A Project Report on

Decoder - Competitive Programming Tool Portal and Discussion Forum

By

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CERTIFICATE

This is to certify that the practical / term work carried out in the subject of **System Design Practice** and recorded in this journal is the bonafide work of

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Guide

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1. Abstract

Decoder is software that provides all help, tools and information related to competitive programming at the same place. Decoder contains an online compiler for some of the languages. Users can also ask questions related to coding(Basically somewhat like Discussion Form). Users can also get the data regarding upcoming contests of various platforms like Codechef, Codeforces, Leetcode, etc…

2. Introduction

Decoder platform is created for competitive programmers, and the good performance in programming contests are most valuable to any competitive programmer. Mostly all of the competitive programming platforms held their contest online and at some specific country time.

There are a lot of programming platforms out there each with their own contest, for one programmer it’s hard to keep a map of every contest date, time and duration. This project will help them to see all the contest information at a single place.

Also, sometimes programmers do not have their own laptop with them and want to participate in a contest then they can simply use a compiler built in our website and compile/run their code. Our platform will guarantee that the code is never shared with anyone and there won’t be any scenario of them being caught in plagiarism by using the over system.

Competitive programming is a sport and for any sport to grow a good a community platform is necessary because it helps them share new ideas and ask for any doubt/solution in problem. Our platform will provide this discussion forum. There are few websites who have started building platforms like this for programmers, and our survey says that most of them are primarily built for any programmer.

This software will also utilise APIs provided by some known competitive programming platforms to fetch the details about upcoming contests. Decoder also has a discussion forum to discuss topics related to competitive programming. Users can ask doubts regarding any topics and other users can comment and reply.

3. Software Requirement Specifications

System Feature

Decoder site provides services to compiler and run code online for free and also ask doubts with other people using discussion forums.

1. Discussion Forum:

Input	Navigate to that page
Description	Can see list of doubts raised by various users of our system

2. Doubt Finder:

Input	Title of the desired doubt
Output	Redirection according to success or failure
Description	You can find a specific doubt or doubts written by specific user
Process	search based on user query and show matching blogs.
Precondition	There is no need to log in to as blogs must be available to all users.

3. **Login:**

Input	username(or email) and password
Output	Redirection according to success or failure
Description	User can log into system to get additional features and save his/her data regarding to system
Process	Validates the given credentials
Precondition	User should have an account to login

4. **Registration:**

Input	Credentials of the user as asked
Output	Redirection according to success or failure
Description	Registers an account
Process	Credentials validation. If validation is successful then account is registered into the system

5. **Ask a Doubt:**

Input	Required data related to doubt like title, description, etc...
Output	Redirection according to success or failure
Description	To ask a new doubt to get help from the community
Process	Data validation
Precondition	Should be authenticated into the system
Postcondition	If ‘Process’ is successful then doubt will be added in the system

6. **Update the doubt:**

Input	Data to be updated for a particular doubt
Output	Redirection according to success or failure
Description	This feature is useful when there is some issue in current version of a doubt
Process	Data validation
Precondition	Authenticated

7. **Remove Doubt:**

Output	Success or Failure Message
Description	Delete particular doubt which is created by user(if doubt is irrelevant)
Precondition	Authenticated

8. **Logout:**

Description	To logout from the system
Process	Session will be destroyed and The user will be redirected to the home page
Precondition	Logged into the system

9. **Save the code:**

Input	Code you want to save
Description	You can save the code
Process	Saving the code into the system
Precondition	Authenticated

10. Various Themes:

Input	Select the theme
Description	You can change the theme of your code editor

11. Compile and Run the code:

Input	Code you want to write
Description	User can compile and run the code

12. Upcoming Contest:

Description	Get some of the details like starting/ending date and time of the contest from various sites

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Other Nonfunctional Requirements

1. Performance Requirements

Performance should not be an issue because all the data queries involve small pieces of data.Changing the screen will require very little computation and thus will occur very quickly. Server updates could only take a few seconds as long as the device can maintain a steady signal. Website will also be up for 24x7 except the maintenance.

2. Safety Requirements

Make this application lightweight, so that it puts a low load on the device. Only the project admin will be having access to the database at the back-end. So, the admin will have rights for modifications as well as direct updates to the database.

3. Security Requirements

System should provide a secure login/registration system, and should not allow unauthorized users to access the application. Secure systems need secure database storage just like many other applications.

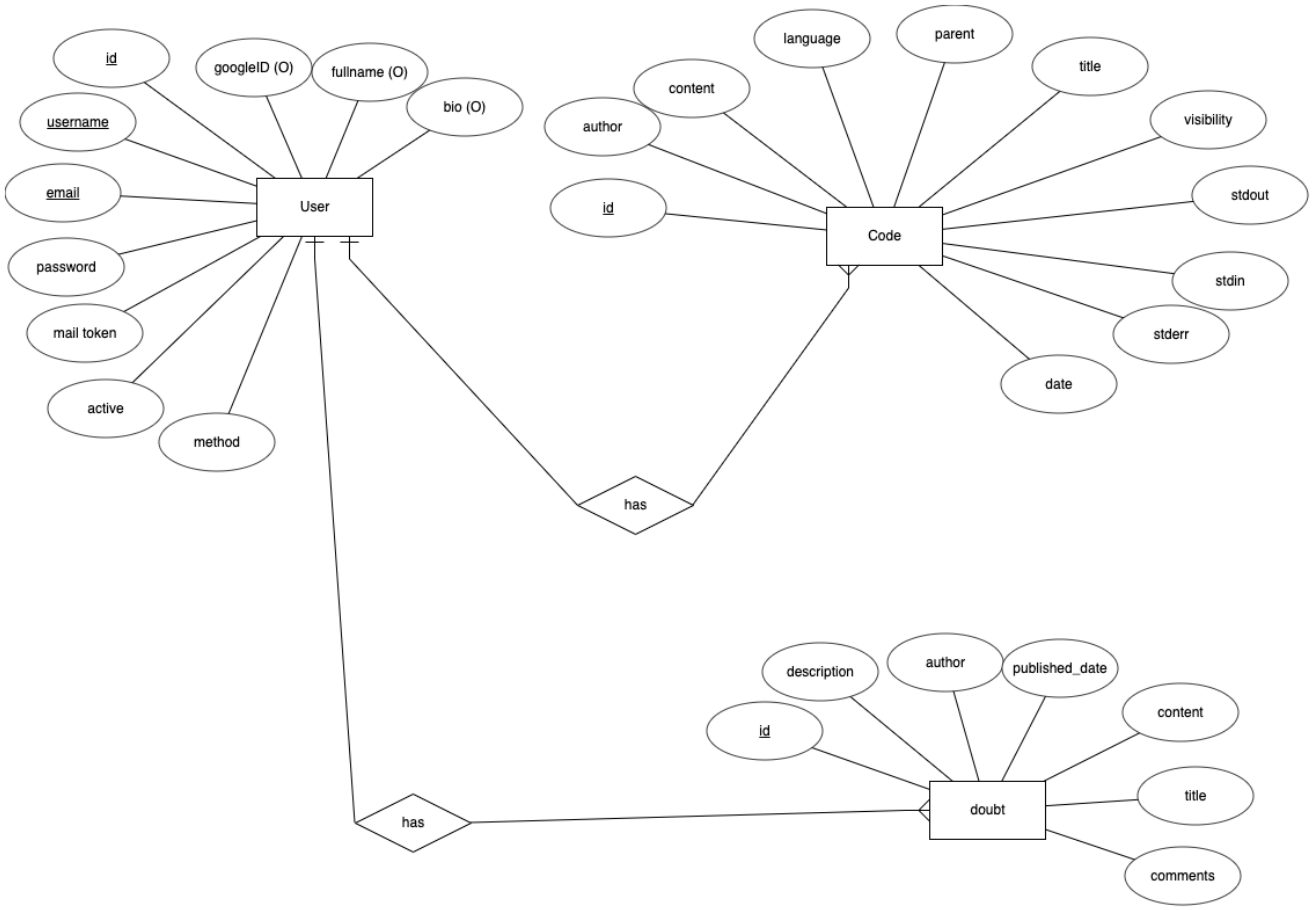
4. Software Quality Attributes

System should be

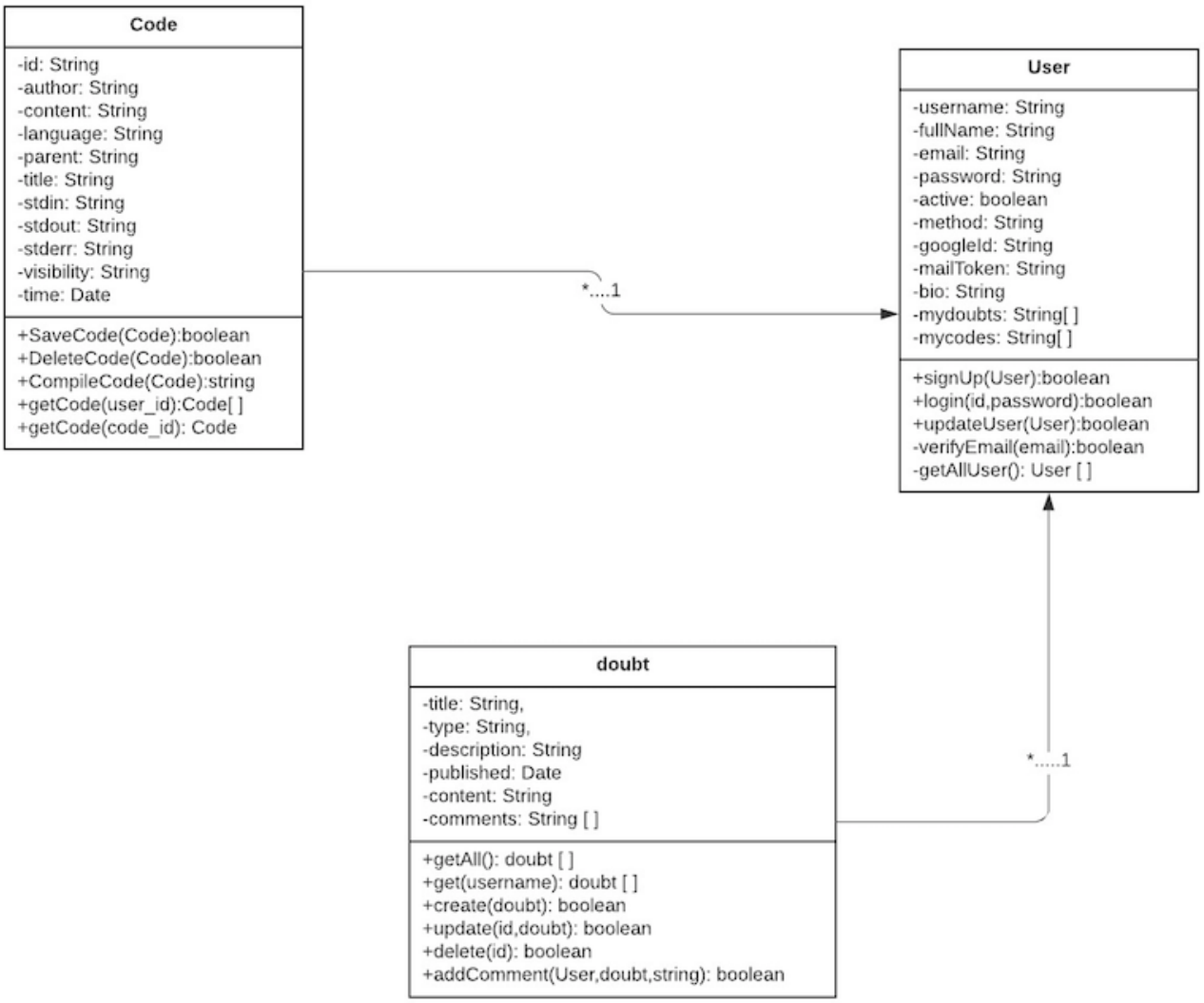
- Consistent in performance
- Safe and Secure
- Robust
- Scalable
- Flexible
- User friendly
- Efficient

4. Implementation Detail

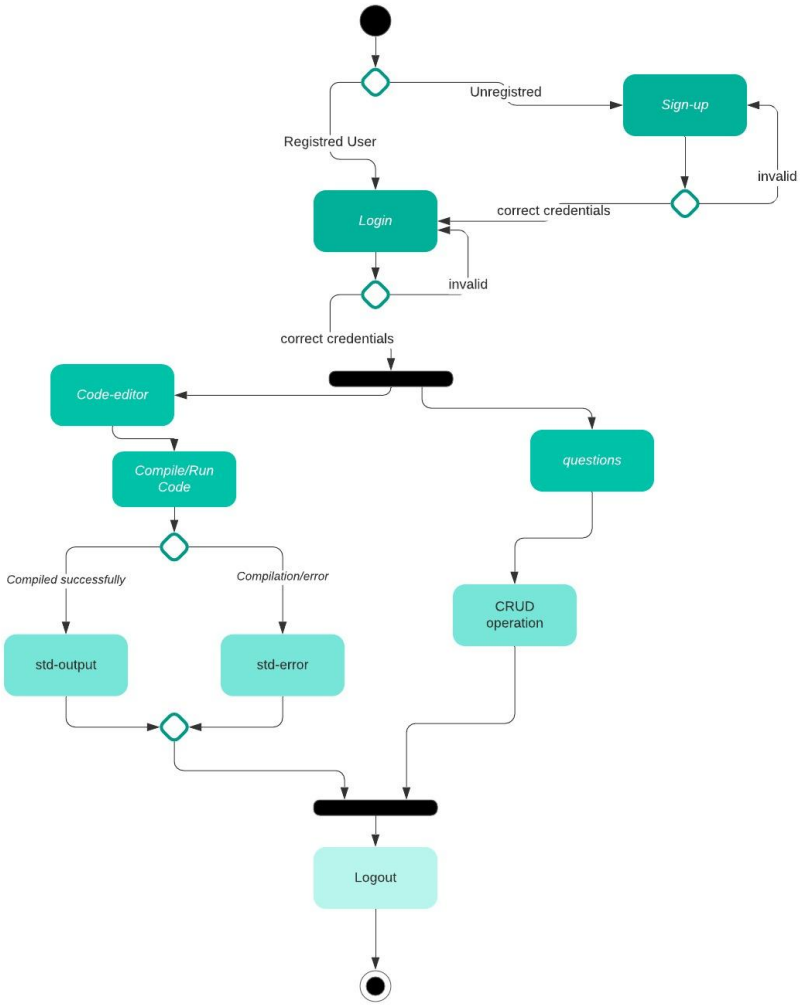
ER diagram



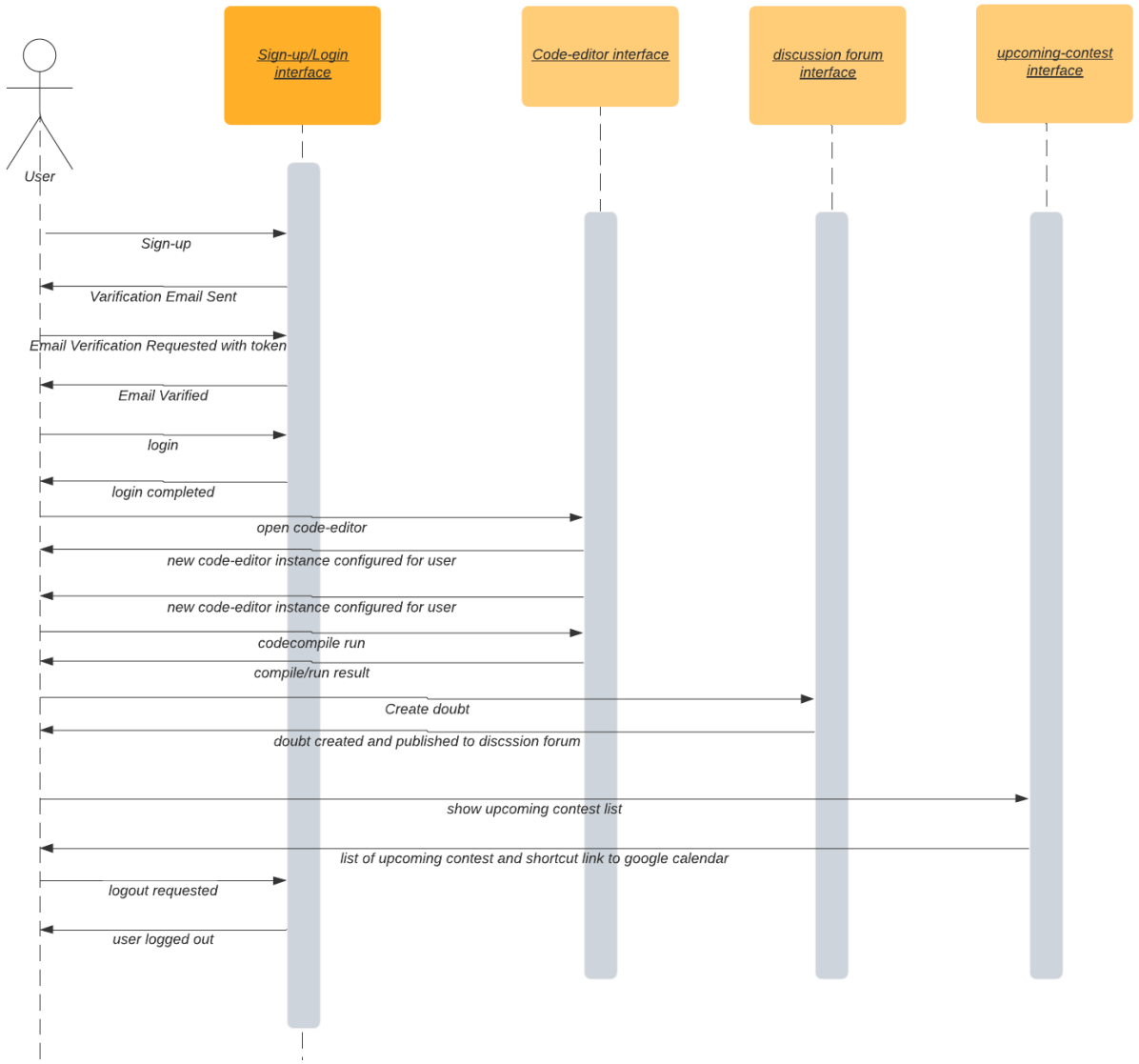
Class diagram



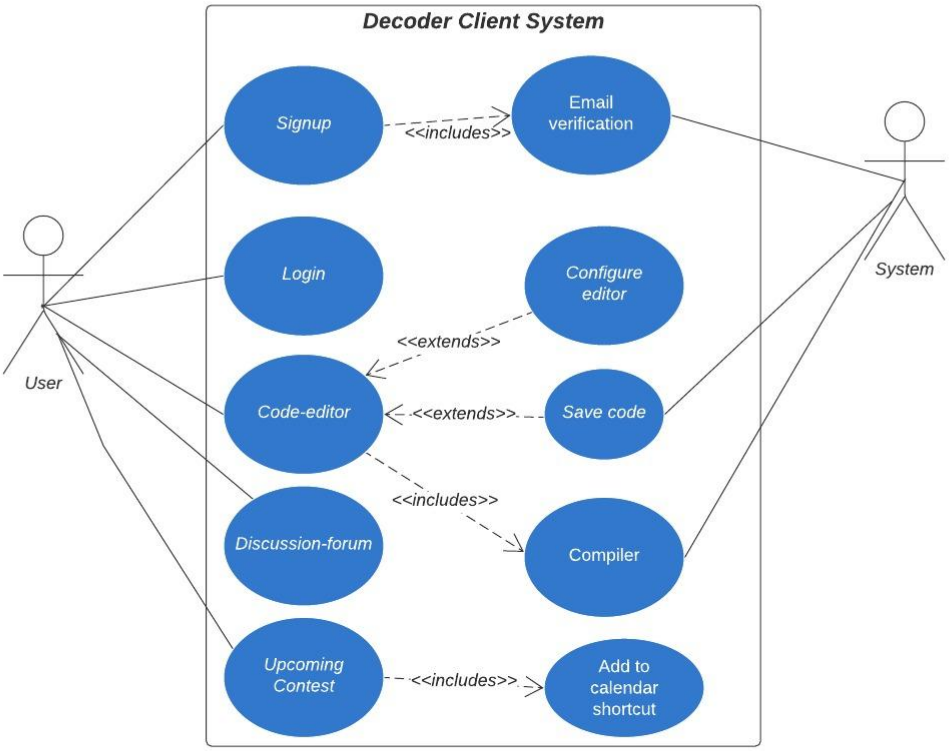
Activity diagram



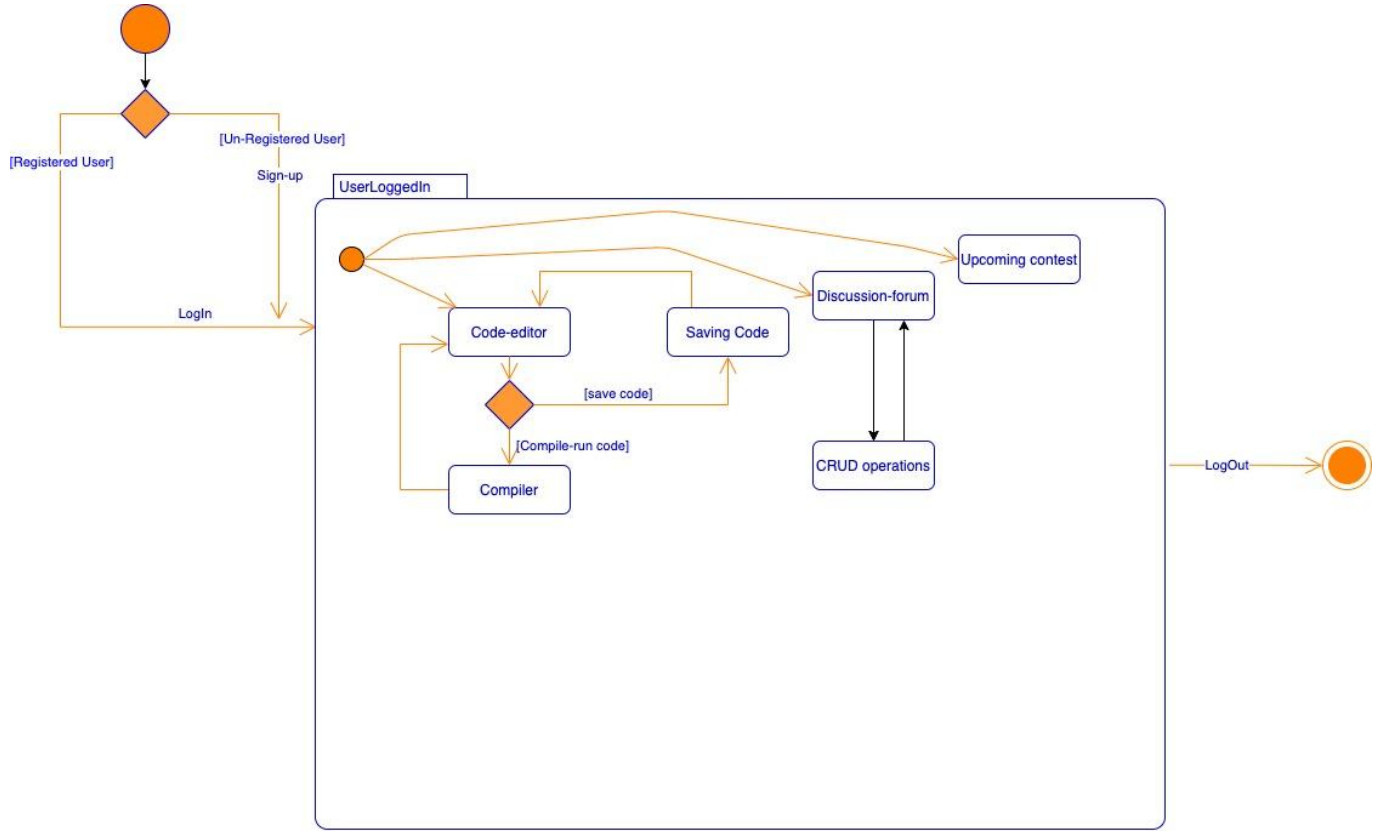
Sequence diagram



Use Case Diagram



State Chart Diagram



Database design

User

_id	Unique primary key
UserName	String
FirstName	String
LastName	String
Bio	String
Password	String

Doubt

_id	Unique primary key
Author	String
Published Date	Date
Title	String
Description	String
Content	String
Comments	Array of comment Comment = {author, content, published date}

Code

_id	Unique primary key
Title	String
Code	String
Input	String
Output	String
Stderr	String
Author	string
Published Date	Date

5. Implementation Detail

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1. Sign-up / Login

Sign-up functionality was successfully implemented. Users should enter valid credentials details during the sign-up process. Proper validation messages are shown if a user gives incorrect/invalid credentials. Verification email is sent to the user to avoid misuse of the email address hence unless the user doesn't confirm email using a token sent to their email address from the system the account will not get activated. Afterwards users will be able to login through either their unique username or email and password.

2. Compiler API

We've created a RESTful API in the backend which will help in compiling the code and then running the code on a certain set of input and yielding the corresponding stdout/stderr.

3. Discussion Forum

We've added functionality of a discussion forum where users can ask doubts, comment on questions and discuss topics. Discussion forum supports markdown syntax so that it would be easier to write mathematical formulations, codes, links etc.

4. Upcoming Contests

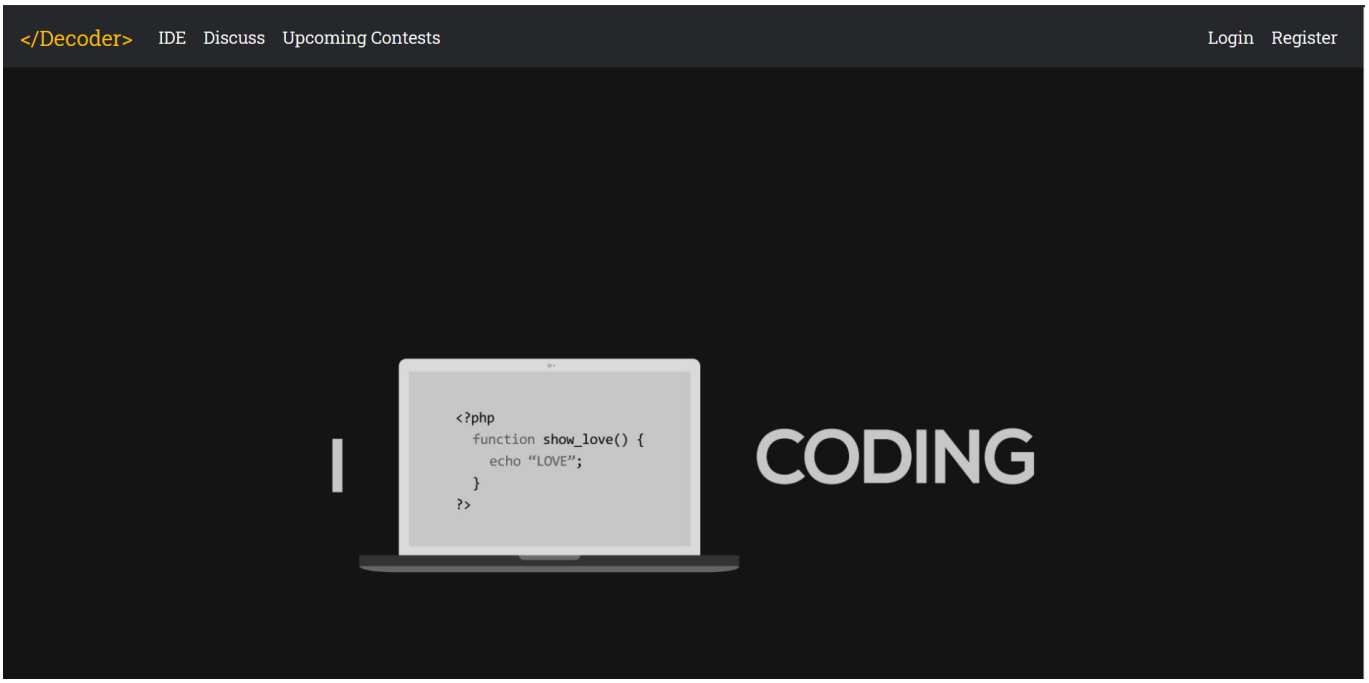
We've fetched future competitive programming contests and listed them down, users can sort them according to the website, search for particular contests, add contests to their google calendar using just one click.The data is fetched using free api provided by kontest.com.

6. Testing

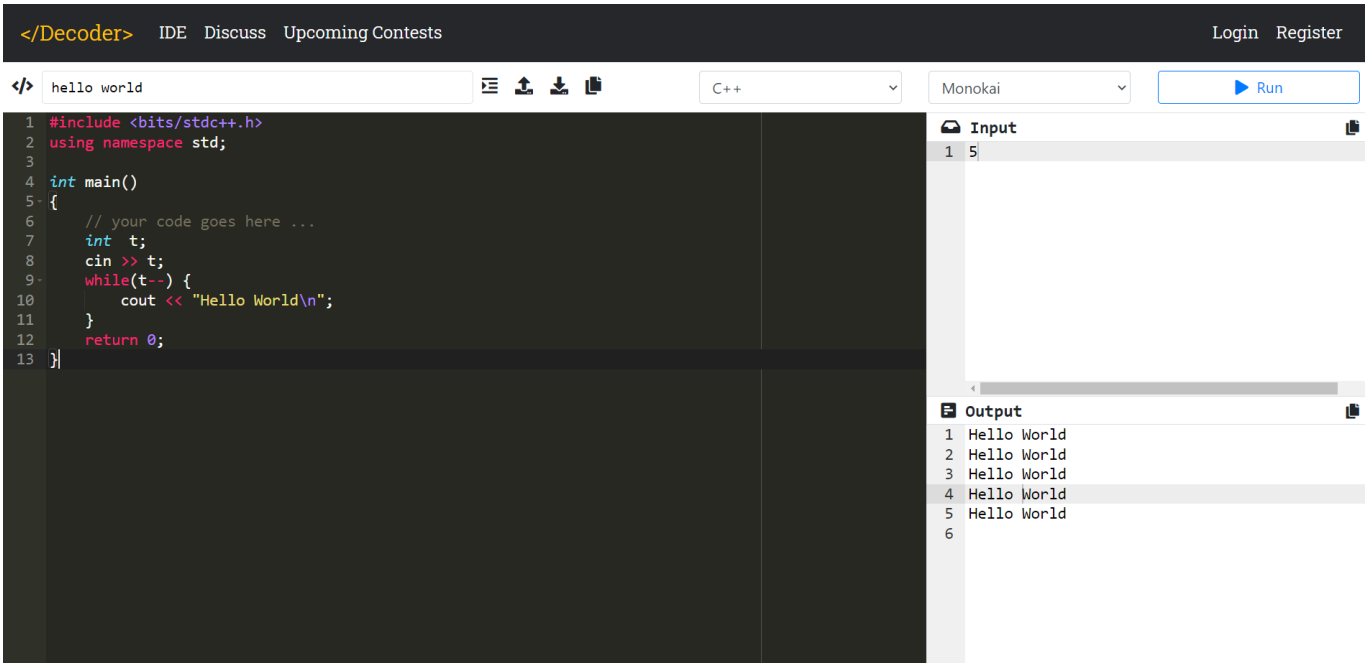
Module	Field names	Expected output	Actual output
Login	Username & Password (correct credentials)	Redirect to Home page	Redirect to Home page
Login	Username & Password (incorrect credentials)	Validation error message and stays on login page	Validation error message and stays on login page
Sign-Up	Email (email which Is already taken)	Warning message and stay to signup page	Warning message and stays on signup page
Blog	Try to create blog without logged in	Warning and redirect to the home page.	Warning and redirect to the home page.
Code-editor	Trying to compile code	Code compilation successful and corresponding stderr/stdout is given	As expected

7. Screenshots

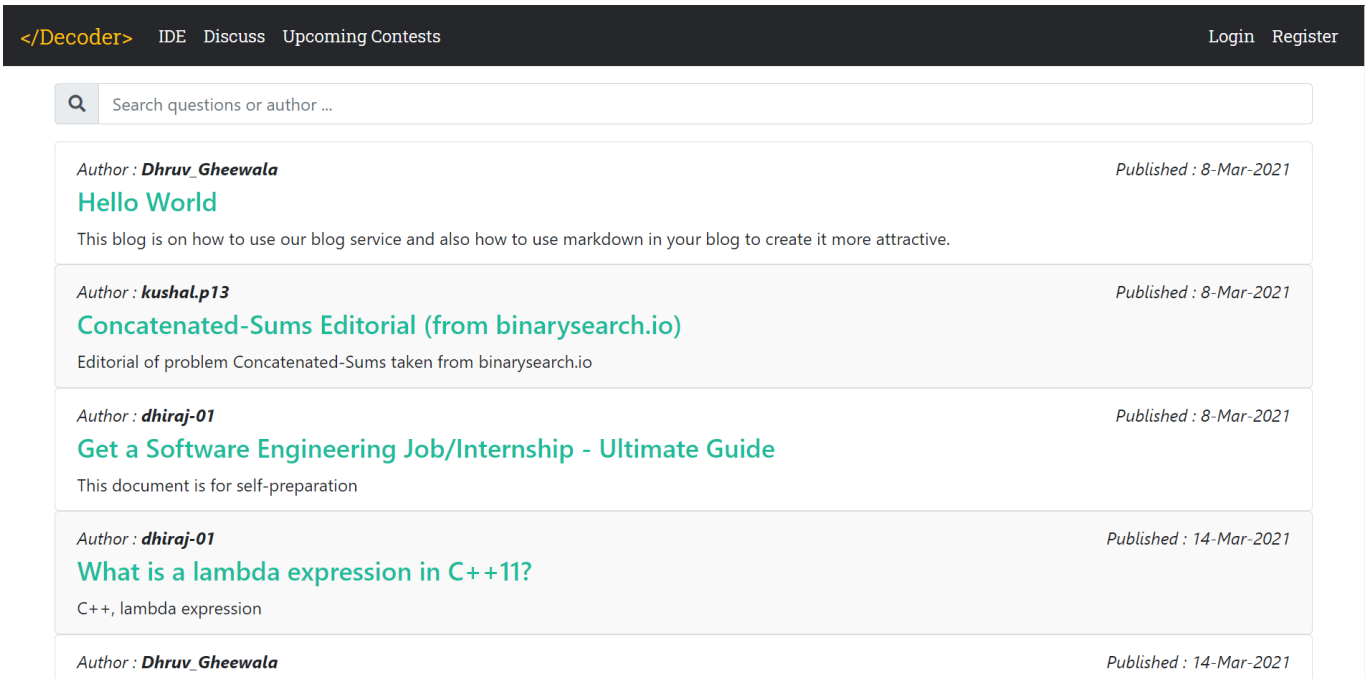
Home page of the website contains a navbar for ide, discussion forum, upcoming contest, login and register.



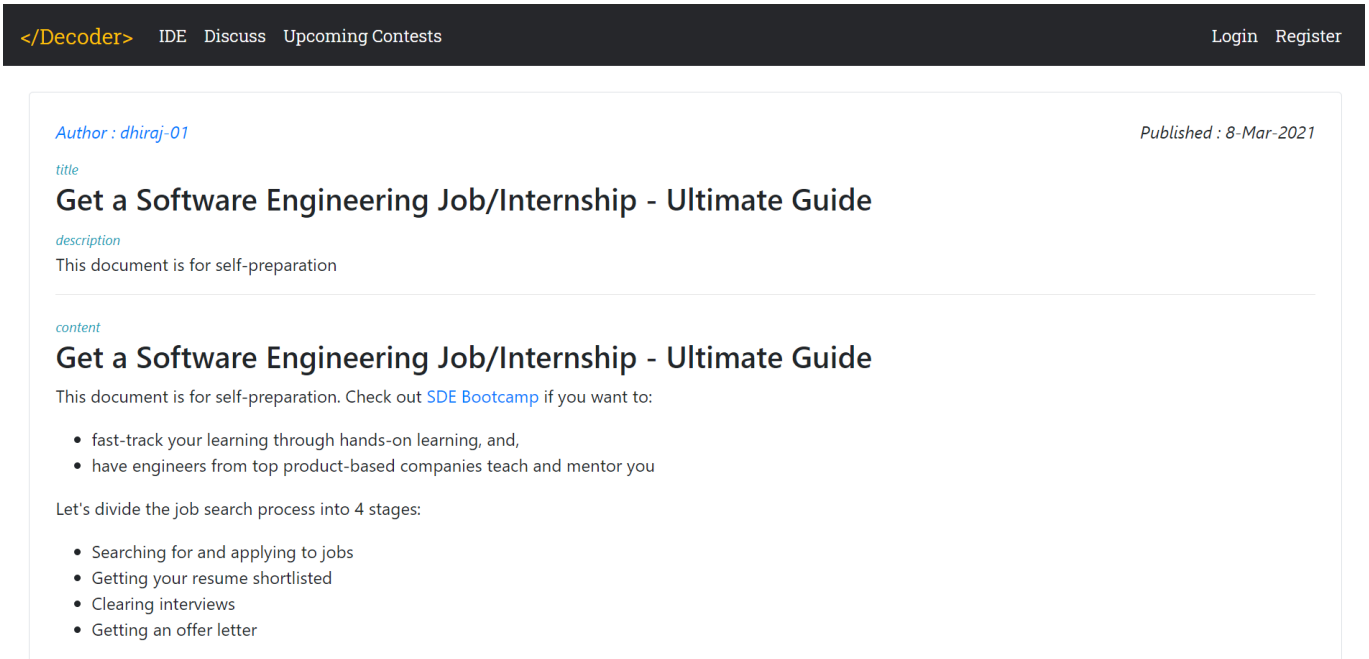
Code ide with different languages and themes with 3 sections: code editor, input editor and output editor.



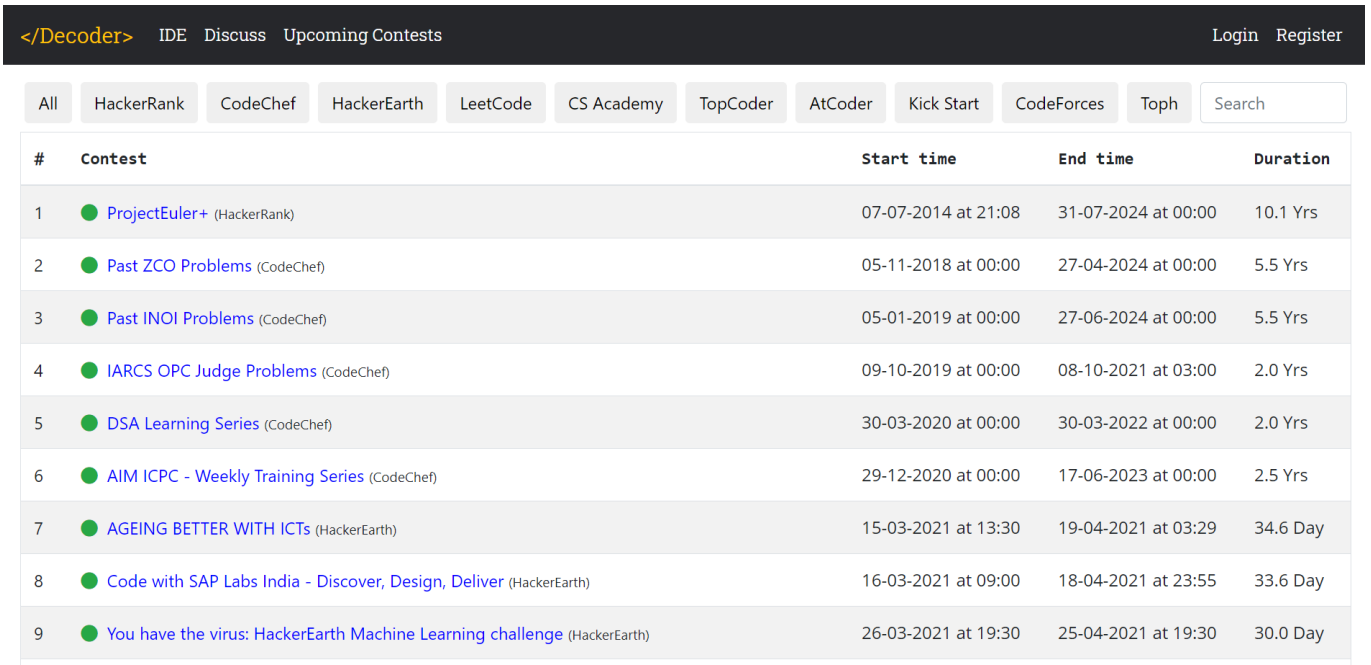
Discussion forums contain recent doubts asked by different authors.



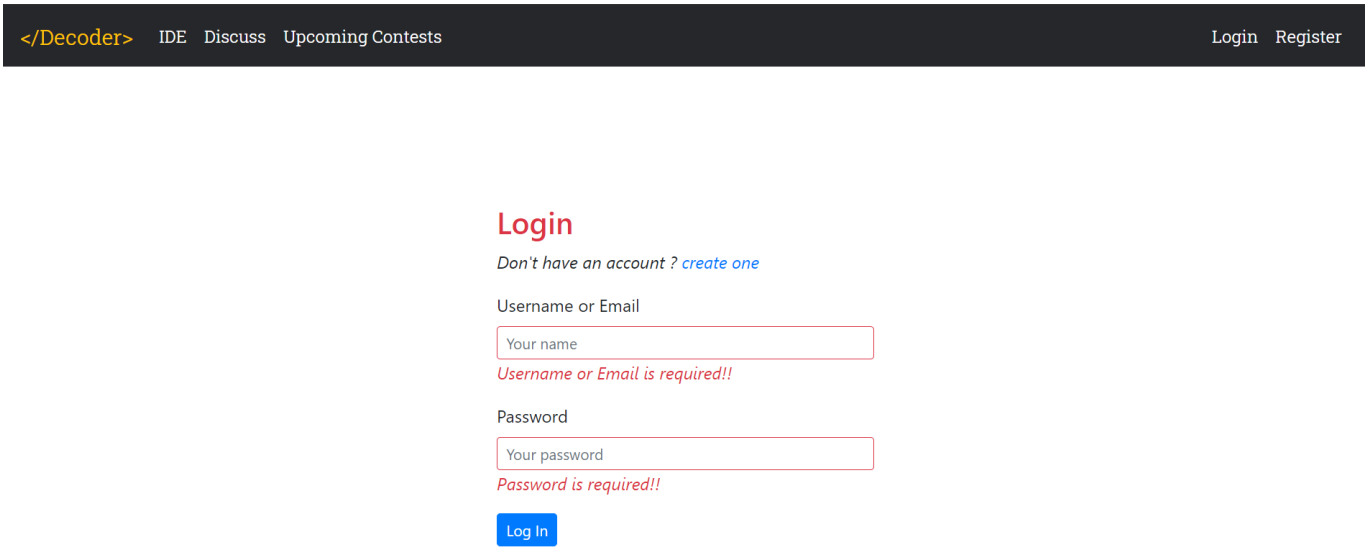
View / read particular doubt



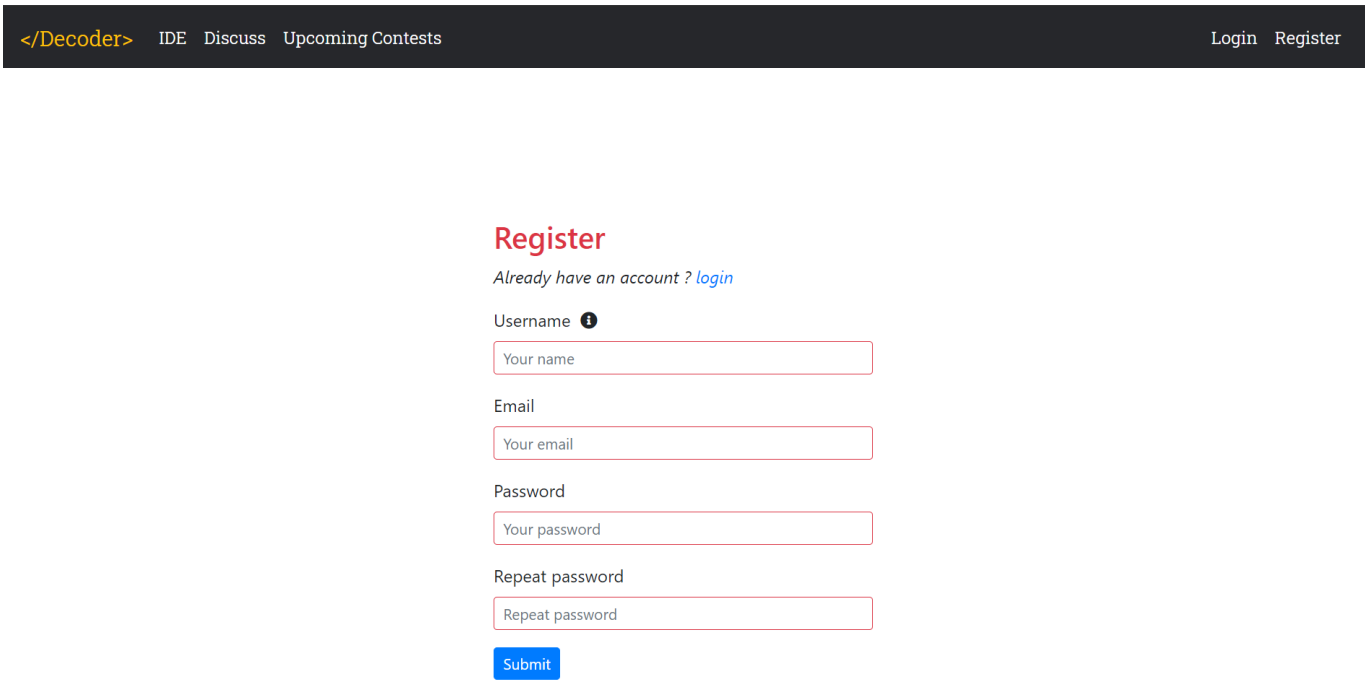
Upcoming contests list on different platforms



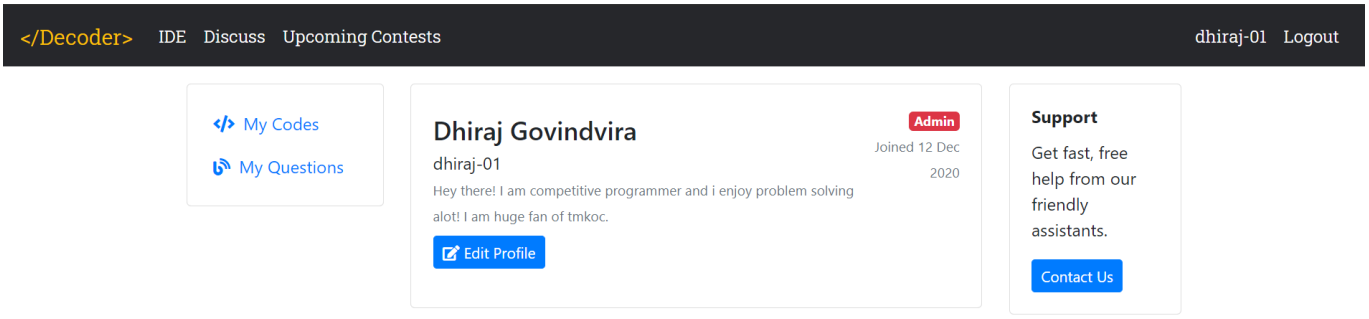
Login page



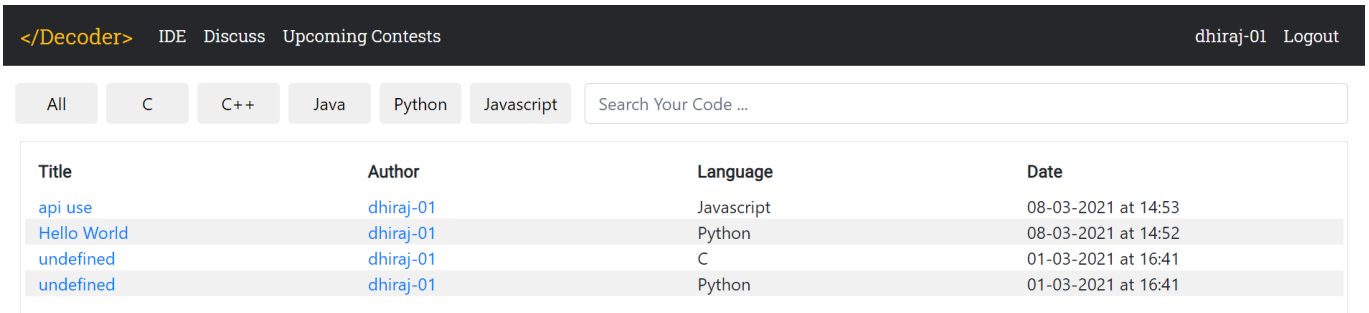
Registration page



Profile page



User saved code



8. Conclusion

The solution is to provide an online tool that gives a compiler for popular languages so that programmers don't have to waste their time in installing SDKs and compilers for different languages and setting up their own environment. Discussion forum to get most out of the competitive programmer's community and contribute towards the community. Contest time table to get up to date with upcoming contest timings and duration.

9. Future Extension

The future extension of this project should include support for more programming languages, unlimited compilation requests, and free compilation api for developers to create more and more competitive programming helper tools.

10. References

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- https://codeforces.com/
- https://www.codechef.com/
- https://atcoder.jp/
- https://ideone.com/
- https://pastebin.com/
- https://www.jdoodle.com/
- https://www.kontests.net/

Thank You