Military Institute of Science & Technology (MIST)

Mirpur Cantonment, Dhaka-1216, Bangladesh

Department of Computer Science & Engineering

CSE 220: Object Oriented Programming Sessional-II

Group No: O_6

Name of the Project: **RedSet**

Team members

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Introduction:

RedSet is a project which is designed to create a learning environment for the students who are eager to learn about Data Structures & Algorithms. It is quite hard to get all the necessary materials to get started with Data Structures in one place. Though materials can be found often but it is hard to find problem sets and related to the data structures.

Not only this, a teacher associated with Institutions can also use this application to provide assignments among students and teach them about Data Structures and Algorithms. Through the application, it is possible to try out problems related to the data structures that the students want to learn and check whether the solutions to the problem are correct or not through an inbuilt compiler in RedSet, which can be customized with inputs that the teacher can give.

Altogether RedSet is a user-friendly application that helps students to develop their skills. Moreover, it also helps the teacher to create an environment.

Features:

- **Responsive GUI:** RedSet comes with a responsive Graphical User Interface.
- **Effective Data Visualization:** RedSet provides its user with his own dataset which are depicted in graphs and pie-charts.
- **Role Based Interface:** RedSet offers a platform for the students as well as the teachers. It also offers an interface where teachers can assign tasks to the students which is distinctively role based.
- **Online Judge:** RedSet offers a simple code editor with highlighting syntax of C++ code that can judge the solution on the basis of time and memory limit with appropriate test cases.

- **Notes:** RedSet can become one of the best place for programmers as they can save their essentials and templates and use them effectively.
- **Topic Based Learning:** RedSet offers students to learn and solve problems in organized manner. They can selectively choose topics they want to learn and solve problems related to the following topic.
- **Effective Judgement:** Teachers can judge their students effectively. They can look into a student's participation in contests, the submission time of the solutions submitted as well as the code they submitted to judge them properly.
- **Fastest Judgement:** As RedSet comes with its very own compiler, the teachers don't need to check those hectic long codes manually anymore. If the solutions are accepted the teachers can view the codes with accepted texts and can mark the students on the basis of the accepted code.
- **Modifying Assignments:** The teachers can change the test cases, time limit, and his/her own solution code and modify the statements with the help of RedSet.
- **Adding members as Teacher:** The teachers of a group can promote a user to a teacher by using his/her username. After being promoted, the user can access all the features that only a teacher can access.
- **Hosting Contests:** It is possible for the teachers of a group to host a contest. They can update the contest at any moment if required. Participants can see other submissions after the contest. But the teachers can view those submissions at any moment.

Log In Sign Up:

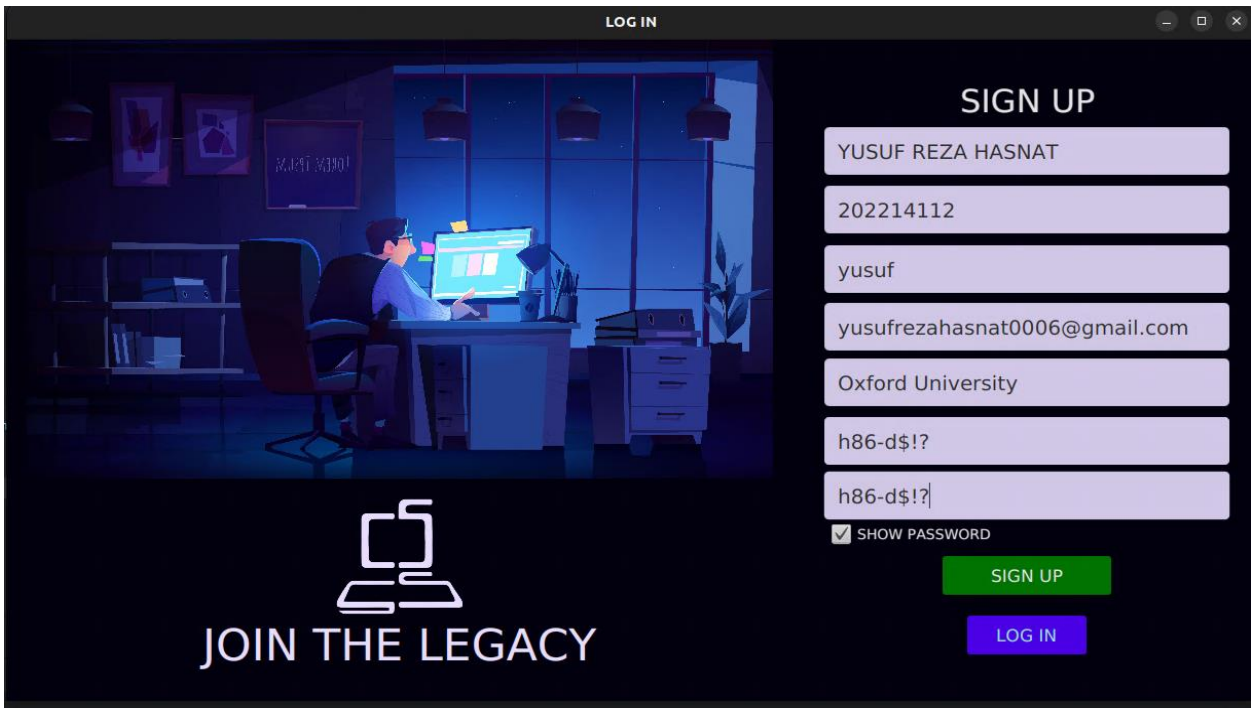


Figure 01: Sign Up

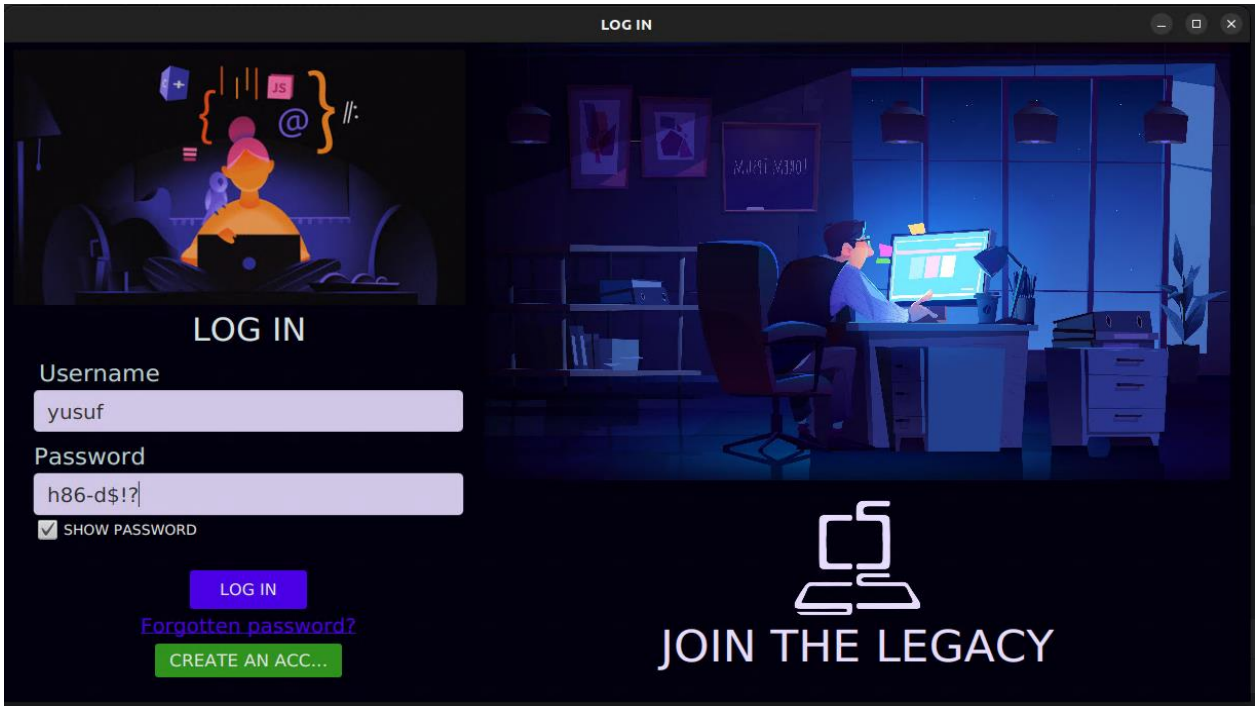
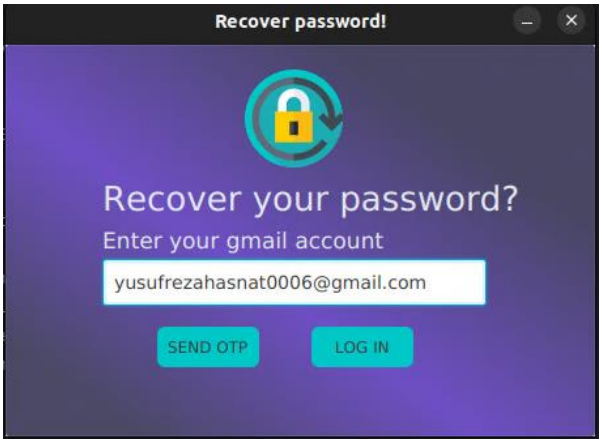
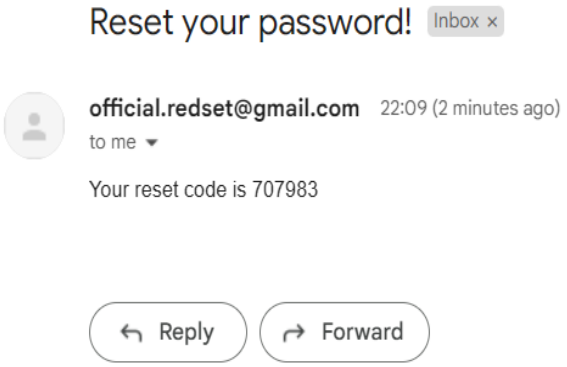


Figure 02: Log In





User can reset password by **Forgotten Password** and then verify using email account which is provided during sign up time. A six-digit OTP is sent to the user email address which is needed to recover the password.

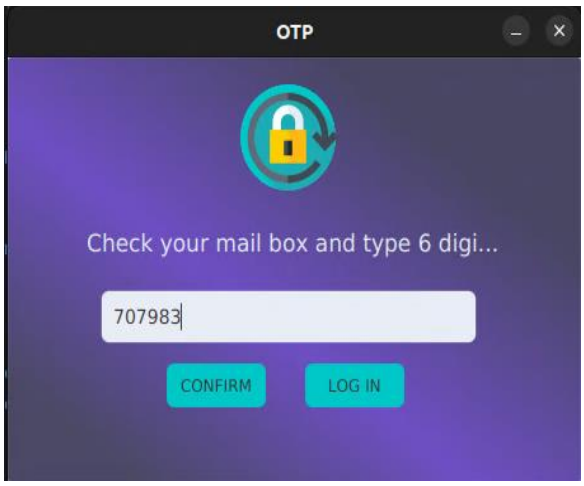


Figure 03: Password recover

Dashboard:

In dashboard user can see all the necessary information and shortcut button.

RedSet button opens the documentation of the project.

By clicking **RUNNING CONTEST** button user can directly go to running contest section. The **POINT** is generated on the basis of used time of the application and a **leaderboard** (Figure 07) is also present here which indicates the most active user in the RedSet community.

By clicking **NOTES** button user directly go to notes section (Figure 05) where user can see saved notes and can create and update notes.

The graph shows the activity of a user for last 30 days. The pie chart shows the information of the topics in **STUDY** section.

LATTICELINE is an exclusive feature of **RedSet** and **CONTEST** opens the upcoming contests of all the connected groups in LatticeLine.

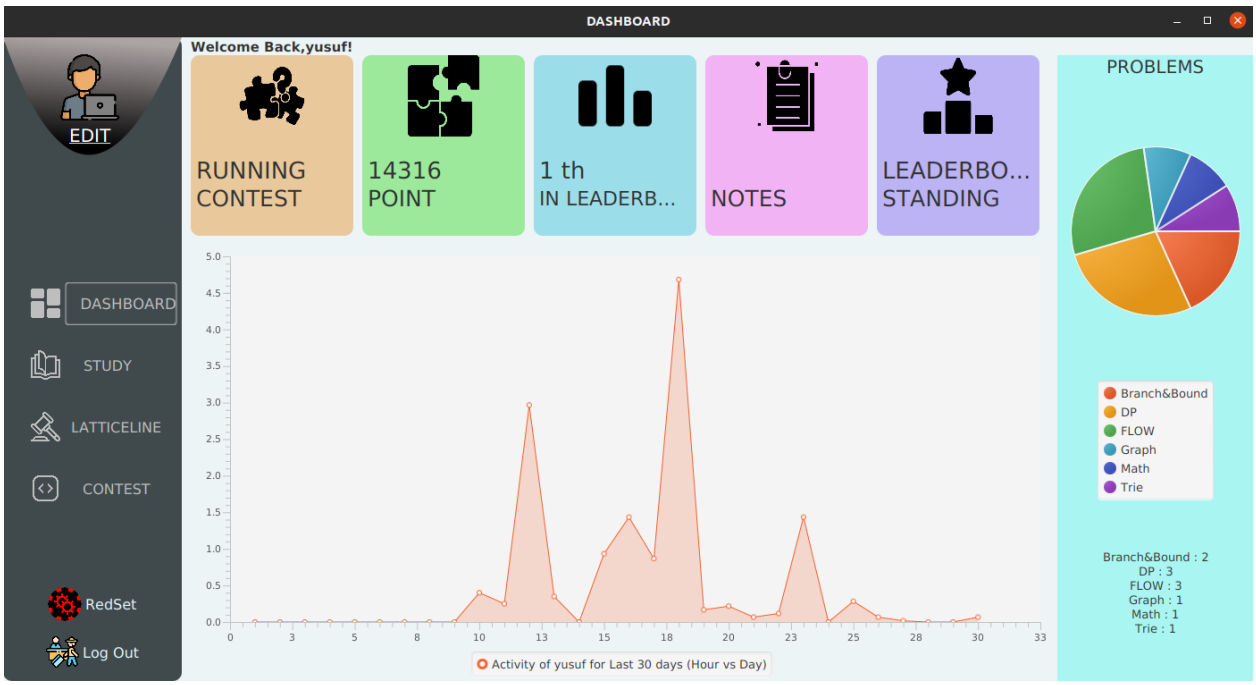


Figure 04: Dashboard

Notes:

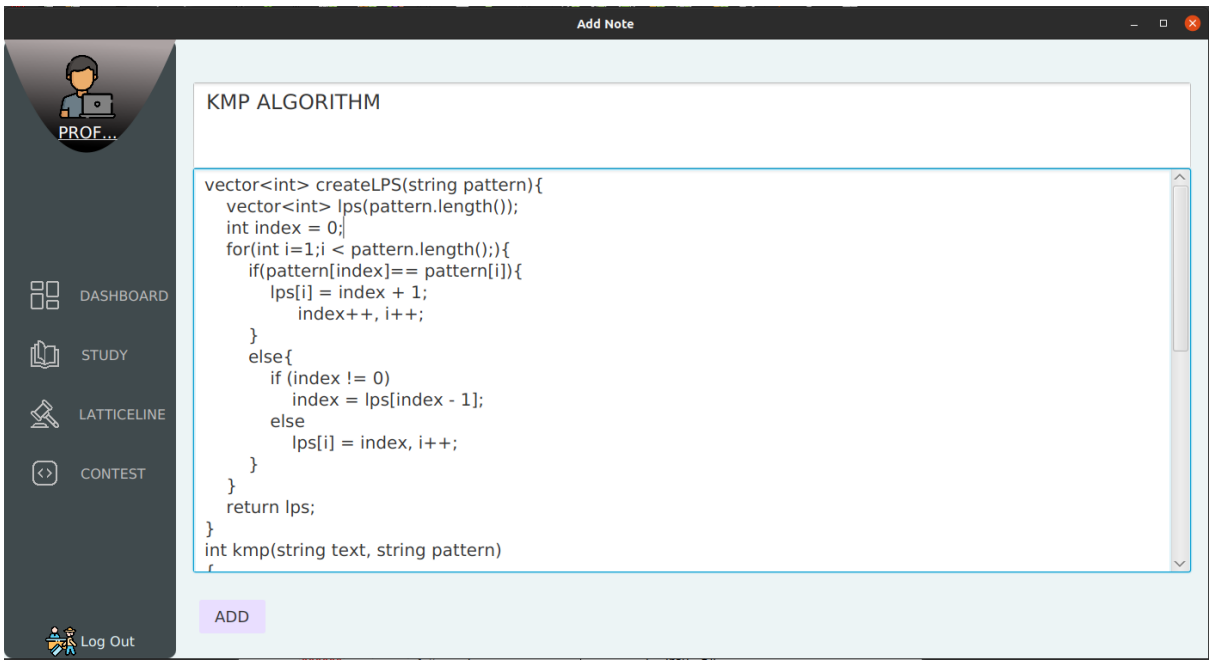


Figure 05: Add Notes

In Notes Section user can add, update and delete notes. Figure 06 shows the saved notes by the user. User can use this note section as a codebook where he can store all the necessary codes and algorithms.

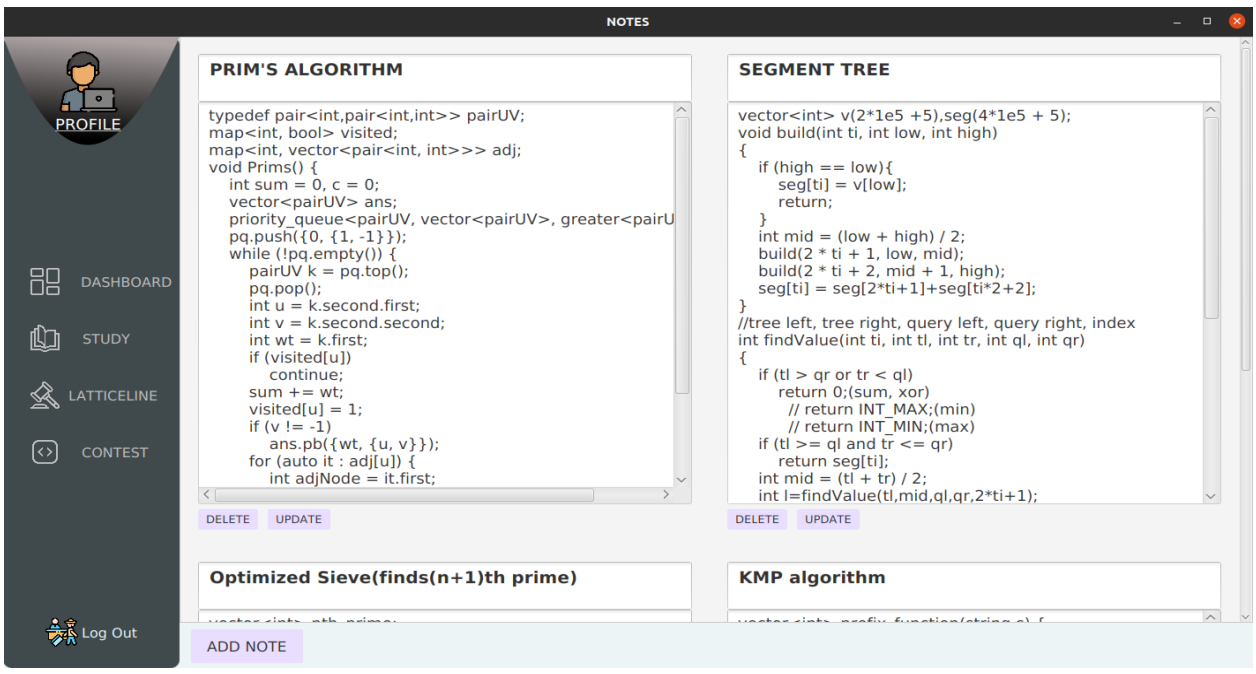


Figure 06: View Notes

Leaderboard:

Here user can see the standing of all the users in RedSet community. Standing is based on the total points of a user.

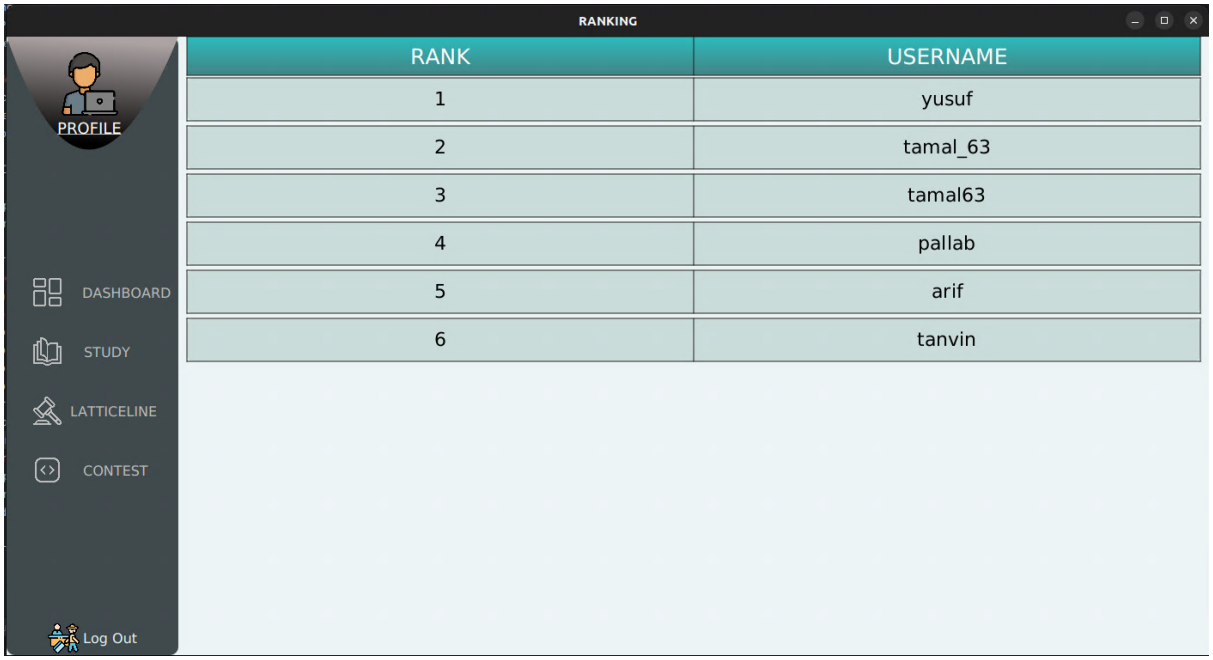


Figure 07: Leaderboard

Study:

In study section, user can see all the topics of algorithm including the number of problems in a particular topic. User can enter a topic and view the problems in that topic.

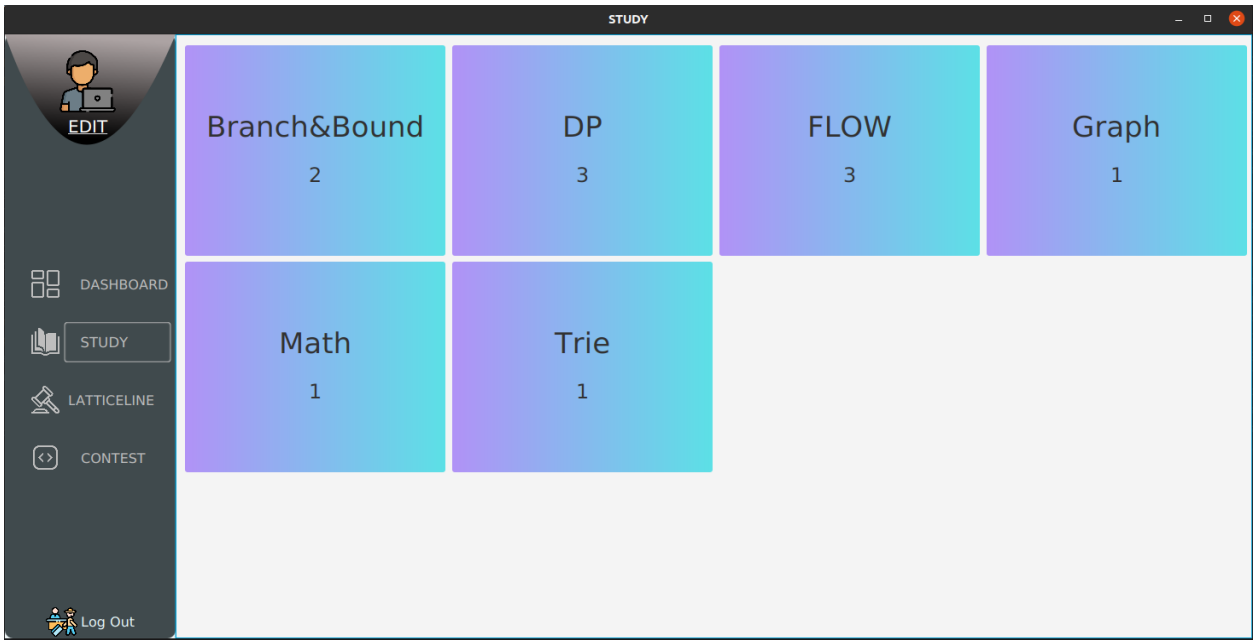


Figure 08: Topics

Figure 09 shows the problems in a topic. Here user can solve the problem or learn how to solve that problem by reading editorial which lies in **Solution** button.

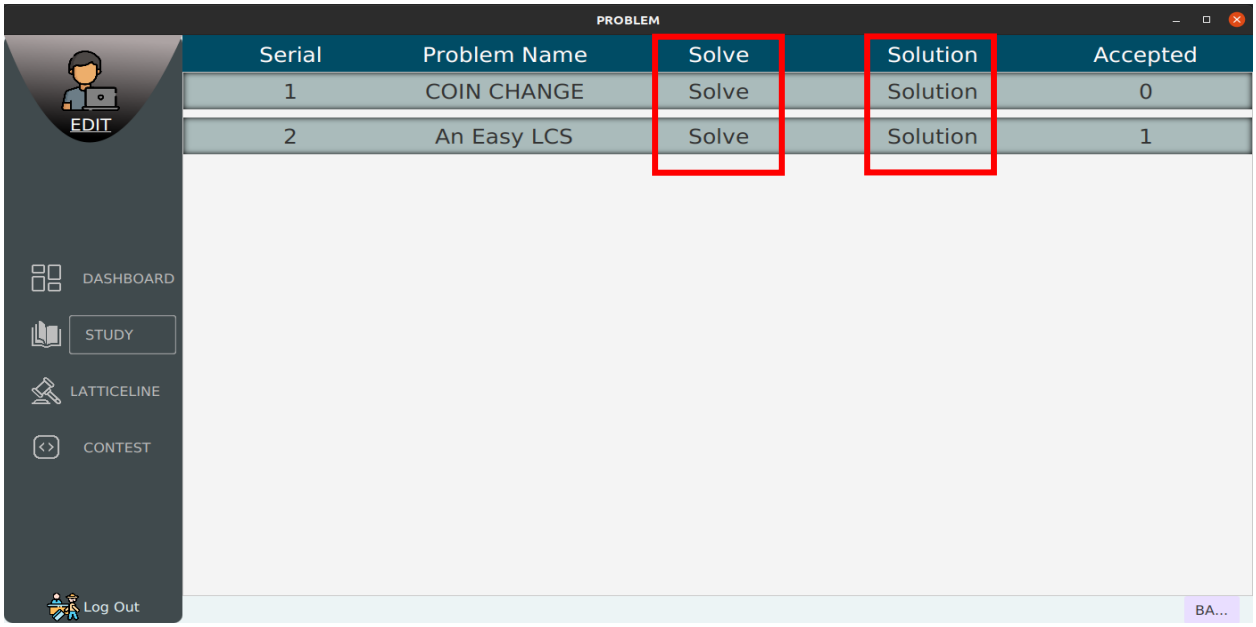


Figure 09: Problem in specific topic

Figure 10 shows that a user is solved COIN CHANGE problem.

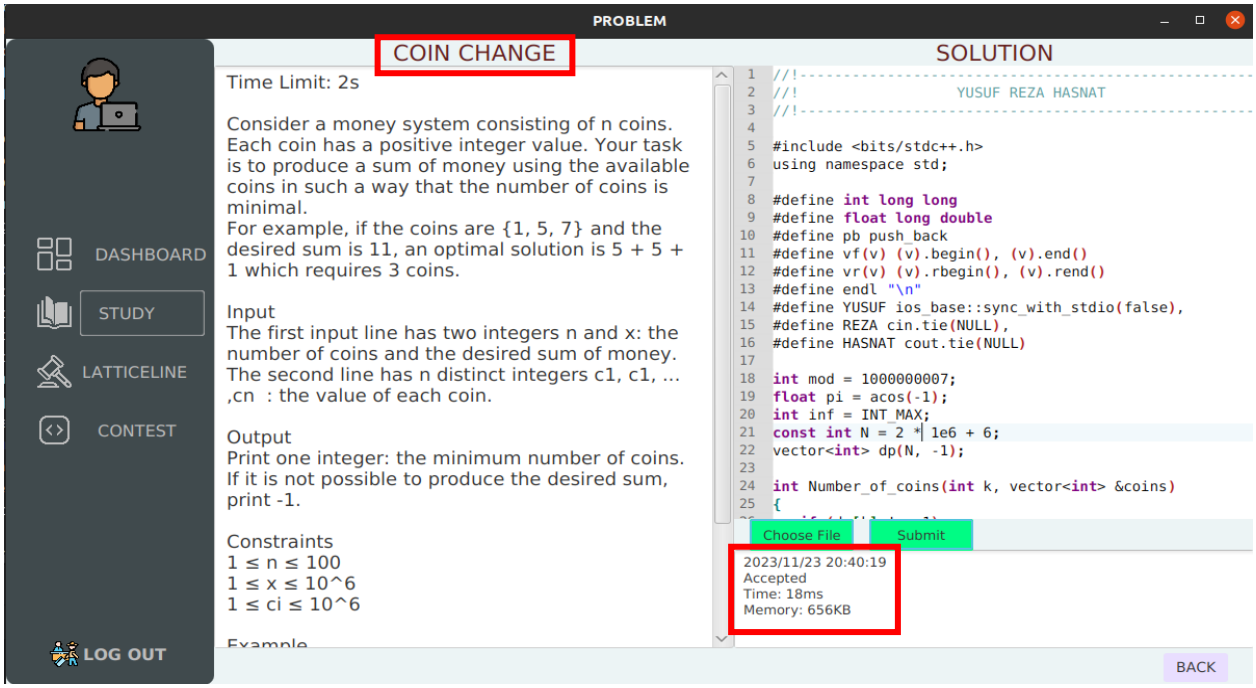


Figure 10: Solve a problem

If a user fails to solve any problem, then he/she can see the solution of that problem by clicking **Solution** button (Figure 09).

Solution section consists of editorial and accepted solution. User can read the editorial and understand the approach to solve that problem.

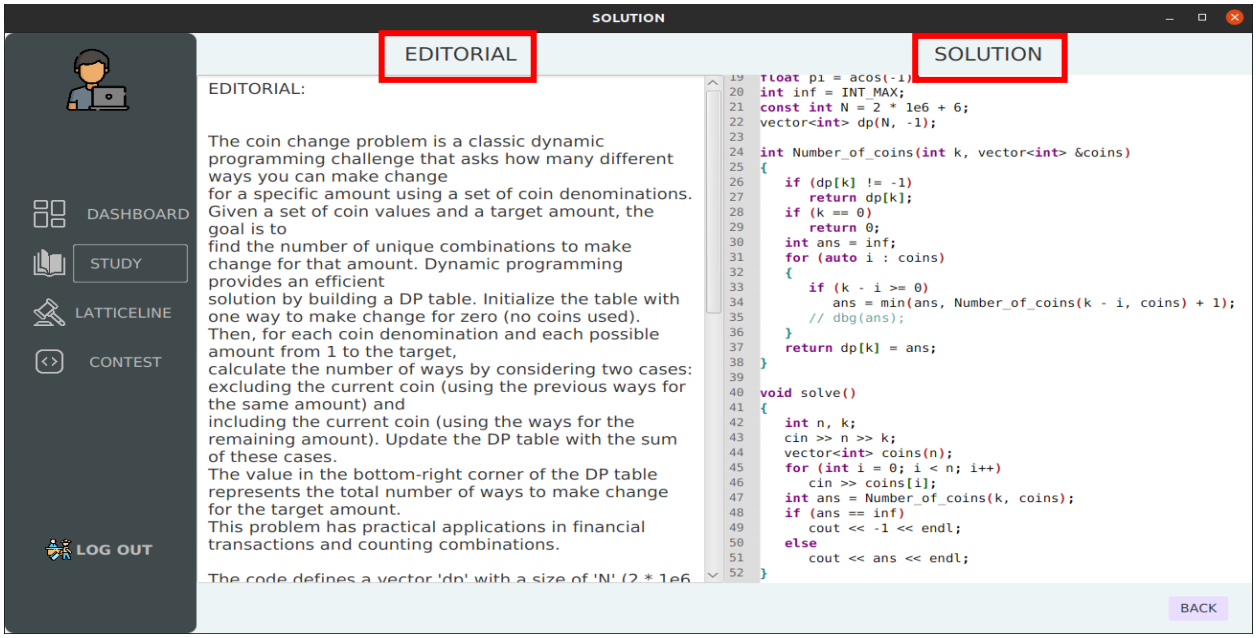


Figure 11: Editorial

Latticeline:

It is an exclusive part of **RedSet**. Features of Latticeline:

- Solving problem from problem section.
- Users can create group or join an existing group.
- Teachers of a group can create assignments, announcements and contests .
- Assignment of a student will only be accepted when all the testcases for this assignment is passed, like an online judge.
- Teachers can see the status of every assignment.
- Users can see real-time ranking of a contest.
- All the submissions of a contest will visible after the contest end.
- Contests and assignments are editable/updatable.
- Teachers can add a user as teacher from the group.

Problem Section:

In this section any user can solve a problem. These problems are added by RedSet.

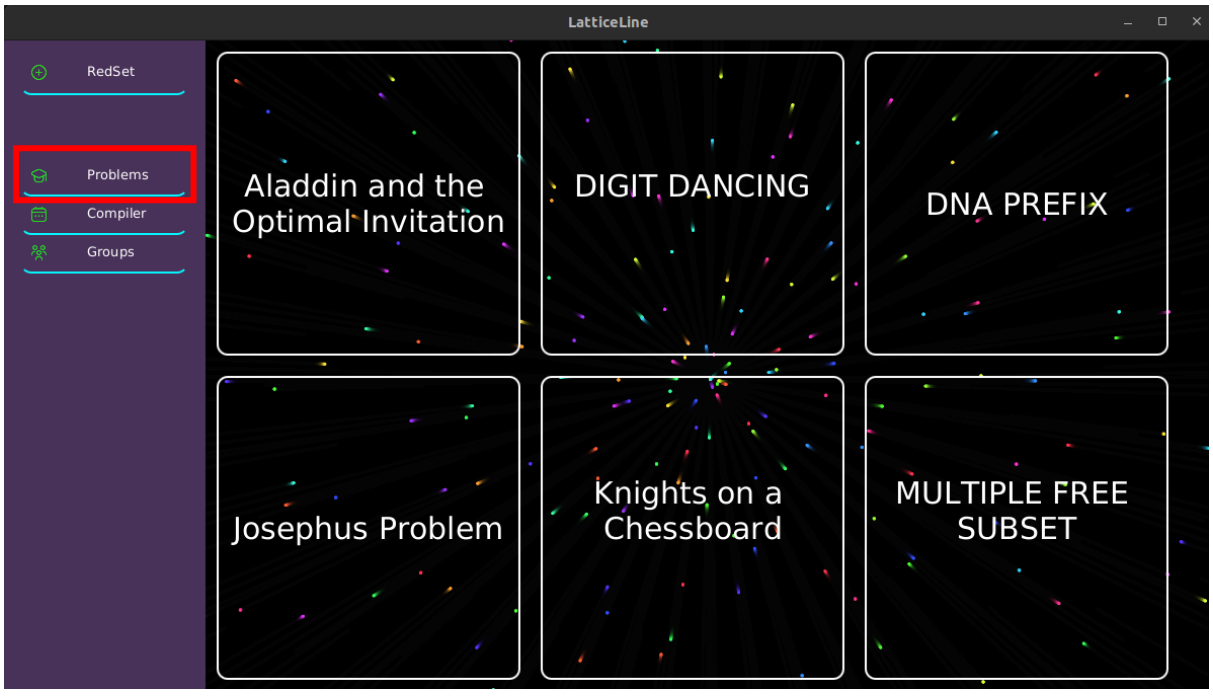


Figure 12: Problem Section

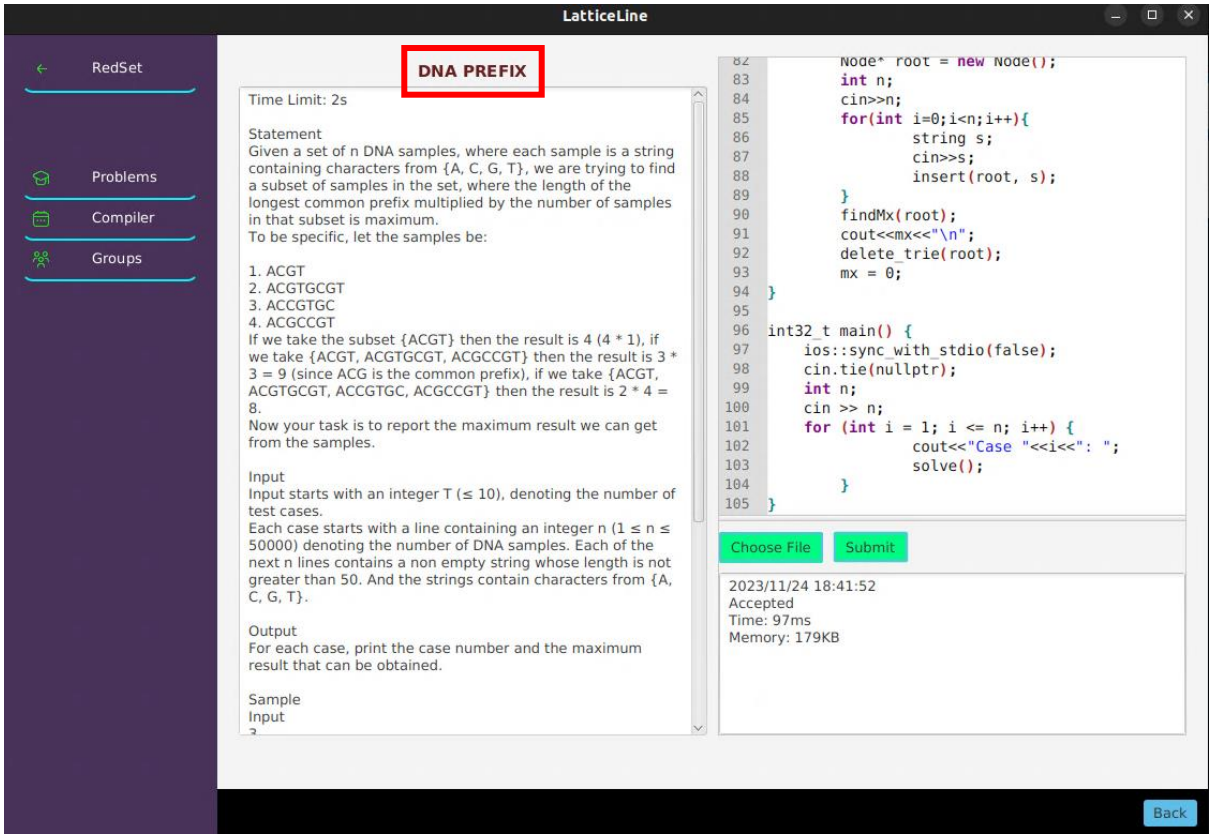


Figure 13: Solve the **DNA PREFIX** problem

User can submit solution of a problem. The compiler will verify the solution.

If the solution is not correct then the compiler will show a message with testcases where the solution gave wrong output.

Else the compiler will show accepted message with required time and memory limit. If user re-entered this problem, then the accepted solution with accepted message (time and memory limit) of that user will visible.

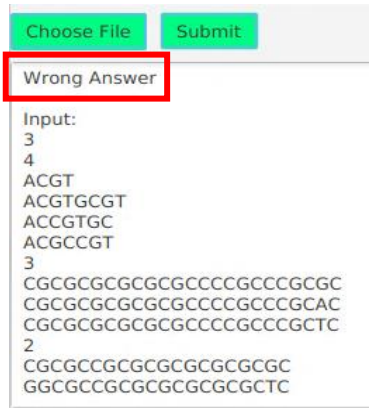


Figure 14: Wrong output

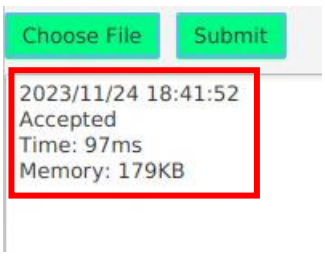


Figure 15: Accepted output

Compiler Section:

Figure 16: Compiler

It is a simple editor with highlighting syntax of C++ code feature that shows output including time and memory complexity. You can choose a file to compile from choose button. Only C++ is available right now.

Compiler can show compile error & runtime error. User can choose a file by clicking **Choose File** button.

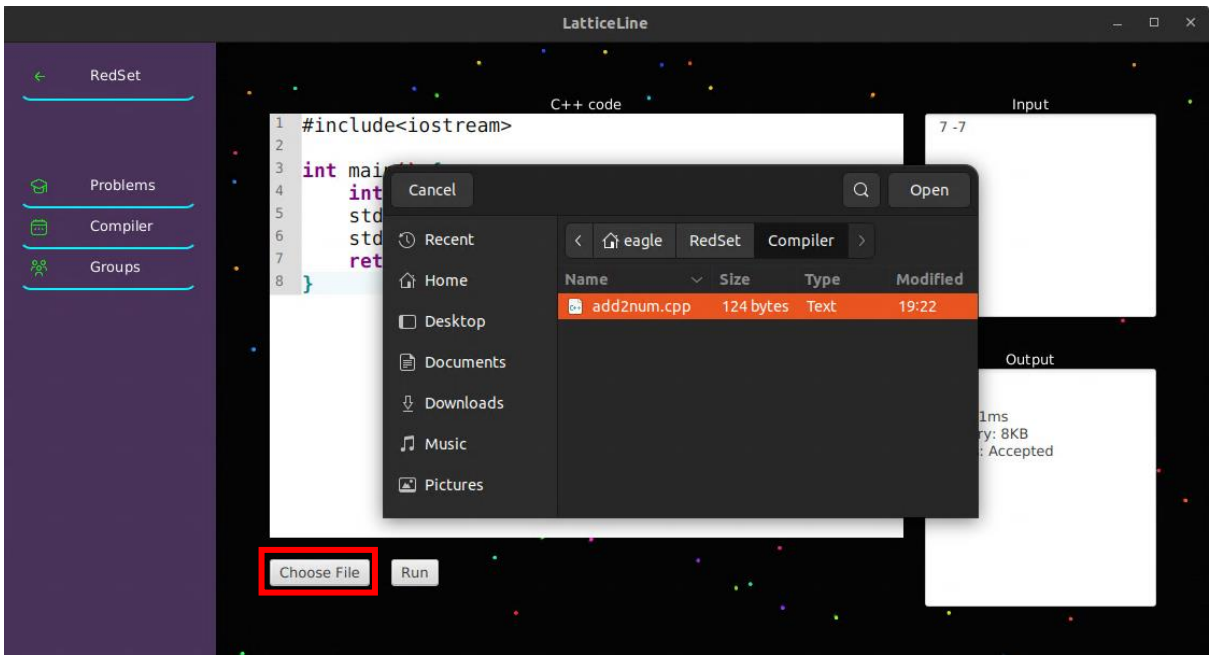


Figure 17: Choose file

Groups Section:

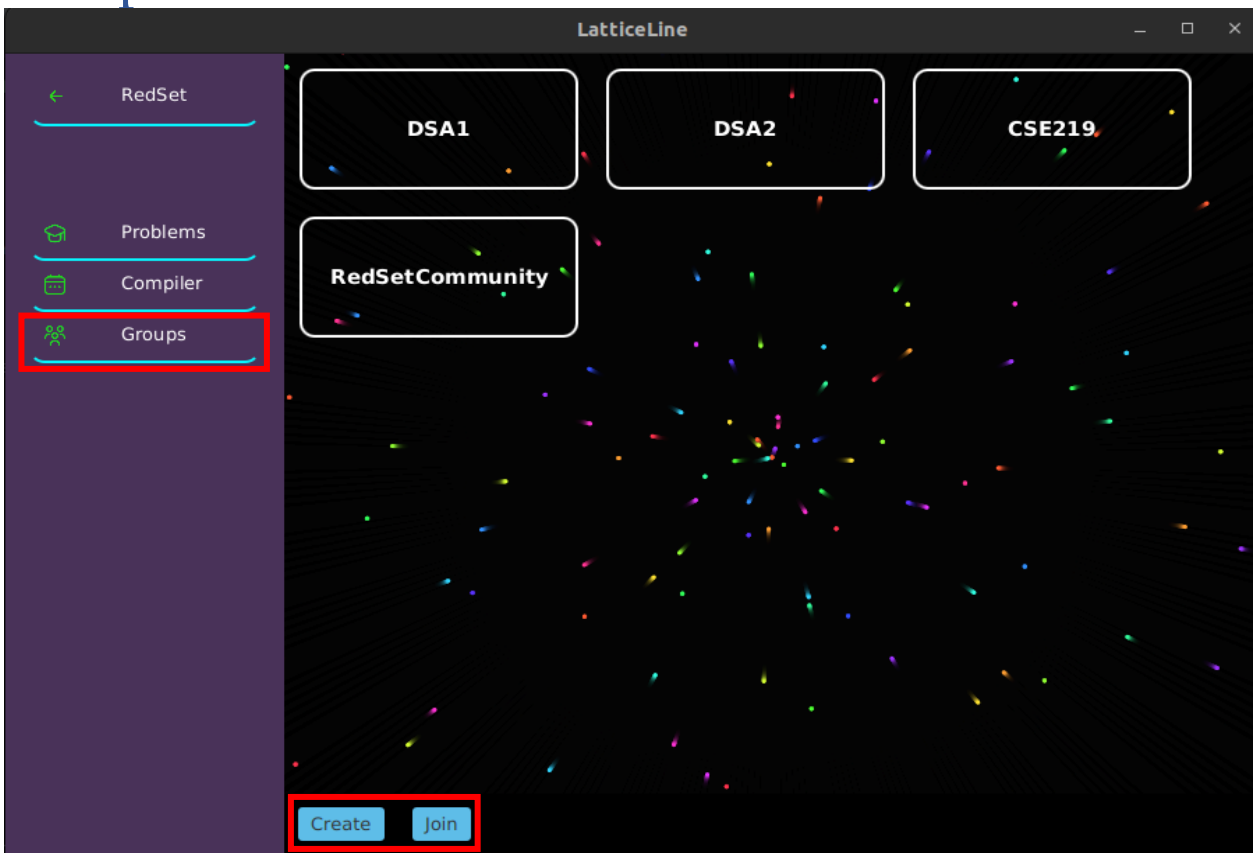


Figure 18: Groups

Join and Create group:

In the group section user can see the connected groups. User can create a group as a teacher or join a group as a student by clicking **Create** & **Join** button showing in the bottom section. While creating a group, the name of that group should be unique.

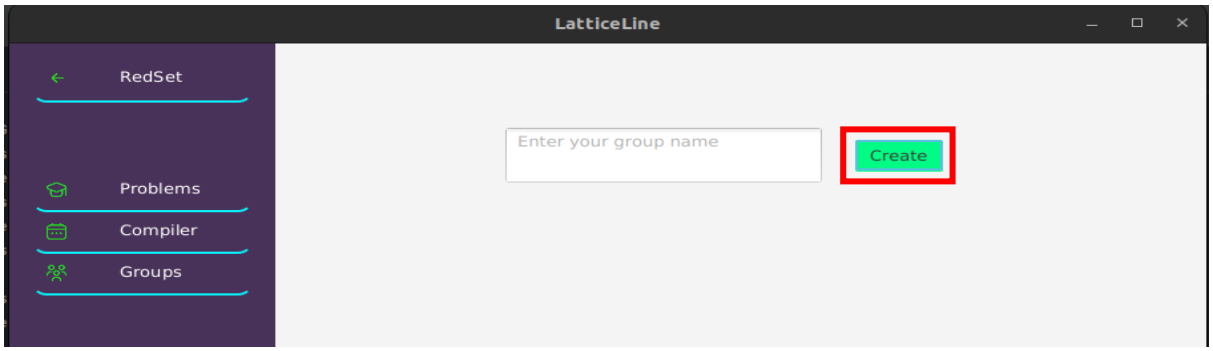


Figure 19: Create Group

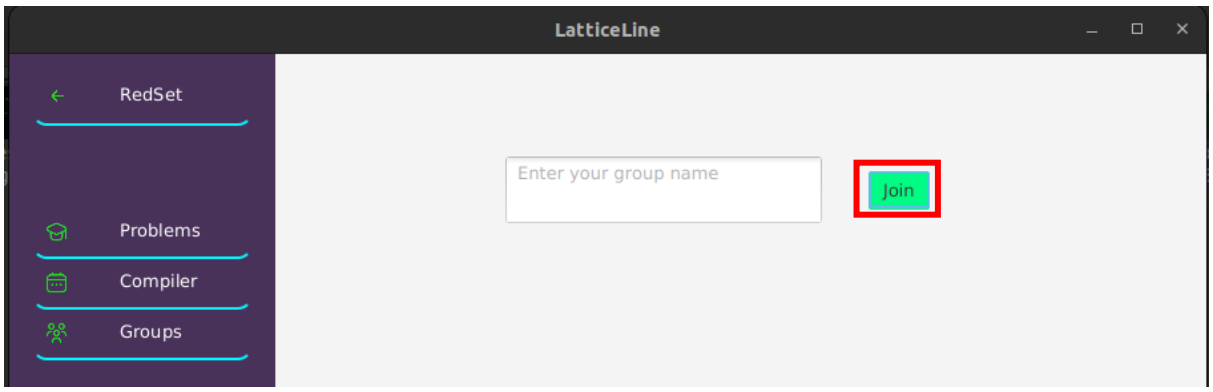


Figure 20: Join Group

Assignment:

In a group a user can see all the assignments. If the user is a **teacher,** then the **Create Assignment** & the **Create Contest** button will visible. The buttons showing in the bottom-right corner are visible for all the users.

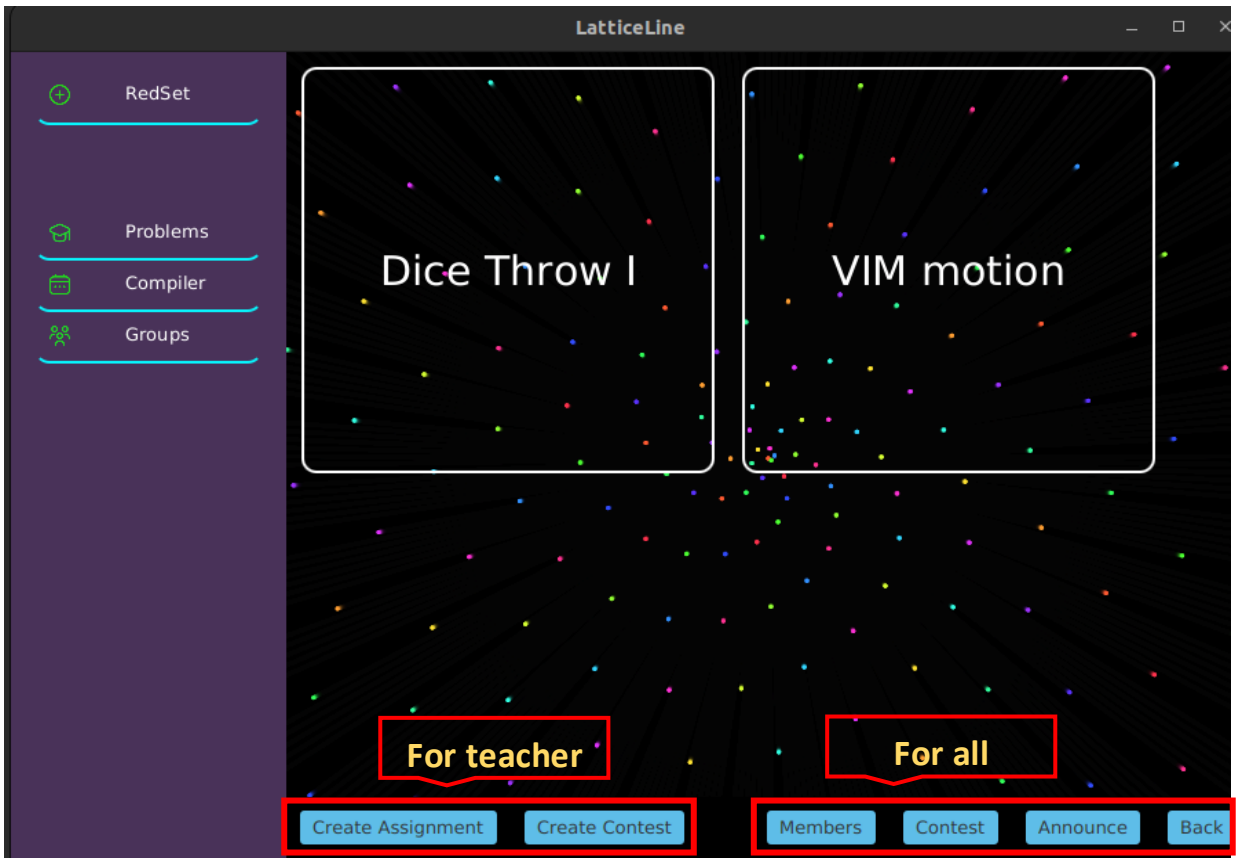


Figure 21: Group

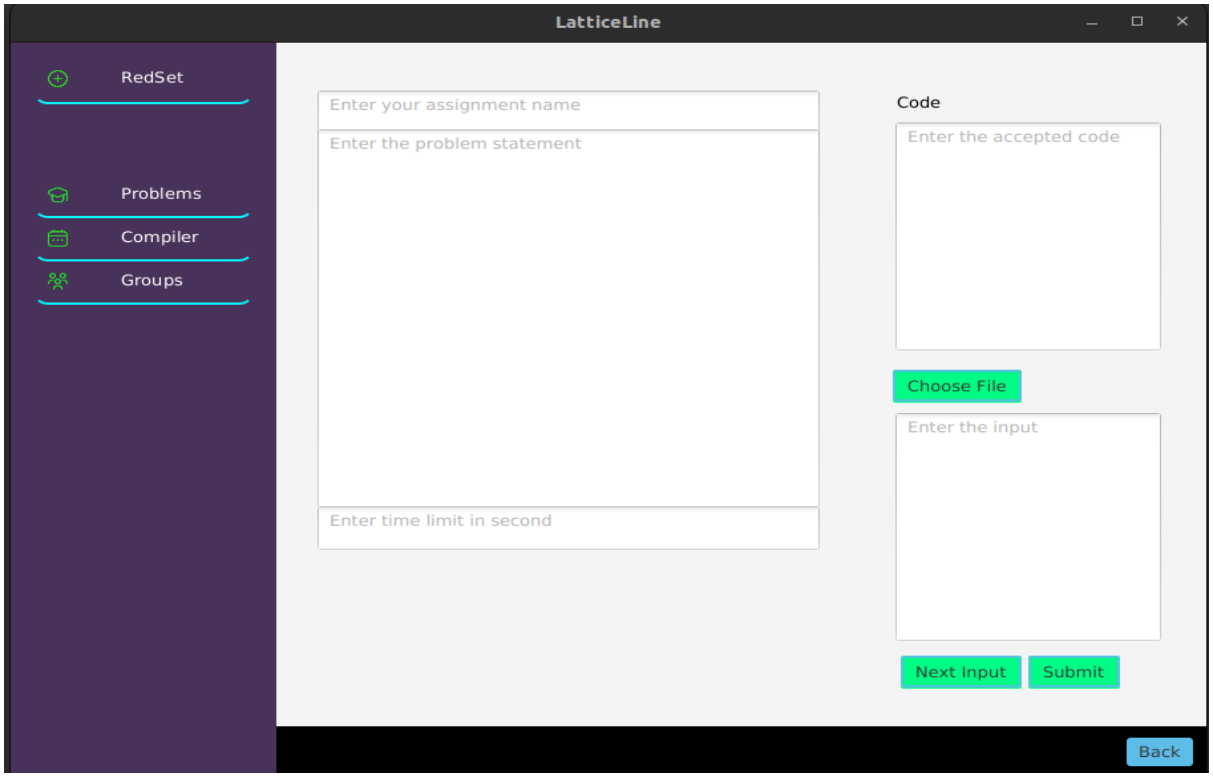


Figure 22: Create Assignment

Only Teachers can create an assignment. Every assignment consists of a unique assignment name, a problem statement, time limit, accepted solution for verifying submissions and input. The code must be written in C++.

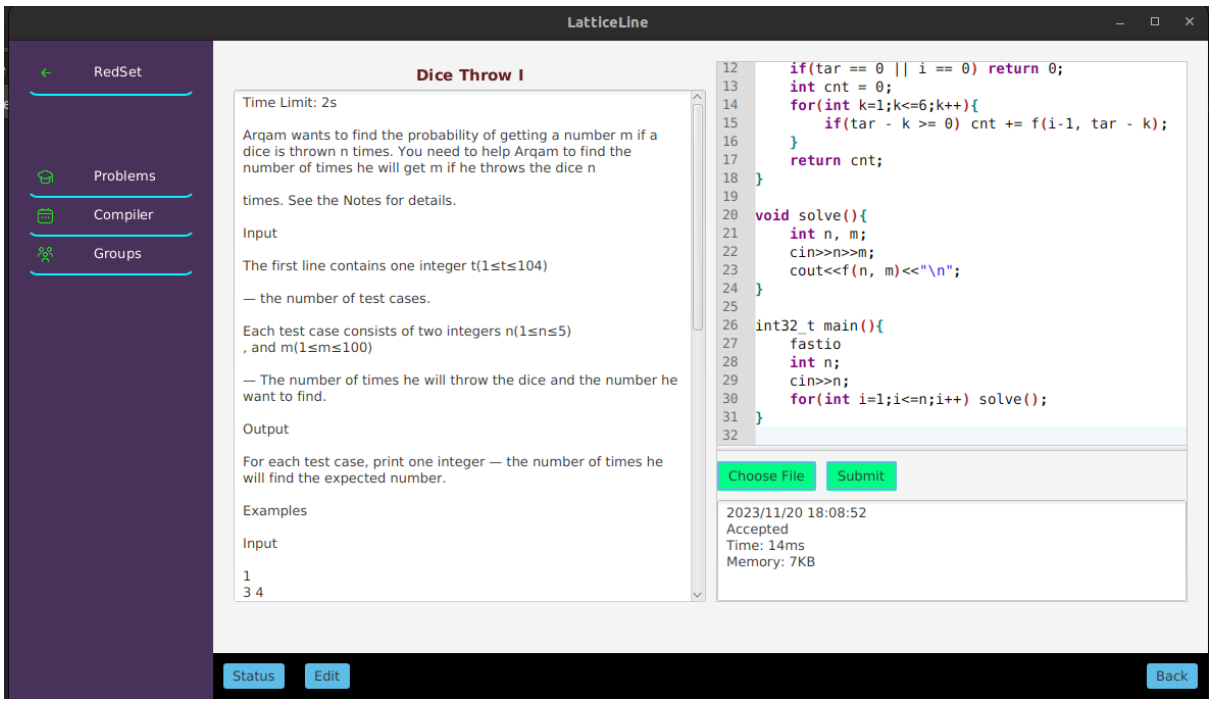


Figure 23: A sample assignment

Figure 23 shows that the **Dice Throw I** assignment is submitted by a user that is passed all the test cases given by the teacher.

Teachers can edit an assignment by clicking **Edit** button showing in the bottom-left corner. **Status** button is also visible by teacher.

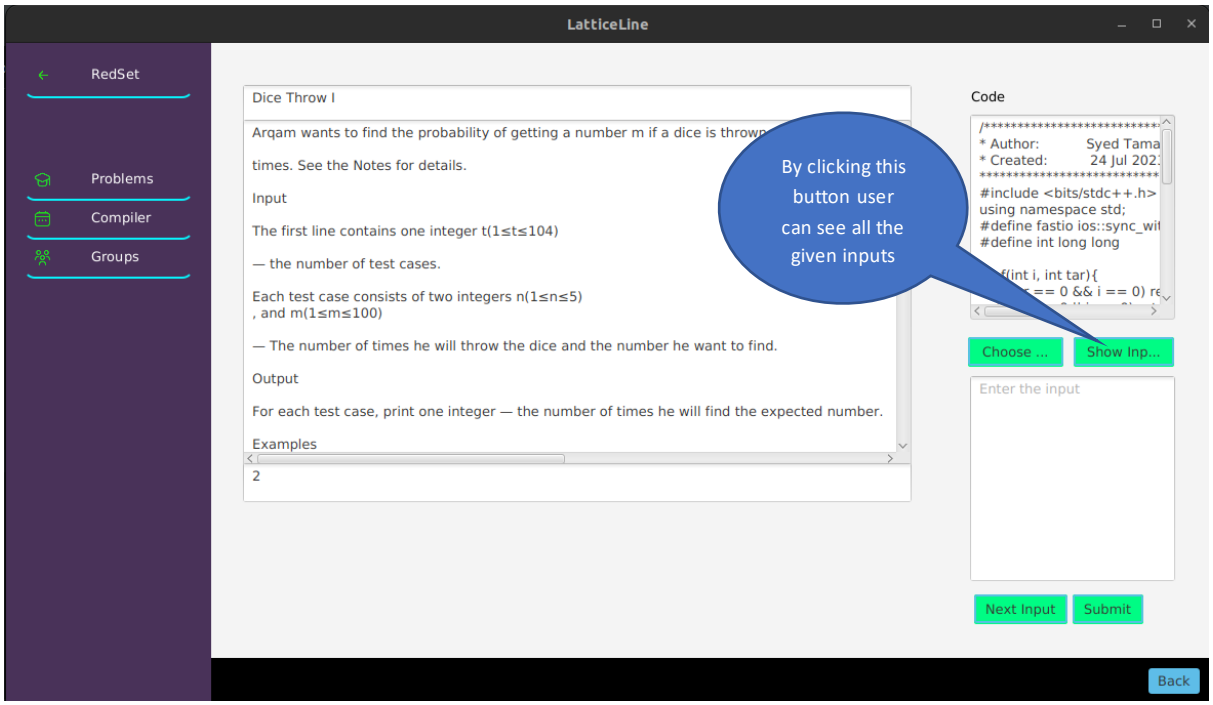


Figure 24: Edit assignment

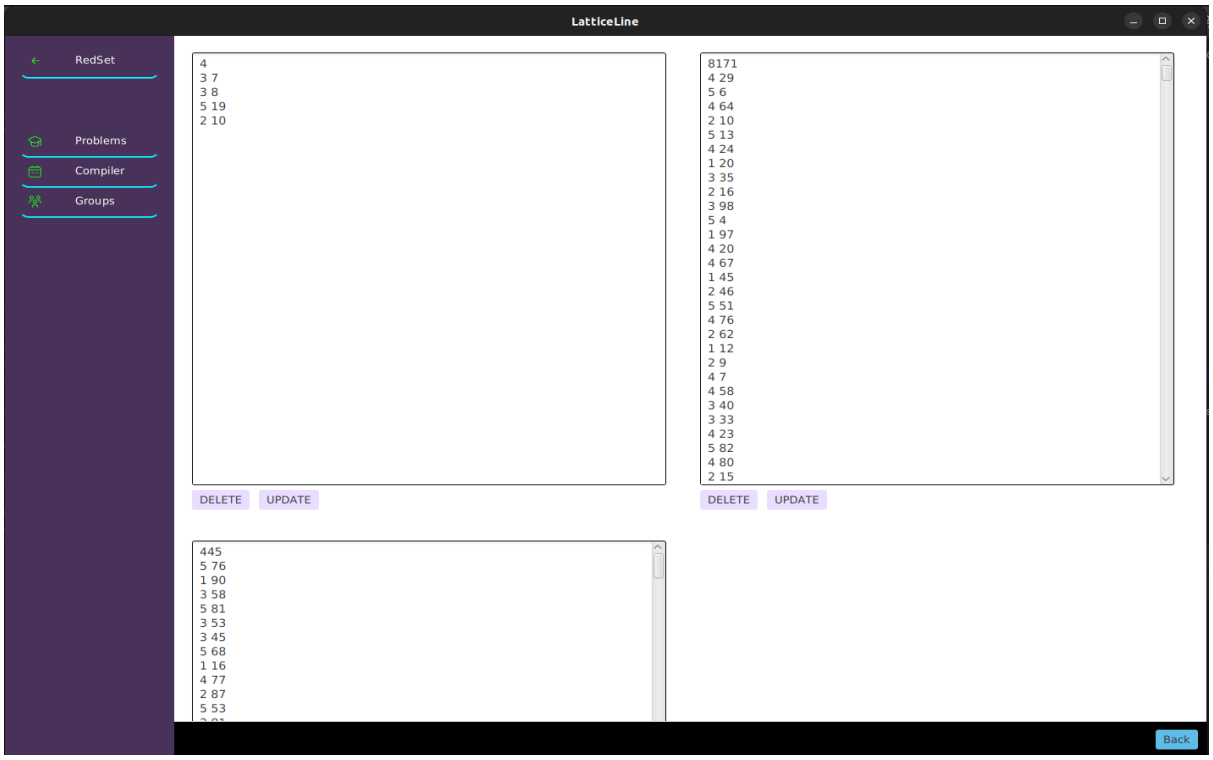


Figure 25: Show inputs

Teacher can see all the status. Here every submission consists of username, submission time, accepted status and code.

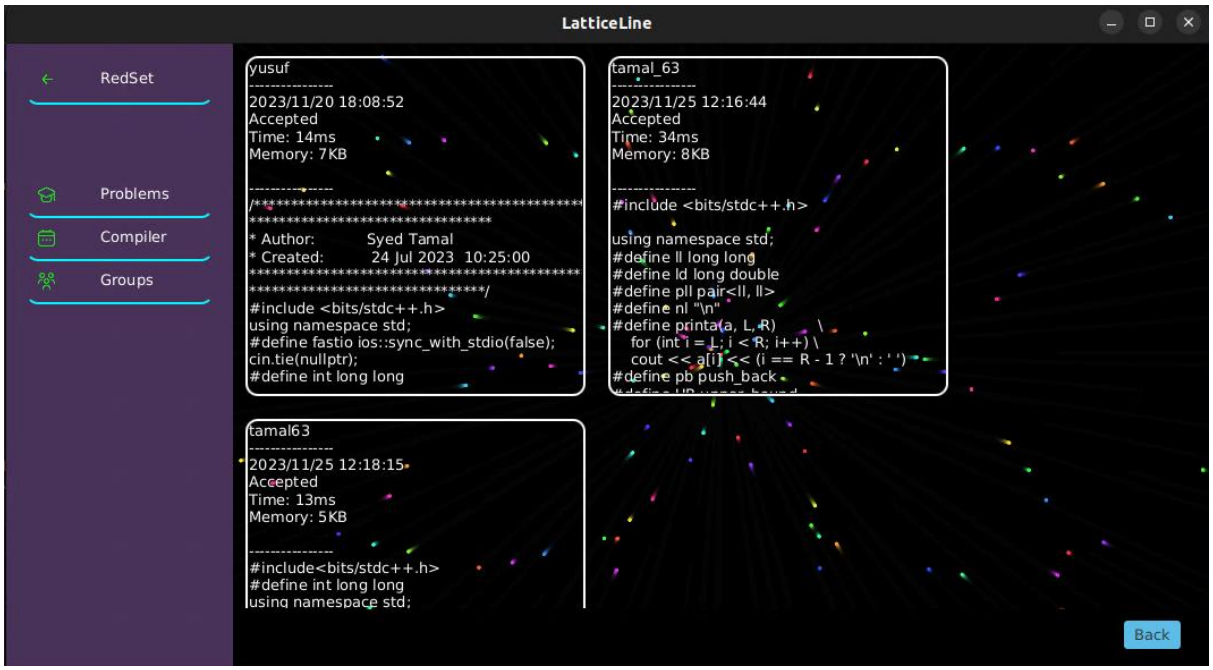


Figure 26: Status

Members:

By clicking **Members** button showing in Figure 21, users can see all the list of students and teachers of the group. A teacher can promote a student as a teacher.

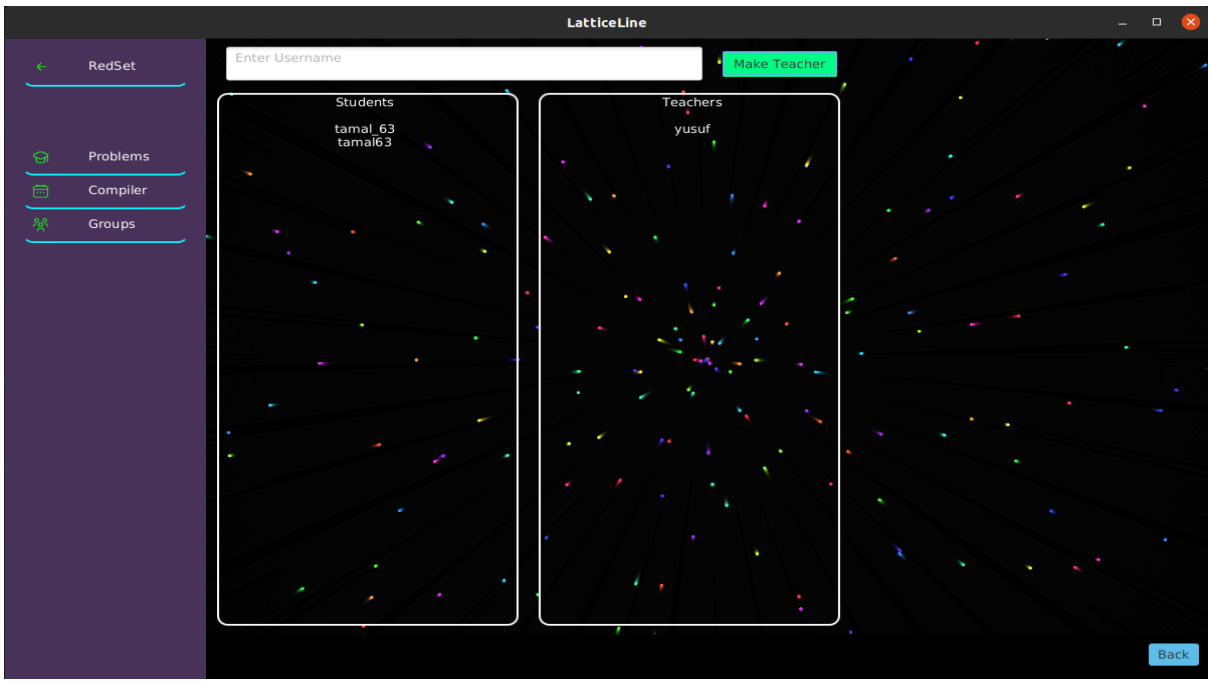


Figure 27: List of members

Announce:

Announce button in Figure 21 shows the announcements (like Figure 28). Users can view the announcements that were made up until the teacher doesn't delete it.

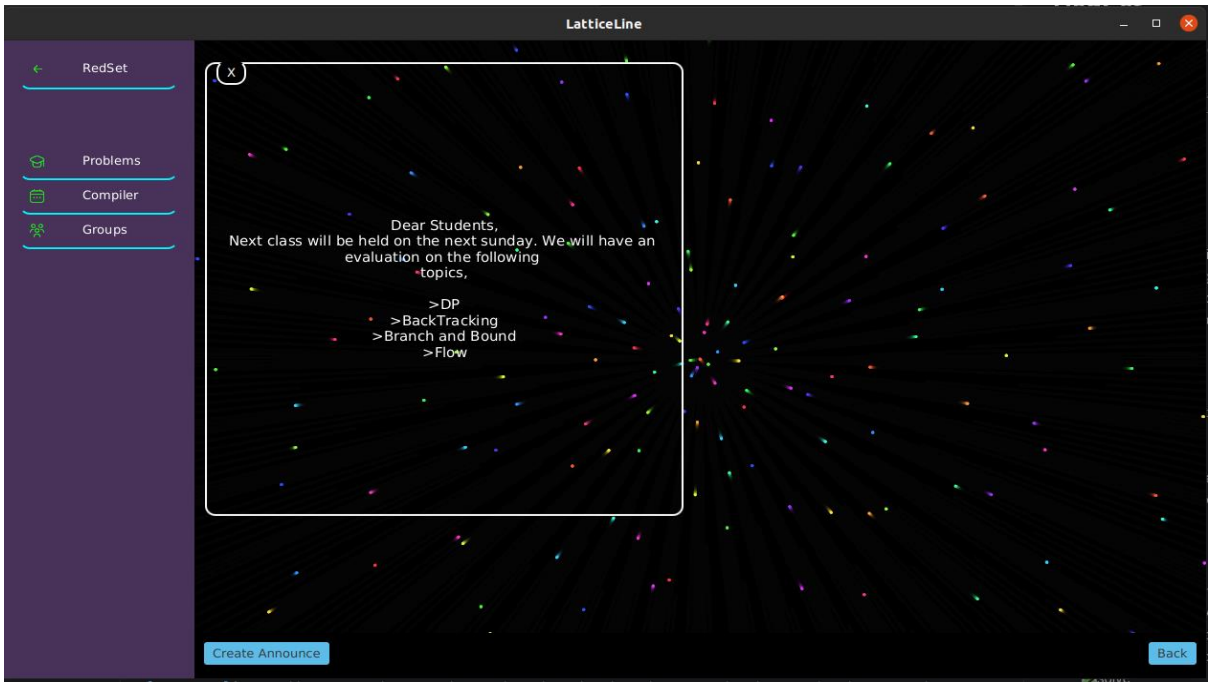


Figure 28: View announcements

Teachers can create announcement by clicking bottom-left **Create Announce** button showing in Figure 28.

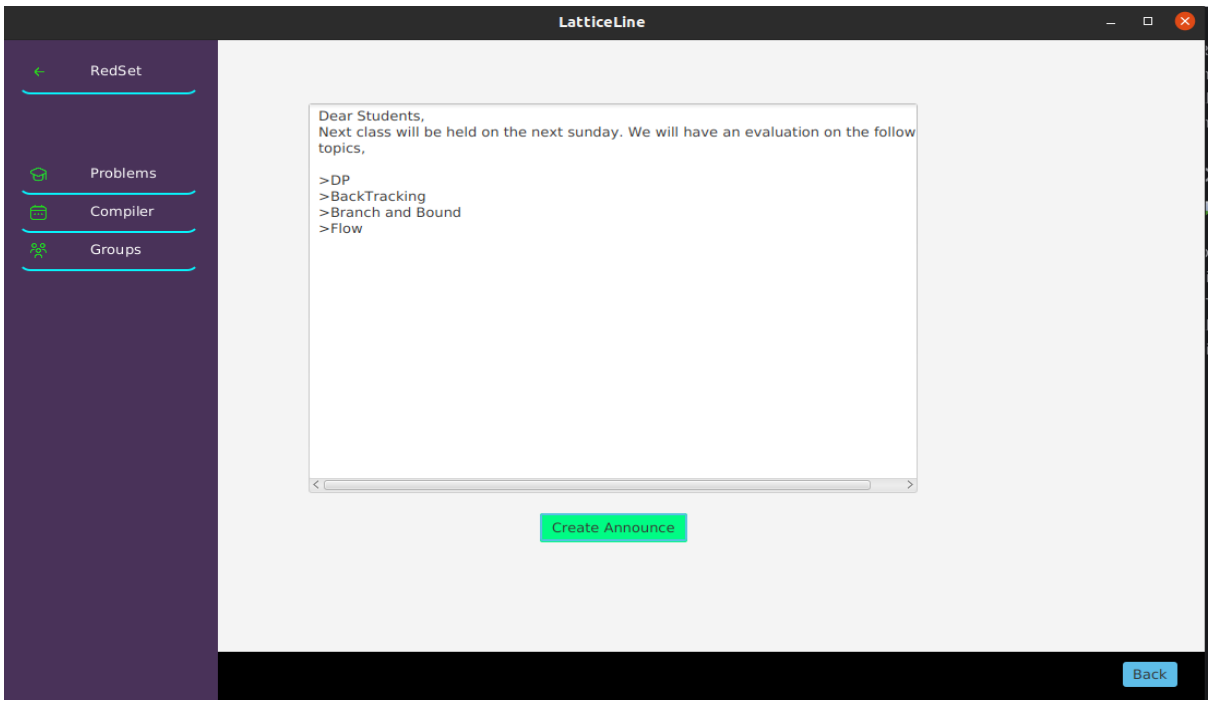


Figure 29: Create announcement

Contest:

Create Contest button shows in Figure 21 opens a new window for creating contest. Contest name must be unique. The writing style of starting and ending time is predefined. Added problem ID will converted in base64 and shows in Added Problems text area. **Add** button will opens a new window like Figure 22.

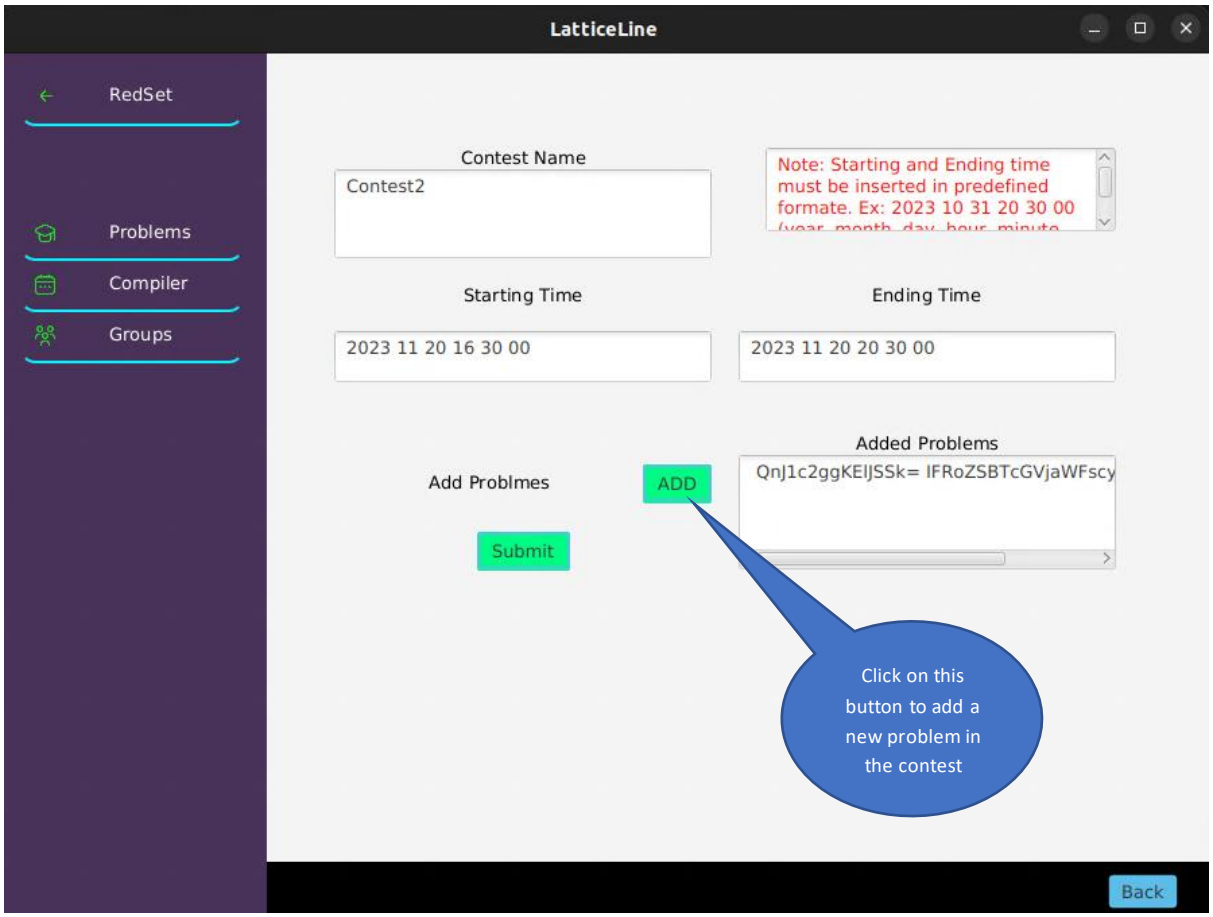


Figure 30: Create Contest

Contest button shows in Figure 21 will open the contest page. Contest page shows all the upcoming, running and ended contests. Latest contests will show first.

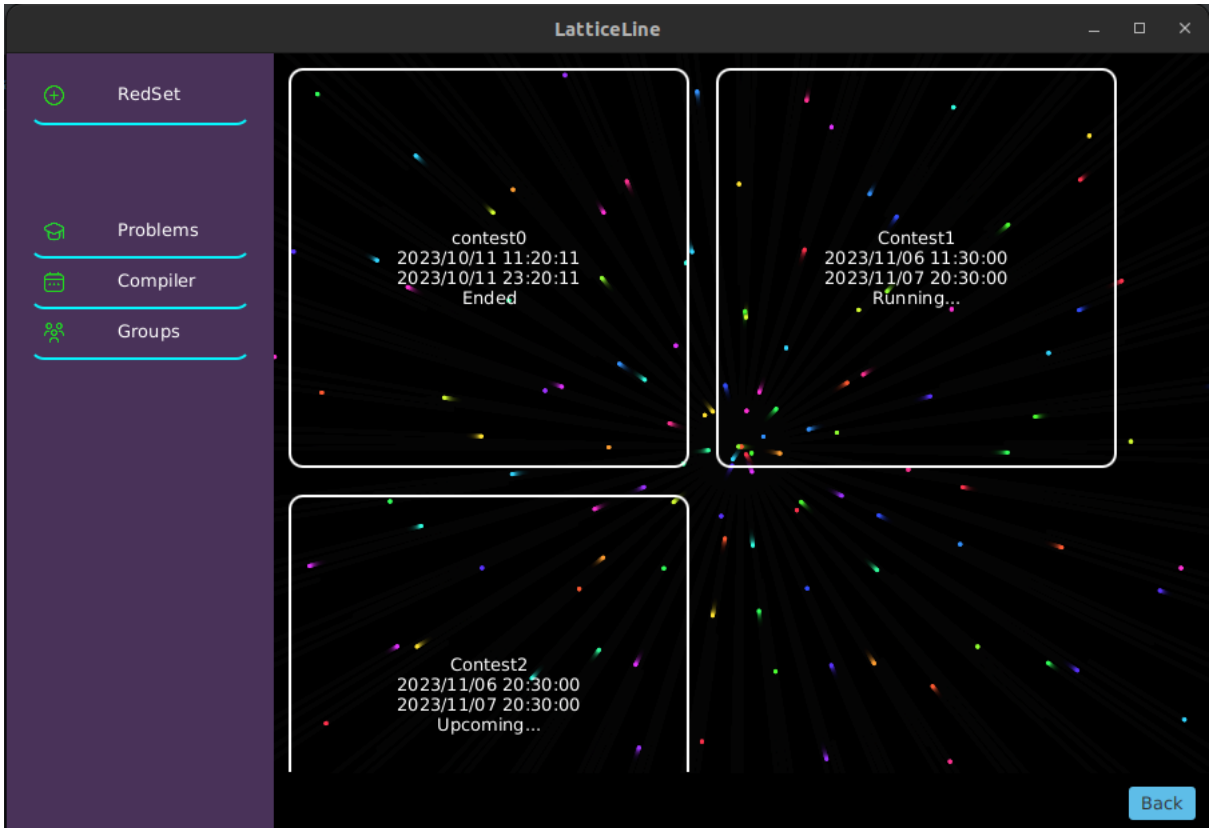


Figure 31: View contests

Students can enter to the contest if the contest is running or ended state. Teachers can enter and edit/update the contest anytime.

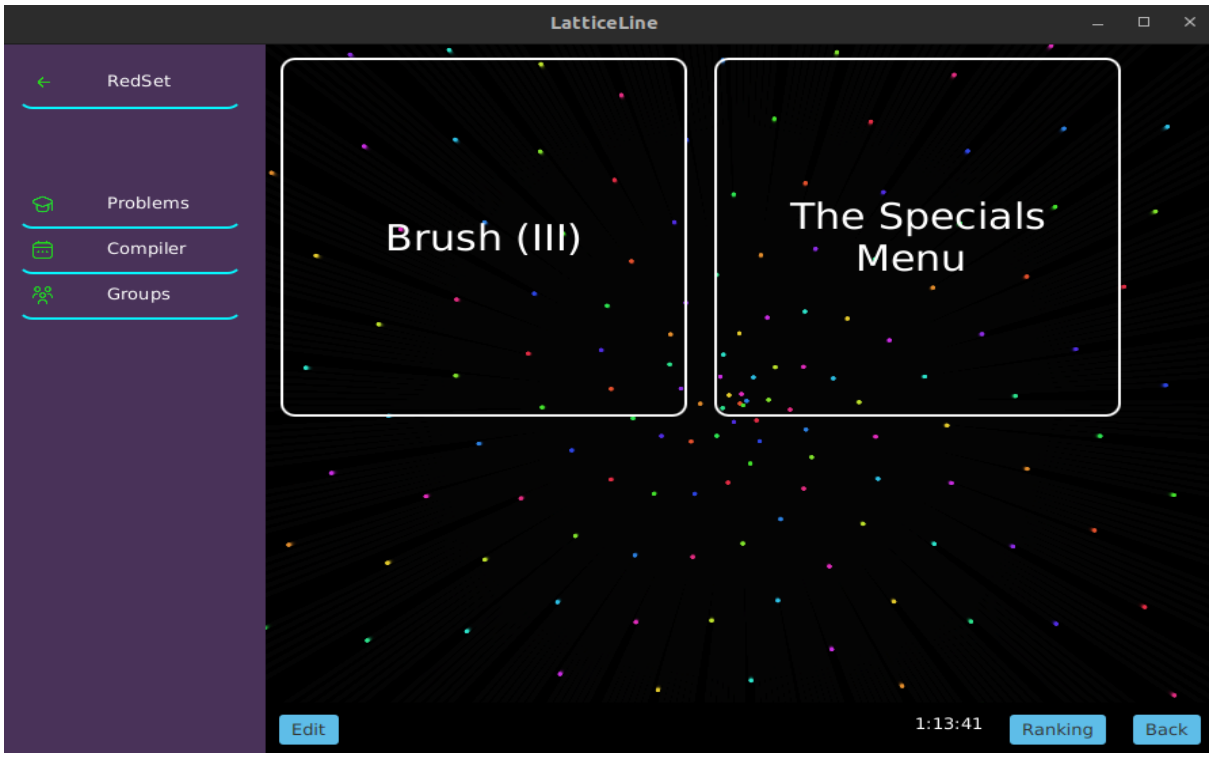


Figure 32: Inside of contest

You can see a countdown at the bottom inside a contest page.

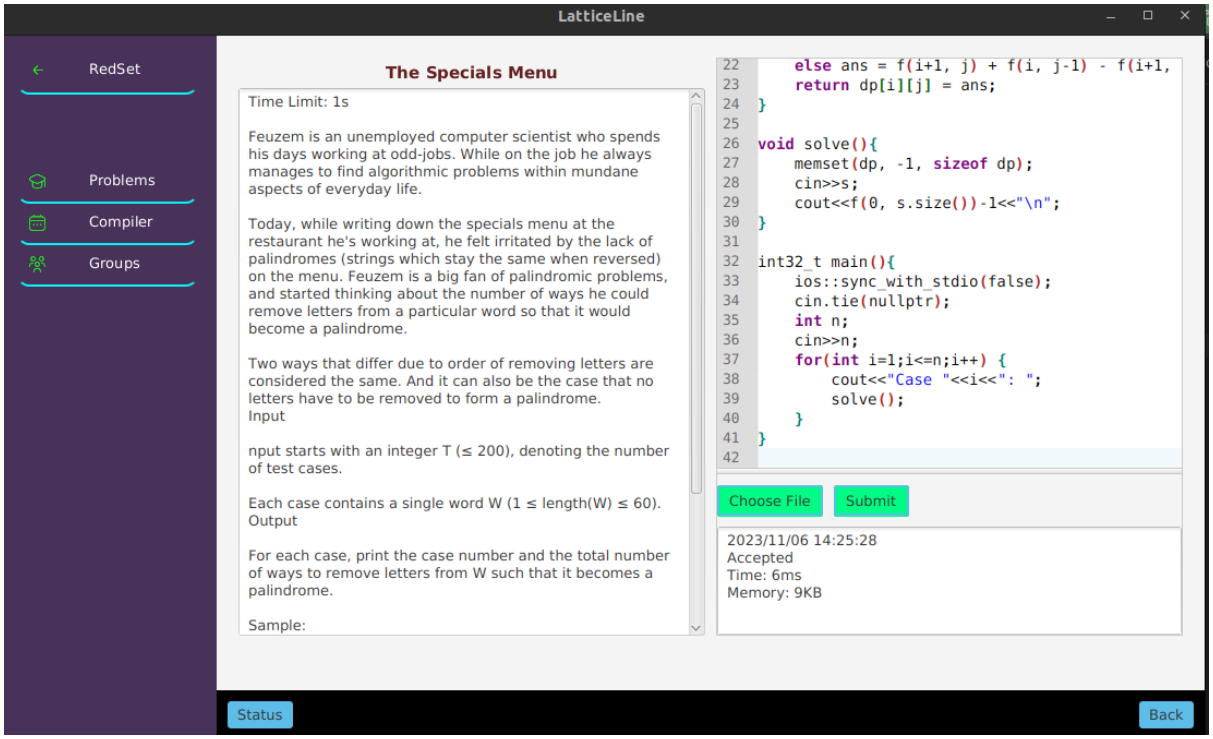


Figure 33: A sample problem of a contest

By clicking **Status** button showing in Figure 33 students can only see the status after the end time of a contest. But teachers can see the status anytime.

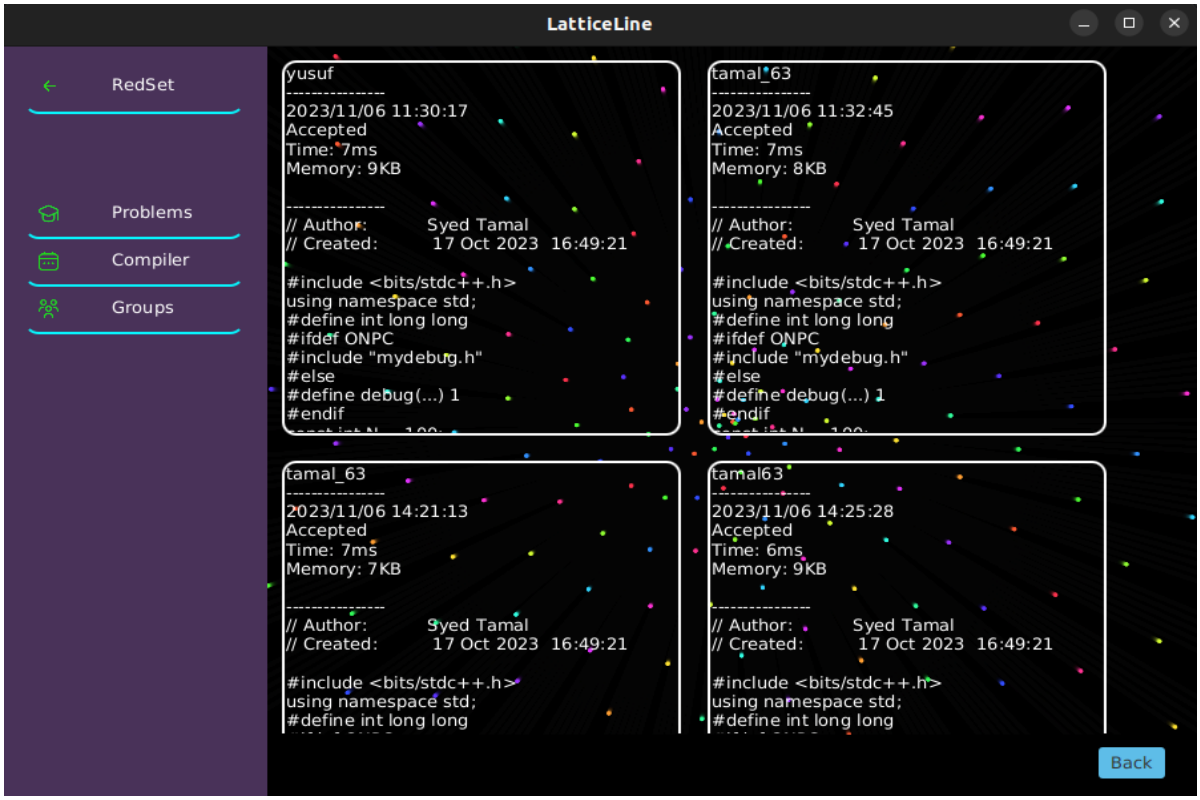


Figure 34: Submissions of all users

By clicking **Ranking** button show in Figure 32 members can see the ranking of the contest.

Figure 35: Ranking of a contest

Profile:

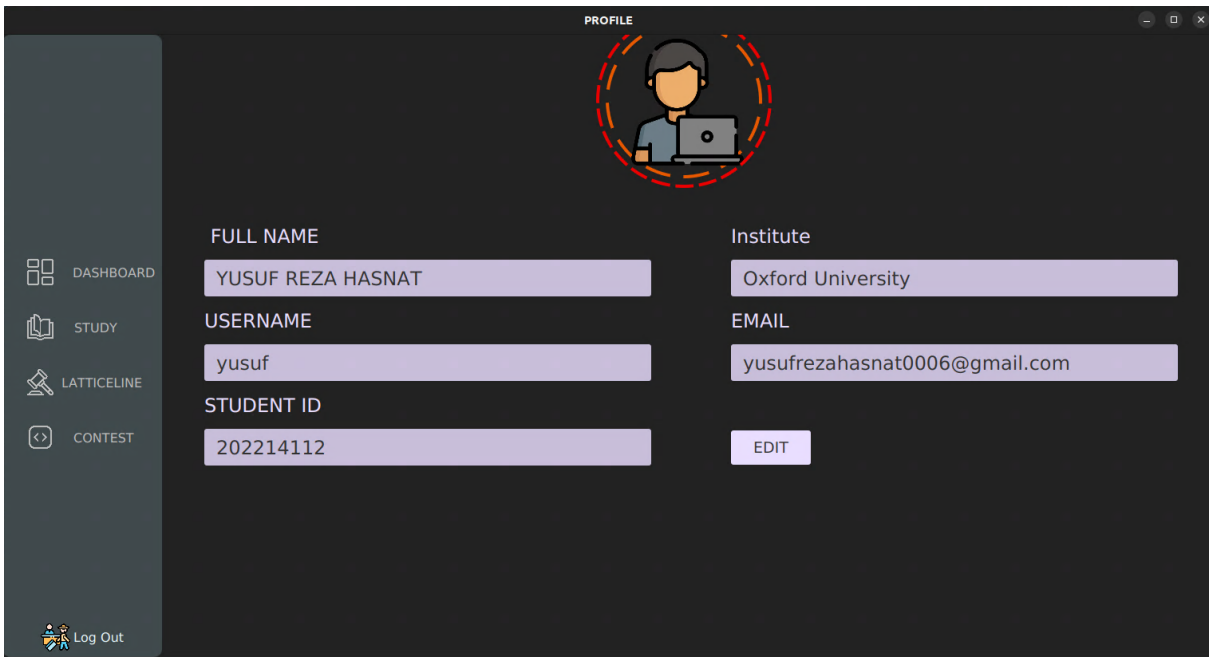


Figure 36: View Profile

User can view their profile and edit the information anytime he/she needs.

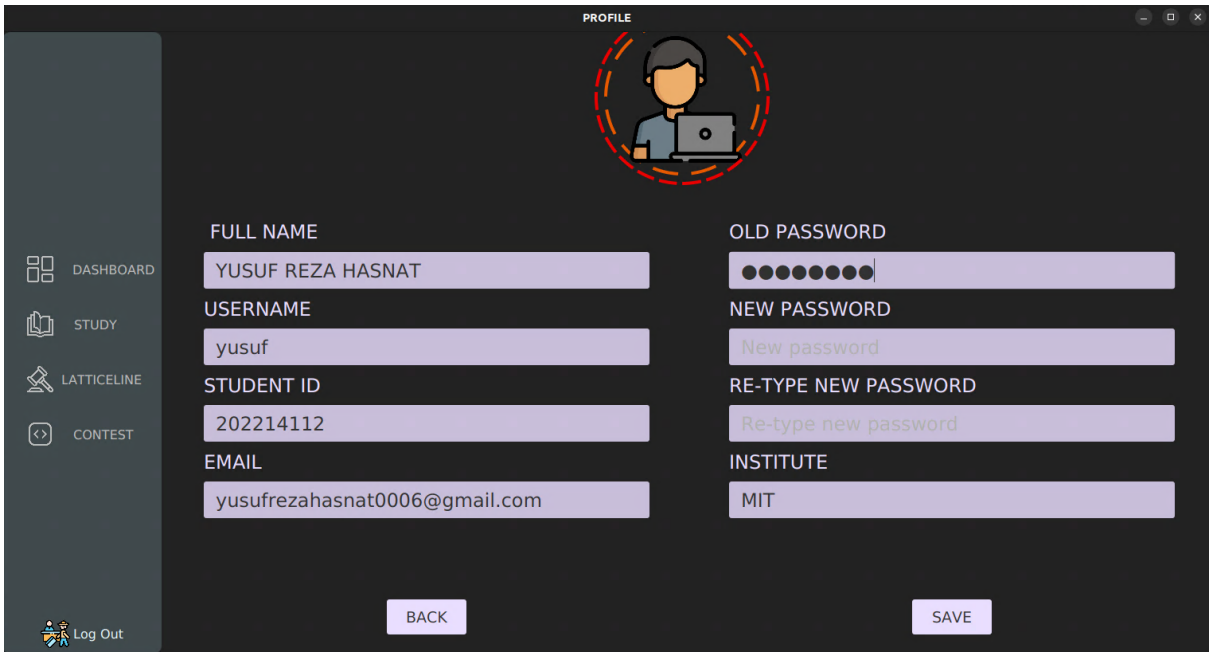


Figure 37: Edit Profile

Limitation:

RedSet only support C++ code compilation right now. We setup syntax highlighting only for C++. Therefore, we cannot create other programming language option.

In the Announce section of every group teacher can create an announcement in text based. Document, picture or file section option is not available yet.

Future Scope:

RedSet may be a best place for a Data Structure and Algorithm classroom. If the database is on cloud, then everyone can use this application. A programming group can host a big contest here. Right now, there is limited problems in Study section and Problem section. In future, we can increase the resources.

Conclusion:

RedSet can become one of the best learning platforms for the programmers if it is utilized properly. Moreover, it can also ease up a teacher's day to day life. Though there are some limitations in RedSet but those can be overcome if the project is developed further.

Documentation:

Project link: Tamal267/RedSet (github.com)