Final Year Project Report

Peer Connect

Project Team:

Vandina - 2012324

Sheetal - 2012318

Project Supervisor:

Mubeen Ahmed Khan

Date: 03 September, 2024

Submitted in the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science in the Faculty of Computing and Engineering Sciences

Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST) Karachi Campus

Plagiarism Free Certificate

This is to certify that the project titled “Peer Connect” has been completed and submitted by **Vandina** & **Sheetal**. The project work was carried out under the guidance of **Mubeen Ahmed khan** at SZABIST. We hereby declare that the content presented in this project report is original and has not been plagiarized from any source.

All sources and references used in the research and development of this project have been duly acknowledged. The project has been completed in accordance with the academic standards and ethical guidelines of SZABIST.

We confirm that this project is an original work and has not been submitted previously for any degree or diploma at any other university or institution.

Name of Advisor: **Mubeen Ahmed Khan**
Designation: Lecturer

Signature: _____

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Declaration of Authorship

We, Sheetal (2012318) and Vandina (2012324) declare that this report titled, "Peer Connect" and the work presented in it are our own. We confirm that:

This work was done wholly or mainly while in candidature for a bachelor's degree at this University.

Where any part of this report has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.

Where we have consulted the published work of others, this is always clearly attributed.

Where we have quoted from the work of others, the source is always given. With the exception of such quotations, this report is entirely our own work.

We have acknowledged all main sources of help.

Where the report is based on work done by us jointly with others, we have made clear exactly what was done by others and what we have contributed ourselves.

Signed: Vandina (2012324)

Sheetal (2012318)

Date: **03** September, 2024

Project Description

Peer Connect is an innovative online platform designed to transform the way students collaborate and engage in their academic journeys. Serving as a dedicated hub for peer-to-peer learning, Peer Connect enables students to connect with others studying similar subjects or courses, fostering an environment of collaborative learning and knowledge sharing.

One of the standout features of Peer Connect is its subject-based group matching system, which allows users to effortlessly find and join study groups tailored to their specific academic interests. The platform's intuitive interface makes it easy for students to create profiles, search for study partners, and initiate real-time study sessions through integrated virtual study rooms equipped with messaging and video capabilities.

In addition to connecting students, Peer Connect facilitates resource sharing, enabling users to exchange notes, practice materials, and other educational resources to enhance their learning experience. The platform promotes a sense of community, addressing the common feelings of isolation that students often encounter in their academic pursuits.

Furthermore, Peer Connect features secure messaging and user-friendly scheduling tools to streamline the process of coordinating study sessions, ensuring that students can connect and collaborate with ease.

The target audience for Peer Connect includes high school and university students seeking study partners, educators looking to facilitate group learning, and anyone interested in enhancing their academic experience through collaboration. The vision of Peer Connect is to make collaborative learning more accessible, engaging, and efficient, empowering students to achieve their academic goals with confidence. By bridging the gap between learners, the platform aims to redefine the educational experience in today's digital landscape.

Keywords: Online platform, collaborative learning, peer-to-peer connection, study groups, resource sharing, user-friendly interface, educational community.

Acknowledgement

In the name of the Almighty, the Most Gracious and Most Merciful, who has blessed us with the knowledge and courage to embark on this research endeavor.

I would first like to thank our Supervisor, **Mubeen Ahmed Khan** of the Computer Science faculty at Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology. The door to his office was always open whenever I ran into a trouble spot or had a question about my work or writing. He consistently helped, cooperated and motivated me throughout the research.

I also thank to our teachers who guided us in the light of their knowledge and experience. I would also like to express my gratitude to my loving parents and family members who helped and gave us encouragement. At the end, I would like to thank Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology for providing me such an inspiring environment. The quality education, the cooperative faculty members and the challenging environment have always motivated and boosted the confidence level of each and every student who has been a part of Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology. And many thanks to all those who let us share their knowledge and resources.

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Supervisor

Mubeen Ahmed Khan

Submitted by

Vandina

2012324

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2012318

Faculty of Computing and Engineering Sciences

Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology, Karachi.

1. Introduction

In response to the evolving needs of modern education, we propose the development of a comprehensive web application that effortlessly connects students studying similar subjects or courses. This platform will serve as a hub for collaborative learning, facilitating group study sessions, real-time interactions, and knowledge sharing. By harnessing the power of technology, this application aims to transform the way students engage with their studies and with each other.

2. Objective

The objective of "Peer Connect" is to create an inclusive online collaborative learning platform where students can connect, form study groups, engage in interactive study sessions, share educational resources, effectively manage study sessions, and participate in subject-specific academic discussions. By fostering a sense of community and knowledge sharing, "Peer Connect" aims to empower students in their educational journeys, providing them with a user-focused and enriching learning experience that excels the limitations of traditional and online education.

3. Problem Description

While there are existing tools like video conferencing platforms, the crux of the issue persists, the lack of tailored features for educational collaboration. General-purpose platforms fall short of providing the dedicated functionality required for academic interactions. Our project aims to differentiate itself by offering a dedicated space designed exclusively for students engaged in similar subjects, recognizing that learning is most effective when contextualized within the subject matter.

Moreover, students often experience a sense of isolation, find it challenging to form study groups, struggle to access valuable learning resources, and may feel disconnected from their peers and the broader academic community. These issues are aggravated when students attempt to navigate complex course materials independently. "Peer Connect" addresses these challenges comprehensively.

4. Methodology

Our project methodology outlines a systematic approach to developing the "Peer Connect" collaborative learning platform. The following phases detail the key activities we will undertake:

Requirements Analysis and Planning:

We will engage in thorough discussions with potential users to gather comprehensive requirements. This will help us define the scope of the platform, including subject-based group matching and real-time communication features.

Technology Selection:

Based on the project's requirements, we will select appropriate technologies. Our frontend will be developed using HTML, CSS, JavaScript, React js. For the backend, we will use Python for matching algorithms, Node.js, and MongoDB for robust data management, authentication, and security.

We will integrate third party services to enable live virtual study sessions with video and audio capabilities.

Algorithm Implementation:

We will be using a filtering algorithm based on database retrieval. This approach allows to efficiently match students based on criteria such as similar courses, shared subjects of interest, and study preferences. It is a straightforward and effective way to connect students with potential study partners or groups.

Design and UI/UX:

We will design wireframes and prototypes for the user interface. The user experience will be seamless, allowing users to navigate effortlessly and engage in meaningful interactions.

Testing and Optimization:

We will thoroughly assess the application for usability, performance, and security.

We will conduct unit testing to verify individual components, integration testing to validate interactions, and user acceptance testing to ensure a smooth user experience. Compatibility with various devices and browsers will be validated.

Deployment and Launch:

Upon successful testing, we will deploy the platform on a reliable hosting service, ensuring scalability and performance. The platform will be launched, allowing users to access its features and initiate collaborative learning interactions.

Continuous Improvement:

We recognize the importance of user feedback. We will actively gather feedback and suggestions from users to identify areas for enhancement.

5. Project Scope

The scope of the "Peer Connect" collaborative learning platform encompasses diverse range of interactive features tailored to enhance students' academic journey. This includes subject-based group matching, enabling students to create profiles and connect with peers sharing similar subjects. Real-time collaboration is integral, with virtual study rooms equipped with chat and collaborative tools to facilitate engaging study sessions. Additionally, students can share resources, notes, and practice materials to enrich their learning experiences. The platform aims to create a holistic and dynamic environment where students can seamlessly collaborate, exchange knowledge, and foster a supportive learning community.

6. Feasibility Study

The feasibility study critically examines the viability of the "Peer Connect" collaborative learning platform, including risk assessment and resource evaluation.

6.1 Risks Involved:

Identified risks include potential inaccuracies in user profiles affecting effective group matching, technical challenges during real-time communication, and potential low user engagement. To ease these risks, rigorous testing will be conducted, and user feedback loops will be established to address any emerging issues promptly.

6.2 Resource Requirements:

The project requires computing resources, require access to web hosting, development tools, and relevant APIs and libraries to build and deploy the platform.

7. Solution Application Areas

Our platform offers a versatile solution with applications across various educational settings, facilitating enhanced learning experiences and academic success:

Remote Learning:

With the growing popularity of remote and online learning, the platform bridges geographical barriers by enabling students from various locations to connect, study together, and exchange insights.

Research Collaborations:

Researchers can utilize the platform to collaborate on research projects, exchange academic resources, and engage in constructive discussions to further their studies.

Exam Preparation:

Platform serves as a valuable tool for students preparing for several types of exams by discussing difficult concepts and quiz each other on relevant topics.

Find Study Partners with Similar Goals:

Studying with like-minded peers fosters a sense of fellowship and shared determination to succeed.

8. Tools/Technology

Frontend: JavaScript, HTML5, CSS3, React.js

Backend: MongoDB (NoSQL), Node.js with Express.js

Real-Time Communication: WebRTC

HW: PC, mobile, camera

SW: Visual Studio Code

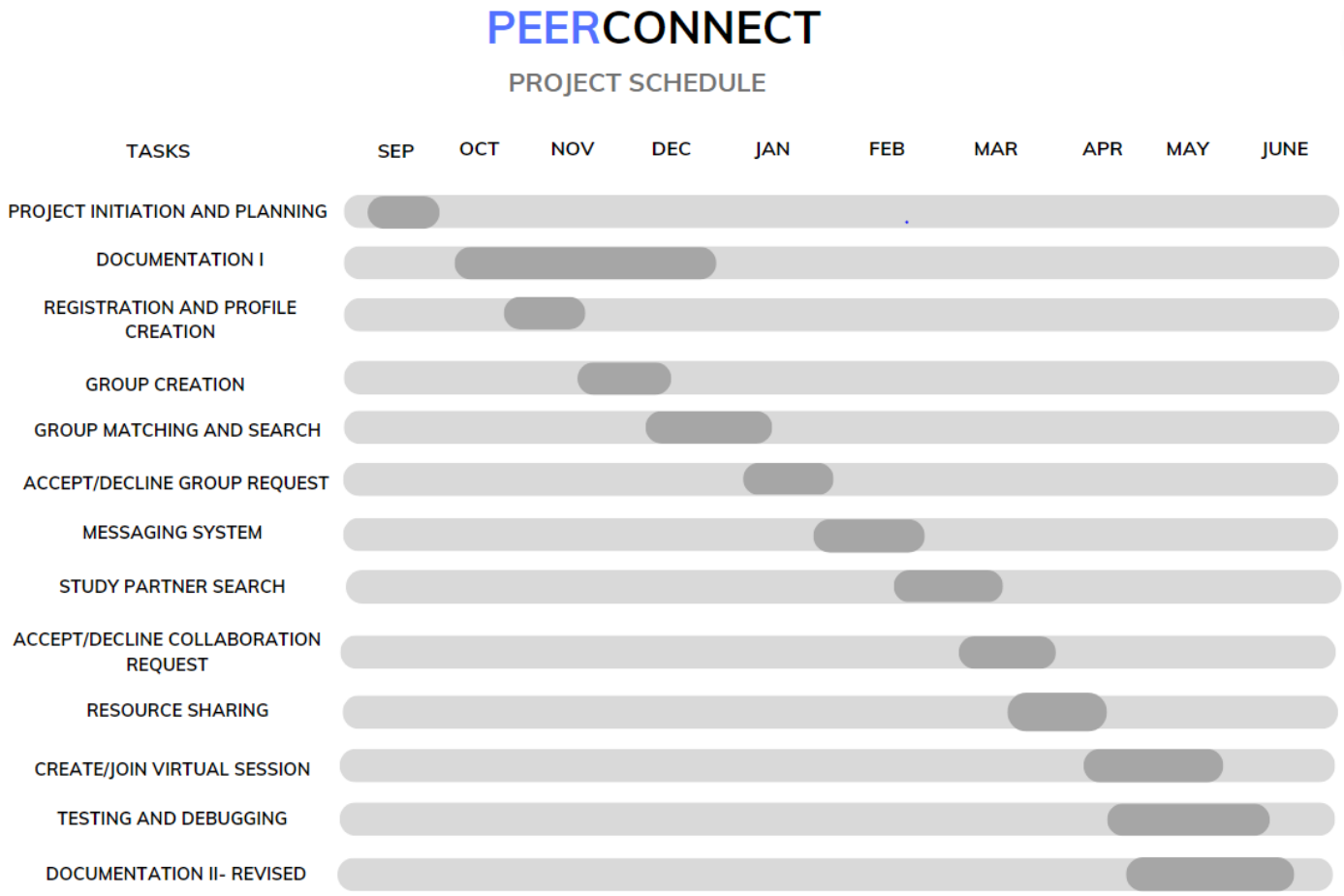
9. Expertise of the Team Members

Our team behind the "Peer Connect" project brings a diverse set of skills to the table. With expertise in UI/UX design, basic web development, and good programming backgrounds, we are well-prepared to tackle the complex challenges of this project. Our collective skills ensure that we can create an intuitive and efficient platform for collaborative learning, enhancing the educational experience for students. Furthermore, our ability to communicate and collaborate effectively ensures seamless teamwork and project management throughout the development process. Together, we are dedicated to delivering a user-friendly platform that fosters collaborative learning and knowledge sharing among students.

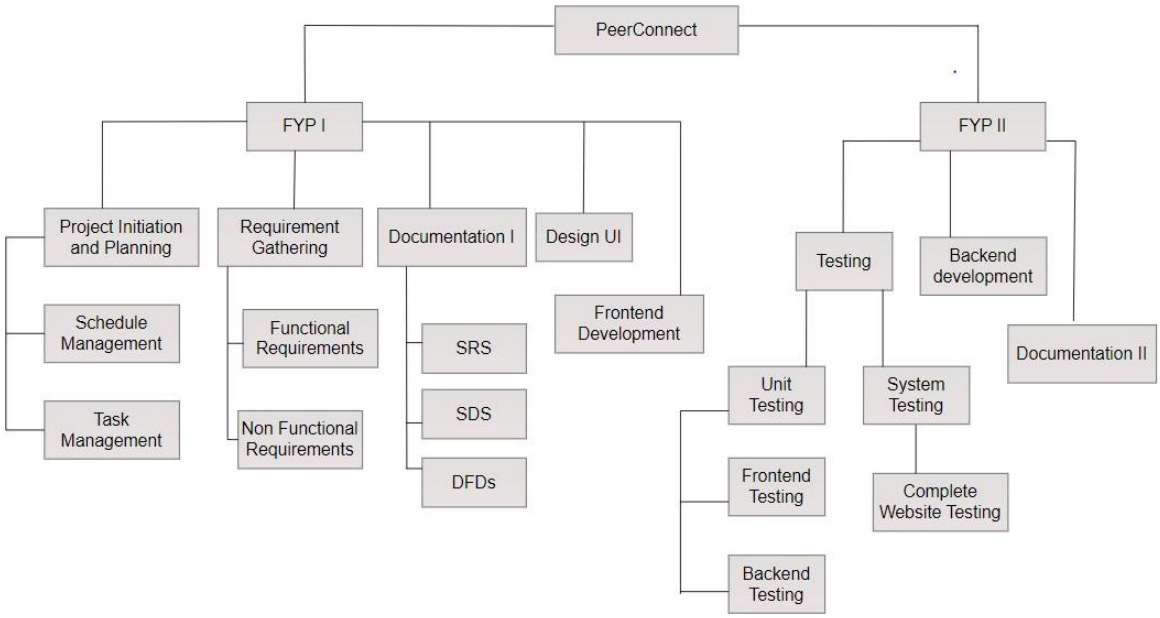
10. Milestones

1. Project Initiation and Planning
2. Project setup and documentation
3. User registration and Profile creation
4. Group creation
5. Group matching
6. Study partner search
7. Accept/Decline requests
8. Messaging system
9. Virtual study rooms
10. Resource sharing
11. Testing and Debugging
12. Deployment and launch

11 .Project Schedule



12. Work Breakdown Structure



13. References

MySQL: https://dev.mysql.com/doc/

Socket.IO: https://socket.io/docs/v4

Mozilla Developer Network (MDN) for JavaScript: https://developer.mozilla.org/en-US/docs/Learn/JavaScript

Stack Overflow: https://stackoverflow.com/

W3Schools for Python: https://www.w3schools.com/python/default.asp

Frontend Masters (Frontend Development Learning Platform): https://frontendmasters.com/

DevDocs.io for React: https://devdocs.io/react

Books:

"Database Systems: Design, Implementation, and Management" by Carlos Coronel.

"Web Development with HTML, CSS, and JavaScript" by Jon Duckett

Software Requirements Specification

for

Peer Connect Web Application

Version 1.0 approved.

Prepared by

1.Vandina (2012324)

2.Sheetal (2012318)

SZABIST

07 Nov 20223

1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) document describes the requirements for developing a collaborative learning web application. This web application, named as Peer Connect aims to connect students studying similar subjects or courses by providing a platform for collaborative learning, group study sessions, knowledge, and resource sharing, enhancing the overall educational experience. This document covers the entire system.

1.2 Document Conventions

In this section the writing format of our document is Arial font style eleven for regular texts and Times font style fourteen for subheadings and Time font style eighteen for main headings.

1.3 Intended Audience and Reading Suggestions

This document is intended for the various contributors involved in the development and management of our application PeerConnect. The audience includes following:

Developers: To understand the technical specifications and implementation details.
Project Manager: Oversee project planning and resource allocation.
Designer: To ensure the user interface meets design expectations.
Tester: To get test cases and check whether the software meets certain requirements.
Documentation Writers: To create client manuals and guides.
Marketing and Sales Staff: To understand the features and benefits for promotional purposes.

The document is organized as follows:

Section 1 provides an introduction to the document's purpose and organization.
Section 2 details the overall product description, scope, objectives, and goals.
Section 3 contains a list of references to other related documents.
Section 4 set out the functional and non-functional requirements in detail.

Readers are encouraged to start with Section 1 and then move on to the sections most relevant to their roles and responsibilities.

1.4 Product Scope

Peer Connect is a collaborative learning web application that aims to create a virtual learning community where users can team up, collaborate, and enhance their academic experiences. This application incorporates a wide range of interactive features custom fitted to excel students' academic journey focusing on subject-based group matching and partner search. It enables students to create profiles and connect with peers sharing similar subjects and study preferences. Real-time collaboration is integral, with virtual study rooms equipped with chat and collaborative tools to facilitate engaging study sessions. Additionally, students can share useful resources, notes, and practice materials to make their learning experiences more engaging. The purpose of this platform

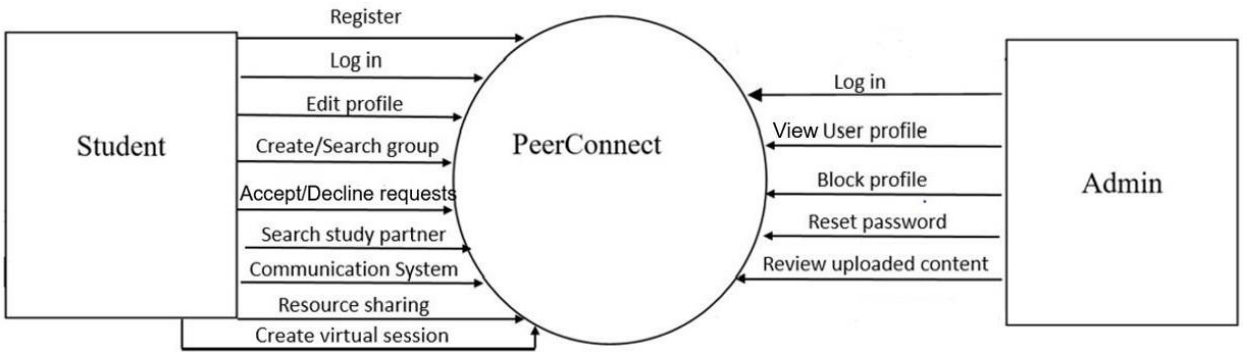
is to create a holistic and dynamic environment where students can effortlessly collaborate, trade knowledge, and cultivate a supportive learning community.

1.5 References

https://ieeexplore.ieee.org/document/278253

2. Overall Description

2.1 Product Perspective



2.2 Product Functions

The core functions of the collaborative learning web application include:

Student Features:

- Registration
- Login/logout
- Profile editing
- Create group
- Search for groups to join
- Accept/Decline group request
- Search for study partners
- Accepting/Declining collaboration requests
- Messaging system
- Resource sharing
- Creating and joining virtual study session

Admin Features:

- Admin login/logout
- Viewing and managing user profiles
- User blocking/unblocking

2.3 User Classes and Characteristics

There are two primary user classes:

Students:

- Differ in educational levels.
- May have different abilities and skills.
- Diverse study preferences and subjects.
- Look for learning opportunities and resources.

Administrators:

- Admins with appropriate permissions responsible for platform management.
- Require the ability to monitor user-created content.
- Manage study groups and user profiles.

2.4 Operating Environment

- Web-Based Application: PeerConnect is a web-based platform accessible through standard web browsers.
- Cross-Platform Compatibility: this application is designed to be compatible with multiple operating systems.
- Compatibility with Web Browsers: PeerConnect is compatible with commonly used web browsers, including Google Chrome, Apple Safari, Microsoft Edge.
- Reliable Internet Access: To use PeerConnect effectively, users need a stable internet connection.

2.5 Design and Implementation Constraints

No, there were no limitations regarding the language specification, or any other sort of constraints set by the users.

2.6 User Documentation

The documents provided along with this project will be.

SRS (Software Requirement Specifications)

SDS (Software Defined Storage)

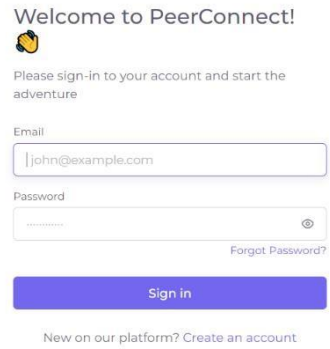
STD (Software Test Description)

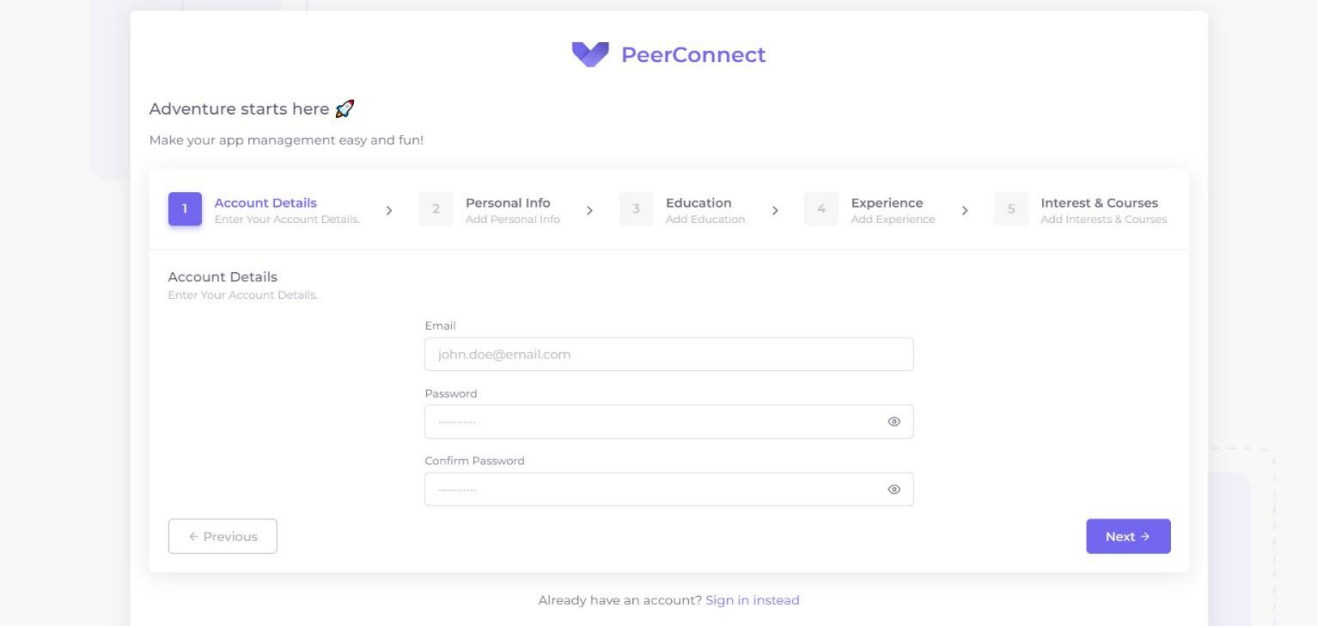
2.7 Assumptions and Dependencies

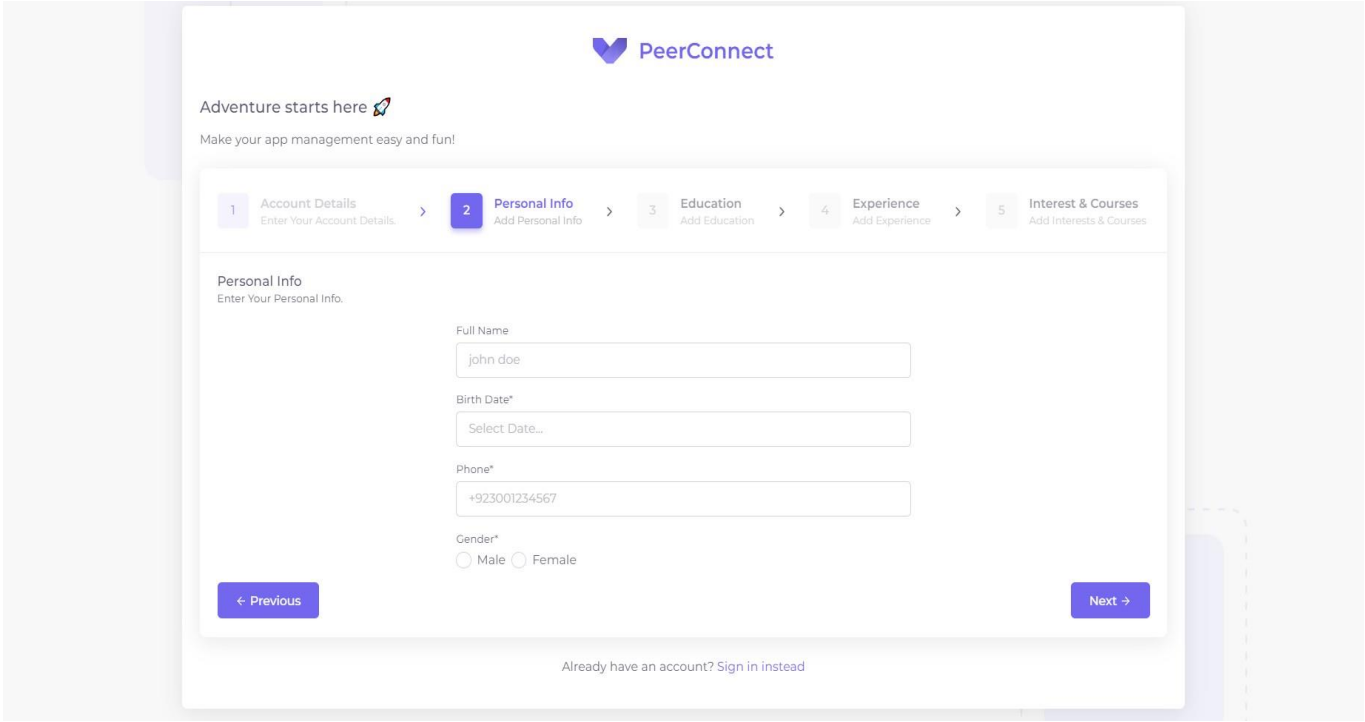
Users should have a desktop computer or laptop and stable internet connection to run the website.

3. External Interface Requirements

3.1 User Interfaces






PeerConnect
Adventure starts here
Make your app management easy and fun!
1 Account Details Enter Your Account Details.
2 Personal Info Add Personal Info
3 Education Add Education
4 Experience Add Experience
5 Interest & Courses Add Interests & Courses
Personal Info
Enter Your Personal Info.
Full Name
john doe
Birth Date*
Select Date...
Phone*
+923001234567
Gender*
Male
Female
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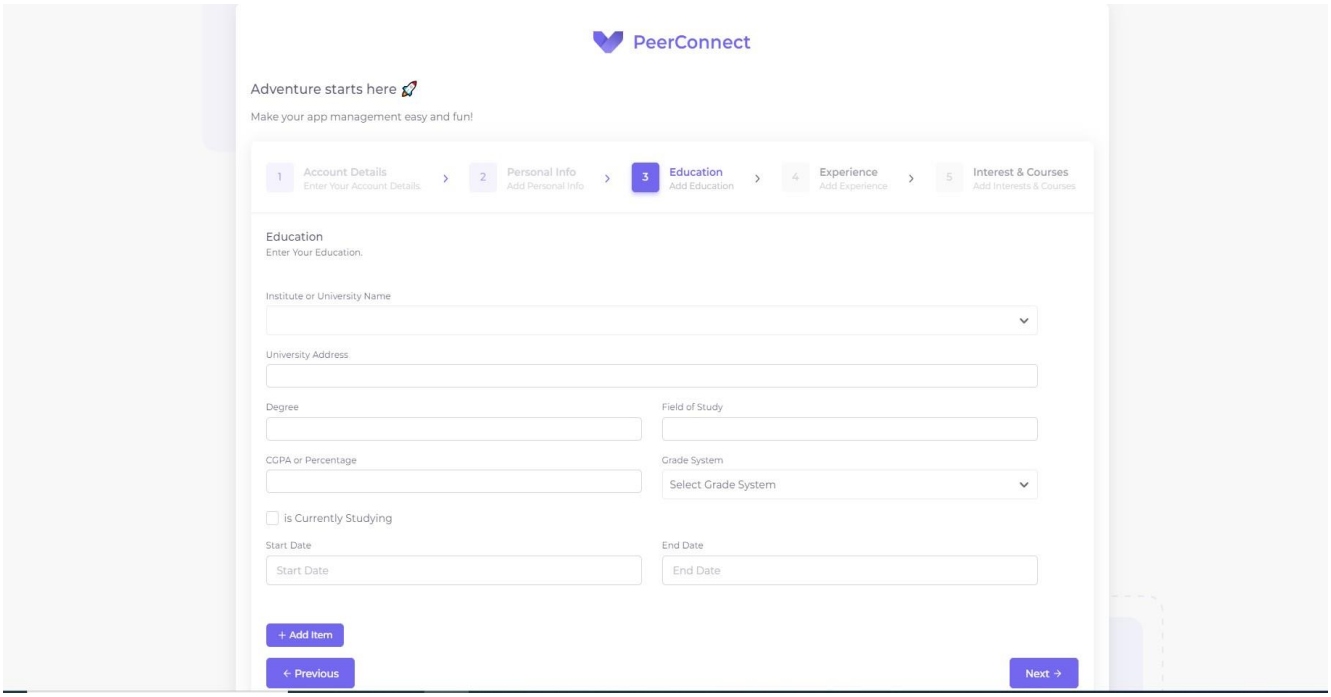
Next →
Already have an account? Sign in instead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2 Personal Info Add Personal Info
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4 Experience Add Experience
5 Interest & Courses Add Interests & Courses
Education
Enter Your Education.
Institute or University Name
University Address
Degree
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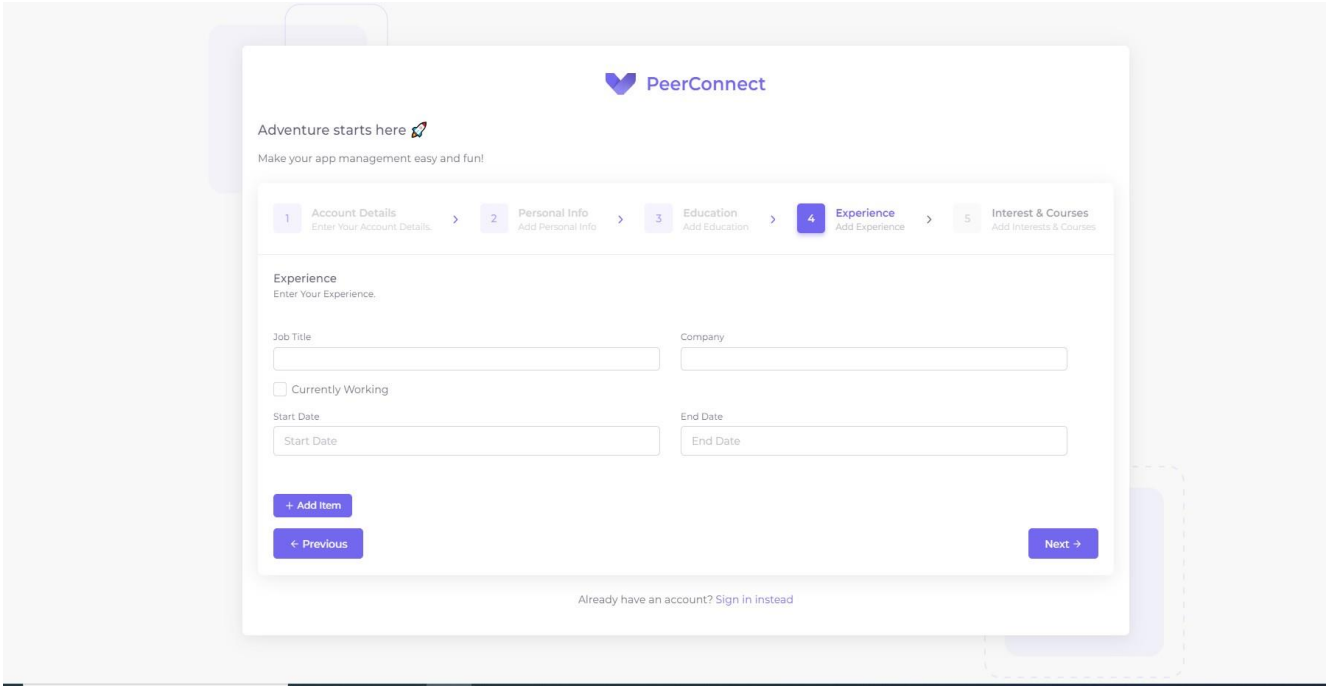
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2 Personal Info Add Personal Info
3 Education Add Education
4 Experience Add Experience
5 Interest & Courses Add Interests & Courses
Experience
Enter Your Experience
Job Title
Company
Currently Working
Start Date
End Date
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End Date
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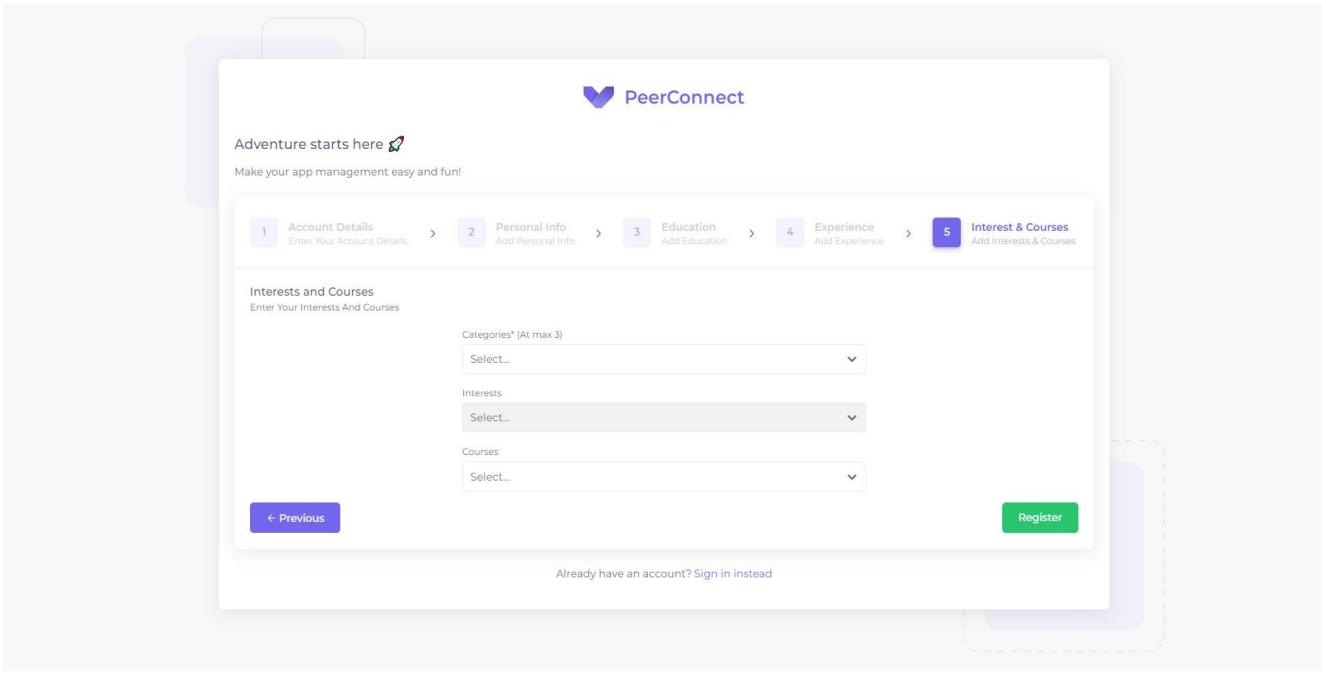
Already have an account? Sign in instead


PeerConnect
Adventure starts here
Make your app management easy and fun!
1 Account Details Enter Your Account Details
2 Personal Info Add Personal Info
3 Education Add Education
4 Experience Add Experience
5 Interest & Courses Add Interests & Courses
Interests and Courses
Enter Your Interests And Courses
Categories* (At max 3)
Select...
Interests
Select...
Courses
Select...
← Previous
Register
Already have an account? Sign in instead

3.2 Hardware Interfaces

Only requires a PC or laptop with browser and stable internet connection.

3.3 Software Interfaces

MongoDB: MongoDB is a scalable NoSQL database, storing data in flexible BSON documents. It's widely used for handling large volumes of unstructured or semi-structured data, particularly in web applications.

Node.js: Node.js is a server-side JavaScript runtime, leveraging the Chrome V8 engine, designed for building scalable and efficient network applications, making it popular for server-side scripting and real-time applications.

JavaScript: It allows web developers to add interactivity and dynamic behavior to websites and is supported by all major browsers.

React js: React.js is a JavaScript library for building user interfaces, known for its component-based architecture, facilitating the creation of interactive UI elements in web applications.

3.4 Communications Interfaces

A good internet connection is required to run this project.

4. System Features

4.1 Use Case - 1

<table>
<tr><td colspan="2">Use case name: Student Registration</td></tr>
<tr><td colspan="2">Summary: This is used to create profile.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: Valid information is entered.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Enter first name, last name, email, password, confirm password, domain, interested subject, university.</td><td>2. The system validates the information that the student entered.</td></tr>
<tr><td></td><td>3. Student profile created and stored in the database</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">2(a)- If all fields are empty, the system shows a “Required” message.
2(b)- If the information that the student entered is not correct then the system shows the message for invalid information.
2(c)- If the password and confirmation password do not match then the system shows the message for unmatched password.</td></tr>
<tr><td colspan="2">Post condition: Account is created.</td></tr>
<tr><td colspan="2">Author Name: Vandina</td></tr>
</table>

4.2 Use Case - 2

<table>
<tr><td colspan="2">Use case name: Login</td></tr>
<tr><td colspan="2">Summary: This is used to validate login credentials.</td></tr>
<tr><td colspan="2">Actor: Student, Admin</td></tr>
<tr><td colspan="2">Preconditions: User must have an account</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. User enters email and password.</td><td>2. System validates information by matching it through database.</td></tr>
<tr><td></td><td>3. User gets logged in.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">2- If email or password does not match then display “Email or password is incorrect”.</td></tr>
<tr><td colspan="2">Post condition: User is logged into his/her account.</td></tr>
<tr><td colspan="2">Author Name: Vandina</td></tr>
</table>

4.3 Use Case - 3

<table>
<tr><td colspan="2">Use case name: Edit Profile</td></tr>
<tr><td colspan="2">Summary: This is used to edit and update student profile.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: Student should be logged in.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Student selects the "Edit Profile".</td><td>2. The system navigates the student to the profile editing page.</td></tr>
<tr><td>3. Student makes changes to their profile information, such as updating their profile picture, changing theirbio, or modifying their interested subject to study.</td><td>4. System records the changes made by the student.</td></tr>
<tr><td>5. Student confirms the changes by clicking the "Save Changes" button</td><td>6. System updates the student's profile information accordingly.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">3- If student decides not to save the changes, they can press a 'Cancel' button. When they do this, the system will go back to the original profile data.</td></tr>
<tr><td colspan="2">Post condition: Profile updated.</td></tr>
<tr><td colspan="2">Author Name: Vandina</td></tr>
</table>

4.4 Use Case - 4

<table>
<tr><td colspan="2">Use case name: Create Group</td></tr>
<tr><td colspan="2">Summary: This is used to create a group for a specific subject.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: The student must have selected the "Create Group" option</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. The student navigates to the "Create Group" section of the application.</td><td>2. The system presents a screen for the student to fill in group details.</td></tr>
<tr><td>3. The student fills in the required information.</td><td>4. The system notifies the student that the group has been successfully created.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">2- If the student does not fill in the mandatory information like group name, the system displays “Required” message.</td></tr>
<tr><td colspan="2">Post condition: Group is created.</td></tr>
<tr><td colspan="2">Author Name: Vandina</td></tr>
</table>

4.5 Use Case - 5

<table>
<tr><td colspan="2">Use case name: Search for groups</td></tr>
<tr><td colspan="2">Summary: Allows users to find study groups to join based on their preferred subjects.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: The student must navigate to the "search groups" section.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. The student navigates to the "Search"</td><td>2. The system provides a search interface that allows the student to specify their search preferences.</td></tr>
<tr><td>3. The student enters their desired subject to study.</td><td>4. System retrieves a list of groups matching the criteria.</td></tr>
<tr><td></td><td>5. System displays the search results, showing both manually searched groups and recommended groups based on the student's preferences.</td></tr>
<tr><td>6. The student can click on a group to view more information.</td><td></td></tr>
<tr><td>7. The student decides to join a group by clicking the "Join Group" option.</td><td></td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">4- if the search returns no results that match the provided criteria, the system informs the student that no results were found.</td></tr>
<tr><td colspan="2">Post condition: If the student decides to join a group, they become a member of that group.</td></tr>
<tr><td colspan="2">Author Name: Vandina</td></tr>
</table>

4.6 Use Case - 6

<table>
<tr><td colspan="2">Use case name: Accept/Decline group requests</td></tr>
<tr><td colspan="2">Summary: allows group creator to accept or decline join requests.</td></tr>
<tr><td colspan="2">Actor: student</td></tr>
<tr><td colspan="2">Preconditions: group creator has an active group.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td></td><td>1. The system displays a list of pending requests, showing the names or usernames of students who have requested to join.</td></tr>
<tr><td>2. Group creator either clicks the "Accept" or clicks
"Decline" button next to the student's request.</td><td>3. The system adds the requesting student as a member of the group, or it removes the join request.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">2- if the group creator attempts to accept a request, but the request is no longer valid, the system notifies the group creator that the request is no longer applicable.</td></tr>
<tr><td colspan="2">Post condition: Updates the status of request as “accepted” or “declined”.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

4.7 Use Case-7

<table>
<tr><td colspan="2">Use case name: Search study partners</td></tr>
<tr><td colspan="2">Summary: this use case outlines the process of a student searching for a study partner</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: The student must navigate to the "search study partner" section.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td></td><td>1. The system displays a search interface where the student can specify their criteria for finding a study partner.</td></tr>
<tr><td>2. The student enters their search criteria and initiates the search.</td><td>3. System retrieves a list of study partners matching the criteria.</td></tr>
<tr><td></td><td>4. System displays the search results, showing both manually searched and recommended study partners based on the subjects they've expressed interest.</td></tr>
<tr><td>5. The student can browse through the list of study partners, view their profile information, and send collaboration request.</td><td></td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">3- If no study partners are found based on the student's specified subject then system displays a message indicating that no study partners matching the criteria were found.</td></tr>
<tr><td colspan="2">Post condition: student can collaborate with other students and be connected to them on this platform.</td></tr>
</table>

4.8 Use Case-8

<table>
<tr><td colspan="2">Use case name: Accept/Decline collaboration requests.</td></tr>
<tr><td colspan="2">Summary: allows students to accept or decline collaboration requests.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: The student has received a collaboration request from another student.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td></td><td>1. The system notifies the student that they have received a collaboration request.</td></tr>
<tr><td>2. Student either chooses to accept it after viewing the profile or decline it.</td><td>3. If student accepts it then student's profile is added to the list of study partners otherwise it is removed from the notification center.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">If student attempts to accept a request, but the request is no longer valid, the system notifies that the request is no longer applicable.</td></tr>
<tr><td colspan="2">Post condition: If student accepts it then student's profile is added to the list of study partners otherwise it is removed from the notification center.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

4.9 Use Case-9

<table>
<tr><td colspan="2">Use case name: Messaging system</td></tr>
<tr><td colspan="2">Summary: this use case describes how a student interacts with the messaging system within study groups and with study partners.</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: Student must have an internet connection ensuring that messages can be delivered and received promptly.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. The student selects a group or study partner with whom they want to communicate.</td><td>2. The system presents a chat interface.</td></tr>
<tr><td>3. The student types and sends a message.</td><td>4. The system displays the response in the chat.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">If student decides not to send a message, they can cancel the message.</td></tr>
<tr><td colspan="2">Post condition: Messages are successfully sent and received.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

4.10 Use Case-10

Use case name: Resource Sharing	
Summary: Resource Sharing allows users to share resources with other users within the system.	
Actor: Student	
Preconditions: The user must have a resource.	
Basic course of events/happy path	
Actor Action	**System Response**
1. The user selects a resource to share.	2. Shared resource becomes accessible in student's dashboard's shared resources section.
Alternative path:	
1- No resource sharing takes place until valid selections are made.	
Post condition: The resource is successfully shared with the users.	
Author Name: Sheetal	

4.11 Use Case-11

<table>
<tr><td colspan="2">Use case name: Join/Create Virtual Session</td></tr>
<tr><td colspan="2">Summary: Helps Users Start or Join Online Meetings</td></tr>
<tr><td colspan="2">Actor: Student</td></tr>
<tr><td colspan="2">Preconditions: The user must be logged into the system.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. The user initiates the creation of a virtual session by specifying session details.</td><td>2. The system generates a unique session link.</td></tr>
<tr><td></td><td>3. The system provides sharing options.</td></tr>
<tr><td>4. Student can share the session with specific study partners or in the group.</td><td></td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">If student chooses to cancel the session then it will end and details of session can no longer be shared.</td></tr>
<tr><td colspan="2">Post condition: The user successfully creates or joins a virtual session.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

4.12 Use Case-12

<table>
<tr><td colspan="2">Use case name: View/manage student profile</td></tr>
<tr><td colspan="2">Summary: Used for accessing a list of student profiles.</td></tr>
<tr><td colspan="2">Actor: Admin</td></tr>
<tr><td colspan="2">Preconditions: The Admin must be logged into the system.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td></td><td>1. System retrieves the student's profile information and displays it to the admin.</td></tr>
<tr><td>2. Admin selects a student profile to view and manage.</td><td></td></tr>
<tr><td>3. Admin can perform actions like review uploaded content.</td><td></td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">N/A</td></tr>
<tr><td colspan="2">Post condition: Admin has viewed the student profile.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

4.13 Use Case-13

<table>
<tr><td colspan="2">Use case name: Block Profiles</td></tr>
<tr><td colspan="2">Summary: Used for maintaining order and user access.</td></tr>
<tr><td colspan="2">Actor: Admin</td></tr>
<tr><td colspan="2">Preconditions: The Admin must be logged into the system.</td></tr>
<tr><td colspan="2">Basic course of events/happy path</td></tr>
<tr><td>Actor Action</td><td>System Response</td></tr>
<tr><td>1. Admin initiates the blocking of a profile.</td><td>2. When Admin decides to block a specific user, the system implements the block action.</td></tr>
<tr><td></td><td>3. The system confirms the successful blocking action to the admin.</td></tr>
<tr><td colspan="2">Alternative path:</td></tr>
<tr><td colspan="2">2- When an admin decides to stop a certain user from using the system, the system makes it happen.</td></tr>
<tr><td colspan="2">Post condition: The specified user is successfully blocked by the admin.</td></tr>
<tr><td colspan="2">Author Name: Sheetal</td></tr>
</table>

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Our web application “Peer Connect” shall respond well under normal loads by making sure that user interactions, such as creating or joining study sessions, accessing study materials, and participating in real-time chats or video conferences, are responsive.
Performance may also depend upon network connectivity, like how efficient is the data retrieval or is there any latency in real-time interactions.

5.2 Safety Requirements

In terms of Safety Requirements, the application protects user data, including personal information and study materials and prevents unauthorized access, promoting user privacy.
Moreover, in case of any problem, the user must report to the organization.

5.3 Security Requirements

After using it is recommended that users must log out from their respective account, to prevent any misuse. Also, user’s data and password shall be encrypted.

5.4 Software Quality Attributes

Peer Connect ensures that user interface and user experience must be clear and easy to follow. In terms of maintenance, error and data handling would be performed efficiently, Moreover Backend

Functionalities would be optimized enough to serve the maximum number of requests in less time.

5.5 Business Rules

- Every user, regardless of role, must register with a valid email and password to access the platform.
- Distinct roles (e.g., students, admins) have varying levels of access and permissions within the platform.
- Admins manage accounts, policies.

6. Other requirements

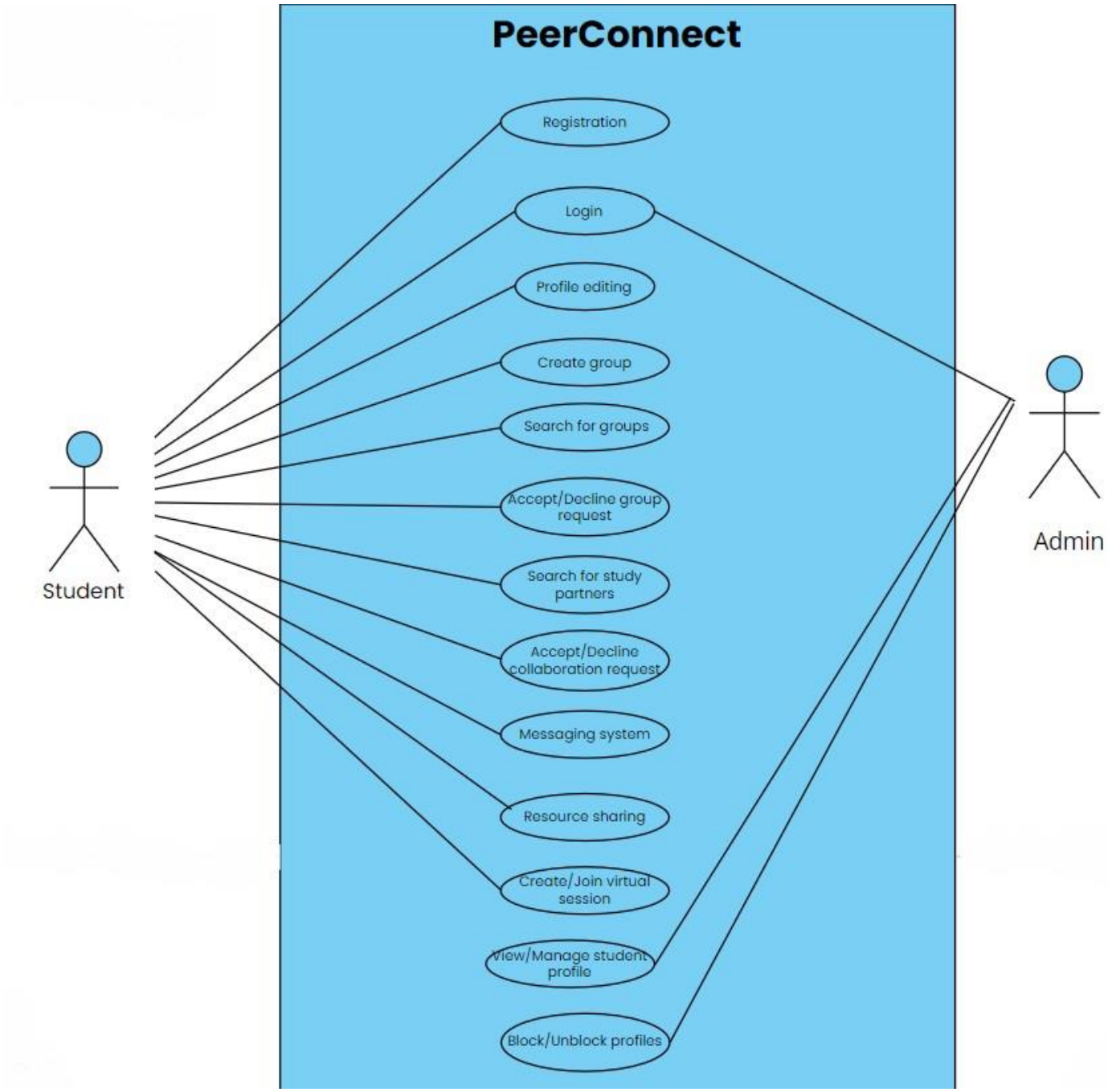
Appendix A: Glossary

Real-Time Communication: The features enabling instant text-based chat and video conferencing for users.

Session Link: A unique URL or identifier that provides access to a specific study session or event.

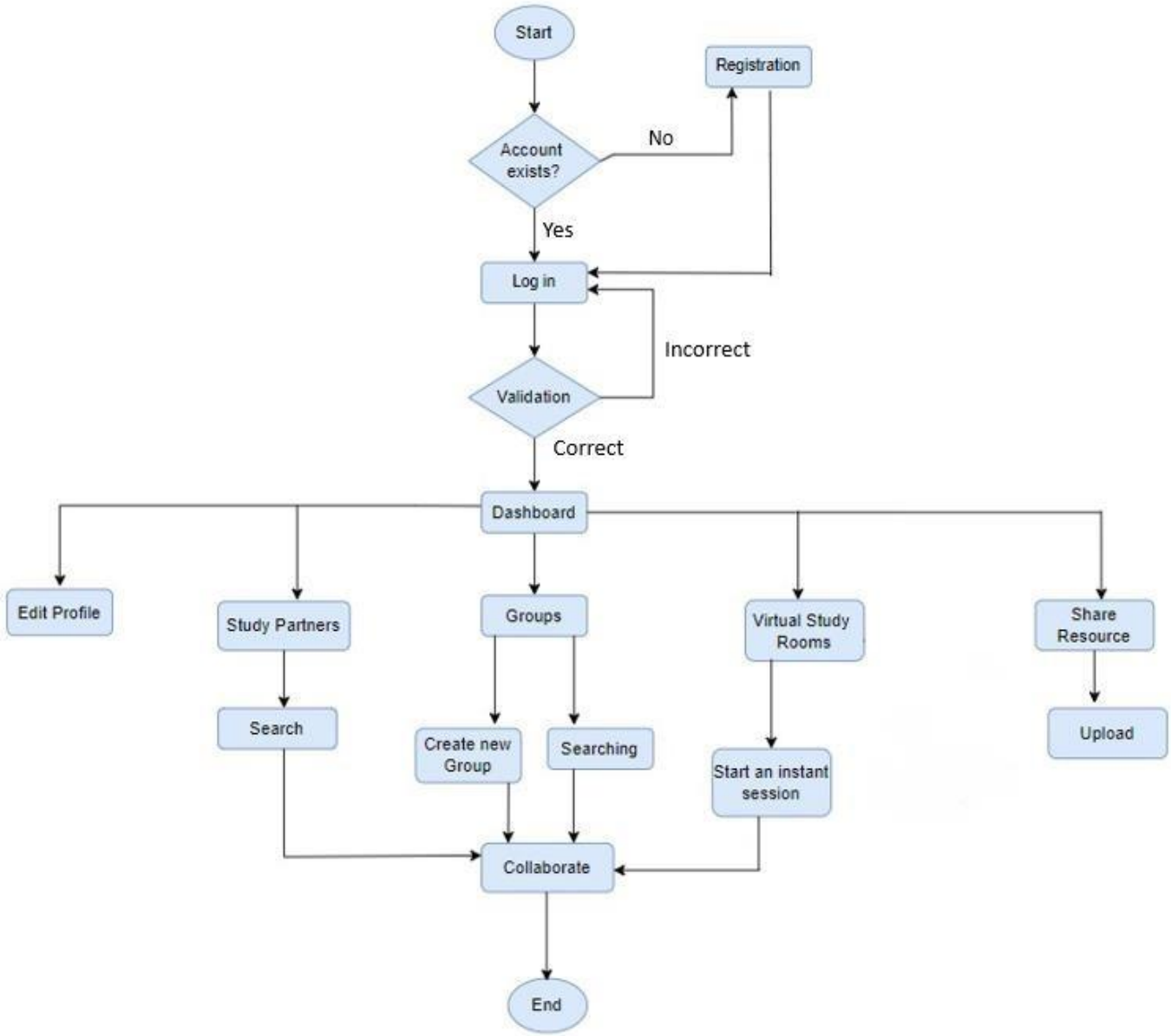
Appendix B: Analysis Models

6.1 Use Case Diagram

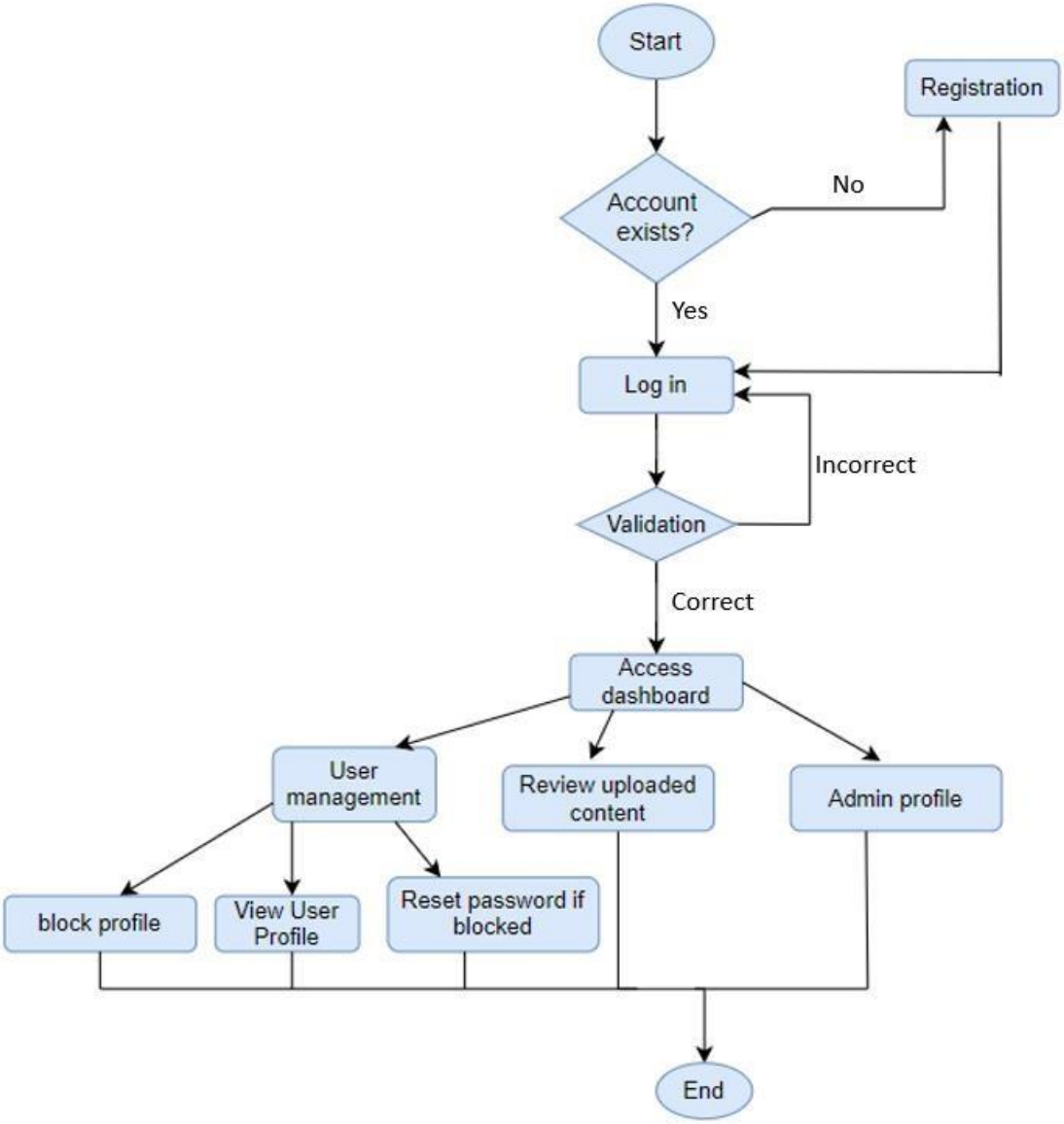


6.2 Flowchart

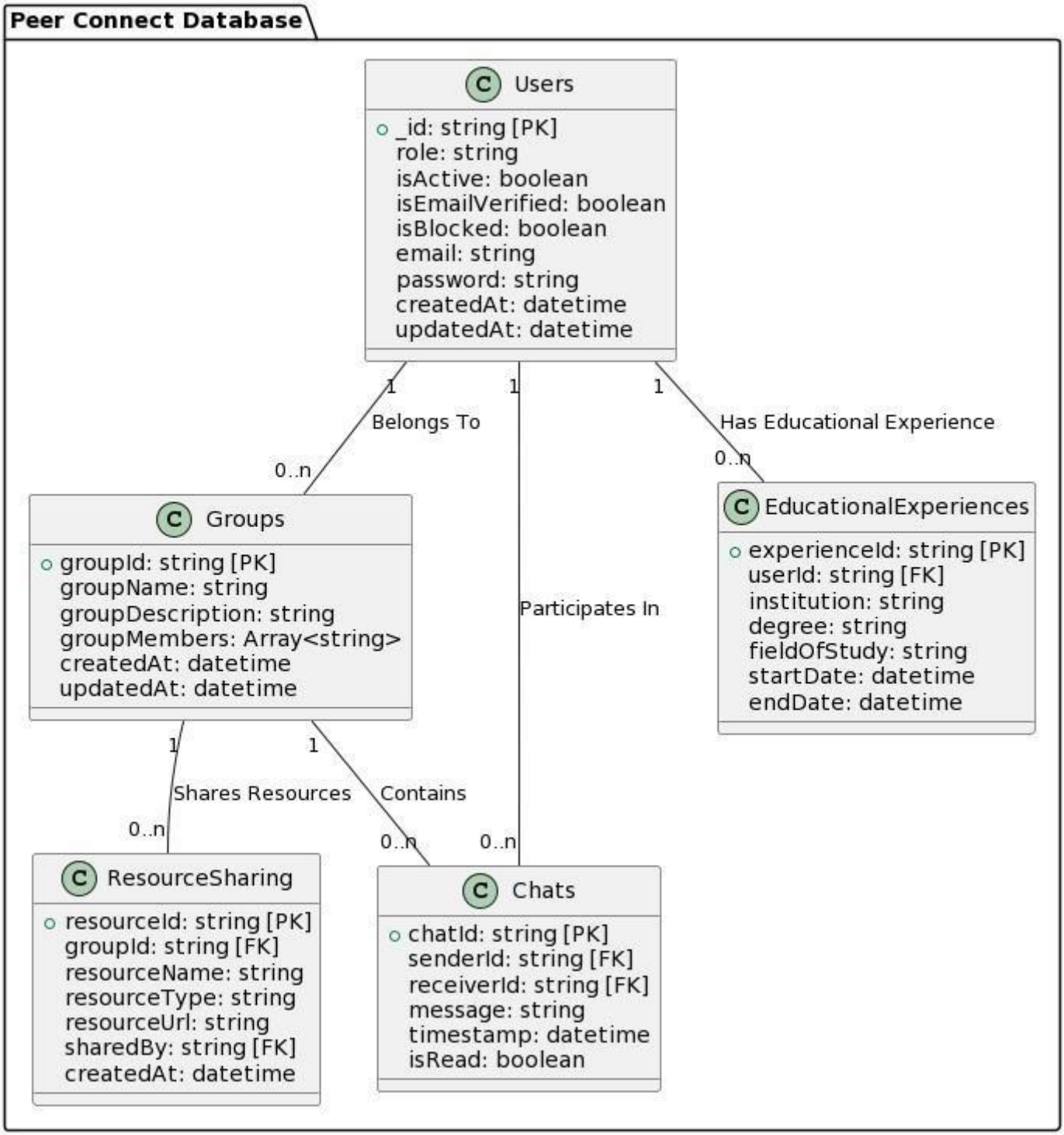
Student



Admin

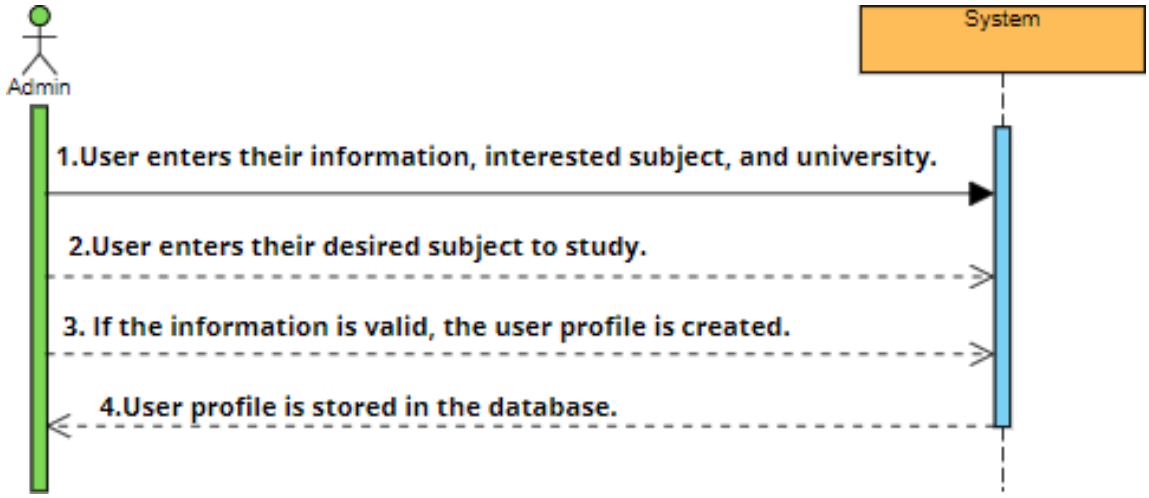

Start
Registration
Account exists?
No
Yes
Log in
Incorrect
Validation
Correct
Access dashboard
User management
Review uploaded content
Admin profile
block profile
View User Profile
Reset password if blocked
End

6.3 ERD

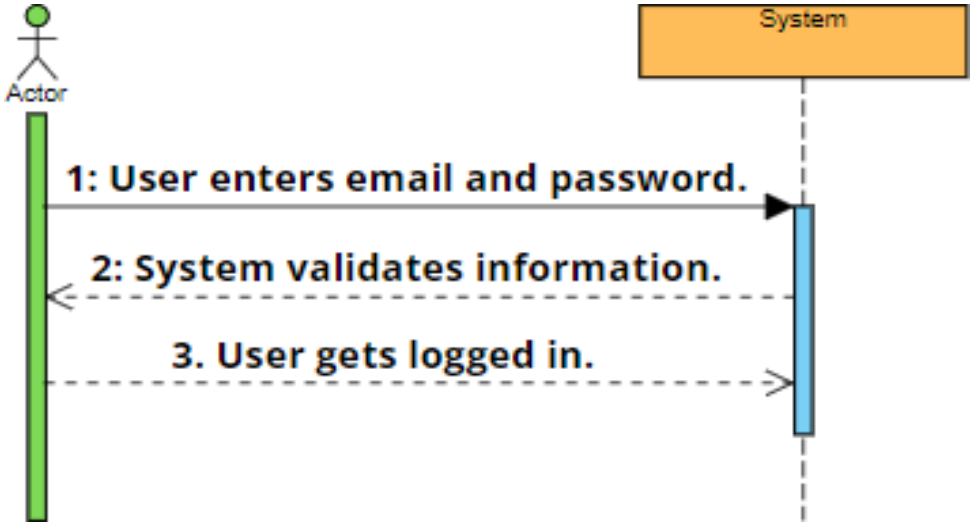

Peer Connect Database
Users
_id: string [PK]
role: string
isActive: boolean
isEmailVerified: boolean
isBlocked: boolean
email: string
password: string
createdAt: datetime
updatedAt: datetime
1
Belongs To
0..n
1
Participates In
0..n
1
Has Educational Experience
0..n
Groups
groupId: string [PK]
groupName: string
groupDescription: string
groupMembers: Array<string>
createdAt: datetime
updatedAt: datetime
EducationalExperiences
experienceId: string [PK]
userId: string [FK]
institution: string
degree: string
fieldOfStudy: string
startDate: datetime
endDate: datetime
1
Shares Resources
0..n
1
Contains
0..n
ResourceSharing
resourceId: string [PK]
groupId: string [FK]
resourceName: string
resourceType: string
resourceUrl: string
sharedBy: string [FK]
createdAt: datetime
Chats
chatId: string [PK]
senderId: string [FK]
receiverId: string [FK]
message: string
timestamp: datetime
isRead: boolean

6.4 System Sequence Diagrams

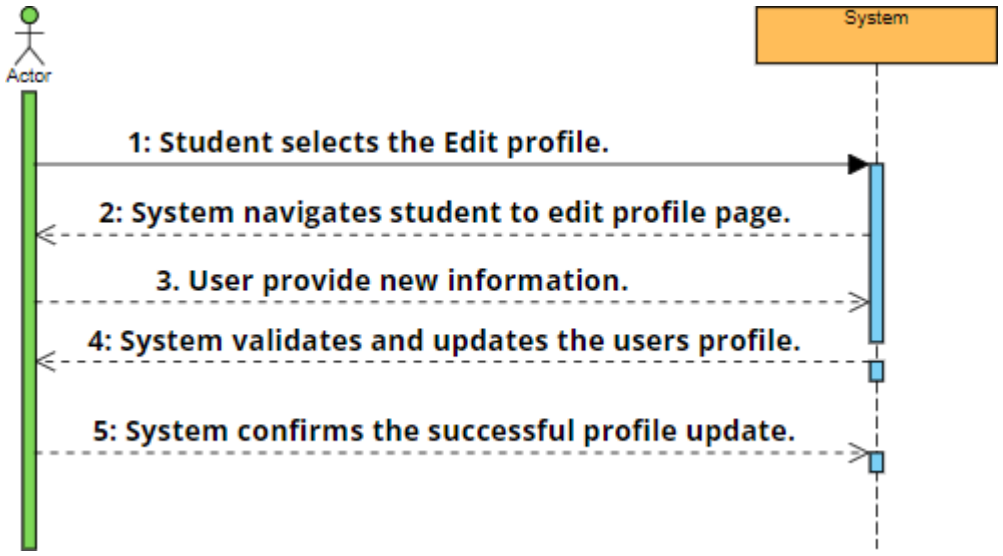
1. Student Registration



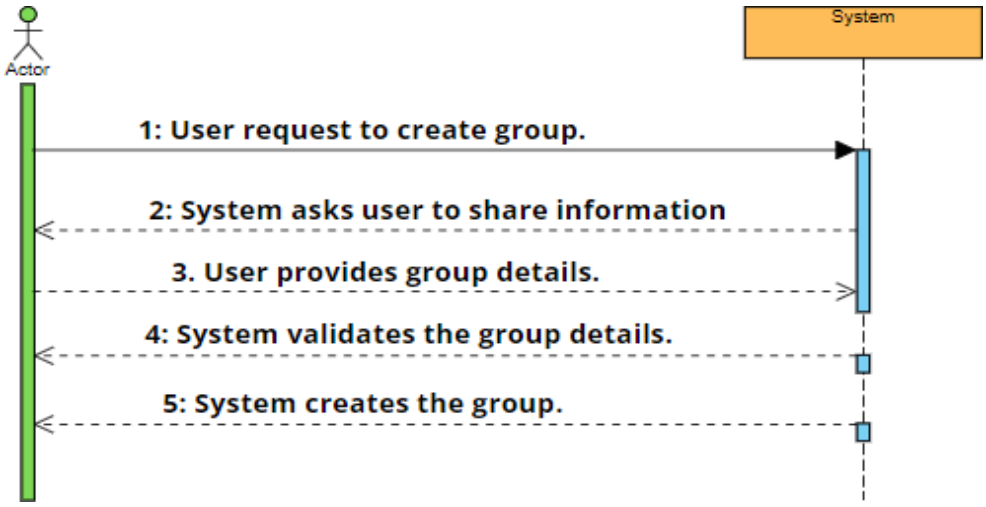
2. Login



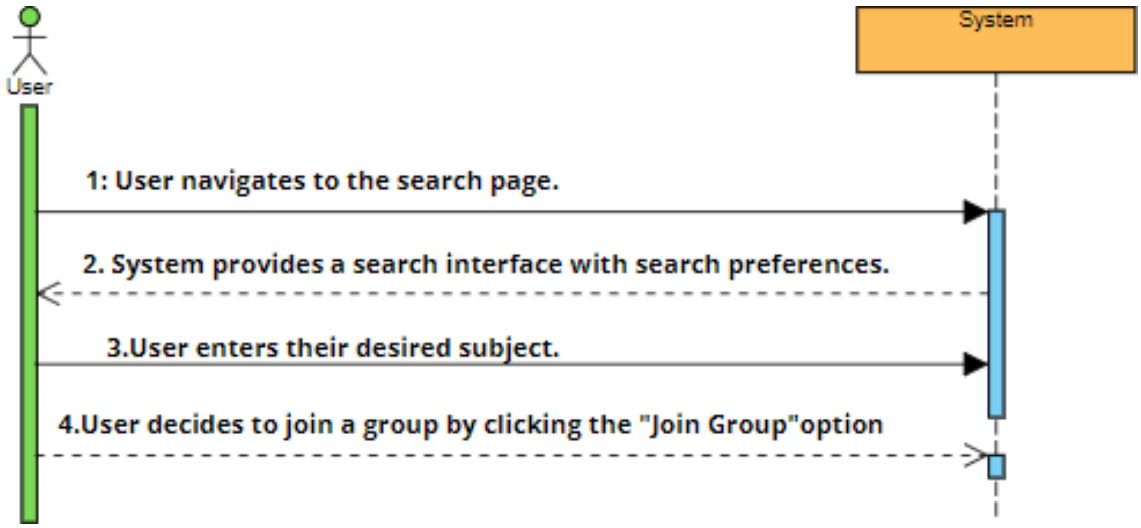
3. Edit Profile



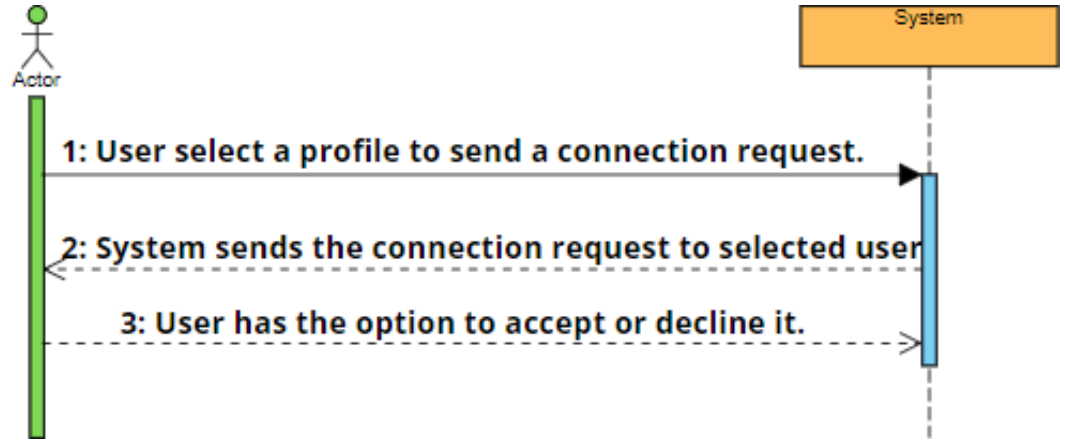
4. Create Group



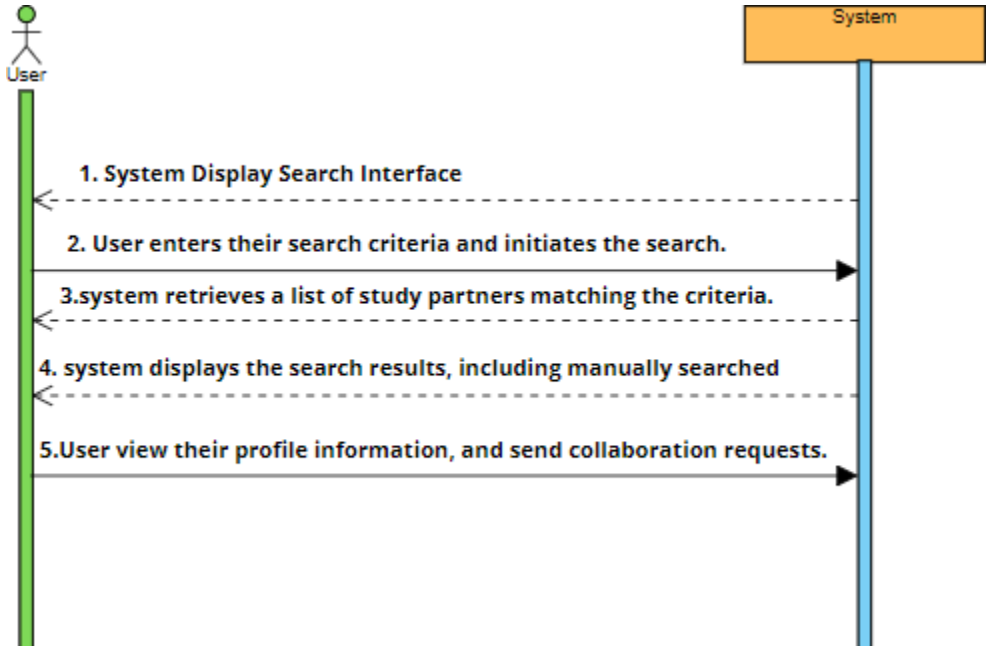
5. Search for groups



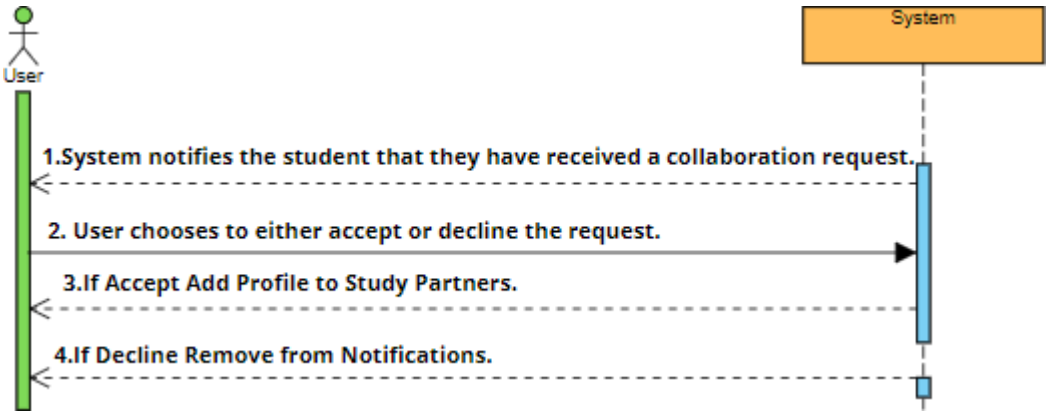
6. Accept/Decline group Request



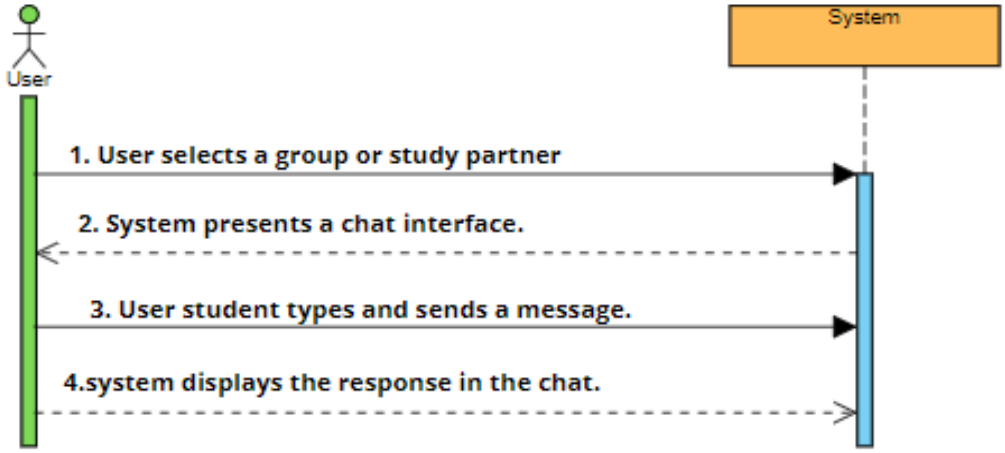
7. Search Study Partners



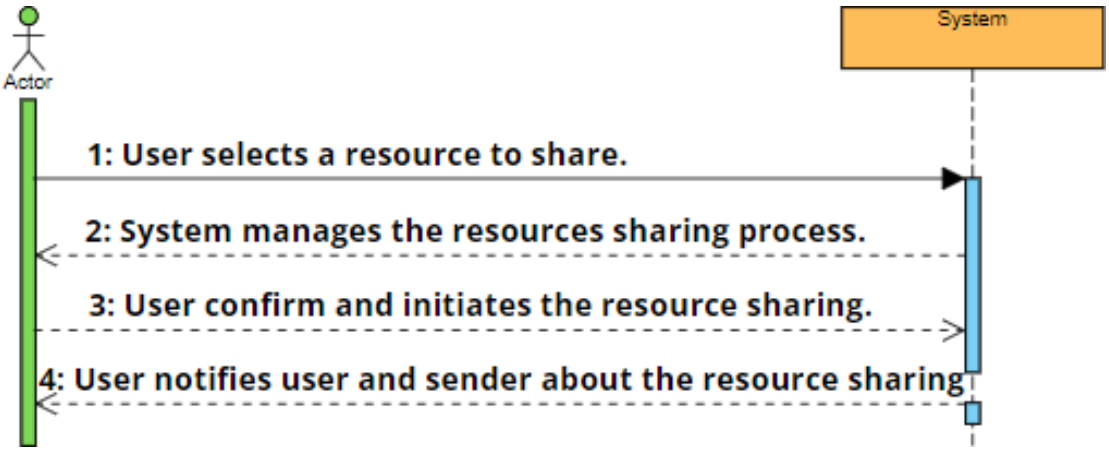
8. Accept/Decline Collaboration Requests



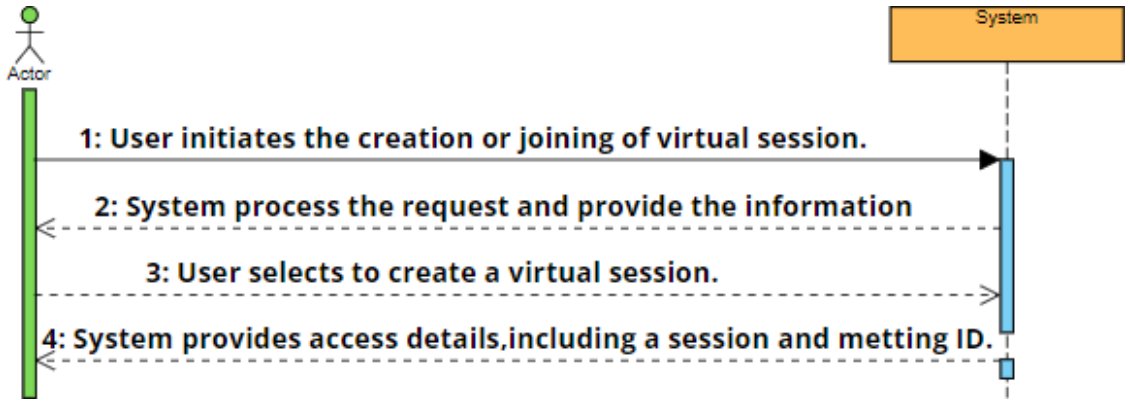
9. Messaging System



10. Resource Sharing



11.Join /Create Virtual Session



Appendix C: To Be Determined List

NA

7. Iteration Plan

Iteration Plan FYP1

S.No.	Features	FYP-I Iterations			
		Monthly Iteration-I	Monthly Iteration-II	Monthly Iteration-III	Monthly Iteration-IV
F1	Add course/interest	Requirements(100%)			
		Design(100%)			
		Implementation(100%)			
		Testing			
F2	Registration	Requirements(100%)			
		Design(100%)			
		Implementation(100%)			
		Testing			
F3	Login	Requirements (100%)			
		Design(100%)			
			Implementation(100%)		
			Testing		
F4	Profile Editing		Requirements(100%)		
			Design(100)%		
				Implementation(100%)	
				Testing	
F5	Create Group		Requirements(100%)		
			Design(100)%		
				Implementation(100%)	
				Testing	
F6	Search for groups		Requirements(100%)		
			Design(100%)		
				Implementation(100%)	
				Testing	
F7	Accept/Decline Group Request		Requirements(100%)		
			Design(100%)		
					Implementation(50%)
					Testing
F8	Search for study partner		Requirements(100%)		
			Design(100%)		
					Implementation(100%)
					Testing
F9	Messaging System (Individual)		Requirements(100%)		
			Design(100%)		
					Implementation(50%)
					Testing
	Output Features	F1, F2	F3	F4, F5, F6	F7, F8, f9

Iteration Plan FYP2

S.No.	Features	FYP-I Iterations			
		Monthly Iteration-I	Monthly Iteration-II	Monthly Iteration-III	Monthly Iteration-IV
F9	Accept/Decline Group Reques				
		Implementation(100%)			
		Testing			
F10	Messaging System (group)				
		Implementation(100%)			
		Testing			
F11	Notifications		Requirements(100%)		
			Design(100)%		
			Implementation(100%)		
			Testing		
F12	Resource Sharing			Requirements(100%)	
				Design(100)%	
				Implementation(100%)	
					Testing
F13	Create/Join Virtual room			Requirements(100%)	
				Design(100%)	
					Implementation(100%)
					Testing
	Output Features	F9	F10	F12	F13

8. Test Cases

Test case- 1

Test case name	Registration			
Test case description	In the following test case we will be checking if the student is registered or not			
Pre-Requisite	Information entered must be valid			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	User enter valid credentials	System displays message "You have successfulyy registered."	as expected	Pass
2	User enter invalid email	System displays message "Please include @ in the email address."	as expected	Fail
3	User leaves fields empty	System displays message "Required"	as expected	Fail

Test case- 2

Test case name	Login			
Test case description	In the following test case we will test the functionality of login feature			
Pre-Requisite	Information entered must be valid			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Navigate to the user profile section.	System displays message "No such user exists."	as expected	Fail
2	Enter correct username and correct password	System displays student dashboard	as expected	Pass
3	Enter correct username and wrong password	System displays message "Incorrect password"	as expected	Fail
4	Leave both fields empty	System displays message "Must enter username and password"	as expected	Fail

Test case- 3

Test case name	Edit Profile			
Test case description	In the following test case we will test the functionality of Edir profile feature			
Pre-Requisite	User must be logged in with valid credentials.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Navigate to the user profile section.	User is directed to the profile editing page.	as expected	Pass
2	Click on the "Edit Profile" button.	Profile fields become editable.	as expected	Pass
3	Update the relevant profile information.	Changes are reflected in the user's profile.	as expected	Pass
4	Save the changes.	System displays a confirmation message.	as expected	Pass

Test case- 4

Test case name	Create group			
Test case description	In the following test case, we will assess the functionality of the Create Group feature.			
Pre-Requisite	User must be logged in with valid credentials.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Navigate to the "Create Group" section.	User is directed to the group creation page.	as expected	Pass
2	Fill in the required group information.	All mandatory fields are filled accurately.	as expected	Pass
3	Add group members.	Members are successfully added to the group.	as expected	Pass
4	Click on the "Create Group" button.	System creates the group.	as expected	Pass
5	Verify the newly created group in the list.	Group is listed in the user's my groups dashboard.	as expected	Pass

Test case- 5

Test case name	Search for groups to join			
Test case description	In the following test case, we will evaluate the functionality of searching for groups to join.			
Pre-Requisite	User must have navigated to search bar.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	nter search criteria (e.g., interests, name).	Relevant groups matching the criteria are listed.	as expected	Pass
2	Review the list of available groups.	Groups displayed match the search criteria.	as expected	Pass
3	Click on a group to view details.	Group details, including members, are displayed.	as expected	Pass
4	Select the "send join request" option for a group.	System sends a join request to the group owner.	as expected	Pass

Test case- 6

Test case name	Accept/Decline group request			
Test case description	In the following test case we will test the functionality of Accept/Decline group request feature.			
Pre-Requisite	User must have navigated to notification center to review requests.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Review the list of pending group join requests.	List displays users requesting to join the group.	as expected	Pass
2	Click on a specific group join request.	Options to "Accept" or "Decline" the request appear.	as expected	Pass
3	Choose the "Accept" option.	Requesting user is added to the group.	as expected	Pass
4	Repeat steps 2-3, but choose the "Decline" option.	Requesting user is not added to the group.	as expected	Pass

Test case- 7

Test case name	Messaging system			
Test case description	In the following test case we will test the functionality of Messaging system.			
Pre-Requisite	User must choose specific group/user to chat with.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Select a specific group or user to message.	Chat interface for the chosen group or user appears.	as expected	Pass
2	Type and send a message in the chat.	Message is successfully sent and displayed in chat.	as expected	Pass
3	Receive a message from another user.	Incoming message is displayed in real-time.	as expected	Pass
4	Check for the delivery status of sent messages.	Sent messages show a "delivered" status.	as expected	Pass

Test case- 8

Test case name	View and manage user profiles			
Test case description	In this test case, we will evaluate the functionality of the Admin feature to view and manage user profiles.			
Pre-Requisite	The user executing this test case must have administrative privileges.			
Step #	**Step Details**	**Expected Result**	**Actual Result**	**Pass/Fail/Not executed/Suspended**
1	Log in to the system with admin credentials.	Successful login as an admin.	as expected	Pass
2	Navigate to the Dashboard.	The admin dashboard is displayed showing user profile details.	as expected	Pass
3	Verify the ability to edit user profile information.	Admin can edit user details.	as expected	Pass
4	Check for the option to block/unblock a user.	Admin can block or unblock a user account.	as expected	Pass

Software Design Specification

1. Introduction

1.1 Purpose of this document

The purpose of this Software Design Specification (SDS) document is to provide a detailed overview of the architecture, design, and implementation details for the "Peer Connect" collaborative learning platform. It serves as a comprehensive guide for the development team, outlining the technical aspects and specifications necessary to build a successful and functional application.

1.2 Scope of the development project

The scope of the "Peer Connect" collaborative learning platform encompasses diverse range of interactive features tailored to enhance students' academic journey. This includes subject-based group matching, enabling students to create profiles and connect with peers sharing similar subjects. Real-time collaboration is integral, with virtual study rooms equipped with chat and collaborative tools to facilitate engaging study sessions. Additionally, students can share resources, notes, and practice materials to enrich their learning experiences. The platform aims to create a holistic and dynamic environment where students can seamlessly collaborate, exchange knowledge, and foster a supportive learning community.

1.3 Definitions, acronyms, and abbreviations

GUI: Graphcal User Interface

ERD: Entity Relationship Diagram

MERN: MongoDB, Express, React, Node

1.4 References

N/A

1.5 Overview of document

This document is organized into several sections:

Section 2: System Architecture Description

Provides an overview and rationale for the program's data and architectural design decisions.

Section 3: Detailed Description of Components

Represents the core of the document, offering detailed insights into each component's structure, function, and dependencies.

Section 4: User Interface Design

Describes the design rules, GUI components, and provides a detailed description of the user interface.

Section 5: Reuse and Relationships to Other Products

Discusses the role of reuse in product design and implementation, including motivations for changes or exclusions.

Section 6: Design Decisions and Tradeoffs

Explores the decisions and tradeoffs made during the design process, capturing ideas that were abandoned and the reasons behind them.

Section 7: Pseudocode for Components

Provides pseudocode for critical components, algorithms, and logic to clarify the system's internal workings.

Section 8: Appendices

Includes relevant diagrams, such as class diagrams, object diagrams, statechart diagrams, activity diagrams, sequence diagrams, collaboration diagrams, use-case diagrams, component diagrams, deployment diagrams, and system block diagrams.

2. System Architecture description

This section provides an overview and rationale for the program's data and architectura design decisions.

2.1. Section Overview

This document consists of complete architecture of PeerConnect website with all basic features. A complete description of software with describing the functionalities of the system. A detailed description of all software components. This document explains all the software requirements, infernal interfaces. GUI (Graphical User Interface are used to define the presentation layer and their functions with complete description of the system. All UML types diagram are used to explain the database structure, software design and hardware level of the system.

2.2. General Constraints

The design and development of the "Peer Connect" collaborative learning platform are influenced by several global constraints that shape the overall system architecture. These constraints encompass various aspects of hardware, software, interface, data representation, performance, and network requirements. Here's a detailed overview of the general constraints:

Hardware Environment:

The platform must operate within the constraints of common hardware configurations, including personal computers and mobile devices.

The system should be optimized to run efficiently on devices with varying processing power and memory.

Software Environment:

The software environment is influenced by the utilization of the MERN stack (MongoDB, Express, React, Node) and WebRTC (Web Real-Time Communication) technology.

The system should be designed to leverage the capabilities and features offered by these software components.

Interface Requirements:

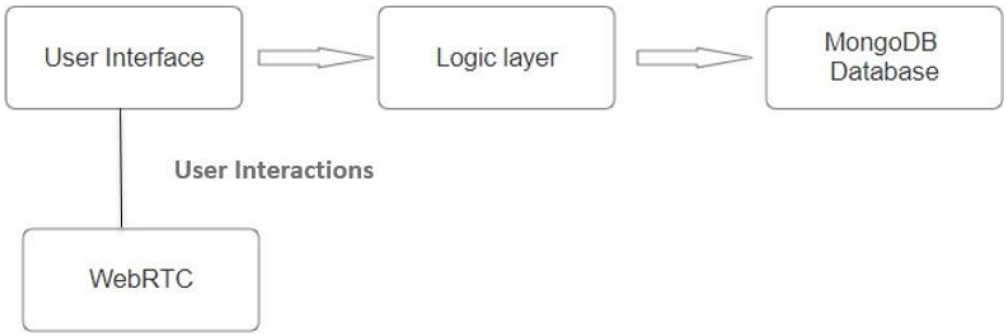
The user interface (UI) must adhere to standard design principles for an intuitive and user-friendly experience. Constraints include responsiveness across different screen sizes, accessibility features to accommodate users with diverse needs and compatibility with popular web browsers.

2.3. Data Design

We have used the MongoDB database in our project. MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas.

2.4. Program Structure

The "Peer Connect" collaborative learning platform adopts a three-tier architecture, dividing the system into presentation, logic, and data layers to ensure modularity, scalability, and maintainability.



- User Interface represents the front-end developed with React.js.
- Logic layer represents the back-end implemented with Node.js and Express.js.
- MongoDB Database represents the data storage layer using MongoDB.
- WebRTC represents the technology used for real-time communication. Facilitates features like virtual sessions and collaborative interactions.

2.5. Alternatives Considered

No alternative path.

3. Detailed description of components

3.1. Section Overview

In this section, we have described the details of the components in the system. This will provide overall description of functional components. This will review of each module identification, type, purpose function, subordinates, dependencies, interfaces, resources, processing, data.

3.2. Component Detail

3.2.1 Registration

Identification	Registration
Type	Module
Purpose	The purpose of the registration module is to manage user registration on the "Peer Connect" platform, ensuring the seamless creation of user profiles.
Function	The component facilitates the collection of user information during the registration process, validates inputs, and stores the data in the system's database.
Subordinates	The subordinates of the registration module include form validation, database interaction, and user interface components.
Dependencies	This module relies on the availability and functionality of the database for storing user information.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for data storage and retrieval.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs, validates data, communicates with the database, and provides appropriate feedback to the user.
Data	Data required for registration is personal data (name, email, password), educational data and etc.

3.2.2. Login

Identification	Login
Type	Module
Purpose	The purpose of the login module is to handle user authentication on the "Peer Connect" platform, allowing users to access their accounts securely.
Function	The component validates user credentials, including email and password, against stored data in the system's database.
Subordinates	Subordinates of the login module include authentication processes, user session management, and user interface interactions.
Dependencies	This module depends on the availability and functionality of the database for retrieving user credentials and validating logins.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for user authentication.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs, validates credentials, and manages user sessions upon successful login.
Data	Internal data includes user credentials (email and password). Interacts with the MongoDB database to retrieve and validate user information.

3.2.3. Edit profile

Identification	Edit profile
Type	Module
Purpose	The purpose of the Edit Profile module is to allow users to modify and update their profile information on the "Peer Connect" platform.
Function	This component facilitates users in accessing and modifying various elements of their profile, such as profile picture, bio, and interested subjects.
Subordinates	Subordinates of the Edit Profile module include profile information update processes, user interface interactions, and data validation.
Dependencies	Depends on the availability and functionality of the database to store updated user profile information.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for updating and storing profile information.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs for profile updates, validates the data, and manages the update process in the database.
Data	Data includes user profile information such as bio, profile picture, and interested subjects.

3.2.4. Create group

Identification	Create group
Type	Module
Purpose	The purpose of the Create Group module is to enable users to initiate the formation of a study group on this platform.
Function	Facilitates the creation of a new study group by providing a form for users to input group details such as the group name and subject.
Subordinates	Subordinates of the Create Group module include the group creation process, user interface interactions, and data validation.
Dependencies	Depends on the availability and functionality of the database to store information about the newly created group.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for storing information about the created study group.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs for group creation, validates the data, and manages the storage of group information in the database.
Data	Data includes group details such as group name, subject, and creator information.

3.2.5. Search group

Identification	Search groups
Type	Module
Purpose	The purpose of the Search Groups module is to allow users to find study groups based on their preferred subjects and interests on the "Peer Connect" collaborative learning platform.
Function	Provides a search interface where users can specify criteria such as the desired subject for finding study groups. Retrieves a list of groups matching the specified criteria from the database. Displays the search results, including manually searched groups and recommended groups based on the user's preferences.
Subordinates	Subordinates of the Search Groups module include the search process, user interface interactions, and data retrieval from the database.
Dependencies	Depends on the availability and functionality of the database to retrieve information about study groups.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for retrieving information about study groups.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs for search criteria, retrieves relevant data from the database, and manages the presentation of search results.
Data	Data includes search criteria entered by the user and information about study groups retrieved from the database.

3.2.6. Accept/Decline group request

Identification	Accept/Decline group request
Type	Module
Purpose	The purpose of the Accept/Decline Group Request module is to allow the group creator to manage and respond to requests from students who wish to join a specific study group on the "Peer Connect" collaborative learning platform.
Function	Displays a list of pending requests, showing the names or usernames of students who have requested to join the group. Enables the group creator to either accept or decline a student's request. If accepted, the system adds the requesting student as a member of the group. If declined, the system removes the join request.
Subordinates	Subordinates of the Accept/Decline Group Request module include the user interface for displaying requests and capturing the group creator's response.
Dependencies	Depends on the availability and functionality of the database to retrieve information about group requests and update group membership.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for retrieving and updating information about group requests and memberships.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs from the group creator for accepting or declining group requests. It updates the database to reflect changes in group membership.
Data	Data includes information about group requests and membership status, which is retrieved from and updated in the database.

3.2.7. Search Study partners

Identification	Search Study partners
Type	Module
Purpose	The purpose of the Search Study Partners module is to enable students to search for potential study partners based on specific criteria, fostering collaboration and knowledge sharing on the "Peer Connect" collaborative learning platform.
Function	Allows students to enter their search criteria and initiate the search. Retrieves a list of study partners matching the specified criteria from the database. Displays the search results, showing both manually searched and recommended study partners based on subjects of interest. Allows students to browse through the list of study partners, view their profile information, and send collaboration requests.
Subordinates	Subordinates of the Search Study Partners module include the user interface for presenting the search interface, displaying search results, and facilitating collaboration requests.
Dependencies	Depends on the availability and functionality of the database to retrieve information about potential study partners.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for retrieving information about potential study partners.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user inputs for search criteria and collaboration requests. It interacts with the database to retrieve and update information about potential study partners.
Data	Data includes information about students' study preferences, interests, and collaboration requests, which is retrieved from and updated in the database.

3.2.8. Accept/Decline collaboration request

Identification	Accept/Decline collaboration requests
Type	Module
Purpose	The purpose of the Accept/Decline Collaboration Request module is to enable students to manage incoming collaboration requests on the "Peer Connect" collaborative learning platform.
Function	Displays a list of pending collaboration requests, showing the names or usernames of students who have requested to collaborate. Allows the user (student) to either accept or decline collaboration requests. If accepted, adds the requesting student as a study partner or group member. If declined, removes the collaboration request. Updates the status of the request as "accepted" or "declined" in the system.
Subordinates	Subordinates of the Accept/Decline Collaboration Request module include the user interface for presenting the list of collaboration requests and managing the accept/decline actions.
Dependencies	Depends on the availability and functionality of the database to retrieve information about collaboration requests and update the status.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for retrieving information about collaboration requests and updating request status.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user actions to accept or decline collaboration requests. It interacts with the database to retrieve and update information about collaboration requests.
Data	Data includes information about collaboration requests, user responses, and the status of each request, which is retrieved from and updated in the database.

3.2.9. Messaging system

Identification	messaging system
Type	Module
Purpose	The purpose of the Messaging System module is to enable real-time communication between students within study groups and study partners on the "Peer Connect" collaborative learning platform.
Function	Provides a chat interface for users to select a study group or study partner with whom they want to communicate. Enables users to type and send messages within the chat interface.
Subordinates	The Messaging System module includes subordinates such as the user interface components for the chat interface and message display.
Dependencies	Depends on the availability and functionality of the database to store and retrieve messages. Interacts with the user interface for displaying the chat interface and messages.
Interfaces	External: Communicates with the user interface for user interaction. Internal: Interacts with the database for storing and retrieving messages.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user actions related to messaging, such as sending and canceling messages. It interacts with the database to store and retrieve messages.
Data	Data includes messages sent by users, message timestamps, and information about the sender and receiver. This data is stored and retrieved from the database.

3.2.10. Resource Sharing

Identification	Resource Sharing
Type	Module
Purpose	The purpose of the Resource Sharing module is to allow users to share educational resources, notes, and practice materials with other users on the "Peer Connect" collaborative learning platform.
Function	Enables users to select a resource for sharing. Facilitates the sharing of the selected resource with other users.
Subordinates	The Resource Sharing module includes subordinates responsible for managing the selection, sharing, and accessibility of shared resources.
Dependencies	Depends on the availability and functionality of the database to store and retrieve shared resources. Interacts with the user interface for displaying the resource-sharing options.
Interfaces	External: Communicates with the user interface for user interactions related to resource sharing. Internal: Interacts with the database for storing and retrieving shared resources.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes user actions related to resource sharing, such as selecting a resource and sharing it with other users. It interacts with the database to store and retrieve shared resources.
Data	Data includes information about shared resources, including file details, uploader information. This data is stored and retrieved from the database.

3.2.11. Join/Create virtual session

Identification	Join/Create virtual session
Type	Module
Purpose	The purpose of the Join/Create Virtual Session module is to enable users to initiate or participate in online study sessions on the "Peer Connect" collaborative learning platform.
Function	Allows users to initiate the creation of a virtual session by specifying session details. Generates a unique session link for the created virtual session. Provides sharing options for the user to share the session link with specific study partners or within a group. Enables users to join existing virtual sessions by clicking on shared session links.
Subordinates	The Join/Create Virtual Session module includes subordinates responsible for managing session creation, generating unique session links, and handling user interactions related to virtual sessions.
Dependencies	Depends on the availability and functionality of real-time communication technologies like WebRTC for hosting virtual study sessions.
Interfaces	Utilizes WebRTC for real-time communication during virtual study sessions.
Resources	Hardware: Requires standard hardware configurations. Software: Utilizes the MERN stack for development and integrates with WebRTC for real-time communication.
Processing	The module processes user actions related to creating and joining virtual sessions, including session details, link generation, and sharing options. It interacts with WebRTC for handling real-time communication during virtual study sessions.
Data	Data includes information about virtual sessions, such as session details, participants, and the session link. This data is managed and stored securely as part of the virtual session management process.

3.2.12. Manage student profiles

Identification	Manage student profiles
Type	Module
Purpose	The purpose of the Manage Student Profiles module is to provide administrative capabilities for viewing and managing student profiles on the "Peer Connect" collaborative learning platform.
Function	Retrieves and displays the student's profile information for administrative review. Allows the admin to select a student profile to view and manage. Provides actions for the admin to perform on student profiles, such as reviewing uploaded content.
Subordinates	The Manage Student Profiles module includes subordinates responsible for retrieving and displaying student profile information, handling administrative actions, and interacting with the database.
Dependencies	Depends on the availability and functionality of the database for retrieving and managing student profile information.
Interfaces	External: Communicates with the user interface for administrative actions and displaying student profile information. Internal: Interacts with the database to retrieve and manage student profile data.
Resources	Hardware: Requires standard hardware configurations. Software: Depends on the MERN stack for development.
Processing	The module processes administrative actions related to student profiles, including retrieving profile information, selecting profiles for review, and performing actions such as reviewing uploaded content.
Data	Data includes student profile information. This information is retrieved from the database and displayed for administrative purposes.

3.2.13. Block Profiles

Identification	Block profile
Type	Module
Purpose	The purpose of the Block Profile module is to provide administrative capabilities for blocking user profiles on the "Peer Connect" collaborative learning platform.
Function	Allows the admin to initiate the blocking of a specific user profile.
Subordinates	The Block Profile module includes subordinates responsible for handling the blocking action, updating the status of the blocked user, and providing confirmation to the admin.
Dependencies	Depends on the availability and functionality of the database for updating the status of the blocked user.
Interfaces	External: Communicates with the user interface for initiating and confirming blocking actions related to user profiles. Internal: Interacts with the database to update the status of the blocked user.
Resources	Hardware: Requires standard hardware configurations. Software: Utilizes the MERN stack for development.
Processing	The module processes administrative actions related to blocking user profiles, including initiating the blocking action, updating the status of the blocked user in the database, and confirming the successful blocking action to the admin.
Data	Data includes user profile information, specifically the status of the user (blocked or active). The module updates this status in the database to reflect the blocking action initiated by the admin.

4. User Interface Design

4.1. Section Overview

This section contains the overall detailed description about the UI design of “PeerConnect”.

4.2. Interface Design Rules

The user interface design adheres to the following design rules:

- The interface follows standard design principles to ensure ease of use and navigation for users.
- The design is responsive, catering to various screen sizes and devices.
- Consideration for accessibility features to accommodate users with diverse needs.
- Ensures compatibility with popular web browsers for a seamless user experience.

4.3. GUI Components

GUI components will be shown below.

4.4. Detailed Description

The user interface for the "Peer Connect" collaborative learning platform is thoughtfully designed to provide an intuitive and engaging experience for users. The interface includes dedicated pages for login, profile editing, group creation, search groups, accept/decline group requests, searching study partners, accept/decline collaboration requests, messaging system, resource sharing, joining/creating virtual sessions, and management of student profiles by administrators. Each page is perfectly created with modern aesthetics, featuring responsive layouts for diverse devices. Users can easily navigate and interact with various components, such as input fields, buttons, and chat interfaces, fostering a seamless and visually appealing user experience. The user interface provides a well-rounded and effective experience for collaborative learning interactions. We aimed to include useful features without making the interface too complicated, striking a balance that allows for both functionality and user-friendly responsiveness.

5. Reuse and relationships to other products

The design incorporates reuse in the following ways:

Front-End Framework (React.js): Leveraging the capabilities of React.js for building dynamic and reusable user interface components.

WebRTC Technology: Utilizing WebRTC for real-time communication features, enhancing the collaborative aspects of the platform.

6. Design decisions and tradeoffs

In designing our collaborative learning platform, we opted for React.js as our front-end framework to harness its dynamic and reusable UI component-building capabilities. This choice facilitates the creation of an interactive and user-friendly interface. Additionally, we incorporated WebRTC technology to enable real-time communication features, enhancing the collaborative nature of our platform. However, these decisions involve tradeoffs. We carefully balance the complexity of incorporating numerous features in the UI with the need for a responsive and efficient user experience. Moreover, adopting WebRTC, while providing excellent communication tools, may introduce added complexity that needs to be weighed against the benefits it brings to our platform's functionality and user engagement.

7.0 Pseudocode for components

7.1 Register

Start

User provides first name, last name, email, password, confirm password, domain, interested subject, and university.

If any field is empty, show a "Required" message.

Validate the entered information.

If passwords do not match, show a "Password Mismatch" message.

Create a new student profile with the provided details.

Save the student profile to the database.

Display a success message for account creation.

End

7.2 Login

Start

User enters email and password.

Validate the entered email and password.

Fetch student data based on the provided email.

If the email or password is incorrect, display an "Invalid Credentials" message.

Generate an authentication token for the student.

Update the last login timestamp.

Display a success message with the authentication token.

End

7.3 Edit Profile

Start

Student selects "Edit Profile".

Navigate to the profile editing page.

Student makes changes to profile information.

Save the changes made by the student.

If student decides not to save, go back to the original profile data.

Display a success message for profile update.

End

7.4 Create Group

Start

Student navigates to the "Create Group" section of the application.

System presents a screen for the user to fill in group details.

Student fills in mandatory information like group name, subject, etc.

If any mandatory information is missing, display a "Required" message.

System validates the entered information for correctness.

If validation fails, display an error message for incorrect information.

Create a new group with the provided details.

Save group information in the database.

Notify the student that the group has been successfully created.

End

7.5 Search for Groups

Start

User navigates to the "Search Groups" section.

System provides a search interface to specify preferences.

User enters desired subject to study.

Retrieve a list of groups matching the criteria.

If no results are found, display a message indicating no matching groups.

Display the search results, showing both manual and recommended groups.

User can click on a group to view more information.

If the user decides to join a group, update the membership status.

End

7.6 Accept/Decline Group Requests

Start

System displays a list of pending requests to the group creator.

For each pending request in the list:

a. Display the name or username of the student who has requested to join.

b. Provide options for the group creator:

i. Click "Accept" to add the requesting student as a member of the group.

- System adds the student to the group.
- System notifies the group creator of the successful addition.

ii. Click "Decline" to remove the join request.

- System removes the join request.
- System notifies the requesting student that their request has been declined.

iii. If the request is no longer valid:

- System notifies the group creator that the request is no longer applicable.

End

7.7 Search Study Partners

Start

User navigates to the "Search Study Partners" section.

Display a search interface for specifying criteria.

User enters search criteria and initiates the search.

Retrieve a list of study partners matching the criteria.

If no study partners are found, display a message indicating no matching partners.

Display the search results, showing both manual and recommended study partners.

User can send collaboration requests to potential study partners.

End

7.8 Accept/Decline Collaboration Requests

Start

The system notifies the student about a received collaboration request.

The student views the collaboration request.

The student decides whether to accept or decline the request.

If the student accepts the request:

a. Add the collaborator's profile to the list of study partners.

b. Display a confirmation message.

If the student declines the request:

- Remove the collaboration request from the notification center.
- Display a confirmation message.

If the request is no longer valid:

- Notify the student that the request is no longer applicable.

End

7.9 Messaging System

Start

The student selects a group or study partner for communication.

The system presents a chat interface for the selected communication entity.

The student types and sends a message.

The system processes and delivers the message to the recipient.

The system displays the response in the chat interface.

If the student decides not to send a message:

- Allow the student to cancel the message.

Messages can be exchanged iteratively between students within a group or study partner.

End

7.10 Resource Sharing

Start

The student selects a resource to share.

The system prompts the student to confirm the sharing action.

If confirmed:

- The system adds the shared resource to the student's dashboard's shared resources section.
- Notify the student that the resource has been successfully shared.

If not confirmed, end the resource sharing process.

The shared resource is now accessible in the student's dashboard.

End

7.10 Join/Create Virtual Session

Start

The user initiates the creation of a virtual session by specifying session details.

The system generates a unique session link.

The system provides sharing options.

- The user can share the session with specific study partners or in the group.

If the user chooses to cancel the session:

- The session ends, and details can no longer be shared.

End

7.11 Manage Student Profiles

Start

The Admin retrieves the student's profile information and displays it.

Admin selects a student profile to view and manage.

Admin can perform actions like reviewing uploaded content.

- The Admin has the option to view and manage various aspects of the student's profile.

End

7.12 Block Profiles

Start

Admin initiates the blocking of a profile.

System retrieves user details based on the provided username.

Admin reviews user details and decides to proceed with blocking.

System updates the user's status to "blocked" and notifies Admin of successful blocking.

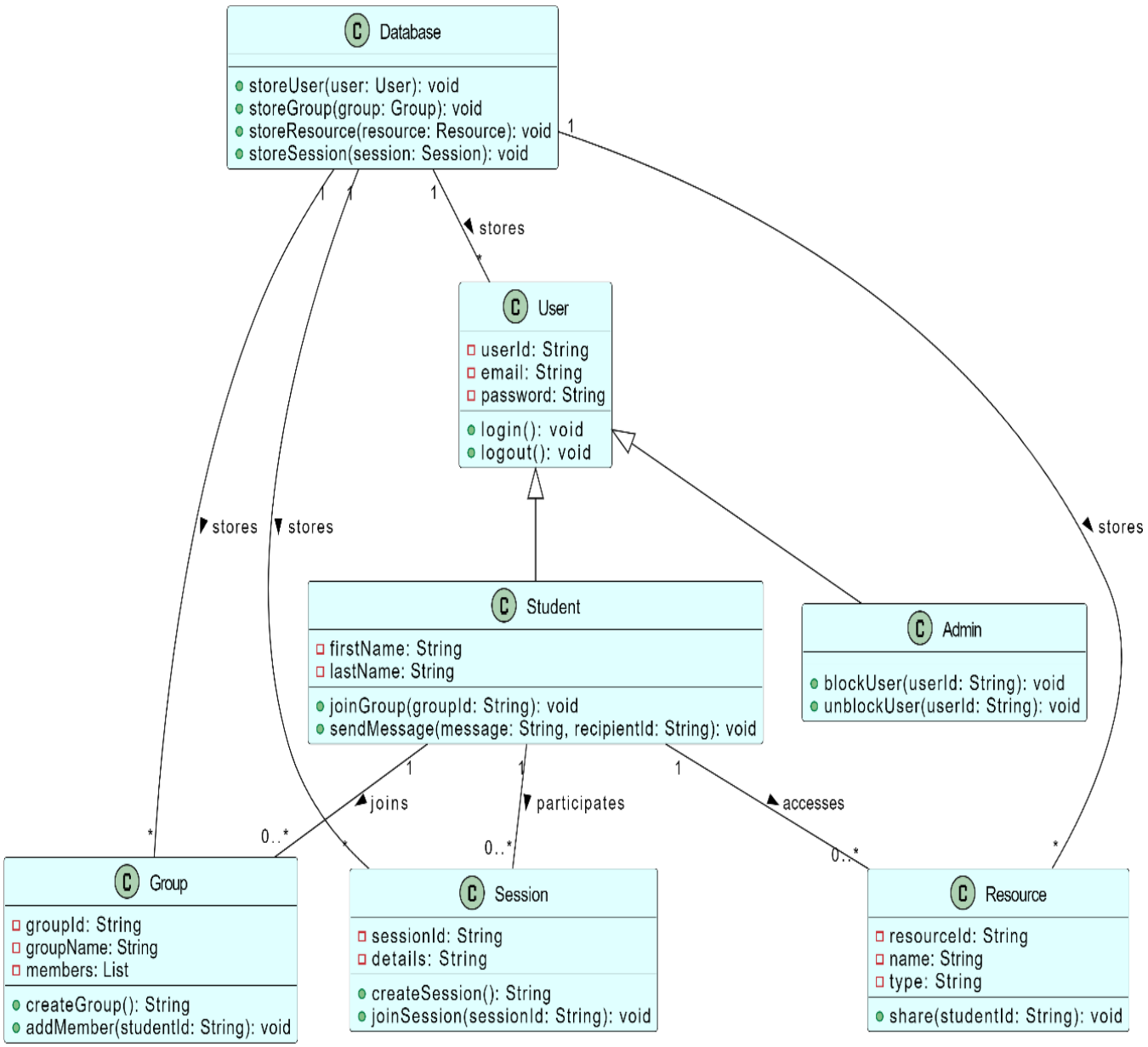
End

8.0 Appendices

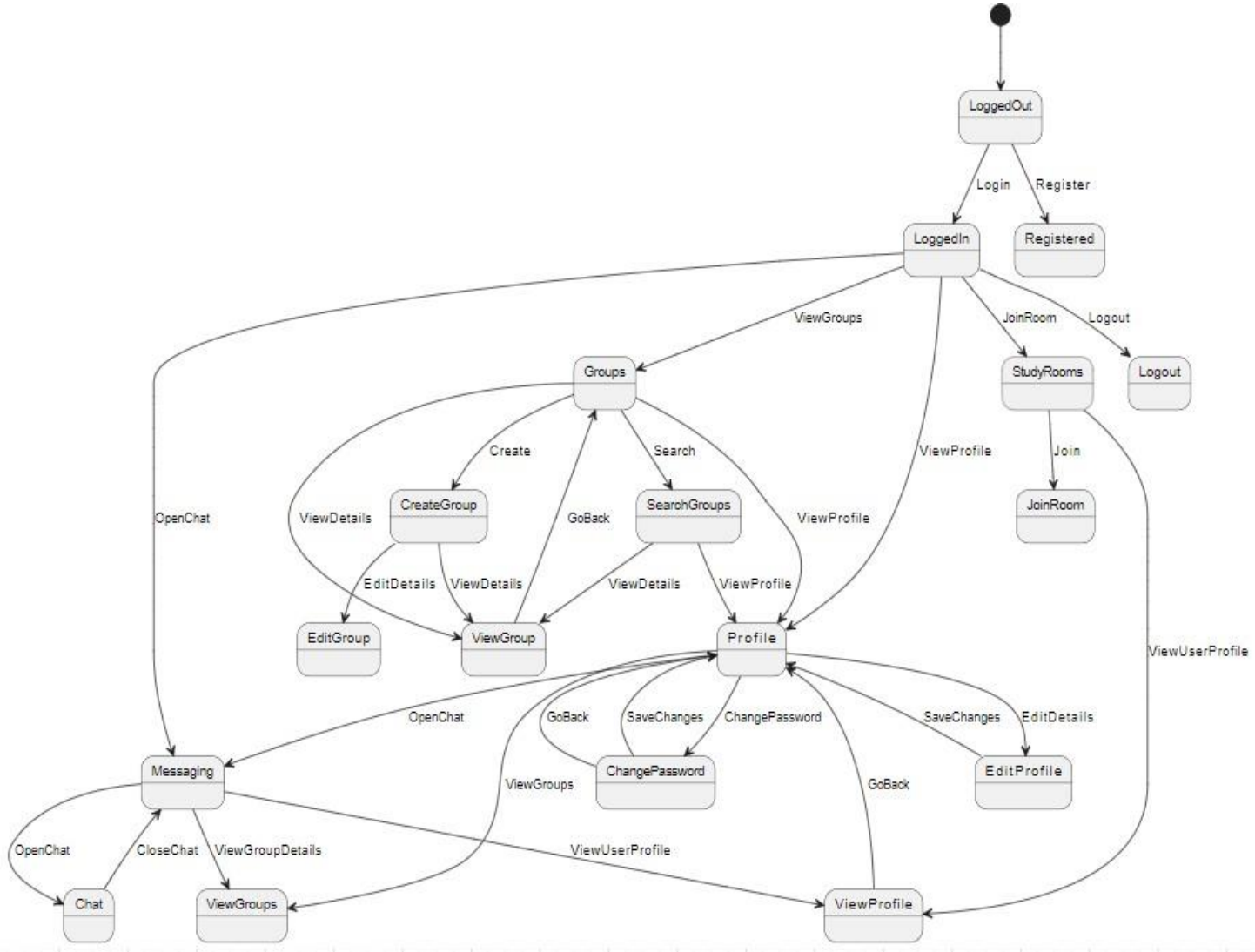
The following list presents the diagrams that should be included at appropriate places

Class Diagram	Describes the structure of a system
Object Diagram	Expresses possible object combinations of a specific Class Diagram
Statechart Diagram	Expresses possible states of a class (or a system)
Activity Diagram	Describes activities and actions taking place in a system
Sequence Diagram	Shows one or several sequences of messages sent among a set of objects
Collaboration Diagram	Describes a complete collaboration among a set of objects
Use-case Diagrams	Illustrates the relationships between use cases
Component Diagram	A special case of a Class Diagram used to describe components within a software system
Deployment Diagram	A special case of a Class Diagram used to describe hardware within the overall system architecture
System Block diagram	A diagram showing the major components of the system with its interconnections and external interfaces

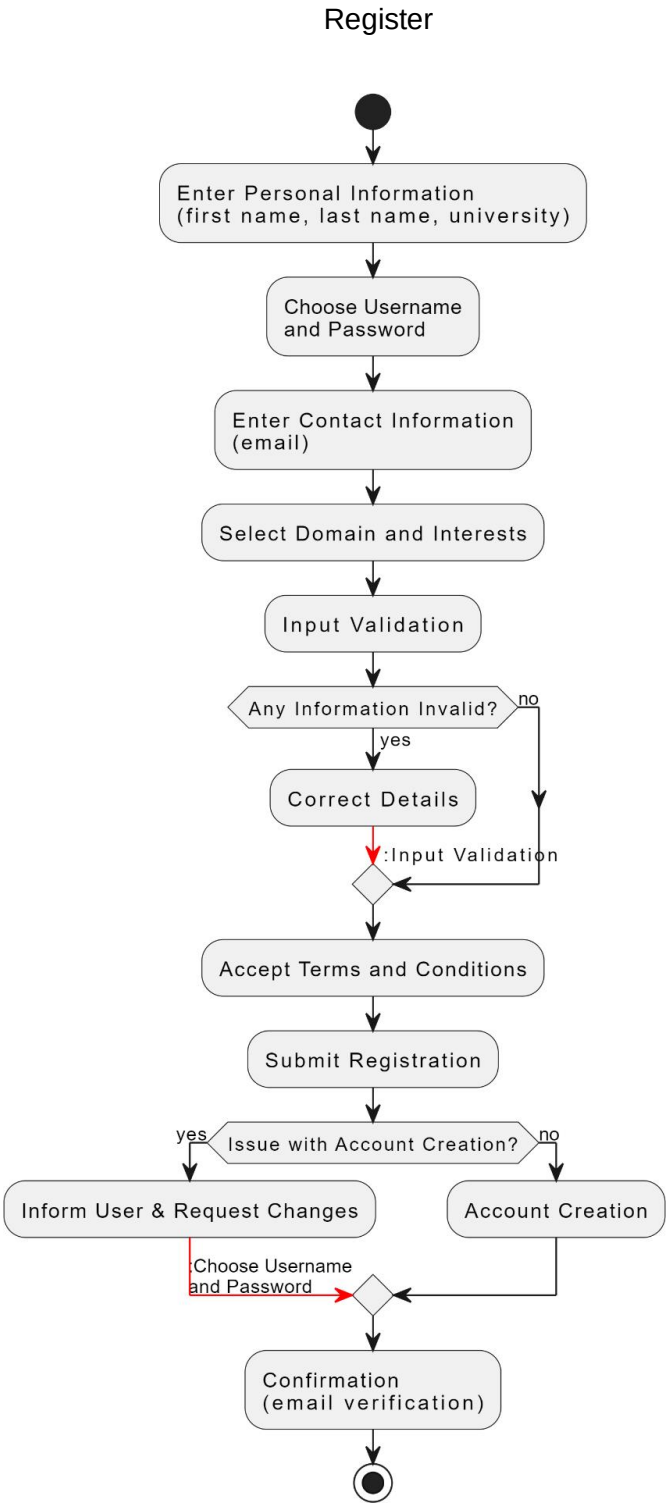
Object Diagram



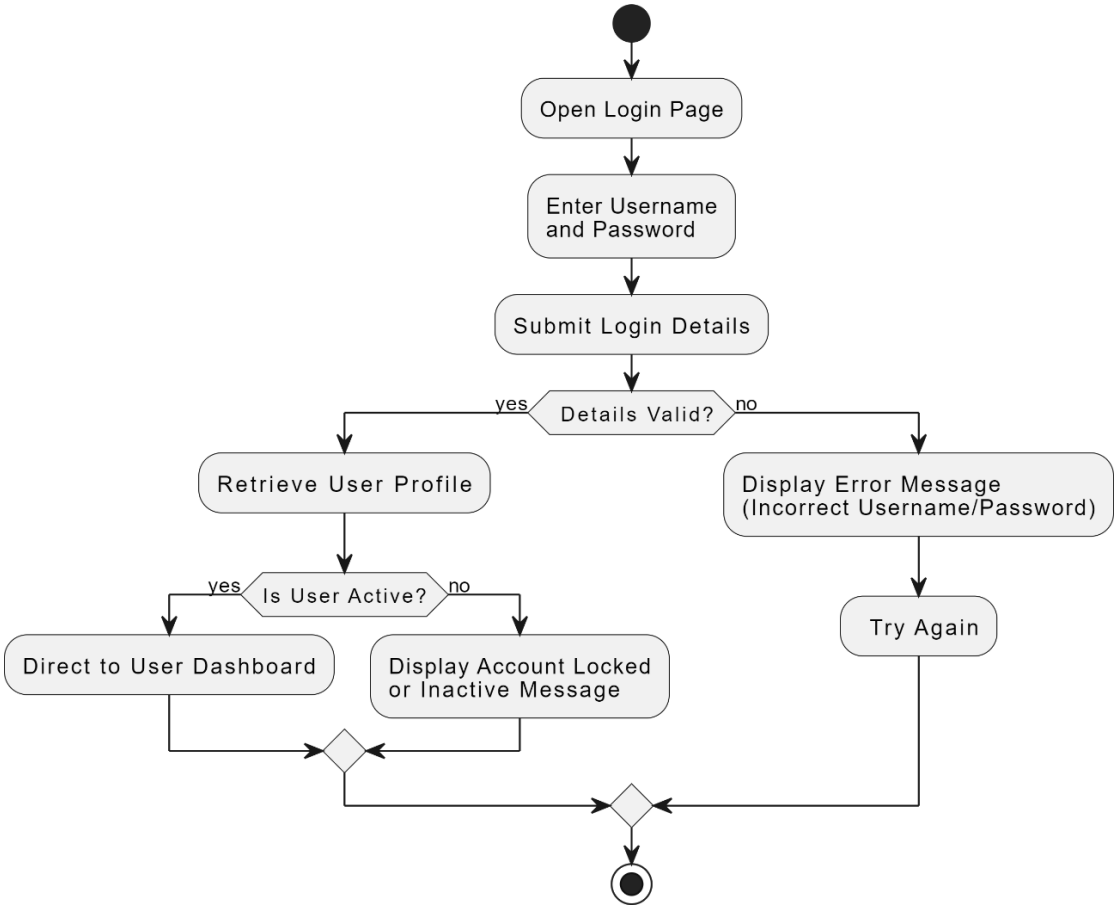
StateChart Diagram:



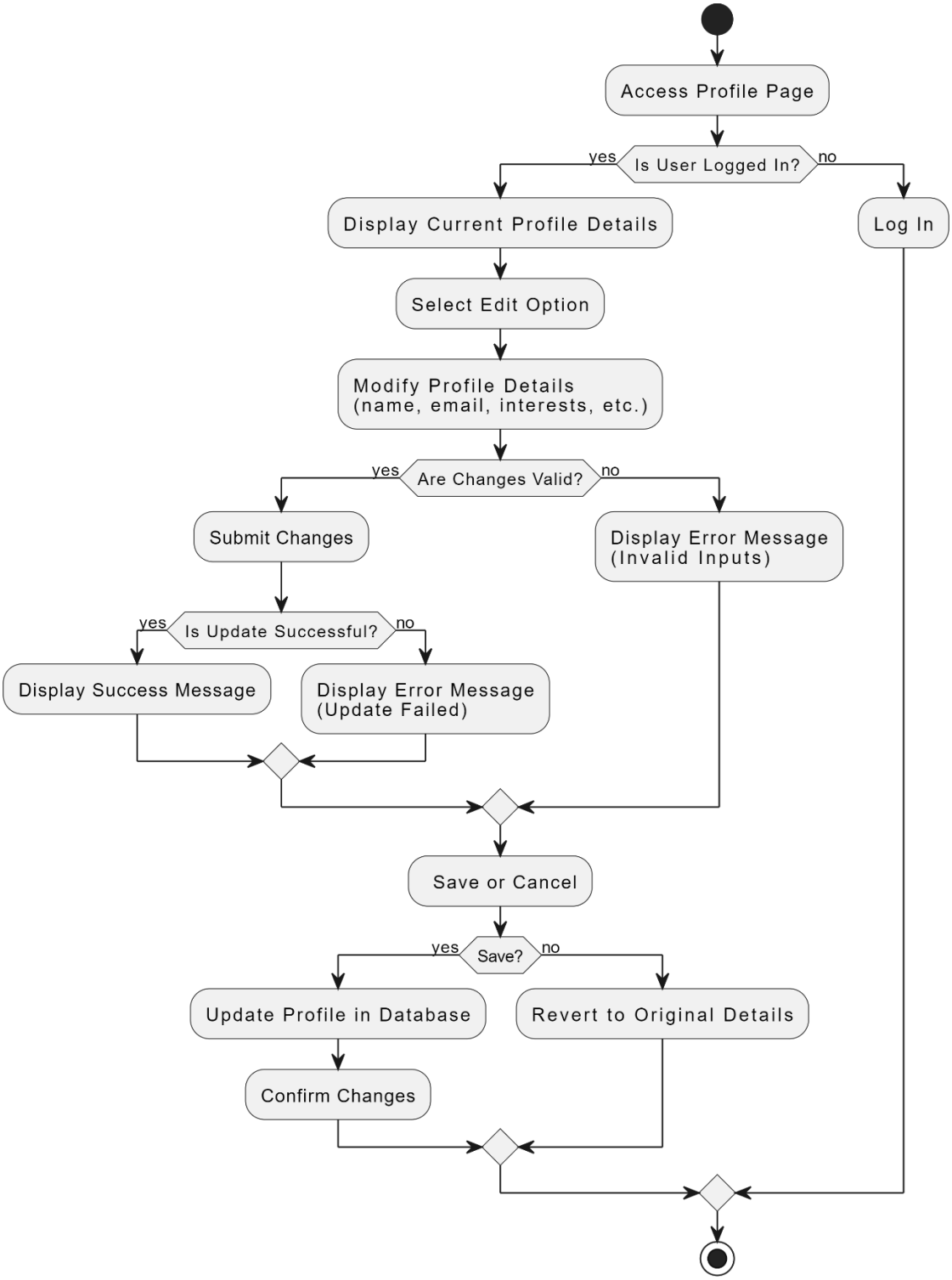
Activity Diagram:



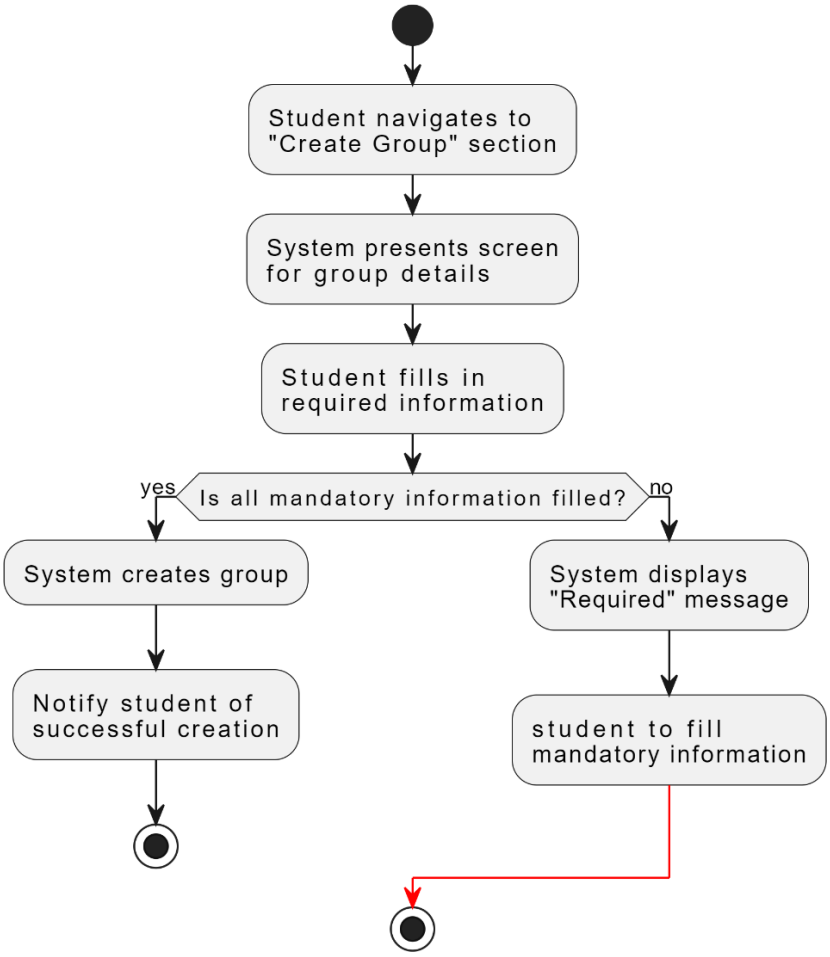
Login


Open Login Page
Enter Username and Password
Submit Login Details
Details Valid?
yes
no
Retrieve User Profile
Display Error Message (Incorrect Username/Password)
Is User Active?
yes
no
Try Again
Direct to User Dashboard
Display Account Locked or Inactive Message

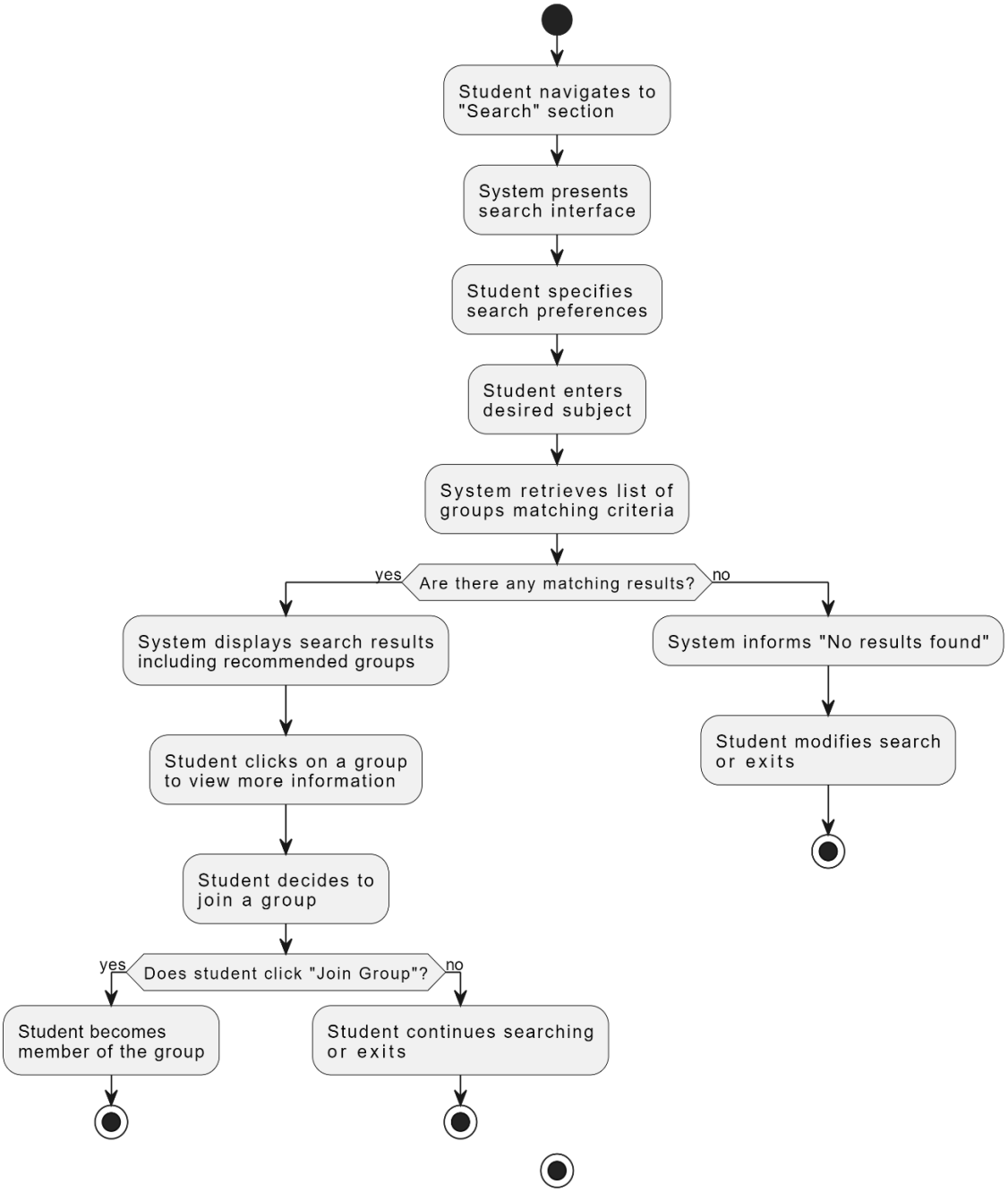
Edit Profile



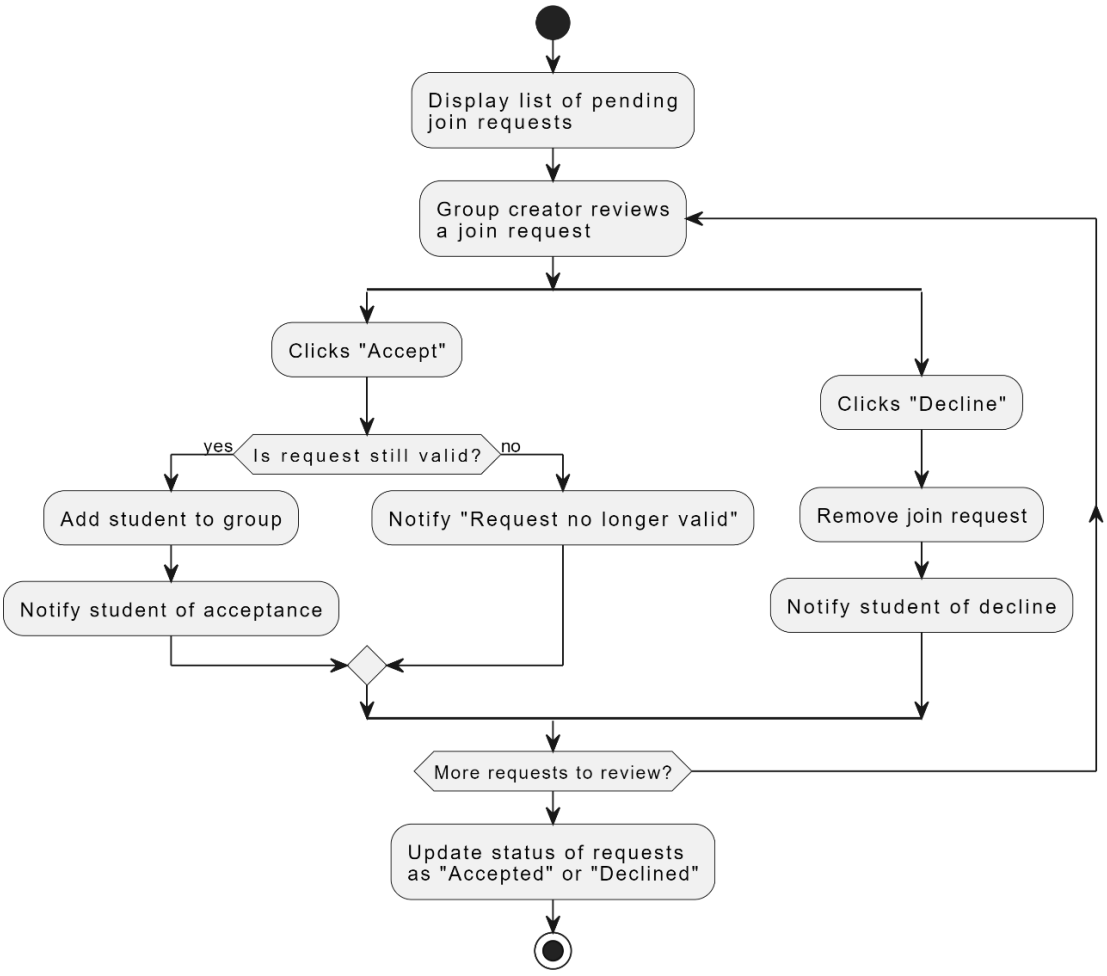
Create Group



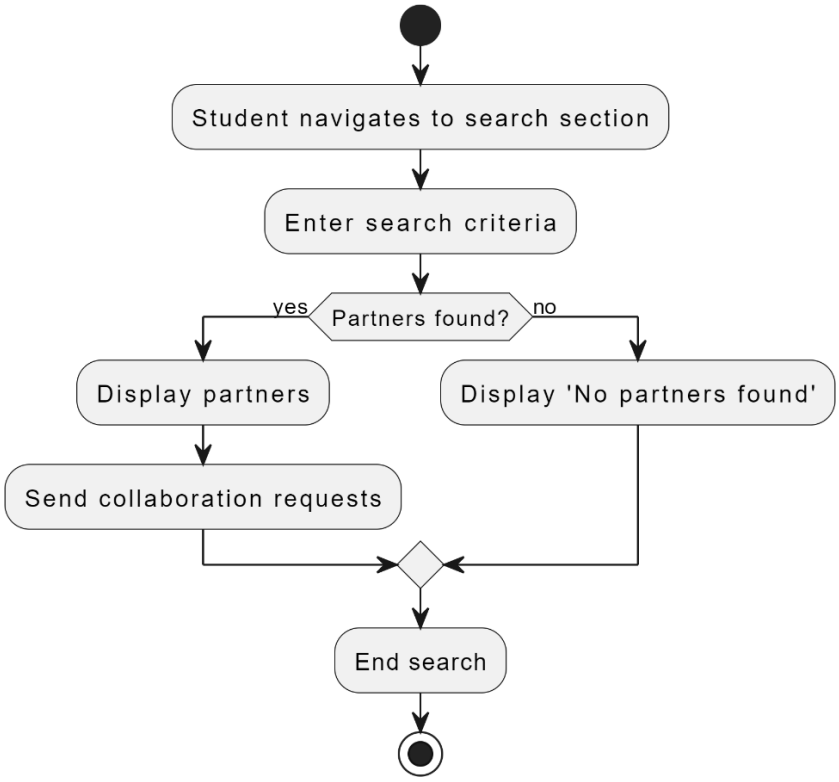
Search for group



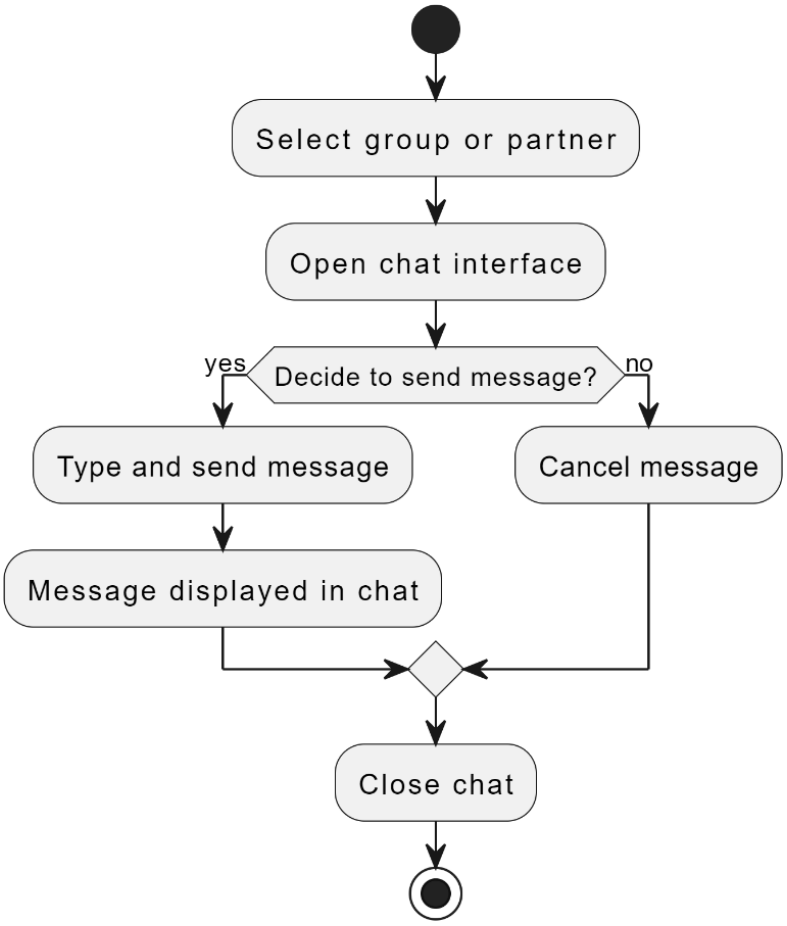
Accept/Decline group requests



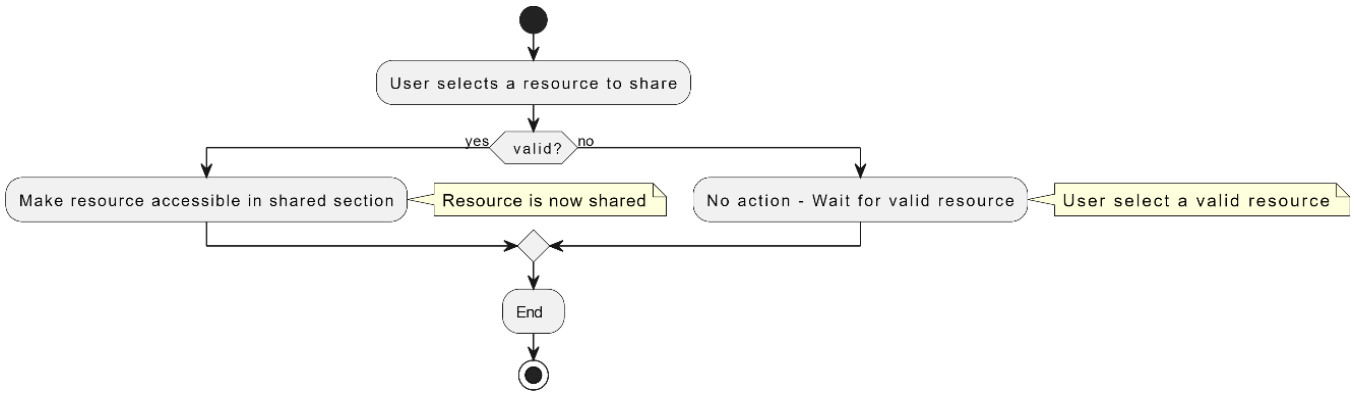
Search study partner



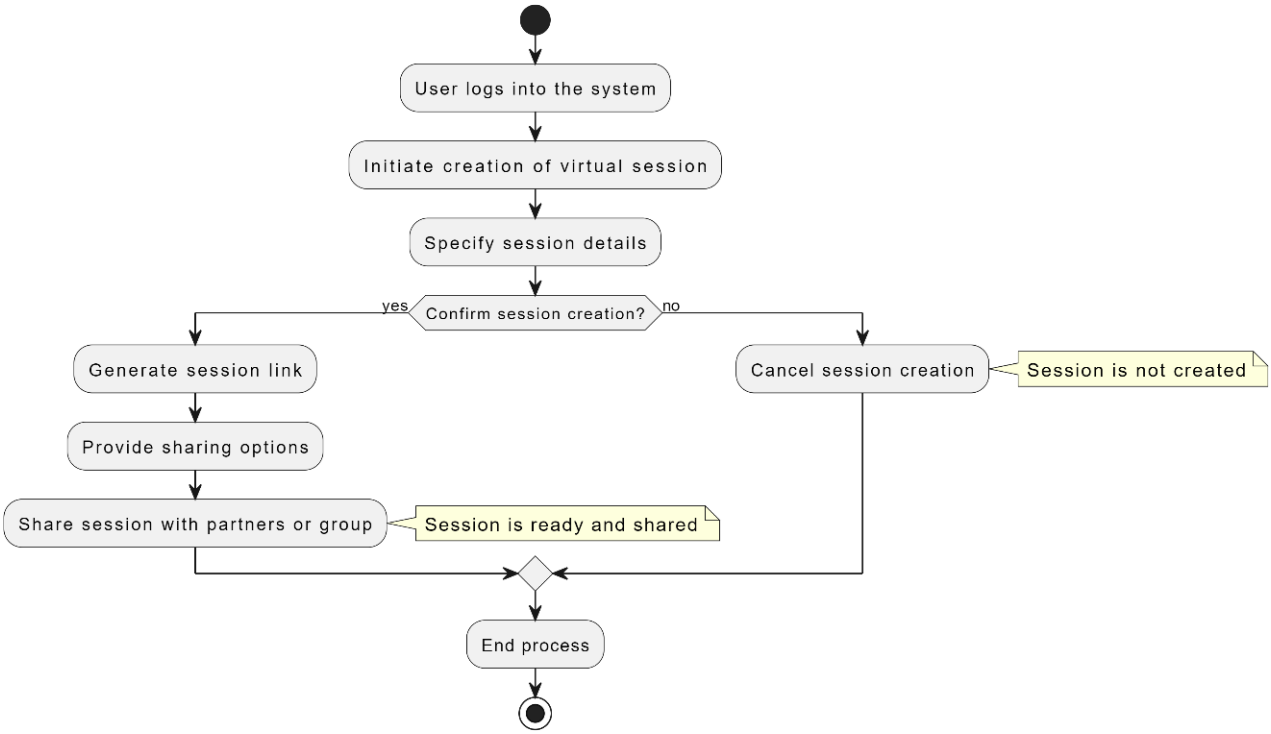
Messaging system



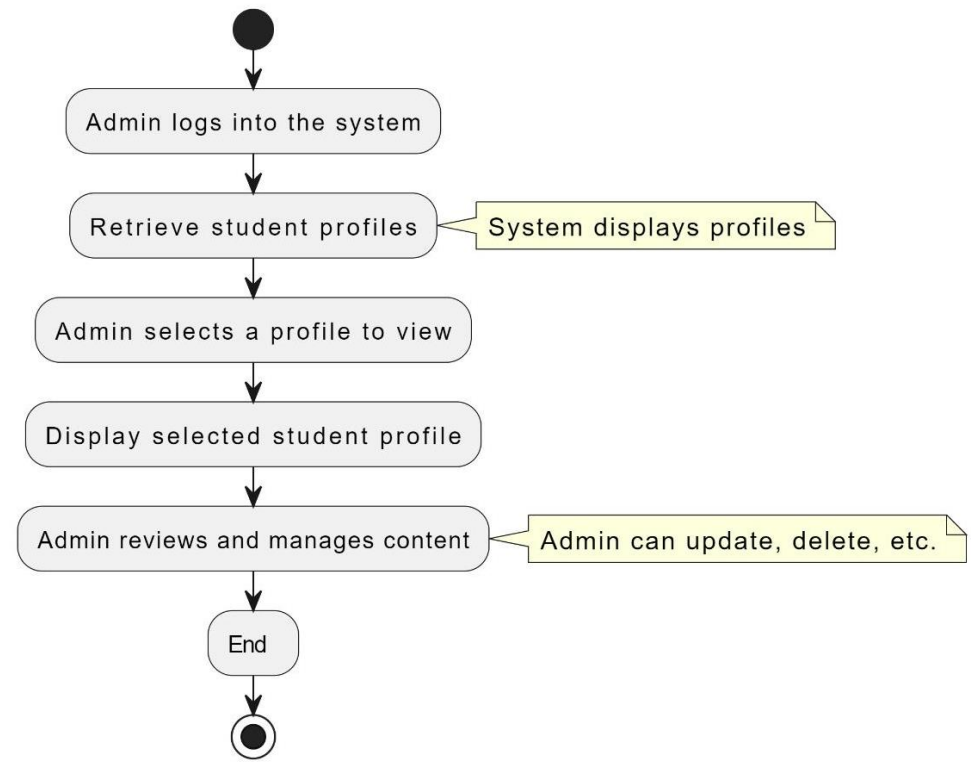
Resource sharing



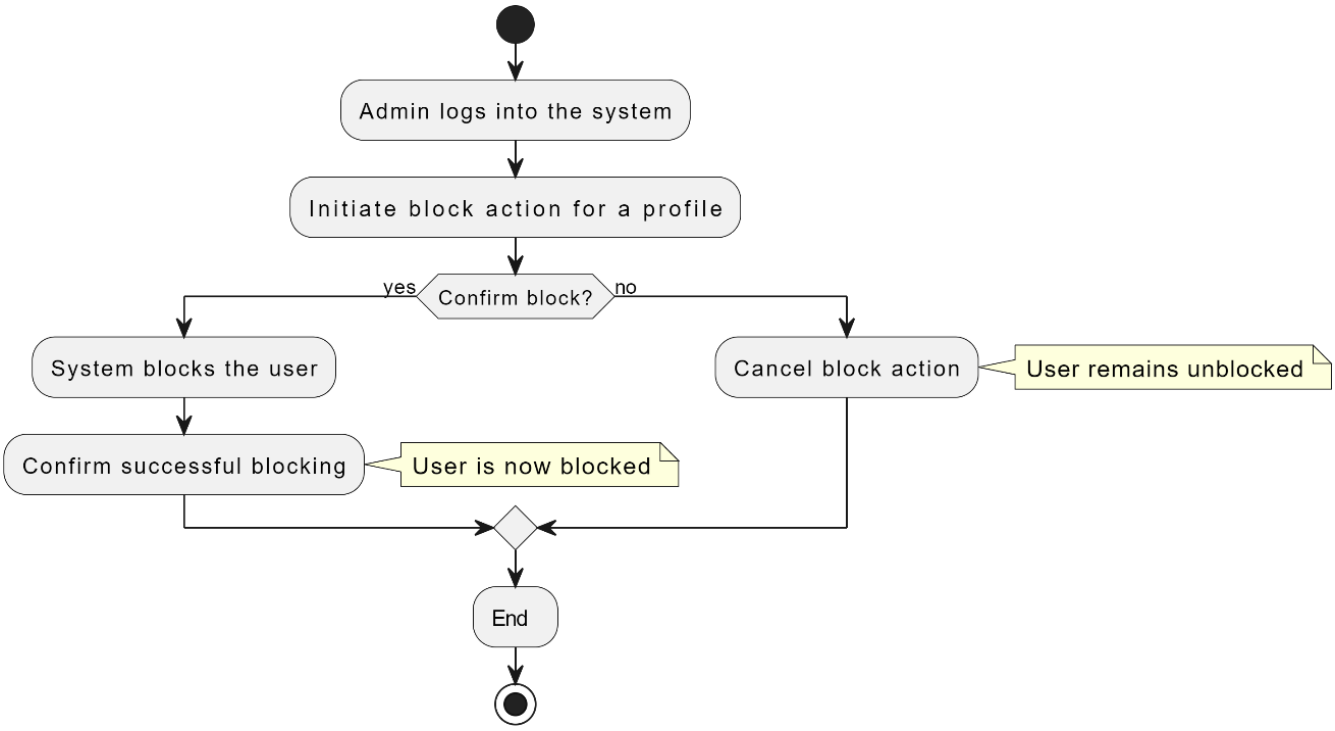
Join/Create Virtual Session



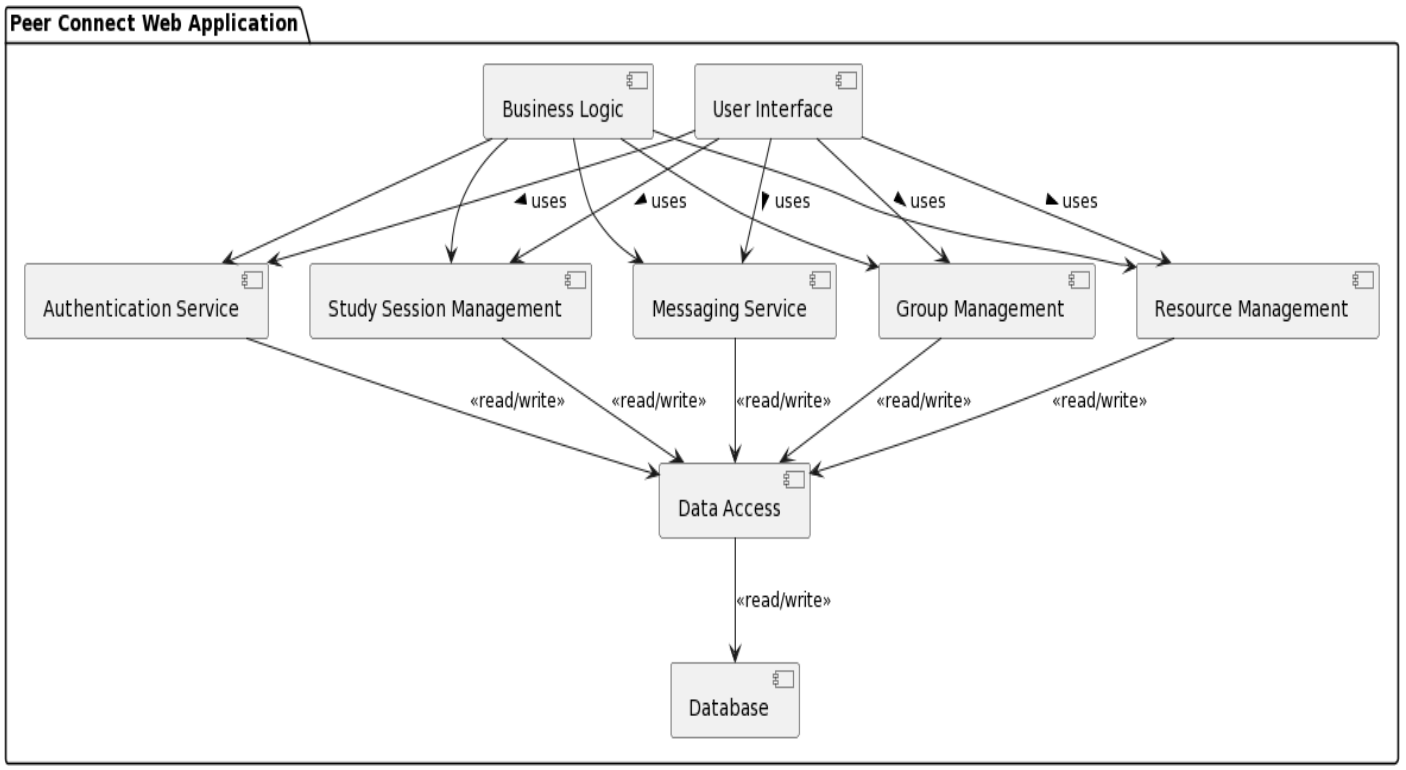
Manage Profile (Admin)



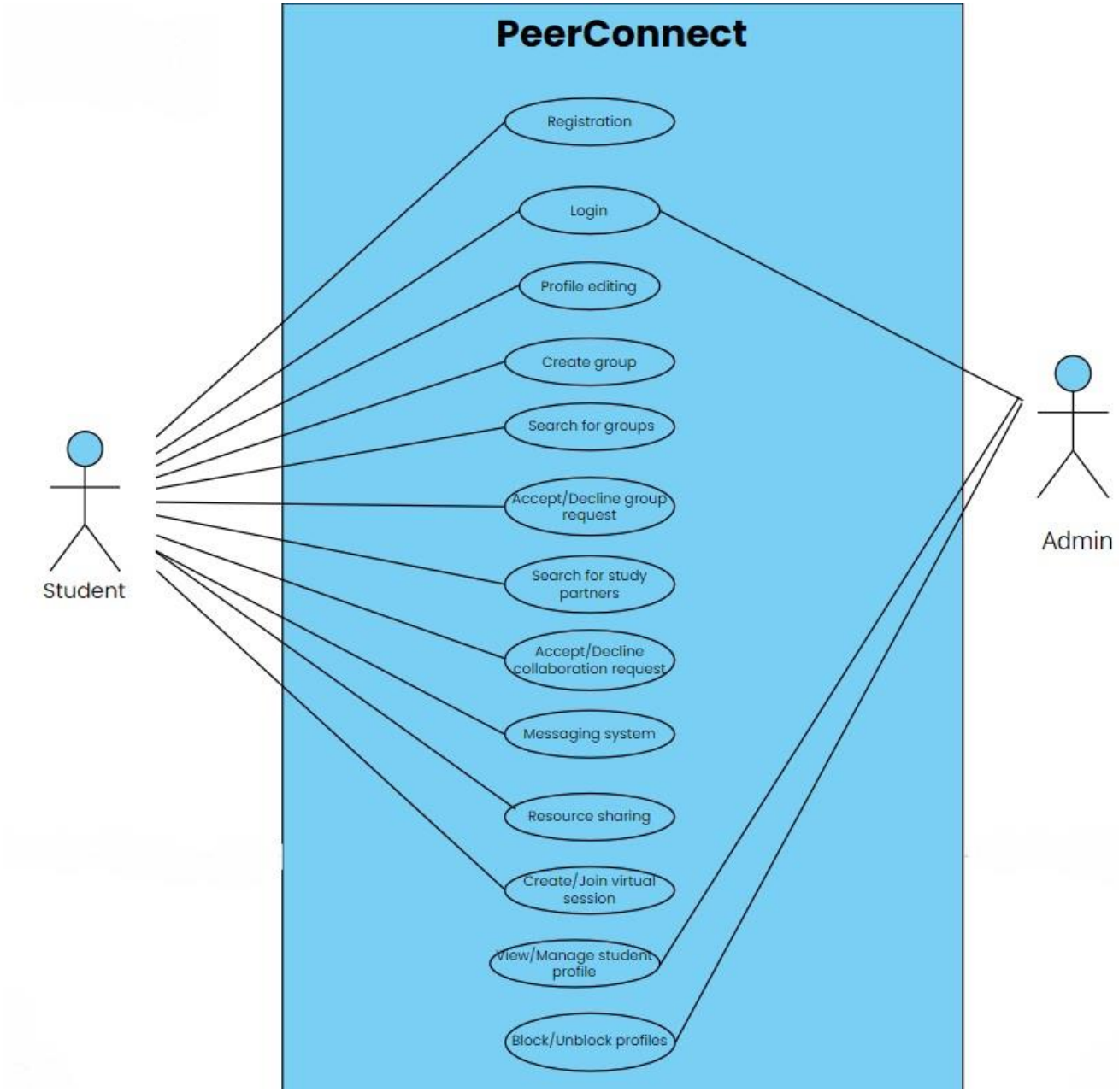
Block profile (Admin)



Component Diagram:

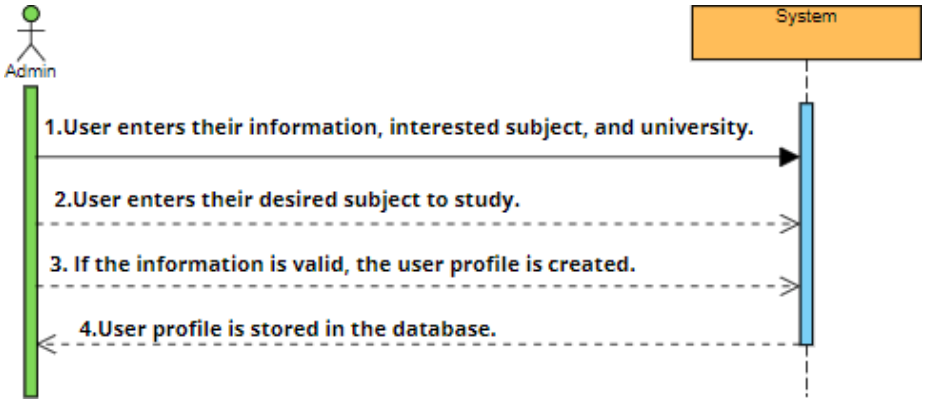


Use Case Diagram:

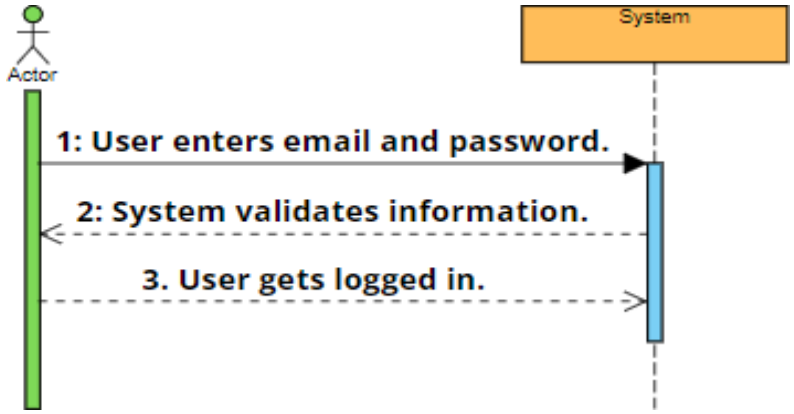


System Sequence Diagrams

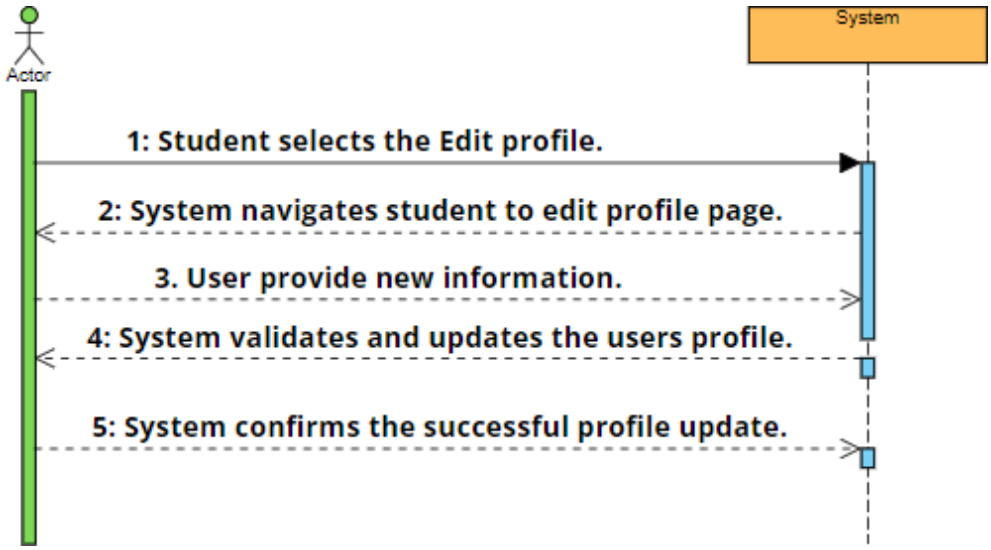
Register



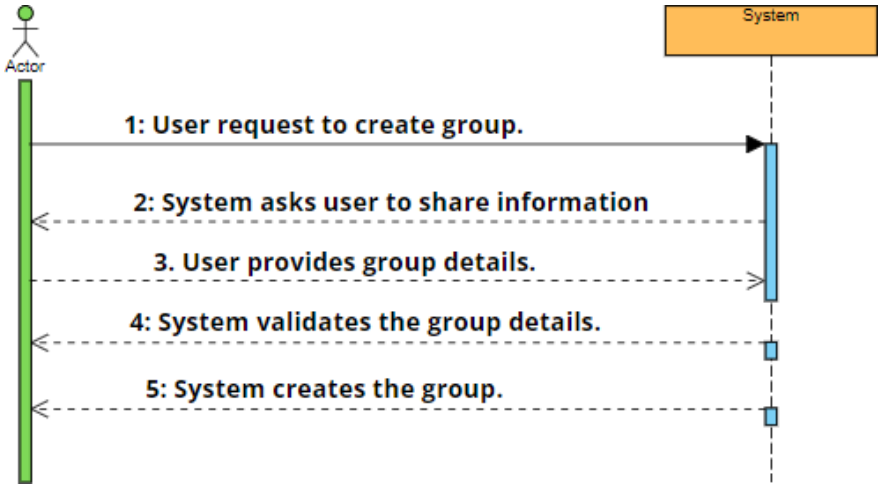
Login



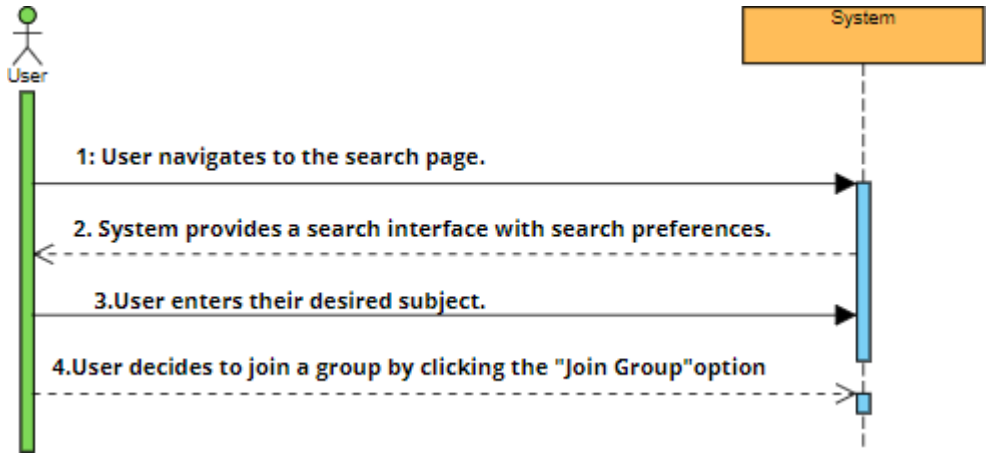
Edit Profile



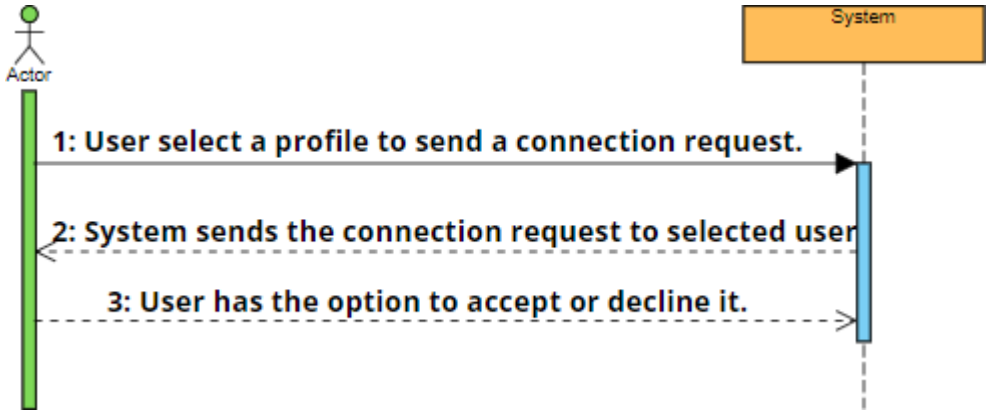
Create Group



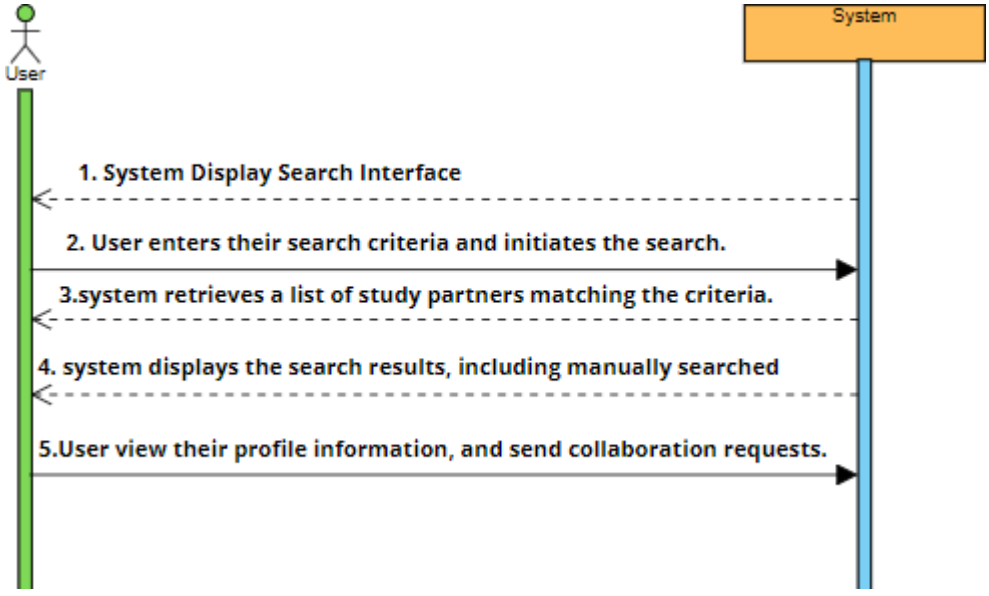
Search for groups



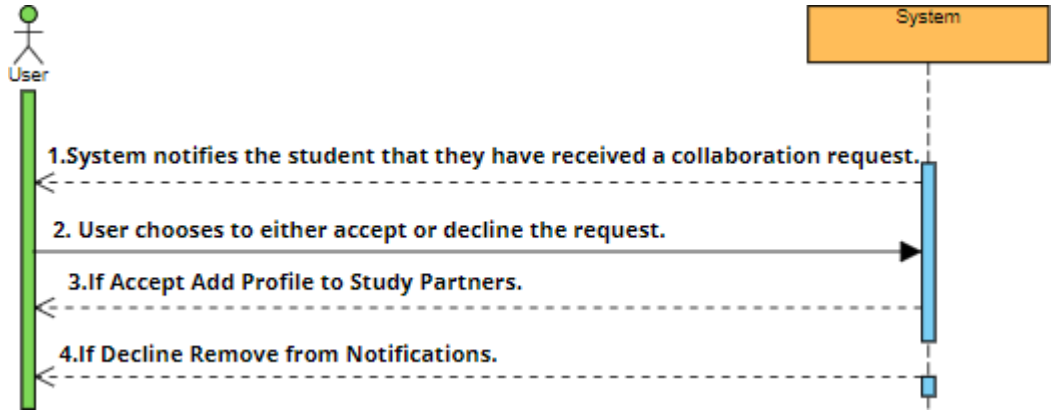
Accept/Decline group Request



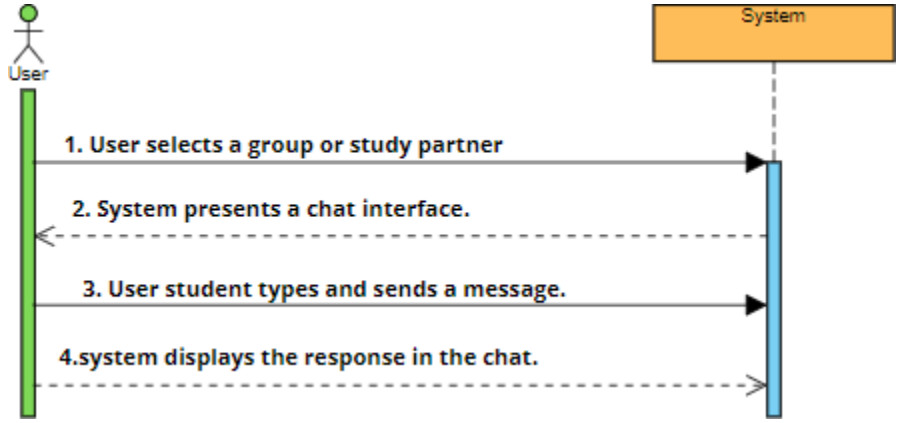
Search Study Partners



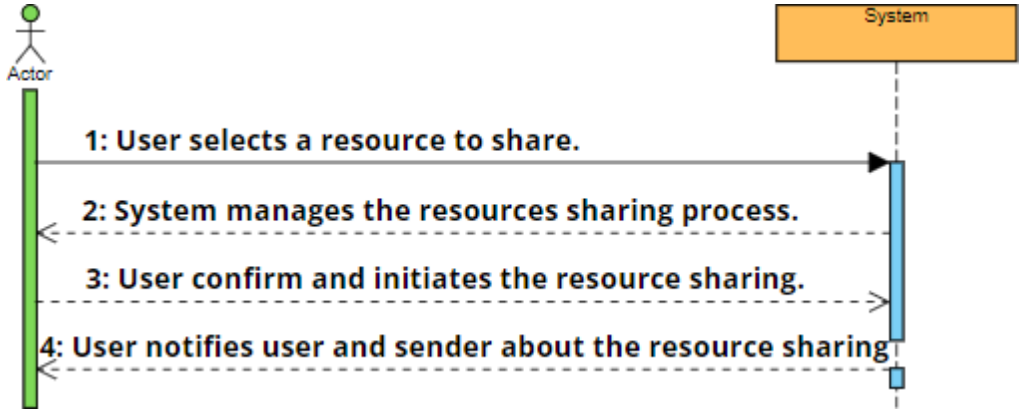
Accept/Decline Collaboration Requests



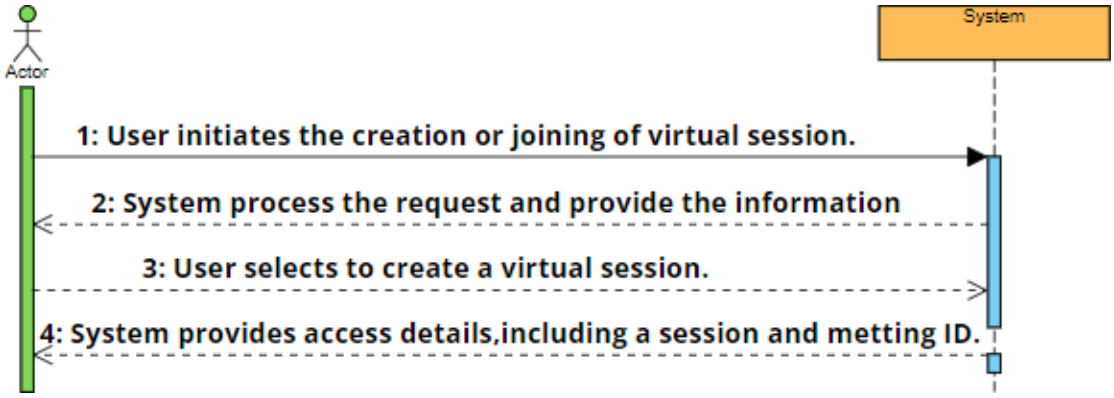
Messaging System



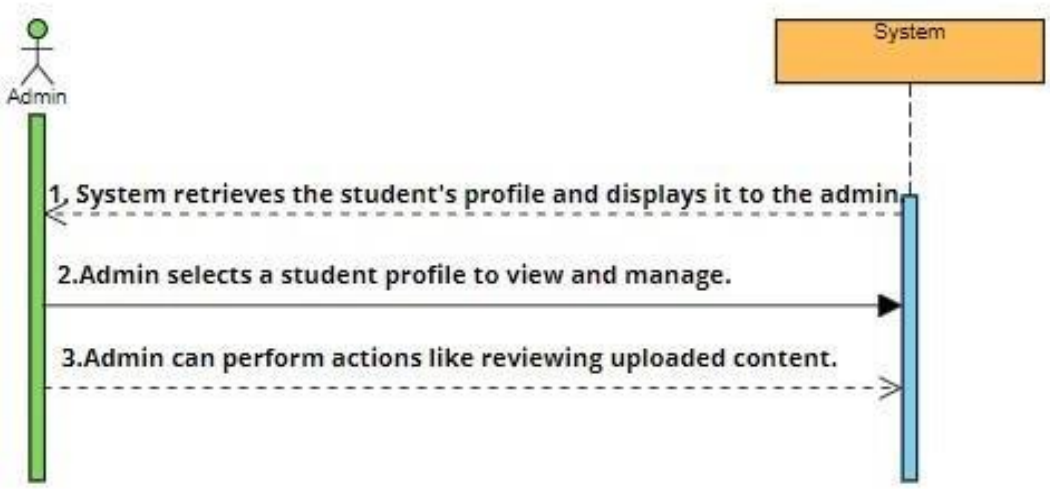
Resource Sharing



Join /Create Virtual Session

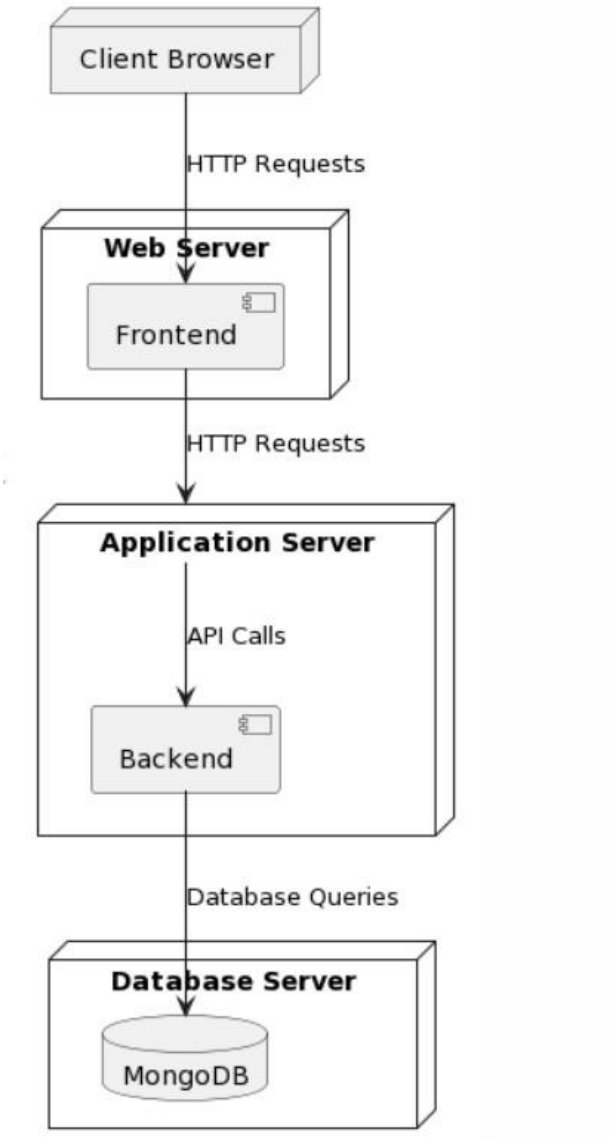


Manage Profile



Block Profile

Deployment Diagram:



System Block