approval or after contests end but cannot edit problems after they go live in active contests.

Use Cases - Platform Admin

1. Manage Users
2. Manage Problems
3. Moderate Discussions
4. View Platform Statistics
5. Manage leaderboard
6. Ban or Restrict user
7. Manage Contests

1. User Management: This refers to overall management of all user accounts by the admin of the website like - view, update, or delete user accounts.

2. Problem Management: Refers to - add, update, or delete coding problems.

3. Submission Analysis: Admin can view statistics on submissions (e.g., acceptance rate per problem).

4. Discussion Moderation: Admins can manage discussions to avoid any inconvenience caused to/by users.(e.g., delete inappropriate comments).

5. Leaderboard Updates: Admin recalculates and updates rankings based on user activity.

6. Ban or restrict users : Admins can temporarily suspend or permanently ban users violating guidelines.

7. Managing contests: Admins can create, schedule, or cancel coding contests and set visibility rules for problems.

Tentative list of reports (Queries)

For Unregistered Users:

1. They can find problems by giving these parameters such as difficulty, tags, or title & level.

Registered Users (Coders):

1. View Favorites
2. View problems
3. View solutions
4. View Contests
5. View checklist
6. View Discussions
7. View Submissions
8. View Leaderboard
9. View profile
10. View Rating chart

(All can be displayed based on their particular respective attribute requirements entered by user)

For Contributors:

1. View Uploaded Problems
2. View Solutions
3. View submissions to problems along with the submitter
4. Edit problems and solutions

For Admin:

1. Problem & User Management
2. Submission Analysis (both Total and user-wise)
3. Discussion Moderation
4. Leaderboard Updates
5. Viewing user profiles
6. Delete Users
7. Managing Contests
8. Daily/Weekly/Monthly/Annual Users
 - - can be sorted based on ranking, submissions, country and so on.