E-Meta

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Project is submitted in partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE

IN

INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

DECLARATION

The work described in this project (**E-Meta**) was approved out by us under the supervision of **Prof. Husnain** and **Prof. Bilal**. We hereby declare that the title of documentation **Education Meta (E-Meta)** and the content of project are the product of my own research and no part has been copied from any publish source (except the references, standard mathematical or genetic models /equations /formula /protocols etc.). We further declare that this work has not been submitted for award of any other degree /diploma. The University may take action if the information provided is found inaccurate at any stage.

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Their constructive criticism during my project helped me to make necessary improvements. We also wanted to thanks our parents who inspired, encouraged and fully supported us for every trial that comes our way, we are grateful for their never ending moral support and prayers which always acted as a catalyst in our academic life.

CERTIFICATION BY THE PROJECT SUPERVISOR

This project is to certify by **M Junaid** Registration # 2018-GCUF-066278 **Mirza Zeeshan Baig** Registration # 2018-GCUF-066324 and **Asad Ur Rehman** Registration # 2018-GCUF-066317 and have successfully completed the final project name as: **Education Meta (E-Meta)** for G.C University Faisalabad, at the department of information technology to full fill the partial requirement for the degree of BS (**CS**).

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Table of Content

Chapter No 1

Introduction to the Problem

1. Chapter No 1: Introduction to the Problem

1.1. Introduction

Most of the university and college students have faced problems in education due to the effect of covid-19. Our educational system shifted from manual to online but now a day our students learning content is transformed from paperwork to digital forms but students receive all learning content from different media like WhatsApp, Gmail, Google drive, data are not stored in one place. like gallery, file manager, etc.

Now our application solves the problem easily gives students centralized data in one place and allows students to get connected in our application to enjoy the feature. The application will collect students' study-related content data in one place. In our application the students whose university, department, and semester will be the same can effectively view the study material and download it without any hassle. Students can discuss problem-related study materials through chat. They can ask questions and tell answers to each other.

This project is an online Education Meta that allows users to see study contents on the E-Meta app. The project provides a list of different kind of educational documents. A user can sign up for free, login to his account, can browse educational documents like notes, quiz, assignments, and past paper according to own interest, and can also view other user's pre uploaded educational documents.

User also can make reviews about this application. User can like or dislike and download all educational documents on this application. User can also discuss to each other user on this application through the chat board. User needs to register on the application before want to share educational contents to other users. So if user want to check his history then user can login using same ID Password next time. User can download various variety of contents on this application.

1.2. Background

Our educational systems generally moved online during the modern age, but today's students learning material is now presented in digital forms rather than paper ones. All educational materials are distributed to various media outlets. Now our application solves the problem easily gives students centralized data in one place and allows students to get connected in our application to enjoy the feature. The application will gather students' study-related content data in one location.

As usual, the students who were studying physically were getting more expensive than the students who were studying online. We have created this app for the convenience of the students, keeping in mind the modern era, all students can come and study online. Students can not only learn but also share educational materials to each other.

Students who attend the same university, department, and semester can easily see and download the study materials using our android application. Students can discuss problem-related study materials through chat. Also they are able to communicate queries and responses to one another. Therefore, our app provides opportunities for students to get education easily and cheaply.

1.3. Purpose

The application will collect students' study-related content data in one place. In our application the students whose university, department, and semester will be the same can effectively view the study material and download it without any hassle. Students can discuss problem-related study materials through chat. They can ask questions and tell answers to each other. Students can upload study material privately and publicly in this application.

A mobile application that helps students will be able to study online here. A student who is our end user can study online and share learning material in one place. Students can also get help from each other by sending messages to each other while studying and gives feedback for better services

1.4. Scope

This project will include viewing, uploading, and downloading learning content. In this project, the student can view study-related content who have the same university, semester, and department. Students can upload notes, quizzes, assignments, and past papers publicly and privately.

If a student has any queries about study-related, he/she will be able to communicate with other students. If a student is requiring notes he can request the student to upload notes. If a student moves to next semester, he will be able to update his semester information. Students can also edit all profiles like profile picture, name, university, department, semester, etc. If students have any queries about the application, they will be able to give us feedback.

Understudies are having a bustling existence and in current time generally students like ease in their life and they need to put their educational contents in a one place yet they can't and our application give a place to store instructive study contents in a single platform. One main thing is in this application users can see their only relevant departments educational contents.

Now a day's people just want to see relevant study contents from one platform. Because then they can find easily relevant contents with the help of E-Meta app, that's why users can use only this application because they want to only search relevant contents in one platform. And as we know that almost all the people have access to phones and laptops with internet availability. We aim through this platform to develop a new system to provide reliable and easy to use online android application for students.

1.5. Objective

The objective of the E-Meta is to give the student a platform that can centralize students' data in one place:

- Students can register by email and password
- Students can create a profile over E-Meta
- Students can share study material and past papers publicly and privately
- Students can download notes, assignments, quizzes, and past papers
- Students can become part of group discussions and individual chat
- Students can be able to update their educational profile
- Students can view and edit profiles picture and cover pictures
- E-Meta application can mention the total uploaded study materials
- Students can view the profile of other users

The objective of this android application is to provide maximum convenience to the people so that people can use this android application. Because it is a modern era and every person uses mobile. They do not have enough time to go to search on google. On the other hand, some women and girls in our society do not like to bring documents from someone because their husbands and brothers are out of country. So, we have made this application keeping in mind their convenience so that people can stand by this application at home and can see desire documents from home by using internet.

Here all of you will get documents related your courses on this platform. Our application provides facility for students to store subject wise documents on E-Meta

App. Every person will see only relevant courses documents. Then as everyone can find his\her relevant study contents. As all of this students would save their precious time due to our platform.

1.6. Intended Audience and Reading Suggestions

The most wanted audience for our app are mostly colleges and universities students, who will install this app in their devices. Students come to this app and log in to their account to get what they want. Students can choose the semester of their choice by selecting the department of their class.

The main purpose of creating our app is to facilitate the student and provide more facilities. In which all students can access their educational materials at minimal cost. Students will not only reduce their expenses but also save them from further difficulties like traveling and time cost.

If a student is not getting any educational materials he can get help from friends. Our intended audience in this application can update their account profiles as per need. All the students who's are only targeted audience for our app can go to the department by going to the settings of their profiles and account for update their semester details.

1.7. Documentation Conversion

- The font used throughout this document is 12pt Times New Roman.
- Any further subsection breakdown is 12pt Times New Roman Font.
- All section and subsection are numbered using the XXX……. Format, where X represent the number.
- Line spacing are 1.5.
- Page margins are 1.5, 1, 1, 1
- All alignments are left align & paragraph are justified.

Chapter No 2

Software Requirement Specification

2. Chapter No 2: Software Requirement Specification

2.1. Overall Description

The students can easily find & store learning content like notes, assignments, quizzes, and past papers on this platform:

2.1.1. Product Perspective

E-Meta is connected to students and focuses on specific learning content like student quizzes, notes, assignments, and past papers. This type of platform is related to student education. Students view, upload, and download learning content, and also they will be able to communicate with other students in a public and individual chat.

2.1.2. Product Features

2.1.2.1 User Management Module

- Admin and Student can register
- Instructor can register
- User can setup profile (personal info, picture info)
- User can reset password
- Login with email and password
- User forgot password
- User can logout

2.1.2.2 Study Material Module

- User can view, upload, update and delete content
- User can upload content publicly and privately
- User can download study material
- User can delete content for-me and for-everyone

2.1.2.3 Discussion Board Module

- Users can send message individual and publicly
- Users can send text and image message
- Can delete message for-me and everyone

2.1.2.4 Notification Module

- If a student upload content, a notification will come
- If a student sends a message (text and image), a notification will come
- Notification can be in the form of text and image format

2.1.2.5 Feedback Module

- Users can send feedback about applications
- Users can put the complaint about other users
- Users can contact us through email

2.1.3. Design and Implementation Constraints

In order to develop mobile applications, developers must have Android Studio and XCode installed on their computer.

- To develop android applications, OS is a must.
- To develop android apps for Registered Users and the organization, android version >= 5.0 must be installed.
- To develop mobile application, developer must meet the following minimum hardware requirements.

✓ 1GB RAM or greater.
✓ Android Version 5.0 to 12
✓ Api Level 21 to 32
✓ 1GB of available storage space.

2.1.4. Assumptions and Dependencies

- Authentication
- Database and storage
- Firebase cloud messaging
- Scalable DP
- Retrofit and GSON
- Pdf Viewer
- Photo View
- Glide
- Diagonal
- Circular Image View

2.2. System Features

2.2.1. Functional Requirement

- User can register by using his email, password, name, optional profile image, University, Department, and current Semester in the application registration interface.
- After registering, users will be redirected to a home screen on which they can explore other application features like view and upload study materials and an individual or group chat with each other.
- Admin can create a profile by using his email, password, and optional profile image in the application registration interface.
- Admin can manage the student's upload study material like notes, quizzes, assignments, and past papers. And admin can accept or reject the request of users uploaded study materials.
- User and Admin can change profile photo, update University, Department, or Semester details, and also can reset password.
- When users upload study materials publicly, privately, and also send messages to each other notification will come on the receiver screen.
- Users can inform application performance through feedback in the application. When users give feedback other users can see this feedback of him. And other users can suggest it is right or wrong.
- After using the application both user and admin can successfully log out the application.

2.3. External Interface Requirements

External interface requirements define the hardware, software, or database elements with which a system or component must interact. External interface requirements specify hardware, software, or database elements with which a system or component must interface. This section provides information to ensure that the system will communicate properly with external components. If different portions of the product have different external interfaces, incorporate an instance of this section within the detailed requirements for each such portion.

2.3.1. User Interfaces

2.3.1.1 Sign In Screen

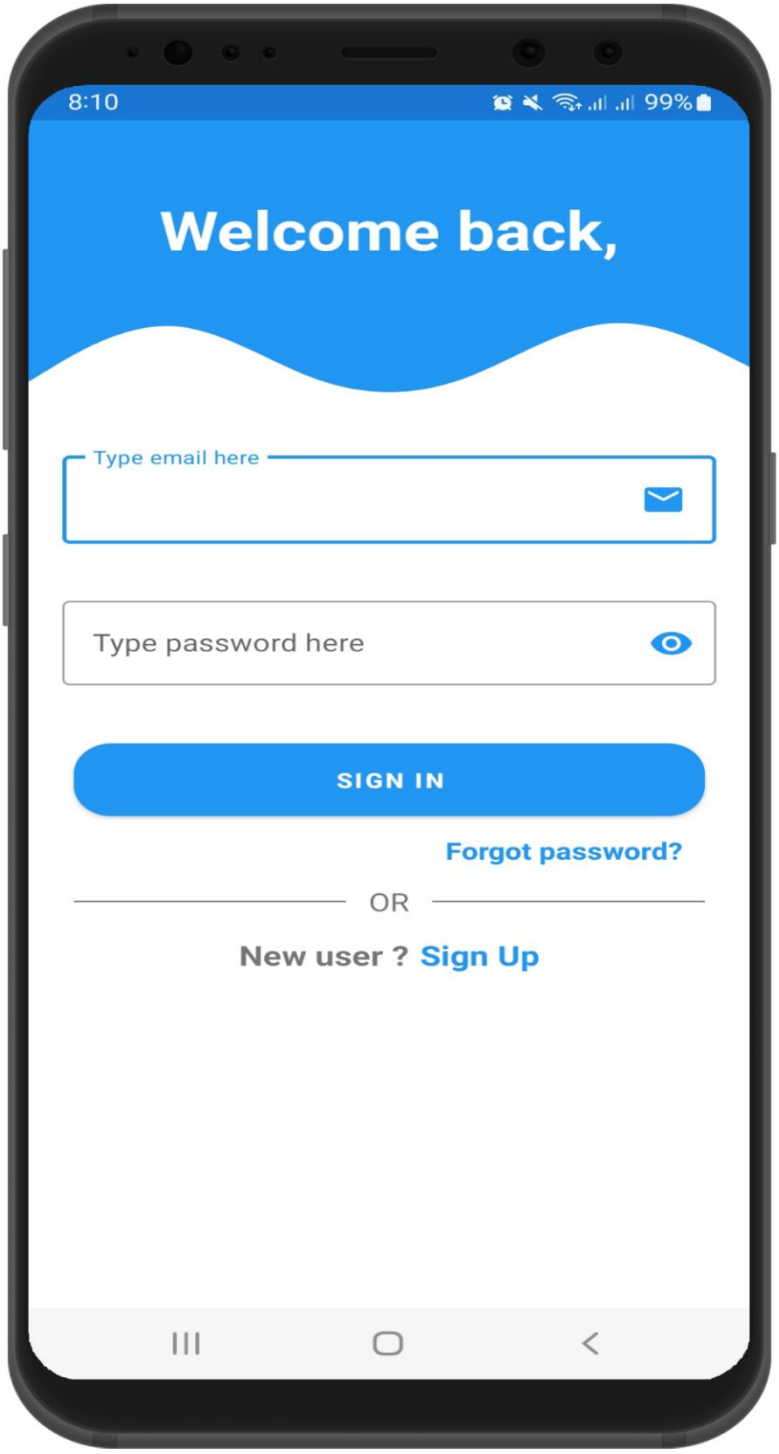


Figure 2.3.1.1: Sign In Screen

2.3.1.2 Sign Up Screen

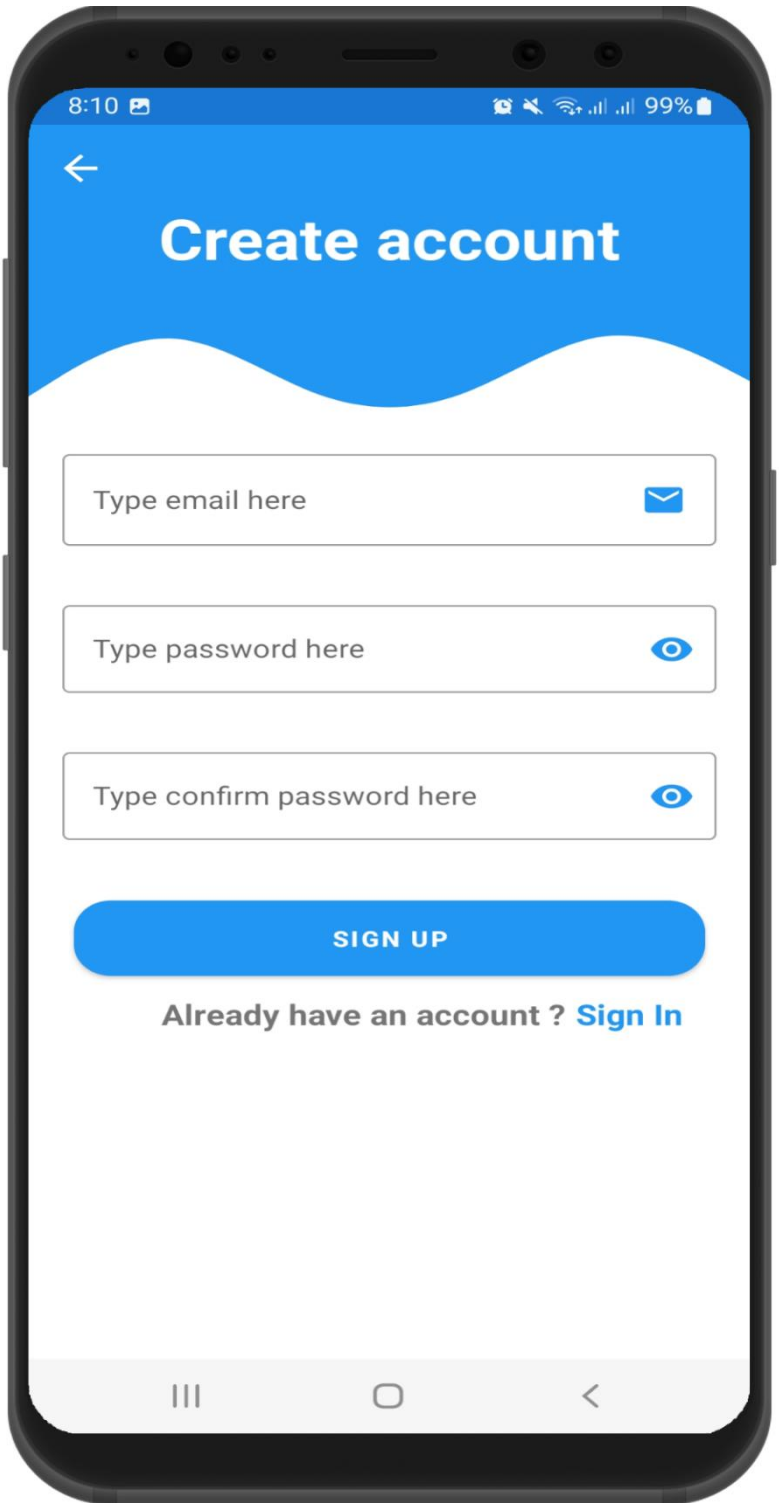


Figure 2.3.1.2: Sign Up Screen

2.3.1.3 Setup Profile Screen

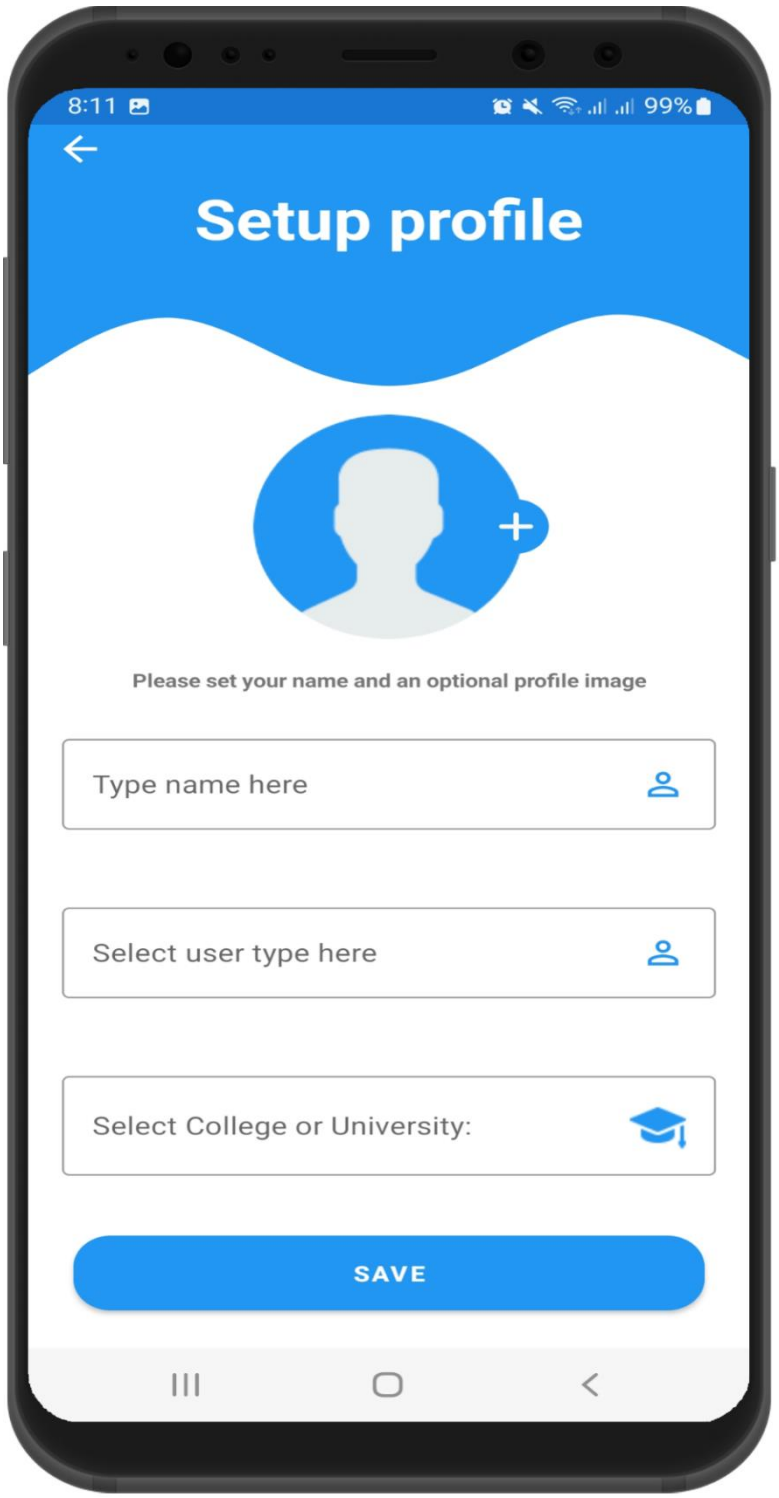


Figure 2.3.1.3 :Setup Profile Screen

2.3.1.4 Select Subject Screen

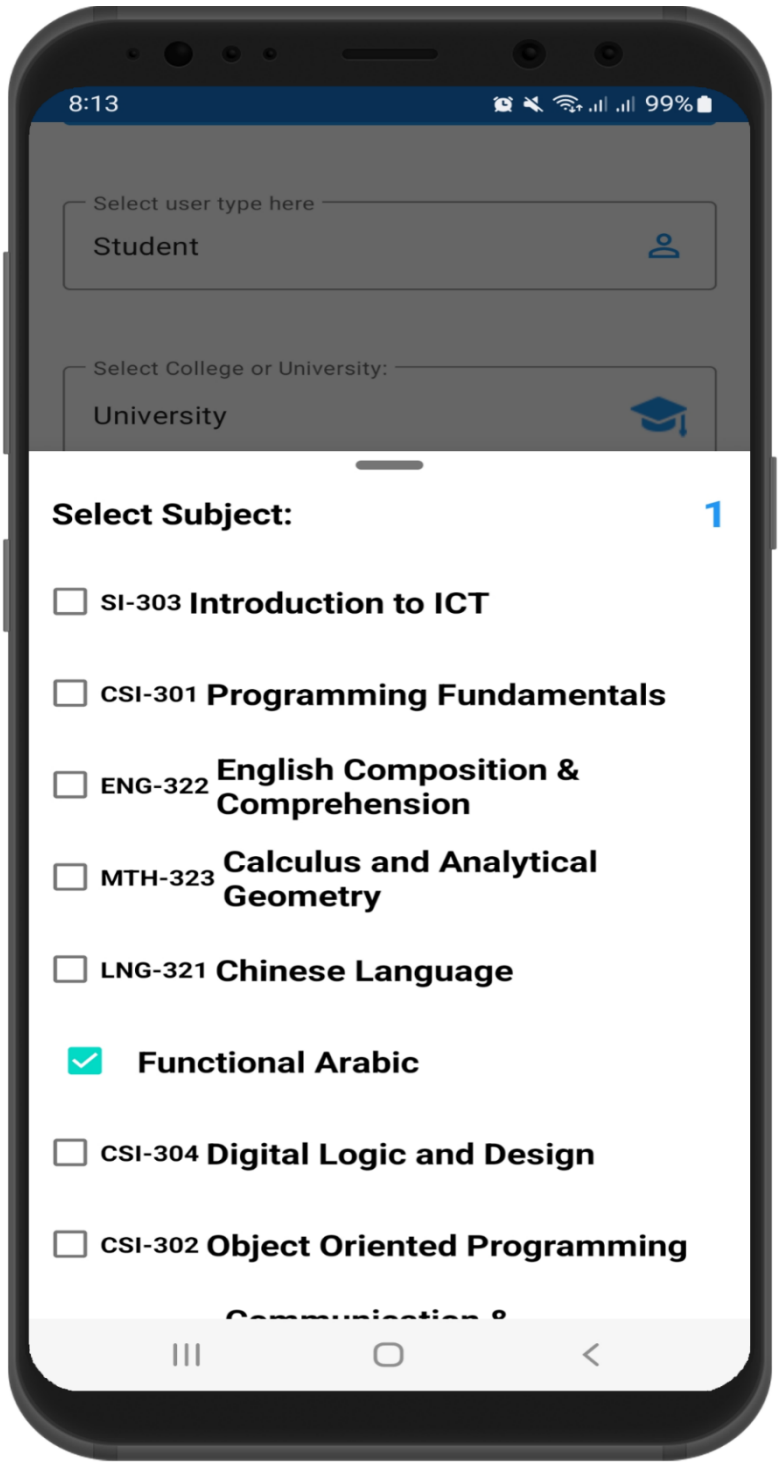


Figure 2.3.1.4: Select Subject Screen

2.3.1.5 Forget Password Screen

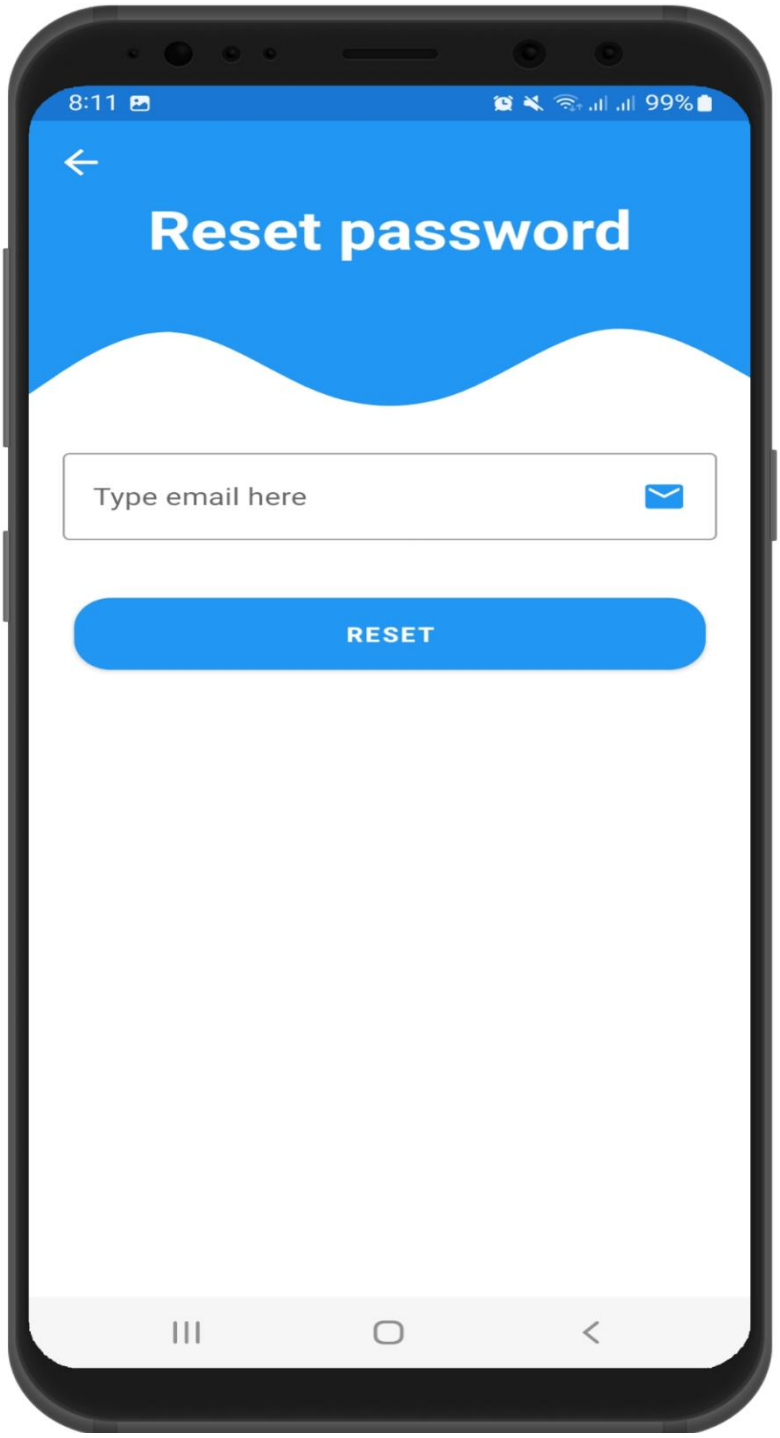


Figure 2.3.1. 5: Forget Password Screen

2.3.1.6 Home Screen

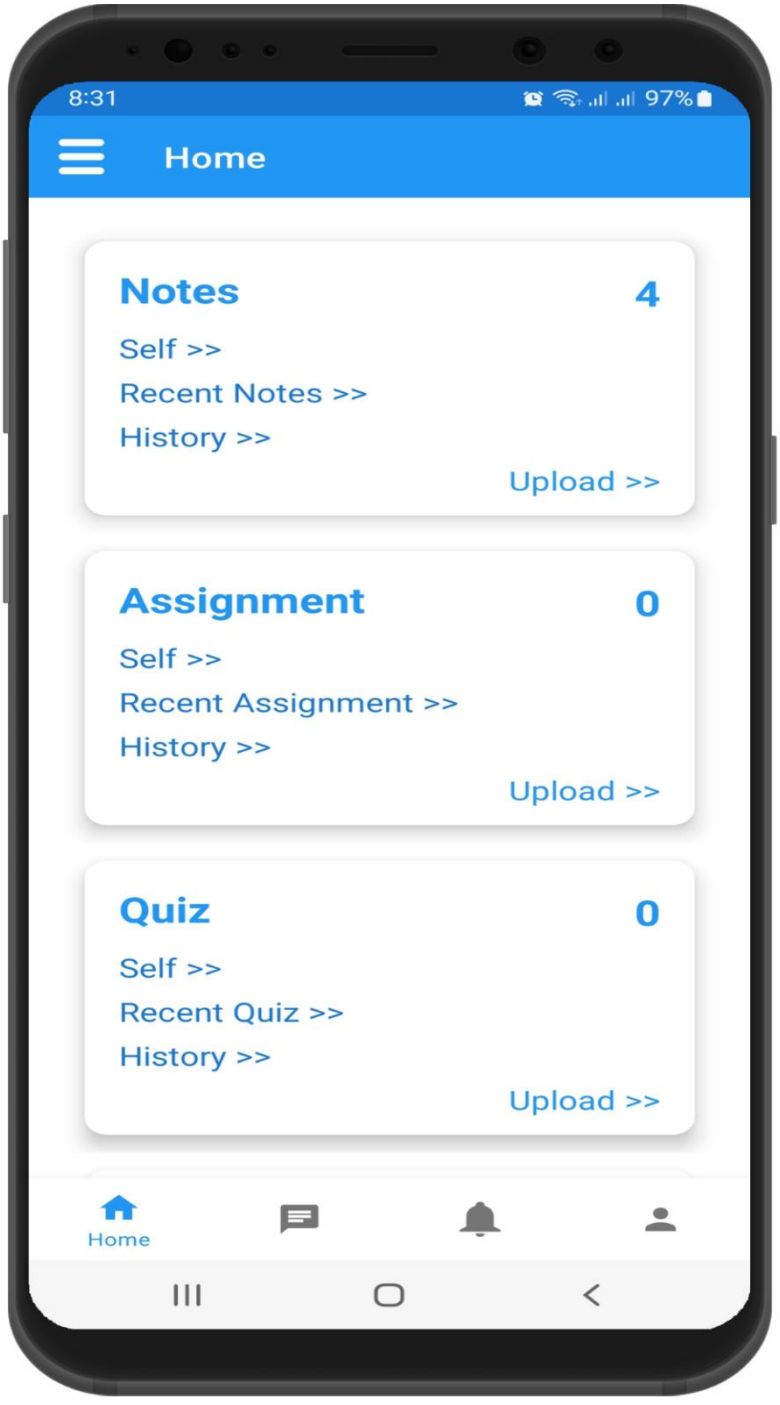


Figure 2.3.1. 6: Home Screen

2.3.1.7 History Note's Screen

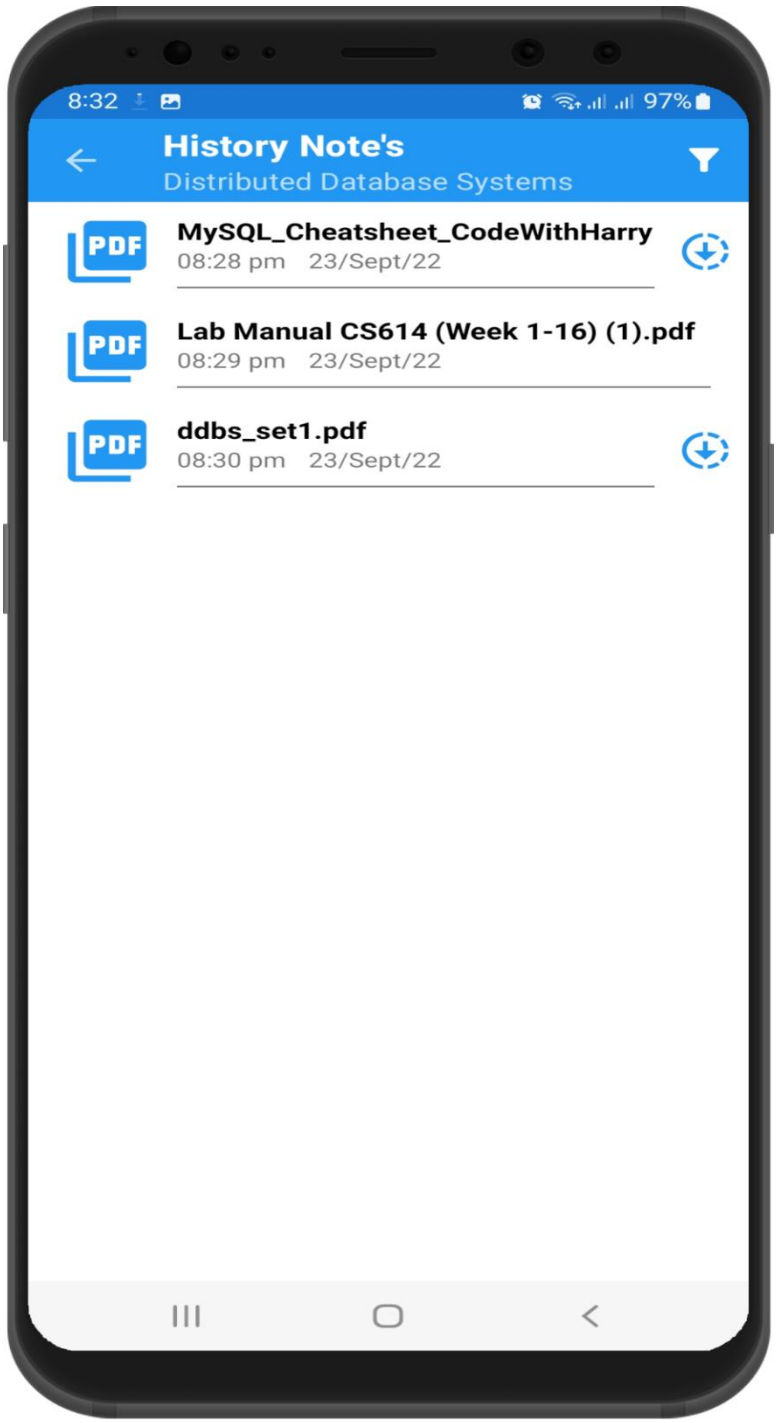


Figure 2.3.1. 7: History Note's Screen

2.3.1.8 Profile Screen

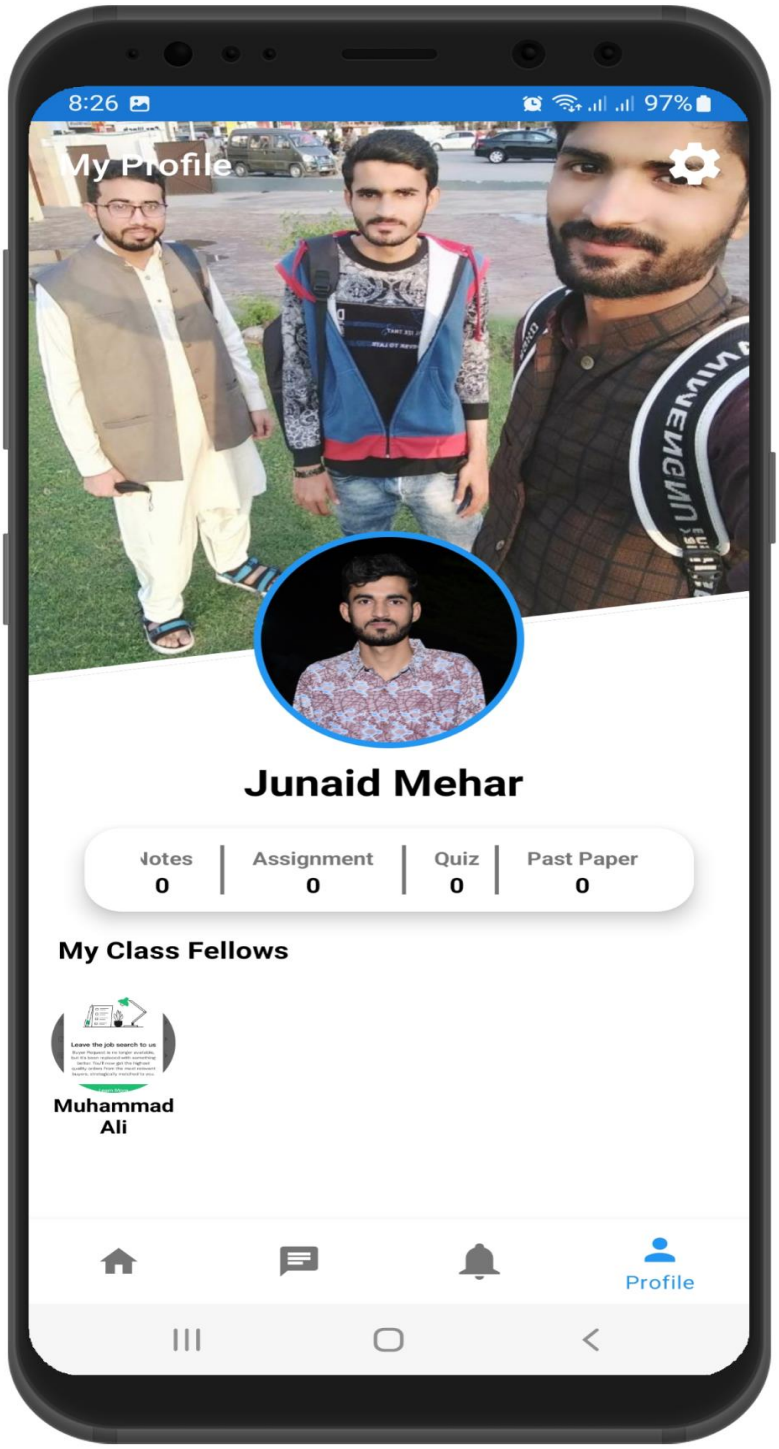


Figure 2.3.1. 8: Profile Screen

2.3.1.9 Discussion Board Screen

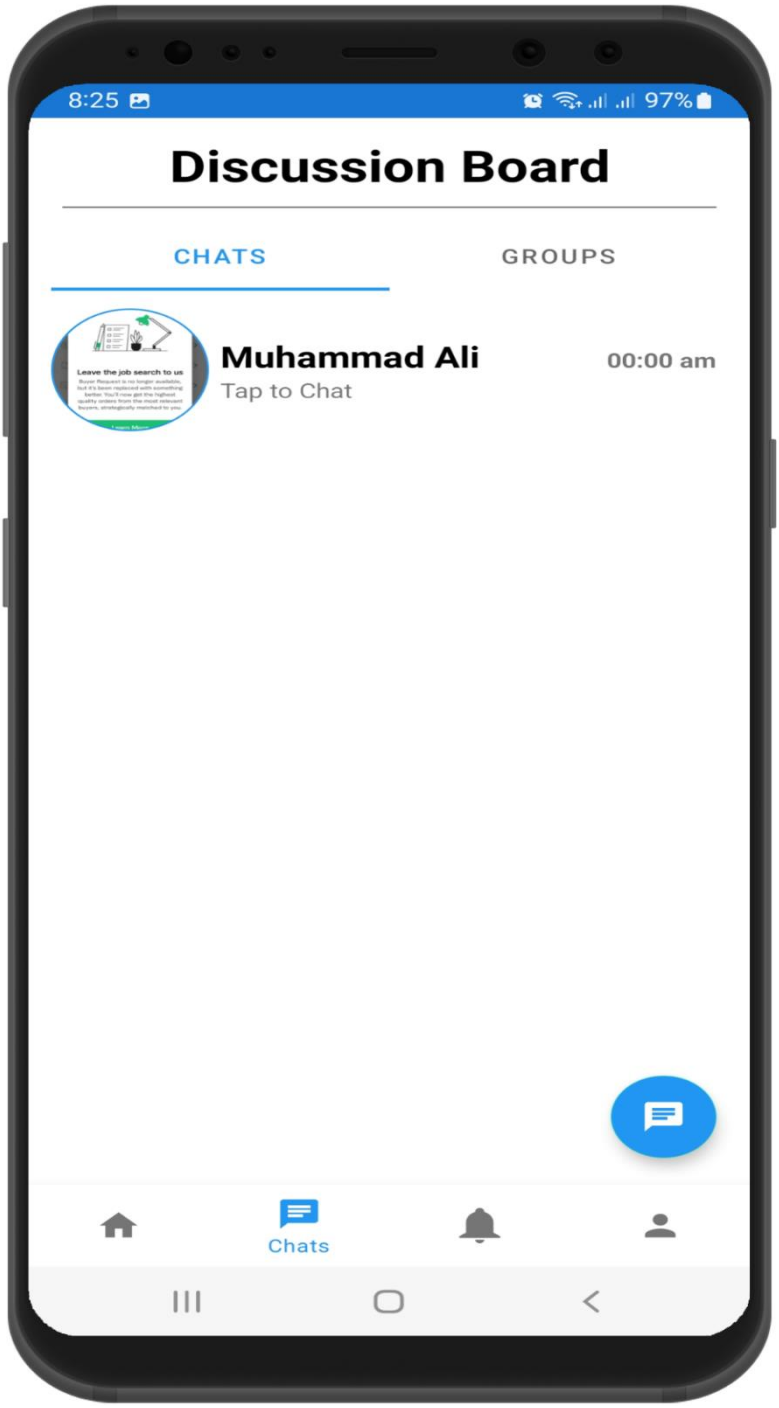


Figure 2.3.1. 9: Discussion Board Screen

2.3.1.10 Settings Screen

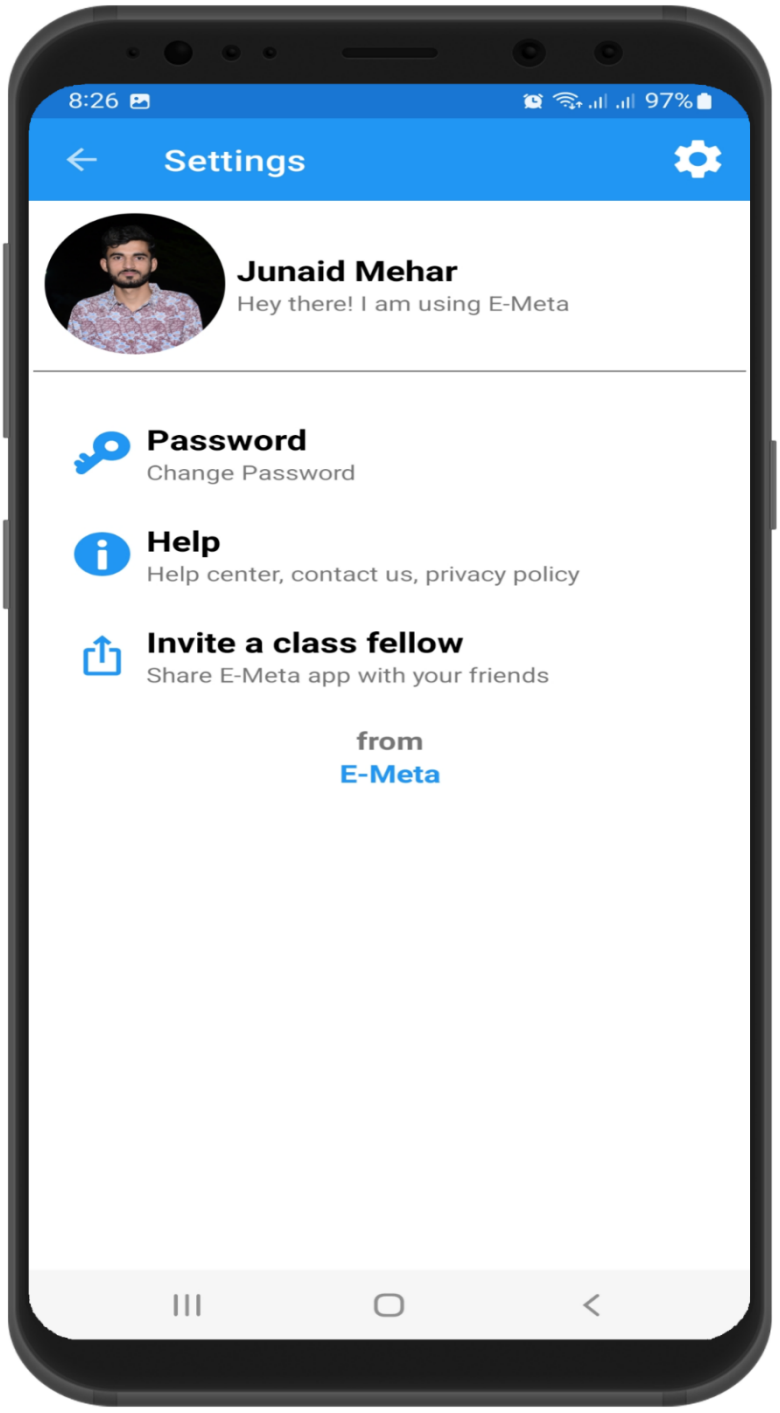


Figure 2.3.1. 10: Settings Screen

2.3.1.11 Upload Study Material Screen

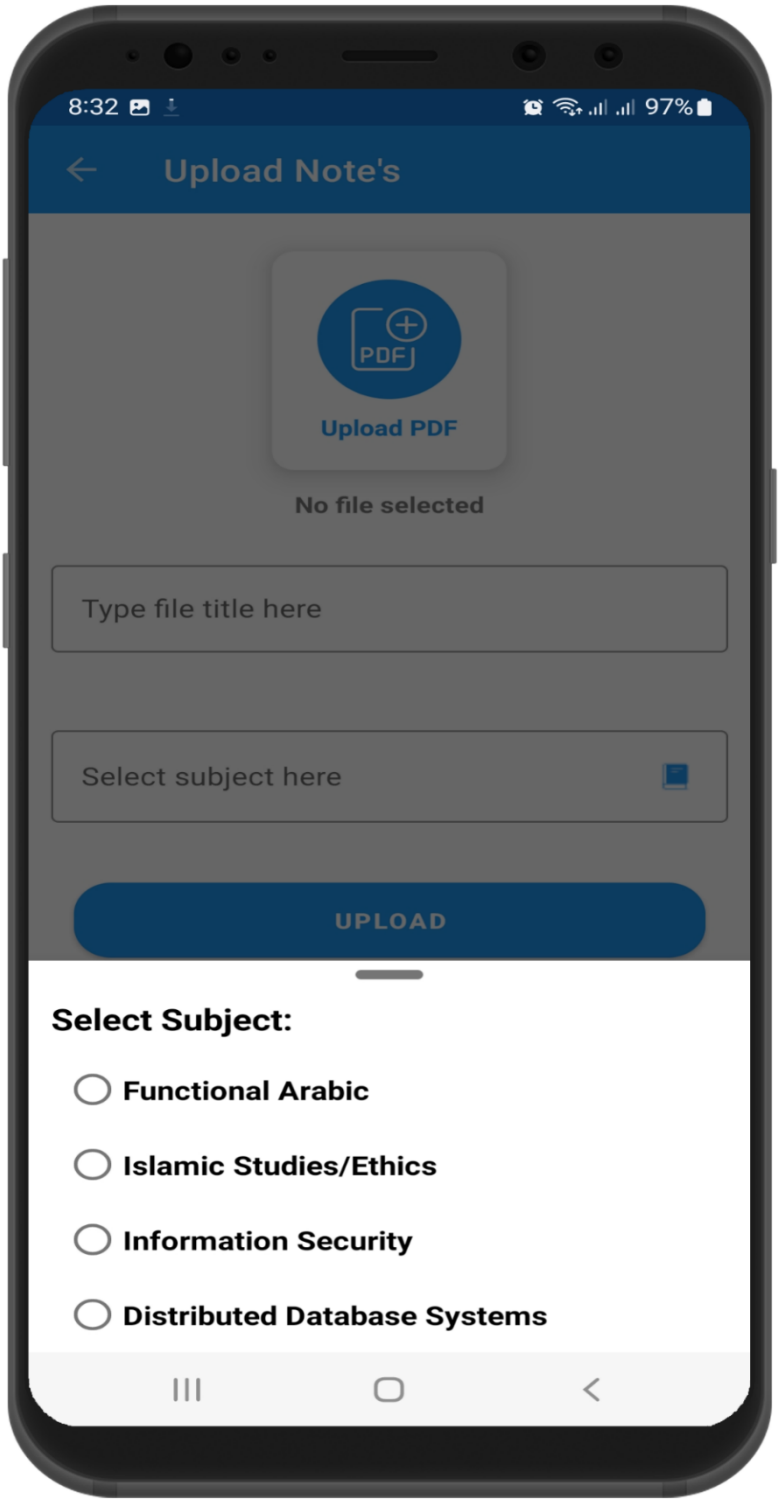


Figure 2.3.1. 11: Upload Study Material Screen

2.3.1.12 Feedback Screen

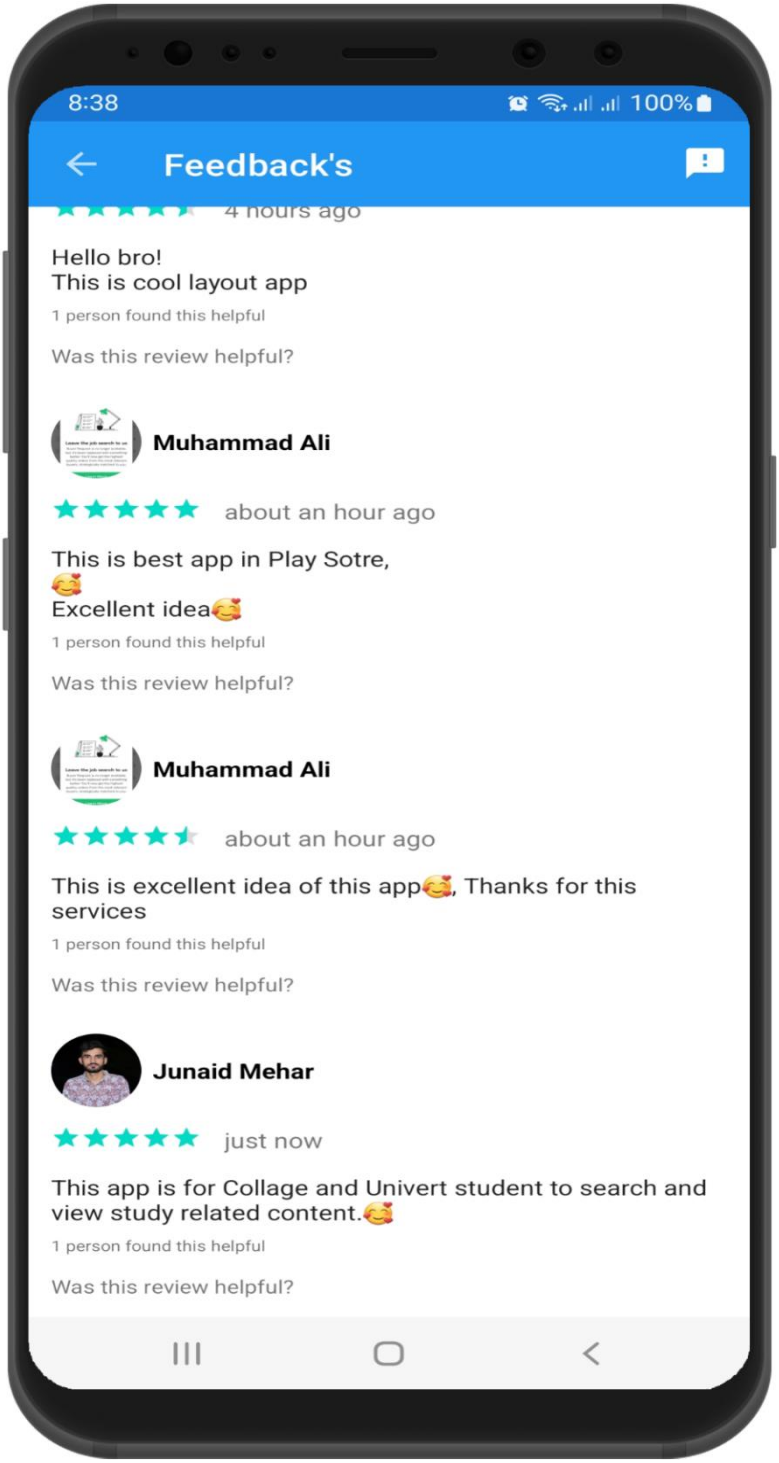


Figure 2.3.1. 12: Feedback Screen

2.3.1.13 Logout Screen

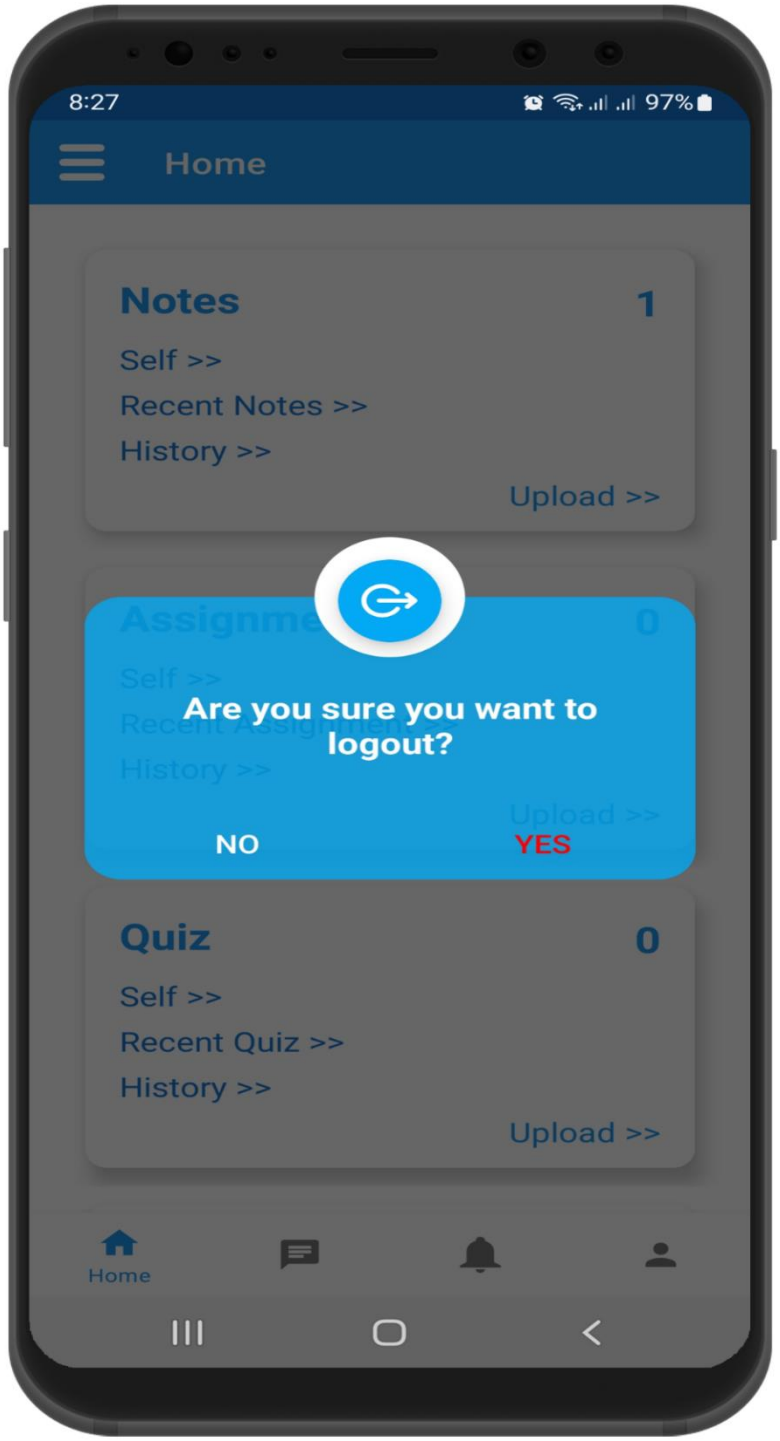


Figure 2.3.1. 13: Logout Screen

2.3.2. Communications Interfaces

Google Firebase is a service which provides such a real-time database server, along with a host of other features and Firebase enables us to develop communication-based applications with relative ease. In this paper, we propose a system which will be capable of sending text-based messages and files such as images, texts over through the internet between two users on the network in real-time. We make use of the Android operating system and Google Firebase to handle the backend of the communication operation, highlighting the various features of both the operating system and the service.

2.4. Other Nonfunctional Requirements

2.4.1. Performance Requirements

The application running compatibility has required a minimum of 1GB RAM with 50MB storage for giving a good user experience.

2.4.2. Safety Requirements

Application architecture is designed in such a way that the system become more secure to prevent unauthorized access to system infrastructure. Preventing user data loss, ensuring that mobile apps and running environment are secured from virus infection. And ensure that the operating system is run as an authorized non-rooted user.

2.4.3. Security Requirements

- Share data securely across apps must use validation to any user input
- Ask for credentials before showing sensitive information.
- Apply network security measures.
- Perform (Penetration Tests) with thorough QA & Security checks.
- Use intents to defer permissions.
- Store private data using the latest cryptography techniques.

Chapter No 3

Analysis (Use Case Model)

3. Chapter No 3: Analysis (use case model)

3.1. Identifying Actors and Use Cases using Textual Analysis

Use Case describes proposed functionality of the system. A Use Case represents a discrete unit of interaction between a user and the system.

3.1.1. Use Case Diagram

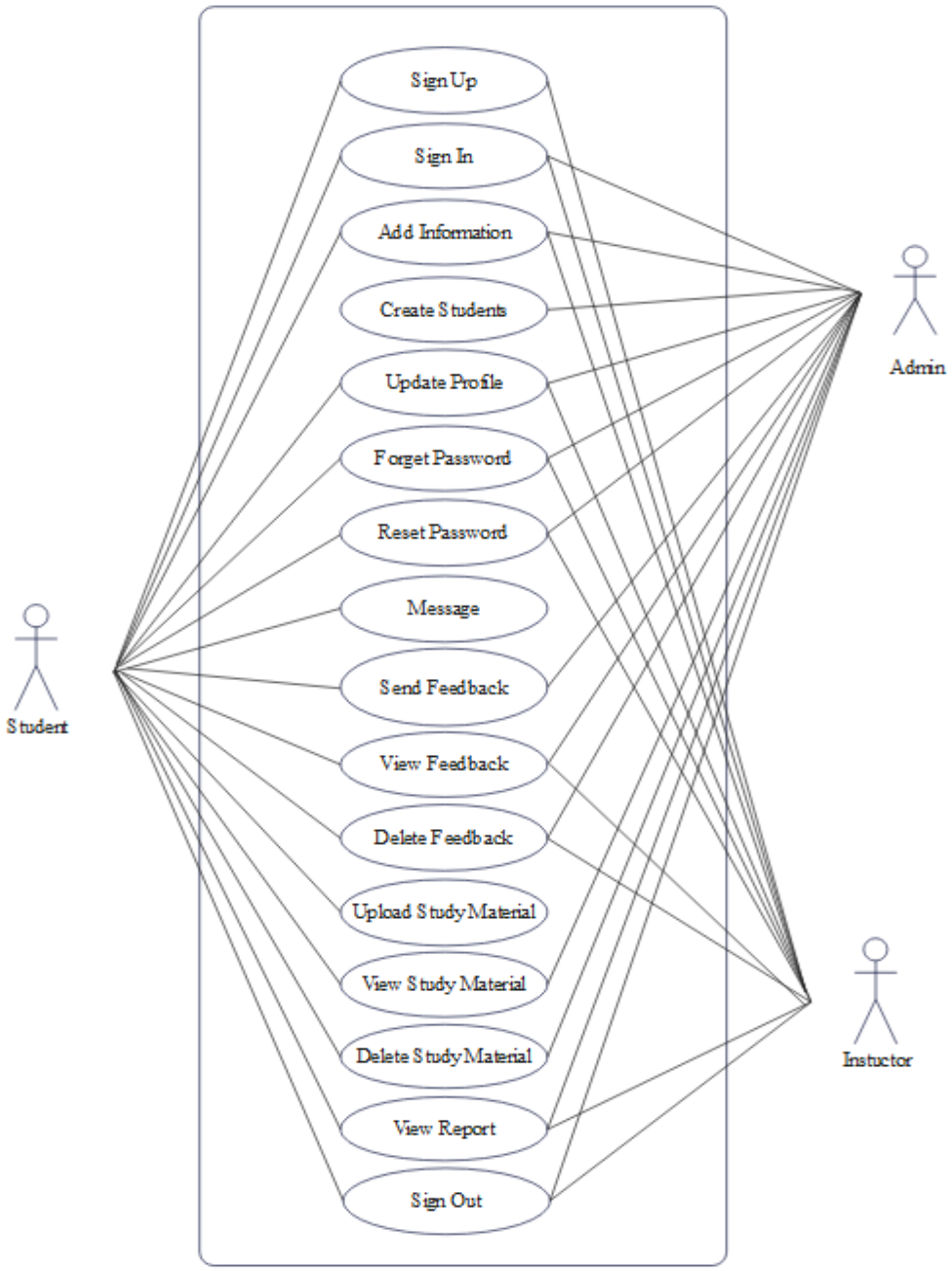


Figure 3. 1.1: Use Case Diagram

Figure Description: Figure 3.1.1 is the Use Case Diagram.

3.2. Forming Use Case Diagram with Candidate and Use Cases

3.2.1. Admin Use Case

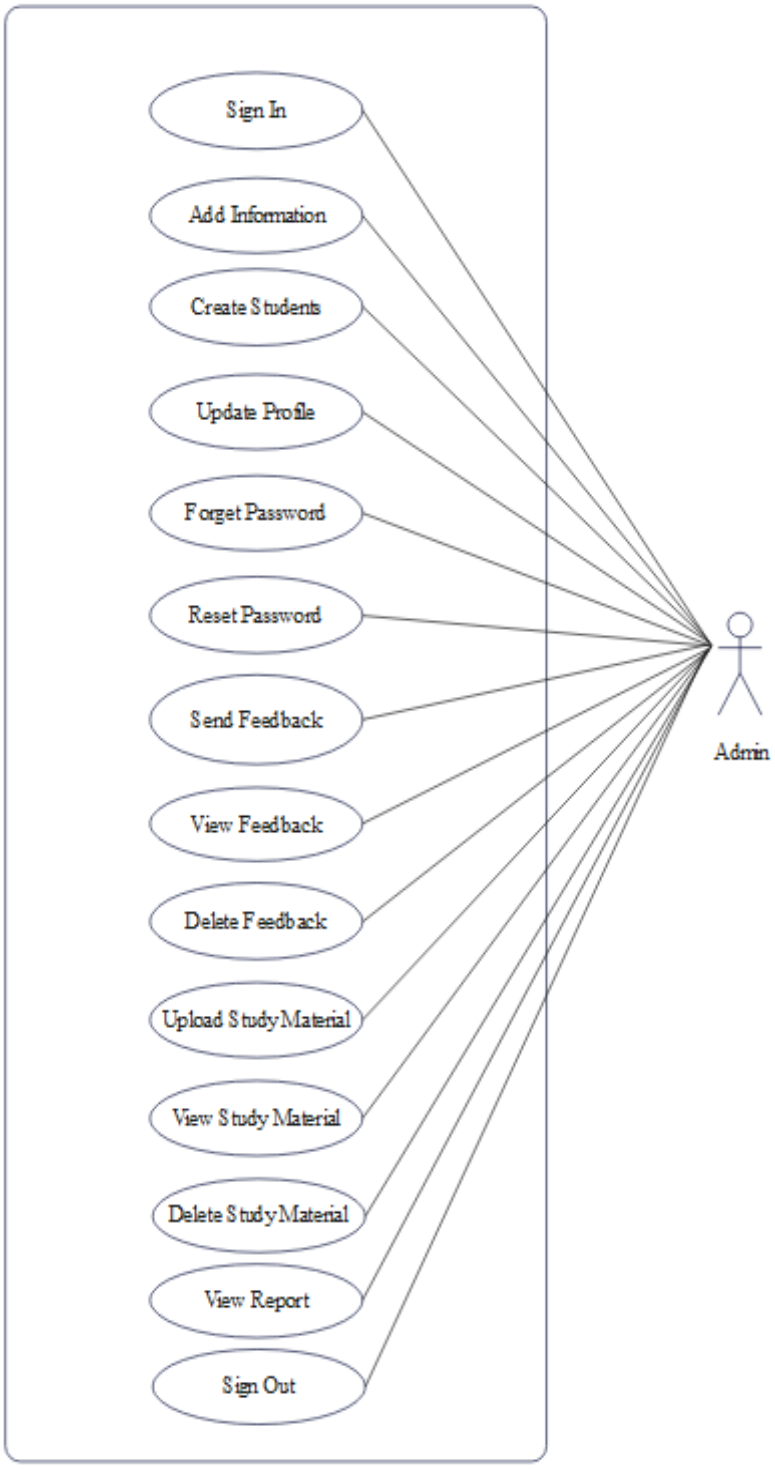


Figure 3.2. 1: Admin Use Case Diagram

3.2.1 Admin Description:

This use case diagram describes the process of Admin profile. Which have the medium priority because the admin is the actor who have more permission level than students. Admin need to first install the android application in his device and after admin will first register himself then will set up his profile then he goes to the home screen. And after account creation process admin can login to their account. Admin role in our project is to verify all other students' accounts and add them users list.

Admin can go to their profile settings and change profile pictures and also can reset password. If admin required more changes then goes to my account screen after login, he can update his profile information. As we know admin has more permissions levels than students. It can also upload content. View other student's contents and manage or delete if any irrelevant contents are uploaded by someone. If admin forgets his password for any reason, he can reset his password by using password reset functionality. There is a good chance admin can forget password if it happened then admin can loss his application.

Also admin have permission to send feedback to instructor if they have any queries or facing any kind of error or problems in using the application they will be able to give feedback. Also in the feedback module admin can send feedback about student's activities to the instructor. Admin is the administrator person in this app. Admin is managing everything in the between Student and Instructor.

Manage data in spreadsheets and reports. Keep records and reports up to date. Supervise other staff and delegate responsibilities. Handle technical issues in their area of expertise. Carry out clerical duties, including answering phones and preparing documents After using the all functionalities admin can logout his account by clicking the logout button.

Admin can save all student reports in this project and send them to the instructor report section. The admin responsibility is to continuously review the reports and all of the other students' actions or activities. Admin can keep track of all student's daily activities and generate monthly reports. After utilizing all features, the administrator can log out of his account by selecting the logout option.

3.2.2. Student Use Case

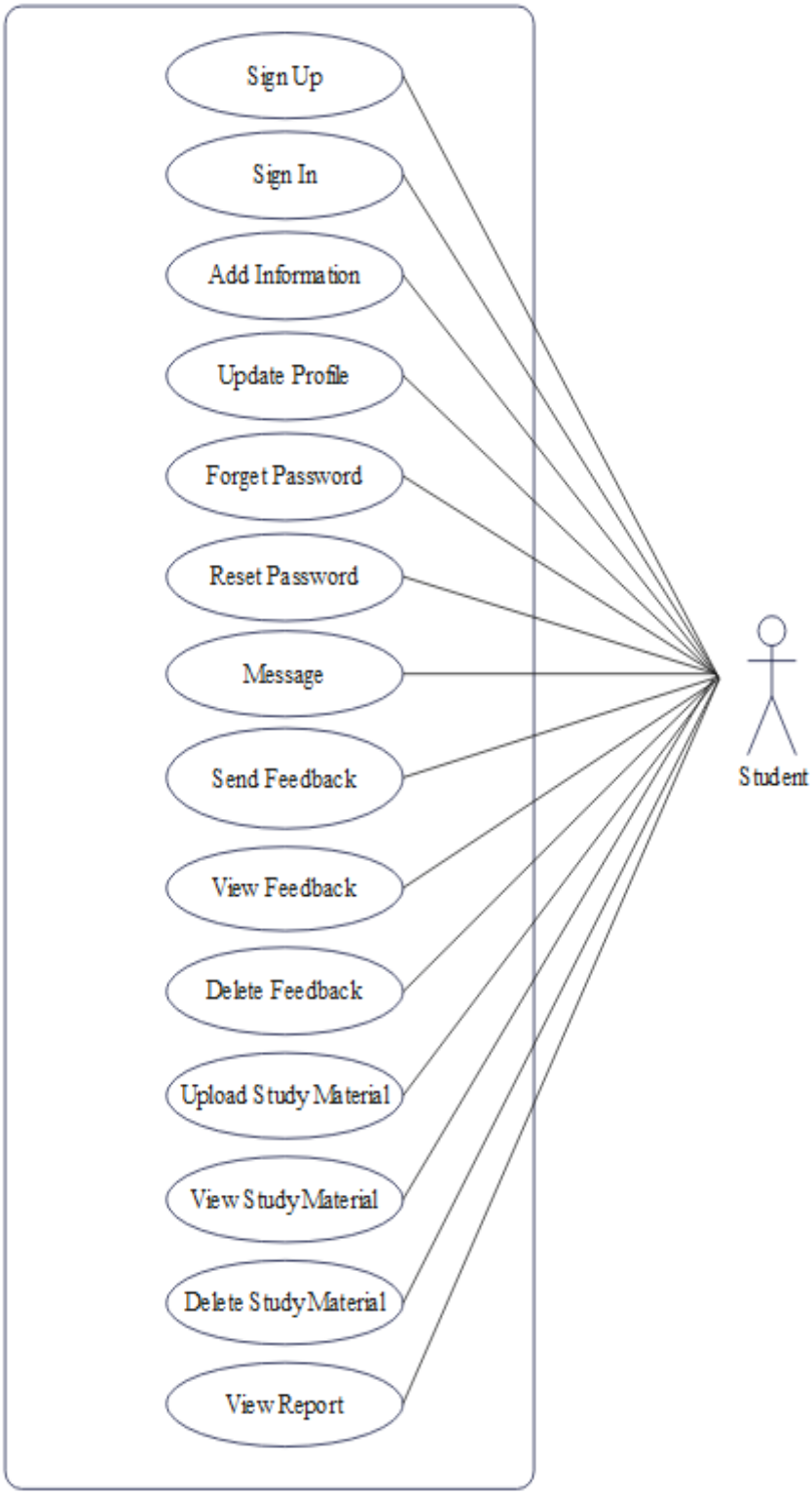


Figure 3.2. 2: Student Use Case Diagram

3.2.2 Student Description:

This use case diagram describes that how will students be able to use the android application and their process. The actor has the highest priority because student is a main actor of our project. Students need to first install the android application in their devices and after student will first register himself then will set up his profile then he goes to the home screen. And after account creation process students can login to their accounts. Also students can add or change their profile information in the profile settings.

Our intended audience in this application can update their account profiles as per need. All the students who's are only targeted audience for our app can go to the department by going to the settings of their profile. Students can go to their profile settings and change profile pictures and also can reset password. If a student moves to next semester, he will be able to update his semester information.

This project will include viewing, uploading, and downloading or deleting the Study contents student can view study-related content who have the same university, semester, and department. Students can upload notes, quizzes, assignments, and past papers publicly and privately. They can send massages to public groups or individually if they need study related information.

If a student is requiring notes he can request to other students through messages to upload notes. If student has any queries about study-related, he/she will be able to communicate with other students. Also students have permission to send feedback to project owner if they have any queries or facing any kind of error or problems in using the application they will be able to give us feedback. Also in the feedback module students can send feedback about applications or put the complaint about other users and contact us through email. Student is a main user of the application.

This application is specially made for students that who want to get soft study material from the internet. And they want to get past paper from this application. Our application provide a lot study material related study content on this platform. One thing is the unique in this app student can only enroll in relevant course and get related his semester subjects etc.

3.2.3 Instructor Use Case

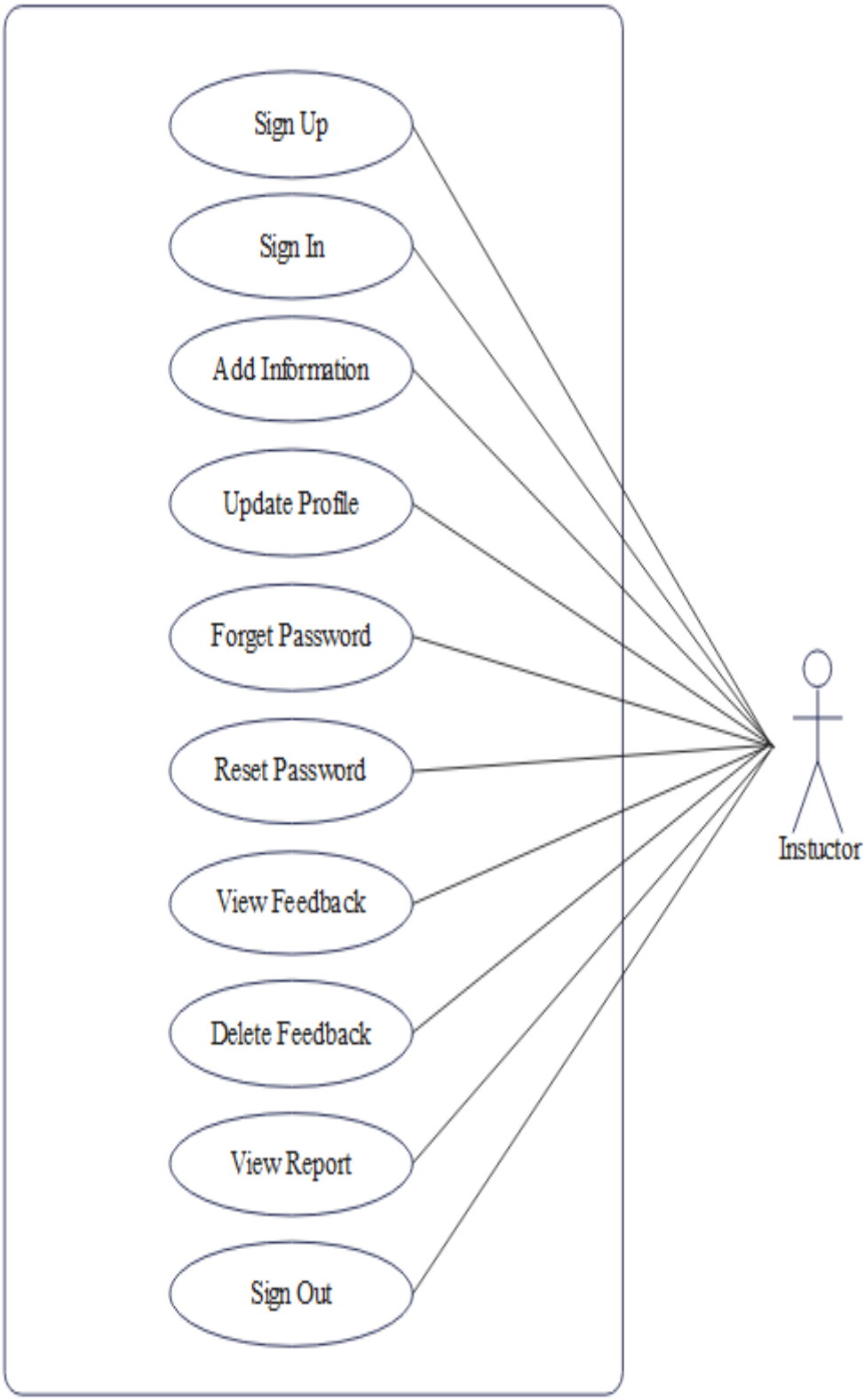


Figure 3.2. 3: Instructor Use Case Diagram

3.2.3 Instructor Description

This use case diagram describes the process of Instructor profile. Which have the very high priority because the instructor is the user who have much more permissions level than all other users. Also Instructor need to first install the android application in his device and only the application developer can create an instructor account and assign specific credentials to instructor account after the instructor user can set up his profile then he goes to the home screen. And after account creation process instructor can login to their account.

Instructor is the main job role in our project is to verify all other users accounts and add them users list. Instructor can go to their profile settings and change profile pictures and also can reset password. If instructor required more changes then goes to my account screen after login. He can update his profile information. As we know instructor is a root user who have all type of read write and execute permissions levels. It can also upload content. View other users ' contents and manage or delete if any irrelevant contents are uploaded by someone.

If instructor forgets his password for any reason, he can reset his password by using password reset functionality or developer is only the person who can change or mange instructor passwords. Also instructor have permission to send feedback to other users. And also have permissions to give feedback replies to other users. If other users have any queries or facing any kind of error or problems in using the application, they will be able to give feedback to instructor.

Instructor manage the SVL (Student Voice Leader) Requests. Instructor can verify the account of SVL and will be able to decline the requests of SVL. If Instructor, verify the account of SVL and will created account of SVL Successfully. Then SVL will be able to login in the application successfully. If instructor decline the requests of SVL then SVL account will not be created.

So the instructor should read their feedback and respond to them carefully. Also in the feedback module instructor can generate feedback report about student’s activities. After using the all functionalities instructor can logout his account by clicking the logout button.

3.3. Describe the Events Flow for Use Case

3.3.1 Admin Login

Identifier	UC-3.3.1-Admin Login	
Primary User	Admin	
Purpose	Admin Login	
Priority	High	
Pre-conditions	Admin should be logged out	
Post-conditions	Admin go to the admin login screen.	
Typical Course of Action		
Sr#	User Action	System Response
1	Admin click on the login form	System will open the login form
2	Admin add login credentials	System will check and verify details.
3		System will display dashboard to the admin.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed.	
2	In case of blank, wrong formatted inputs, system will generate alert/error message.	
Cross References		
Not any		

Table 3.3.1: Admin Login

Description:

This use case describes the admin login process. Which have the highest priority because without login in the android application we cannot access the Admin page. The pre- condition for this use case is to not be login in the admin. After providing the username and password the actor, the credentials are evaluated and in case of successfully login the system responses by login.

3.3.2 Manage User

Identifier	UC-3.3.2-Manage User	
Primary User	Admin	
Purpose	To manage User	
Priority	High	
Pre-conditions	Admin should be logged in	
Post-conditions	Admin go to the mange user list.	
Typical Course of Action		
Sr#	User Action	System Response
1	Admin click on the user page	System will open the user page
2	Admin manage the users like view, add, edit and delete.	System will response according to the action. If admin add the user the system will add a new user, if admin deletes and user system will delete that particular user, if admin edits an user system will update the users.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.2: Manage User

Description:

This use case describes the processes of managing the user of different study materials. Which have the high priority because user is an important part of a application. Admin can add, read, delete and edit users on user list page. Admin first need to login into the system to perform all these functions.

3.3.3 Student Login

Identifier	UC-3.3.3-Student Login	
Primary Actor	Student	
Purpose	Student Login	
Priority	High	
Pre-conditions	Student should not be logged in	
Post-conditions	Student go to the login screen	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on the login form	System will open the login form
2	Student add login credentials	System will check and match details.
3		System will display home screen to the Student.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed.	
2	In case of blank, wrong formatted inputs system will generate alert/error message.	
Cross References		
Not any		

Table 3.3.3: Student Login

Description:

This use case describes the Student login process. Which have the highest priority because without login in the android application we cannot add the documents in application. After providing the username and password the actor, the credentials are evaluated and in case of successfully login the system responses by login the student else the system shows the error message that the provided credentials are not valid or missing.

3.3.4 Registration

Identifier	UC-3.3.4-Registration	
Primary User	User	
Purpose	Registration	
Priority	High	
Pre-conditions	User should not be register	
Post-conditions	User go to the sign in screen.	
	After signing in user go to home screen.	
Typical Course of Action		
Sr#	User Action	System Response
1	User click on the signup form	System will open the signup form
2	User give the required details.	System will check and match details.
3		System will display sign in and show the message “new user successfully registered.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed.	
2	In case of blank, wrong formatted inputs system will generate alert/error message.	
Cross References		
Not any		

Table 3.3.4: Registration

Description:

This use case describes the registration process. Which have the highest priority because without registering in the android application user cannot add the documents into app. After providing the required information, the credentials are evaluated and in case of successfully registering the system responses by successfully registered into the system else the system shows the error message that the provided credentials are not valid or missing.

3.3.5 Admin Manage Study Material

Identifier	UC-3.3.5-Manage Study Material	
Primary Actor	Admin	
Purpose	To manage Study material	
Priority	High	
Pre-conditions	Admin should be logged in	
Post-conditions	Admin go to the Study Material Management section.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Admin click on the Study Material Management Section.	System will open the admin page
2	Admin manage the study contents like view, delete.	System will response according to the action. Admin can view the pre uploaded study contents on study material management section.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.5: Admin Manage Study Materials

Description:

This use case describes the processes of managing the Study Materials. Which have the high priority because Study Materials is an important part of our application. Admin can view contents. Admin also can read the contents. Admin can delete the contents if contents will be irrelevant contents on Study Materials screen. Admin first need to login into the system to perform all these functions.

3.3.6 Instructor Login

Identifier	UC-3.3.6-Instructor	
Primary User	Instructor	
Purpose	Login	
Priority	High	
Pre-conditions	Instructor should not be login	
Post-conditions	Instructor go to the sign in screen.	
	After signing in user go to home screen.	
Typical Course of Action		
Sr#	User Action	System Response
1	Instructor click on the signup form	System will open the signup form
2	Instructor give the required details.	System will check and match details.
3		System will display sign in and show the message "Instructor successfully Logged in.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed.	
2	In case of blank, wrong formatted inputs system will generate alert/error message.	
Cross References		
Not any		

Table 3.3.6: Instructor Login

Description:

This use case describes the Instructor Login process. Which have the highest priority because without login in the android application instructor cannot tell instructions to the students. After providing the required information, the credentials are evaluated and in case of successfully logging the system responses by successfully logged in into the system else the system shows the error message that the provided credentials are not valid or missing.

3.3.7 Admin Update Profile

Identifier	UC-3.3.7-Admin Update Profile	
Primary Actor	Admin	
Purpose	To Update profile	
Priority	Medium	
Pre-conditions	Admin should be logged in	
Post-condition	Admin should go my account screen for update profile.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Admin click on my account screen	System will show my account screen.
2	Admin click on a Save button.	System will update the Admin profile.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed that, there is no internet connection.	
Cross References		
Not any		

Table 3.3.7 Admin Update Profile

Description:

This use case describes the process to update Admin profile. Which have the medium priority because when the Admin wants to update profile from this application. The admin can update his profile he goes my account screen after login he update his profile. Admin can edit his profile. Admin can change his first name or his last name as he wants. Admin can also update his profile picture from this application.

3.3.8 Admin Forgot Password

Identifier	UC-3.3.8-Forgot Password	
Primary Actor	Admin	
Purpose	To Forgot Password	
Priority	High	
Pre-conditions	Admin should be logged out	
Post-conditions	Email is sent to the entered email account with the reset password link	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Admin go to the login screen.	System will open the login screen.
2	Admin can reset their password.	System will response according to the action.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.8 Admin Forgot Password

Description:

This use case describes the processes Admin Forgot Password. Which have the high priority because if admin forgot his password he can reset the password using forgot password function. It is very important part of the any android application because for some reason if admin use application after some time then there is a good chance admin can forget password if it happened then admin can loss his application. In this case we use Simple Mail Transfer Protocol (SMTP) by using this protocol password can be change and new password will be send to the mail.

3.3.9 Admin Logout

Identifier	UC-3.3.9-Admin Logout	
Primary Actor	Admin	
Purpose	To Logout	
Priority	High	
Pre-conditions	Admin should be logged in	
Post-conditions	Admin go to the logout button page in admin panel.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Admin click on the logout button.	System will logout the admin.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.9: Admin Logout

Description:

This use case describes the processes of admin logout from the system. Which have the high priority because admin login and logout are main function of the admin. First need to login into the system to perform all these function. Admin can logout whenever he thinks his work is done it is the very important part of the android application because if admin logout then he can save screen from risk if dose not log out then if any other person use that device then there is a chance he can harm the android application or delete some valuable content or ad something wrong and any Admin does not want any kind of mess like this. So that's why logout is very important part of any application. That is also the reason this is very important part of our application.

3.3.10 Student Manage Study Material

Identifier	UC-3.3.10-Manage Study Material	
Primary Actor	Student	
Purpose	To manage Study material	
Priority	High	
Pre-conditions	Student should be logged in	
Post-conditions	Student go to the Study Material Management section and select his,university,department and subject etc.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on the Study Material Management Section.	System will open the Study Material Management Section
2	Student manage the study contents like upload study materials, view, delete etc.	System will response according to the action. Student can view the pre uploaded study contents and upload study contents by itself on study material management section.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.10: Student Manage Study Materials

Description:

This use case describes the processes of managing the Study Materials. Which have the high priority because Study Materials is an important part of our application. Student can view,upload study materials and downloads contents of others student. Student also can read the contents. Student can delete the contents if contents will be irrelevant contents on Study Materials screen. Student first need to login into the system to perform all these functions.

3.3.11 Download Notes/Past Paper/Assignment/Quiz

Identifier	UC-3.3.11-Download Notes/Past Paper/Assignment/Quiz	
Primary Actor	Student	
Purpose	To make download	
Priority	Medium	
Pre-conditions	Student should not be logged in.	
Post-conditions	Student can download Notes ,Past Paper, Assignment, Quiz through download button on Study Material section.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on download button.	System will show download button.
2	Student click on download button.	System will download Notes, Past Paper, Quiz and Assignment.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed.	
Cross References		
Not any		

Table 3.3.11: Download Notes/Quiz/Assignment/Past Paper

Description:

This use case describes the process of download Study Materials like Notes, Quiz, Assignment and past papers through download button. For using this feature sign in is necessary. Student can download the study contents or any past paper in the application through the download button and then download will start. This is very useful feature for Students.

3.3.12 Student Update Profile

Identifier	UC-3.3.12-Student Update Profile	
Primary Actor	Student	
Purpose	To Update profile	
Priority	Medium	
Pre-conditions	Student should be logged in	
	Student should go my account screen for update profile.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on my account screen	System will show my account screen.
2	Student click on a Save button.	System will update the Student profile.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed that, there is no internet connection.	
Cross References		
Not any		

Table 3.3.12 Student Update Profile

Description:

This use case describes the process to update Student profile. Which have the medium priority because when the Student move next semester he/she can update profile from this application. The Student can update his profile he/she goes my account screen after login he/she update his profile. Student can edit his profile. Student can change his first name or his last name department, semester etc as he wants. Student can also update his profile picture from this application.

3.3.13 Student Forgot Password

Identifier	UC-3.3.13- Student Forgot Password	
Primary Actor	Student	
Purpose	To Forgot Password	
Priority	High	
Pre-conditions	Student should be logged out	
Post-conditions	Email is sent to the entered email account with the reset password link	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student go to the login screen.	System will open the login screen.
2	Student can reset their password.	System will response according to the action.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.13 Student Forgot Password

Description:

This use case describes the processes Student Forgot Password. Which have the high priority because if Student forgot his password he can reset the password using forgot password function. It is very important part of the any android application because for some reason if student use application after some time then there is a good chance student can forget password if it happened then student can loss his application. In this case we use Simple Mail Transfer Protocol (SMTP) by using this protocol password can be change and new password will be send to the mail.

3.3.14 Student Logout

Identifier	UC-3.3.14-Student Logout	
Primary Actor	Student	
Purpose	To Logout	
Priority	High	
Pre-conditions	Student should be logged in	
Post-conditions	Student go to the logout button in the application.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on the logout button.	System will logout the student account.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.14: Student Logout

Description:

This use case describes the processes of student logout from the system. Which have the high priority because student login and logout are main function of the student. First need to login into the system to perform all these function. Student can logout whenever he thinks his work is done it is the very important part of the android application because if student logout then he can save screen from risk if dose not log out then if any other person uses that device then there is a chance he can harm the android application or delete some valuable content or ad something wrong and any Student does not want any kind of mess like this. So that's why logout is very important part of any application. That is also the reason this is very important part of our application.

3.3.15 Manage Discussion Board

Identifier	UC-3.3.15-Discussion Board	
Primary Actor	Student	
Purpose	To manage discussion board	
Priority	High	
Pre-conditions	Student should be logged in	
Post-conditions	Student go to the discussion board section.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click in the discussion board.	System will open chat box publicly and privately.
2	Student can view messages, delete, send messages publicly and privately.	System will response according to the action. Student can view, delete and send messages in the discussion board.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.15: Manage Discussion Board

Description:

This use case describes the processes of Manage Discussion Board from the system. First need to login into the system to perform all these function. Student can discuss any question related to study in the discussion board with another student. And many questions can solve through asking to each other in the chat. Every student can discuss their question with one another student by publicly or privately in the discussion board. this is very important part of our application. As this many confusions will be clear easily.

3.3.16 Manage Student Feedback

Identifier	UC-3.3.16-Student Feedback	
Primary Actor	Student	
Purpose	To Give Feedback	
Priority	Medium	
Pre-conditions	Student should be logged in	
Post-conditions	Student go to the feedback section.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Student click on the Feedback screen.	System will show feedback screen.
2	Student Click on feedback and give feedback.	System will save feedback of the student in application.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed that, there is no internet connection.	
Cross References		
Not any		

Table 3.3.16: Give Feedback

Description:

This use case describes the process of give feedback about application. Student can tell us about our application through feedback option. Student can also complain about others students if student do misbehave with others student. For give us feedback student must need to be sign up and login. If user is not login, then he can't give feedback about our application.

3.3.17 Instructor Update Profile

Identifier	UC-3.3.17-Instructor Update Profile	
Primary Actor	Instructor	
Purpose	To Update profile	
Priority	Medium	
Pre-conditions	Instructor should be logged in	
	Instructor should go my account profile for update profile.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Instructor click on my account profile	System will show my account profile.
2	Instructor click on a Save button.	System will update the Instructor profile.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed that, there is no internet connection.	
Cross References		
Not any		

Table 3.3.17 Instructor Update Profile

Description:

This use case describes the process to update Instructor profile. Which have the medium priority because when the Instructor wants to update his/her profile. Instructor can edit his/her profile through update profile function. Instructor can update his name, profile picture and other data from this application.

3.3.18 Instructor Forgot Password

Identifier	UC-3.3.18- Instructor Forgot Password	
Primary Actor	Instructor	
Purpose	To Forgot Password	
Priority	High	
Pre-conditions	Instructor should be logged out	
Post-conditions	Email is sent to the entered email account with the reset password link	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Instructor go to the login screen.	System will open the login screen.
2	Instructor can reset their password.	System will response according to the action.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.18 Instructor Forgot Password

Description:

This use case describes the processes Instructor Forgot Password. Which have the high priority because if Instructor forgot his password he can reset the password using forgot password function. It is very important part of the any android application because for some reason if instructor use application after some time then there is a good chance instructor can forget password if it happened then instructor can loss his application. In this case we use Simple Mail Transfer Protocol (SMTP) by using this protocol password can be change and new password will be send to the mail.

3.3.19 Instructor Logout

Identifier	UC-3.3.19-Instructor Logout	
Primary Actor	Instructor	
Purpose	To Logout	
Priority	High	
Pre-conditions	Instructor should be logged in	
Post-conditions	Instructor go to the logout button in the application.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	Instructor click on the logout button.	System will logout the instructor account.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.19: Instructor Logout

Description:

This use case describes the processes of Instructor logout from the system. Which have the high priority because Instructor login and logout are main function of the instructor. First need to login into the system to perform all these function. Instructor can logout whenever he thinks his work is done it is the very important part of the android application because if Instructor logout then he can save screen from risk if dose not log out then if any other person uses that device then there is a chance he can harm the android application or delete some valuable content or ad something wrong and any instructor does not want any kind of mess like this. So that's why logout is very important part of any application. That is also the reason this is very important part of our application.

3.3.20 Manage Notification

Identifier	UC-3.3.20-Manage Notification	
Primary Actor	Student	
Purpose	To Receive Notification	
Priority	Medium	
Pre-conditions	Student should be logged in	
Post-conditions	Student can discussion and send study material in the application. Then notification will generate of this action.	
Typical Course of Action		
Sr#	Actor Action	System Response
1	When Student upload study materials in the study material section and will discussion in the chat.	System will send the messages notification and uploading study materials notification in the applications.
Sr#	Alternate Scenarios	
1	In case of non-availability of internet, Error message will be displayed	
Cross References		
Not any		

Table 3.3.20 Manage Notification

Description:

This use case describes the process to receive notification in the application. Which have the medium priority because when the Student wants to upload study materials and send messages in the publicly or privately in the application notification will receive to another student in the application. As this other student will alert of updating in the application.

Chapter No 4

Design

4. Chapter No 4: Design

4.1. Architecture Diagram

System design is the process of defining elements of system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. System design implies a systematic approach to the design of a system. It may take a top- down or bottom-up approach.

System Design is one of the most important things that developer has to be before developing a system. A good system design may give a good startup and able to cope with system requirements. The basic study of system design is the understanding of component parts and their subsequent interaction with one another. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user.

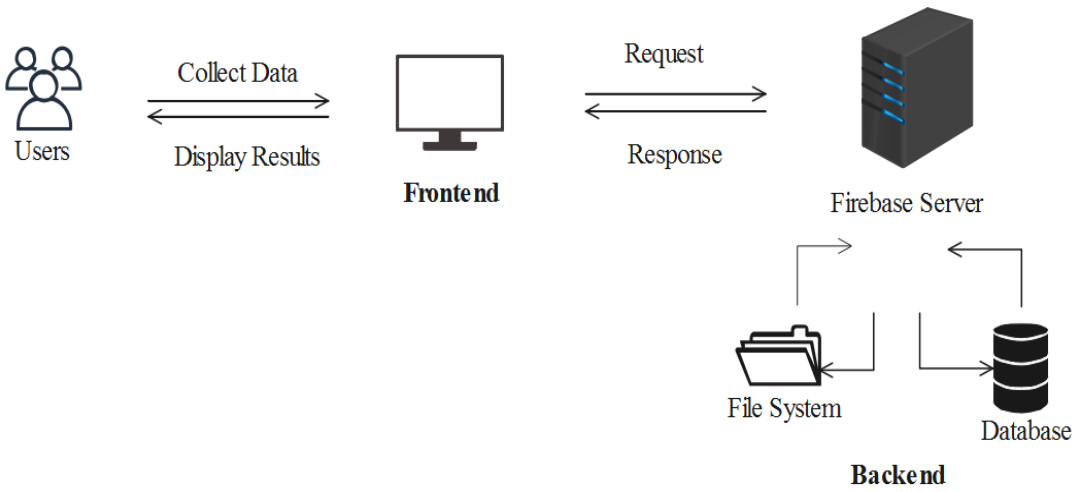


Figure 4. 1: Architectural Design

Figure Description: Figure 4.1 is about the architectural design of the system.

4.2. ERD with Data Dictionary

4.2.1 Entity Relationship Diagram(ERD)

An entity relationship diagram (ERD), also known as an entity relationship model, is a graphical representation that depicts relationships among people, objects, places, concepts or events within an information technology (IT) system.

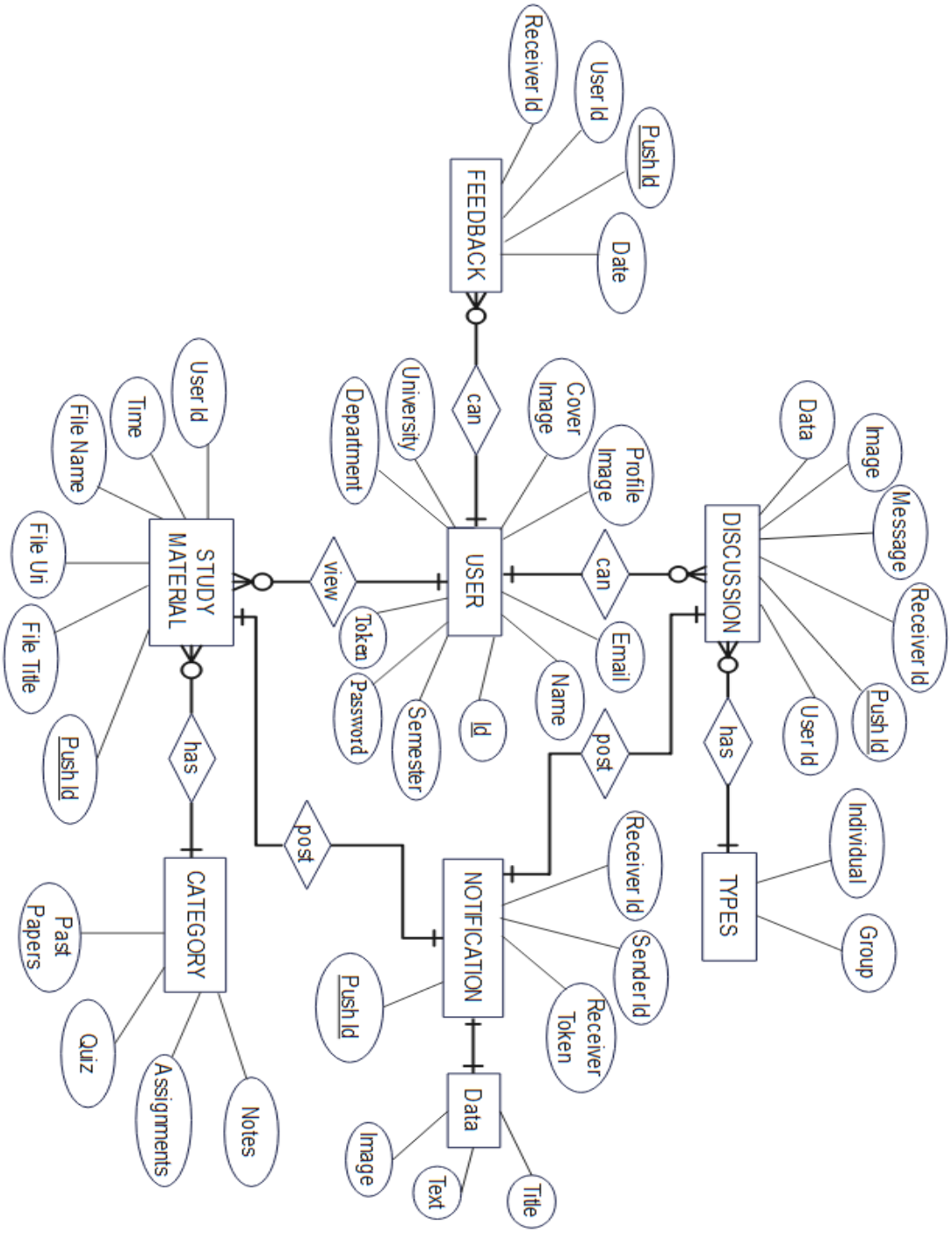


Figure 4. 2.1: Entity Relationship Diagram

4.2.1 ERD Description:

This ERD diagram describes the user work process in graphical representation, which has the medium priority because the diagram will describe all of the functions and work procedures of this application. The user in the diagram is the main entity that has many attributes and also for the user in the diagram we have a total of three other relations with user operation entities.

As we mentioned all user attribute that describes how a user can register himself in the application users will give an email, password, and name, in string format and the user can set his profile cover picture and also he can choose university department and semester in which he wants to go and in the first relation of this class, we describe user operation of study material that which shows that user can view, upload, update, delete study material. And in the second relation of this diagram, we show how users can send messages view all messages, and delete messages in string, format. In the discussion board entity, students can send and receive messages and images and also study contents in groups and individual chat.

Students can view other students' public messages and delete recent messages. And in the third relation shows the process of the feedback. In the operation, the user has too many relations that describe the feedback attributes and stores push id, receiver id, and user id, in string format and date in long data type format. Also, the study material and discussion panel have a one-to-one relation with notification that stores and shows notifications from the discussion panel and study material module. The notification system will use push id, receiver id, sender id, and receiver token and also show data in form of title text images format. In the study, material entity users have one too many relations with category. In the category attributes users can manage notes, quizzes, assignments, and past papers.

ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system. It develops a conceptual design for the database. It also develops a very simple and easy to design view of data. In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

4.2.2 Data Dictionary

A Data Dictionary is a collection of names, definitions, and attributes about data elements that are being used or captured in a database, information system, or part of a research project.

4.2.2.1 User Table Schema

Filed Name	Data Type	Description	Constraint
UserId	String	Store User User Id	Primary Key
PushId	String	Store Push Id	
Name	String	Store User Name	
Email	String	Store User Email	
Password	String	Store Password	
Confirm Password	String	Store Confirm Password	
Profile Image	String	Store User Profile Image	
Cover Image	String	Store User Cover Image	
University	String	Store User University	
Department	String	Store User Department	
Semester	String	Store User Semester	

Table 4.2.2.1: User Schema

Description:

The module describes the process of user management. Which have high priority because the android application project is specially design for students. When student comes to our application then firstly they need to register their account. And after In the signup page students can register providing information like Email and password. After that they can login to their accounts by providing credentials. Students can forget password for their accounts. One of the main important feature of our project is in the event that any student has finished his one semester of study and needs to admit in the next semester. Then he/she can change his/her department semester enrollment data in the application. In the process of user management students can update their educational profile and they can view and edit profiles picture and cover picture. In user management process students can view the profiles of the other students.

4.2.2.2 Study Material Table Schema

Filed Name	Data Type	Description	Constraint
Push Id	String	Store User Push Id	Primary Key
User Id	String	Store User Id	
File Url	String	Store User File Url	
File Name	String	Store User File Name	
File Title	String	Store User File Title	
Date	Date	Store Date	

Table 4.2.2.2: Study Material Schema

Description:

The module describes the process of study material. Which have high level priority because student in our android application spent most of their time on study material. In the process of study material module students can view, upload, update and delete their study content. Also students can upload study contents publicly and privately. And also Students can download study material or delete content for-me and for-everyone.

4.2.2.3 Feedback Table Schema

Field Name	Data Type	Description	Constraint
User Id	String	Store user Id	Primary Key
Push Id	String	Store feedback message	
Receiver Id	String	Store unique receiver Id	
Feedback	String	Store feedback record unique Id	
Date	Long	Store date	

Table 4.2.2.3: Feedback Schema

Description:

This module describes the feedback process. Which have lowest priority because users don't send feedback complaints often but if there is any kind of issue they faced then they can give feedback about their problems. In the process of feedback students can send feedback about applications. If any user found runtime crashes in our application,

they can send complaints about this issue on play store. Students can complain about other class fellows. And also they can contact us through email.

4.2.2.4 Notification Table Schema

Filed Name	Data Type	Description	Constraint
Push Id	String	Store User Push Id	Primary Key
Receiver Token	String	Store Receiver Token	
Sender Id	String	Store User Push Id	
Receiver Id	String	Store User File Url	
Data	Notification Data	Store Data	
Date	Date	Store Date	

Table 4.2.2.4: Notification Schema

Description:

The module describes the process of Notification table schema. Which have medium level priority because student in our android application don't receive notifications all the time.

- If a student upload study content, a notification will be received to others.
- If a student sends a message (text and image), a notification will be received.
- Notification can be text and image format.
- If any of the student send message in the group and individual a notification will come in the application.

4.2.2.5 Discussion Board Table Schema

Filed Name	Data Type	Description	Constraint
Push Id	String	Store Push Id	Primary Key
User Id	String	Store User Id	
Receiver Id	String	Store Receiver Id	
Message	String	Store User Message	
Date	Date	Store Date	

Table 4.2.2.5: Discussion Board Schema

Description:

The module describes the process Discussion Board Table Schema. Which have medium level priority because student in our android application don't always use discussion board all the time. In the discussion board students can send message individual and publicly. And students can send message in the form of text and image message. And also they can delete message for-me and everyone in the group and individual.

4.3. Data Flow Diagram

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. They are often elements of a formal methodology such as Structured Systems Analysis and Design Method (SSADM).

4.3.1 DFD Level 0 Diagram

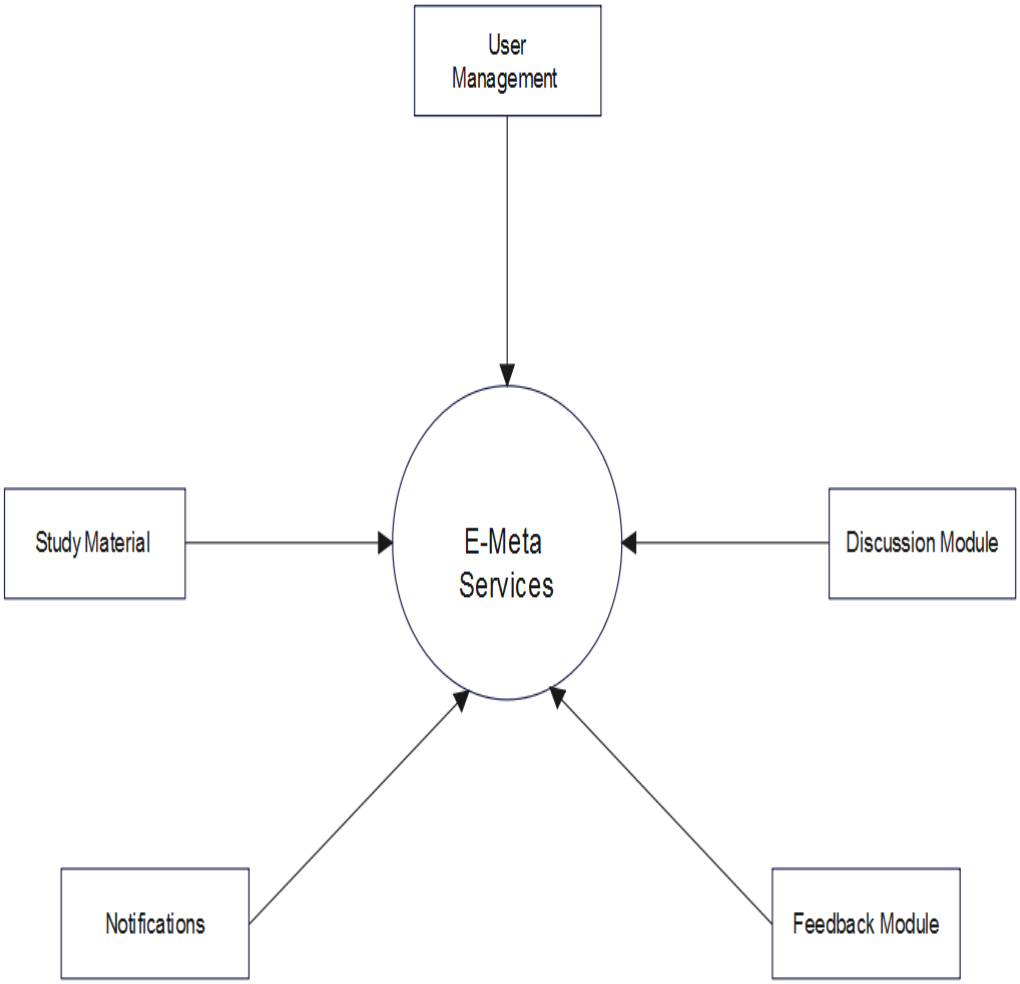


Figure 4.3. 1: DFD Level 0 Diagram

4.3.2 DFD Level 1 Diagram

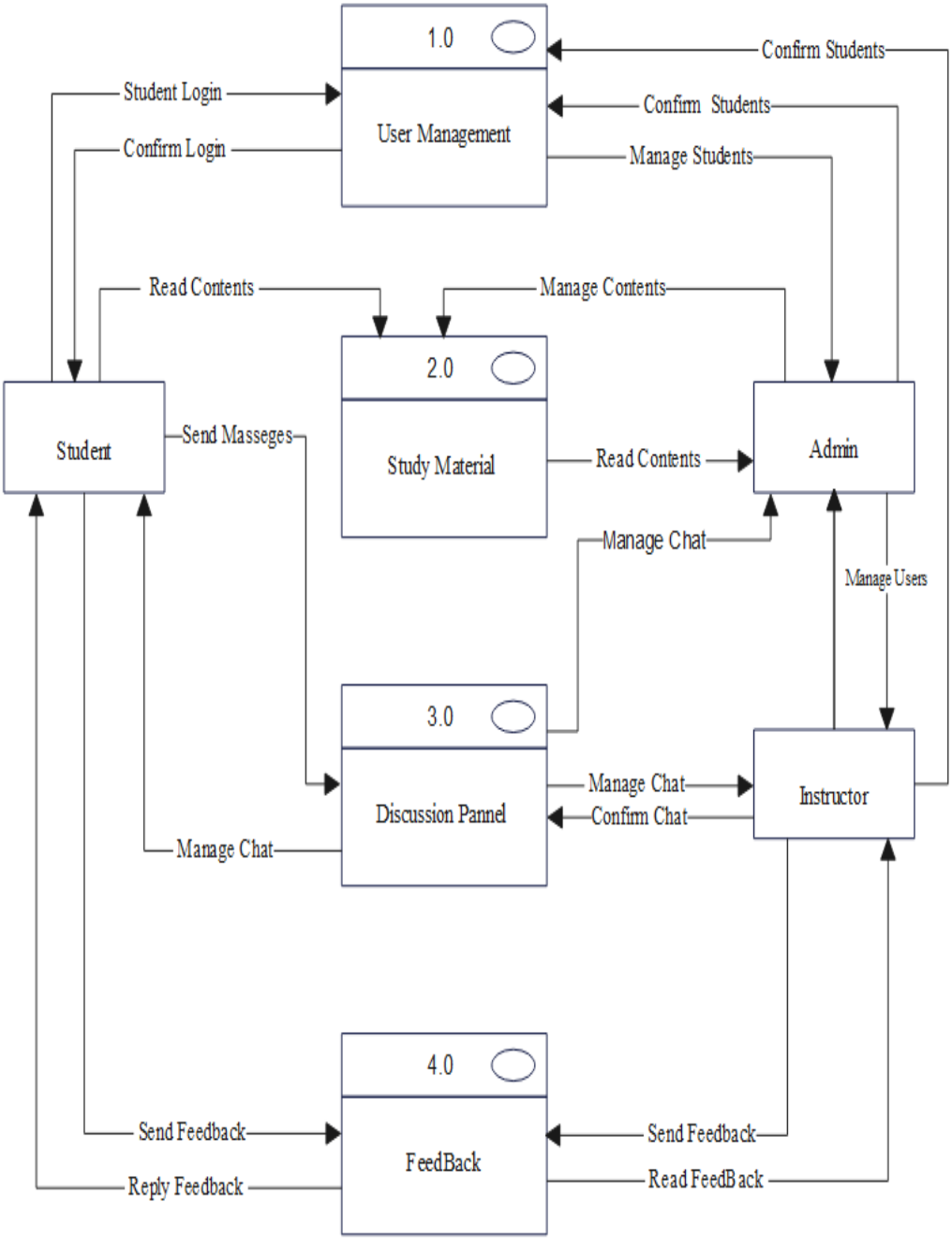


Figure 4.3. 2: DFD Level 1 Diagram

4.4. Class Diagram

A class diagram is a type of diagram and part of unified modeling language that define and provides the overview and structure of a system in terms of classes, attributes and methods, and the relationship between different classes**.**

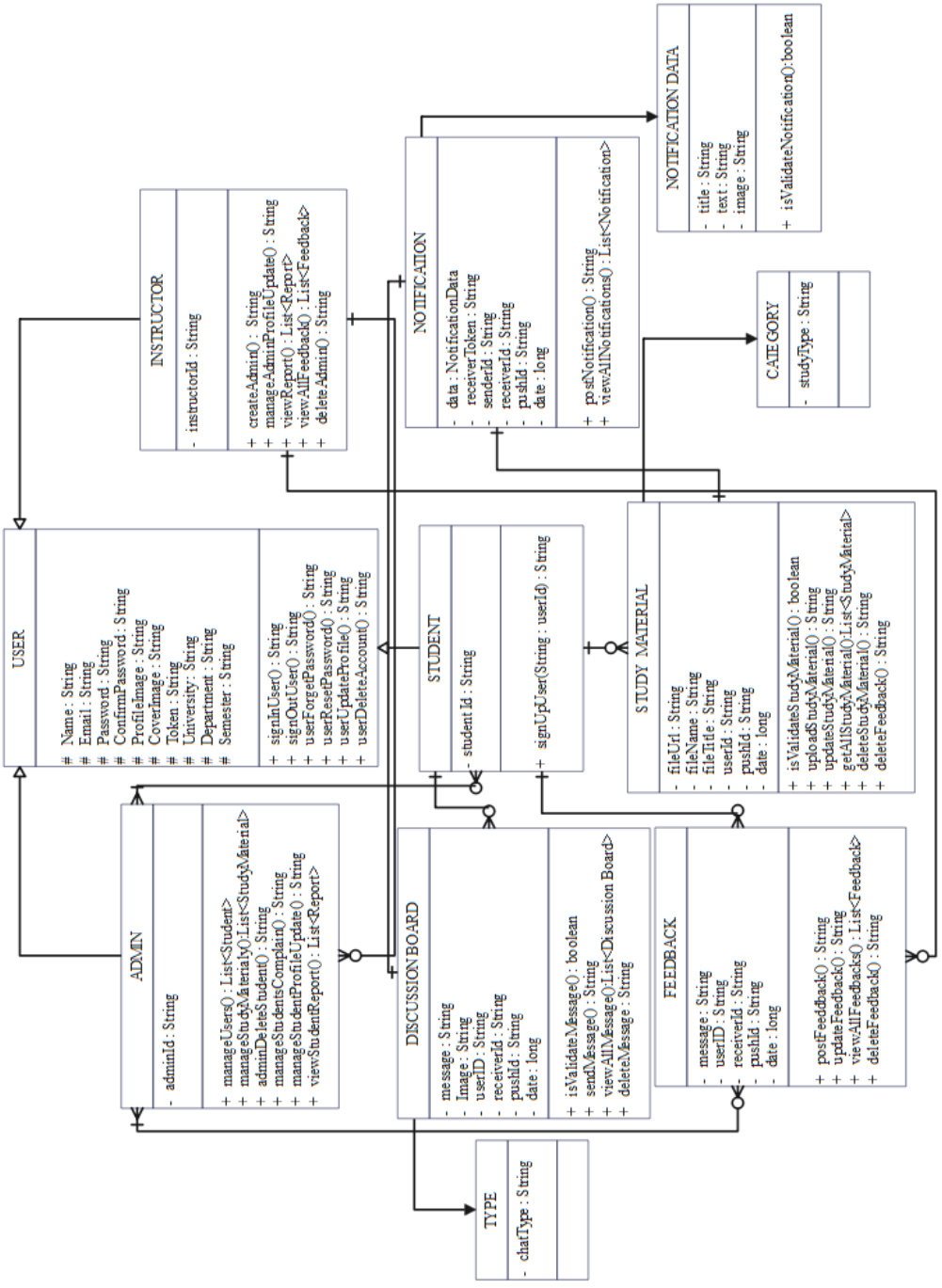


Figure 4.4: Class Diagram

4.4 Figure Description:

This Class diagram describes the process of the classes with attributes and their work operations. Which has the medium priority because the diagram will describe all of the functions and work procedures of this application. Users need to first install the android application on their device and as we mentioned. In the diagram, we have a total of three parent classes. And all other classes are child classes.

In our user parent class, we mentioned all users attribute that describes how a user can register himself in the application users will give an email, password, and name, in string format and the user can set his profile cover picture and also he can choose university department and semester in which he wants to go and in the third table of this class, we describe user operations that which shows the process of the user after registering himself they can sign in and update profiles settings and also they can change password or reset password and they can delete their account.

The user class is the parent class of all other classes. Admin and instructor are the child classes of the user class in the admin class we mentioned admin id which will be assigned in string format.

The student is actor who have high priority in our project because mostly users in our application are students and also the project is especially designed for students. Student will first register himself then will set up his profile then he goes to the home screen. And after account creation process students can login to their accounts. The study material table class is a child class of user and students. As we mentioned in the table attributes that the table is describe how users will send store view study material contents.

he basic purpose of this table is that describes the process of when student send view, upload, delete, update, private and public study material contents. Student will first register himself then will set up his profile then he goes to the home screen. And after account creation process students can login to their accounts. In the discussion board operation students can send and receive messages images and also study contents. Students can view others student’s public messages and delete recent messages.

4.5. Object Diagram

An object diagram is a graph of instances, including objects and data values. A static object diagram is an instance of a class diagram; it shows a snapshot of the detailed state of a system at a point in time.

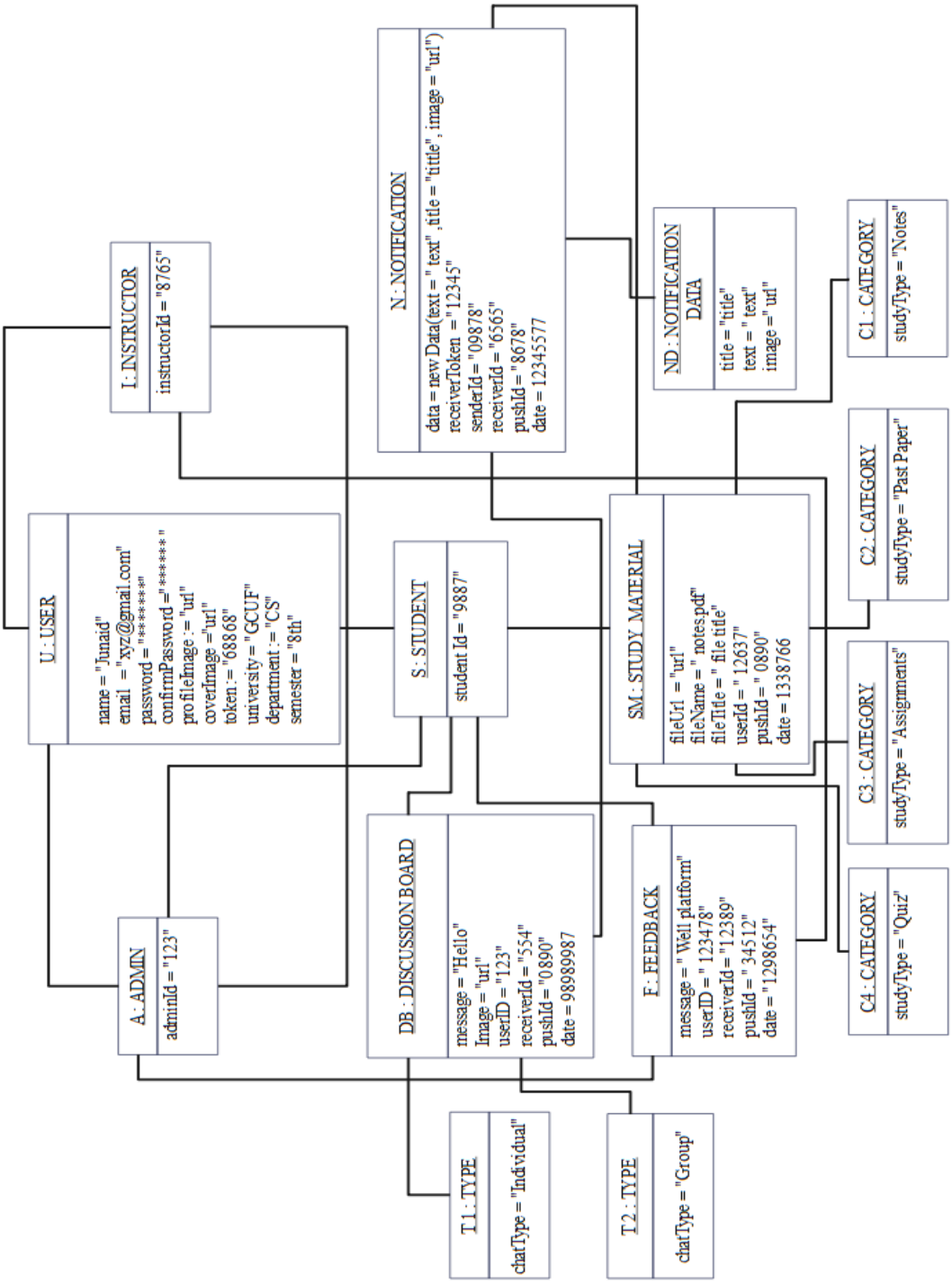


Figure 4.5: Object Diagram

4.5 Figure Description:

The purpose of a diagram should be understood clearly to implement it practically. The purposes of object diagrams are similar to class diagrams. The difference is that a class diagram represents an abstract model consisting of classes and their relationships. However, an object diagram represents an instance at a particular moment, which is concrete in nature. It means the object diagram is closer to the actual system behavior. In our user parent class, we mentioned all user attributes and behavior that describe how a user can register himself in the application users will give an email, password, and name, in the text fields. And the user can set his profile cover picture and also he can choose the university department and semester in which he wants to go. The user can change their password or reset the password and they can delete their account. The actor has more permission levels than the students. Also, the instructor object is a child object of the user. As we mentioned instructor attribute id will be assigned in random decimal format. The instructor is the user who has much more permissions level than all other users. When we need an instructor account only the application developer can create an instructor account and assign specific credentials to the instructor account after the instructor account creation the user can set up his profile and then he goes to the home screen. And after account creation process instructors can log in to their accounts. The instructor's main job role in our project is to verify and create an admin and all other users' accounts and add them users list.

The instructor can go to their profile settings and change profile pictures and also can reset the password. If the instructor required more changes then goes to my account screen after login. The study material object describes the process of the study material management process and its behavior with the system. The study material is a child object for users and students.

4.6. Sequence Diagram

A sequence diagram is a Unified Modeling Language (UML) diagram that illustrates the sequence of messages between objects in an interaction. A sequence diagram consists of a group of objects that are represented by lifelines, and the messages that they exchange over time during the interaction.

4.6.1 Sign Up Sequence Diagram

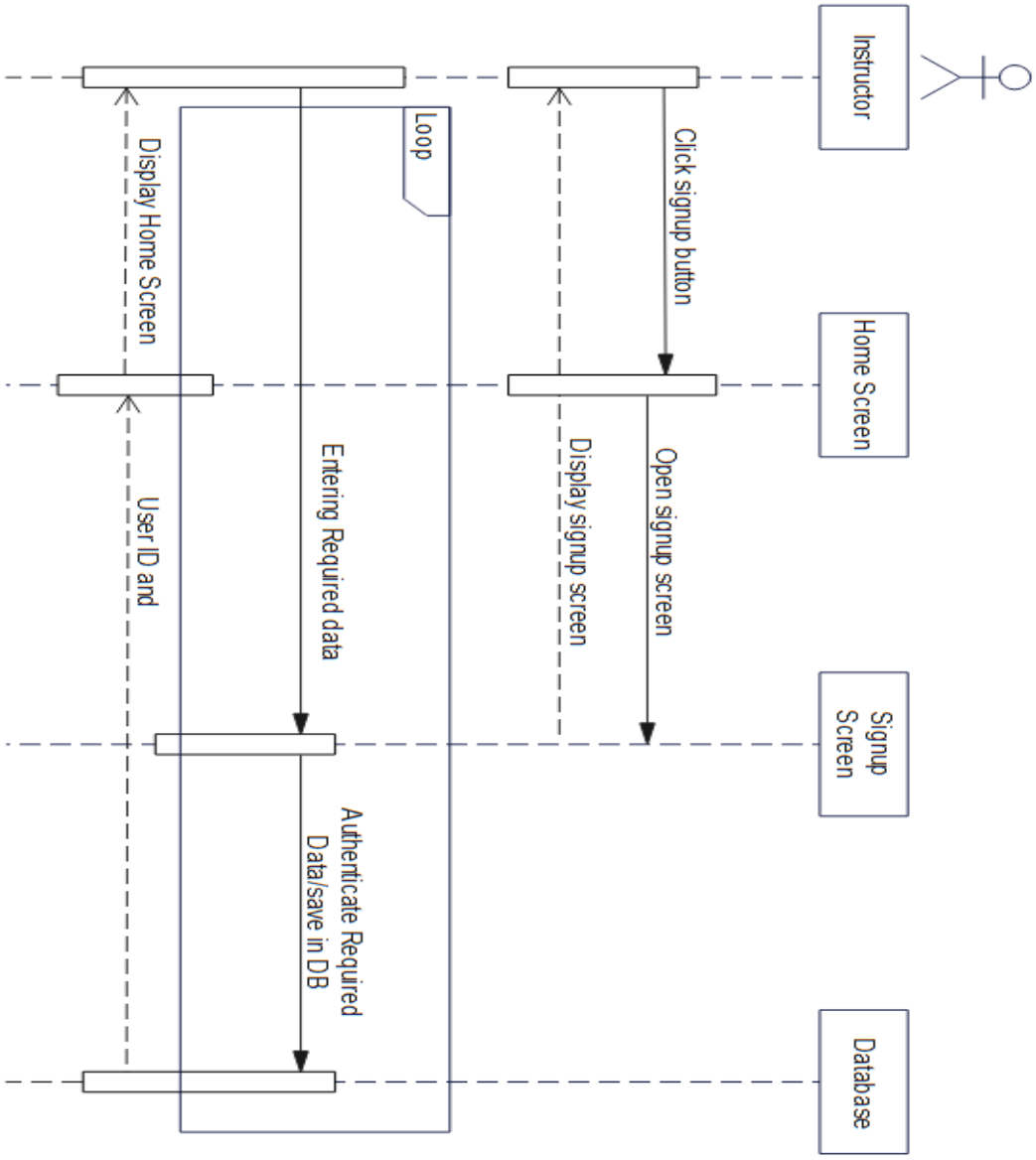


Figure 4.6.1: Sign up Sequence Diagram

Description:

This diagram describes the Instructor sign up process for sequence diagram. It will call sign up screen for the instructor and then the signup screen will send response to home screen so that it can be displayed to the instructor.

4.6.2 Sign In Sequence Diagram

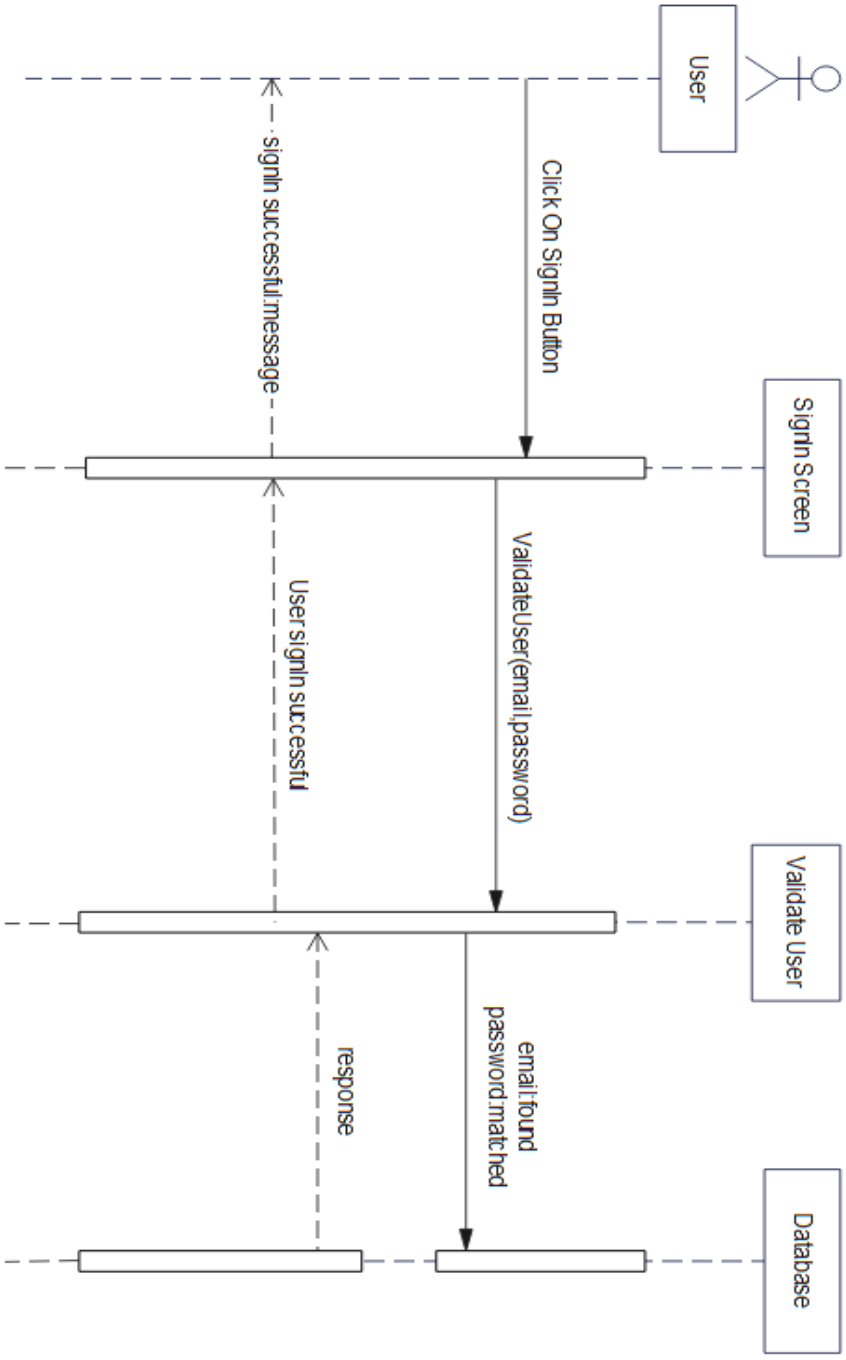


Figure 4.6.2: Sign In Sequence Diagram

Description:

This diagram describes the user sign in process for sequence diagram. It will call sign in screen for the user and then the sign in screen will send response to home screen so that it can be displayed to the home screen.

4.6.3 Reset Password Sequence Diagram

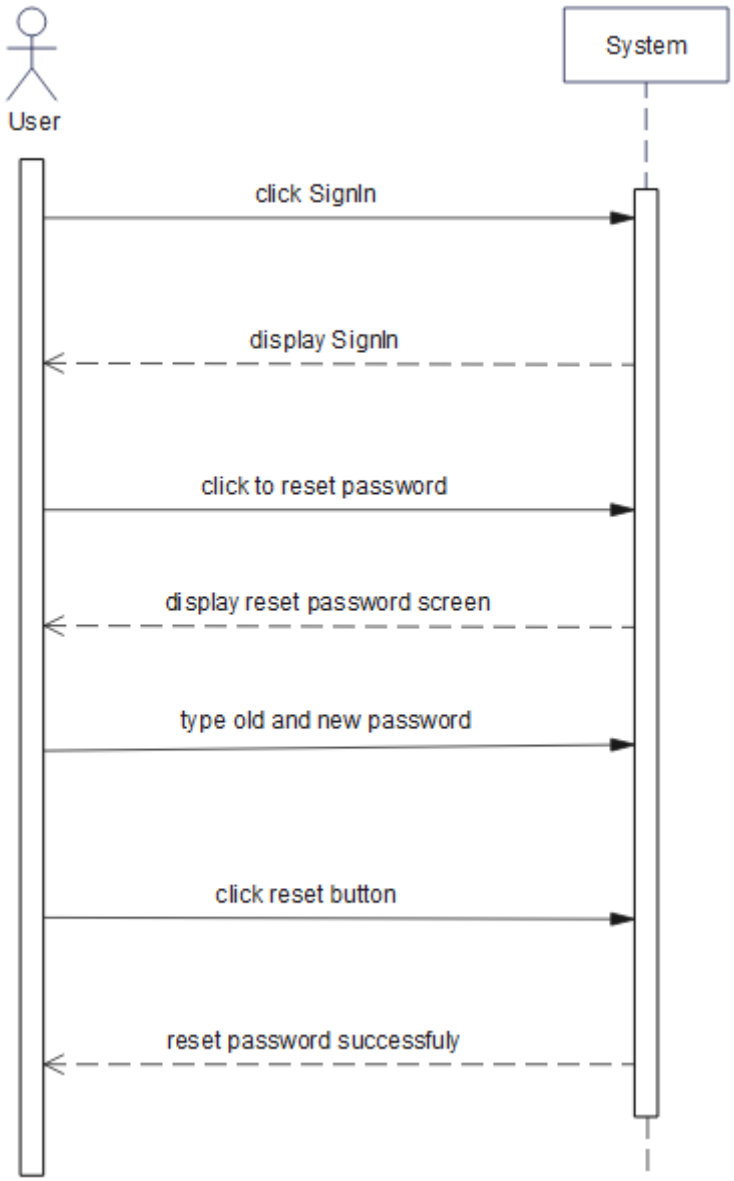


Figure 4.6.3: Reset Password Sequence Diagram

Description:

This diagram describes the reset the password process for sequence diagram. It will call reset password screen for the user and then the reset password screen will send response to home screen so that it can be displayed to the user.User can reset his\her password by reset button easily.

4.6.4 Sign Out Sequence Diagram

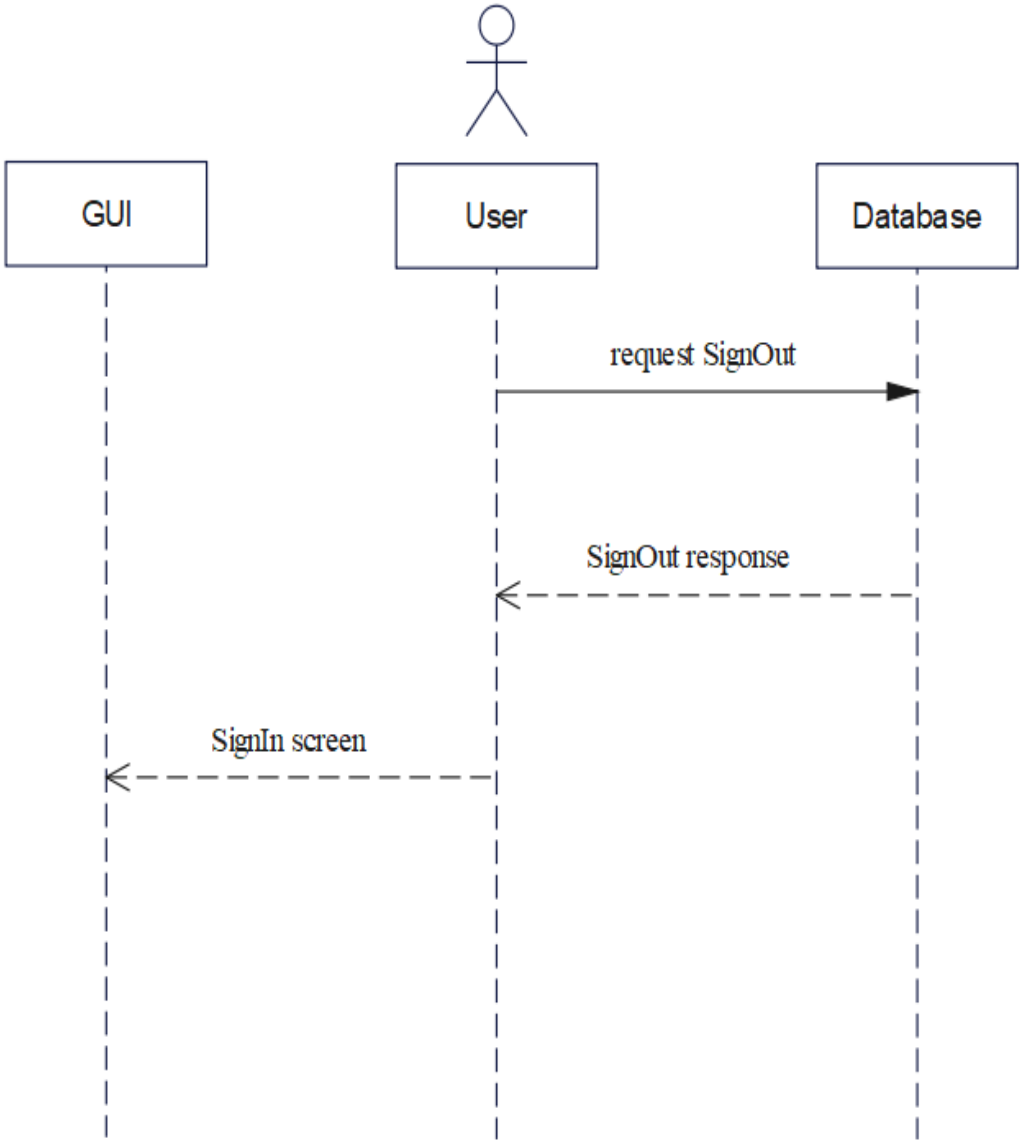


Figure 4.6.4: Sign Out Sequence Diagram

Description:

The sequence diagram describes the process of user and database interactions in arranged time sequence. In the above diagram the user sends a sign-out message request sequence to the database by clicking on the sign-out button and in the response the database will show the sign-out request to the user gui screen. All of the requests interactions between user database and gui screen will process it synchronously. User can sign out easily through sign out button in this app.

4.6.5 Send Message Sequence Diagram

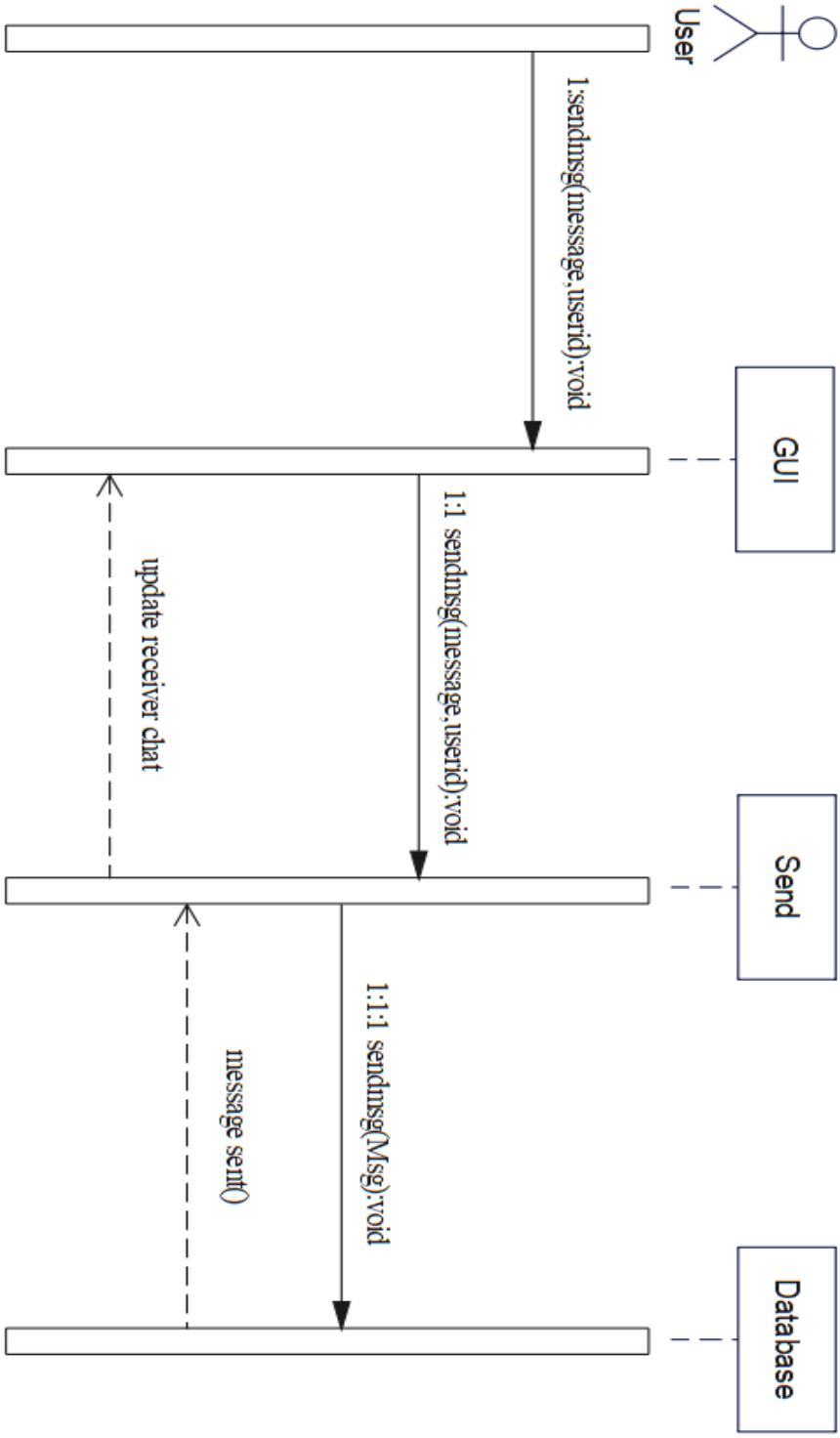


Figure 4.6.5: Send Message Sequence Diagram

Description:

This diagram describes of send message process for sequence diagram. User can send message individual and group for discussion related to study material topic.

4.6.6 Upload Study Sequence Diagram

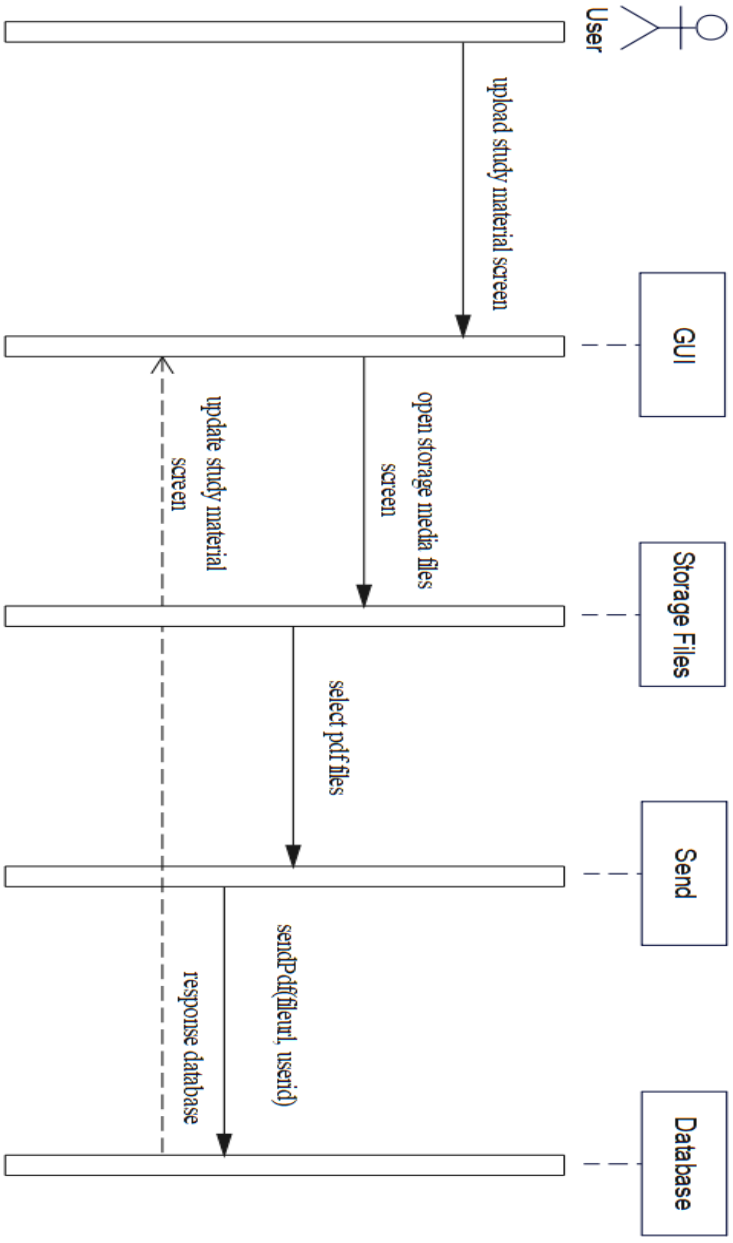


Figure 4.6.6: Upload Study Sequence Diagram

Description:

This diagram describes the Upload study material process for sequence diagram. Student can upload study material publicly and privately in this app and that material will be stored in database.

4.7. Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system similar to a flowchart or a data flow diagram. Activity diagrams are often used in business process modeling. They can also describe the steps in a use case diagram. Activities modeled can be sequential and concurrent.

4.7.1 Sign In Activity Diagram

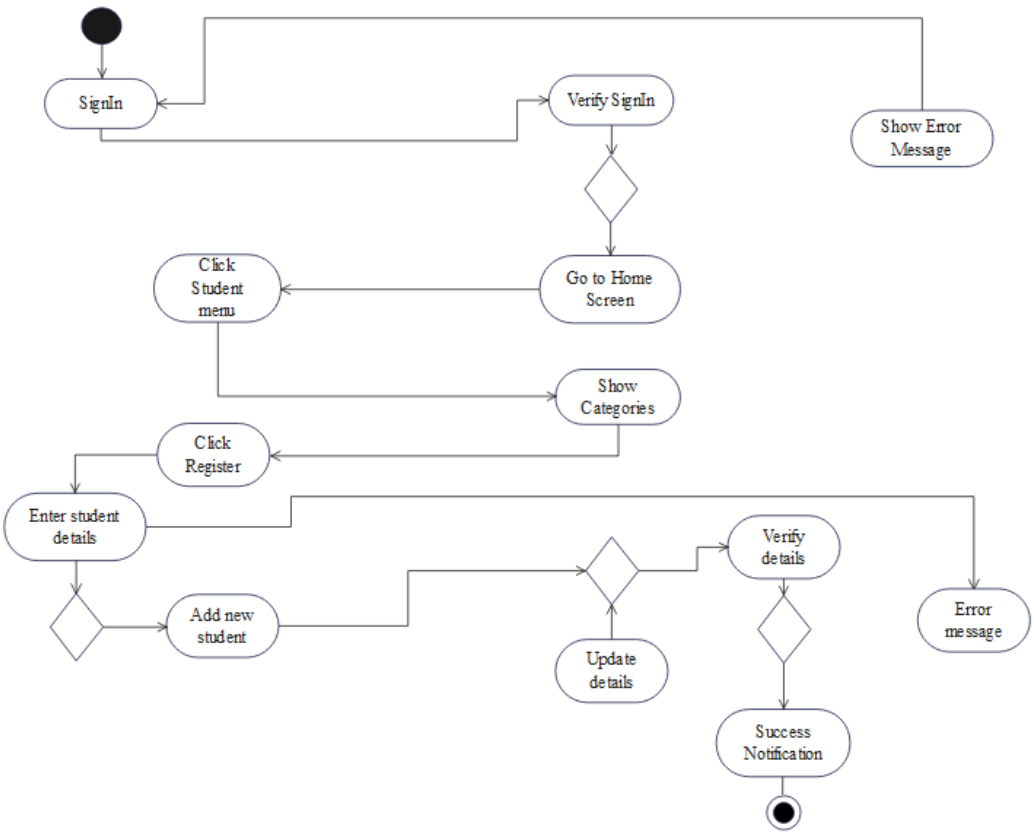


Figure 4.7.1: Sign In Activity Diagram

Description:

The activity diagram describes the process of user Sign In activity Diagram. when a user needs to login to his account he/she will give credentials to access the account. And after the second action box, it will verify the login details. If the details are accurate then it will redirect the user to the account home screen. And in the student of the next action can open his menu page and show categories even if the student or user need to register an account he/she can click on the registration page then after giving user detail the next action verifies the details of the user if anything is not matched in details then

it will show the error message to the user. And if the details are accurate then the decision box will redirect to the next verification process that which shows a verification success message to the user. After performing the activity, finally, the process is terminated at the termination node.

4.7.2 Upload Study Activity Diagram

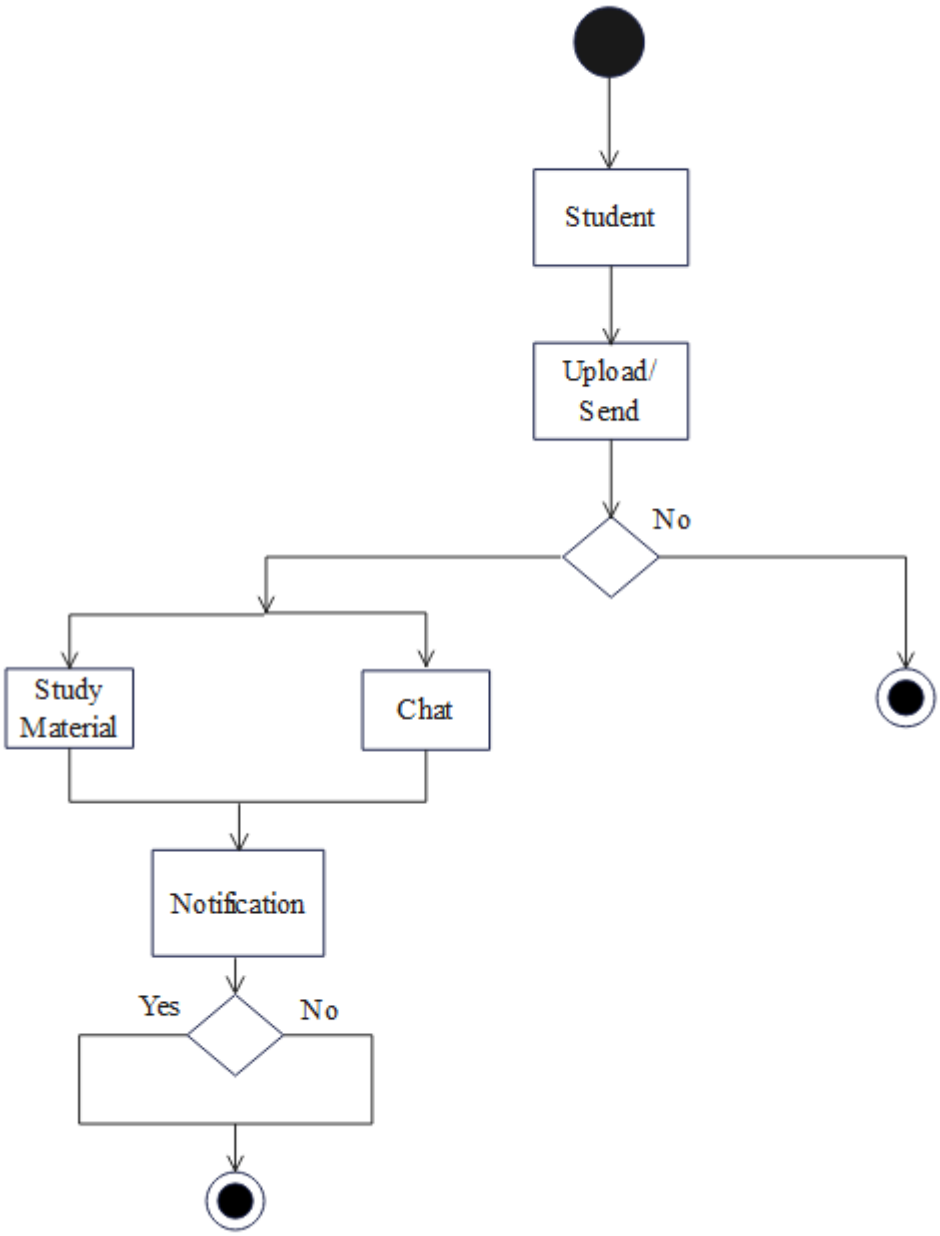


Figure 4.7.2: Upload Study Activity Diagram

Description:

The activity diagram describes the process of student uploading study material and chats activity. The circle is the starting stage before an activity takes place and is depicted as the initial state when a student needs to upload study material then he will click on the upload button and after the decision process, it will verify the student to upload study material or access messages chat module.

4.7.3 Send Message Activity Diagram

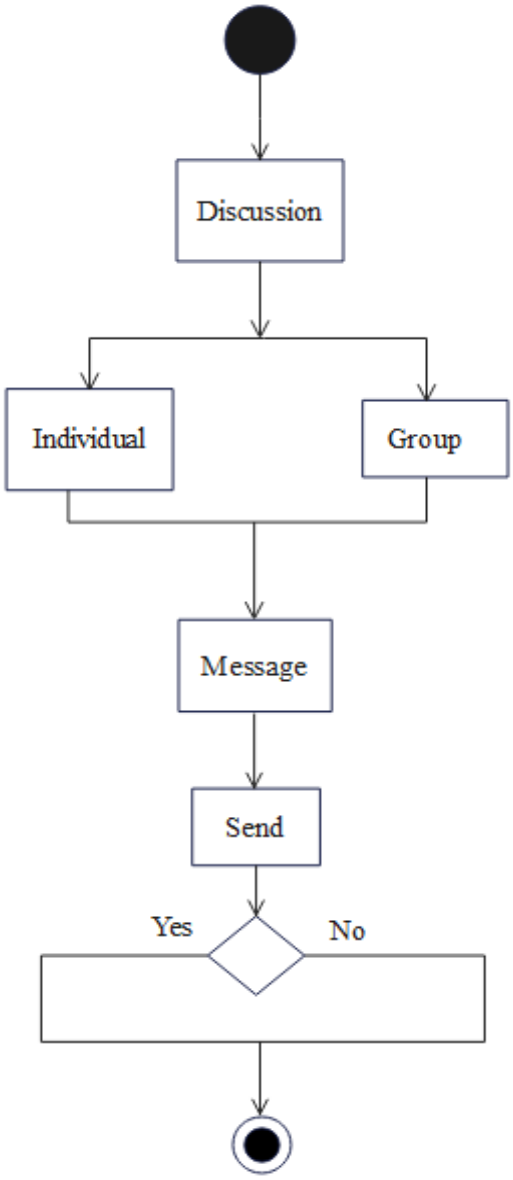


Figure 4.7.3: Send Message Activity Diagram

Description:

The activity diagram describes the process of the student discussion module activity. The circle is starting stage before an activity takes place and is depicted as the initial state. when the student click on send button so then it will verify whether the student sent a message or not. In the next process when a student sends data so then it goes again to the discussion process that which shows notifications to students. After performing the activity, finally, the process is terminated at the termination node.

4.7.4 Upload Study Activity Diagram

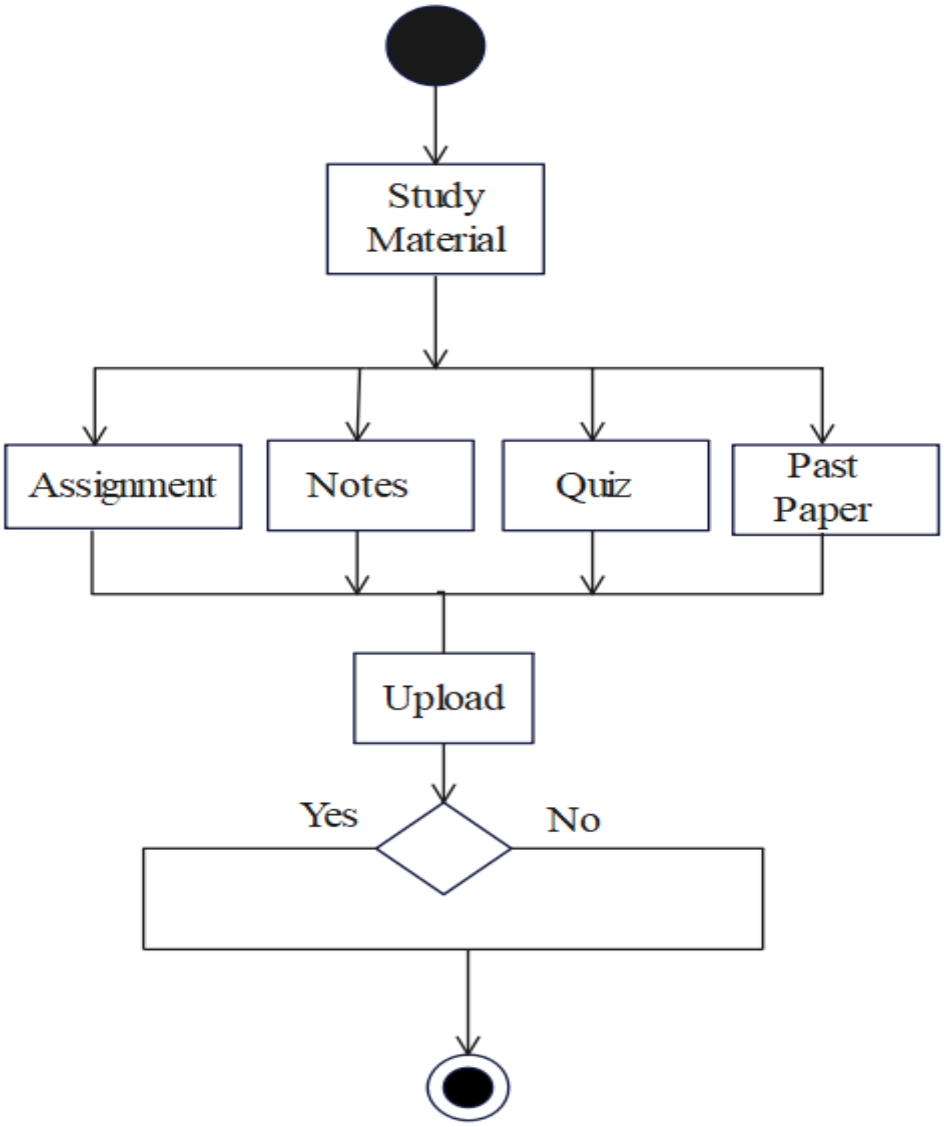


Figure 4.7.4: Upload Study Activity Diagram

Description:

The activity diagram describes the process of student uploading study material. The circle is the starting stage before an activity takes place and is depicted as the initial state. As we mentioned in our above flowchart the study material is the main action object that shows when a student needs to upload study material then he will choose the type of content file from his device storage and click on the upload button. Then after the decision process, it will verify the student to upload study material. In the next process when a student sends data so then it goes again to the discussion process that which shows notifications to students. After performing the activity, finally, the process is terminated at the termination node.

4.7.5 Register User Activity Diagram

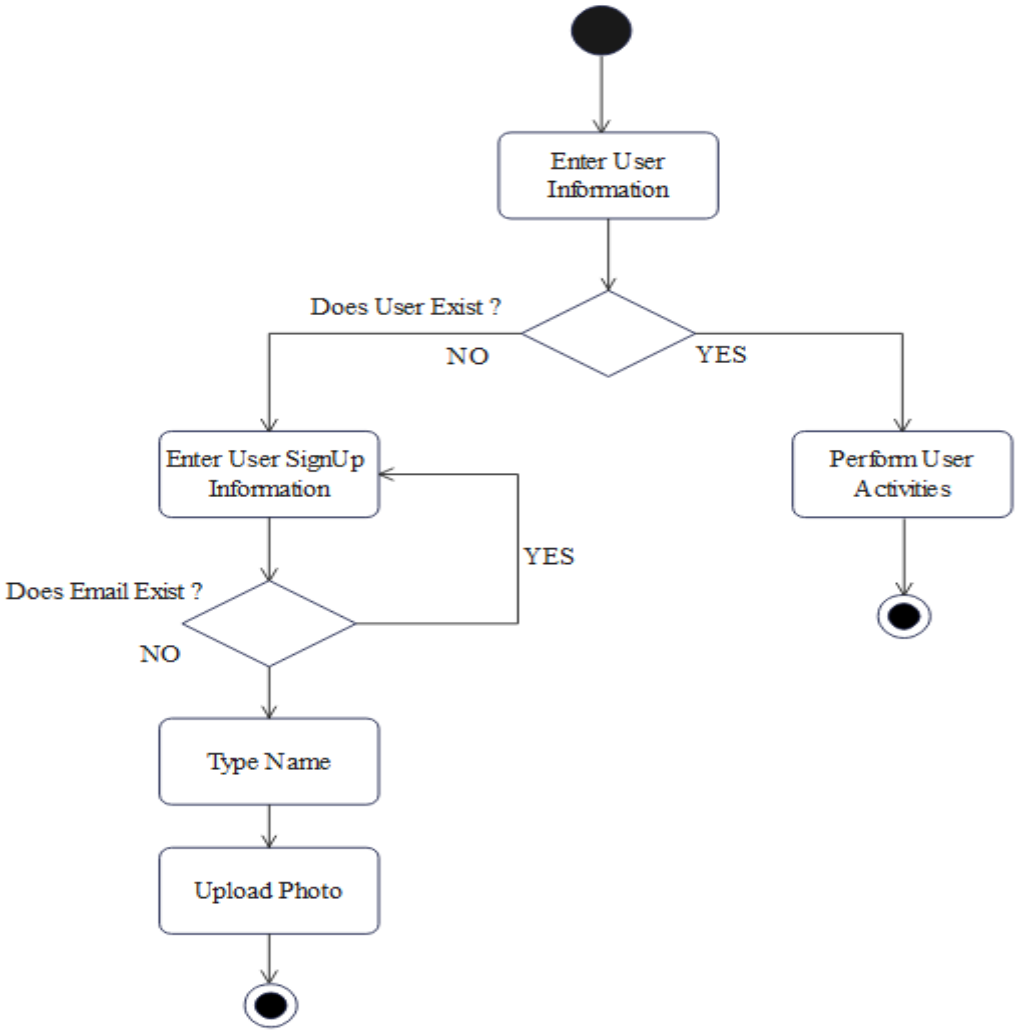


Figure 4.7.5: Register User Activity Diagram

Description:

The activity diagram describes process of user sign-in and sign-up activity. When a user needs to login to his account he/she will give credentials to access the account. And after the decision process, it will verify the login details. If the details are accurate then it will redirect the user to the account home screen.

4.8. Collaboration Diagram

A collaboration diagram, also known as a communication diagram, is an illustration of the relationships and interactions among software objects in the Unified Modeling Language (UML).

4.8.1 Sign In Collaboration Diagram

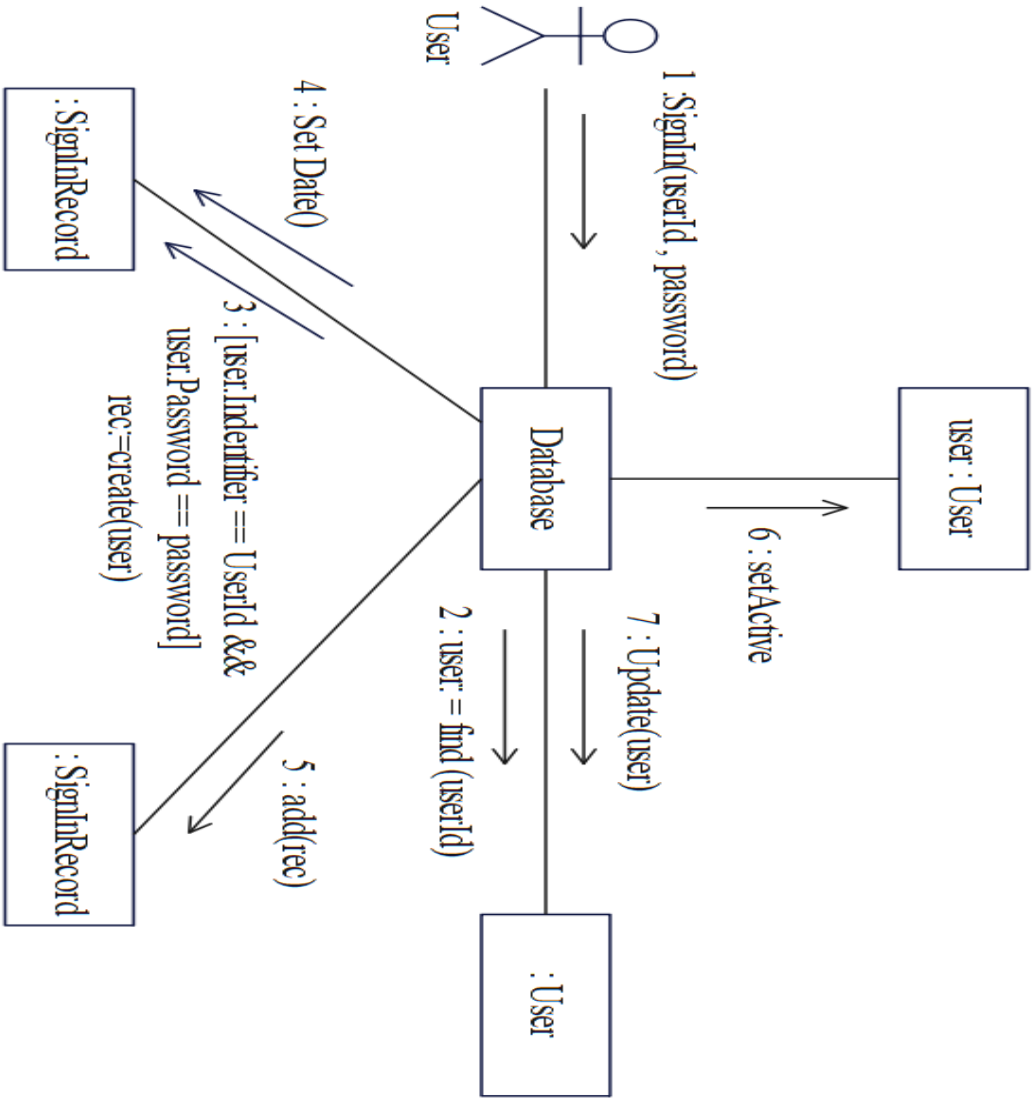


Figure 4.8.1: Sign In Collaboration Diagram

4.8.1 Figure Description:

The collaboration diagram describes the process of relationships and interactions among different software objects. As we mentioned in our above diagram only the database in the center is the main object that will facilitate other connected objects like users to do what they want.

And Actors are instances that invoke the interaction in the diagram. Each actor has a name and a role, with one actor initiating the entire use case. As such a user is the second actor who wants to log in to their account. When the user posts information to the database, he will enter his information. And the database searches for it from the already existing records.

In the diagram upper arrows or shown as a labeled arrows placed near links can portray messages between objects. These messages are communications between objects that convey information about the activity and can include the sequence number. A user is an actor who will give an email password to store or verify data in the database and when the user wants to log in to his account.

He will post his credentials to the database and the backend database will search for the accurate user from previously stored data if the user is found in the database search as an active user then the object gives authorization to the user to get access to his profile. Also, these records will enable the user to know when and at what time he/she logged in to his/her account.

Administrator can add students after verifying. Admin can also check the student group chat and if there is violating in the chat administer can remove his\her account from the application. Admin also check student study material in the app. If someone is sending Irrelevant content administer can remove the account of that person. Admin can verify everything in this application.

In the collaboration diagram, the actor plays the main role as it invokes the interaction. Each actor has its respective role and name. In this, one actor initiates the use case. The link is an instance of association, which associates the objects and actors. It portrays a relationship between the objects through which the messages are sent. It is represented by a solid line.

4.8.2 Upload Study Collaboration Diagram

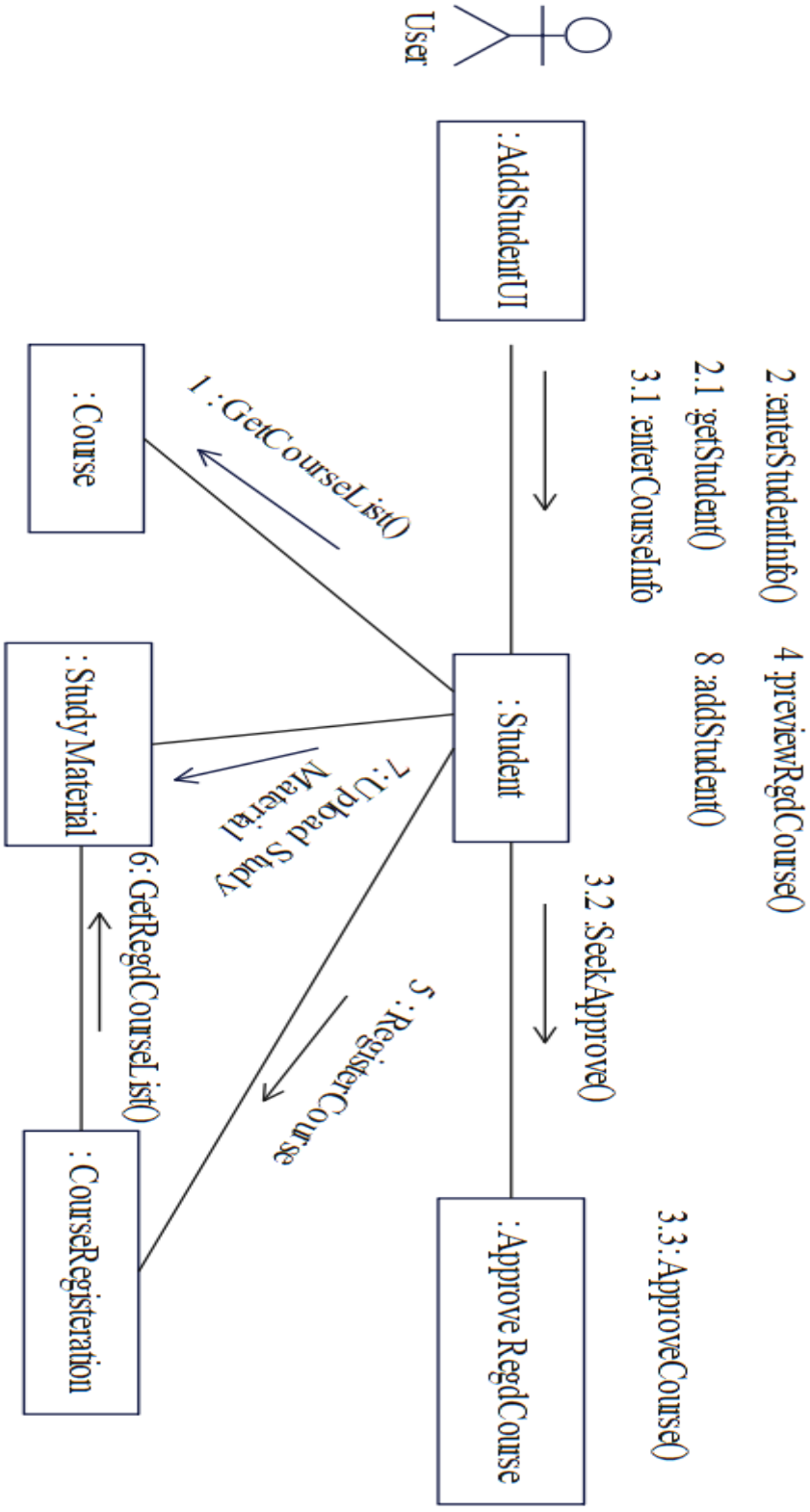


Figure 4.8.2: Upload Study Collaboration Diagram

4.8.2 Figure Description:

The collaboration diagram describes the process of relationships and interactions among different software objects. As we mentioned in our above diagram only the student in the center is the main object that will facilitate other connected objects like users to do what they want. The links connect objects with actors and are depicted using a solid line between two elements.

Each link is an instance where messages can be sent. And also actors are instances that invoke the interaction in the diagram. Each actor has a name and a role, with one actor initiating the entire use case. As such a user is the second object who wants to send a request for account approval or wants to update the currently enrolled semester or wants to upload study material or when they want to send messages in the discussion panel from their own accounts.

Also when the student object wants to register his own course then he will send an upload course request to the study material object. And after the study material object gets approval from the course registration object. After all this process, students can pass their course in the database.

As we mentioned in the diagram upper arrows or shown as a labeled arrows placed near links can portray messages between objects. These messages are communications between objects that convey information about the activity and can include the sequence number.

A user is an actor who will upload contents to store or verify data in the database and when the user wants to update course enrolment from his account. He will send enter course information request to the database and the backend database will keep it in the approval request until the admin will verify it later.

It is a communication between objects which carries information and includes a sequence number, so that the activity may take place. It is represented by a labeled arrow, which is placed near a link. The messages are sent from the sender to the receiver, and the direction must be navigable in that particular direction. The receiver must understand the message.

4.9. State Transition Diagram

A state transition diagram is used to represent a finite state machine. These are used to model objects which have a finite number of possible states and whose interaction with the outside world can be described by its state changes in response to a finite number of events.

4.9.1 Sign Up State Transition Diagram

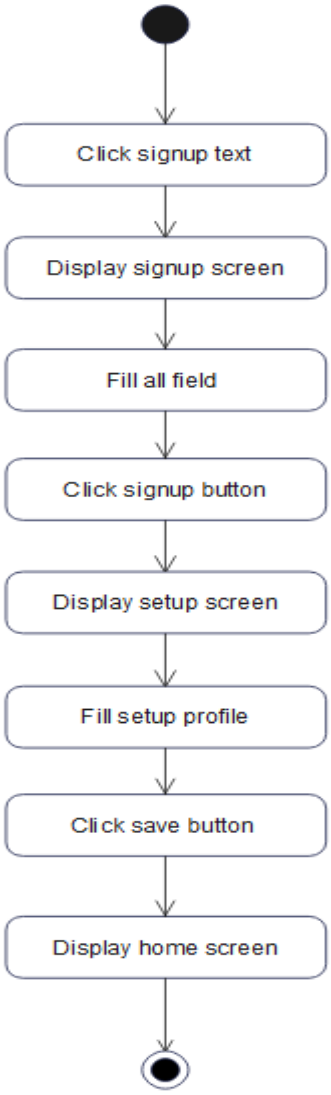


Figure 4.9.1: Sign Up State Transition Diagram

Description:

This figure describes the process for sign up screen. User can sign up easily in this application through sign up screen. After sign up user can perform action in the application

4.9.2 Sign In State Transition Diagram

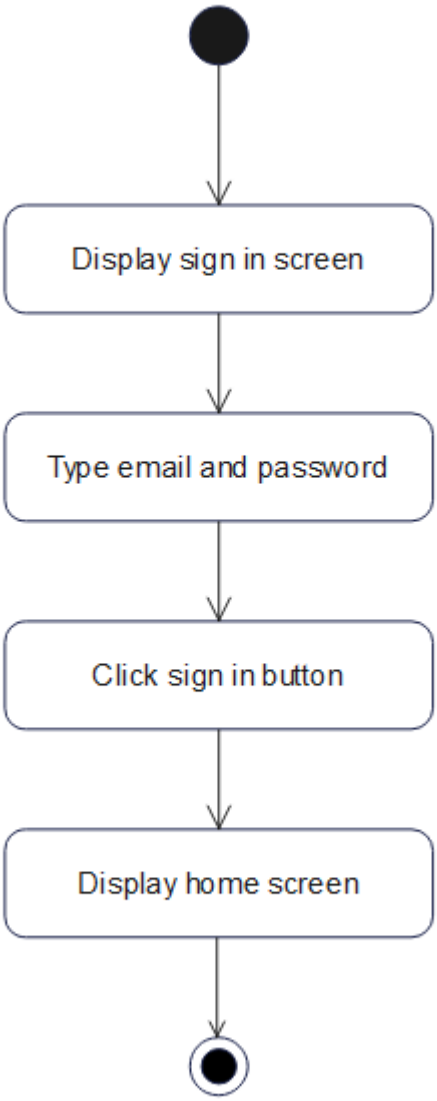


Figure 4.9.2: Sign In State Transition Diagram

Description:

This figure describes the process for sign in screen. User can sign in easily in this application through sign in screen. After sign in user can perform action in the application

4.9.3 Study Material State Transition Diagram

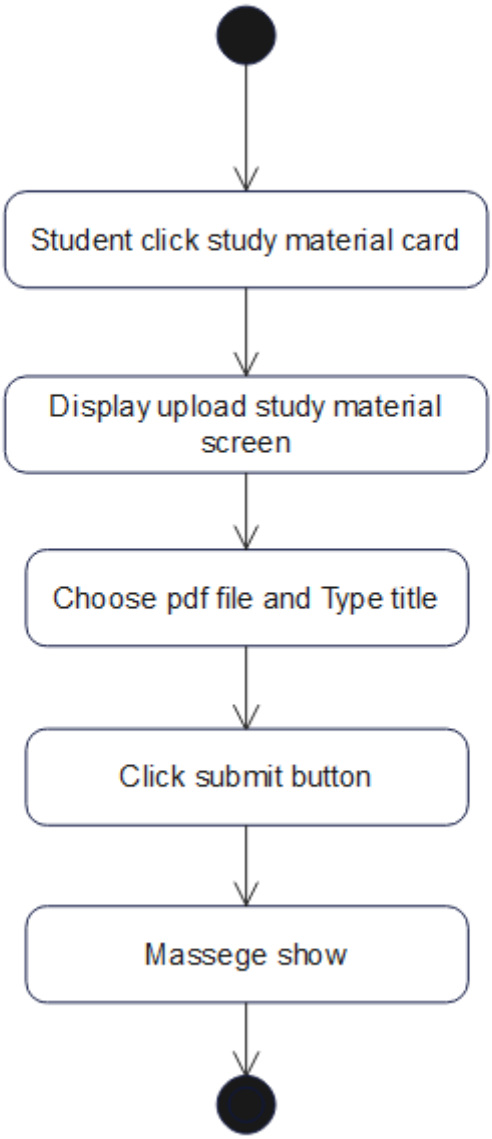


Figure 4.9.3: Study Material State Transition Diagram

Description:

This figure describes the process for Upload Study Material screen. User can sign in first in this application through the sign in screen. After sign in user can perform action in the application. User can upload study material in this app easily.

4.9.4 Update Field State Transition Diagram

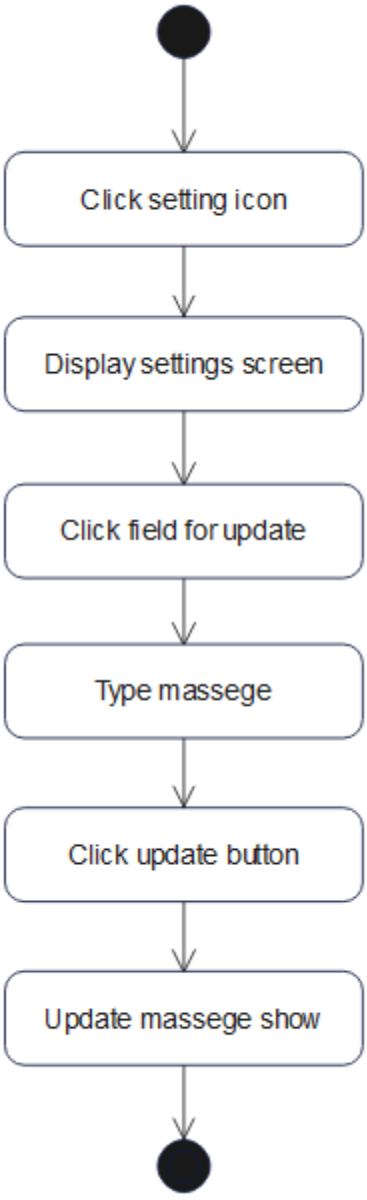


Figure 4.9.4: Update Field State Transition Diagram

Description:

This figure describes the process for Update Field. User can sign in first in this application through the sign in screen. After sign in user can perform action in the application. User can update his field like profile in this app easily.

4.9.5 Discussion Board State Transition Diagram

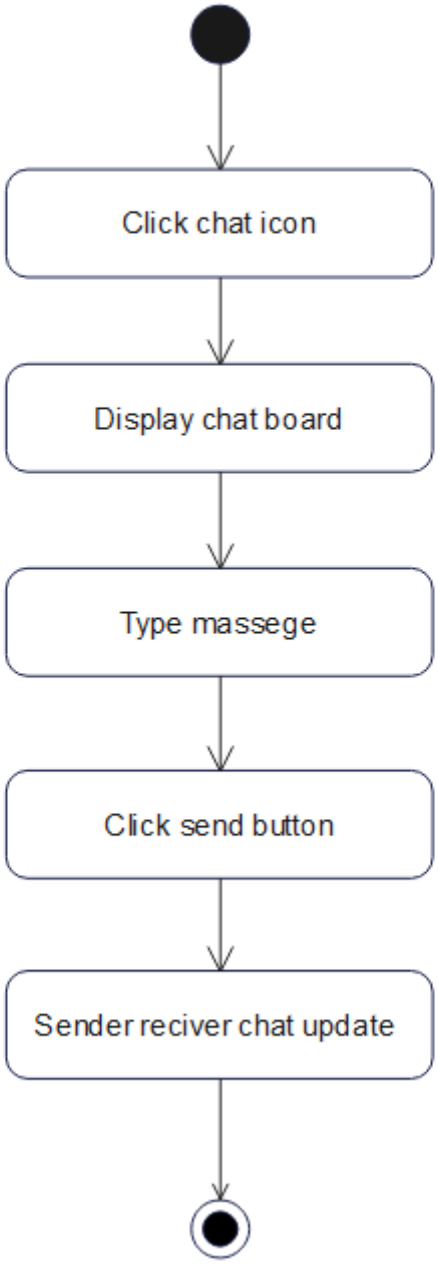


Figure 4.9.5: Discussion Board State Transition Diagram

Description:

This figure describes the process for Discussion Board. User can sign in first in this application through the sign in screen. After sign in user can perform action in the application. User can discussion related to study material in this app easily.

4.9.6 Update Password State Transition Diagram

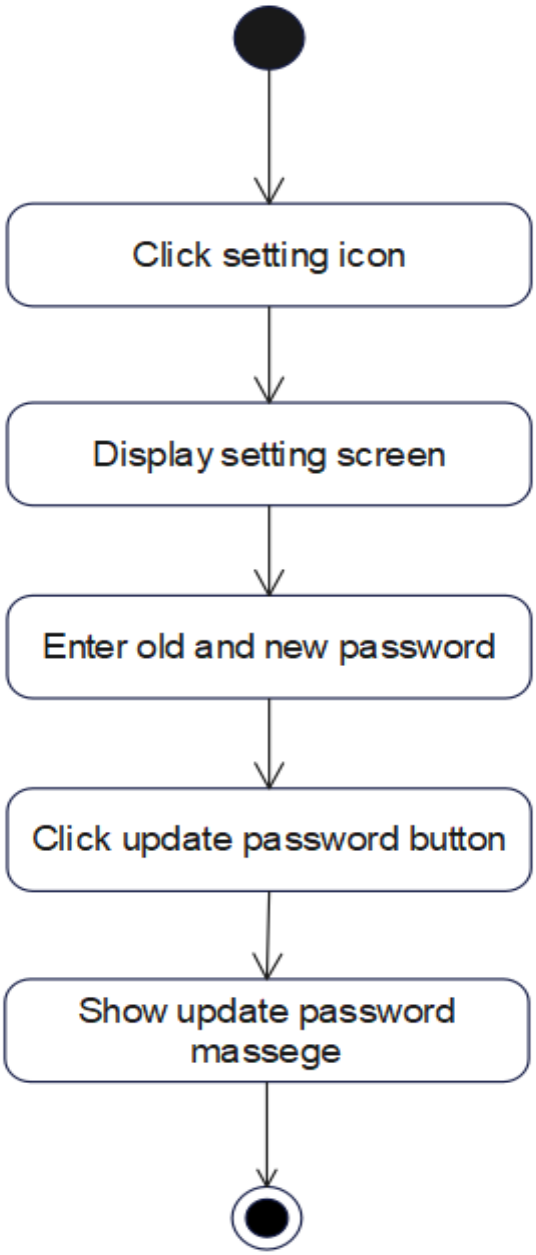


Figure 4.9.6: Update Password State Transition Diagram

Description:

This figure describes the process for Update Password. User can sign in first in this application through the sign in screen. After sign in user can perform action in the application. User can change his\her password in this app easily.

4.9.7 Feedback State Transition Diagram

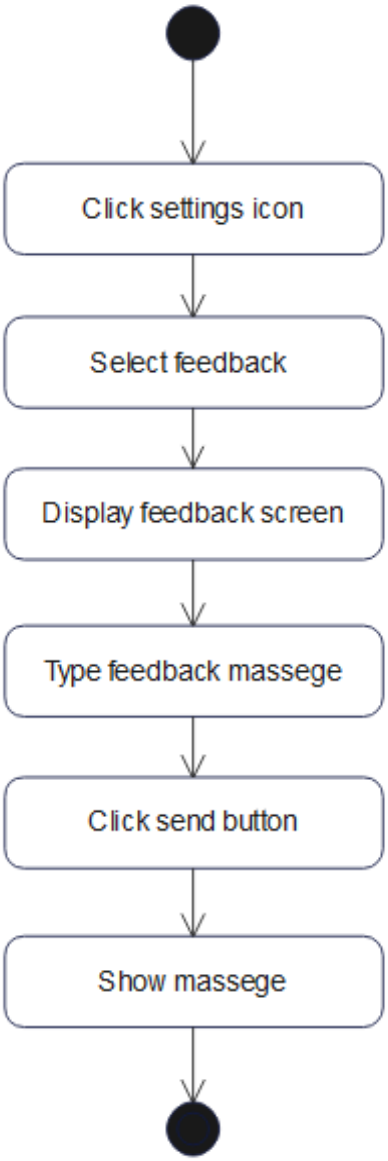


Figure 4.9.6: Feedback State Transition Diagram

Description:

This figure describes the process for Feedback. User can give feedback about to application. User can comment on this app easily.

Chapter 5

Implementation

5. Chapter No 5: Implementation

5.1. Component Diagram

Component diagram is a special kind of diagram in UML. Thus from that point of view, component diagrams are used to visualize the physical components in a system. These components are libraries, packages, files, etc. Component diagrams can also be described as a static implementation view of a system.

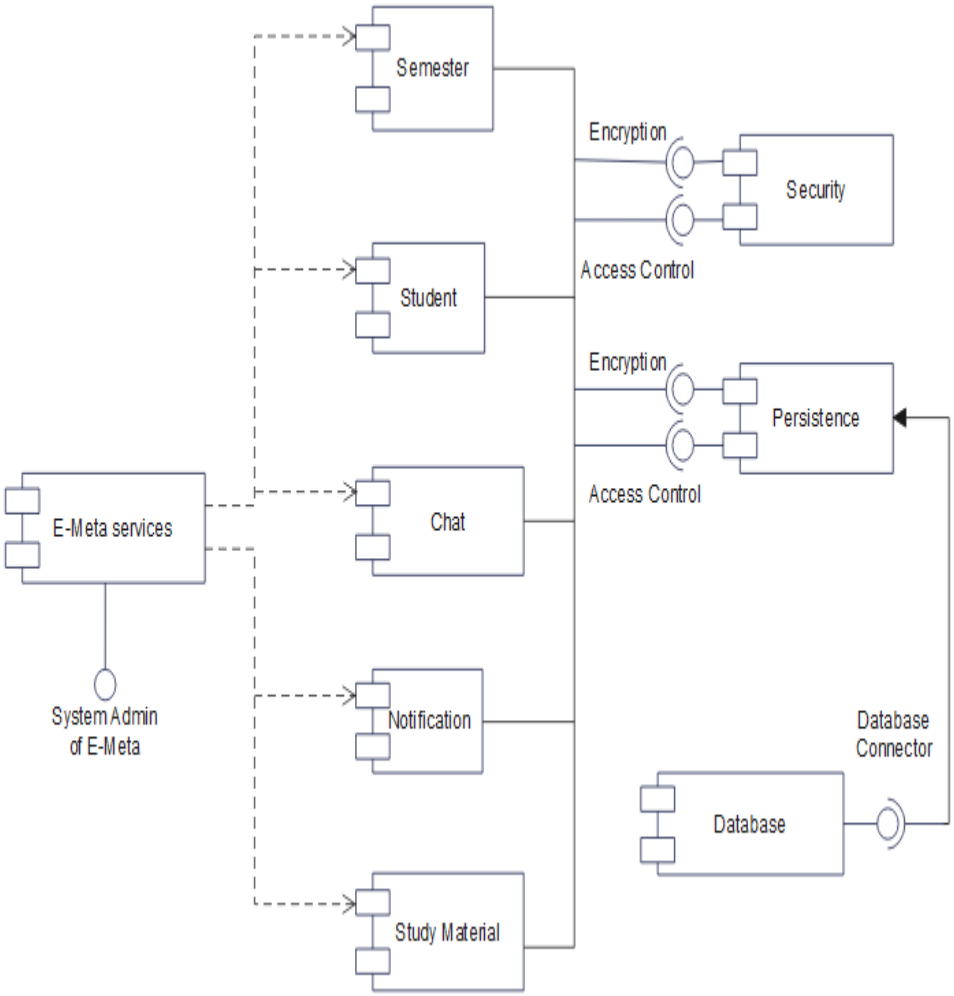


Figure 5.1: Component Diagram

5.2. Deployment Diagram

A deployment diagram in the Unified Modeling Language models the physical deployment of artifacts on nodes. To describe a web site, for example, a deployment diagram would show what hardware components exist, what software components run on each node, and how the different pieces are connected.

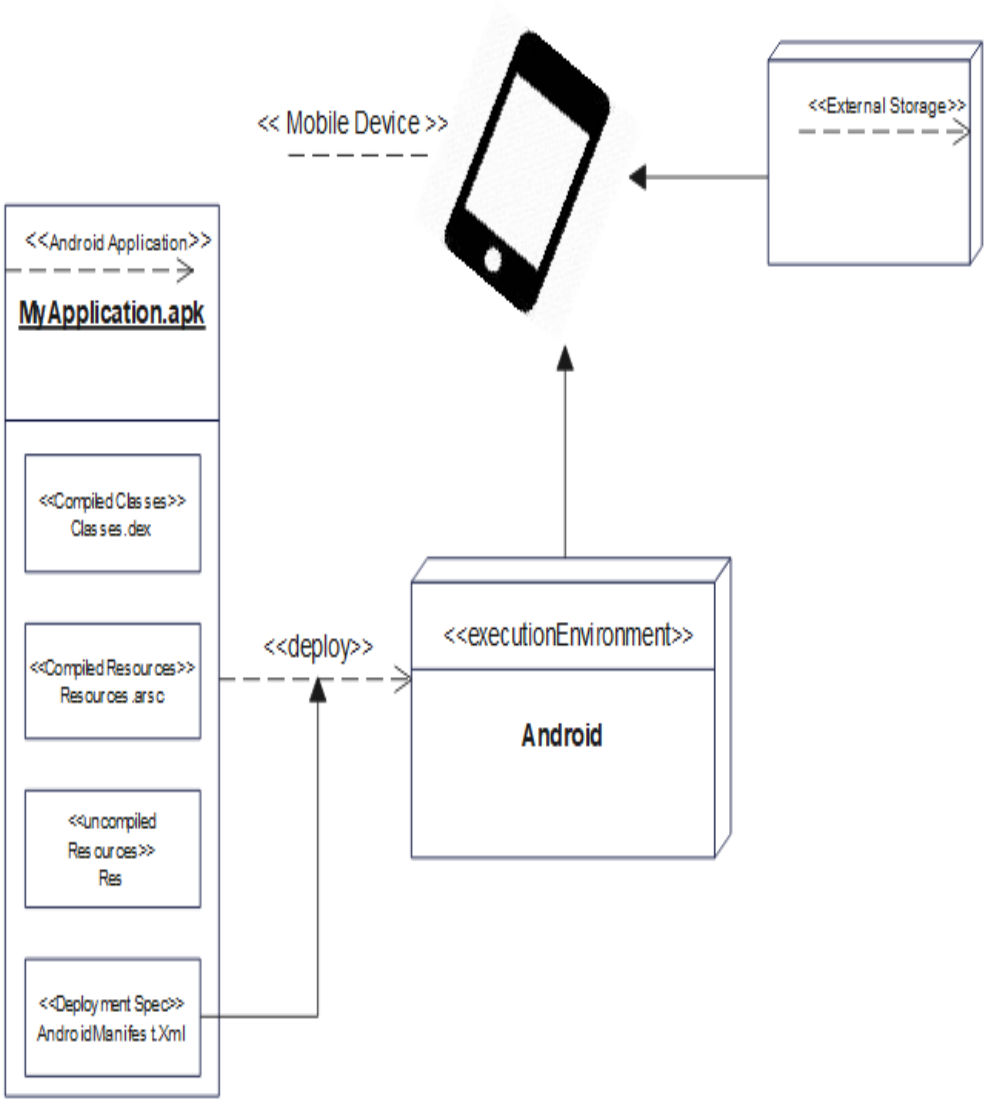


Figure 5.2: Deployment Diagram

5.3. Database Architecture (1-Tier, 2-Tier, 3-Tier Architecture)

A Database Architecture is a representation of DBMS design. It helps to design, develop, implement and maintain the database management system. A DBMS architecture allows dividing the database system into individual components that can be independently modified, changed, replaced and altered.

There are mainly three types of DBMS architecture:

1. 1-Tier Architecture
2. 2- Tier Architecture
3. 3-Tier Architecture

Each architecture has its own pros and cons where 1-Tier architecture is the simplest architecture in which client, server and database all reside on the same machine. Such architecture is rarely used in production.

Whereas 2-Tier architecture has a layer between the client and server where the presentation layer runs on a client (PC, Mobile, etc.) and the data is stored on a server.

3-Tier Architecture is the most popular client server architecture in DBMS in which the development and maintenance of functional process, logic, data access, data storage, and user interface is done independently as separate modules. This tier contains presentation layer, application layer and a database layer.

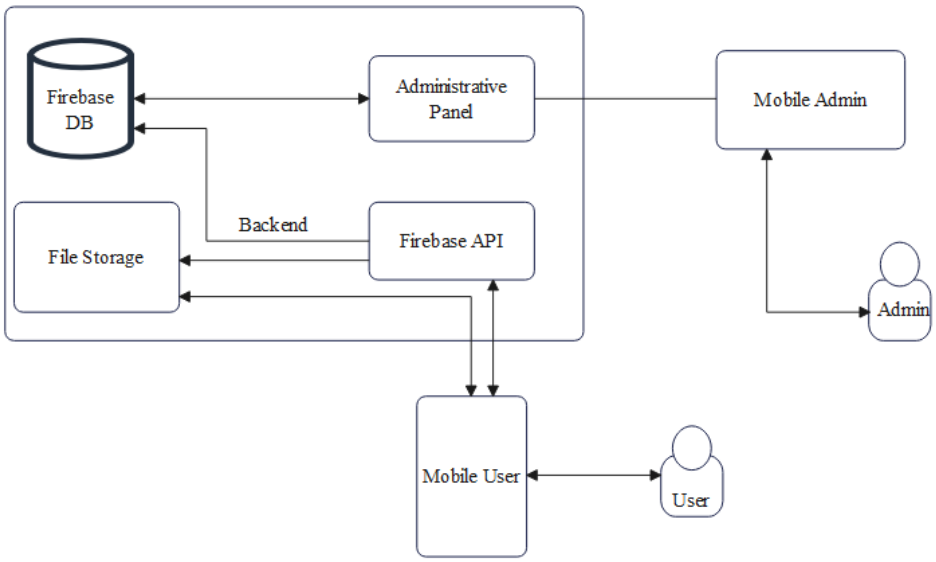


Figure 5.3: Database Architecture

Chapter 6

Testing (Software Quality Attributes)

6. Chapter No 6: Testing (Software Quality Attributes)

6.1. Test Case Specification

Test Case Specification document described detailed summary of what scenarios will be tested, how they will be tested, how often they will be tested, and so on and so forth, for a given feature. It specifies the purpose of a specific test, identifies the required inputs and expected results, provides step-by-step procedures for executing the test, and outlines the pass/fail criteria for determining acceptance.

6.1.1 Admin Sign In Test Case

Test Case Id:	TC-1	Test Data
Test Case	Admin Sign In	
Objective	To Admin Sign in Process	
Perquisites	Admin must be registered	
Input	Enter Valid Email and Password	saahil786@gmail.com Zt1234
Expected Result	Sign In should be successful	
Actual Result	Home screen successfully loaded	
Status	Admin Successfully Signed In	Pass

Table 6.1.1: Admin Sign In

Description:

This test case describes the admin Sign In process. Sign in screen is loaded is the perquisites for this test case. After providing the valid email and password, admin gone to admin activity and seen the home screen.

6.1.2 Admin Sign Up Test Case

Test Case Id:	TC-2	Test Data
Test Case	Admin Sign Up	
Objective	To Admin Sign Up Process	
Perquisites	Admin must be non registered	
Input	Enter Name, Email and Password	Mirza saahilzeeshan786@gmail.com zt$786
Expected Result	Sign up screen will be loaded.	
Actual Result	Sign up screen successfully loaded	
Status	Admin Successfully Signed Up	Pass

Table 6.1.2: Admin Sign Up

Description:

This test case describes the Admin Sign Up process. Sign up screen is loaded is the perquisites for this test case. After providing the required information and clicking on the sign-up button, user seen the message Signed Up successfully. Admin must be registered in this application then Admin can see pre uploaded study material and also can perform other task.

6.1.3 Student Sign Up Test Case

Test Case Id:	TC-3	Test Data
Test Case	Student Sign Up	
Objective	To Student Sign Up Process	
Perquisites	Student must be non registered	
Input	Enter Name, Email and Password.	Zeeshan Saahil787@gmail.com 12345
Expected Result	Sign up screen will be loaded.	
Actual Result	Sign up screen successfully loaded	
Status	Student Successfully Signed Up	Pass

Table 6.1.3: Student Sign Up

Description:

This test case describes the Student Sign Up process. Sign up screen is loaded is the perquisites for this test case. After providing the required information and clicking on the sign-up button, user seen the message Signed Up successfully. User must be registered in this application then user can see pre uploaded study material and also download study material in the application. Student will be able for discussion in the application.

6.1.4 Student Sign In Test Case

Test Case Id:	TC-4	Test Data
Test Case	Student Sign In	
Objective	To Student Sign in Process	
Perquisites	Student must be registered	
Input	Enter Valid Email and Password	saahilzeeshan786@gmail.com zeeshan@786
Expected Result	Home screen will be loaded	
Actual Result	Home screen successfully loaded	
Status	Student Successfully Signed In	Pass

Table 6.1.4: Student Sign In

Description:

This test case describes the Student Sign In process. Sign in screen is loaded is the perquisites for this test case. After providing the valid email and password, student gone to Student activity and seen the home screen. And student can see pre upload study material, download, can discuss to each other related to study material in the application.

6.1.5 Instructor Sign Up Test Case

Test Case Id:	TC-5	Test Data
Test Case	Instructor Sign Up	
Objective	To Instructor Sign Up Process	
Perquisites	Instructor must be non registered	
Input	Enter Name and Email and Password.	Mr Zeeshan saahilzeeshan786@gmail.com Zeeshan$786
Expected Result	Sign up screen will be loaded.	
Actual Result	Sign up screen successfully loaded	
Status	Instructor Successfully Signed Up	Pass

Table 6.1.5: Instructor Sign Up

Description:

This test case describes the Instructor Sign Up process. Sign up screen is loaded is the perquisites for this test case. After providing the required information and clicking on the sign-up button, Instructor seen the message Signed Up successfully. After that instructor can perform action in the application.

6.1.6 Instructor Sign In Test Case:

Test Case Id:	TC-6	Test Data
Test Case	Instructor Sign In	
Objective	To Instructor Sign in Process	
Perquisites	Instructor must be registered	
Input	Enter Valid Email and Password	instructor@gmail.com ZT143
Expected Result	Sign In should be successful	
Actual Result	Home screen successfully loaded	
Status	Instructor Successfully Signed In	Pass

Table 6.1.6: Instructor Sign In

Description:

This test case describes the Instructor Sign In process. Sign in screen is loaded is the perquisites for this test case. After providing the valid email and password, Instructor gone to Instructor activity and seen the home screen. And instructor can perform action in the application.

6.1.7 Mange Study Material Test Case

Test Case Id:	TC-7	Test Data
Test Case	Manage Study Material	
Objective	To upload study material in the application	
Perquisites	Student must be registered first	
Input	Upload Study Material like ,Pdf,Image	Pdf, Image
Expected Result	Study Material will be uploaded.	
Actual Result	Study Material successfully uploaded	
Status	Study Material successfully uploaded in the application	Pass

Table 6.1.7: Manage Study Material

Description:

This test case describes the Manage Study Material process. Student must be registered first is the perquisites for this test case. After that Student will be able to upload study material in the application. And student also will be able to see pre uploaded study material in the application. Student can also send images related to study material in the chat publicly or privately.

6.1.8 Student Sign Out Test Case

Test Case Id:	TC-8	Test Data
Test Case	Student Sign Out	
Objective	To Student Sign Out Process	
Perquisites	Student must be Signed In first	
Input	Student click on sign out button	Sign out
Expected Result	Student will be sign out	
Actual Result	Student successfully sign out	
Status	Student Successfully Signed Out	Pass

Table 6.1.8: Student Sign Out

Description:

This test case describes the Student Sign Out process. Student must be Sign in first is the perquisites for this test case. After that student will be able to sign out from the application. When user think his\her work has done he\she will be sign out easily from this application. And as this his\her data will be safe in this application.

6.1.9 Download Study Material Test Case

Test Case Id:	TC-9	Test Data
Test Case	Download Study Material	
Objective	To download study material process	
Perquisites	Student must be Signed In first	
Input	Student click on download button	Download
Expected Result	Student will be able to download study material	
Actual Result	Student successfully download study material	
Status	Student successfully download study material	Pass

Table 6.1.9: Download Study Material

Description:

This test case describes the Download Study Material process. Student must be Sign in first is the perquisites for this test case. After that student will be able to download study material from the application. When student wants to download important Notes, Quiz, Assignment and Past Paper he\she will be able to download from this application easily.

6.1.10 Manage Feedback Test Case

Test Case Id:	TC-10	Test Data
Test Case	Manage Feedback	
Objective	To give feedback process	
Perquisites	Student must be Signed In	
Input	Student click on feedback button	Feedback
Expected Result	Student will be able to give feedback	
Actual Result	Student successfully give feedback	
Status	Student successfully give feedback in the app	Pass

Table 6.1.10: Manage Feedback

Description:

This test case describes the Manage Feedback process. Student must be Sign in is the perquisites for this test case. After clicking on feedback button and writing the specific comment in the description section bar and writing email in email section clicking on the send button, student make a feedback successfully

6.1.11 Discussion Board Test Case

Test Case Id:	TC-11	Test Data
Test Case	Discussion Board	
Objective	To discussion process	
Perquisites	Student must be Signed In	
Input	Student click in the chat box and type message and send image	Message Upload Image
Expected Result	Student will be able to send message and image in the chat box.	
Actual Result	Student successfully send message and image	
Status	Student successfully send message and image in the chat box	Pass

Table 6.1.11: Discussion Board

Description:

This test case describes the Discussion Board process. Student must be Sign in is the perquisites for this test case. After clicking in the chat and writing the specific message in the application. And student can write message publicly and privately message in the application. Student can also send study related images through the discussion board.

6.1.12 Update Student Profile Test Case

Test Case Id:	TC-12	Test Data
Test Case	Update Student Profile	
Objective	To Update Student Profile Process	
Perquisites	Student must be Signed In	
Input	Student click on his\her profile	Image Name University Department Semester
Expected Result	Student will be able update his\her profile	
Actual Result	Student successfully Update his\her profile	
Status	Student successfully his\her profile	Pass

Table 6.1.12: Student Update Profile

Description:

This test case describes the Student Update Profile process. Student must be Sign in is the perquisites for this test case. After clicking on his\her profile he\she can change his\her image, name university, department and semester. When student move to next semester then he will need to update his profile in the application. Then he will be able to see the study material of the next semester.

6.1.13 Forget Password Test Case

Test Case Id:	TC-13	Test Data
Test Case	Forget Password	
Objective	To Forget Password process	
Perquisites	Student must be Signed Out	
Input	Press Forget Password button and type email	Saahilzeeshan786@gmail.com
Expected Result	Forget password form should be display	
Actual Result	Forget password form displayed	
Status	Forget Password Form Successfully Displayed	Pass

Table 6.1.13: Forget Password

Description:

This test case describes the Forget Password process. Student must be Sign out is the perquisites for this test case. After pressing on forget password button then type email in text box. And code is sent successfully on that email. After that he\she will recover his account through forget password feature.

6.1.14 Notification Test Case

Test Case Id:	TC-14	Test Data
Test Case	Notification	
Objective	To Notification process	
Perquisites	Student must be Signed In	
Input	Upload Pdf , Send message in the chat	Pdf, Message
Expected Result	Notification should be received	
Actual Result	Notification received and display successfully	
Status	Notification Successfully Displayed and received	Pass

Table 6.1.14: Notification

Description:

This test case describes the Notification process. Student must be Sign in is the perquisites for this test case. Notification will be received when student upload pdf and send messages in the chat. After that he\she will received and can read chat related study material.

6.1.15 Update Admin Profile Test Case

Test Case Id:	TC-15	Test Data
Test Case	Update Admin Profile	
Objective	To Update Admin Profile Process	
Perquisites	Admin must be Signed In	
Input	Admin click on his\her profile. Update yourself	Image Name University Department Semester
Expected Result	Admin should be update his\her profile	
Actual Result	Admin successfully Update his\her profile	
Status	Admin successfully his\her profile	Pass

Table 6.1.15: Admin Update Profile

Description:

This test case describes the Admin Update Profile process. Admin must be Sign in is the perquisites for this test case. After clicking on his\her profile he\she can change his\her image, name university, department and semester. When Admin move to next semester then he will need to update his profile in the application. Then he will be able to see the study material of the next semester.

6.1.16 Update Instructor Profile Test Case

Test Case Id:	TC-16	Test Data
Test Case	Update Instructor Profile	
Objective	To Update Instructor Profile Process	
Perquisites	Instructor must be Signed In	
Input	Instructor click on his\her profile. Update yourself	Image Name Email Password
Expected Result	Instructor should be update his\her profile	
Actual Result	Instructor successfully Update his\her profile	
Status	Instructor successfully his\her profile	Pass

Table 6.1.16: Instructor Update Profile

Description:

This test case describes the Instructor Update Profile process. Instructor must be Sign in is the perquisites for this test case. After clicking on his\her profile he\she can change his\her image, name email and password. When Instructor move to next semester then he will need to update his profile in the application.

6.2. Black box Testing

Black Box Testing is a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. It is also known as Behavioral Testing.

6.2.1 Boundary Value Analysis

Boundary value analysis is based on testing at the boundaries between partitions. It includes maximum, minimum, inside or outside boundaries, typical values and error values. It is generally seen that a large number of errors occur at the boundaries of the defined input values rather than the center. It is also known as BVA and gives a selection of test cases which exercise bounding values. This black box testing technique complements equivalence partitioning. This software testing technique base on the principle that, if a system works well for these particular values then it will work perfectly well for all values which comes between the two boundary values.

6.2.1.1 Sign Up Form Boundary value analysis

BVA on Name

In our app we have text field (Name) which accepts the length between 3-30 characters.

Boundary Value Analysis Of Name		
Invalid (min-1)	Valid (min, +min, max, -max)	Invalid (max+1)
2 characters	3,7,16,25,30, characters	31 characters

BVA on Password

In our app we have password field (password) which accepts the length between 8-30 characters and numbers.

Boundary Value Analysis on Password		
Invalid (min-1)	Valid (min, +min, max, -max)	Invalid (max+1)
7 characters	8,16,25,30, characters	31 characters

6.2.2 Equivalence Class Partitioning

Equivalence Partitioning Method is also known as Equivalence class partitioning (ECP). It is a software testing technique or black-box testing that divides input domain into classes of data, and with the help of these classes of data, test cases can be derived.

6.2.2.1 Sign Up Form Boundary value analysis

ECP on Subjects

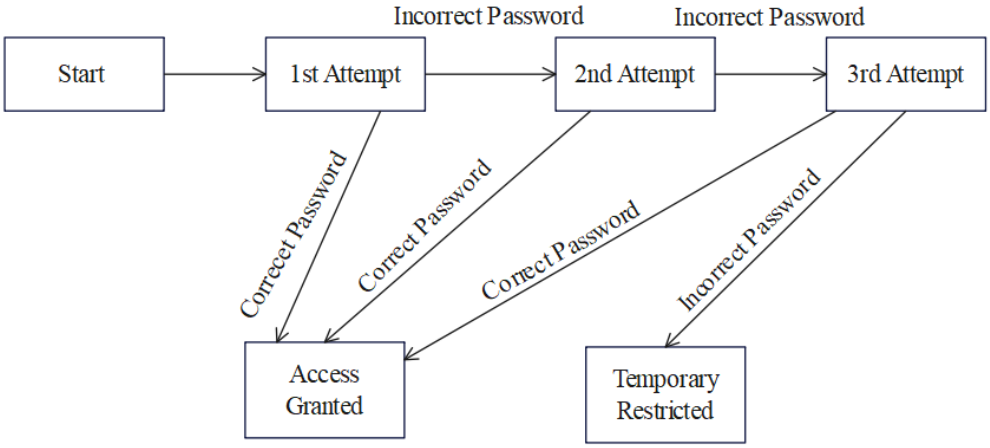
In our app we have subject field (subjects) which accepts the length of 6 subjects.

Equivalence Class Partitioning on Subjects		
Invalid	Invalid	Valid
Subjects >=7	Subjects = 7	Subjects <=6

6.2.3 State Transition Testing

State Transition Testing is a black box testing technique in which changes made in input conditions cause state changes or output changes in the Application under Test(AUT). State transition testing helps to analyze behavior of an application for different input conditions. Testers can provide positive and negative input test values and record the system behavior.

State Transition Diagram



In this diagram when the user gives the correct PIN number, he or she is moved to Access granted state. Following Table is created based on the diagram above.

6.2.3.1 Sign in Form for State transition table

ST on Password

	Correct Password	**Incorrect Password**
S1) Start	**S5**	**S2**
S2) 1st Attempt	**S5**	**S3**
S3) 2nd Attempt	**S5**	**S4**
S4) 3rd Attempt	**S5**	**S6**
S5) Access Granted	**-**	**-**
S6) Temporary Restricted	**-**	**-**

In the above-given table when the user enters the correct Password, the state is transitioned to Access granted. And if the user enters an incorrect password, he or she is moved to next state. If he does the same 3 time, he will reach the account Temporary restricted state.

6.2.4 Decision Table Testing

Decision table testing is a software testing technique used to test system behavior for different input combinations. This is a systematic approach where the different input combinations and their corresponding system behavior (Output) are captured in a tabular form. That is why it is also called as a Cause-Effect table where Cause and effects are captured for better test coverage.

6.2.4.1 Decision Table Testing for Sign in Form

Condition	Case 1	Case 2	Case 3	Case 4
Email	T	F	F	T
Password	F	T	F	T
Output	E	E	E	H

Legend:

T – Correct username/password
F – Wrong username/password
E – Error message is displayed
H – Home screen is displayed

Interpretation:

Case 1 – Email was correct but password was wrong. The user is shown an error message.

Case 2 – Email was wrong, but the password corrects. The user is shown an error message.

Case 3 – Email and password both were wrong. The user is shown an error message.

Case 4 – Username and password both were correct, and the user navigated to Home screen.

6.2.4.2 Decision Table Testing for Study Material Form

In our app we have activity (Study Material) which accepts the format pdf and max size 30mb.

DT on Pdf

Condition	Case 1	Case 2	Case 3	Case 4
Format	T	F	F	T
Size	F	T	F	T
Output	E	E	E	U

Legend:

T – Correct Format/Size

F – Wrong Format/Size

E – Error message is displayed

U – Pdf is Uploaded Successfully

Interpretation:

Case 1 – Format was correct but size was wrong. The user is shown an error message.

Case 2 – Format was wrong, but the size correct. The user is shown an error message.

Case 3 – Format and Size both were wrong. The user is shown an error message.

Case 4 – Format and Size both were correct, and the Pdf is uploaded successfully.

6.2.5 Graph Base Testing

This technique of Black box testing involves a graph drawing that depicts the link between the causes (inputs) and the effects (output), which trigger the effects. This testing utilizes different combinations of output and inputs.

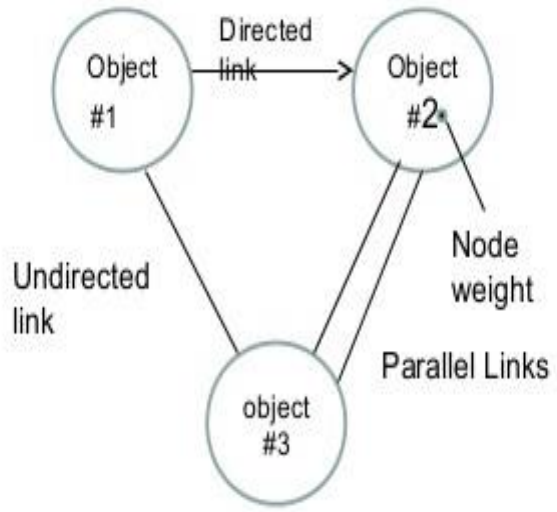


Figure 6.2.5 Graph Base Testing

his technique of Black box testing involves a graph drawing that depicts the link between the causes (inputs) and the effects (output), which trigger the effects. This testing utilizes different combinations of output and inputs. It is a helpful technique to understand the software's functional performance, as it visualizes the flow of inputs and outputs in a lively fashion.

6.3. White Box Testing

White Box Testing is a testing technique in which software's internal structure, design, and coding are tested to verify input-output flow and improve design, usability, and security. In white box testing, code is visible to testers, so it is also called Clear box testing, Open box testing, Transparent box testing, Code-based testing, and Glass box testing.

6.3.1 Statement Coverage

Statement coverage is a white box testing technique, which involves the execution of all the statements at least once in the source code. It is a metric, which is used to calculate and measure the number of statements in the source code which have been executed. In this the test case is executed in such a way that every statement of the code is executed at least once.

6.3.2 Branch Coverage

Branch coverage technique is used to cover all branches of the control flow graph. It covers all the possible outcomes (true and false) of each condition of decision point at least once. Branch coverage technique is a white box testing technique that ensures that every branch of each decision point must be executed. Test coverage criteria requires enough test cases such that each condition in a decision takes on all possible outcomes at least once, and each point of entry to a program or subroutine is invoked at least once. That is, every branch (decision) taken each way, true and false. It helps in validating all the branches in the code making sure that no branch leads to abnormal behavior of the application.

6.3.3 Path Coverage

Path coverage testing is a specific kind of methodical, sequential testing in which each individual line of code is assessed. As a type of software testing, path coverage testing is in the category of technical test methods, rather than being part of an overarching strategy or "philosophy" of code. It is labor-intensive and is often reserved for specific vital sections of code. In this the test case is executed in such a way that every path is executed at least once.

All possible control paths taken, including all loop paths taken zero, once, and multiple (ideally, maximum) items in path coverage technique, the test cases are prepared based on the logical complexity measure of a procedural design. In this type of testing every statement in the program is guaranteed to be executed at least one time. Flow Graph, Cyclomatic Complexity and Graph Metrics are used to arrive at basis path.

Chapter No 7

Tools and Technologies

7. Chapter No 7: Tools and Technologies

7.1. Programming Language

The following are the platforms, languages and tools used in the implementation of E-Meta application.

7.1.1 Programming Language

1. XML
2. Java

Operating System

- Android OS

Database/Data Storage

- Firebase

7.1.2 Tools

- Android Studio
- GitHub
- Postman
- Adobe Photoshop

1. XML

XML stands for extensible markup language. A markup language is a set of codes, or tags, that describes the text in a digital document. The most famous markup language is hypertext markup language (HTML), which is used to format Web pages. XML, a more flexible cousin of HTML, makes it possible to conduct complex business over the Internet.

- XML stands for extensible Markup Language.
- XML is a markup language much like HTML.
- XML was designed to store and transport data.
- XML was designed to be self-descriptive.

Difference Between XML and HTML

XML and HTML were designed with different goals:

- XML was designed to carry data - with focus on what data is

- HTML was designed to display data - with focus on how data looks
- XML tags are not predefined like HTML tags are
- XML stands for Extensible Markup Language. It is a text-based markup language derived from Standard Generalized Markup Language (SGML). XML tags identify the data and are used to store and organize the data, rather than specifying how to display it like HTML tags, which are used to display the data.

2. Java

The online Java Platform, Standard Edition (Java SE) Documentation contains API specifications, feature descriptions, developer guides, reference pages for JDK tools and utilities, demos, and links to related information. The Java SE documentation is also available in a download bundle which you can install on your machine. To obtain the documentation bundle, see the download page. For API documentation, refer to The Java Platform, Standard Edition API Specification. This documentation provides brief descriptions of the API with an emphasis on specifications, not on code examples.

The JDK Bug Database web site lets you search for and examine existing bug reports, submit your own bug reports, and tell us which bug fixes matter most to you. To directly submit a bug or request a feature, fill out this form.

The Java Development Kit (JDK) is a distribution of Java Technology by Oracle Corporation. It implements the Java Language Specification (JLS) and the Java Virtual Machine Specification (JVMS) and provides the Standard Edition (SE) of the Java Application Programming Interface (API). It is derivative of the community driven Open JDK which Oracle steward. It provides software for working with Java applications. Examples of included software are the virtual machine, a compiler, performance monitoring tools, a debugger, and other utilities that Oracle considers useful for a Java programmer. Oracle have released the current version of the software under the Oracle NoFee Terms and Conditions (NFTC) license. Oracle's primary implementation of the JVMS is known as the Hot Spot (virtual machine).

3. IDE

An integrated development environment (IDE) is a software application that provides

comprehensive facilities to computer programmers for software development. An IDE normally consists of at least a source code editor, build automation tools and a

debugger. Some IDEs, such as Net Beans and Eclipse, contain the necessary interpreter, compiler, or both; others, such as Sharp Develop and Lazarus, do not.

The boundary between an IDE and other parts of the broader software development environment is not well-defined; sometimes a version control system or various tools to simplify the construction of a graphical user interface (GUI) are integrated. Many modern IDEs also have a class browser, an object browser, and a class hierarchy diagram for use in object-oriented software development.

An integrated development environment (IDE) is software for building applications that combines common developer tools into a single graphical user interface (GUI). An IDE typically consists of

Source code editor: A text editor that can assist in writing software code with features such as syntax highlighting with visual cues, providing language specific auto-completion, and checking for bugs as code is being written.

Local build automation: Utilities that automate simple, repeatable tasks as part of creating a local build of the software for use by the developer, like compiling computer source code into binary code, packaging binary code, and running automated tests.

Debugger: A program for testing other programs that can graphically display the location of a bug in the original code.

7.2. Operating Environment

E-Meta will be a mobile application for users and it'll be able to run on Android devices with the minimum requirement as follows:

- Version 5.0 or greater than 5 (API level 21 or more)
- 1GB RAM or the greatest
- 50MB Storage or greater