CS353 - DATABASE SYSTEMS

PROJECT PROPOSAL

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GROUP NO: 15

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Web Page

Problem Statement

Description

For our project, we will design an online coding platform. In the platform, there will be coding and non-coding challenges and contests. Contests will consist of challenges. Challenges will have a difficulty level between 1 to 5 and they can have categories such as subjects (arrays, recursion, object design, etc.) and languages (Java, Python, C++, etc.). A user who solves a challenge correctly will earn points based on the difficulty level of the challenge. The solutions will be assessed by comparing the correct output with the submission output for every test case. If every test case passes, the solution will be counted as correct.

The platform will enable the users to prepare for technical interviews since it will include coding contests, coding and non-coding challenges and also attend contests of companies. It will also give the opportunity of organizing, announcing or sponsoring contests to companies.

By using the system, users will be able to make submissions to challenges and earn points by doing so, like or dislike challenges, comment on challenges, participate in contests, see their rank in the weekly leaderboards, and get notifications when a company invites them to a contest. Users will be sorted based on the points they earn that week in weekly leaderboards.

Editors will be able to create challenges and assign them categories and difficulty levels, add test cases, add categories to the system, organize contests, and verify companies on the system.

Companies will be able to create challenges and assign them categories and difficulty levels, add test cases, add categories to the system, create contests, invite users to their contests, sponsor contests, view weekly leaderboards, and post announcements.

Usage of a database

Why?

For the system, we will need to store information about users, editors, companies, challenges, contests, submissions made by users for the challenges, categories, test cases, company announcements, and contest invitations sent by the companies. While doing that, in order to have a consistent system, easily access the data and to avoid data redundancy, data isolation, integrity or security problems, atomicity of updates and uncontrolled concurrent accesses by different users, we are going to use a database.

How?

The database system will consist of the following entities:

- User
- Creator
    - Editor
    - Company
- Item

        - Challenge
            - Non-coding
            - Coding
        - Contest
    - Submission
    - Testcase
    - Announcement
    - Invite

The details of the proposed database system is given in the E/R diagram in the last section.

Requirements

Functional Requirements

Editors

- Create coding and non-coding challenges (referred to as challenges as a generalization throughout the proposal)
- Prepare coding contests that include both coding and non-coding challenges
- Add challenge categories such as subjects (arrays, recursion, object design, etc.) and languages (Java, Python, C++, etc.)
- Add difficulty levels to challenges
- Verify companies

Users

- Solve coding and non-coding challenges
- Enroll and participate in contests
- Earn points from solving challenges (challenges with higher difficulty award more points)
- Participate in weekly leaderboards based on points
- Receive notifications when a company invites them to a contest
- Like or dislike challenges
- Comment on challenges

Companies

- Create coding and non-coding challenges
- Create exclusive contests
- Sponsor contests
- View user leaderboards
- Invite users to contests
- Add challenge categories (see Editor)
- Add difficulty levels to challenges
- Post announcements

Non-functional requirements

Reliability

Since, the system will be used by a lot of users and companies, the reliability of the system is significant. The application must return accurate answers to the users and it has to have a low percentage of critical malfunctions.

Maintainability

Even if the system has a high reliability percentage, it can malfunction. Since the system will be used by companies, required time to solve these malfunctions must be significantly low.

Performance

The system will be used by a lot of users. Therefore, the number of interactions and changes in the system will be high. In order to respond to these changes and interactions in a small interval of time, the system has to have a high performance.

Capacity

The system will be used by a lot of users and companies. Information of these users and companies will be held in the database. In addition to that, the submissions that users made to questions will be held in the system which is the biggest data in the all system. Therefore, the system has to have a high capacity.

Limitations

- Usernames and company names should be between 3 and 20 characters long.
- Emails should be in the format name@domainname.domain.
- Only one account can be registered for an email address.
- If submissions for coding challenges pass the test cases, points are awarded to the user based on their difficulty level. If the submission doesn't pass, 0 points are awarded.
- In order to like or comment on a challenge, a user must have made at least 1 submission to that challenge.
- Coding questions should have at least 1 test case.
- Only verified companies can invite users to their contests.
- Companies can only invite users to the contest they created.
- Leaderboards are created on Monday every week.

Conceptual Design