

RnD Project Report

SAFEApp in IOS

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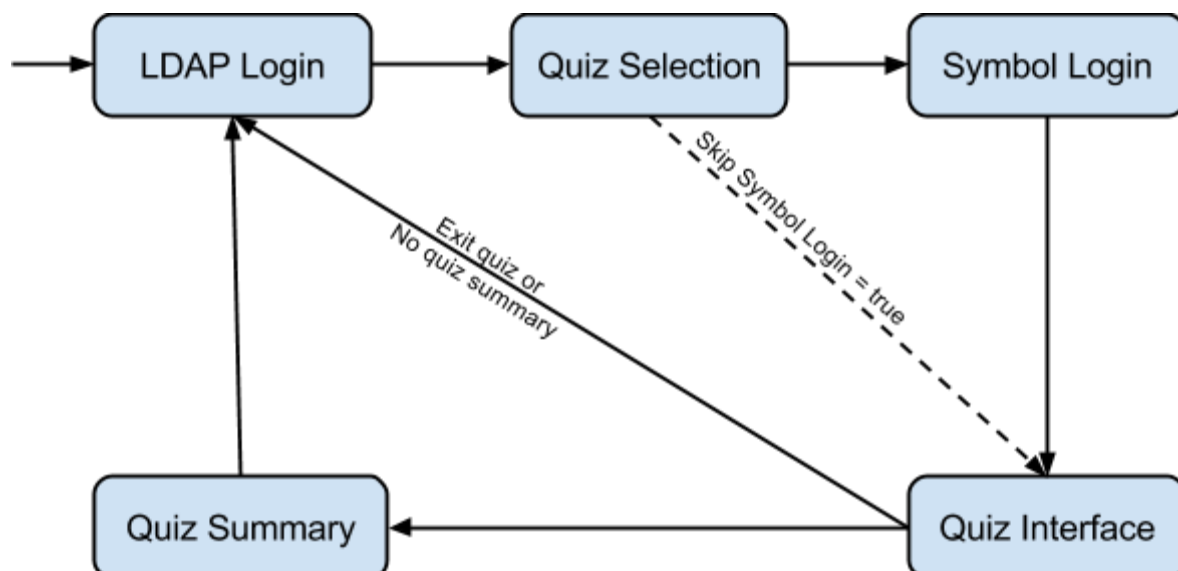
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Introduction :

- The main objective of this R&D project is to revamp the already existing QuizApp application in ios. QuizApp which now is called SAFEApp is a mobile application developed on both android and iOS which is used to conduct quizzes in classrooms with high level of security.
- The app has various phases of authentication. Starting with the ldap authentication, next passcode authentication, wifi SSID verification etc.
- A web interface is created in which a Professor can create an account and add quizzes , view submissions and some other statistics. The web interface also contains a dashboard in which any suspicious activities in students phone like phone call etc are shown.
- A server is also created as a part of this project which is used to fetch questions, fetch login details etc from the database.
- As part of this project i have added many new features to the app supporting images in questions, images as answers, equations in questions options etc. which will be discussed below.

The following is a simple state diagram showing the overview of how the app works.

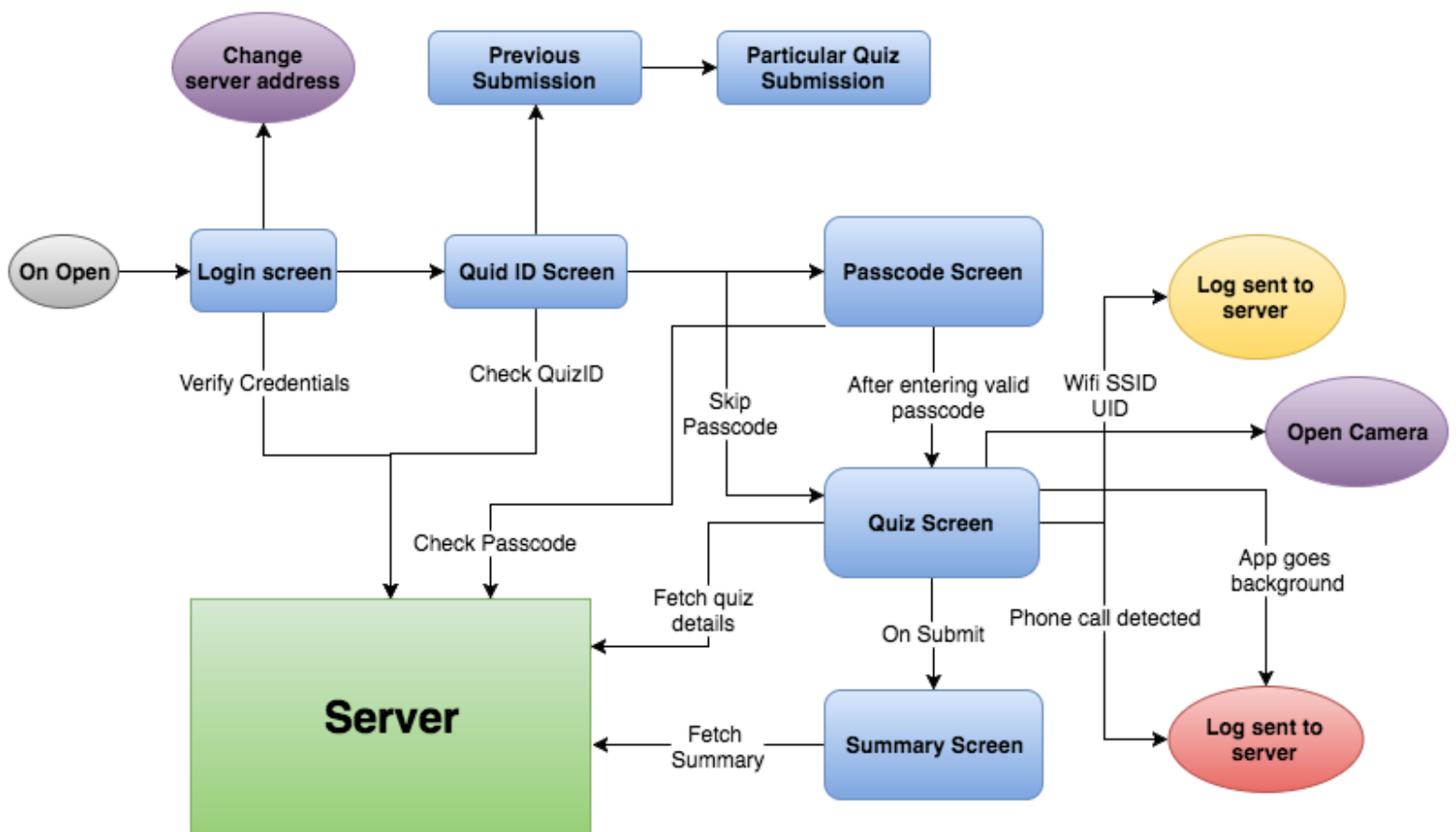


There are 5 main viewcontrollers in this app.

1. Login Screen.
2. Quiz Selection Screen.
3. Symbol Login Screen
4. Quiz Interface.
5. Summary Screen.

There are other viewcontrollers which are used to show previous submissions and list of attempted and unattempted questions.

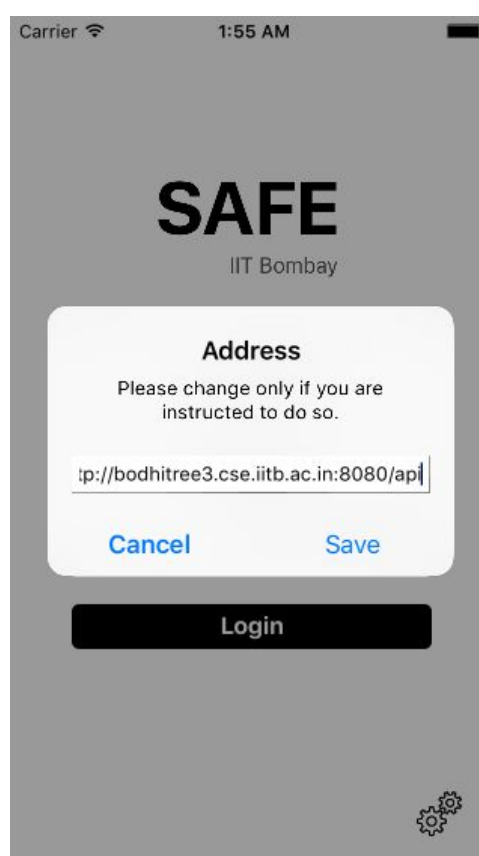
Following is the state diagram showing the navigation between screens and server.



Details of individual Screens :

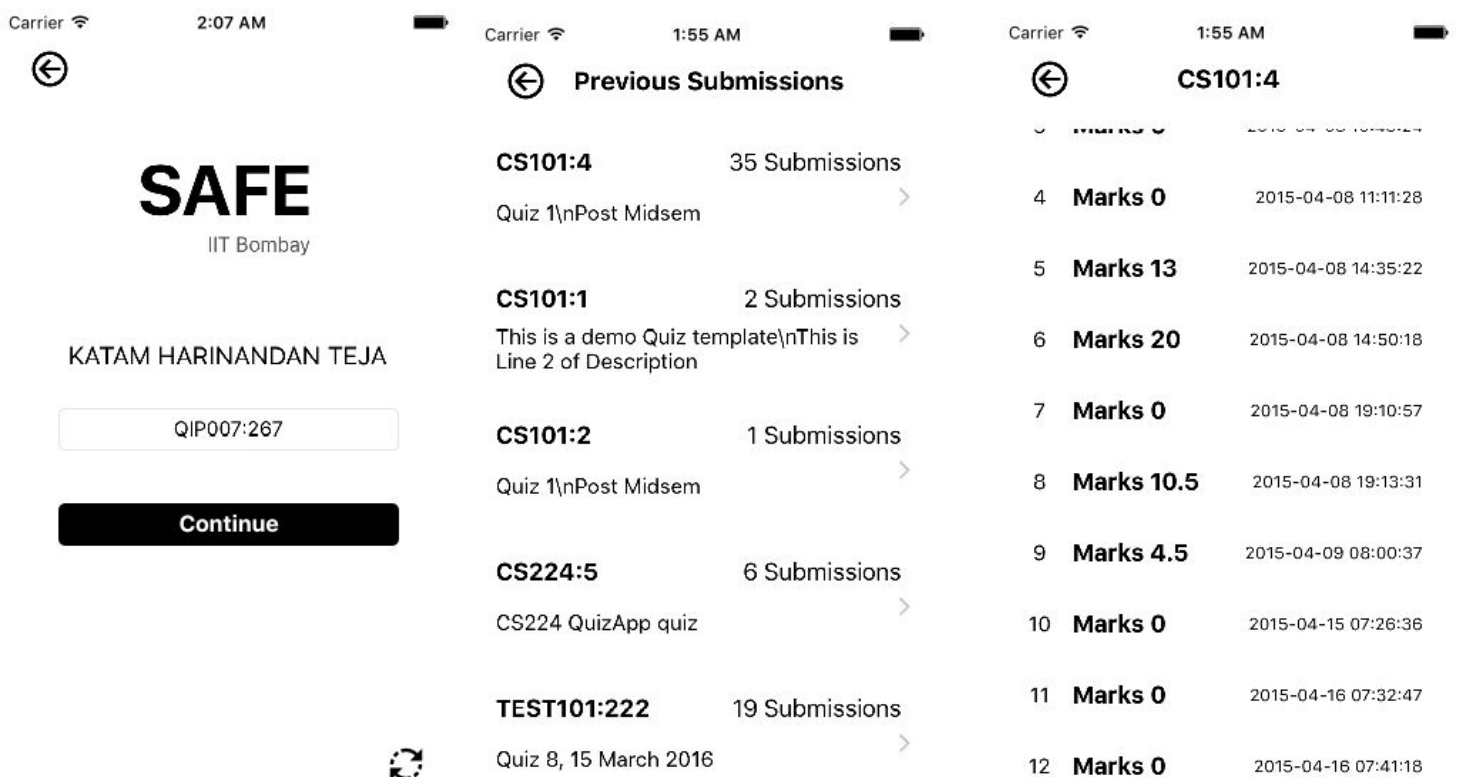
Login Screen :

- When the student opens the app he is shown the login screen where the student need to enter his LDAP credentials to move to next phase.
- A button is provided at the bottom of the screen to change the base server address which is changed only when instructor instructs him/her to do so.
- The default base server url is <http://bodhitree3.cse.iitb.ac.in:8080/api>
- Once the user enters the credentials and press on login button a server call to <http://bodhitree3.cse.iitb.ac.in:8080/api/ldap-auth> is made which checks if the credentials are correct.
- An error message is shown if there is no connectivity(Please check your internet connection) or if the login credentials are invalid(Please check your credentials).
- Save password option is also present which when checked and after a successful login stores the password and can be used for the next login.
- The design is made so as to be in sync with android design.
- Screenshots :



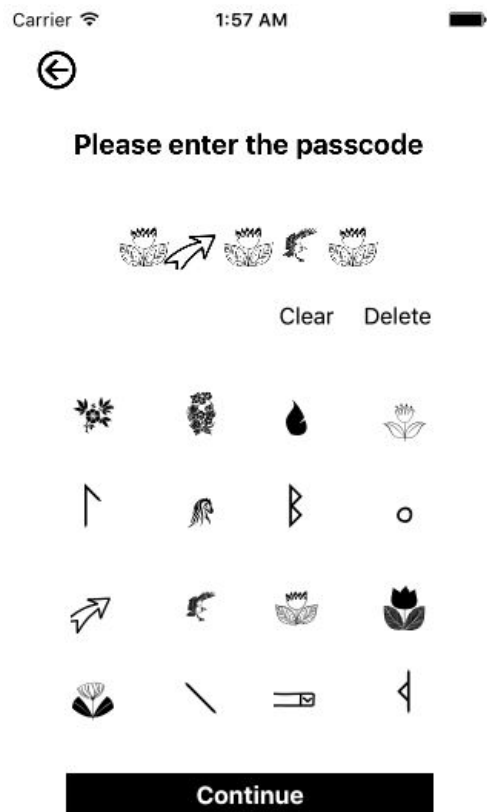
Quiz Selection Screen & Previous submission:

- After the user enters the credentials he is brought to Quiz selection screen where the student enters the quizid of the quiz being conducted which will be decided by the professor when the quiz is created.
- Once he enters the quizID and clicks continue the app makes a post request to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz> to check if the quizid is infact a valid id and if its valid to send the client whethere or not to use a symbol login phase if yes it also send the symbols to be displayed.
- An error message is shown if there is no connectivity(Please check your internet connection) or if the quizid is invalid(Quiz ID is invalid).
- This screen also contains a button which shows all the previous submissions made by that student. For previous submission a post request to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz/get-submissions> is made which returns the list of quizIDs and its description. On tapping on a particular quizID another post request to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz/summary> is made.
- Screenshot :



Symbol Login Screen :

- If the quiz demands a symbol login phase then the student is shown the Symbol Login screen.
- This screen contains symbols from a custom font which is imported into the app and specifically designed for the purpose of this project.
- Symbol login is the main authentication phase because the symbols used for the symbol code are not easily readable by students unlike a passcode with numbers and alphabets which can be easily transferred to a student outside of classroom. For this purpose a custom font with symbols from various other fonts are merged is created.
- All the unicodes of the characters to be displayed are sent by the server after entering the quizID
- Once user types the correct passcode which will be displayed by the instructor during the quiz the server verifies the passcode and checks if the user is eligible to enter the quiz.
- An error message is shown if there is no connectivity(Please check your internet connection) or if the symbol code is invalid(Passcode is invalid).
- Screenshot :



Quiz Interface :

- If the instructor wants to skip the symbol login phase then the app directly shows quiz interface from the quiz selection screen.
- This is the phase where the student attempts and submits the quiz.
- There are 6 types of questions in the quiz interface we provide.
 - a. Multiple choice with single correct answer.
Radio buttons are provided to mark the correct answer.
 - b. Multiple choice with more than one correct answer.
Check boxes are provided to mark the answers.
 - c. Fill in the blank with integer type answer.
 - d. Fill in the blank with decimal answer.
 - e. Fill in the blank with text answer.
 - f. Manual correction
 - i. Image type answer
 - ii. String answer
- Then the app makes a post request to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz/get> to get questions and options for multiple choice, quiz duration and other details regarding the quiz.
- There is also an option to the instructor to shuffle options and/or shuffle questions which when enabled shuffles the options for a multiple choice questions and shuffles questions respectively which are decided by the instructor while creating the quiz.
- On the top the next previous buttons are shown which are used to navigate to next/previous questions.
- Below the navigation bar the question is shown which is basically a webview. JQmath libraries are used to load custom equations in the webview.
- Below there are two buttons which are displayed only when questions requires them. One is the reason button which when pressed shows a

popup in which you can type the reason behind your answer. The other button is an image button which is used to open the image embedded in the question.

- Below an textfield or camera button or options tableview is shown as the question demands.
- On the bottom there are three buttons. First button is used to reset the answer, second one to open the questions list view which will be explained below, third one to submit the quiz.
- On the bottom right a timer is shown which shows the time left for the quiz to end.
- When the user decides to submit or the time is up a post request with all the answers and other inputs from the user to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz/submit> is made.
- Once the user starts the quiz a log containing wifi SSID, uid of the user is sent to the server. When the app goes background a log is sent to the server which shows up in the dashboard which will be discussed in detail below.
- An error message is shown if there is no connectivity while loading the quiz or while submitting the quiz (Please check your internet connection).
- Screenshot :



00:04:47



00:04:44



00:07:53



Question 3



Chose the correct answers :

- ☐ Wrong Answer
- ☐ Correct Answer
- ☐ Correct Answer
- ☐ Wrong Answer



00:07:48

Carrier

1:56 AM

Answered

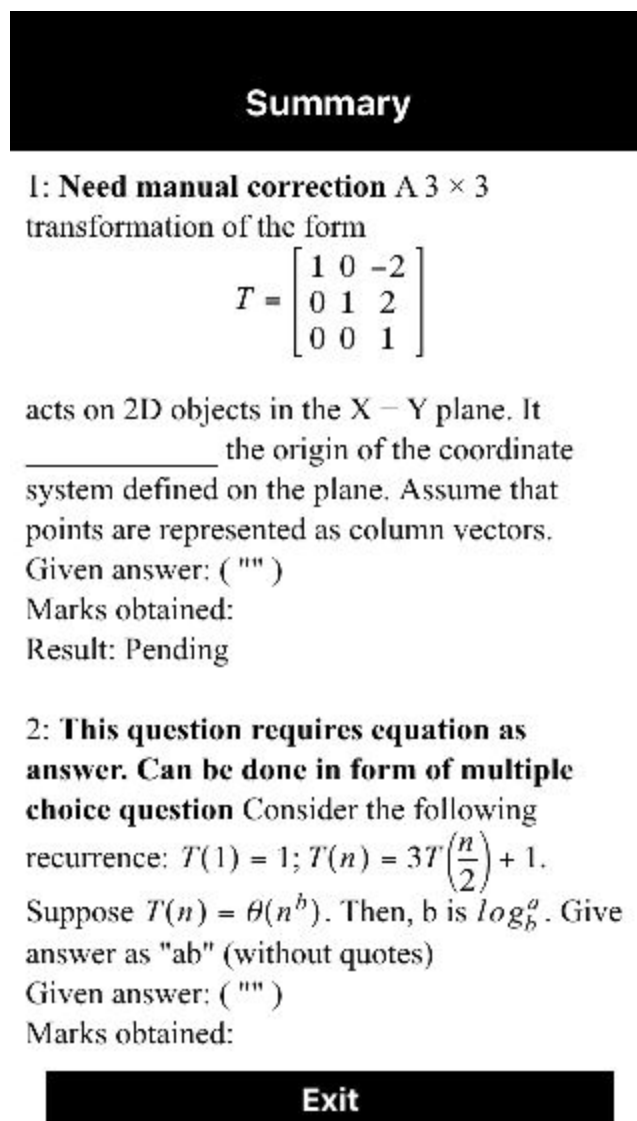
Unanswered

1: Need manual correction
\\nA 3×3 transformation of the form
\$\$T=\\left[\\begin{matrix} 1,0,-2;0,1,2;0,0,1\\end{matrix}\\right]\$\$...

2: This question requires
equation as answer. Can be done in
form of multiple choice question</...</p>
</div>
<div data-bbox=

Summary Screen :

- This screen shows the summary of the entire quiz. It shows question numbers with their marks given answers etc.
- There are options to show or hide marks , answers in the summary depending on the tags the summary is shown.
- At the bottom an exit button is provided which closes the app.
- Then the app makes a post request to <http://bodhitree3.cse.iitb.ac.in:8080/api/quiz/summary> to get the summary and the tags (show marks, show correct answers).
- An error message is shown if there is no connectivity(Please check your internet connection) or if the symbol code is invalid(Passcode is invalid).
- Screenshot :



Security logs:

- There is a chance that the user clicks the home button which sends the app into background and opens a browser to find the answers.
- For this purpose whenever the app goes background a local notification is sent to the user requesting him/her to go to the app.
- When he opens the app then a post request is made to <http://bodhitree3.cse.iitb.ac.in:8080/api/add-log> with a message “student name went background timestamp” which is stored in the logs of the student for the quiz session.
- When a user receives a phone call or makes a phone call or lift a phone call the app detects all these activities and reports it to the instructor by marking it as a red log, which shows up on the instructors dashboard.

App Publication :

- Previous publication
<https://itunes.apple.com/us/app/quizapp-iitb/id983617836?ls=1&mt=8>
- Haven't published yet but once will published in a day or so.
- <https://github.com/harinandan1995/Safe-App-R-D> link to git repository.

Existing Bugs :

- The user can turn off wifi and connect to different wifi during the quiz.
- Sometimes the size of webview in options doesn't adjust properly.
- Auto layout is not present.

Future Modifications :

- There is a possibility that the student can take a screenshot of the passcode and send to his/her friend. To send he/she must close the app (to background) then a log is sent but still disabling screenshot feature when the app is open can be added to make it more secure.
- Good layout for all types of apple (ios) devices.