A PROJECT REPORT ON

CO-STUDY SPACE
(A Virtual Study Platform for Students)

SUBMITTED TO THE
CUMMINS COLLEGE OF ENGINEERING FOR WOMEN, KARVENAGAR, PUNE
(An autonomous institute affiliated to Savitribai Phule Pune University.)
IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE

OF

BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)

SUBMITTED BY

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DEPARTMENT OF COMPUTER ENGINEERING

MKSSS'S CUMMINS COLLEGE OF ENGINEERING FOR WOMEN
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SAVITRIBAI PHULE PUNE UNIVERSITY
2019 -2020

CERTIFICATE

This is to certify that the project report entitled

CO-STUDY SPACE

Submitted by

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is a bonafide student of this institute and the work has been carried out by her under the supervision of **Dr. Anjali Naik** and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University, for the award of the degree of **Bachelor of Computer Engineering**.

Dr. Anjali Naik
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Department of Computer Engineering

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Head,
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Dr. M. B. Khambete
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Place : Pune

Project Completion Certificate

Date: 26/04/2020

TO WHOM IT MAY CONCERN

This is to certify that **Mitali Chaudhari , Madhumita Chatne, Sanika Dhawale and Shravani Gore**, students of MKSSS Cummins College of Engineering have successfully completed the sponsored project **Co-Study Space (A virtual study platform)** with **Open Infotech**. During the period of project completion with us, they were found punctual, hardworking and inquisitive.

We wish them every success in life.

Mr. Vikram Ghadge,

Open Infotech

Place: Pune

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the people without whom the completion of this BE project report was impossible. Our sincere thanks to Dr. Anjali Naik Ma'am for her constant support, encouragement and valuable guidance for our project and the report as well. Thank you for making available all the facilities needed to prepare this report. Anjali ma'am has always been a great support in giving the necessary background information and inspiration for the project implementation and completion of the report.

Our sincere Thanks to Dr. Madhuri Khambete and HoD Computer department Dr. Supriya Kelkar for giving us great exposure throughout this project activity by means of Cummins College of Engineering, Pune.

Many people have made valuable comments, suggestions on this project idea which gave us inspiration to improve our project. We thank all the people for their help directly and indirectly to complete our assignment.

Madhumita Chatne
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Shravani Gore

ABSTRACT

The aim of the project is to create a platform that will enable students(users) across various disciplines to form virtual study groups where students can collaborate, share notes, plan their study goals and discuss their doubts. This application will help users organize the topics they need to study and augment it with facilities like digital text extraction and text summarization. The application would be fully focused on academic-related content. The application would allow users to create study groups of varying scope viz. Private, Public, Research according to their choice.

This study platform will allow the user to create study groups, where users can create topics, which will make it easy to post questions topic wise. The members of the group could post answers to the following questions. The user could add text, images, tables, etc to the answers. The other members could like and comment on the posted answers. A provision to post study material (for ex. .docs, .ppt, .pdf files) will also be available to the users.

The user could search for the groups, topics or information of his interest using the search tab. Users could also join these groups by asking for access to the admin, so that users will be able to access data as well as add data to the group. A user will also receive notifications regarding the activities happening around his/her account.

The aim is to create a Mobile application as well as Web Application for our project Co-study Space.

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1. INTRODUCTION

1.1 Overview

The trend of life-long learning is increasing rapidly in today's digital world. In such a framework, on-line Learning is becoming an important tool to allow the flexibility requested by such a kind of learning process. Online discussion and collaboration platforms requirements are constantly changing, they have transformed the everyday life of the students as they influence their study methods. Such platforms evaluation is based on an approach that identifies the dimensions, specifications, and the essential criteria necessary for learning. Obviously, the analysis of the features of a system is not sufficient: it is also important to understand how they are integrated to facilitate learning and what principles are applied to guide the way. Co-study space is such a platform which mainly focuses on group studies. For effective learning purposes, it includes resources in various formats (text, image, PDF), and provides access for collaborative working, from shared documents.

1.2 Motivation:

- Our "information-oriented" society shows an increasing need for life-long learning. In such a framework, on-line Learning is becoming an important tool to allow quality requested by such a kind of learning process.
- E-learning platforms requirements are constantly changing, they have transformed the everyday life of the students as they influence their study methods.
- So our aim is to provide a virtual platform: Co-Study Space which is a virtual studying space essentially designed for students. Students can form groups with

their peers, collaborate and discuss with them, share notes in the form of questions and answers, get the doubts cleared by other teammates.

- We took an online survey to define the scope of Co-study space clearly. Following were the questions.

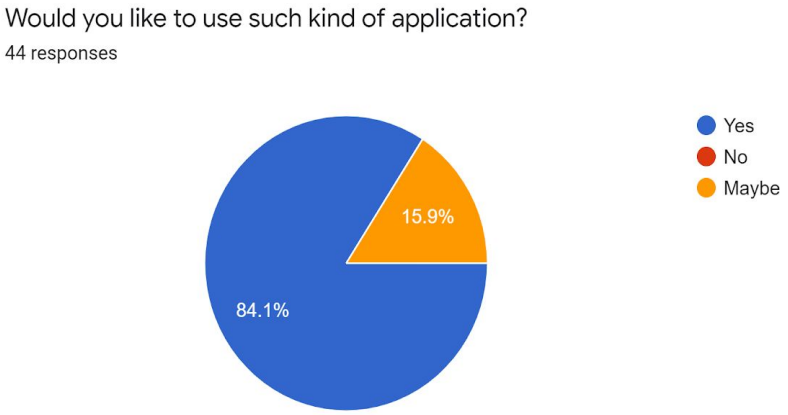


Figure 1: Project survey question-1

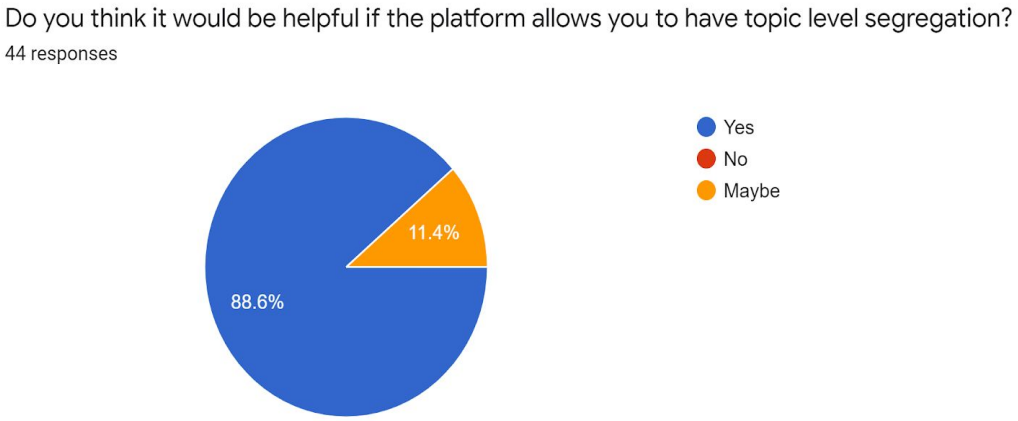


Figure 2: Project survey question-2

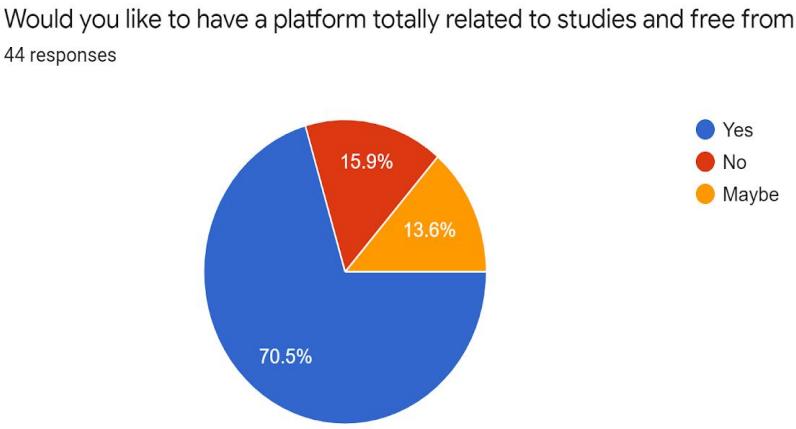


Figure 3: Project survey question-3

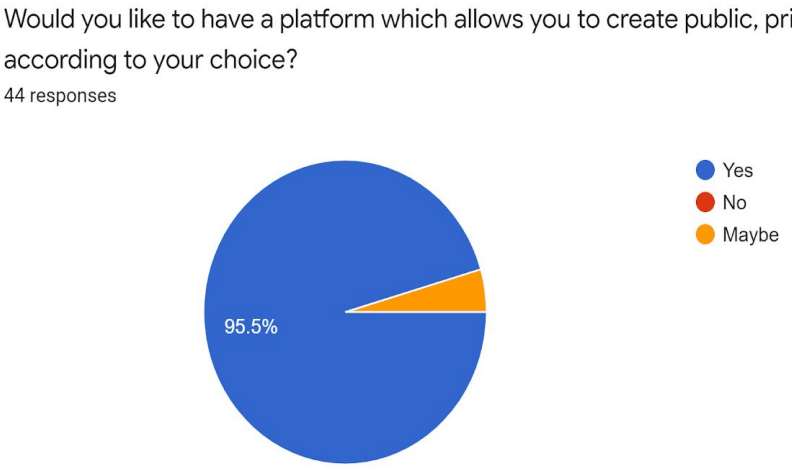


Figure 4: Project survey question-4

1.3 Problem Definition and Objectives:

- To create a platform that will enable students(users) across various disciplines to form virtual study groups where students can collaborate, share notes, plan their study goals and discuss their doubts.
- To create an application that will help users organize the topics they need to study and augment it with tools like image processing and text summarization.
- To create an application that would be fully focused on academic-related content without any scope for off-the-topic discussions.
- To create an application that would allow users to create study groups of varying scope viz. Private, Public, Research.
- To develop a mobile as well as a web application for the platform.

1.4 Project Scope & Limitations

Scope :

- To develop a web-app as well as a mobile application that is centrally connected to a database forming an end to end system.
- Providing the user with a functionality to choose a group type viz. public, private, or research, as per their requirement.
- Users can upload images, pdf documents to share notes.
- To maintain the readability, image processing tools (to extract text from images and providing the data in text format to the users) will be used.
- Text Summarisation will be used to provide the gist of the entire answer/text which will be helpful for revision purposes.

Limitations:

- While extracting text from an image, the images with unclear or bad handwriting, may extract the wrong text.
- Images with bigger sizes may take more time to get uploaded.

2. LITERATURE SURVEY

2.1 Background of Domain:

The trend of life-long learning is increasing rapidly in today's digital world. In such a framework, on-line learning is becoming an important tool to allow the flexibility requested by such a kind of learning process. Online discussion and collaboration platforms requirements are constantly changing, they have transformed the everyday life of the students as they influence their study methods. Such platforms evaluation is based on an approach that identifies the dimensions, specifications, and the essential criteria necessary for learning. Obviously, the analysis of the features of a system is not sufficient: it is also important to understand how they are integrated to facilitate learning and what principles are applied to guide the way. Co-study space is such a platform which mainly focuses on group studies. For effective learning purposes, it includes resources in various formats (text, image, documents), and provides access for collaborative working, from shared documents.

2.2 Comparison

Here we have compared various virtual platforms with Co-study Space:

Points	Quora	Reddit	Github Discussion Forum	Moodle	Stackoverflow	Co-study Space
Focus on group studies	No	No	No	No	No	Yes
Topic segregation for each study group	No	Yes	No	No	No	Yes
Constraint on negative conversation	No	No	No	No	No	Yes
Functionalities : Public, Private and Research Groups	No	No	No	No	No	Yes
Image Processing for text extraction	No	No	No	No	No	Yes
Text summarization (to get a gist of a long answer in few points)	No	No	No	No	No	Yes

Figure 5: Gap Comparison

Points of Comparison:

1. Focus on group studies

Quora : One can ask random questions related to any random topic [1]

Reddit : One can create groups to discuss the topic of their interest. [2]

Github Discussion Forum: All doubts are related to Github, but the doubts are question centric. [3]

Moodle : Moodle is focused on course-related studies. A variety of assessment tools are available so that the teacher can assess the progress of the students.[4]

Stackoverflow: All technical doubts are cleared in the form of a question/answer. [5]

Co-study space: A study group can be created where one can post notes, questions, and question papers. The groups can be created based on the access level of user choice.

2.Topic segregation for each study group

Quora : Very broad level of topics.

Reddit : Very broad level of topics.

Github : Has Conversations, Series.

Stackoverflow : No topic level segregation but segregation is on question level.

Co-Study space: Topic level segregation.

3.Constraint on Negative conversation

All applications: Negative comments will be restricted.

Co-study space: It does the above-mentioned points as well as avoids unnecessary conversations that are not related to studies. Example: Bullying.

4.Functionalities: Public, Private and Research Groups

All other applications: No choice to create a private group with your peers which can be joined by anyone using the application.

Co-study space: Gives a user three choices(public, private, and research) to create groups as per their convenience.

5.Image Processing for text extraction

All other applications: Support posting of images but do not extract text from them.

Co-Study space: Support image processing and text extraction from digital text images.

6.Text summarization (to get a gist of a long answer in few points)

All other Applications: Don't have the feature of text summarization.

Co-Study space: If longer answers are posted the application creates a summary of the answer which provides the gist of the answer.

2.3 Research Paper

Studying and Comparing the Free E-learning Platforms- 2016 IEEE [6]

E-learning platforms transformed the everyday life of teachers and students. An e-learning platform study, from a methodical and systematic approach that identifies the dimensions, specifications, and the essential criteria for the evaluation of these platforms is a must. In this paper, the analytical study of free e-learning platforms is proposed. Four platforms are selected according to certain criteria filter among the 600 platforms that are listed in the THOT CURSUS directory. Thus, the paper presents an approach that is used for the quality evaluation of the selected e-learning platforms. Then, the paper identifies these platforms while specifying their types, their designers, and their licensing. In the 'comparison of platforms' portion of the paper the selected e-learning platforms in comparison are stated, based on the evaluation approach. The figure provides comparison between the four platforms.

Identification				
Platform's name:	**Atutor***	**Claroline Connect***	**Moodle***	**Sakai***
Platform designer:	Inclusive Design Research Centre, *OCAD* University	*UCL / IPM / ECAM*	*Martin Dougiamas* and *Moodle Community*	*Sakai Community*
Platform type:	LCMS	LMS	CMS, VLE, LCMS	LMS
Platform genre:	Online learning platform	Online learning platform	Online learning platform	Online learning platform
Platform's pedagogical model:	traditional pedagogy	social constructivist	social constructivist [24]	Constructivism
Platform license:	GPL	GPL [22]	GPL	Educational Community License
Description:	Online learning platform	Online learning and collaborative work platform	Online learning platform	Online learning platform, including collaboration tools
Version & Edition:	V. 2.2 (24 Aug. 2014)	V. 5.1.10 (May. 2015)	V. 2.9 (11 May. 2015)	V. 10 (08 July. 2014)
Used technology:	PHP (5.6.3)	PHP (5.5+)	PHP (5.4.4+)	JAVA
Language:	Multi-language support, more than 38 languages [13]	Multi-language support, limited number of languages (fr, en, es)	Multi-language support, more than 135 languages [12]	Multi-language support, more than 20 languages [9]
Website:	www.atutor.ca	www.claroline.net	www.moodle.org	www.sakaiproject.org
User institutions	Fundação Universitária Vida Cristã, Srinakharinwirot university, softaculous, Nursing Course Server, Ubicomp Courses, etc.	High School of Namur-Liège-Luxembourg, Neuchâtel university, campus : Belfort & Lyon 'esta', LaSalle Beauvais,Saint Louis Namur, Lyon Catholic university, Collège Saint-Pierre, etc.	Toulouse III 'Paul Sabatier' university, Louvain Catholic university, Lille 1 & Lille 3 university, Paul-Valéry university, Jean Moulin university, Lyon III, Artois university, etc.	Collège Providence, Baltimore university, Duke university, GHANA university, Brock university, Washington & Lee university, Collège Washington & Jefferson, etc.

Figure 6: Case Study

These platforms also offer an improvement in the conduct of teachings for the construction and the organization of elaborate formations. Despite the degree of utility and the usability reached by the selected platforms, the result of the evaluation of each of these platforms shows that each has its strengths and weak points. Also, platform quality analysis, according to the paper's approach led to interesting results that most of the selected platforms were initially developed a decade ago, based on a 'classical training model'. The teacher holds the knowledge and transmits it, to future learners so as to foster the learning of these latter. They are mostly Teaching Management Systems or TMS, tools at the teacher's service for creating and managing the courses rather than at the service of the learner and the learning process.

2.4 Products Compared

1. Quora :

- It is an application where users can ask questions, get them answered, and edited which is also done by the users, factually, or in the form of opinions.
- Features:
    - Upvote/Downvote: Users can rank answers based on how relevant and helpful they found the answers. The feature is intended to maintain the quality of content posted online. The more upvotes an answer receives, the higher it is ranked, and it shows up on top of searches. If an answer is ranked poorly, it will be "collapsed" and will not show up in people's feeds.
    - Anonymous Posting: The user has an option to ask a question or answer the questions anonymously, if the user is not comfortable unveiling his/her identity for a specific question or answer.

- Report Answer: Users can report plagiarism, harassment, etc, and factually incorrect articles, etc. This feature is intended to keep sub-standard content under check.
- Suggest Edits: Users can propose changes to an answer. The proposed changes are made visible to the author of the answer, who can either approve (and publish) or reject the changes.
- Edit Question & Source: A user can directly edit a specific question. These changes are reviewed by Quora, which can revert them if they are unconstructive.

2. Stack-Overflow :

- Stack Overflow is a website for professional and enthusiast programmers where they can ask questions and get them answered.
- It contains questions and answers on a wide range in computer programming.
- Features:
  - Upvote/Downvote: Users can upvote an answer they find most prominent. Users of Stack Overflow can earn points and "badges" for example, a person is awarded 10 reputation points for receiving an "up" vote on an answer given to a question.
  - Additional Privileges: Users unlock new privileges with an increase in reputation like the ability to vote, comment, and even edit other people's posts.
  - Specific Questions: Stack Overflow only accepts questions about programming that are tightly focused on a specific problem.

3.Reddit :

- Reddit is a social web content rating, and discussion website.
- The members of the application can submit content to the site such as links, text posts, images, etc which can then be voted up or down by other members.
- Features:
    - Reddit provides a feature to upvote or downvote posts and comments to help the best content rise to the top.
    - Users are gifted coins if another user particularly valued the comment or post, generally due to humorous or high-quality content.
    - Discussions on Reddit are organized into user-created groups called subreddits. The names of the subreddit begin with "r/", for example: r/science is a community devoted to discussing scientific topics and r/television is a community devoted to discussing TV shows.

4.Moodle :

- Adopted by colleges and universities worldwide.
- For every course in the college, there is a moodle group which includes the teacher and the students.
- Students have to enroll in these courses. Usually the teacher accepts the student's enrollment.
- Students can submit assignments for courses. The assignments usually have a deadline.
- Teachers can grade students' assignments and students can view their marks and progress.
- The assignments are checked for plagiarism.
- It has a discussion forum.

3. SOFTWARE REQUIREMENT SPECIFICATIONS

3.1 Product Scope

Purpose :

To create a platform that will enable students(users) across various disciplines to form virtual study groups where students can collaborate, share notes, plan their study goals and discuss their doubts.

Scope :

- To develop a web-app as well as a mobile application that is centrally connected to a database form an end to end system.
- Providing the user with a functionality to choose a group type- public, private, or research- as per their requirement. Users can upload images, pdf documents to share notes.
- To maintain the readability, image processing tools (to extract text from images and providing the data in text format to the users) will be used.
- Text Summarisation will be used to provide the gist of the entire answer/text which will be helpful for revision purposes.

3.1.1 Features

1. User :

1. Login/Signup	2.Create Group
3.Edit User Profile	4.Join Group
5.Search groups	6.Search topics
7.Leave Group	8.Logout
9.Add Topics	10.Upvote

11. View Notifications	12.Study Material
13. Request to join group	14. Text Extraction
15. Text Summarization	

2.Group Admin:

1.Login/Signup	2.Create Group
3.Edit User Profile	4.Join Group
5.Search groups	6.Search topics
7.Leave Group	8.Logout
9.Add Topic	10.Upvote
11.View Notification	12.Study Material
13.Invite member	14.Request to join group

3.2 Functional Requirements:

3.2.1 REQ1: Signup:

A form will be shown for user registrations for the signup option. Users should enter the details like name, email id, password, university, course, etc. On clicking sign up details will be recorded by the system. Form details must be complete.

3.2.2 REQ2: Login :

Users will enter email id and password to log-in.

3.2.3 REQ3: Create Group :

Users can create public, private, and research groups. The user who creates the group will be the admin of that group.

3.2.4 REQ4: Edit User Profile :

Users can edit their profile information by updating or deleting the present information.

3.2.5 REQ5: Join Group :

Users can send requests to join groups of their interests to the group admin. Users have to answer a questionnaire to join the group, which will be checked by the admin of that group.

3.2.6 REQ6: Search groups :

Users can search groups from the existing groups.

3.2.7 REQ7: Search topics :

Users can search for topics in groups.

3.2.8 REQ8: Leave Group :

Users can leave any of their groups according to their choice.

3.2.9 REQ9: Logout :

Users can logout from their co-study space account.

3.2.11 REQ11: Add Topics :

Users can add topics to the group.

3.2.13 REQ13: Invite/Add Members :

Only the admin of the group can invite members to join the group. Admin can accept the group joining requests sent by other users on co-study space.

3.2.14 REQ14: Likes:

If the user likes any answer then the user can give a thumbs up to the answer.

3.2.15 REQ15: View Notification:

Users will be able to view the notifications on the notifications page.

3.2.16 REQ15: Study Material:

Users can upload study material to the group.

3.3 External Interface Requirements:

- User Interface
  - Front-end software: and browser , for phone -android phone
- Hardware Interfaces
  - Any devices, which support the popular browsers, for phone- android or IOS.
- Communication Interface
  - This project supports all types of web browsers.

3.4 Non-Functional Requirements

3.4.1 Performance Requirements:

The application should provide stable performance even when many users are accessing it simultaneously.

3.4.2 Security Requirements:

The application provides access to the authentic and authorized users only. Users can only access their profiles. Private and research group data should not be accessible to any user outside the group unless the group is closed and data is made public by the admin of that group.

3.4.3 Software Quality Attributes:

1.Adaptability: The application should be adaptable to a subsequent web interface.

2.Availability: The application shall be available all the time.

3.Robustness: The application shall provide the capability to back-up the Data.

4.Usability: Anyone can use the application with basic computer Knowledge to share the data and access the shared data.

3.5 System Requirements

3.5.1 Database Requirements:

MongoDB - NoSQL Database

3.5.2 Software Requirements:

- React Native - mobile application framework.
- MERN Stack:
- MongoDB - NoSQL Database
- Express - Backend Framework
- React - Frontend UI Framework
- Node js - Javascript Runtime Environment which allows you to use javascript as a server-side technology or a server-side scripting language.

- Git - Open source distributed version control system, it helps in handling the history of what changes have happened. It provides features like branches and merges.
- Asana - Project management tool
- IDE: Visual Studio Code

3.5.3 Hardware Requirement(For Development):

- Operating System: Windows 10
- RAM - minimum 4 GB

4. SYSTEM DESIGN

4.1 System Architecture

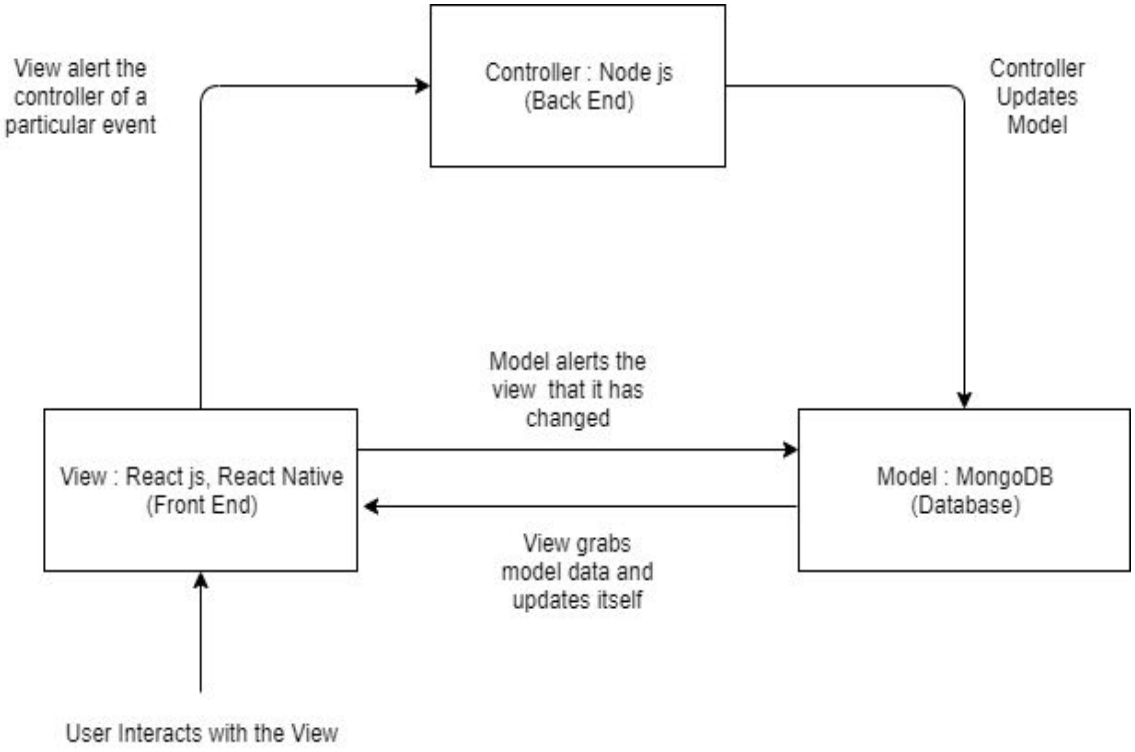


Figure 7: System Architecture

4.2 Data Flow Diagrams

DFD Level 0:

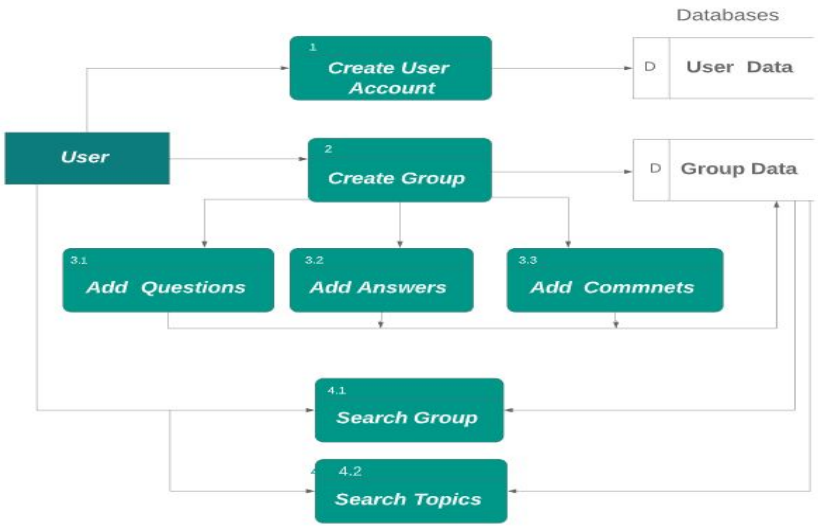


Figure 8: Data Flow Diagram Level 0

DFD Level 1:

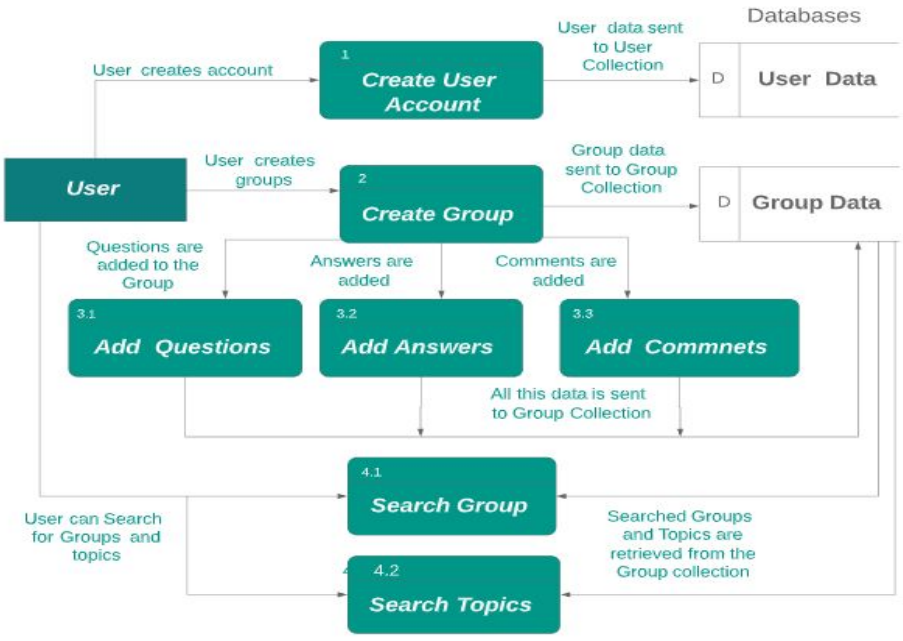


Figure 9: Data Flow Diagram Level 1

DFD Level 2:

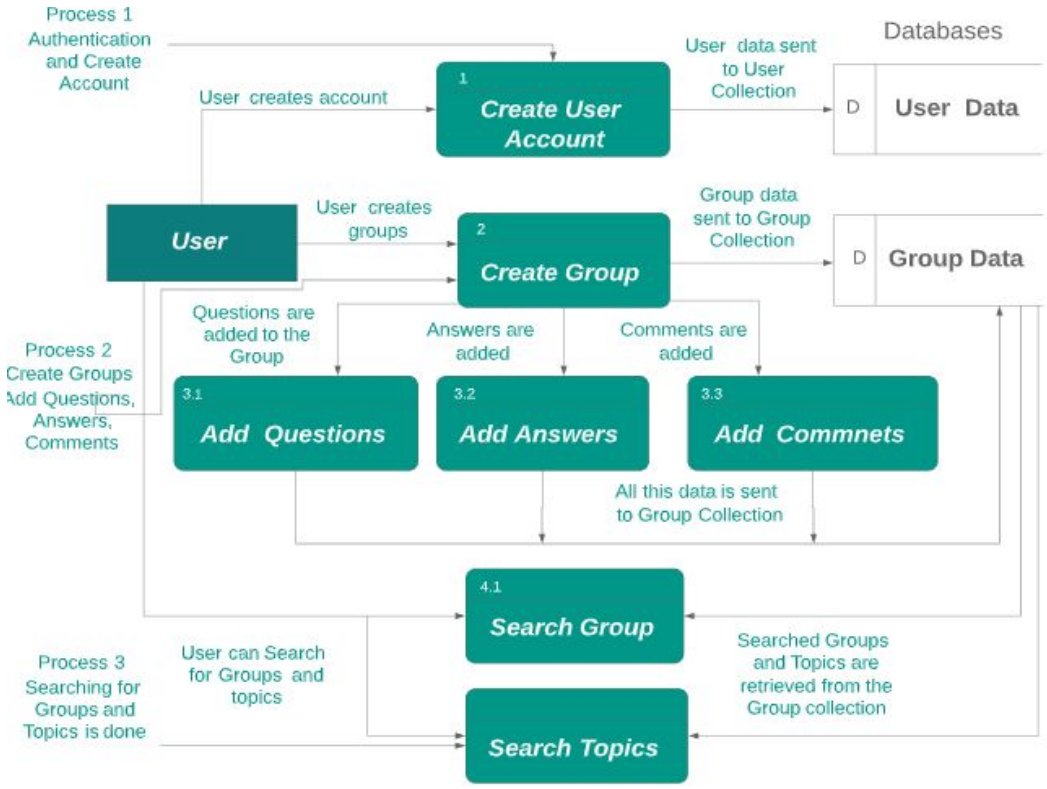


Figure 10: Data Flow Diagram Level 2

4.3 Entity Relationship Diagrams

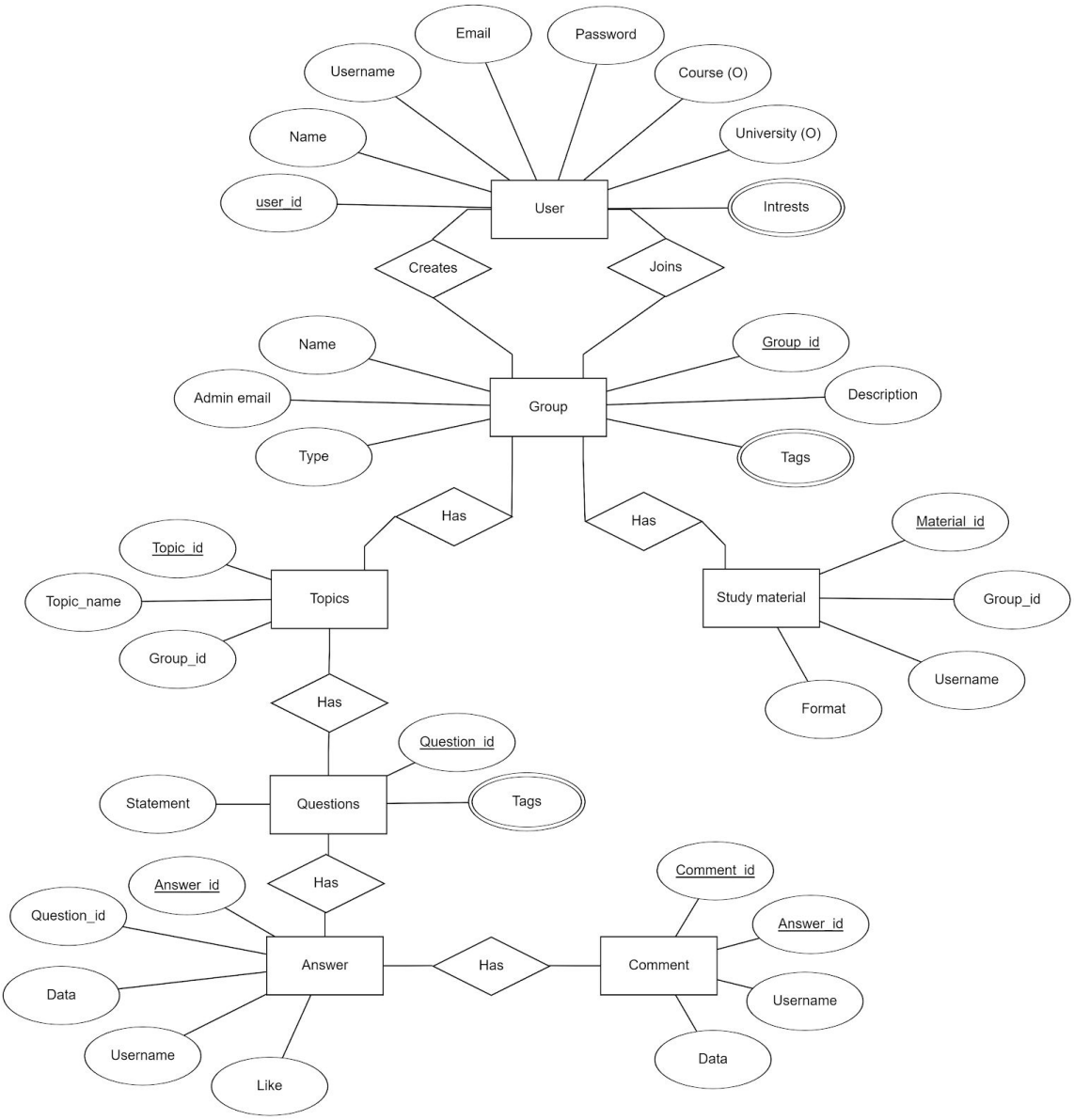


Figure 11: Entity Relationship Diagram

4.4 UML Diagrams:

4.4.1 Activity Diagram:

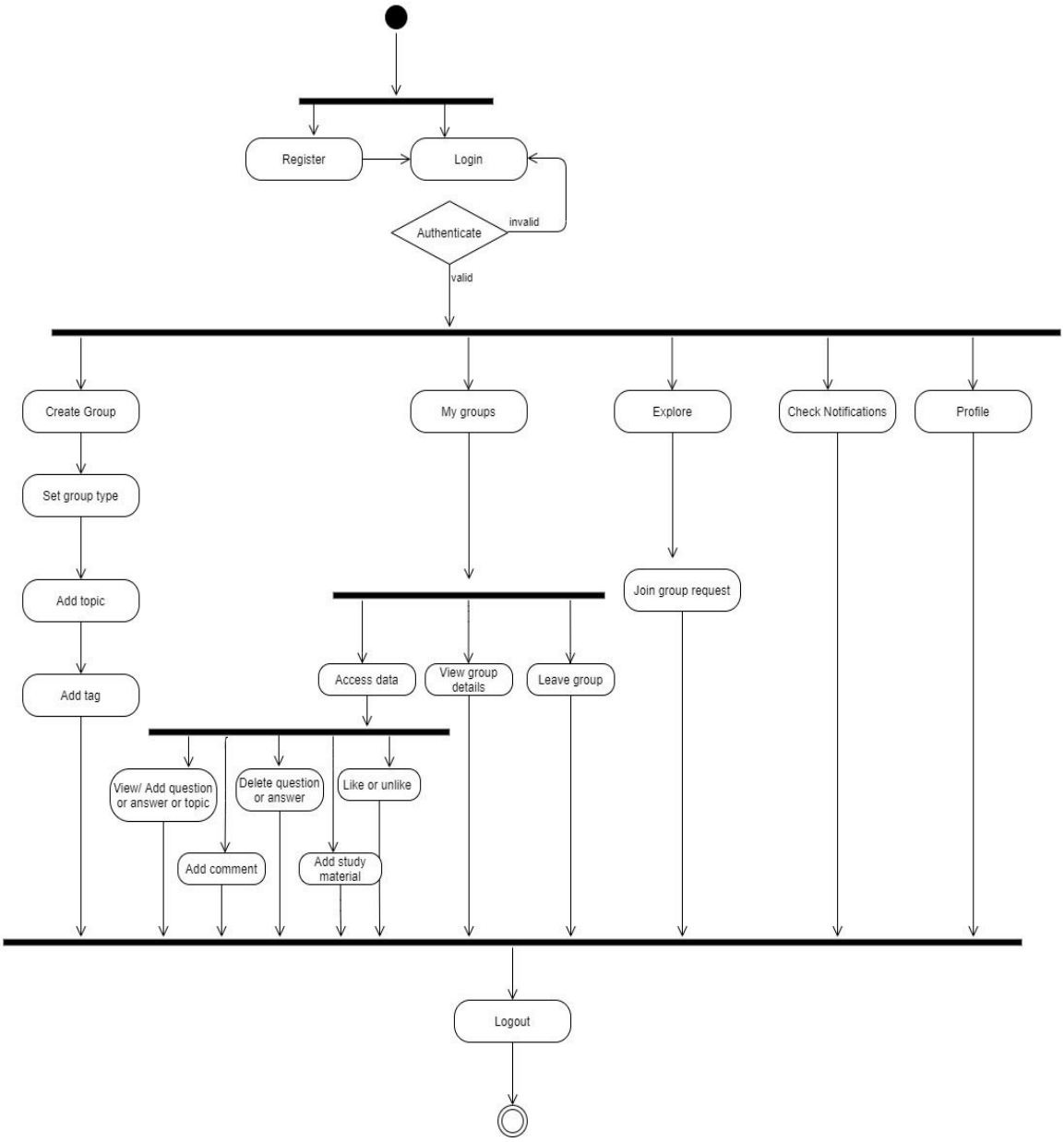


Figure 12: Activity Diagram

4.4.2 Use Case Diagram:

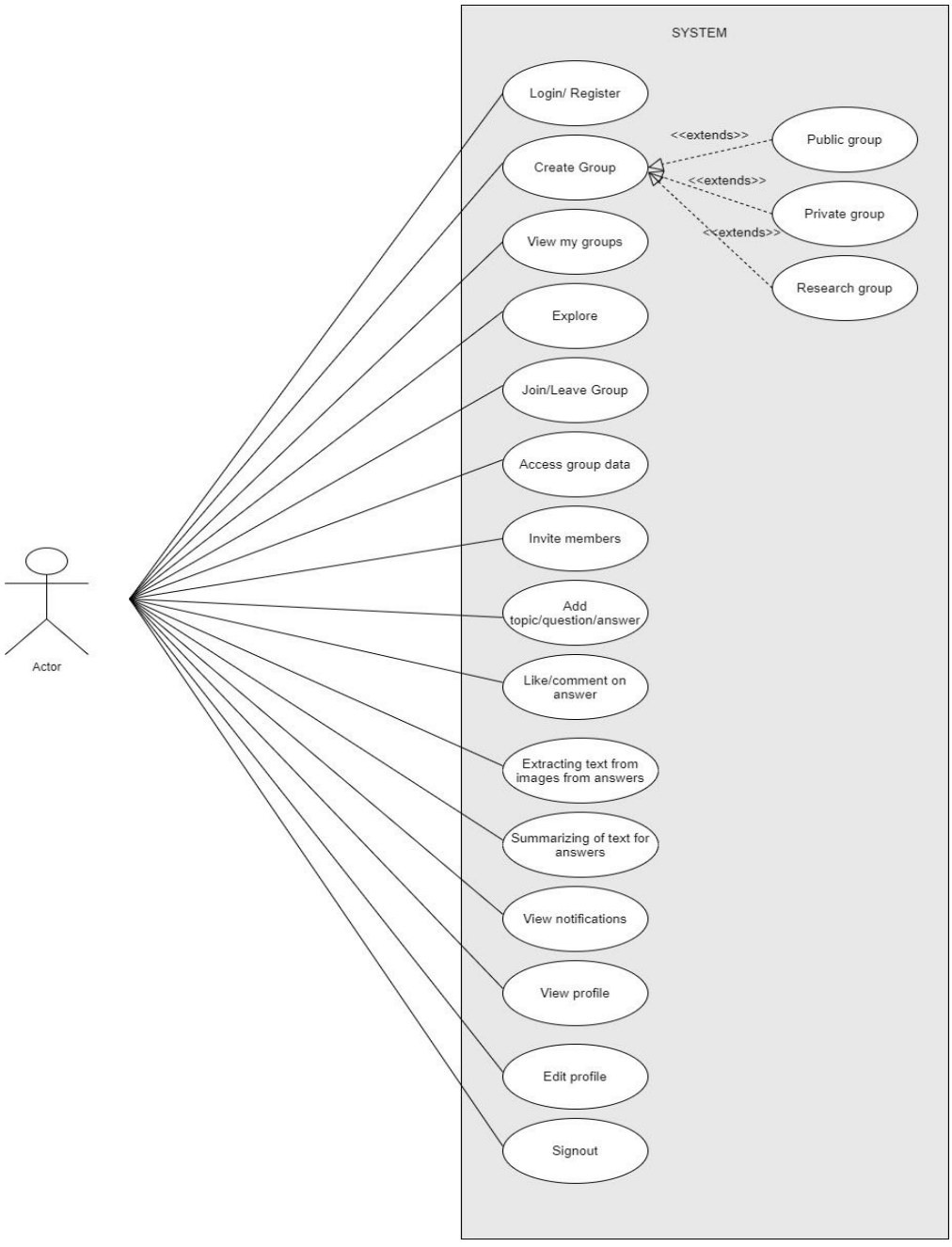


Figure 13: Activity Diagram

4.4.3 Class Diagram:

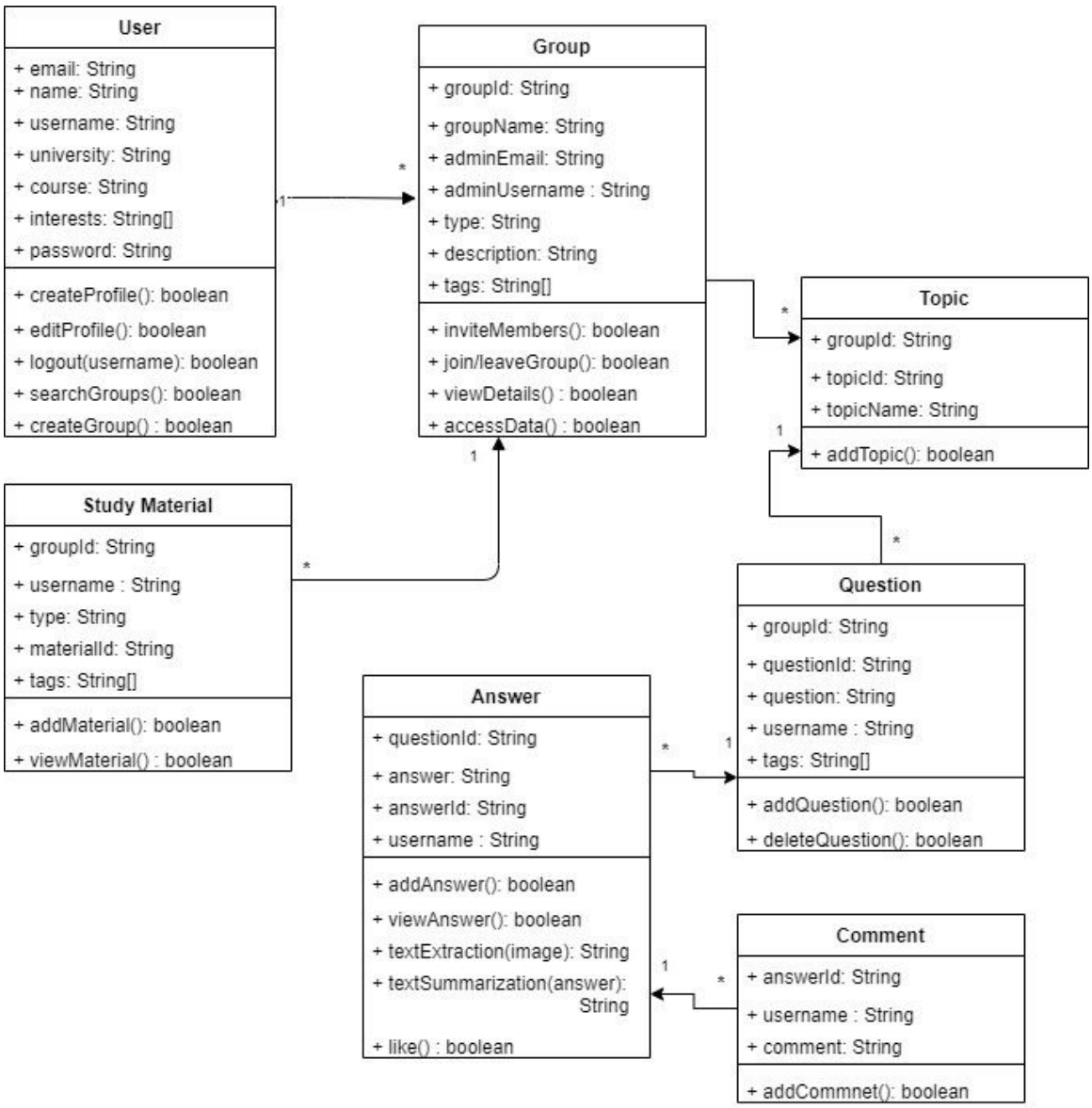


Figure 14: Activity Diagram

4.4.4 Sequence Diagram:

Signup Diagram

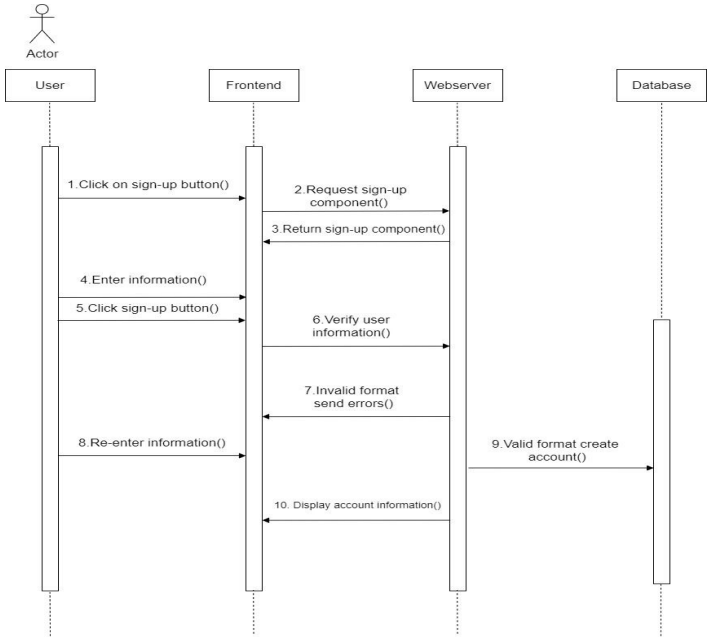


Figure 15: Sequence Diagram-Sign up

Login Diagram

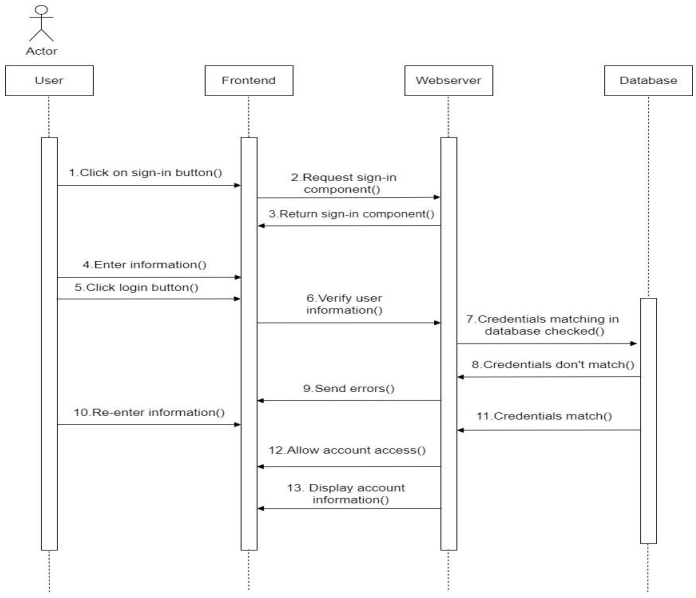


Figure 16: Sequence Diagram-Login

Create Group

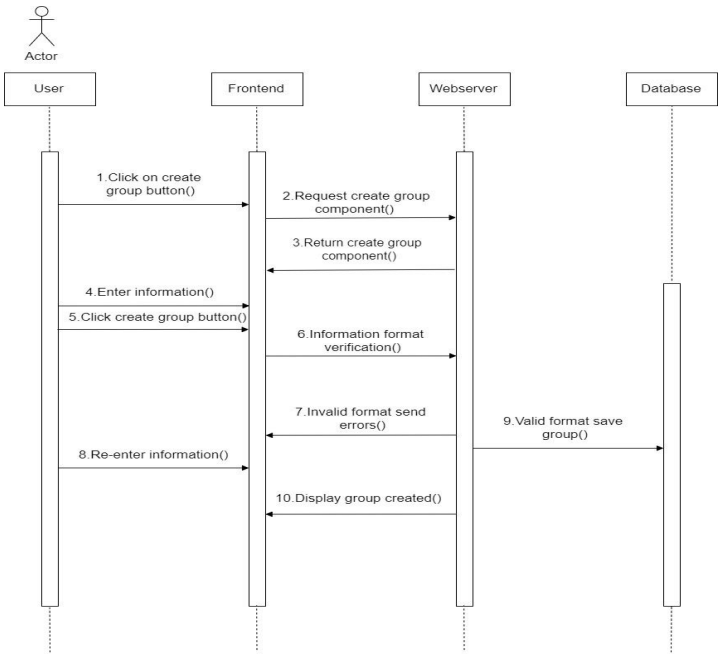


Figure 17: Sequence Diagram-Create group

Post Question

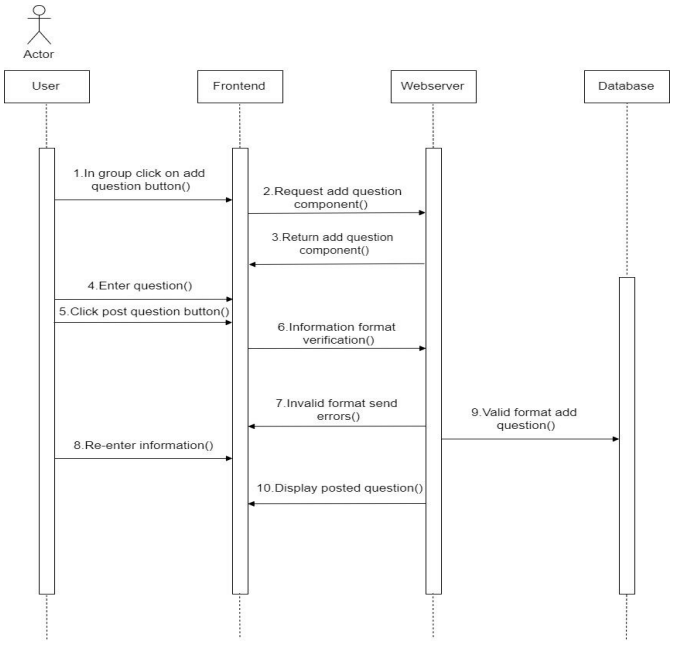


Figure 18: Sequence Diagram-Post Question

Post Answer

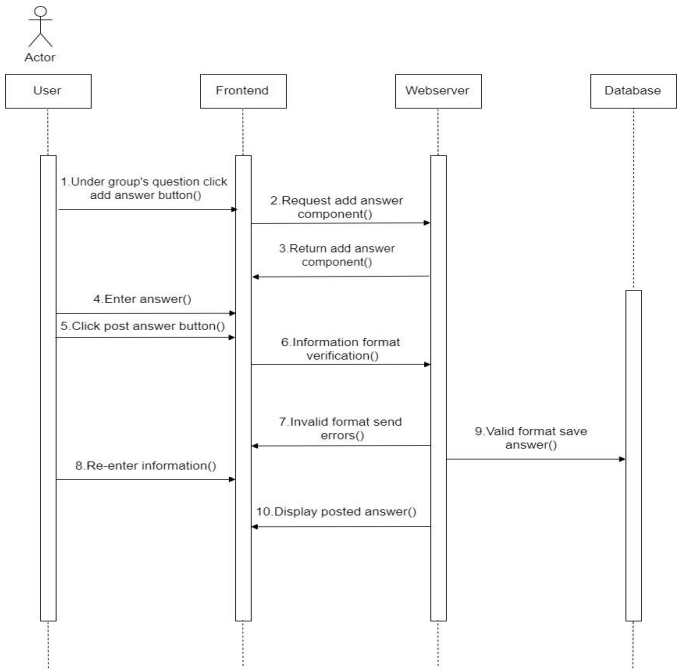


Figure 19: Sequence Diagram-Post Answer

4.4.5 Module Diagram

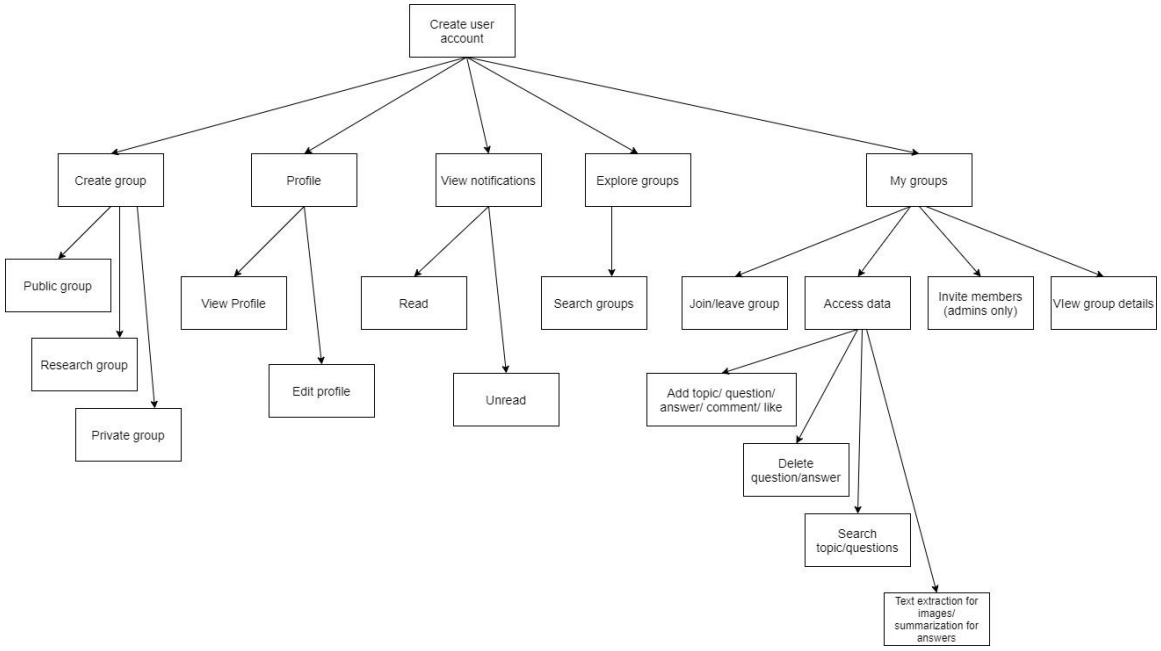


Figure 20: Module Diagram

5. PROJECT IMPLEMENTATION

5.1 Overview of Project Modules

1. Register

Register tab is provided using which one could open a new account on Co-Study Space. The name, email-id, and password of the user are asked while registering for the application.

2.Login

Login tab is provided, using which the user can log-in to the application. The email-id and password of the user are asked to complete the Login process.

3.Create Group

To create a group on Co-Study Space, the 'Create Group' module is provided. To create a group, group name, description about the group, type of group (public, private, research), tags(you can add multiple tags), topic/topics to the group need to be added. Then by clicking on the 'submit' button the group will be created.

4. Add topic:

Once you are inside the group, by clicking on the 'Add Topic' button you can create a new topic.

Note: To add the topic to the group, you should be a member of that group.

5. Add Question:

Once you are inside a specific topic, the question can be added by clicking on the ‘Add Question’ button.

Note: To add the question to the group, you should be a member of that group.

6. Add Answer:

The answer can be added by clicking on the ‘Add Answer’ button. Text, images, links, tables can be added to the answer. On clicking the ‘Submit’ button the answer will be posted. Others can add comments and upvotes to your answer.

Note: To add an answer to any question, you need to be a member of that group in which the question is present.

7. Add Study Material

After clicking on the ‘Upload’ button one could upload the study material. All types of files(for example- .docs, .pptx, .pdf) can be added.

8. Join Group

One can join a specific group by clicking on the ‘Join Group’ button. A request will be sent to the group admin. If the admin accepts your request then you will become a member of that group and can enjoy all the group functionalities.

9. Leave Group

A group can be left by clicking on the ‘Leave Group’ button. If you are the admin, then you will be asked to make someone else the admin before leaving the group.

10. Notifications

The notifications related to all your activities will be displayed in the notifications tab (ex.- if someone has answered your question, or commented on your answer, or liked your answer, etc)

11.Profile

You can view your profile by clicking the profile icon on the navigation bar. Here you can view the information that you had submitted during the sign-up process. You can also add further information about your course, university, and interests.

12.My groups

All the groups with you as a member will be displayed on this page.

5.2 Tools and Technologies

5.2.1 Mobile Application Frontend:

•React Native:

- React Native is a framework that has been developed by Facebook for creating native-style (A native application is a software program that is developed for use on a particular platform or device.) apps for iOS & Android under one common language, JavaScript.
- Features:
    - Faster to Build: The unique selling point of React Native is the lesser development time. The framework provides ready-to-apply components that can accelerate the process.
    - One Framework, Multiple Platforms: React Native allows you to reuse the codebase between iOS and Android.

- Hot Reloading: Hot Reloading feature in react native application provides help to display the updated UI Content, whenever the user saves anything in react native script or code.
- Smaller Team: Since React Native provides the functionality to write the same
- code for Android and iOS, there is no need for separate Android and iOS
- developers.

5.2.2 Web Application Frontend:

•React JS:

- React is a javascript library created and maintained by Facebook and a community of individual developers and companies.
- React is used as a base in the development of single-page or mobile applications, as it is optimal for rapidly changing data that needs to be recorded.
- Features:
  - Virtual DOM(DOM (document object model) is a logical structure of documents in HTML, XHTML, or XML formats) in ReactJS that makes the user experience better and developer's work faster.
  - Reusable components.
  - One-direction data flow in ReactJS provides a stable code.ReactJS allows for direct work with components and uses downward data binding to ensure that changes in child structures don't affect their parents. That makes code stable.

5.2.3 Web Application Backend:

- NodeJS: The JavaScript runtime environment. It is used to run JavaScript programs on a machine rather than in a browser.
- ExpressJS: It is a framework layered on the top of NodeJS that is used to build the backend of a site using NodeJS functions and structures.

5.2.4 Database:

MongoDB :

- MongoDB is widely used as a document-oriented NoSQL database for high volume data storage.
- MongoDB is a cross-platform and document-oriented database that provides high performance, availability, and easy scalability.
- MongoDB works on the concept of collection and document. MongoDB uses JSON-like documents with schema.
- Relational database would make the database bulky in case of our project.

5.2.5 Languages:

- Javascript:

  JavaScript also called JS is interpreted as an object-oriented language with first-class functions, and it is the best-known scripting language for Web pages, but it is used in many non-browser environments as well. It is a prototype-based, multi-paradigm scripting language that is dynamic, supports object-oriented, imperative, and functional programming styles.

5.2.6 Project Management Tool

- Asana:

  Asana is a cloud-based project management solution that enables companies and ad agencies to manage tasks and projects, communicate and collaborate. It is helpful for companies and teams that handle multiple projects at one time, and it can serve companies of any size. Features include reporting, task management, a customer portal, automatic notifications, collaboration tools, dashboards, a mobile application, etc.

5.2.7 Integrated development environment

- Visual Studio Code

  Visual Studio Code combines the simplicity of a source code editor with powerful developer tooling, like the IntelliSense code completion. First, it is an editor that gets out of your way. The Visual Studio Code provides support for using macOS, Linux, and Windows. Visual Studio Code features a lightning-fast source code editor that is perfect for day-to-day use. With the support for hundreds of languages, Visual Studio Code helps you to be instantly productive with syntax highlighting, auto-indentation, bracket-matching, snippets, box-selection, etc. Intuitive keyboard shortcuts, easy customization, and community-contributed keyboard shortcut mappings let you navigate your code easily. For good coding, you'll often benefit from tools with more code understanding than only blocks of text.

5.2.8 Gitlab

- GitLab

  It is an open-source code repository and collaborative development platform. GitLab offers a location for online code storage and collaborative development of the massive software projects. The repository includes version control for enabling hosting different development chains and versions, allowing users to inspect previous code and go back to it in the event of unforeseen problems.

5.2.9 Deployment Platform:

- DigitalOcean:

  DigitalOcean is a cloud computing platform that offers an Infrastructure as a Service platform for software developers. DigitalOcean is very famous with open source developers and competes with AWS and Google Compute Engine.

  To deploy the IaaS environment on Digital Ocean, developers have to launch a private virtual machine (VM) instance, which is called a "droplet." Developers can choose the droplet's size, the geographical region and data center that will run it, and which Linux operating system it will use: Ubuntu, CentOS, Debian, Fedora or FreeBSD. Secure Shell(SSH) is also supported for secure communication.

6. SOFTWARE TESTING

6.1 Types of Testing

- Black Box Testing

  In Black Box Testing, the code is like a black box for the one who tests it. The Person doing the testing isn't concerned about the working of the code but is only concerned with the input and the output of the code. This technique can be used to test functional and nonfunctional requirements without referring to its internal structure.

- Unit Testing

  In Unit Testing, individual units of program code are tested for the correct result. A unit in this method is the smallest functionality/piece of code that can be tested. We have used Mocha, a famous Javascript Testing Framework to test the backend.

6.2 Test cases & Test Results

Test Cases- Login

Test Case id	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Check response when valid registered email and password is entered.	Email: sai10@gmail.com Password: sai123	Login should be successful	Login was successful	Pass
2	Check response when unregistered email is entered.	Email: sanika@gmail.com Password: sanika123	Login should be unsuccessful	Login was unsuccessful	Pass
3	Check response when password doesn't match.	Email: sai10@gmail.com Password: asdw	Login should be unsuccessful	Login was unsuccessful	Pass

Test cases- Register

Test Case id	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Verify if the name is not null (minimum three characters).	Name: Sanika	Valid Name	Valid Name	Pass
2	Verify if email is valid (not null and contains @ and '.')	Email: sanika@gmail.com	Valid Email	Valid Email	Pass
3	Verify if password has at least six characters	Password: abcd@5	Valid Password	Valid Password	Pass
4	Verify if confirm password has at least six characters	Confirm Password: abcd@5	Valid Password	Valid Password	Pass
5	Verify if password and confirm password match.	Password: abcd@5 Confirm Password: abcd@5	Password Match	Password Match	Pass

Test Cases- Groups

Test Case id	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Verify if the group name is not null (minimum three characters).	Name: Java basics	Valid Name	Valid Name	Pass
3	Verify if the group description is not empty .	Group Description: Java basic introduction is included.	Valid Group Description	Valid Group Description	Pass
4	Access to private group's data not permitted for the non group members.	Non group member trying to access the data of the private group.	Access not granted	Access not granted	Pass
5	Public data is available for everyone.	Public data can be accessed by anyone.	Access granted	Access granted	Pass

6	Only public group members can ask questions, answer,add topics, like, comment on the public group.	Question asked in a public group by the group member.	Question added to the group.	Question added to the group.	Pass
7	At Least one tag should be added.	Tag: OOPs	Valid case	Valid case	Pass
8	Tag name should not be null.	Tag: OOPs	Valid case	Valid case	Pass
9	At Least one topic should be added.	Topic: Java-introduction	Valid case	Valid case	Pass
10	Topic name should not be null.	Topic: Java-introduction	Valid case	Valid case	Pass

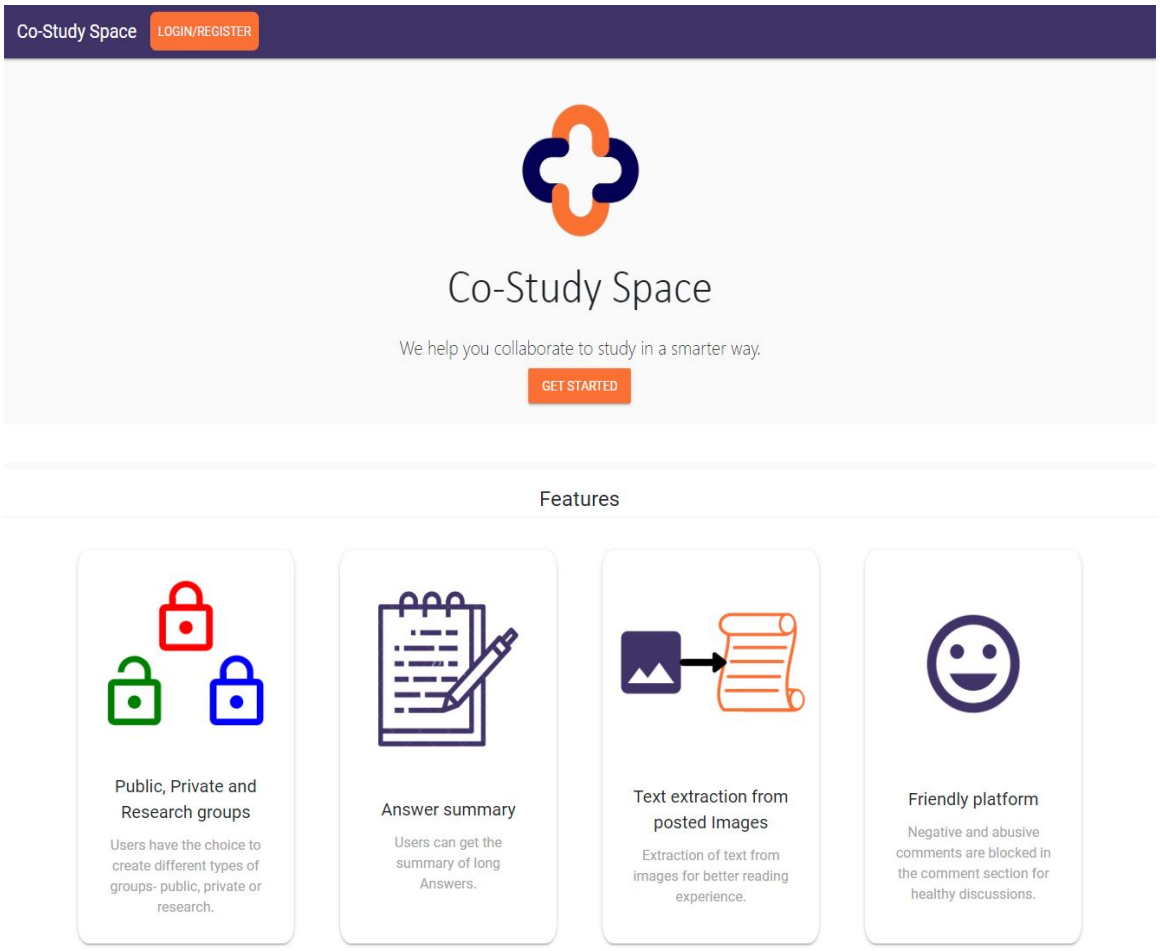
Test Cases- Topics, questions, answers and comments

Test Case id	**Test Case Description**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/ Fail**
1	Verify if the question is not null.	Question: What is java?	Valid Question	Valid Question	Pass
2	Verify if the question is not null.	Question:	Invalid Question	Invalid Question	Pass
3	Verify if topic is not null.	Topic: Basics of java	Valid topic	Valid topic	Pass
4	Verify if topic is not null.	Topic:	Invalid topic	Invalid topic	Pass
5	Verify if the answer is not empty.	Answer: Java is a programming language.	Valid answer.	Valid Answer.	Pass
6	Verify if the answer is not empty.	Answer:	Invalid answer.	Invalid Answer.	Pass
7	Verify if the comment is not null.	Comment: Nice answer.	Valid comment	Valid comment	Pass
8	Verify if the comment is not null.	Comment:	Invalid comment	Invalid comment	Pass

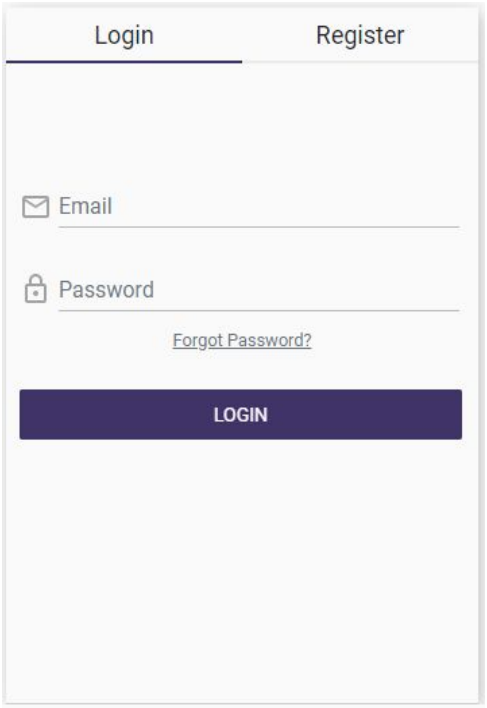
7. RESULTS

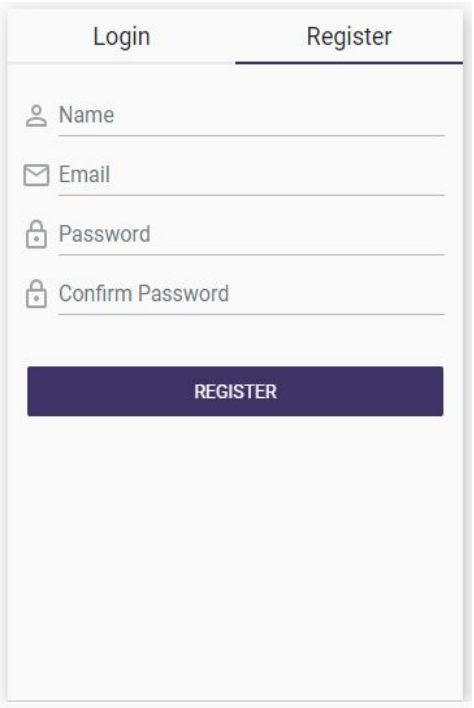
7.1 Screenshots

- Home Page:

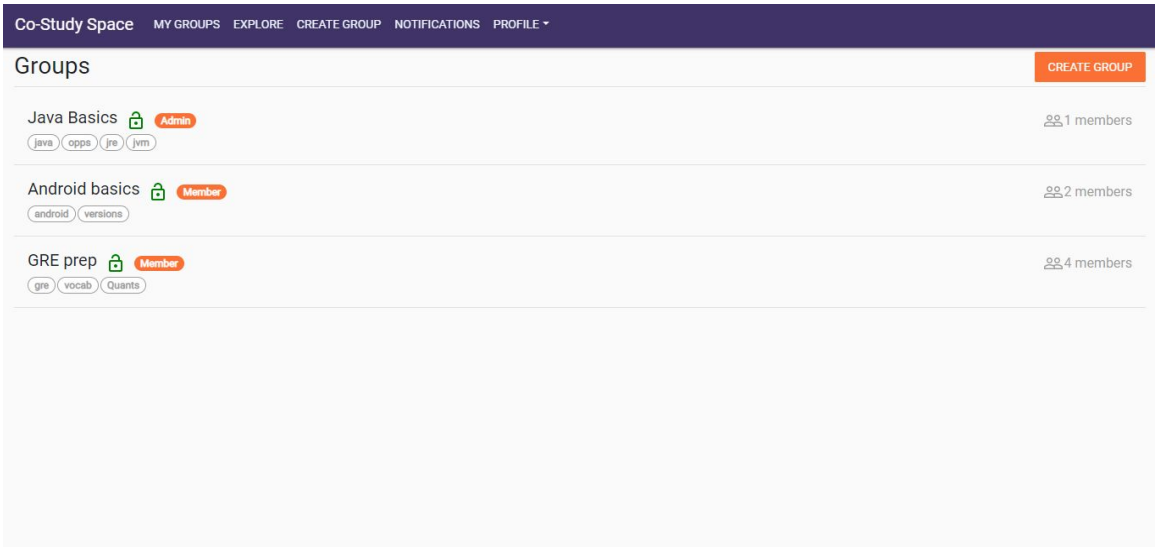


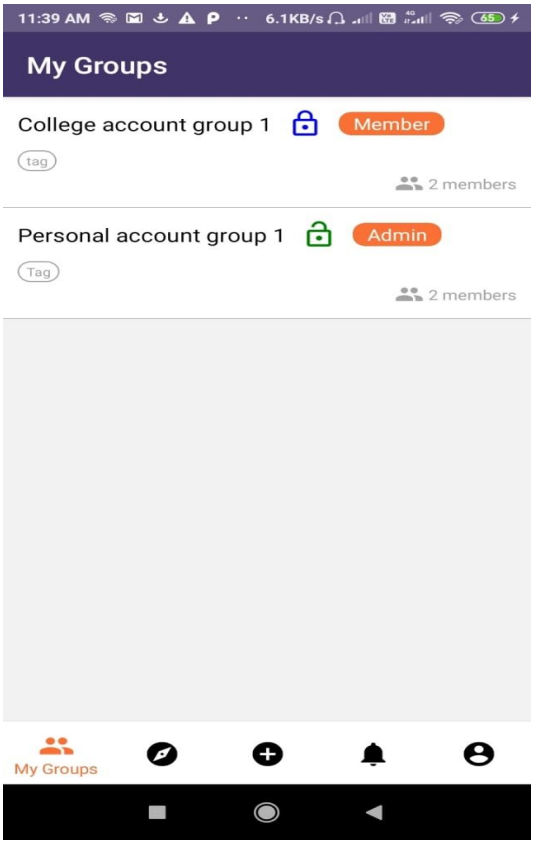
- Login Register


Login
Register
Email
Password
Forgot Password?
LOGIN

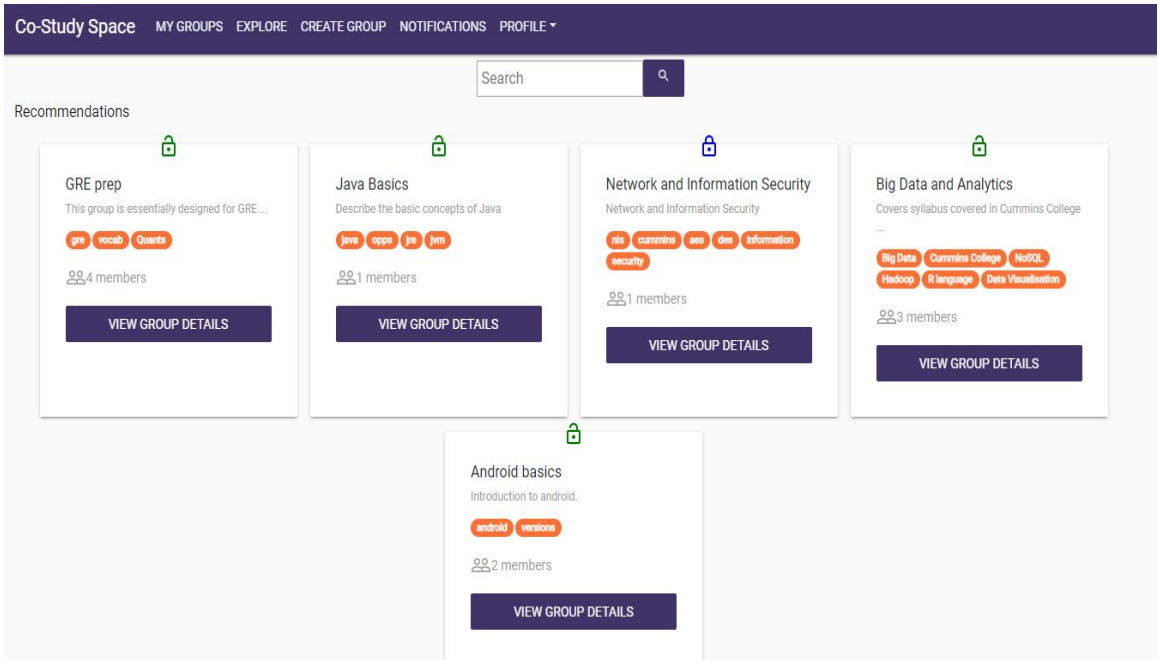

Login
Register
Name
Email
Password
Confirm Password
REGISTER

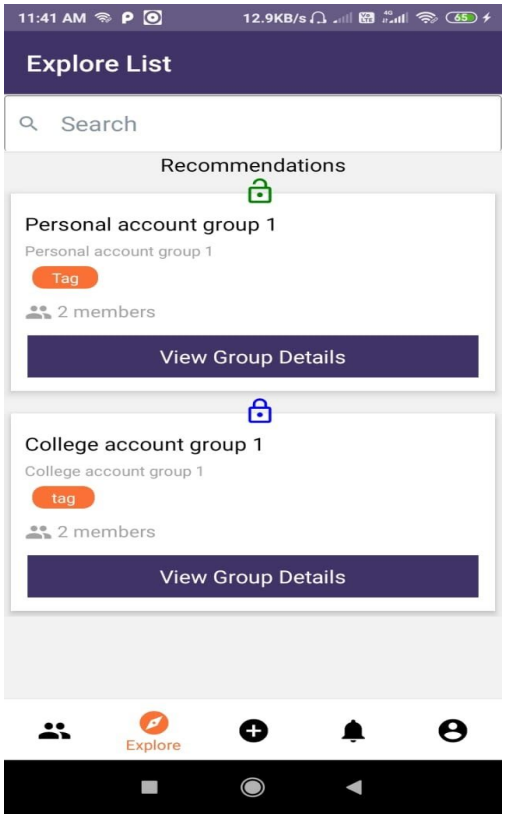
- My Groups


Co-Study Space
MY GROUPS
EXPLORE
CREATE GROUP
NOTIFICATIONS
PROFILE
Groups
CREATE GROUP
Java Basics
Admin
java
opps
jre
jvm
1 members
Android basics
Member
android
versions
2 members
GRE prep
Member
gre
vocab
Quants
4 members

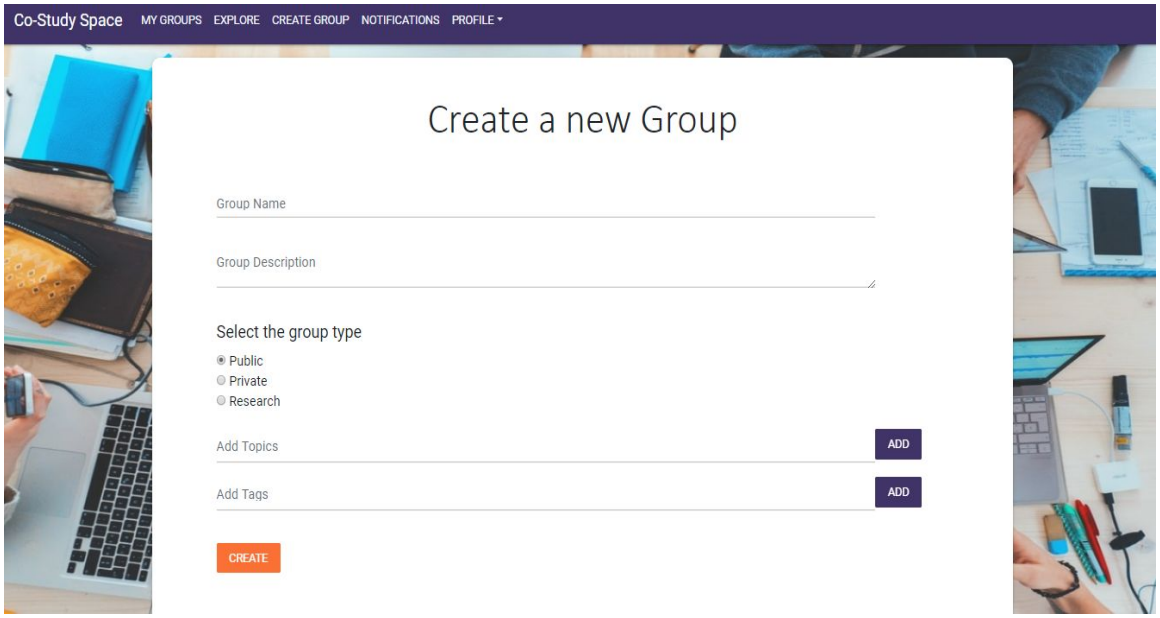

11:39 AM
6.1KB/s
My Groups
College account group 1
Member
tag
2 members
Personal account group 1
Admin
Tag
2 members
My Groups

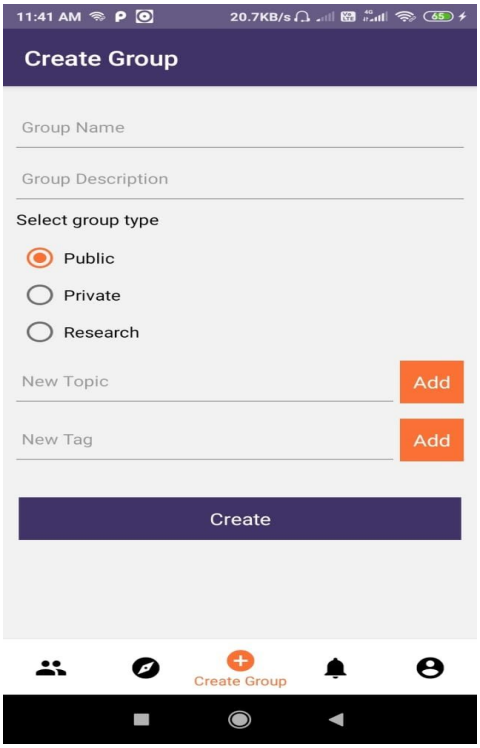
- Explore


Co-Study Space
MY GROUPS
EXPLORE
CREATE GROUP
NOTIFICATIONS
PROFILE
Search
Recommendations
GRE prep
This group is essentially designed for GRE ...
gre
vocab
Quants
4 members
VIEW GROUP DETAILS
Java Basics
Describe the basic concepts of Java
java
opps
jre
jvm
1 members
VIEW GROUP DETAILS
Network and Information Security
Network and Information Security
nis
cummins
aes
des
information
security
1 members
VIEW GROUP DETAILS
Big Data and Analytics
Covers syllabus covered in Cummins College
Big Data
Cummins College
NoSQL
Hadoop
R language
Data Visualisation
3 members
VIEW GROUP DETAILS
Android basics
Introduction to android.
android
versions
2 members
VIEW GROUP DETAILS

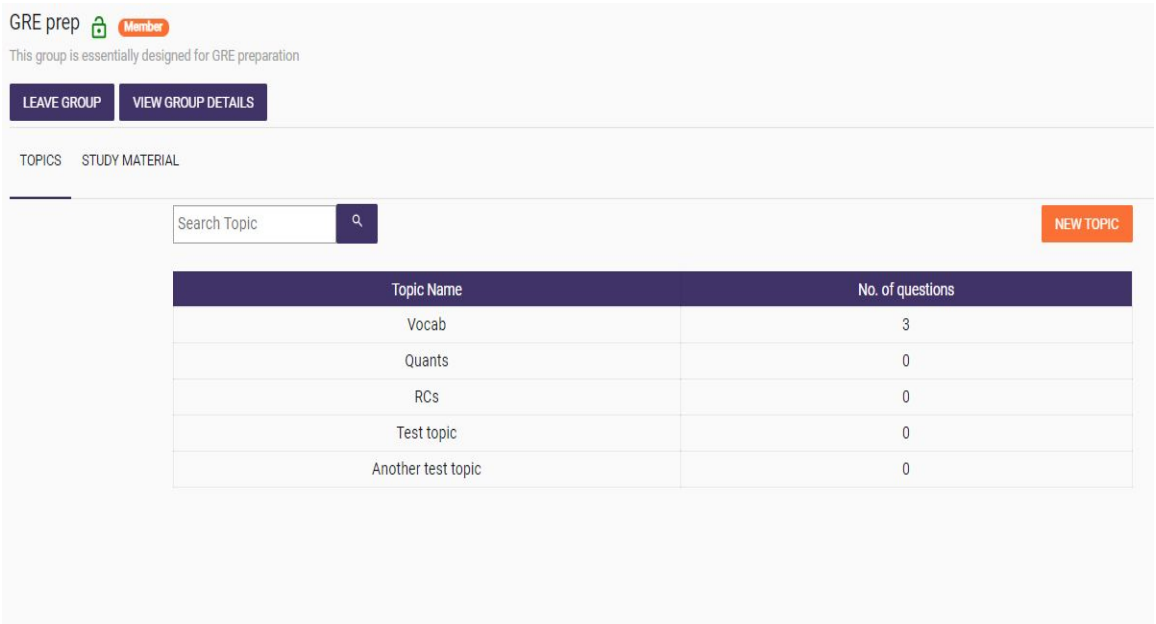


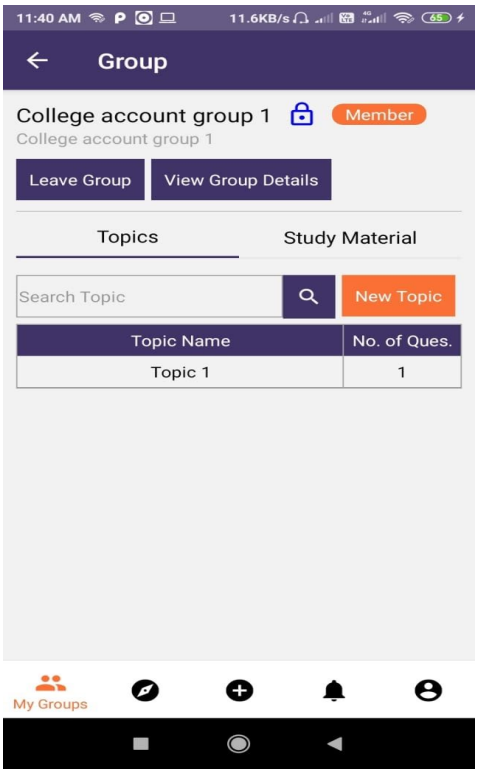
- Create Group




11:41 AM
20.7KB/s
Create Group
Group Name
Group Description
Select group type
Public
Private
Research
New Topic
Add
New Tag
Add
Create
Create Group

- Topics


GRE prep
Member
This group is essentially designed for GRE preparation
LEAVE GROUP
VIEW GROUP DETAILS
TOPICS
STUDY MATERIAL
Search Topic
NEW TOPIC
Topic Name
No. of questions
Vocab
3
Quants
0
RCs
0
Test topic
0
Another test topic
0

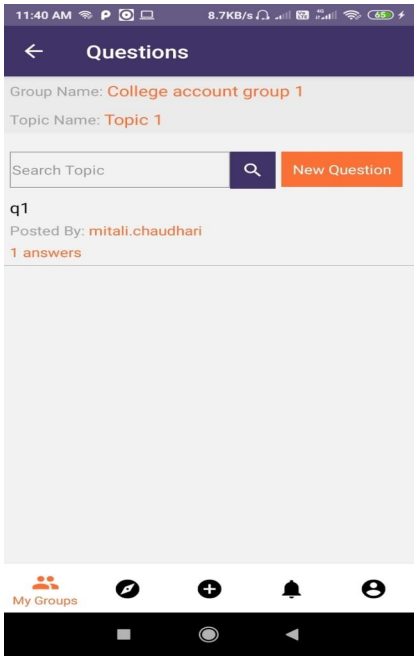


- Group Member Details

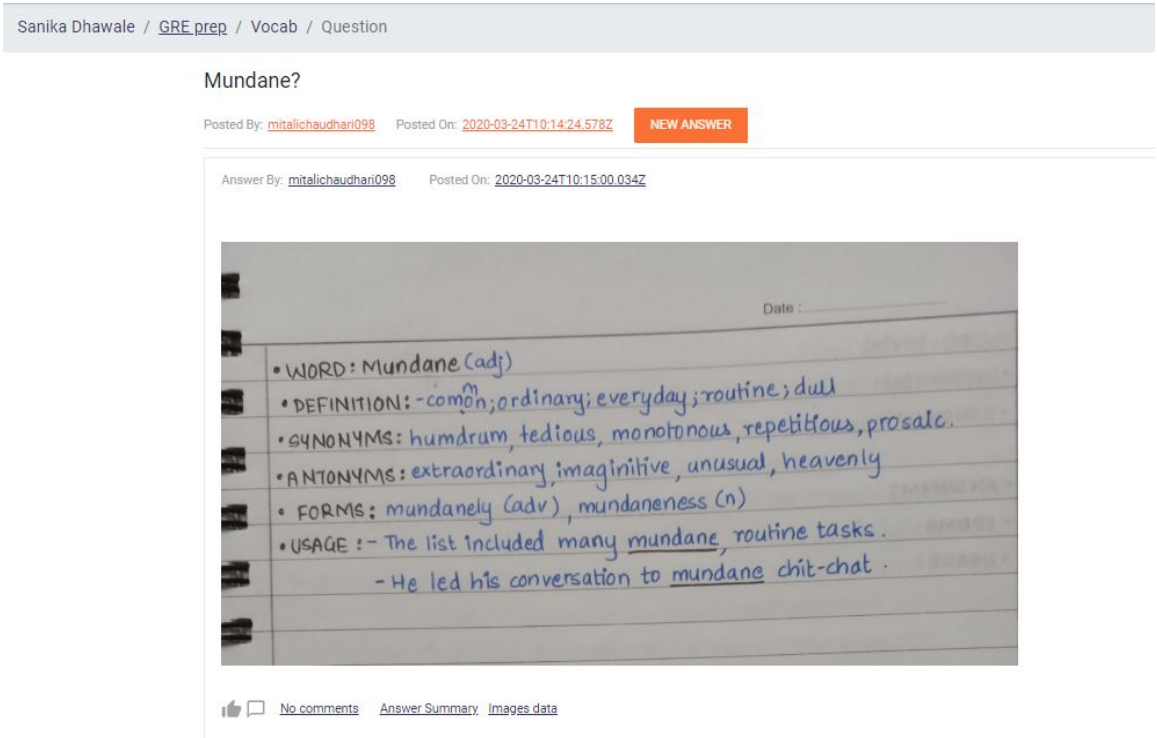
Group Member details:

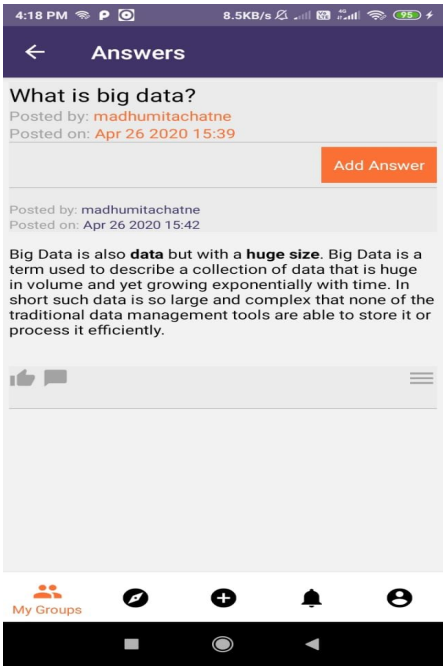
Username	Name	Badge
mitalichaudhari098	Mitali Chaudhari	Admin
shravani.gore	Shravani	Member
madhumita.chatne	Madhumita	Member
sanika.dhawale	Sanika Dhawale	Member

- Add question

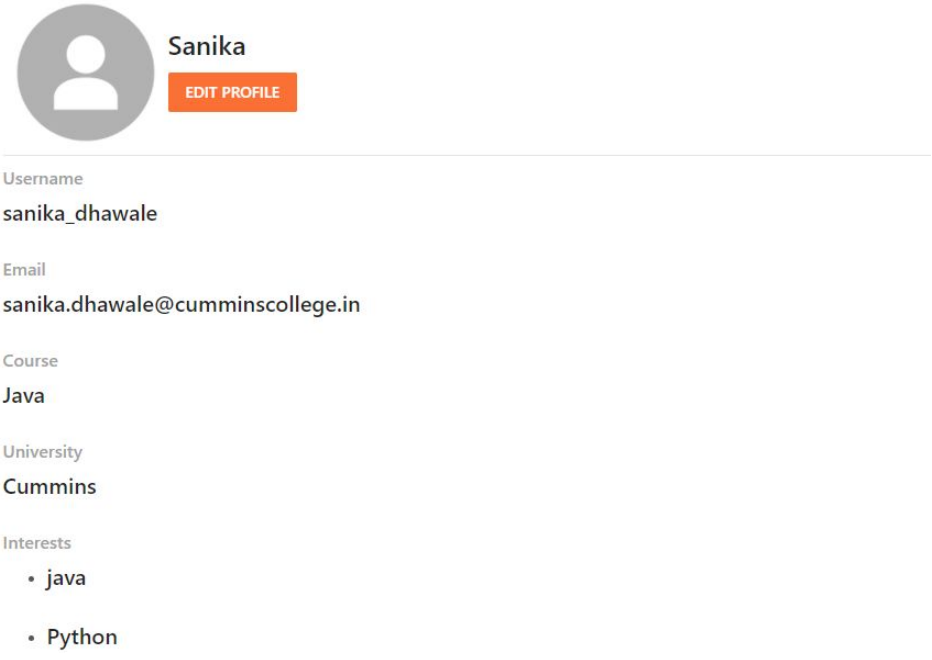


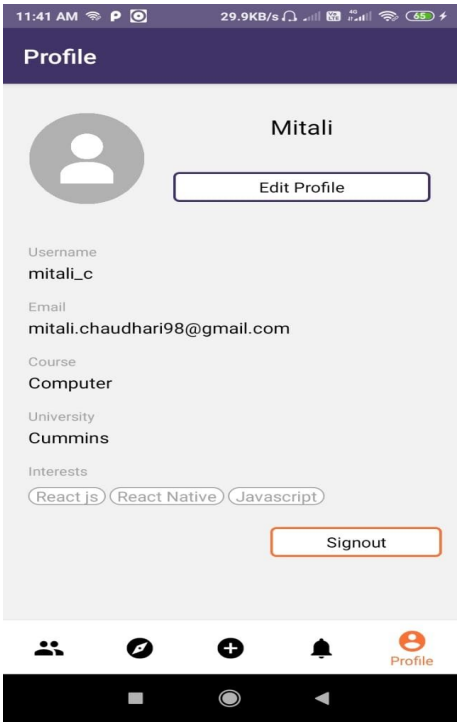
- Add Answers




4:18 PM
8.5KB/s
Answers
What is big data?
Posted by: madhumitachatne
Posted on: Apr 26 2020 15:39
Add Answer
Posted by: madhumitachatne
Posted on: Apr 26 2020 15:42
Big Data is also data but with a huge size. Big Data is a term used to describe a collection of data that is huge in volume and yet growing exponentially with time. In short such data is so large and complex that none of the traditional data management tools are able to store it or process it efficiently.
My Groups

- Profile


Sanika
EDIT PROFILE
Username
sanika_dhawale
Email
sanika.dhawale@cumminscollege.in
Course
Java
University
Cummins
Interests
java
Python


11:41 AM
29.9KB/s
Profile
Mitali
Edit Profile
Username
mitali_c
Email
mitali.chaudhari98@gmail.com
Course
Computer
University
Cummins
Interests
React js
React Native
Javascript
Signout
Profile

8. CONCLUSION AND FUTURE WORK

8.1 Conclusion

All the modules which have been mentioned in the report - Register(with Email verification), Login, Home Page, My Groups Page, Explore (Search module), Create Group, Add Topic, Add Questions, Add Answers, Add Comments, Add Likes, Add Study Material, Notifications, Profile, Edit Profile, Join Group, Invite members, Leave Group, Get Answer Summary, Text extraction from image, Blocking negative and harsh comments, Get Started (Page giving brief instructions as of how to use the application), FAQs Page, etc has been implemented successfully.

The web application has been deployed on Digital Ocean and is running successfully. All the functionalities for the Mobile app have also been implemented.

8.2 Future Work

The features which are currently being implemented can be enhanced in the future. The search which is being used to search groups, questions, specific topics, and answers can be improved for more effective results. The users can be recommended with the groups, topics, and information of their interests based on the information the user has previously interacted with.

8.3 Applications

The Co-Study Space web, as well as the mobile application, can be used by the students across all the fields of education, to collaborate and study efficiently. This application can be used by the students to study for a specific exam. This application can help them to share study material, solve personal doubts by posting questions and discuss various solutions. This application would not only help the students but also could be used by working professionals, research groups, etc. to collaborate and solve problems or work on their respective projects.

APPENDIX A

Plagiarism Report of project report

PLAGIARISM SCAN REPORT

Words	866	Date	April 26,2020
Characters	5725	Exclude Url	

0% Plagiarism	100% Unique	0 Plagiarized Sentences	54 Unique Sentences

PLAGIARISM SCAN REPORT

Words	899	Date	April 26,2020
Characters	5955	Exclude Url	

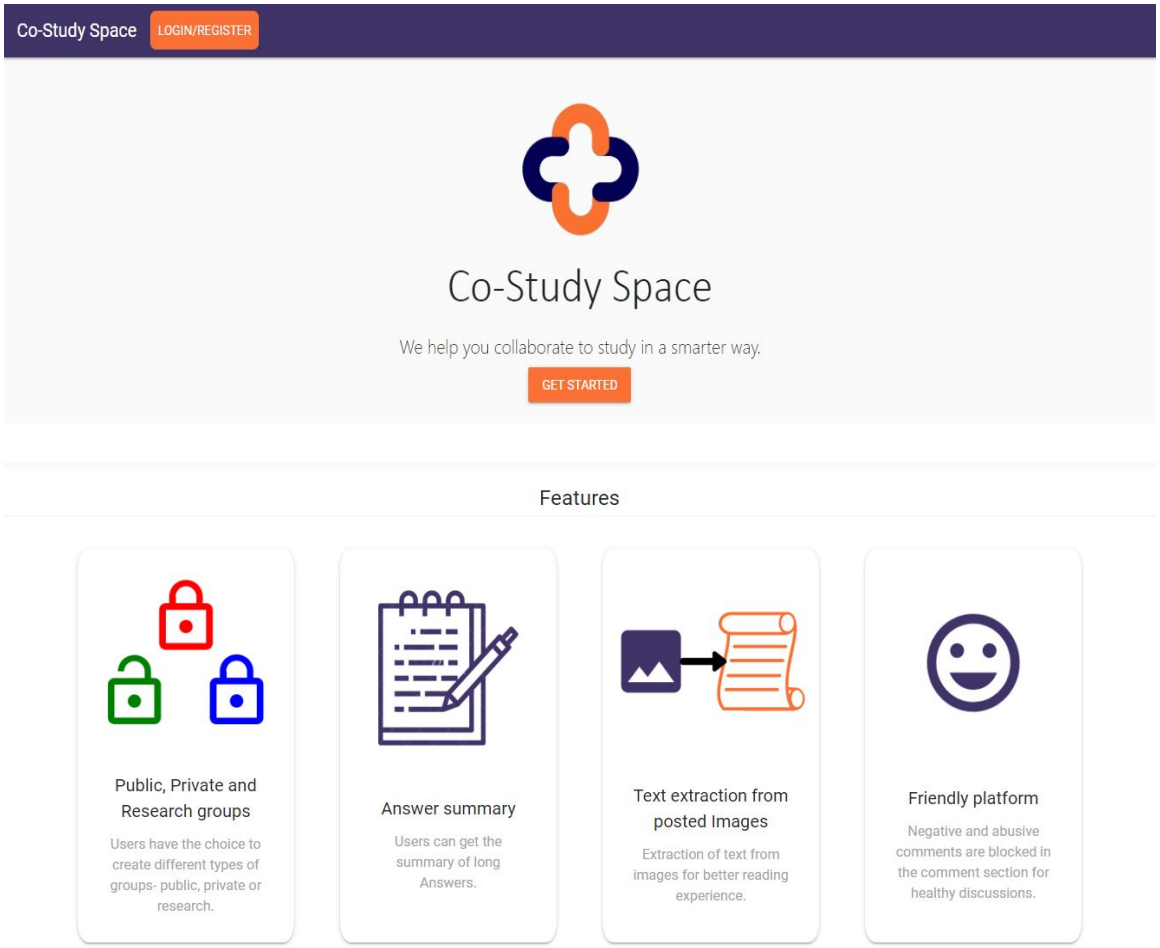
0% Plagiarism	100% Unique	0 Plagiarized Sentences	56 Unique Sentences

APPENDIX B : USER MANUAL

Co-study Space

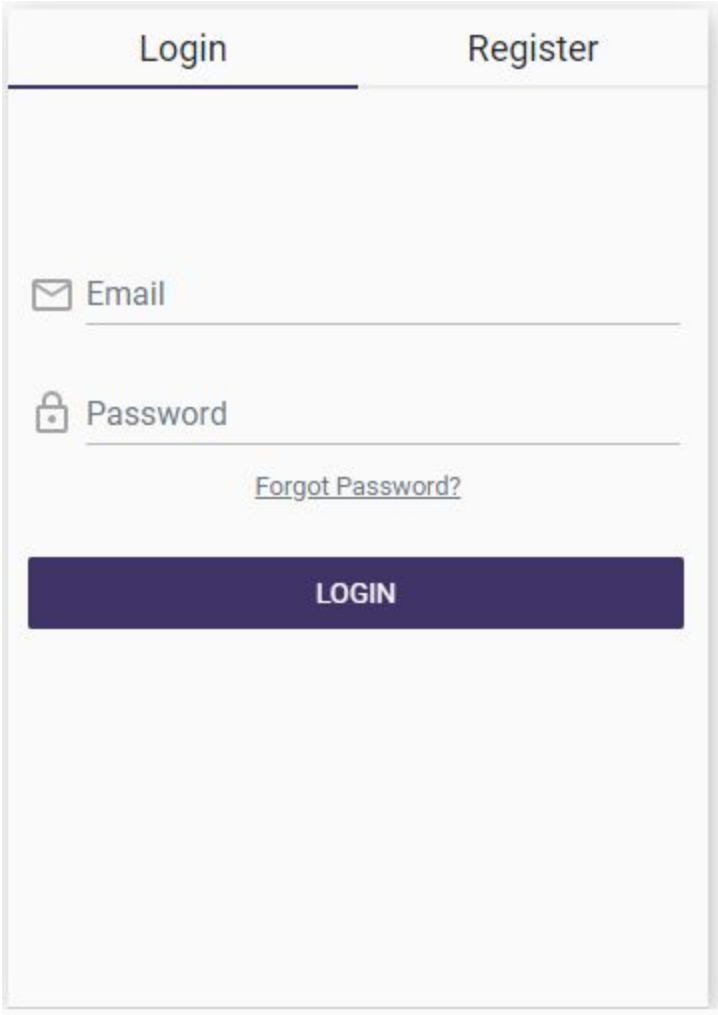
Web and Mobile Application User Guide

Home Page



This is the Landing Page of the website which you will see, once you go to the website url.

Login



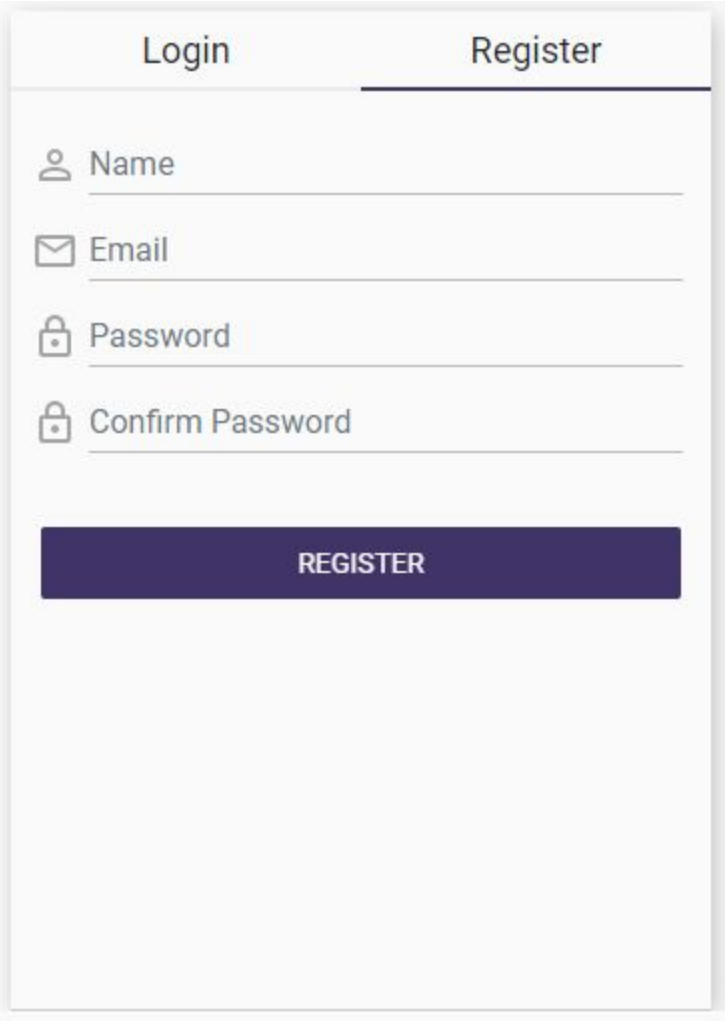
Login

Users who have previously registered for the Co-Study Web Application must login by:
Entering their **Username** .
Entering their **Password**.
Selecting **Login** to advance to the next screen and begin using the application.

Register
Users who have not previously registered for the Web Application must select “Register to use the site” to access the “Register” tab.

Forgot Password
If a user forgets his or her password, he or she must select “Forgot password ”for help.

Register



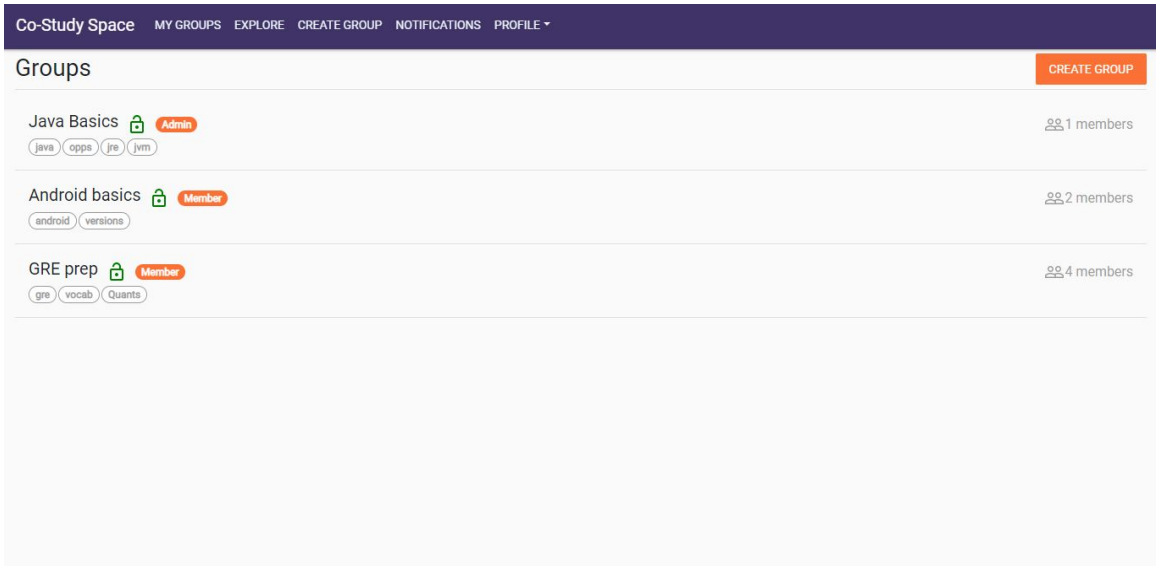
Register
Users will be asked to enter or select the following information (all items are required):

Name
Enter the name (Name should have at least 3 characters)

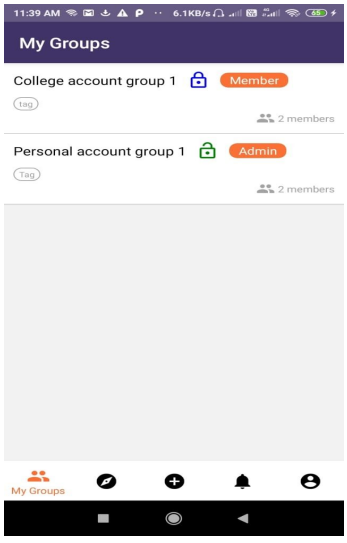
E-Mail
Enter the user's email address.
Password
Enter a password (Password should have at least one numeric value)
Confirm Password : Re-enter the same password, for confirmation.

My Groups

Web view



Mobile View

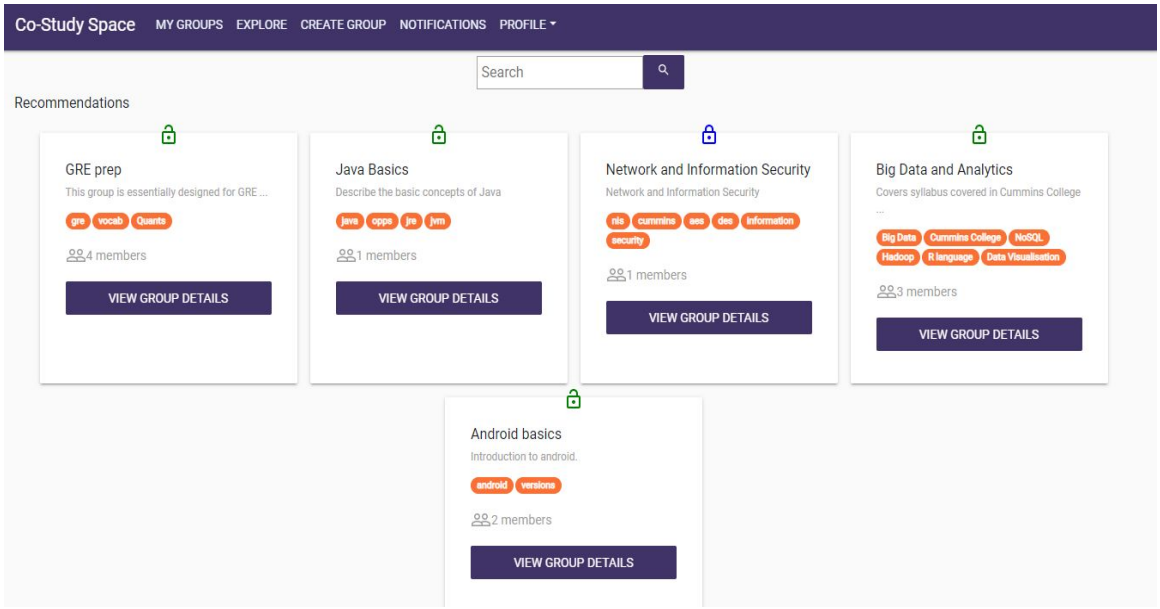


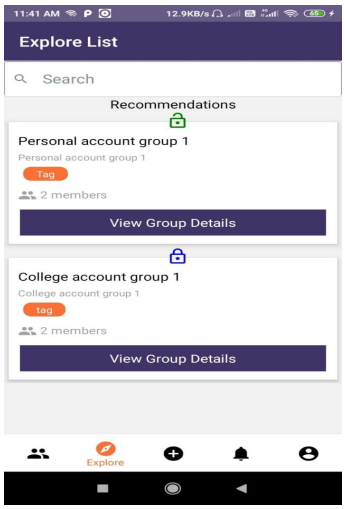
You will see the my-groups page once you Login or register, all the groups of which you are a part of will be displayed here.

Create Group Button
Create group button is present in the right corner, clicking which you are directed to the create group screen, where you can create a new group.

Explore

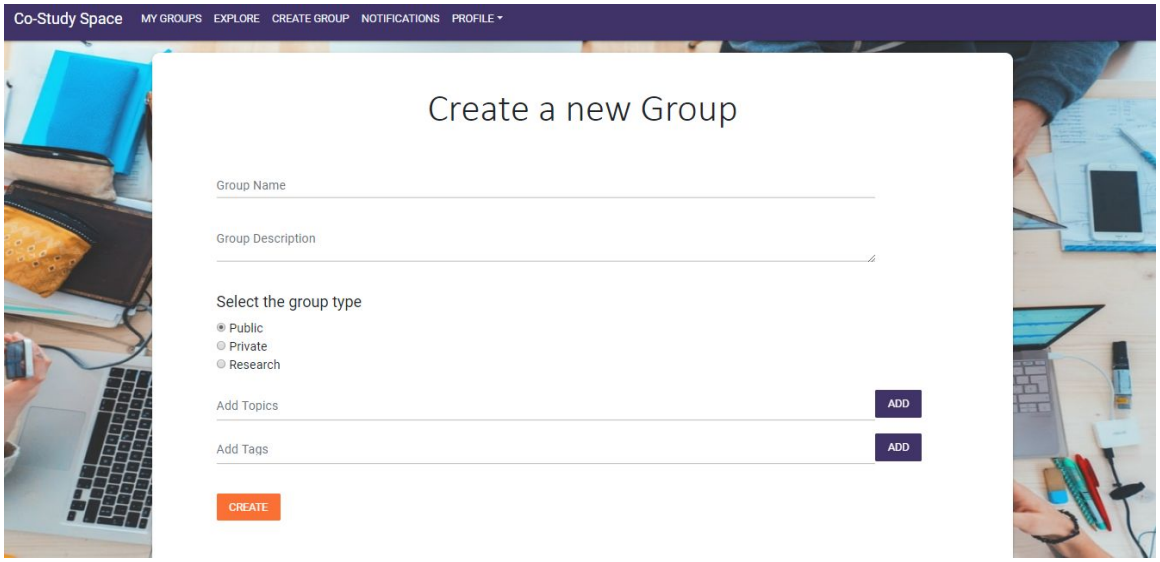
Web View and Mobile View



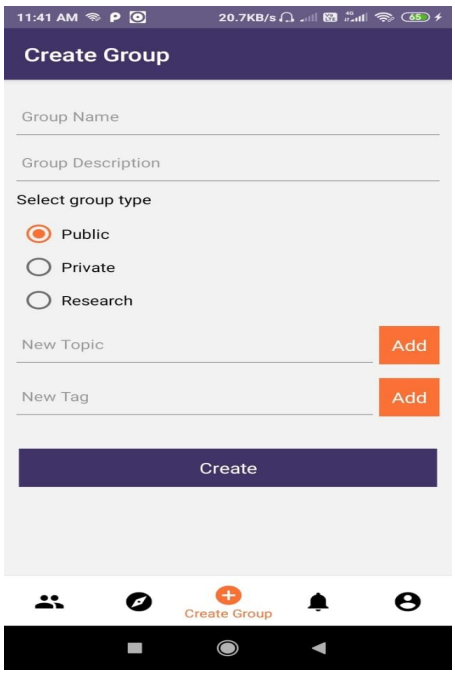


You could search the topics and groups of your interest using the search bar on the explore page. All the groups of your interest are displayed on the screen.

Create Group



Mobile View



Create group page will allow you to create a new group by filling the following fields (all the fields are compulsory)

Group Name
Enter a Group name related to the topic of your group.

Group Description
Enter the description about the group.

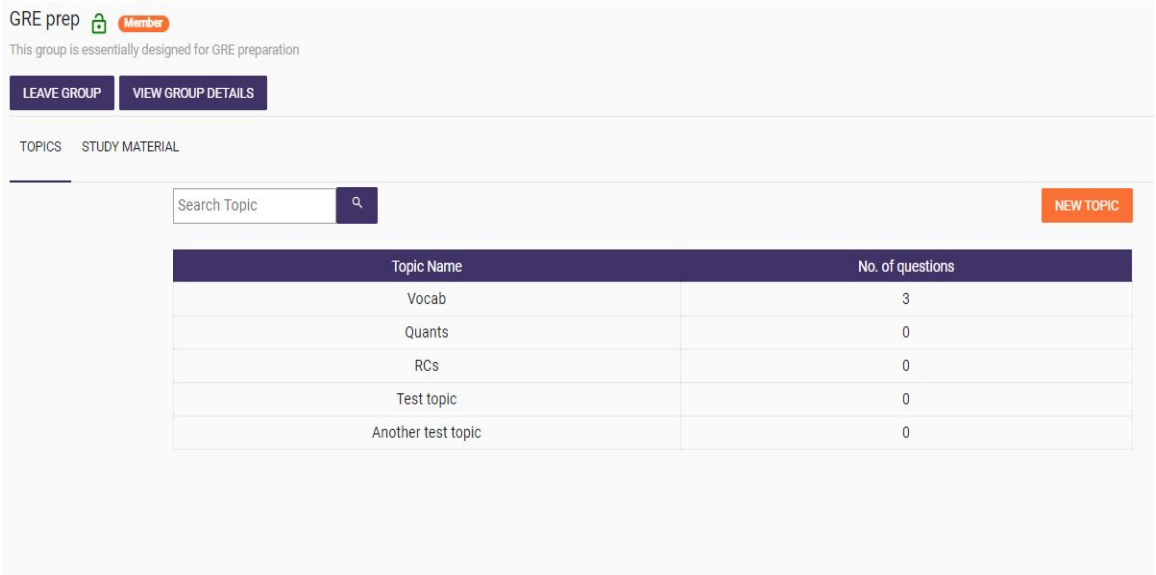
Select the group type
Select the type of the group you want to create- public, private, research.

Add Topics
Add the topics which you want in your group.

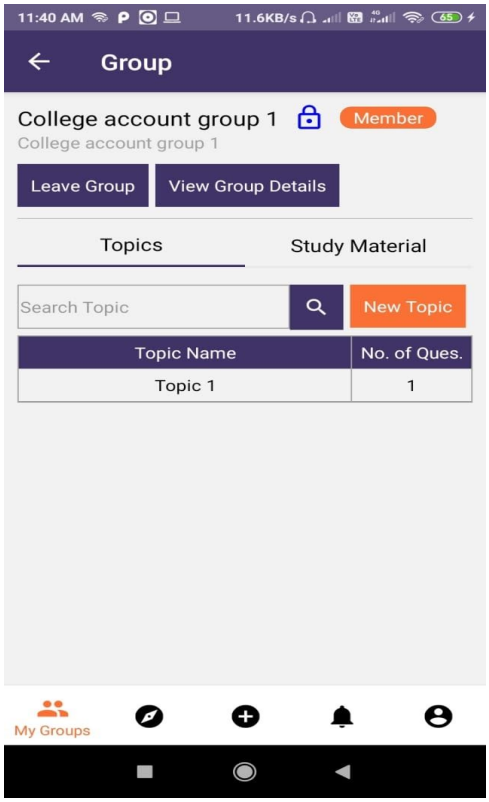
Add Tags
Add the tags related to your group topic, so that it becomes easier to search a specific topic or data related to it.

A Group

Web View



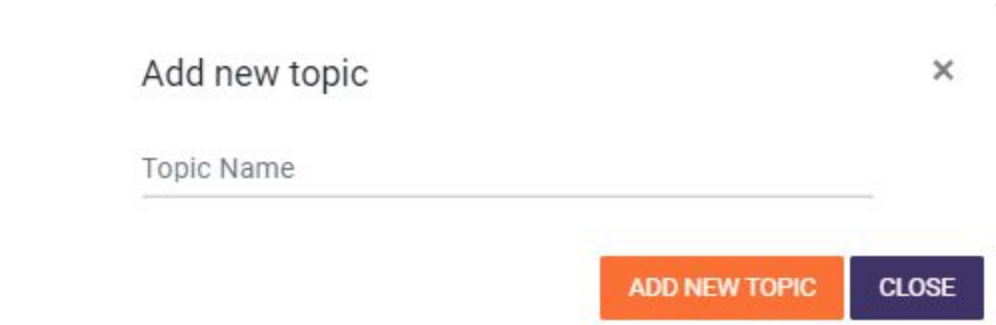
Mobile View



Topics Tab

Under the topics tab, all the topics in the group are listed, one can also search the topics using search bar.

- **New Topic Button**
  You can add a new topic using the ‘new topic’ button.Enter a topic name and click on ‘Add new Topic’.

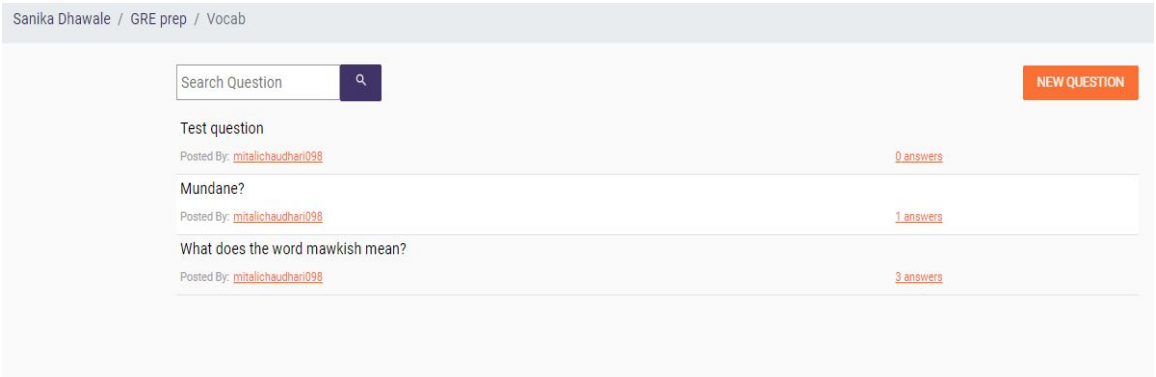


View Group Details:

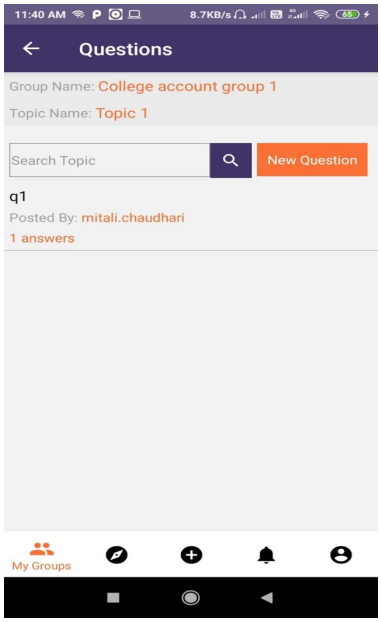
On clicking the 'View Group Details' Button the username, name and the badge of all the members of the group are displayed.

Add Question

Web View:

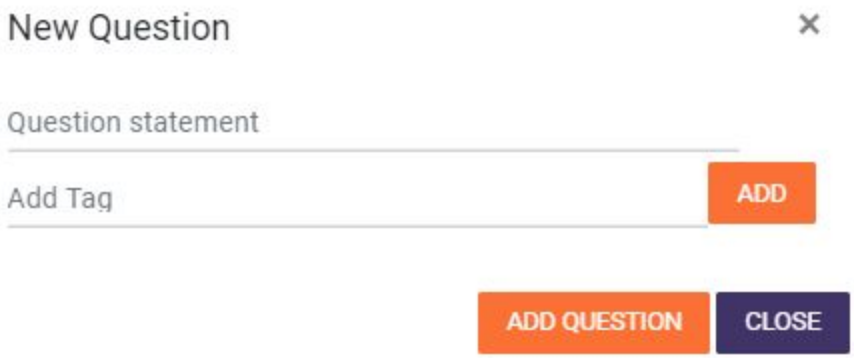


Mobile View:



Here all the questions in a particular topic are displayed, on clicking a question you can see all the answers which are posted. You can also search a specific question using the search bar.

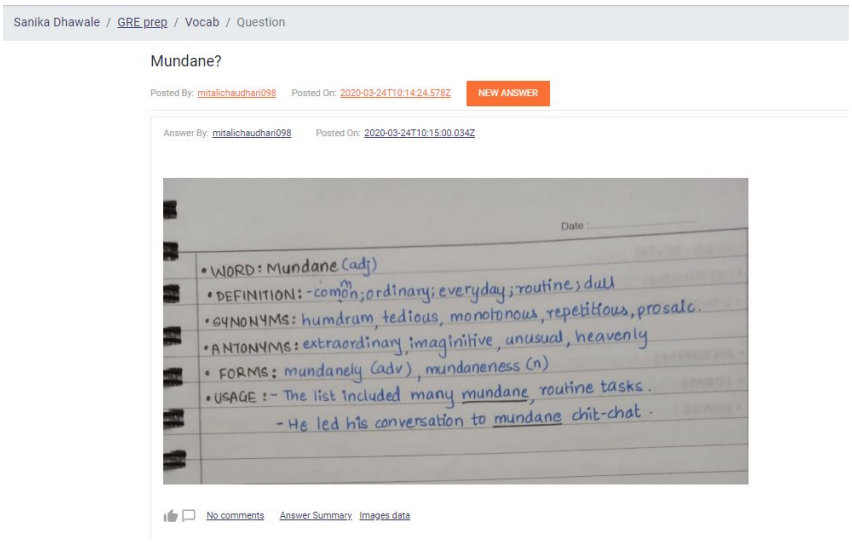
New Question Button



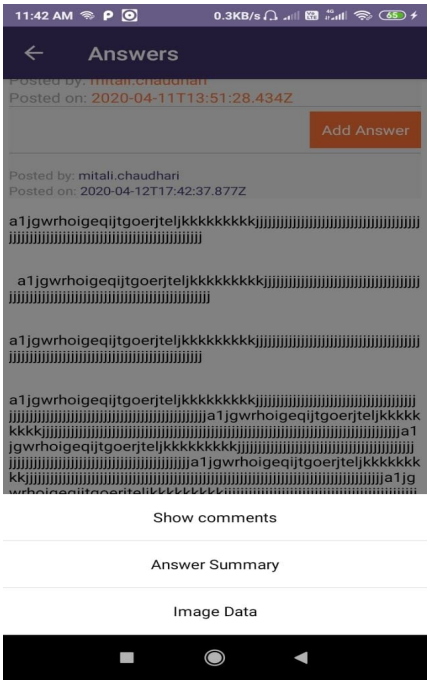
- You will see this window after clicking on the ‘New Question’ Button.
- You can add a Question statement and tags related to the Question statement and click on the ‘Add Question’ button and your question will be added.

Add Answer

Web View:

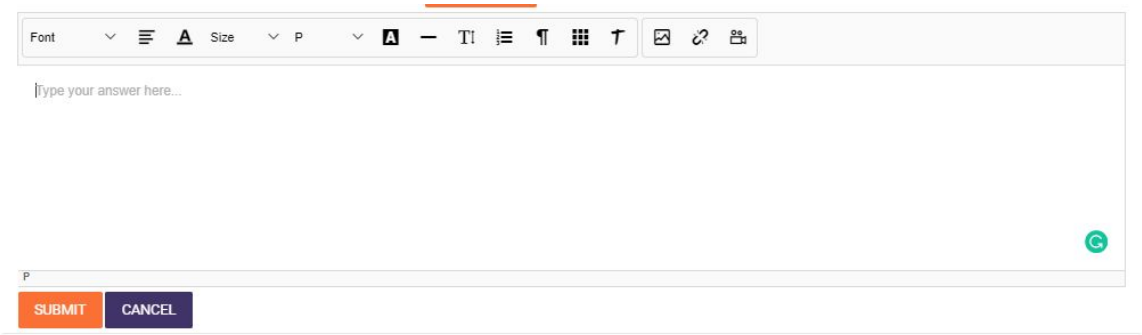


Mobile View:



New Answer Button

Clicking on the ‘New Answer’ button you will be directed to the following page



An Editor will appear where you can add text, images, etc.
On clicking the ‘Submit’ button the answer will be submitted.

Like Button
You can click the ‘Like’ button if you like the answer.

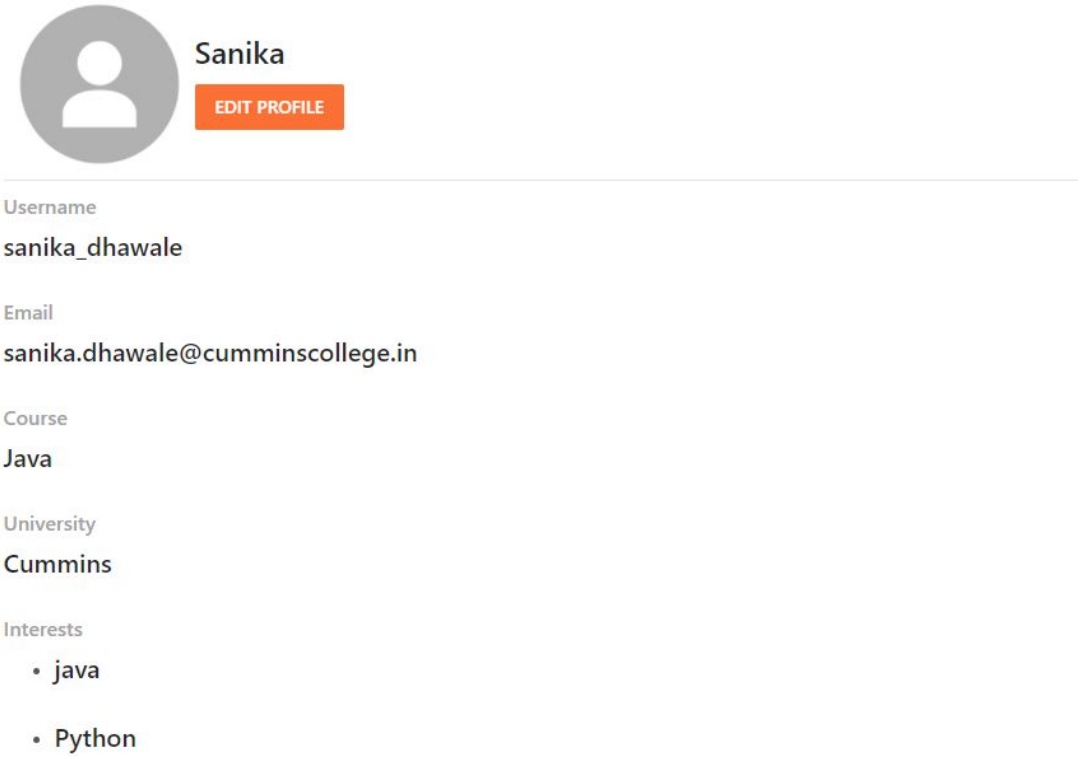
Comment Button
You can add a comment on clicking the Comment button.

Answer Summary
On clicking the ‘Answer Summary’ button, the summary of the answer will be displayed.

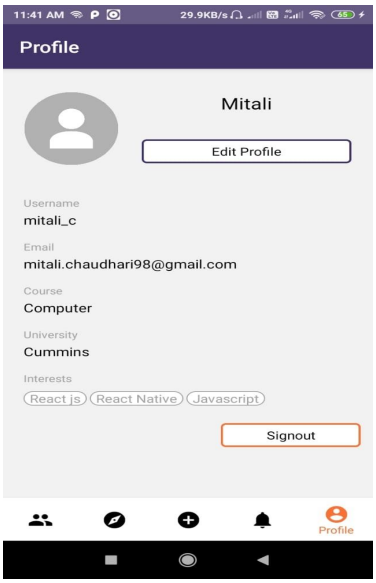
Image Data
On clicking the ‘Image Data’ button the data from the image will be extracted and displayed in the text format.

Profile

Web View



Mobile View



All the user's information is like username, Email, Course, University, Interests are displayed on this page, which can also be edited.

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