Mini project Report

PEERCODE

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ACKNOWLEDGMENT

We feel immense pleasure in presenting this project report on "**PeerCode: Online Coding Judge**". We wish to express a true sense of gratitude towards **Prof. Anagha Chaudhari**, our project guide who at a very discrete step in the study of this project, contributed his/her valuable guidance and helped to solve every problem that arose.

We take this opportunity to thank our Principal **Dr. N.B. Chopade** and **Prof. Dr. K. Rajeswari** (HOD Comp Dept.) for opening the doors of the department towards the realization of our project, for their guidance and encouragement.

Most importantly, we would also like to express our sincere gratitude towards all the staff members of the Computer Department. We also express our thanks to all our friends for their support and suggestions shown during the completion of our project. We take this opportunity to express our thanks to all who rendered their valuable help, along with all those unseen people across the internet for maintaining those valuable resources for the successful completion of our project. I owe our success to all of them.

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ABSTRACT

PeerCode is a project implemented for students. PeerCode will help students to solve programming questions.

The interface of the PeerCode is Web pages that can be accessed with any browser. The system is implemented in React, Firebase, MongoDB and CSS.Students can do coding practice and participate in contests.

PeerCode is an easy-to-use application. Anyone who knows how to code or is new to coding can carry out here. It is an easy to use and user-friendly application with a good GUI(Graphical User Interface) design.

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CHAPTER 1

INTRODUCTION

1.1 Overview

This report discusses the result of the work done in development of Online Coding Judge in "PEERCODE" Project.It provides users to code online and get the results immediately. This project can be used by the college administration for testing the coding skills of particular students. It will help to improve students' skills of problem solving and how to approach a particular problem in interviews.

1.2 Motivation

In today's world the computer field is growing on a rapid pace in domains of Artificial Intelligence, Machine Learning, Neural Network, Blockchain, Web Development, Software Development etc.But to succeed in these domains everyone has to have basic knowledge of coding and the various languages required to build your skill set and immense amount of practice is needed.

This platform will help users to develop their coding skills by practicing different types of coding statements and improve their skills like in algorithms , data structures etc. and get hired in renowned companies.There will be weekly coding contests and some common questions asked in Coding Questions.

Our main motive in doing this project was like in college teachers can test the students coding skills and get to know how much the student has learned the concept when he faces a coding question.

1.3 Proposed Solution

We propose a project in the form of a web application to practice coding questions by using the IDE provided in the web application.Our basic idea of this is to help a student/user to practice coding questions provided on our website to improve their coding skills and think logically and implement the concepts they have learned.We will also provide a page of competitions where users can compete between themselves to solve the questions more

efficiently and logically.Teachers also can add coding questions to conduct their own contests on college basis.

CHAPTER 2

LITERATURE STUDY

2.1 Research Papers

1. Design and Implementation of Online Automatic Judging Syst (Haohui Liang)

https://iopscience.iop.org/article/10.1088/1755-1315/69/1/012091/pdf

The Online Automatic Judging System which can be applied to various algorithm programming competition and training, can carry out and evaluate code, automatically judging the correctness, and counting the efficiency indicators, such as running time and memory consumption

2. A Survey on Online Judge Systems and Their Applications (Szymon Wasik,Macij Antczak)

https://arxiv.org/pdf/1710.05913.pdf

In this literature a survey was conducted to analyze the online judge systems advantages and its applications in the upgrading computing world.

3. On Automated Grading of Programming Assignments in an Academic Institution (Brenda Cheanga, Andy Kurnia)

https://www.cs.tufts.edu/~nr/cs257/archive/brenda-cheang/automated-grading.pdf

In order for anyone to claim to have knowledge of computer science, the ability to write a working program is a definite prerequisite. Furthermore, one of the most important steps in learning the art of programming is practice, i.e. getting one's hands dirty by actually sitting down to write working programs. Indeed, when it comes to learning computer programming, practice makes perfect. In computer courses the fundamentals are taught but when it comes to programming

any individual writes a code an tests according its test cases but when it comes for grading manually it's difficult so automatic grading is important.

5.Importance of Responsive Web Development

https://developer.mozilla.org/en-US/docs/Learn/CSS/CSS_layout/Responsive_Design

In today's world an individual can open any site on phone, tabs, laptops, desktop and the website must function in the same manner in any screen size. So it's very important to build a responsive website so that anyone can access it anyway.

2.2 Existing System Study

Have gone through the existing websites for coding like leetcode,hackerrank,codechef etc.

CHAPTER 3

PROBLEM DEFINITION

3.1 Problem Definition

In today's world the computer field is growing at a rapid pace in domains of Artificial Intelligence, Machine Learning, Neural Network, Blockchain, Web Development, Software Development etc.
But to succeed in these domains everyone has to have basic knowledge of coding and the various languages required to build your skill set and immense amount of practice is needed. So our basic idea is to make an Online Coding website which will allow users to code Online and get results immediately.This will help students to develop their skill sets.

3.2 Objectives

- Our basic idea is to Facilitate the idea of practicing coding questions for coding interviews and to improve how to approach a problem.
- We will provide the users to practice coding they learn from other website API's like Udemy, Coursera and even of their own practice.
- To provide a contest page where students can compete between themselves to solve more and more questions.
- This product will be compatible for Windows,Ubuntu etc.
- To make the website responsive.
- To provide a feedback system so that we can try to make changes to the site.

3.3 Scope

- It will provide the users To practice coding they learn from other website API's like udemy,coursera and even of their own practice.

- This Product can be utilized by anyone.
- And also teachers can evaluate students for their coding skills.

Future Scope:

- A separate login page for teachers to host the events where they will have access to host events as per their criterias.

- Users/Students can see their submitted codes for a particular question later.

CHAPTER 4

SOFTWARE REQUIREMENT SPECIFICATIONS

4.1 Overall Description

This section will provide us with all the factors and requirements of the product.

4.1.1 Product Perspective

PeerCode is a web hosted application.

Software Interface: This system includes a navigation bar where you can find out the functionalities of our site. We have given a Contest, Practice , Help , Profile section on site. The user can solve the questions only when he has logged in.

The question database will include the coding questions and can be changed by the end users.

The user database maintains all the information like name,email, count of the questions solved by the user etc.

4.1.2 Overview of a Functional Requirements

Functional requirements are mandatory which are needed to be fulfilled. They generally describe and define features of the end product of a software system and simply focus on what the end product does.

These are the requirements that a system should accomplish. Functional requirements are types of requirements that depend upon type of software as different software has a different functional requirement, system on which software is used as it heavily affects functions of software and users to fulfill their requirements. Functional requirement of users is high-level abstract statements. it generally describes of what system should be whenever required but system functions should be described in detail by functional system requirements

4.1.3 Overview of Data Requirements

Data requirements definition establishes the process used to identify, prioritize, precisely formulate, and validate the data needed to achieve business objectives.

The data requirements in this project are:

- Question details such as title, description, input,output, etc.
- Student details such as email id, name,password etc.
- Contest details such as name, date ,questions etc.

4.2 Functional Requirements

Login/signup:-

- To give access to users with valid information.
- To make a new account for new users.

Database:-

- To store user details(username , passwords).
- To store the questions..
- To store Feedbacks.

GUI:-

- Dashboard
- Notifications
- Dropdown List for selecting coding language from the given options.
- Pops up for errors.

Backend:-

- Running all user code on Judge0 api.
- Validation of Code.

4.3 Non-Functional Requirements

Reliability:-

- If a user is new,he must register first and then login.
- Must handle load during many Users.
- Can run on any platform.

User friendly:-

- User friendly interface.
- Navigation is easy.

- The system must provide or site must work 24*7 hours online.

Security:-

- Provide email authentication.
- Login credentials for entering the platform.
- Plagiarism Checks to avoid Cheating.

Maintainability:-

- Feedback system.

4.4 Experiment Details

4.4.1 Platform Used:

- React js
- Firebase
- Nodejs
- Expressjs
- Bootstrap

CHAPTER 5

PROJECT PLAN

5.1 Project Plan (CPM/PERT/GANTT Charts)

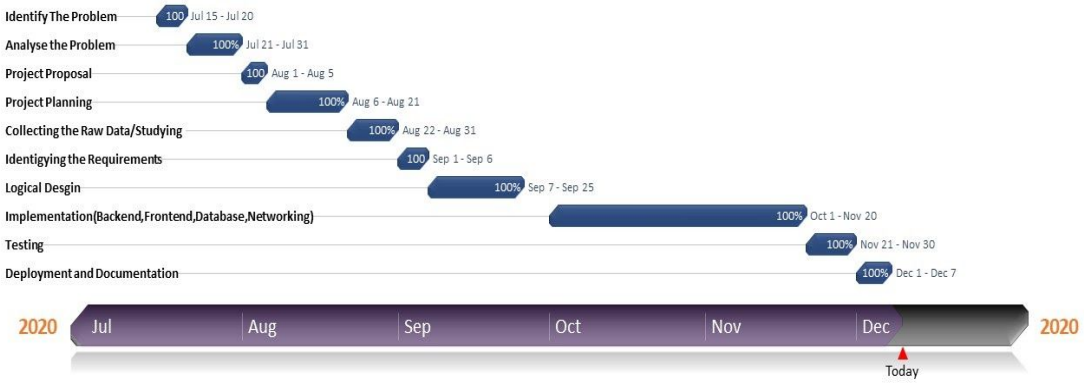


Fig 5.1 GANTT CHART

This is the Gantt Chart used to show the timeline of a project like how it was planned and executed.It took 135 days to complete the whole project.

5.2 Feasibility Study

A feasibility study is part of the initial design stage of any project/plan. It is conducted in order to objectively uncover the strengths and weaknesses of a proposed project or an existing business.

5.2.1 Technical Feasibility

- In Technical Feasibility current resources both hardware software along with required technology is analyzed/assessed to develop the project.
- We have developed our application with the latest technologies such as react and firebase which are extremely feasible.
- The technology we will be using is available, free and is being used all around the world.

Software: - It will not be requiring any special software.
Software Requirements: Web Browser (Google chrome, Internet Explorer, etc.)

Hardware: - Hardware requirements includes following points:
Hardware Components: Android powered phones, PC's

After the system is once developed it can be easily handled by a non-technical person.
So, a technically sound expert is not required here. Hence this problem does not arise at all.

5.2.2 Economic Feasibility

Our software is economically feasible. It does not require any other installation cost. Users can sign up for free without any extra charges.

5.2.3 Performance Feasibility

Admins can easily update, add and delete user details and contest related details whenever they want .Our database is well designed, efficient, normalized and has less redundancy. System stores the feedback given by users and if problems are there they can be rectified.

5.2.4 Time Feasibility

A time feasibility study will take into account the period in which the project is going to take up to its completion. A project will fail if it takes too long to be completed before it is useful.

5.3 Risk analysis

5.3.1 Project Risk

Project risk is an uncertain event or condition that, if it occurs, has an effect on at least one project objective.
We are not asking for any bank details or personal information other than the email of the user .

5.3.2 Project Management

Project Management is an important part of project development. It deals with all the important areas for project development like Feasibility, Requirement analysis, Project Schedule, Project Plan etc. It was achieved by proper selection of Software Life Cycle Model.We have been following Agile software development model throughout the process.

5.4 Effort and Cost Estimation

5.4.1 Lines of code(LOC)

Lines of code (LOC), is a software metric used to measure the size of a computer program by counting the number of lines in the text of the program's source code. LOC is typically used to predict the amount of effort that will be required to develop a program, as well as to estimate programming productivity or maintainability once the software is produced.
The LOC for our project is 4800-5000.

5.4.2 Effort

We initially researched about our problem statement,Went through various Research papers and other documentation required for our project.
We studied the official documentation of react,firebase,node js,bootstrap,express js,etc which were required for project development.
Each team member contributed equally during the project implementation.

5.4.3 Development Time and Number of People

Mid-July 2020 to November 2020
We took approximately 4 and 1/2 months to complete our project and there were four people in this project.

CHAPTER 6

SYSTEM DESIGN AND IMPLEMENTATION

6.1 System architecture

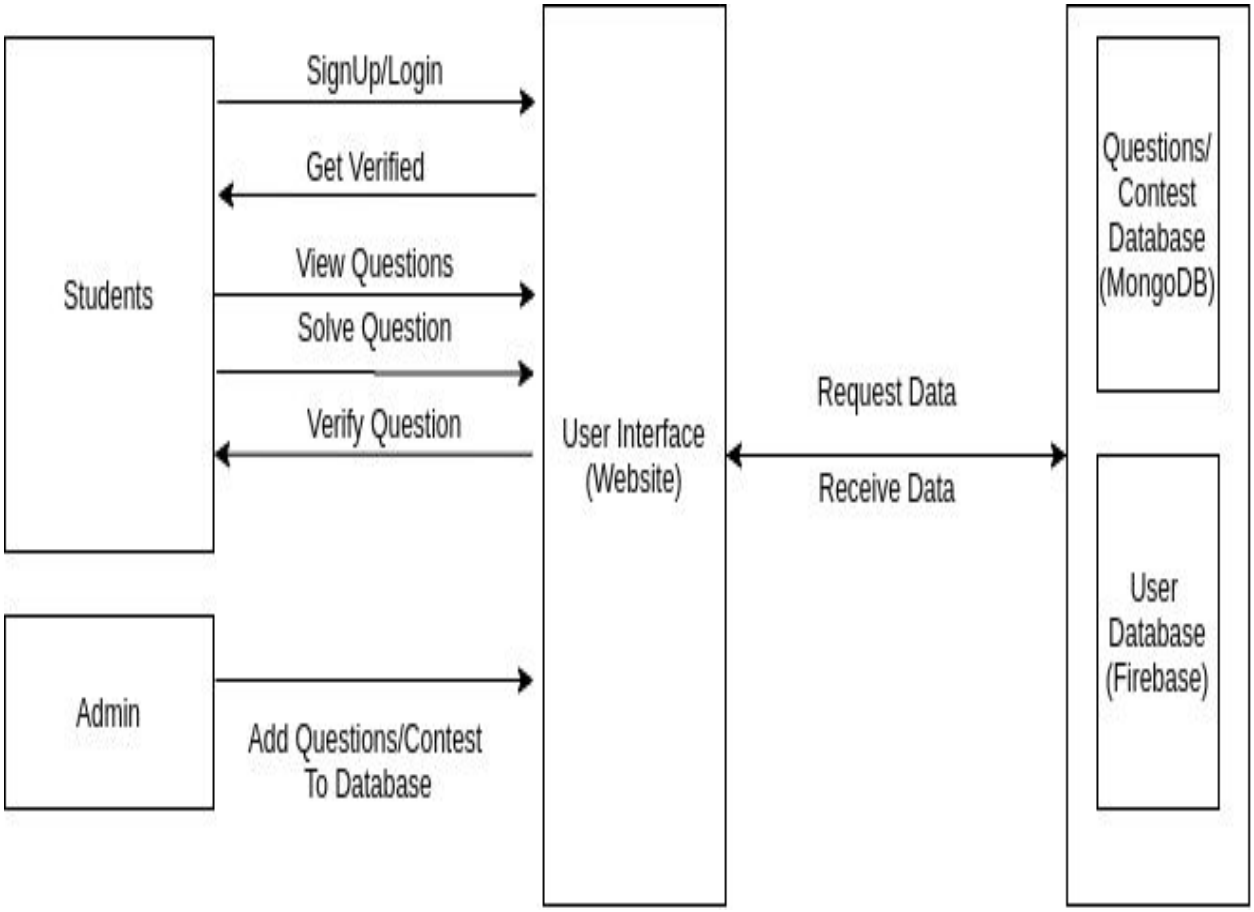


Fig 6.1 SYSTEM ARCHITECTURE

6.2 Database Design

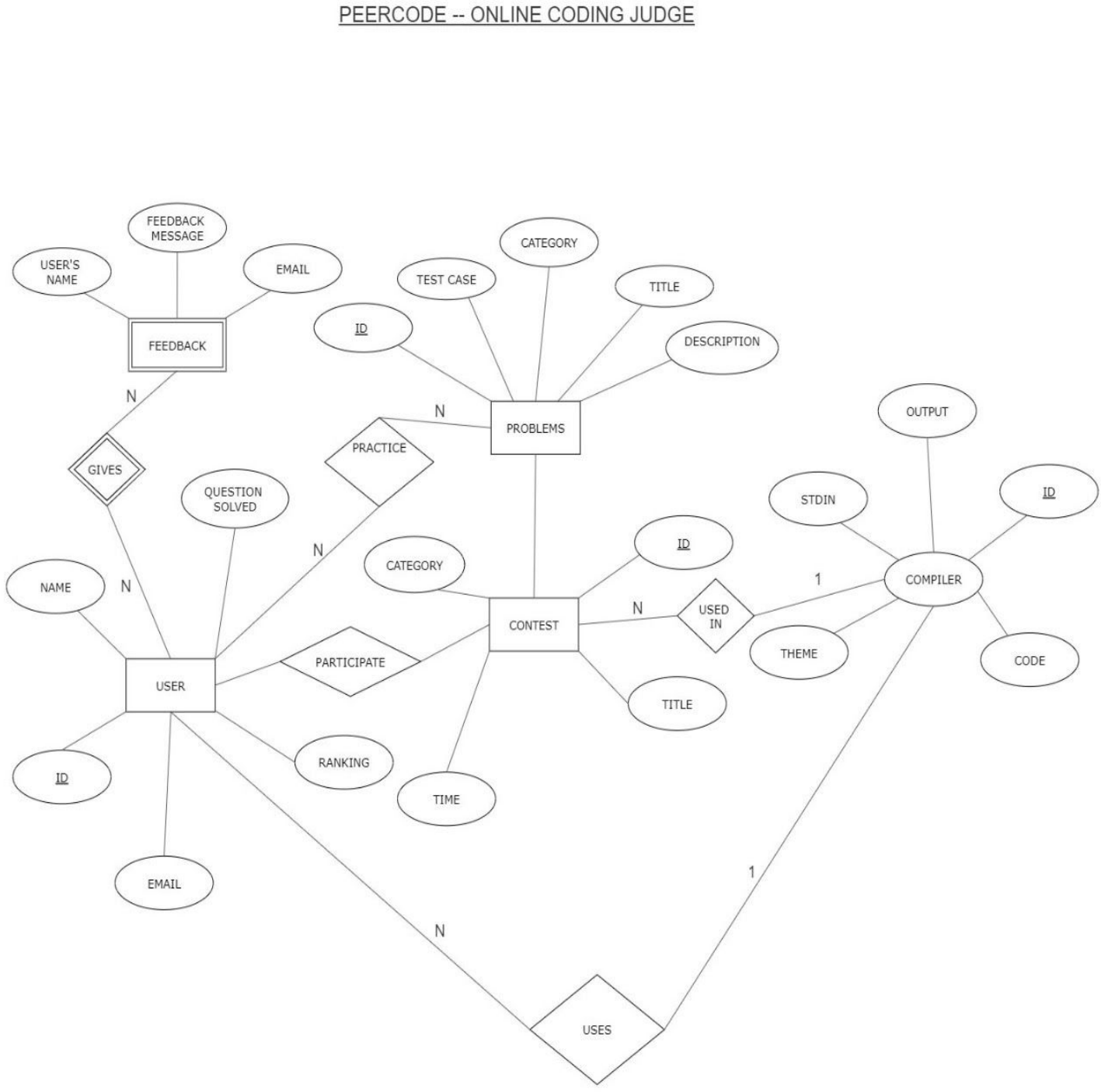


Fig 6.2 DATABASE DESIGN

6.3 UML diagrams

1.Use-Case Diagram

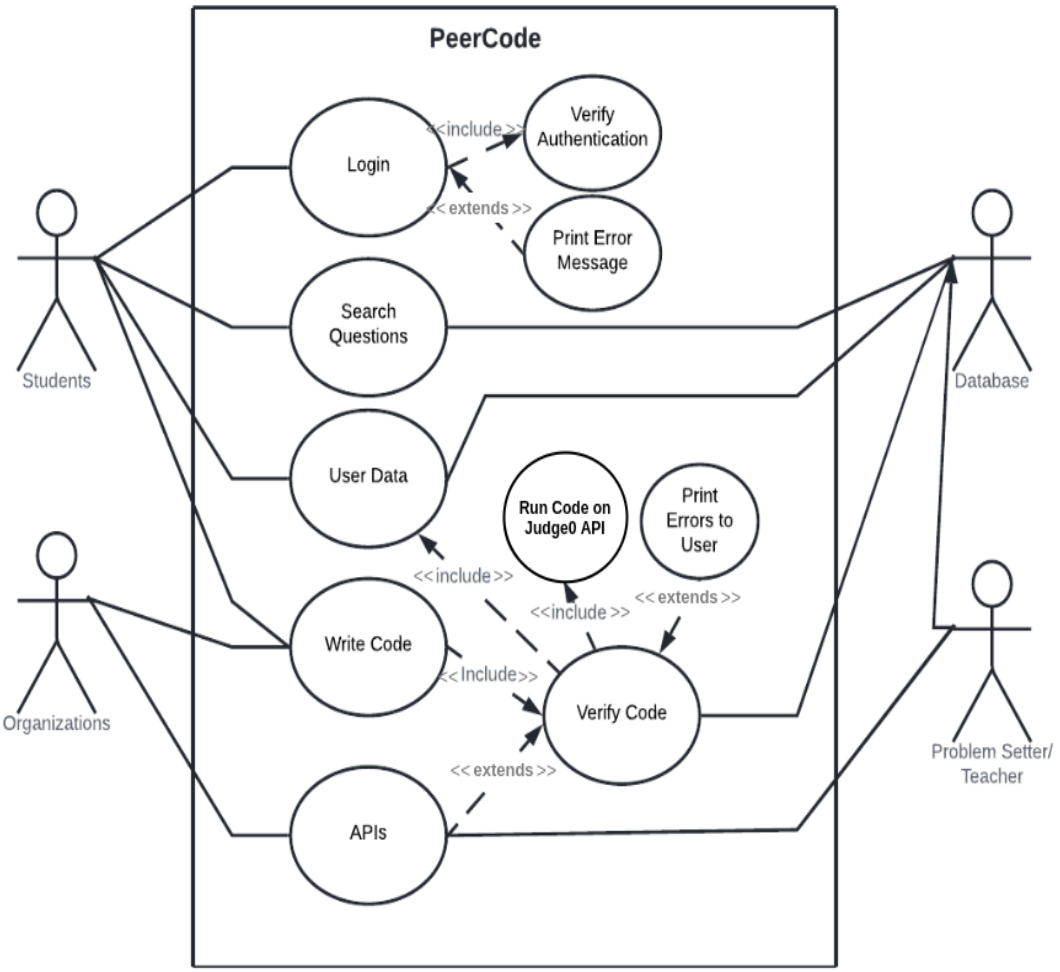


Fig 6.3.1 USE CASE DIAGRAM

2. Class diagram

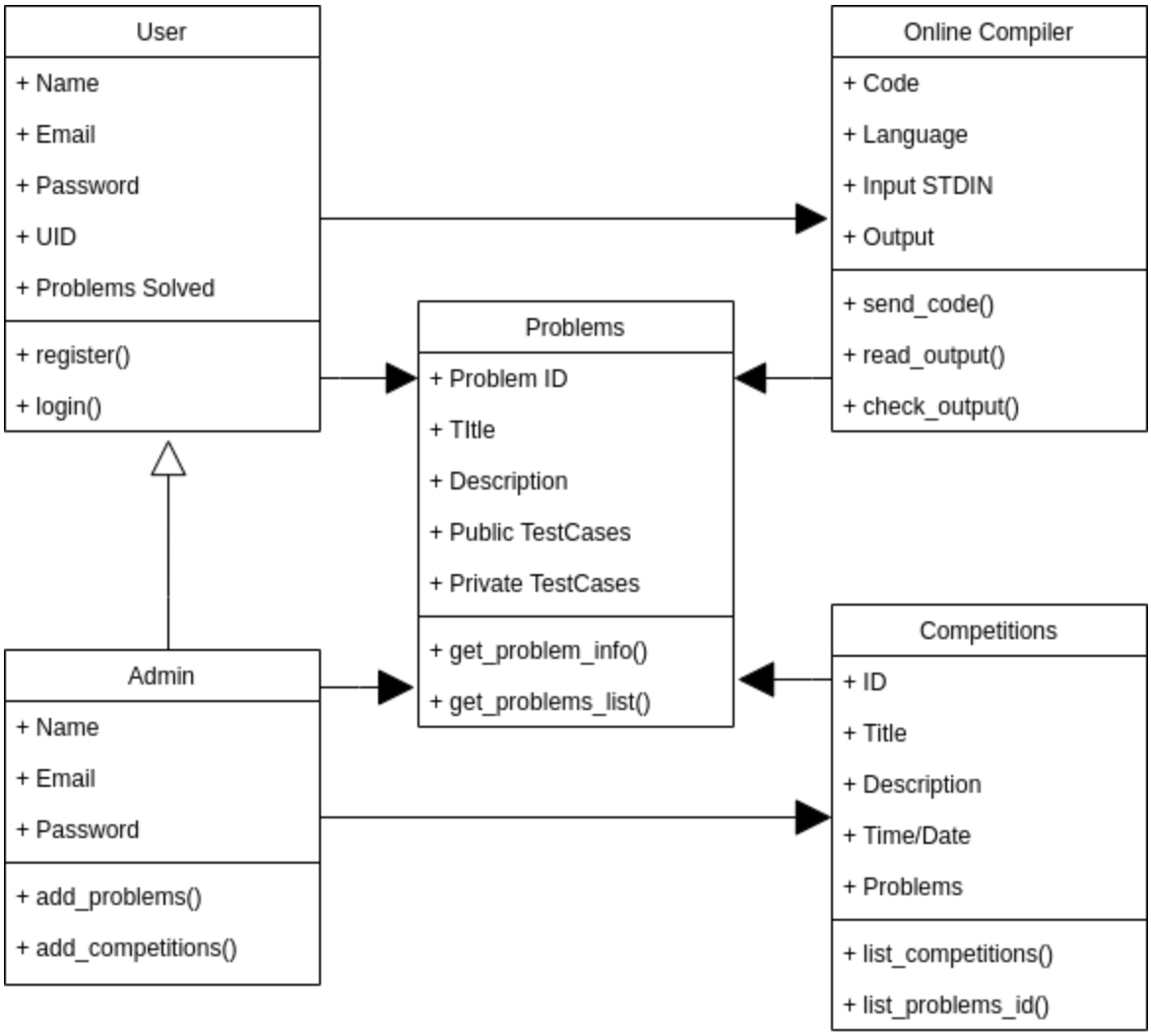


Fig 6.3.2 CLASS DIAGRAM

3. State Diagram

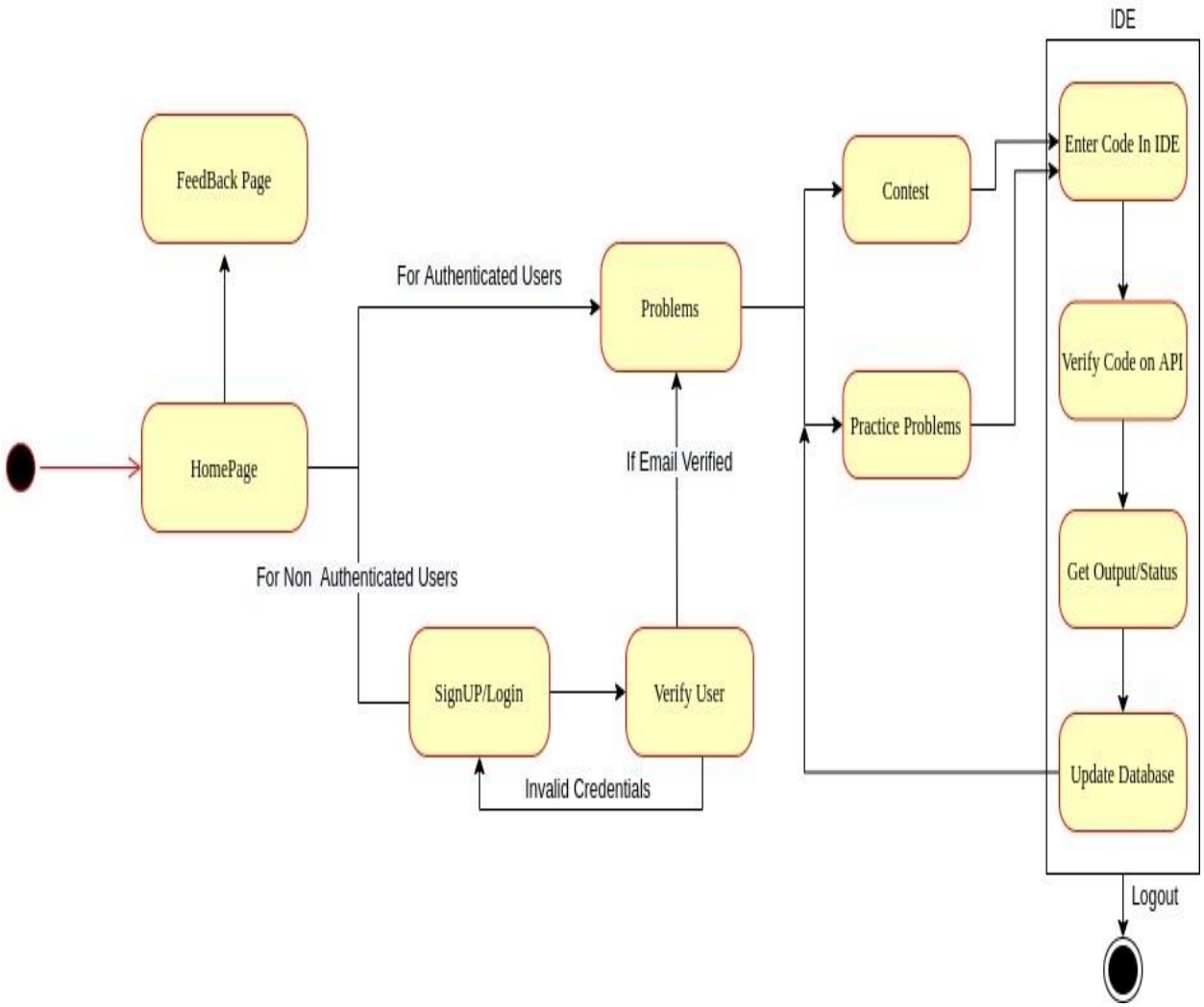


Fig 6.3.3 STATE DIAGRAM

4. Activity Diagram

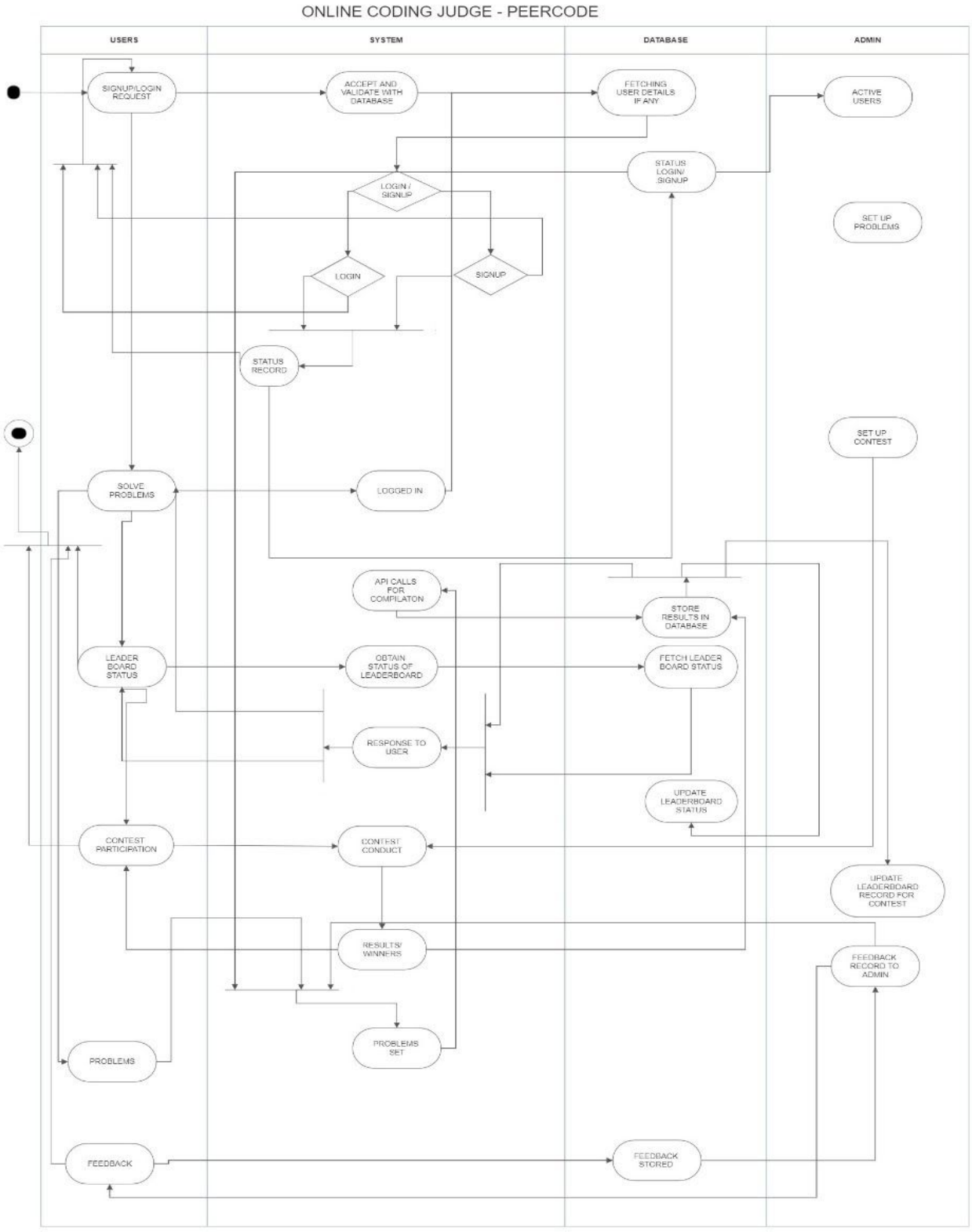


Fig 6.4.4 ACTIVITY DIAGRAM

5. Sequence Diagram

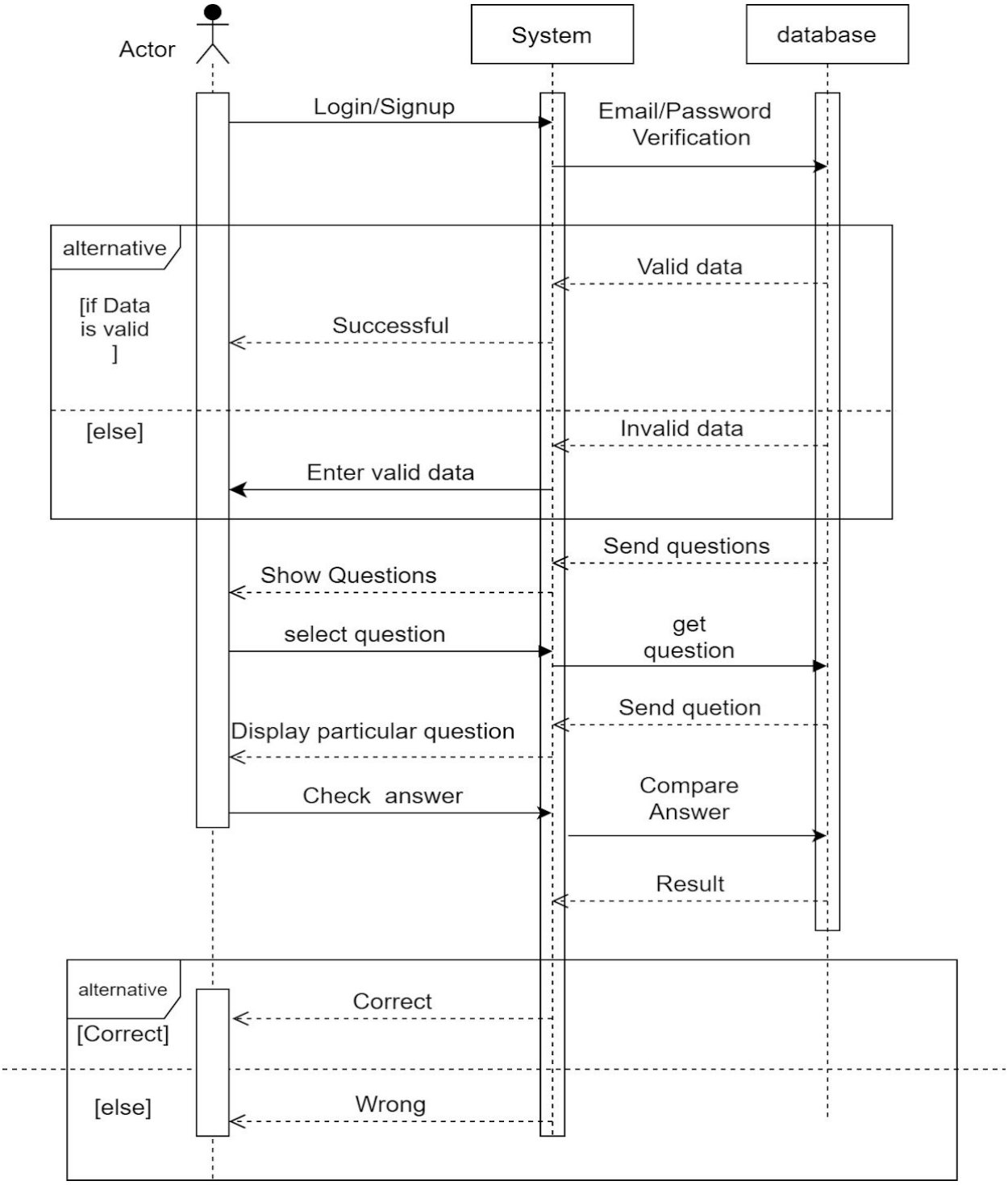


Fig 6.4.5 SEQUENCE DIAGRAM

CHAPTER 7

TEST SPECIFICATIONS

7.1 Test Cases

Web page is collection of various pages where we have to perform various action which has various events to perform which creates test cases as follow –

1] **SignUp page:**

Procedure: Click Signup Button.
Data: Users should insert valid email and fill all inputs.
Output:If email is not correctly entered give error else create new user.

2]**SignIn page:**

Procedure: Click SignIn Button.
Data: User should insert email and password used for SignUp.
Output: If email is not registered previously give error else if email is registered but password is wrong then give wrong password error else login successfully and redirect to home page.

3] **Code Run button in IDE:**

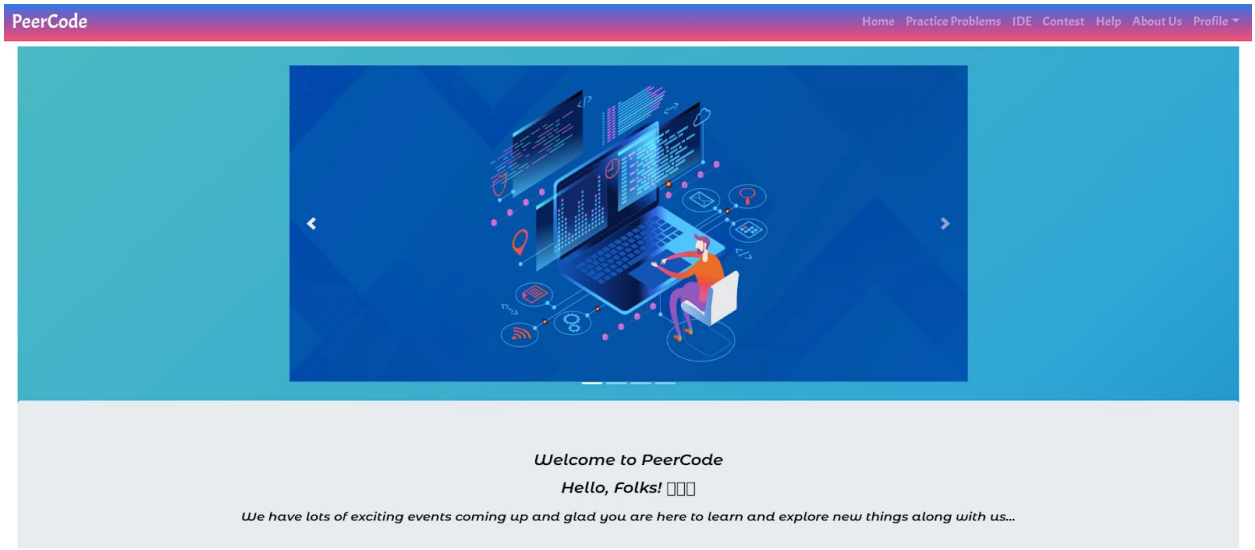
Procedure: Click Run
Output: If user is not logged in give alert to SignIn else show result of code.

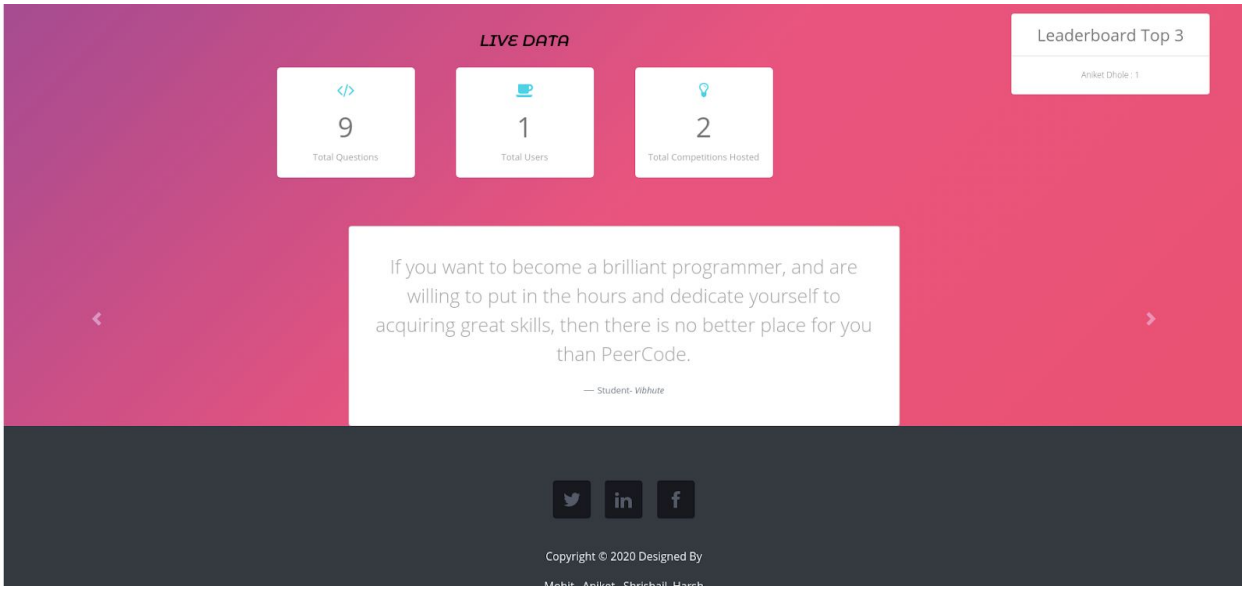
CHAPTER 8

EXPERIMENTS RESULTS AND ANALYSIS

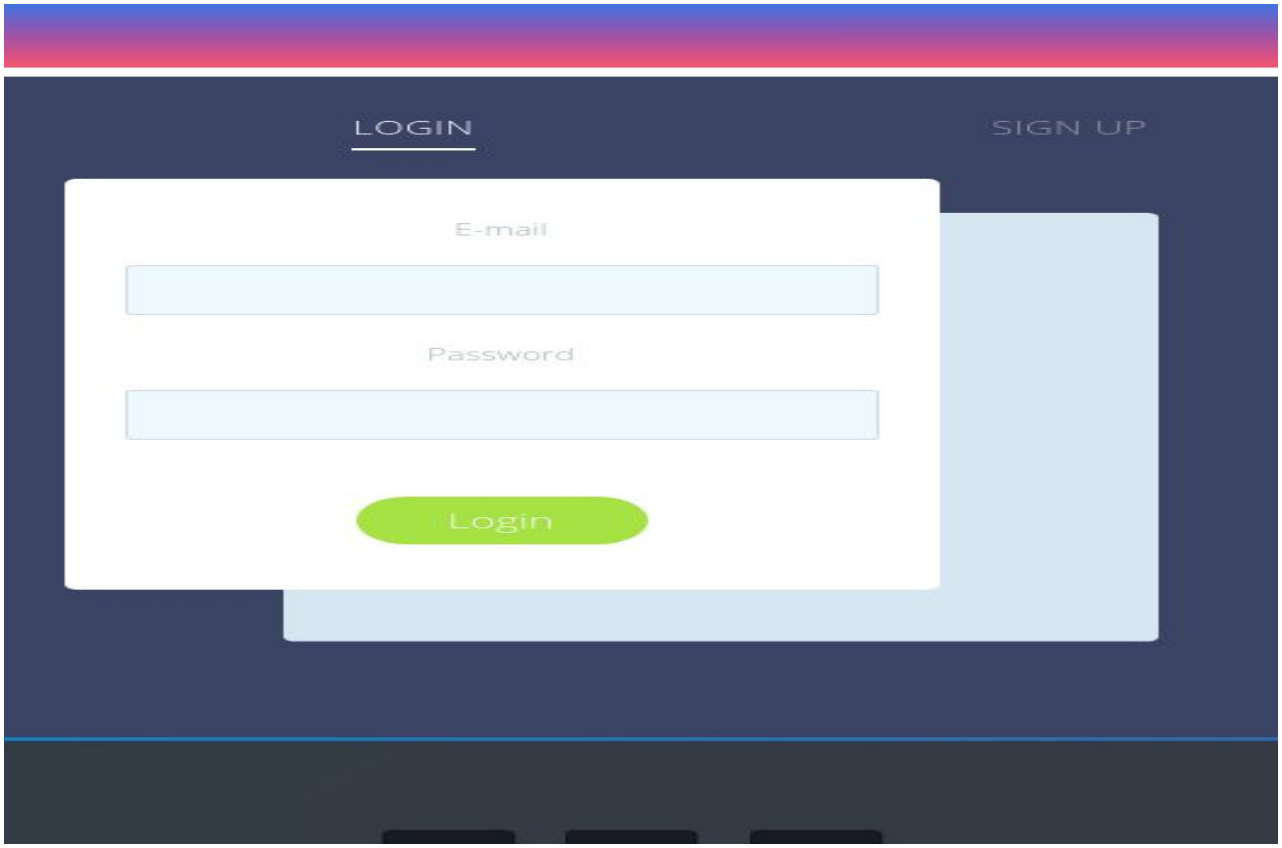
1. Screenshots including GUI

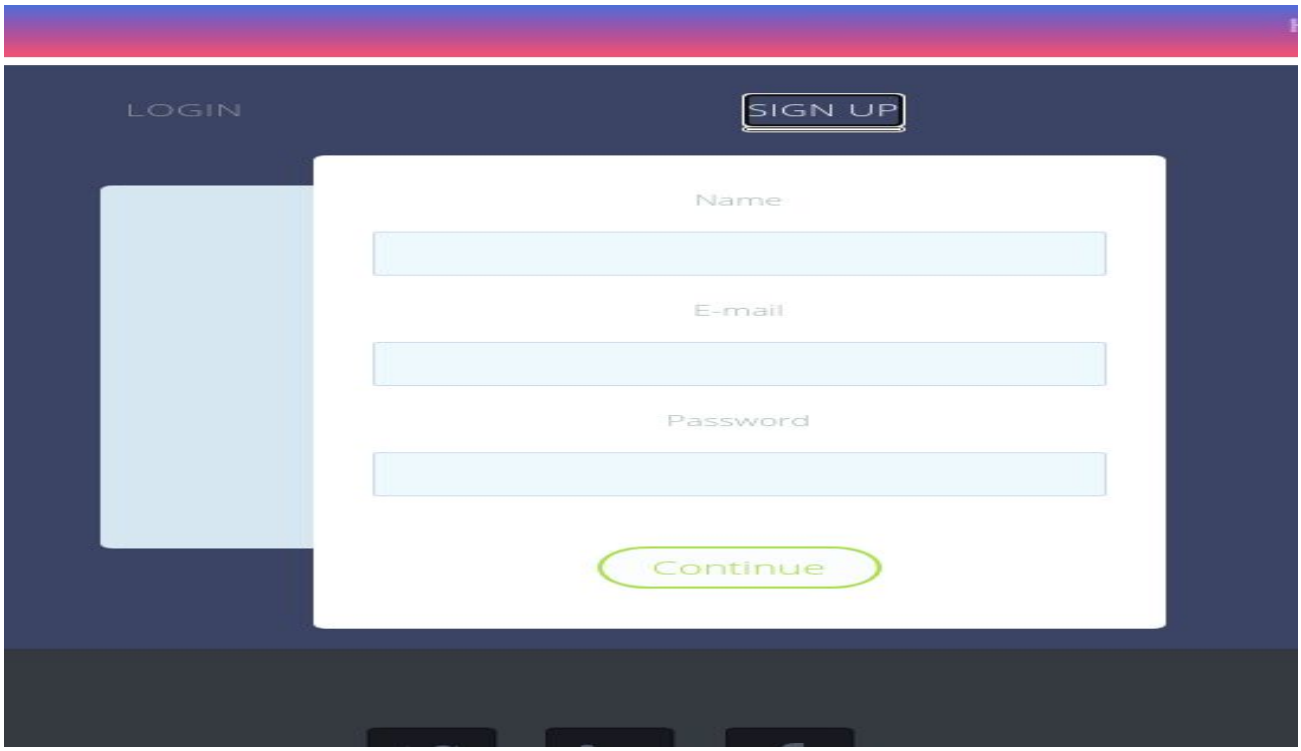
This is the main landing page of the website.



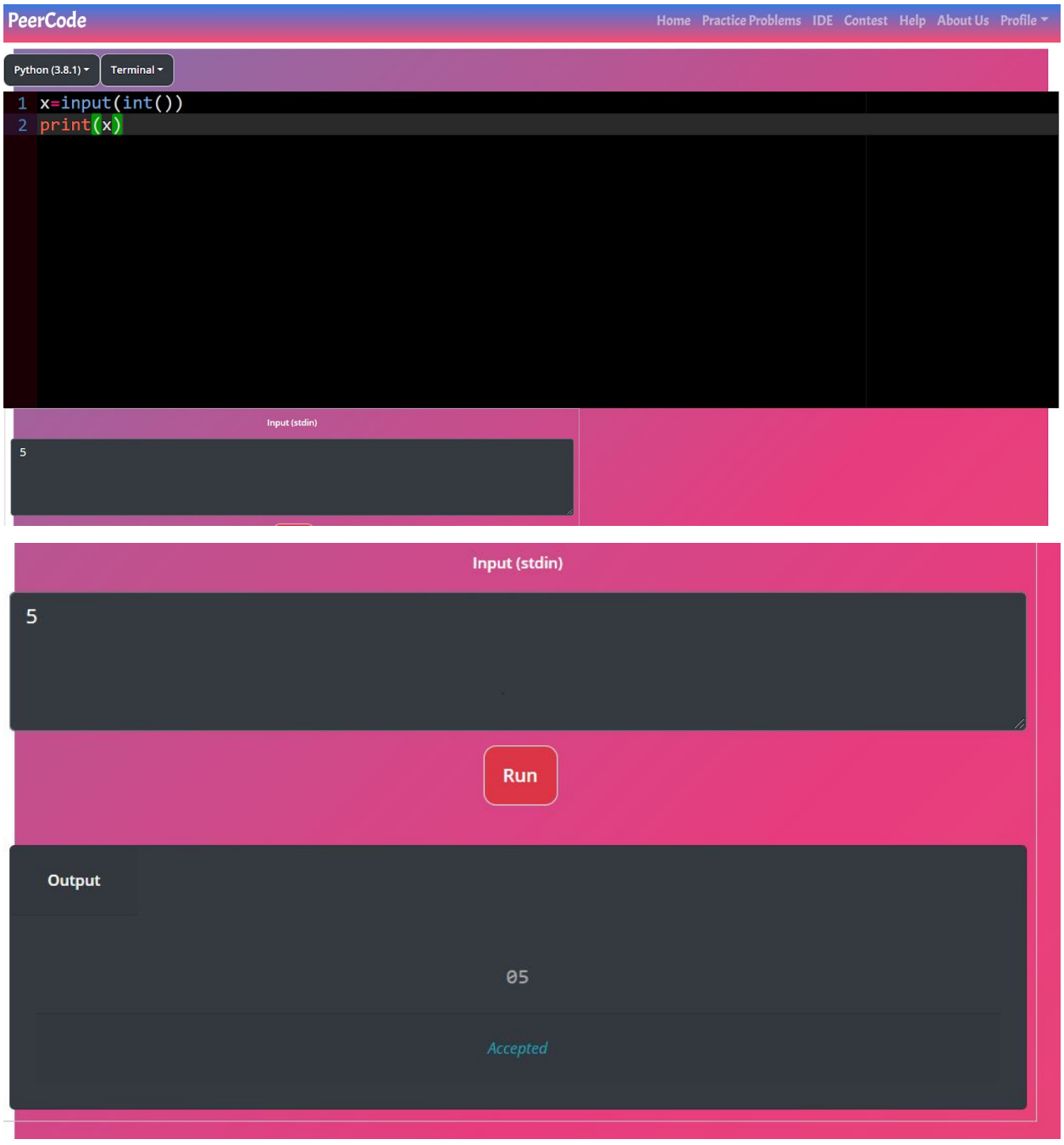


This is the login and sign up page for User.

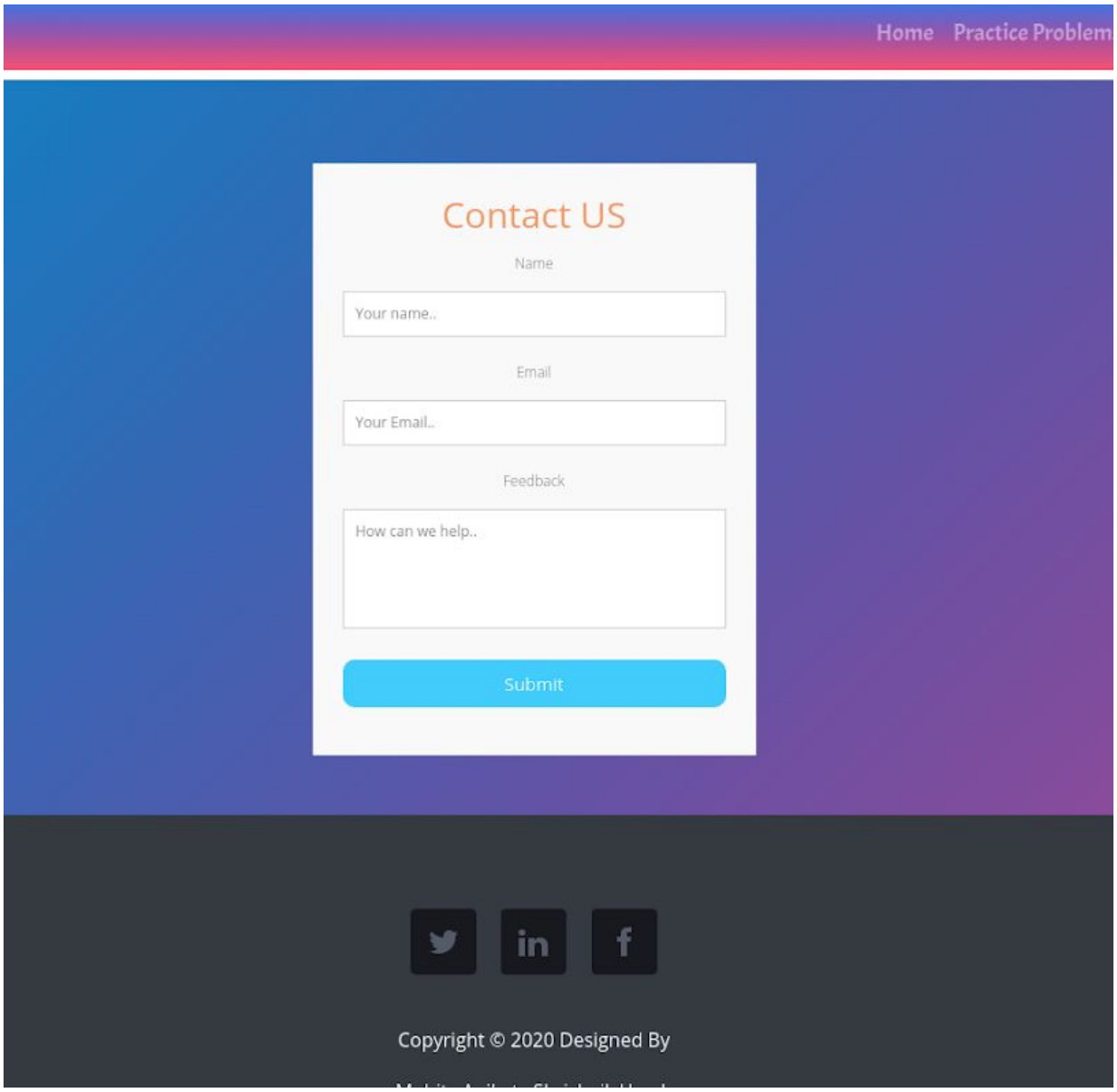




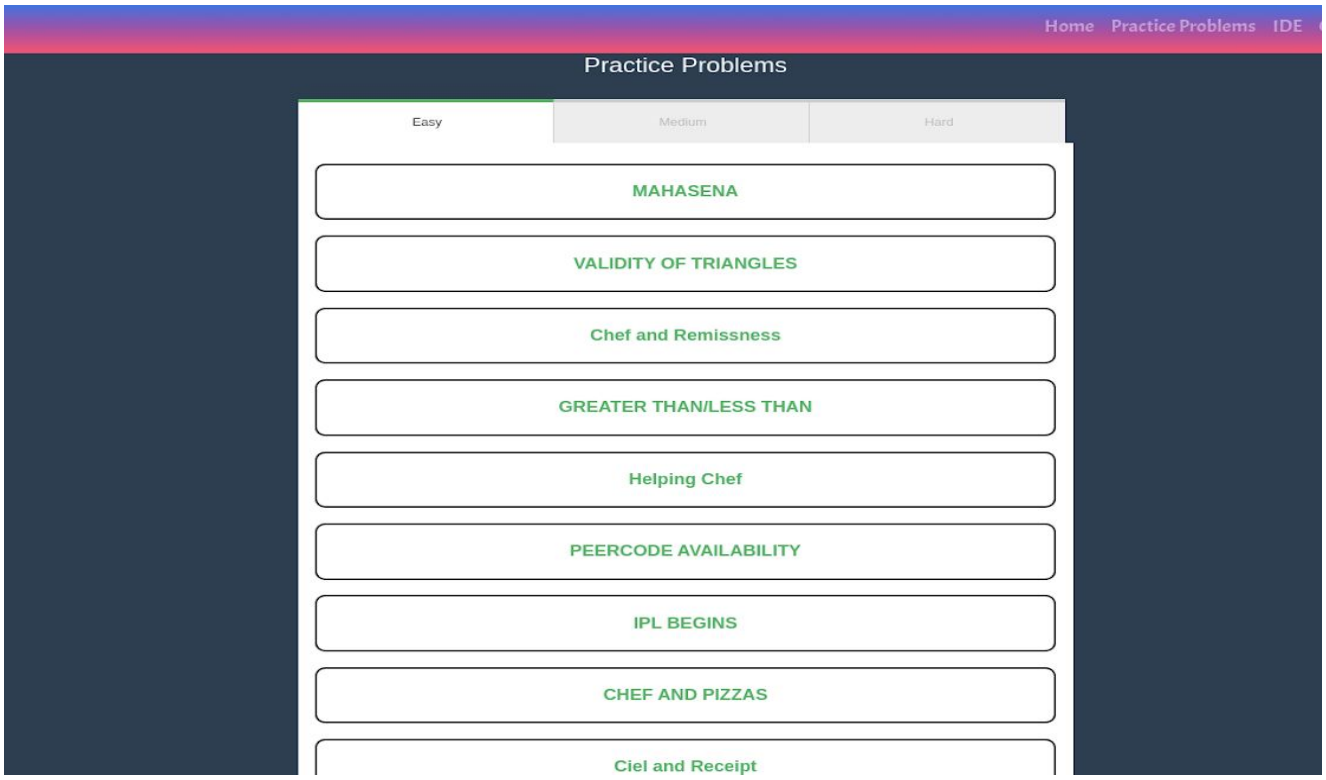
This is the IDE Compiler which includes Code Editor ,Various Themes and Languages,Code Input,Code Output.

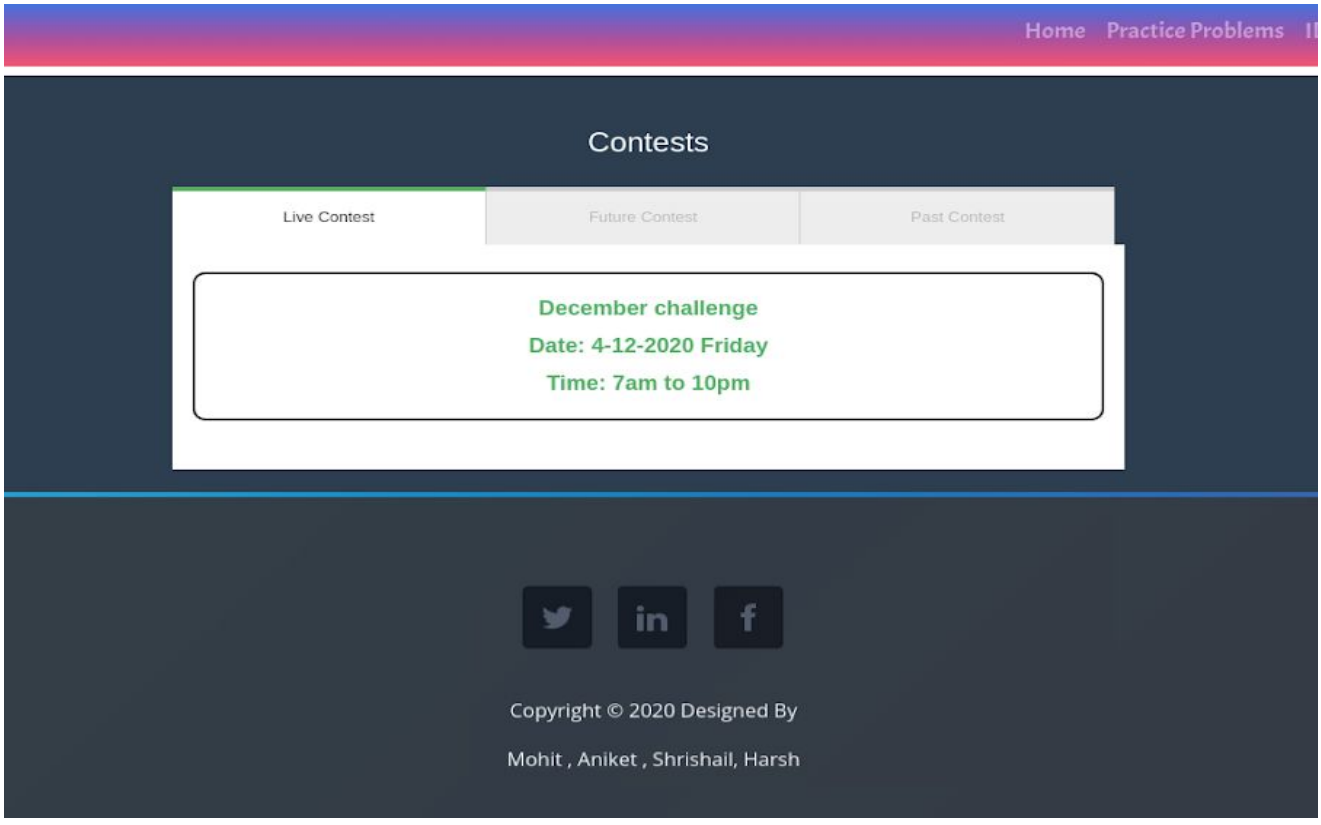


This is Contact Us Page which Takes User Input, Stores Data in Firebase Database and Notifies Admin about feedback.

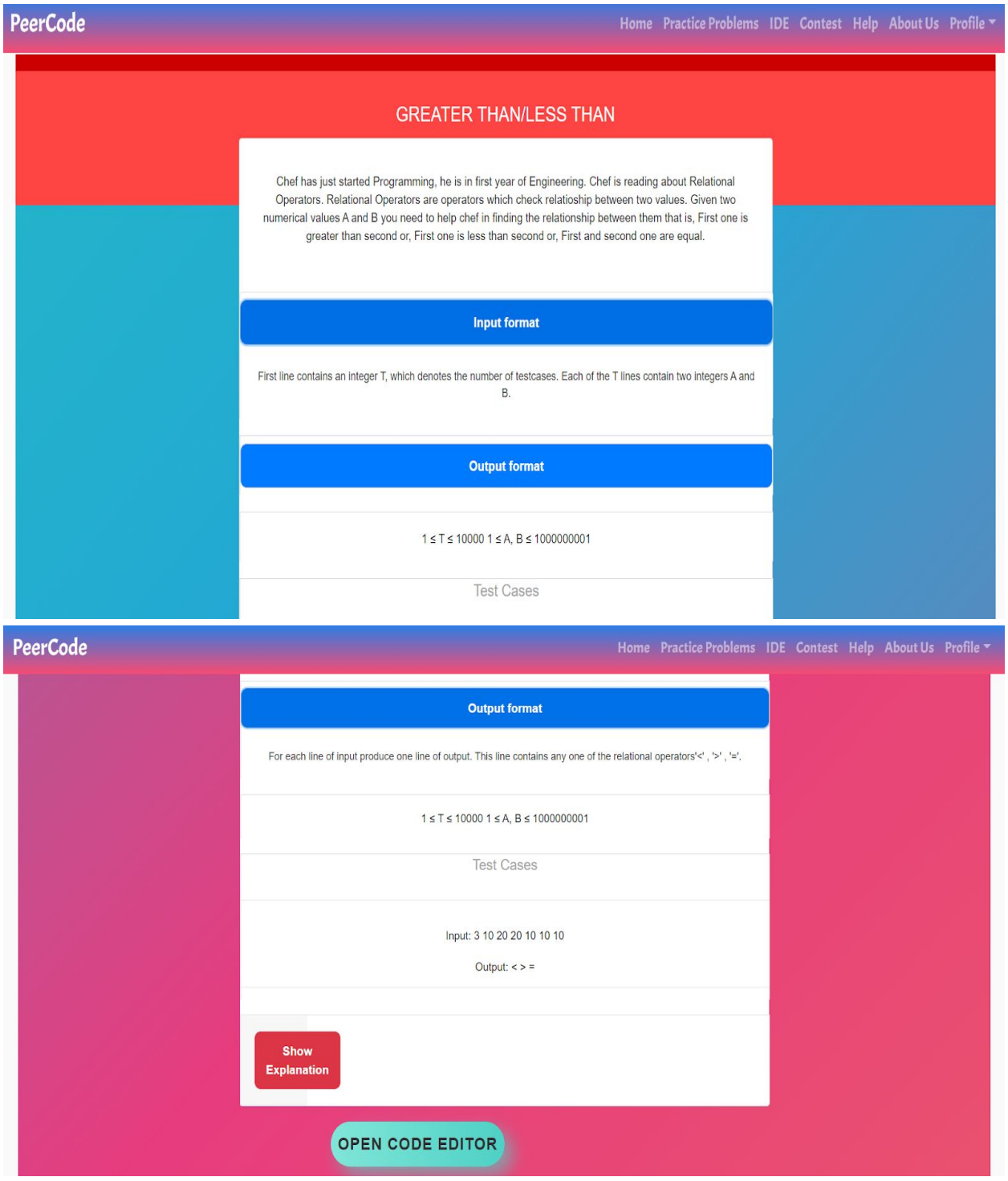


Practice Problems Page, Contests Page.





Problem Details Page.



CHAPTER 9

ADVANTAGES ,DISADVANTAGES AND APPLICATIONS

9.1 Advantages:

Our software/website can be used by students, teachers for testing students and technical event organizers for coding contests.

9.2 Disadvantages:

The software could be more secure.We provide basic security but high level security is not provided by us.

9.3 Applications:

- Can be used by anyone just they have to Sign Up
- Best stakeholders are colleges.

CHAPTER 10

CONCLUSION AND REFERENCES

Conclusion

PeerCode will be a platform where students , teachers can learn and grow together and work towards developing and improving their coding skills and get prepared for Placement Interviews. PeerCode has huge requirements starting from its design to its deployment part and presents challenges in developing it .Some of Challenges that we will be facing are :

1. Platform must be Scalable enough to handle large numbers of learners who will be using the platform simultaneously such that all users can use it without any issues and with flexibility.
2. Platform must be Reliable enough such that even if there exists some hardware / Software Failure , the Entire System should not fail, and work properly such that all incoming load is balanced properly.
3. Platform's Consistency and Availability will also play an important role in the platform's efficient working . At initial Stages , Platform may not be 100 % consistent but as the platform grows up this part will also be handled and taken care of and same is the case with Availability .
4. Conducting Weekly , Monthly Coding Contest with proper time schedule and Ranking of users based on time submission is another task.

Also , PeerCode is mainly Focused towards students of PCCOE so that they can improve their coding skills and get prepared for Placement Interviews and Coding Challenges .

References

1. Design and Implementation of Online Automatic Judging System (Haohui Liang)

https://iopscience.iop.org/article/10.1088/1755-1315/69/1/012091/pdf

The Online Automatic Judging System which can be applied to various algorithm programming competition and training, can carry out and evaluate code, automatically judging the correctness, and counting the efficiency indicators, such as running time and memory consumption

2. A Survey on Online Judge Systems and Their Applications (Szymon Wasik,Macij Antczak)

https://arxiv.org/pdf/1710.05913.pdf

In this literature a survey was conducted to analyze the online judge systems advantages and its applications in the upgrading computing world.

3. The Costs and Benefits of Pair Programming (Alistair Cockburn, Laurie Williams)

https://collaboration.csc.ncsu.edu/laurie/Papers/XPSardinia.PDF

Pair or collaborative programming is where two programmers develop software side by side at one computer. They found that for a development-time cost of about 15%, pair programming improves design quality, reduces defects, reduces staffing risk, enhances technical skills, improves team communications and is considered more enjoyable at statistically significant levels. When pair programming, two programmers work collaboratively on the same algorithm, design or programming task, sitting side by side at one computer.

4. On Automated Grading of Programming Assignments in an Academic Institution (Brenda Cheanga, Andy Kurnia)

https://www.cs.tufts.edu/~nr/cs257/archive/brenda-cheang/automated-grading.pdf

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5.Importance of Responsive Web Development

https://developer.mozilla.org/en-US/docs/Learn/CSS/CSS_layout/Responsive_Design

In today's world an individual can open any site on phone, tabs, laptops, desktop and the website must function in the same manner in any screen size. So it's very important to build a responsive website so that anyone can access it anyway.

Existing System Study

Have gone through the existing websites for coding like leetcode,hackerrank,codechef etc.