FYP Document “Study Sphere”

Software Requirements And Design Specification

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Contents

1 Introduction

1.1 System Introduction

Study Sphere is an Android-based application designed to enhance the learning experience for students by integrating study management with social collaboration features. It serves as a platform where students can manage study materials, collaborate with peers, generate quizzes and summaries, track their progress, and earn rewards, all under administrative oversight. Key features include group collaboration, study material sharing, quiz generation, progress tracking, and a reward system to motivate students. Study Sphere aims to foster a collaborative and engaging learning environment, combining academic tools with social interaction to support students in achieving their educational goals.

1.2 Background of the System

In the digital age, education has increasingly shifted towards online and collaborative platforms, yet many students still struggle with organizing study materials, staying motivated, and collaborating effectively with peers. Traditional study methods often lack the interactivity and community support that modern learners need. Recognizing this gap, Study Sphere was developed as an innovative mobile application to revolutionize the way students study by integrating academic tools with social features. The idea behind the Study Sphere is to transform the solitary act of studying into a collaborative and rewarding experience, leveraging technology to connect students globally and provide them with tools to enhance their learning efficiency.

1.3 Objectives of the System

- Provide a digital platform that enhances the study experience, making it more interactive, organized, and rewarding for students.
- Create a space where students can collaborate with peers, share study materials, and engage in group discussions, fostering a sense of community.
- Offer tools for generating summaries, quizzes, and Q&A sessions to support active learning and self-assessment.
- Enable students to track their progress and earn rewards, encouraging consistent study habits and motivation.
- Provide administrative oversight to ensure a safe and productive environment for all users.

1.4 Significance of the System

Study Sphere addresses the modern need for a comprehensive study platform that combines academic tools with social collaboration. By enabling students to manage study materials, collaborate with friends, and track their progress, Study Sphere enhances the learning experience, making it more engaging and efficient. The system fosters a global community of learners, allowing students to connect over shared academic interests, share resources, and support each other. Additionally, the reward system motivates students to stay committed to their studies, while administrative oversight ensures a safe and constructive environment. Study Sphere supports education by providing tools for organization, self-assessment, and collaboration, ultimately contributing to improved academic outcomes and a deeper appreciation for learning.

2 Overall Description

2.1 Product Perspective

Study Sphere operates at the intersection of educational tools and social collaboration platforms, distinguishing itself by focusing on student-centric features. Unlike generic study apps or social media platforms, Study Sphere integrates study management with peer collaboration, offering functionalities like group creation, study material sharing, quiz generation, and progress tracking. It leverages technologies such as mobile connectivity, cloud storage for study materials, and real-time chat functionalities, innovating in how they are applied to education.

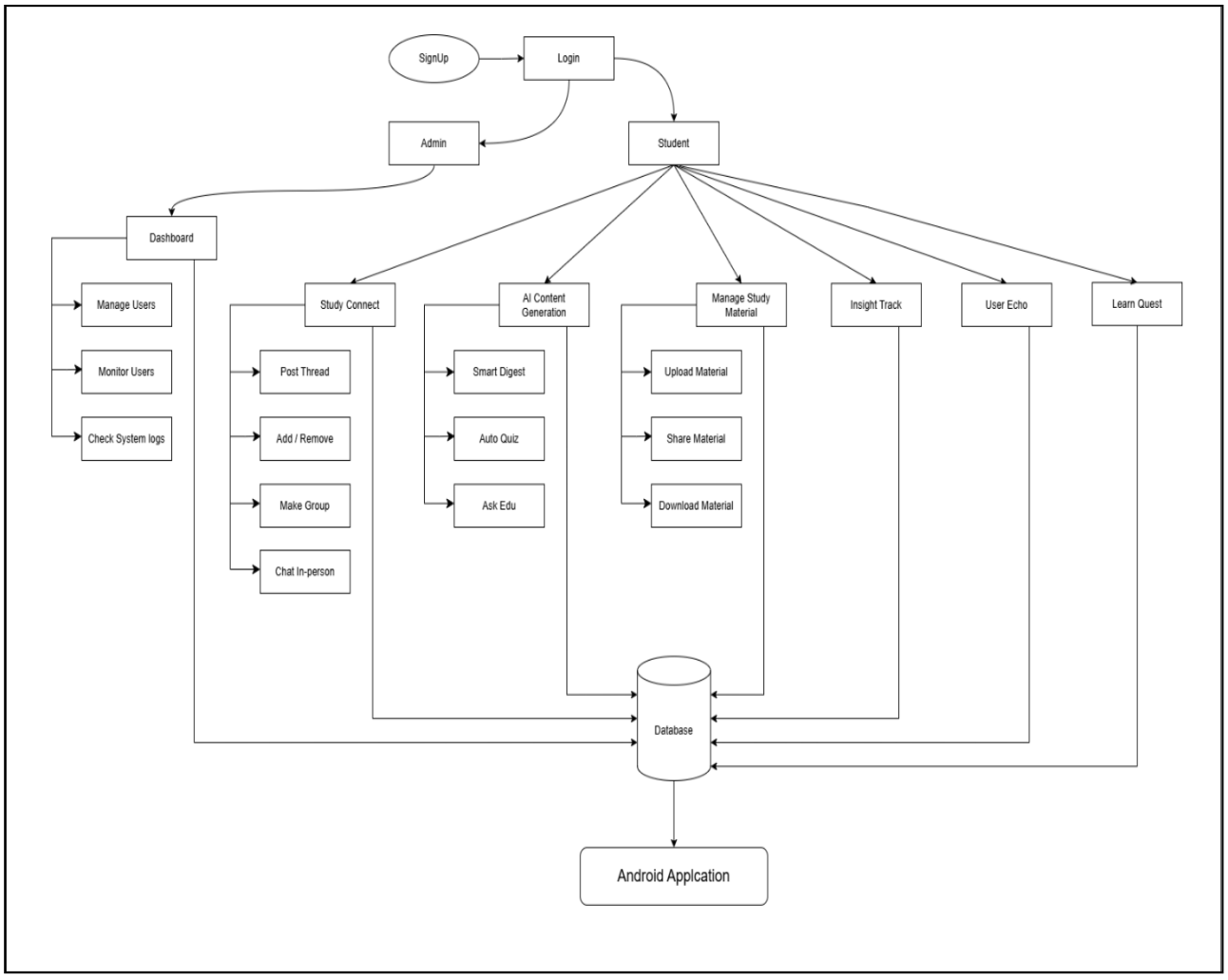

Figure 2.1: System Design

2.2 Product Scope

Study Sphere is designed to be a comprehensive platform for students, aiming to redefine how they study and collaborate. Its scope includes features for managing study materials (uploading, categorizing, sharing, downloading), collaborating with peers (group creation, chatting, posting threads), generating learning resources (summaries, quizzes, Q&A), tracking progress, and earning rewards. The system also includes administrative oversight to monitor user activities and ensure a safe environment. Study Sphere seeks to bridge the gap between individual study and collaborative learning, creating a vibrant community where students can support each other academically.

2.3 Product Functionality

2.3.1 Study Management:

- **Material Management**: Students can upload, categorize, share, and download study materials, ensuring easy access and organization.
- **Summary and Quiz Generation**: Students can generate summaries and quizzes from study materials to aid in learning and self-assessment.
- **Progress Tracking**: Students can monitor their study progress, including quiz scores and completed materials, to stay on track with their goals.

2.3.2 Collaboration Features

- **Group Collaboration**: Students can create groups, post discussion threads, and chat with friends, fostering collaborative learning.
- **Q&A Sessions**: Students can ask questions and receive answers from peers or the system, promoting knowledge sharing.

2.3.3 Engagement and Oversight

- **Rewards System**: Students earn rewards (e.g., points, badges) for completing activities like quizzes, motivating consistent engagement.
- **Administrative Monitoring**: Admins can monitor user activities to ensure proper usage and maintain a safe environment.

2.4 Users and Characteristics

- **Student**:
    - **Description**: Primary users who use the app to study, collaborate, and track progress. They vary in academic levels, study habits, and technological expertise.
    - **Activities**: Registering, logging in, managing study materials, collaborating with friends, generating quizzes, tracking progress, giving feedback, and earning rewards.

- **Admin**:
    - **Description**: Oversees the app's functionality, manages users, and ensures a safe environment.
    - **Activities**: Monitoring user activities, managing user accounts, and resolving issues.

2.5 Operating Environment

Study Sphere is an Android application developed using Flutter, with Firebase as the back-end database for real-time data storage and user authentication.

- **Hardware Platform**: Designed to run on smartphones and tablets.
    - **Minimum Requirements**:
        - **Processor:** Quad-core or equivalent
        - **RAM:** At least 4 GB
        - **Storage:** Minimum of 100 MB of free storage space, with additional space for user data (e.g., study materials, quiz results).
- **Operating System**:
    - **Android:** Supports Android 5.0 (Lollipop) and higher.
    - **iOS:** Not supported.
- **Other Requirements**:
    - **Internet Connection:** A stable internet connection is required for data synchronization and real-time collaboration.
    - **Permissions:** The app requires permissions for storage access and network connectivity.

3 Specific Requirements

3.1 Functional Requirements

3.1.1 User Account Management

Requirement ID	Requirement	Description
SFR-001	User Registration	Users must be able to create accounts using email via Firebase Authentication.
SFR-002	User Login	Users must be able to log in with credentials or single sign-on methods.
SFR-003	Profile Management	Users should be able to update profiles, including name, bio, profile picture.

3.1.2 Note Sharing

Requirement ID	Requirement	Description
SFR-004	Upload Notes	Users must be able to upload study materials.
SFR-005	Share Notes	Users should be able to share notes publicly or within private study groups.
SFR-006	Search Notes	Users should be able to search notes using tags, categories, or keywords.

3.1.3 Discussion and Collaboration

Requirement ID	Requirement	Description
SFR-007	Discussion Threads	Users must be able to post questions and replies in forum-style discussions.
SFR-008	Group Chats	Users should be able to create/join public or private group chats with file-sharing capabilities.
SFR-009	Notifications	Users should be able to receive real-time notifications for new messages or thread replies.

3.1.4 AI-Powered Tools

Requirement ID	Requirement	Description
SFR-010	Text Summarization	System must be able to generate summaries from uploaded content.
SFR-011	Quiz Generation	System must be able to create quizzes based on study materials.
SFR-012	Context-Aware Q&A	Users must be able to ask questions on uploaded content, and the system should provide accurate responses.

3.1.5 Gamified Learning

Requirement ID	Requirement	Description
SFR-013	Reward System	Users should be able to earn points/badges for activities like note sharing, quiz completion, and discussions.
SFR-014	Leaderboards	The system should be able to display user rankings based on earned points to encourage participation.

3.1.6 Progress Tracking

Requirement ID	Requirement	Description
SFR-015	Activity Logging	The system should be able to track time spent on summaries, quizzes, and discussions.

3.1.7 User Feedback

Requirement ID	Requirement	Description
SFR-016	User Feedback	Users must be able to provide feedback through surveys or suggestion boxes.

3.1.8 Administrative Functions

Requirement ID	Requirement	Description
SFR-017	User Management	Admins must be able to view, suspend, or delete user accounts.
SFR-018	Feedback Review	Admins should be able to access and act on user feedback.

3.2 Behaviour Requirements

3.2.1 Use Case Diagram for Study Sphere

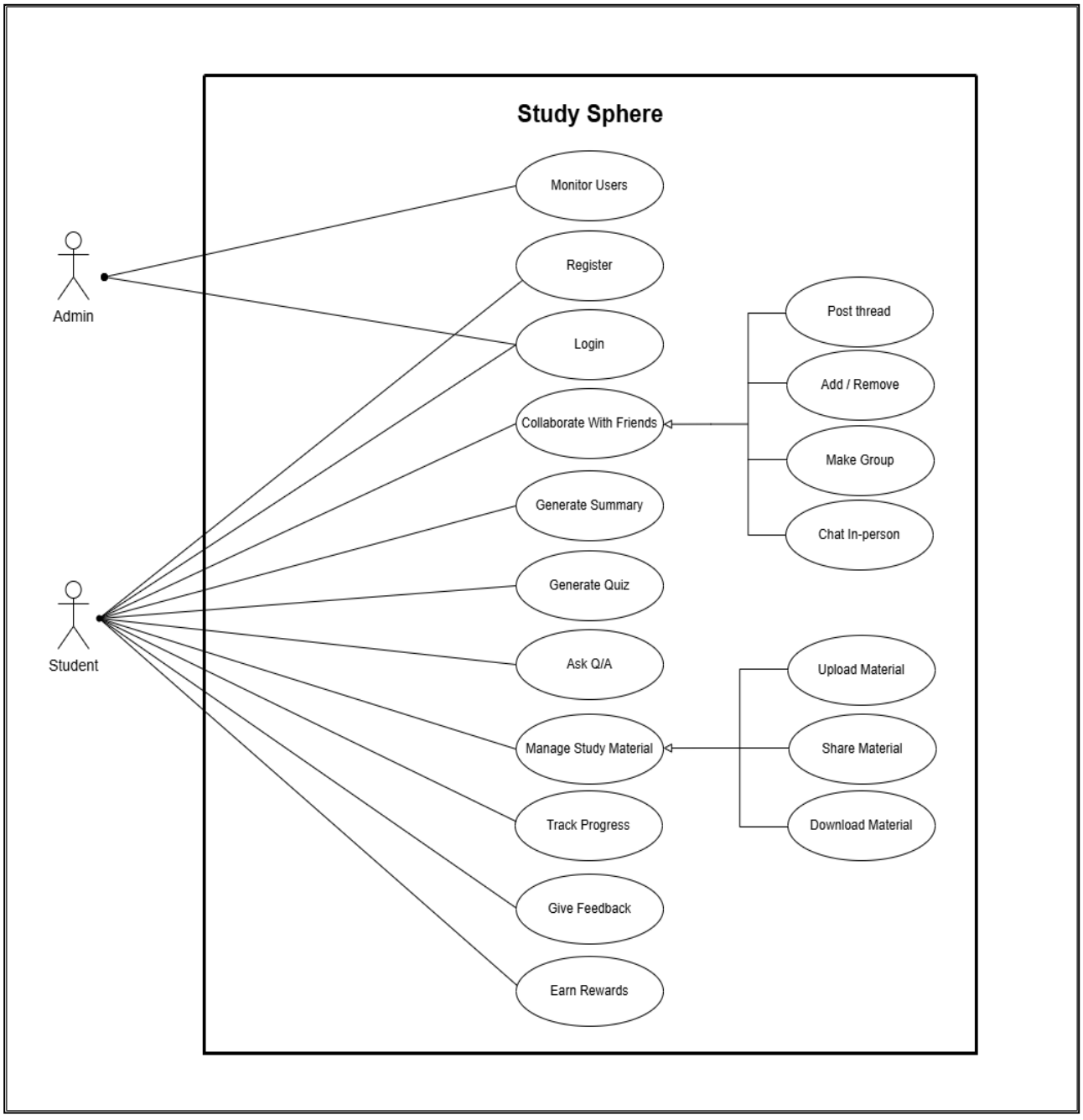

Figure 3.1: Use Case Diagram of System

3.2.2 Use Case #1: Monitor Users

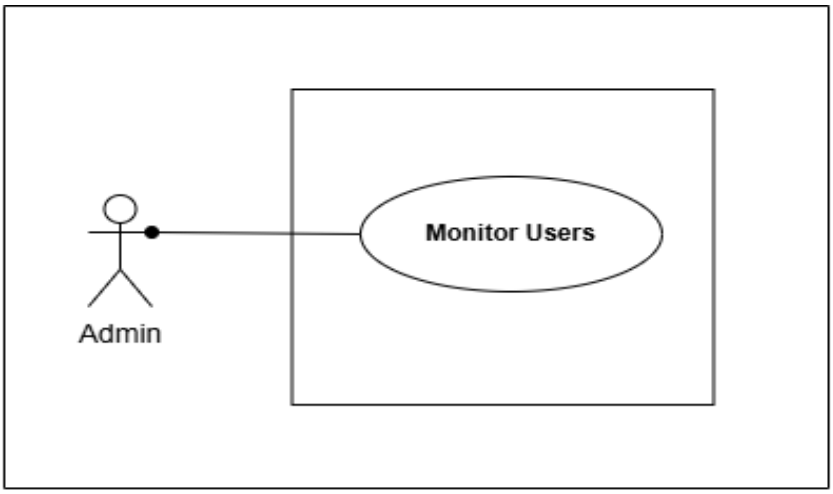

Figure 3.2: Use Case Diagram for Monitor Users

Table 1: For Monitor Users

Field	Details
Actors	Admin
Description	The admin monitors the activities of students to ensure proper usage.
Pre-Condition	Admin must be logged into the system with appropriate permissions.
Steps	1. Admin logs into the system. 2. Admin selects the "Monitor Users" option. 3. System displays user activity data. 4. Admin reviews the data.
Post-Condition	Admin receives a report or dashboard of user activities.

3.2.3 Use Case #2: Register

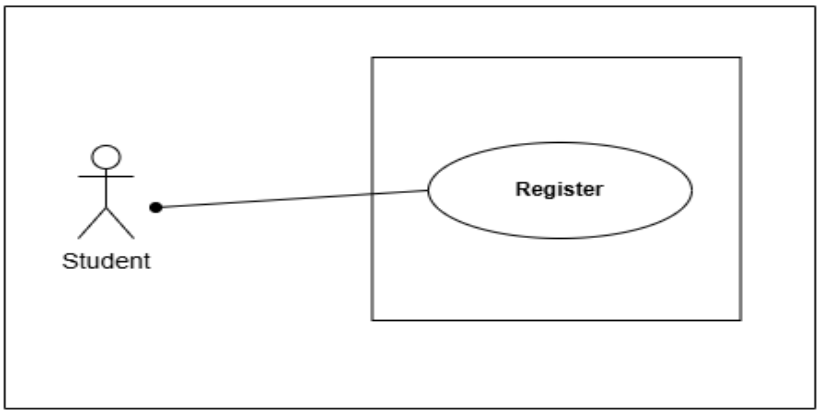

Figure 3.3: Use Case Diagram for Register

Table 2: For Register

Field	Details
Actors	Student
Description	A student creates an account to access the Study Sphere system.
Pre-Condition	The student must not already have an account.
Steps	1. Student accesses the registration page. 2. Student provides required details (e.g., name, email, password). 3. System validates the input. 4. System creates the account.
Post-Condition	The student is registered and can log in.

3.2.4 Use Case #3: Login

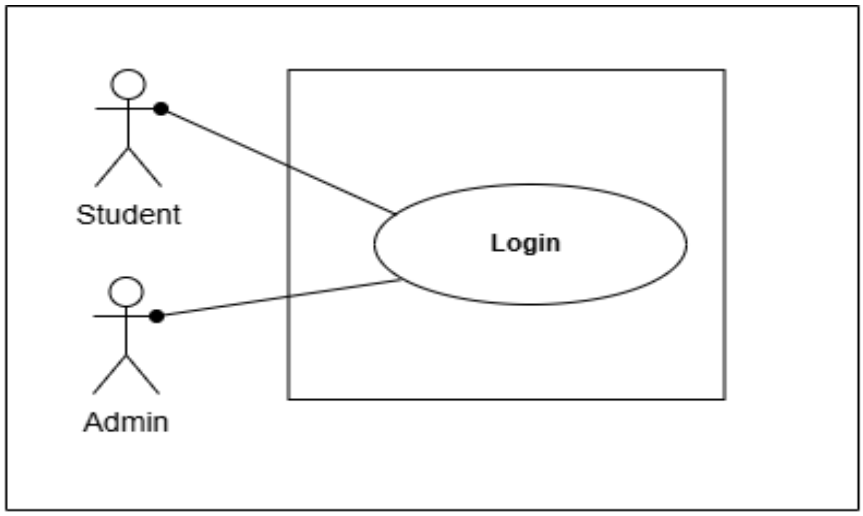

Figure 3.4: Use Case Diagram for Login

Table 3: For Login

Field	Details
Actors	Student, Admin
Description	A User logs into the system to access its features.
Pre-Condition	The User must have a registered account.
Steps	1. User enters their credentials (e.g., email, password). 2. System verifies the credentials. 3. System grants access and redirects to the dashboard.
Post-Condition	The User is authenticated and gains access.

3.2.5 Use Case #4: Collaborate with Friends

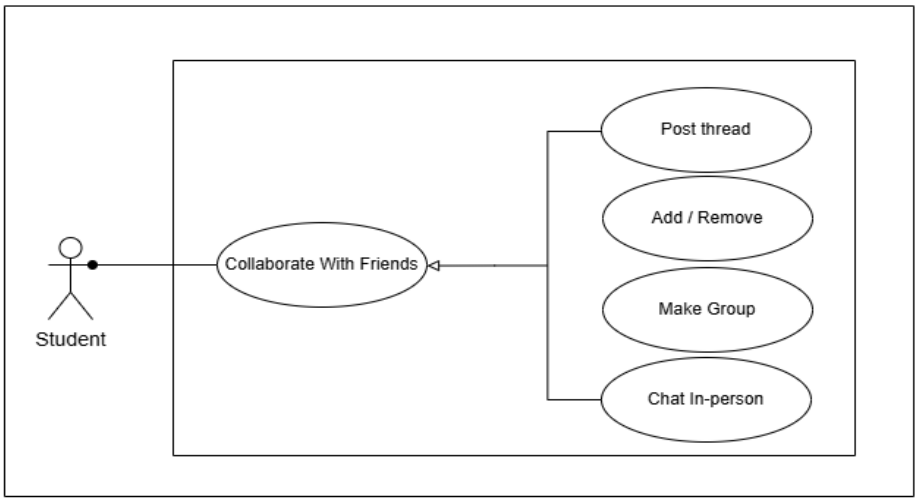

Figure 3.5: Use Case Diagram for Collaborate with Friends

Table 4: For Collaborate with Friends

Field	Details
Actors	Student
Description	A student collaborates with friends by creating groups, posting threads, chatting.
Pre-Condition	The student must be logged in.
Steps	1. Student selects the "Collaborate with Friends" option. 2. Student chooses to create a group, post a thread, chat or add/remove a friend. 3. System facilitates the chosen action.
Post-Condition	The student successfully collaborates with friends.
Relationships	Extends: Post Thread, Add/Remove, Make Group, Chat.

3.2.6 Use Case #5: Generate Summary

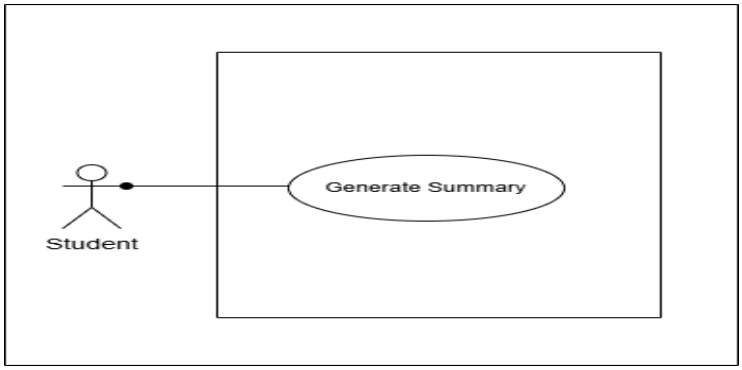

Figure 3.6: Use Case Diagram for Generate Summary

Table 5: For Generate Summary

Field	Details
Actors	Student
Description	A student generates a summary of study materials.
Pre-Condition	The student must be logged in and have content available.
Steps	1. Student selects the "Generate Summary" option. 2. Student uploads the content to summarize. 3. System generates a summary.
Post-Condition	A summary is generated and available to the student.

3.2.7 Use Case #6: Generate Quiz

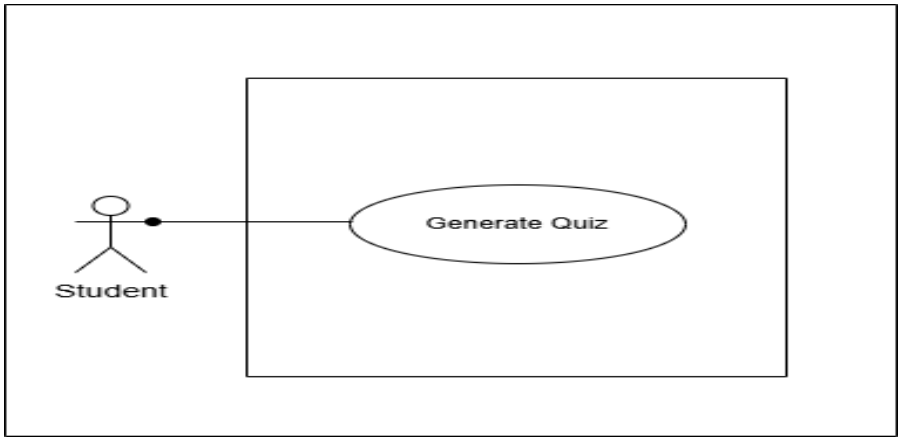

Figure 3.7: Use Case Diagram for Generate Quiz

Table 6: For Generate Quiz

Field	Details
Actors	Student
Description	A student generates a quiz based on study materials.
Pre-Condition	The student must be logged in and have study materials available.
Steps	1. Student selects the "Generate Quiz" option. 2. Student chooses the study material. 3. System generates a quiz with questions.
Post-Condition	A quiz is generated and available for the student.

3.2.8 Use Case #7: Ask Q/A

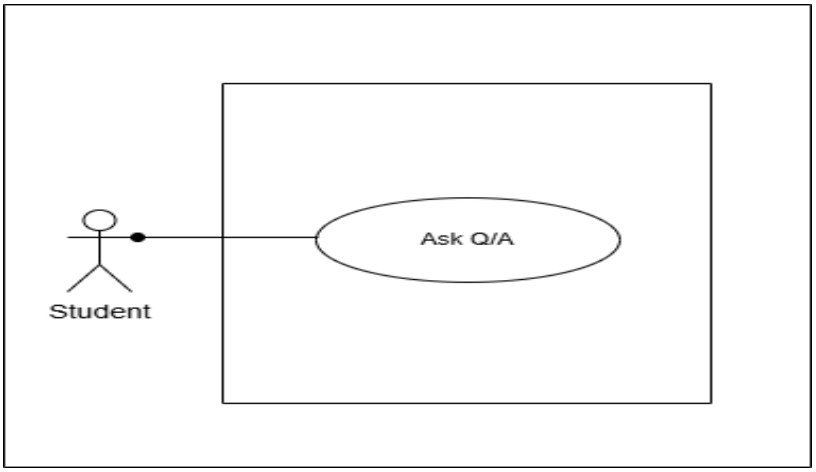

Figure 3.8: Use Case Diagram for Ask Q/A

Table 7: For Ask Q/A

Field	Details
Actors	Student
Description	A student asks questions and receives answers from the system.
Pre-Condition	The student must be logged in.
Steps	1. Student selects the "Ask Q/A" option. 2. Student submits a question. 3. System provide an answer.
Post-Condition	The student receives an answer to their question.

3.2.9 Use Case #8: Manage Study Material

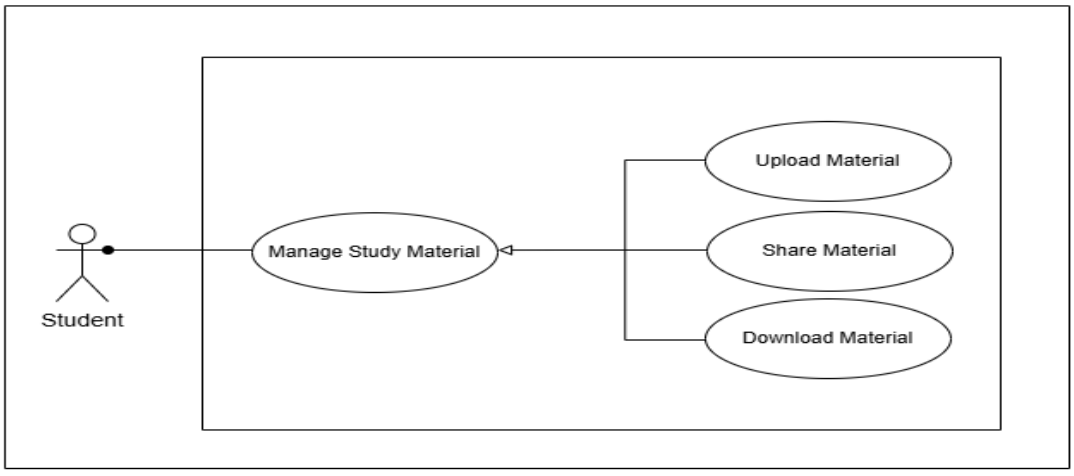

Figure 3.9: Use Case Diagram for Manage Study Material

Table 8: For Manage Study Material

Field	Details
Actors	Student
Description	A student manages study materials by uploading, categorizing, sharing, etc.
Pre-Condition	The student must be logged in.
Steps	1. Student selects the "Manage Study Material" option. 2. Student chooses to upload, categorize, share, or download. 3. System performs the chosen action.
Post-Condition	Study materials are managed as per the student's actions.
Relationships	Extends: Upload, Categorize, Share, Download.

3.2.10 Use Case #9: Track Progress

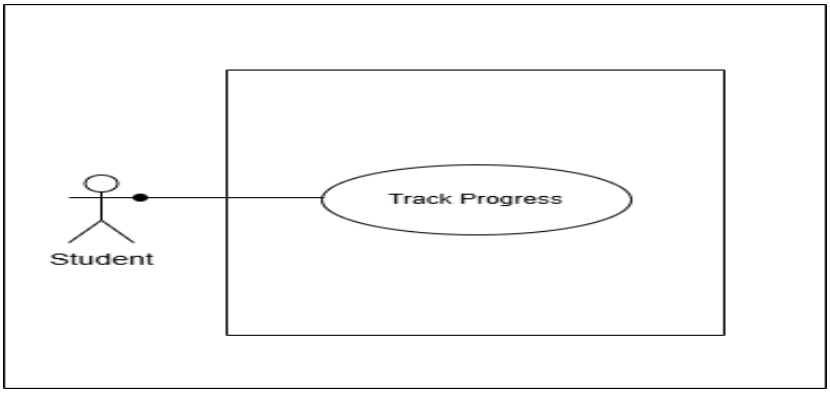

Figure 3.10: Use Case Diagram for Track Progress

Table 9: For Track Progress

Field	**Details**
Actors	Student
Description	A student tracks their learning progress within the system.
Pre-Condition	The student must be logged in and have completed activities.
Steps	1. Student selects the "Track Progress" option. 2. System displays the student's progress (e.g., quiz scores, completed materials).
Post-Condition	The student views their progress report.

3.2.11 Use Case #10: Give Feedback

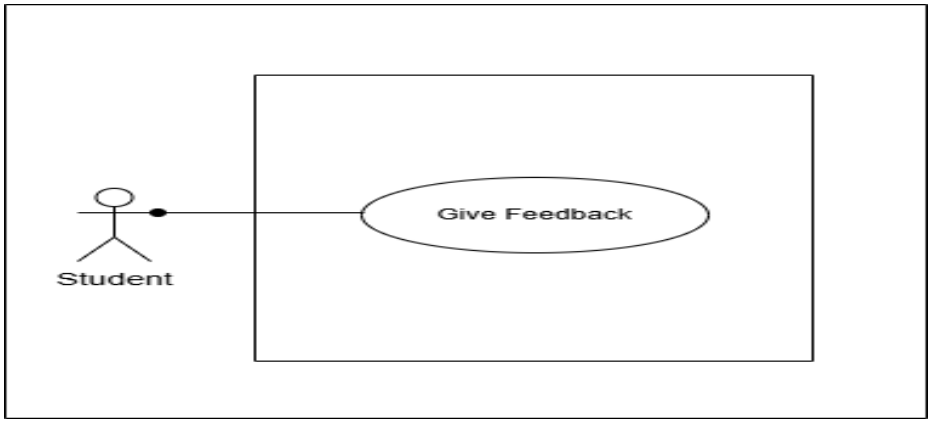

Figure 3.11: Use Case Diagram for Give Feedback

Table 10: For Give Feedback

Field	Details
Actors	Student
Description	A student provides feedback on the system or study materials.
Pre-Condition	The student must be logged in.
Steps	1. Student selects the "Give Feedback" option. 2. Student enters their feedback. 3. System submits the feedback.
Post-Condition	Feedback is submitted and stored in the system.

3.2.12 Use Case #11: Earn Rewards

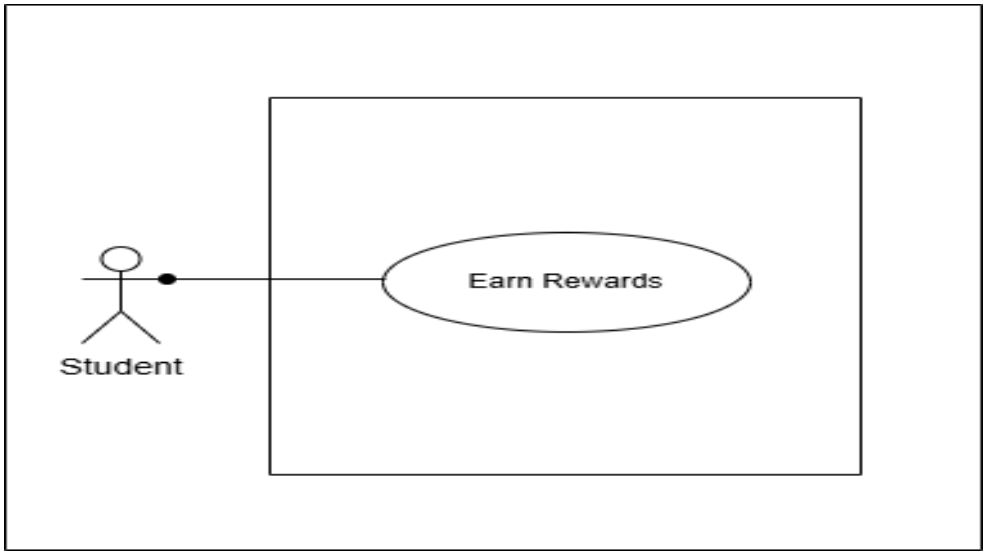

Figure 3.12: Use Case Diagram for Earn Rewards

Table 11: For Earn Rewards

Field	Details
Actors	Student
Description	A student earns rewards for completing activities (e.g., quizzes).
Pre-Condition	The student must be logged in and have completed a reward-eligible activity.
Steps	1. Student completes an activity (e.g., a quiz). 2. System evaluates the activity for reward eligibility. 3. System awards the student a reward.
Post-Condition	The student receives a reward (e.g., points, badges).

3.3 External Interface Requirements

3.3.1 User Interfaces

Study Sphere offers a user-friendly interface designed for easy navigation and intuitive interaction.

- **Home Screen**:
    - **Features**: Provides quick access to study materials, collaboration groups, quizzes, and progress tracking.
    - **Standard Buttons**: Navigation bar with "Home," "Groups," "Materials," "Progress," and "Profile" tabs.
- **Study Material Screen**:
    - **Features**: Displays a list of study materials with options to upload, categorize, share, or download.
    - **Standard Buttons**: "Upload," "Categorize," "Share," and "Download" buttons.
- **Collaboration Screen**:
    - **Features**: Shows groups, threads, and chat options for collaboration.
    - **Standard Buttons**: "Create Group," "Post Thread," "Chat," and "Add/Remove Friends" buttons.
- **Error Message Display Standards**:
    - Error messages are clear, consistent, and appear as pop-up notifications with steps to resolve issues (e.g., network errors, validation errors).

3.3.2 Hardware Interfaces

- No extra hardware interfaces are needed.
- The system uses standard hardware resources, including network connectivity and storage

3.3.3 Software Interfaces

StudySphere integrates with various software components to deliver its functionality. This section details the connections between StudySphere and other software elements, including operating systems, databases, libraries, tools, and external services.

- **Operating System**:
    - **Supported Platforms**: Android 5.0 (Marshmallow) and higher.
    - **Purpose**: Provides the runtime environment for the Flutter-based StudySphere app.
    - **Interactions**:
        - **Permissions Management**: Requests access to storage (for note uploads/downloads) and network connectivity (for Firebase communication).
        - **Notifications**: Uses Android's notification system to deliver push notifications via Firebase Cloud Messaging.
        - **Background Processing**: Manages background tasks like data synchronization when the app is not in the foreground.
- **Database and Backend Services**:
    - **Firebase Fire store**
    - **Firebase Authentication**
    - **Firebase Cloud Storage**
- **Libraries and Plugins**:
    - **Python Libraries (Backend AI Processing)**:
        - **transformers (Hugging Face)**: Used for NLP tasks in SmartDigest (summarization) and AutoQuiz (quiz generation).
        - **sentence-transformers**: Supports AskEdu's RAG framework for context-aware Q&A.
        - **fastapi**: Runs the Python backend server for AI processing.

- **Flutter Plugins:**

  The app uses various Flutter plugins to enhance functionality and connect with hardware components, such as:

  1. image_picker: For camera access.
  2. shared_preferences: For local storage and caching.
  3. firebase_core: For integrating with Firebase services.

- **External Libraries:** The app might use external libraries for specific functions, such as analytics or data visualization.

3.3.4 Communications Interfaces

StudySphere relies on robust communication interfaces to support real-time collaboration, data synchronization, and user notifications. This section outlines the communication functions, standards, security measures, and synchronization mechanisms specific to StudySphere's implementation.

- **Communication Standards**:
  - **HTTPS**:
    - **Purpose**: Ensures secure communication between the StudySphere app and Firebase services (Firestore, Storage, Authentication).
    - **Implementation**: All API calls and data transfers use HTTPS to encrypt data in transit.
  - **WebSocket-like Real-Time Sync (Firestore)**:
    - **Purpose**: Provides real-time updates for chats, discussion threads, and shared notes.
    - **Implementation**: Firestore's real-time listeners monitor collection changes and push updates to the app.
  - **Firebase Cloud Messaging (FCM)**:
    - **Purpose**: Delivers push notifications to Android devices.
    - **Implementation**: FCM sends lightweight messages to trigger app updates or user alerts.
  - **REST API (FastAPI)**:
    - **Purpose**: Facilitates communication between the Flutter app and the Python backend for AI processing.
    - **Implementation**: The app sends POST requests with JSON payloads; the backend responds with processed data.

- **Security and Encryption**:
    - **Data Encryption**:
        - All data transmitted between the app and Firebase (Firestore, Storage, FCM) is encrypted using HTTPS/TLS.
        - Chat messages and uploaded files are stored encrypted in Firestore and Storage.
        - AI processing requests to the Python backend use HTTPS to secure content transmission.
    - **Authentication**:
        - Firebase Authentication secures user sessions with JSON Web Tokens (JWTs).
        - Role-based access ensures only authorized users (e.g., admins) can access sensitive functions.
- **Data Transfer and Synchronization**:
    - **Real-Time Synchronization**: The app relies on Firebase for real-time data synchronization, allowing users to receive instant updates.
    - **Data Transfer Rates**: The app is designed to work efficiently with typical mobile data transfer rates, ensuring smooth communication and minimal latency.

4 Other Non-functional Requirements

4.1 Performance Requirements

- **Response Time**: Most interactions (e.g., navigating screens, loading materials) should complete within 2 seconds under normal conditions.
- **Startup Time**: The app should start within 5 seconds on supported devices.
- **Chat and Messaging**: Messages should be delivered in real-time.
- **Scalability**: The system should handle increased loads (e.g., multiple users in a group chat) without performance degradation.
- **Resource Utilization**:
    - Memory Usage: Should remain within reasonable limits to prevent slowdowns.
    - Battery Consumption: Optimized to minimize battery drain during use

4.2 Safety and Security Requirements

- **Safety Requirements**:
    - **Data Protection**: User data (e.g., study materials, chat messages) must be protected against unauthorized access or loss.
    - **Error Handling**: The app should recover from errors without causing data loss or harm to users.
- **Security Requirements**:
    - **User Authentication**: Secure authentication mechanisms (e.g., email verification, password protection) to prevent unauthorized access.
    - **Data Encryption**: All data transmitted between the app and Firebase should be encrypted.
    - **Access Control**: Users should only access authorized functions and data.
    - **Content Moderation**: Admins can review and moderate user-generated content to ensure compliance with guidelines.

5 Design Description

5.1 Composite Viewpoint

5.1.1 Package Diagram (Logical)

Represents the modular structure of StudySphere. Shows interactions where the Flutter app connects to Firebase for data operations and the Python backend for AI tasks, ensuring a clear separation of concerns.

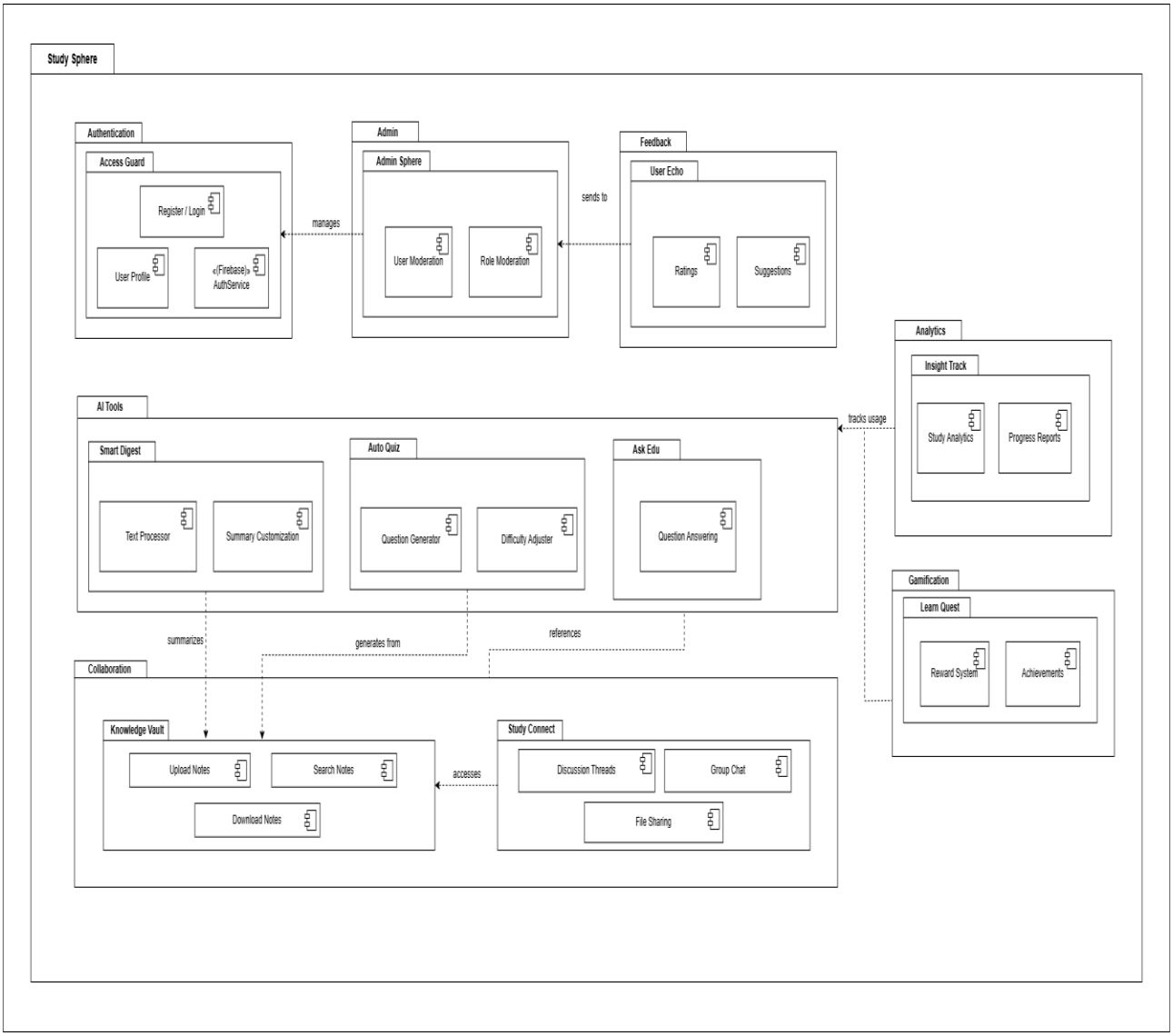

Figure 5.1: Package Diagram of the System

5.1.2 Deployment Diagram (Physical)

Illustrates the physical setup per Section 5.1, with nodes including user devices (Flutter app, as in Section 2.5), Firebase Cloud (Firestore, Authentication, Storage, per Section 3.3.3), and a Python server (for AI processing, per Section 3.3.3). Highlights network links for HTTPS communication (Section 3.3.4) between the app, Firebase, and the server, showing data flow for real-time sync (SFR-010).

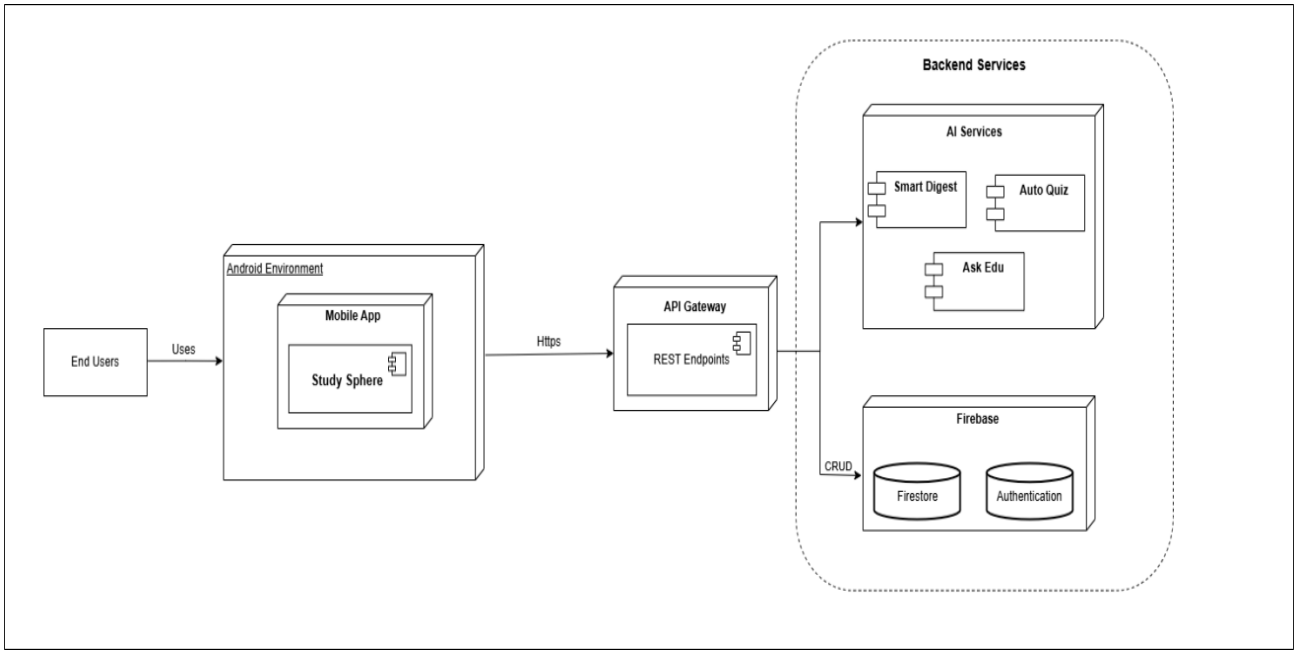

Figure 5.2: Deployment Diagram of the System

5.2 Logical Viewpoint

The logical viewpoint offers a structural look of the system. The Class diagram is used here to showcase the classes and their interaction with each other representing the structure of the system.

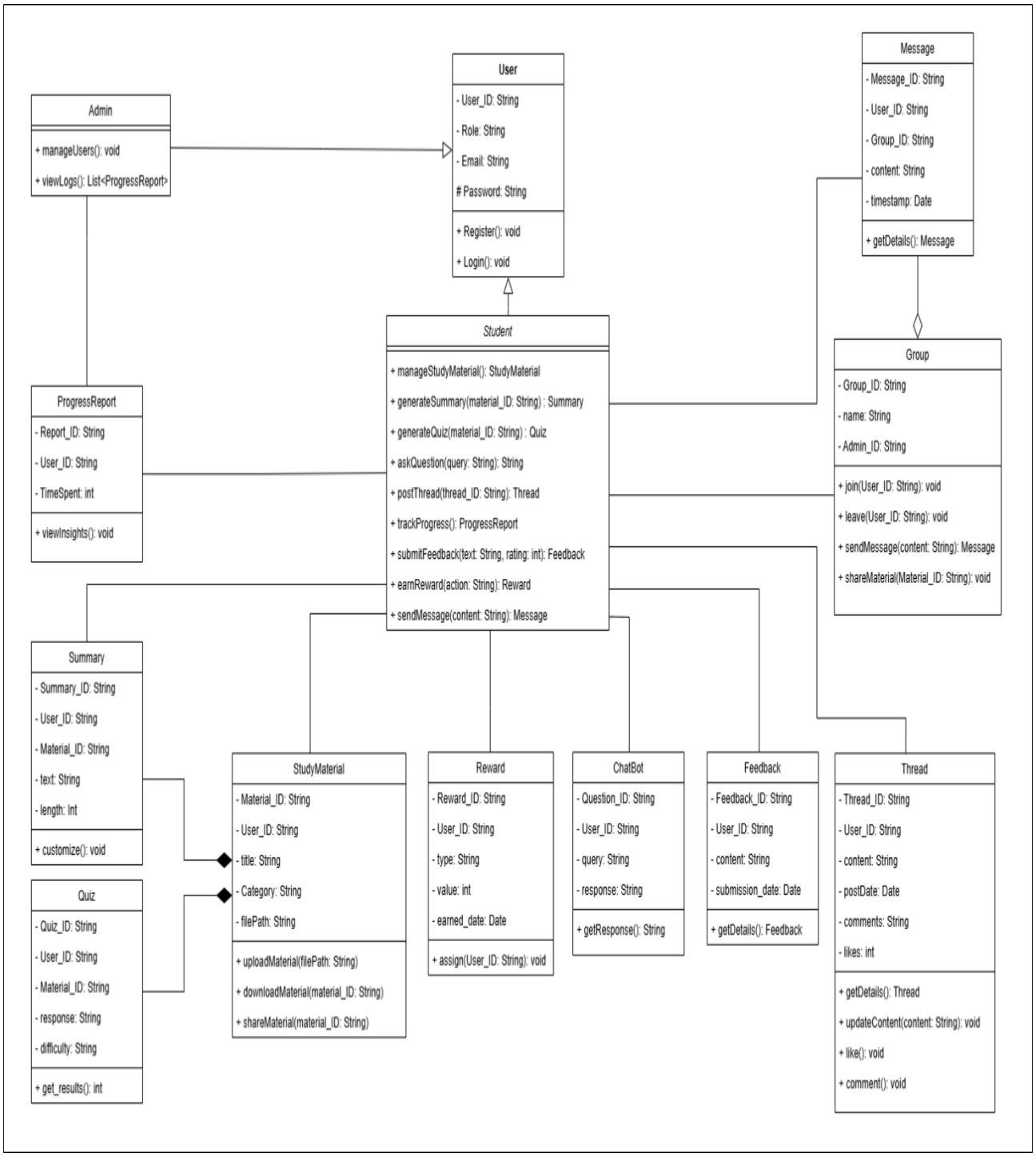

Figure 5.3: Class Diagram of the System

5.3 Information Viewpoint

Informational viewpoint of the system is represented using Entity Relation Diagram. Here the ERD showcases different entities of Study Sphere, their main attributes and relations with each other.

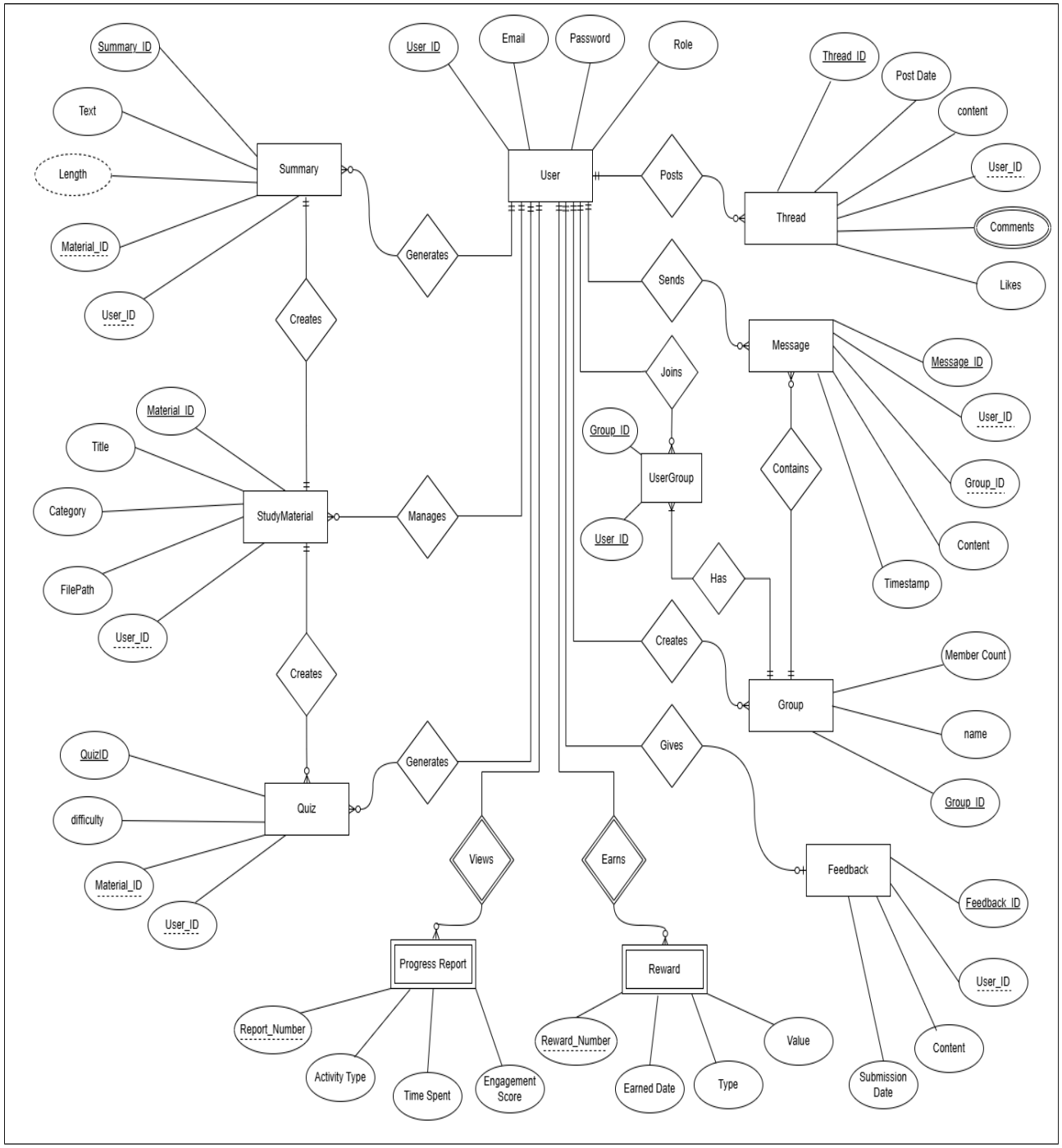

Figure 5.4: Entity Relationship Diagram of the System

5.4 Interaction Viewpoint

5.4.1 Sequence Diagram for Register

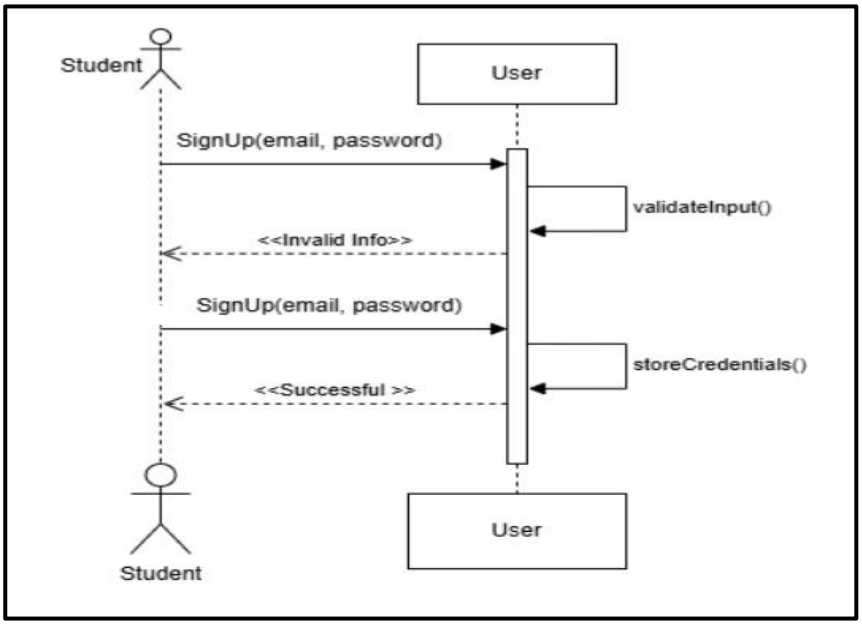

Figure 5.5.1: Sequence Diagram for Register

5.4.2 Sequence Diagram for Login

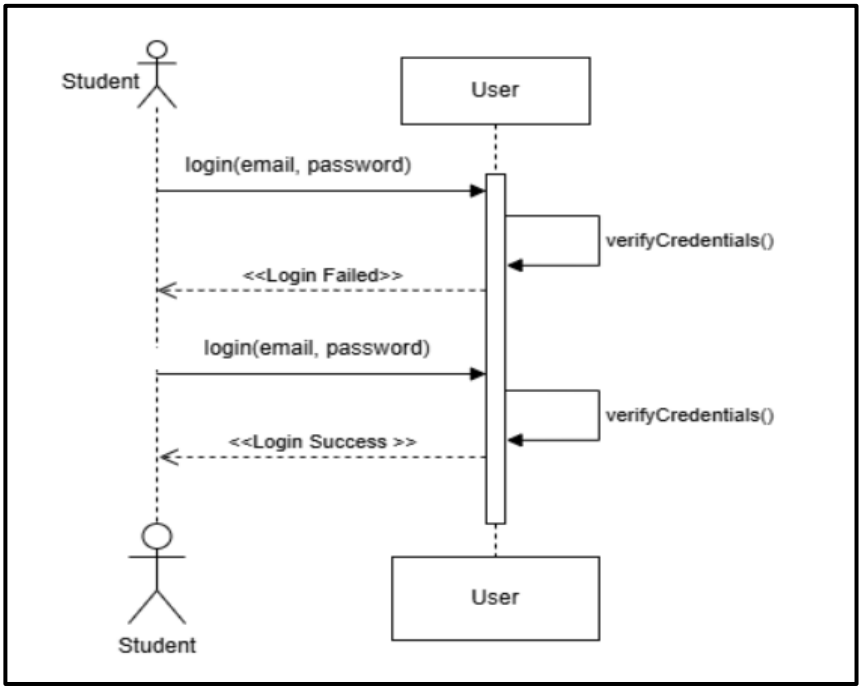

Figure 5.5.2: Sequence Diagram for Login

5.4.3 Sequence Diagram for Upload Material

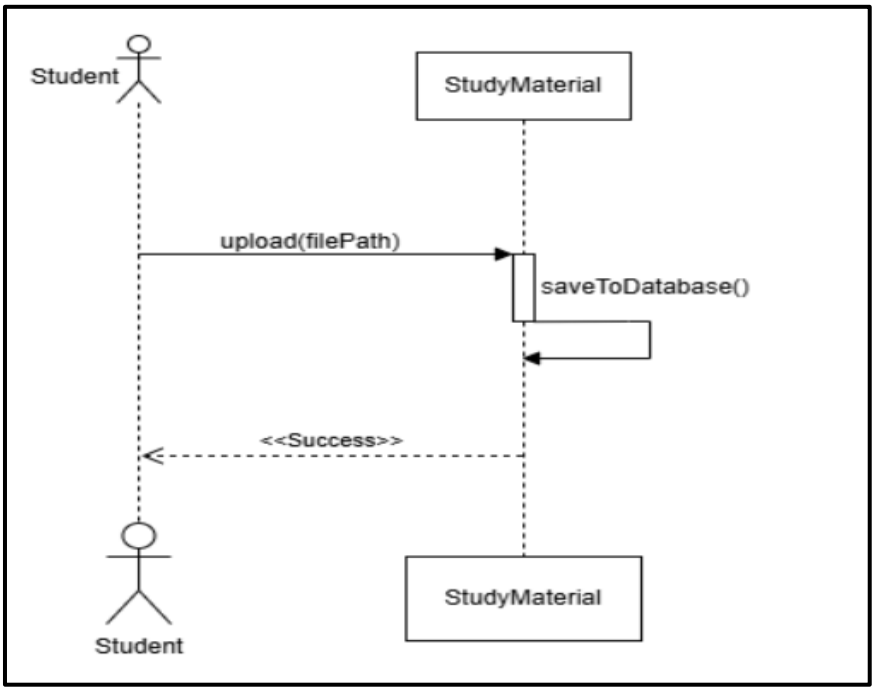

Figure 5.5.3: Sequence Diagram for Upload Material

5.4.4 Sequence Diagram for Post Thread

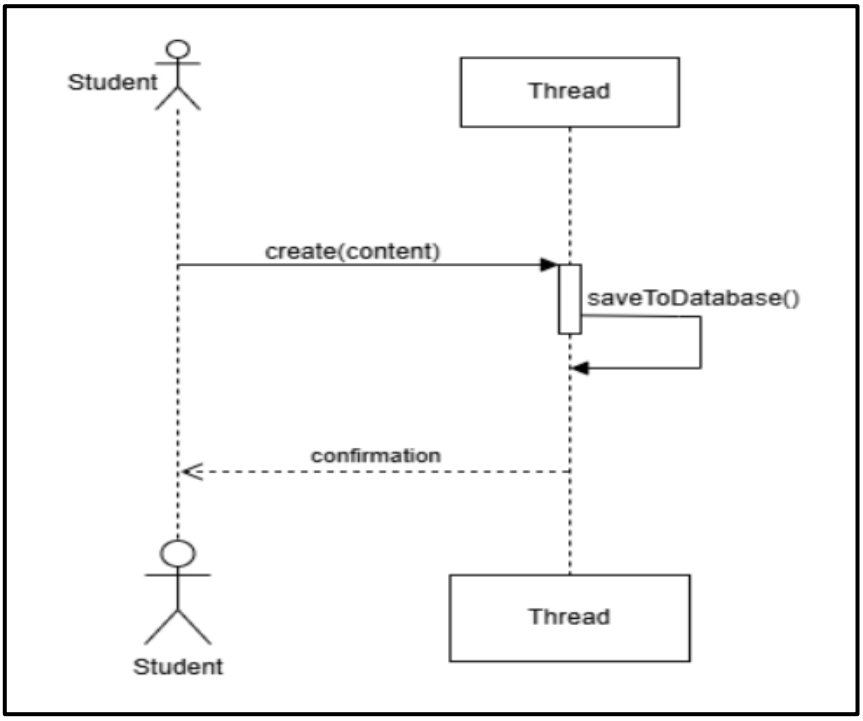

Figure 5.5.4: Sequence Diagram for Post Thread

5.4.5 Sequence Diagram for Send Message

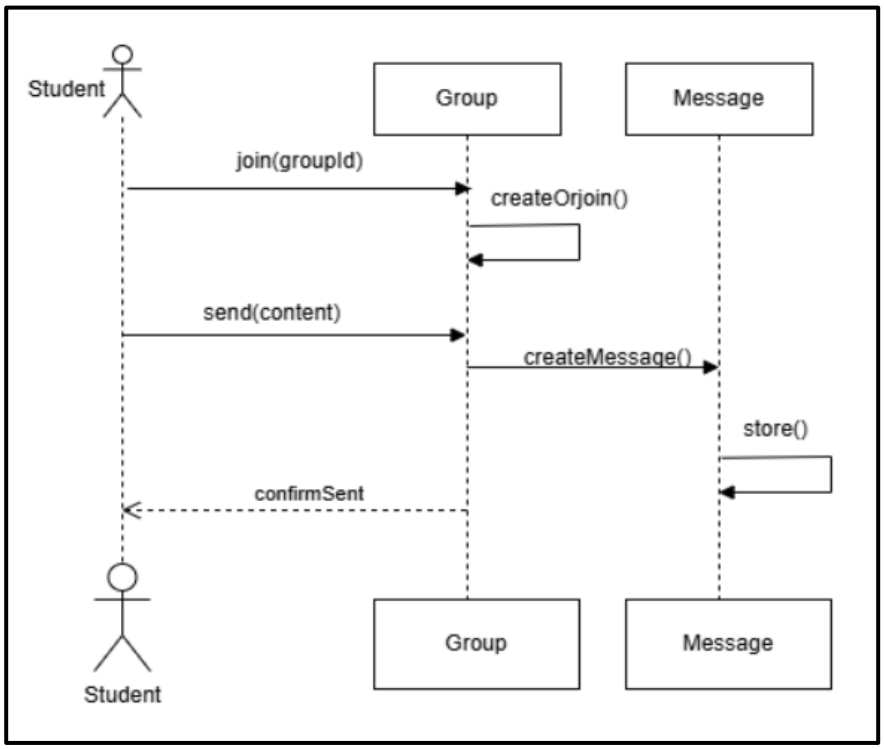

Figure 5.5.5: Sequence Diagram for Send Message

5.4.6 Sequence Diagram for Generate Quiz

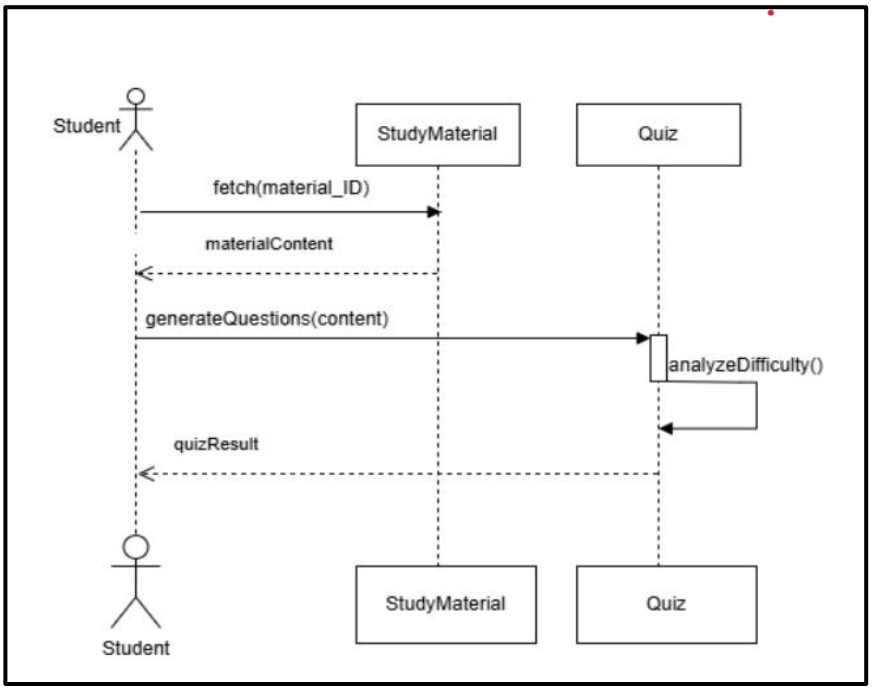

Figure 5.5.6: Sequence Diagram for Generate Quiz

5.4.7 Sequence Diagram for Generate Summary

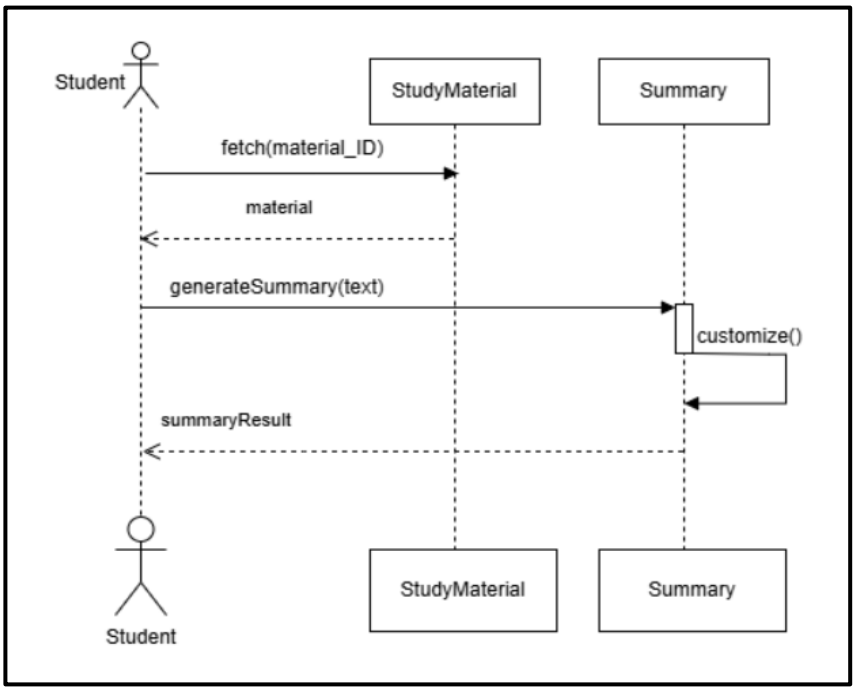

Figure 5.5.7: Sequence Diagram for Generate Summary

5.4.8 Sequence Diagram for Ask Question

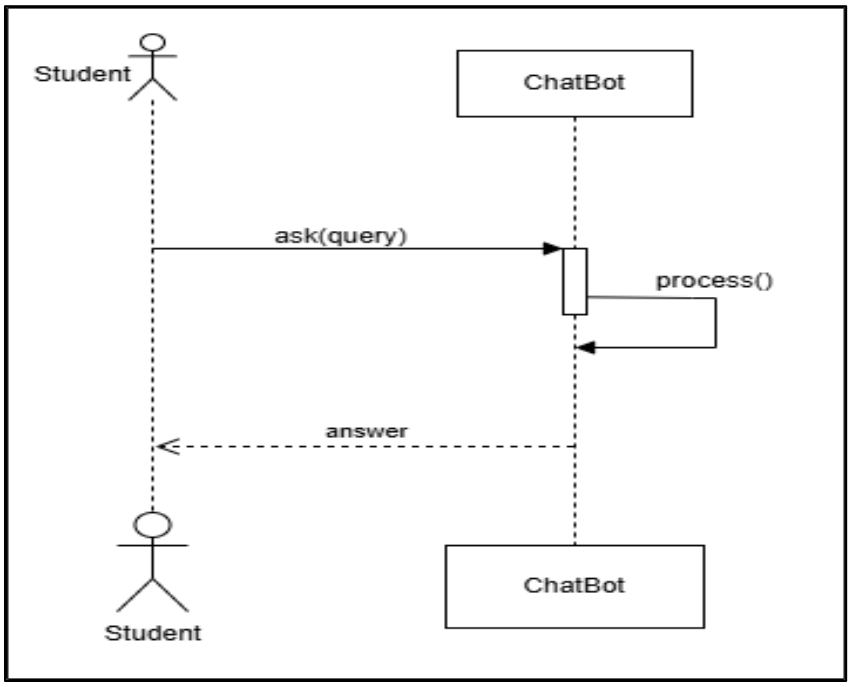

Figure 5.5.8: Sequence Diagram for Ask Question

5.4.9 Sequence Diagram for Earn Reward

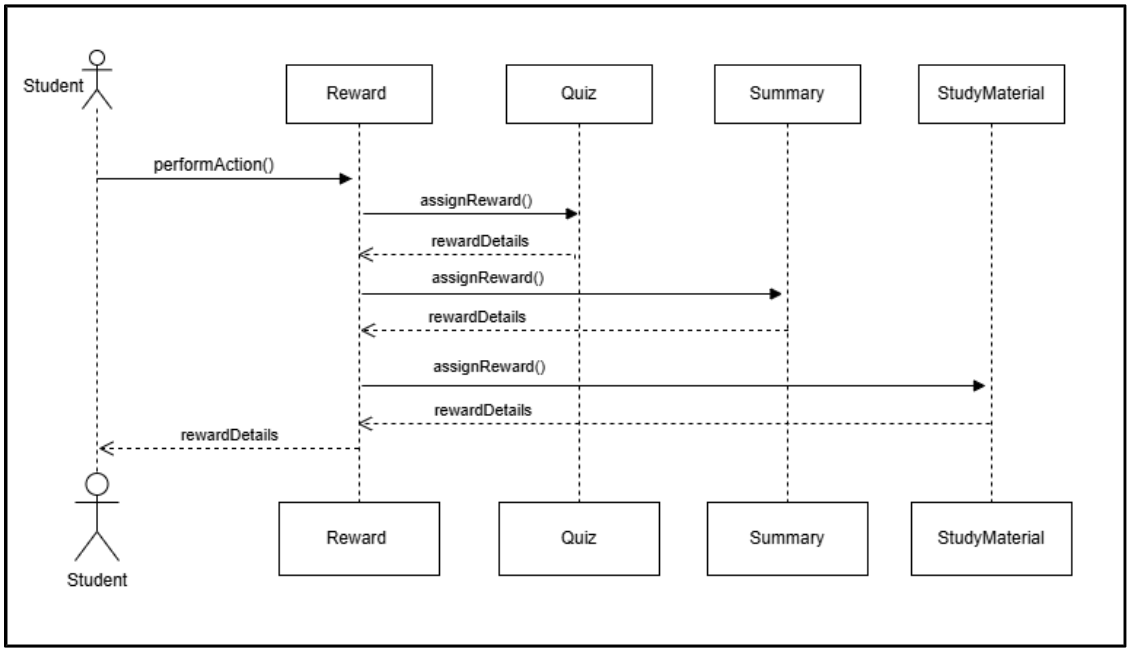

Figure 5.5.9: Sequence Diagram for Earn Reward

5.4.10 Sequence Diagram for Track Progress

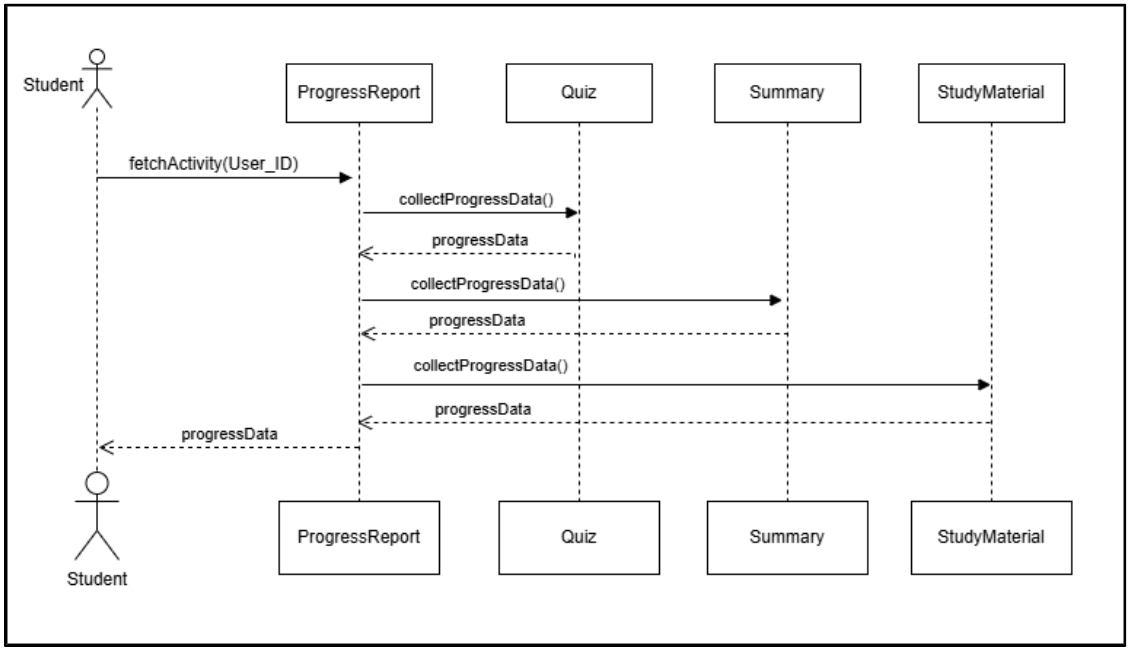

Figure 5.5.10: Sequence Diagram for Track Progress

5.4.11 Sequence Diagram for Give Feedback

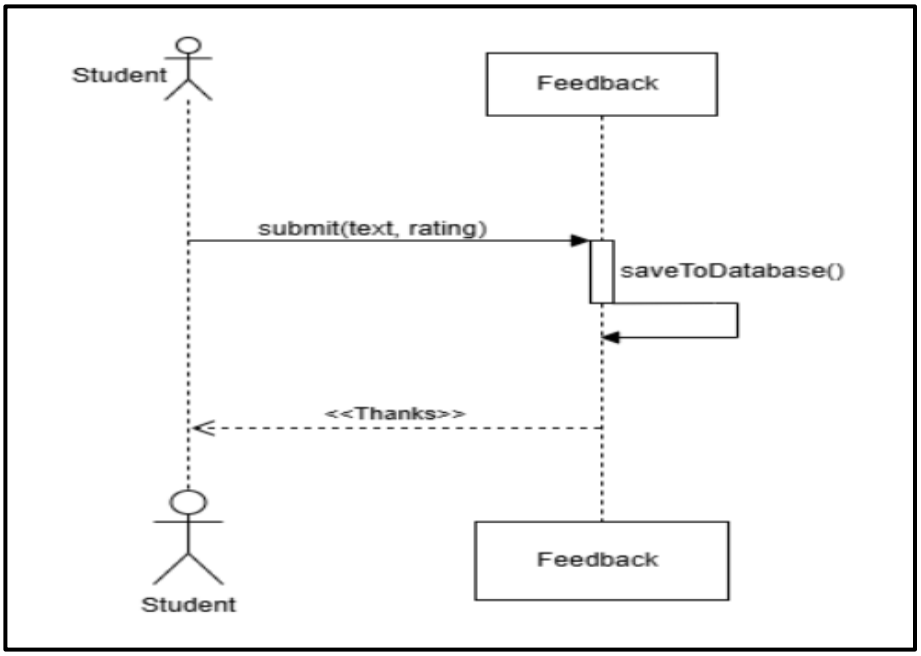

Figure 5.5.11: Sequence Diagram for Give Feedback

5.5 State Dynamics Viewpoint

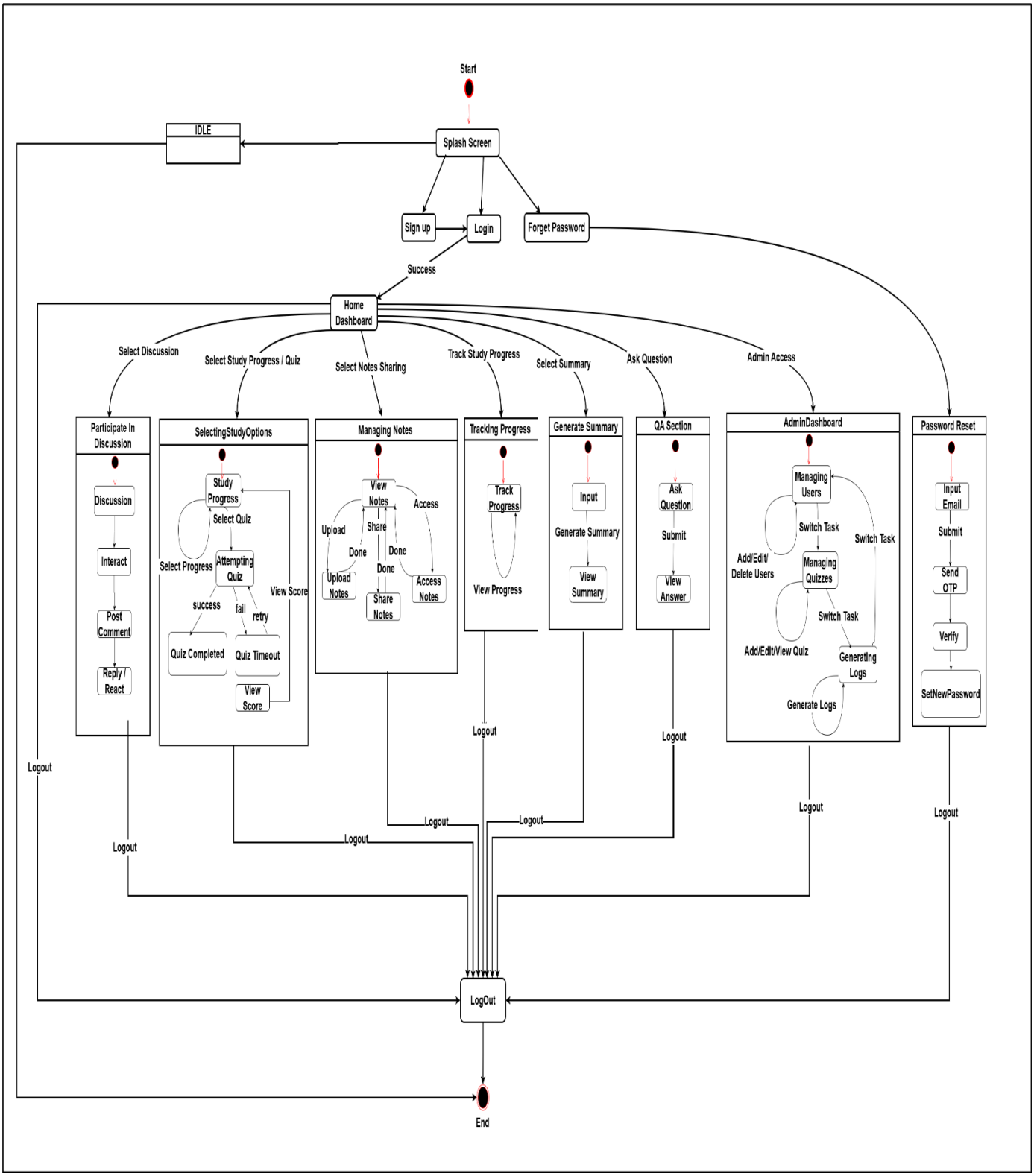

Figure 5.6: State Machine Diagram of the System

5.6 Algorithm Viewpoint

5.6.1 Activity Diagram

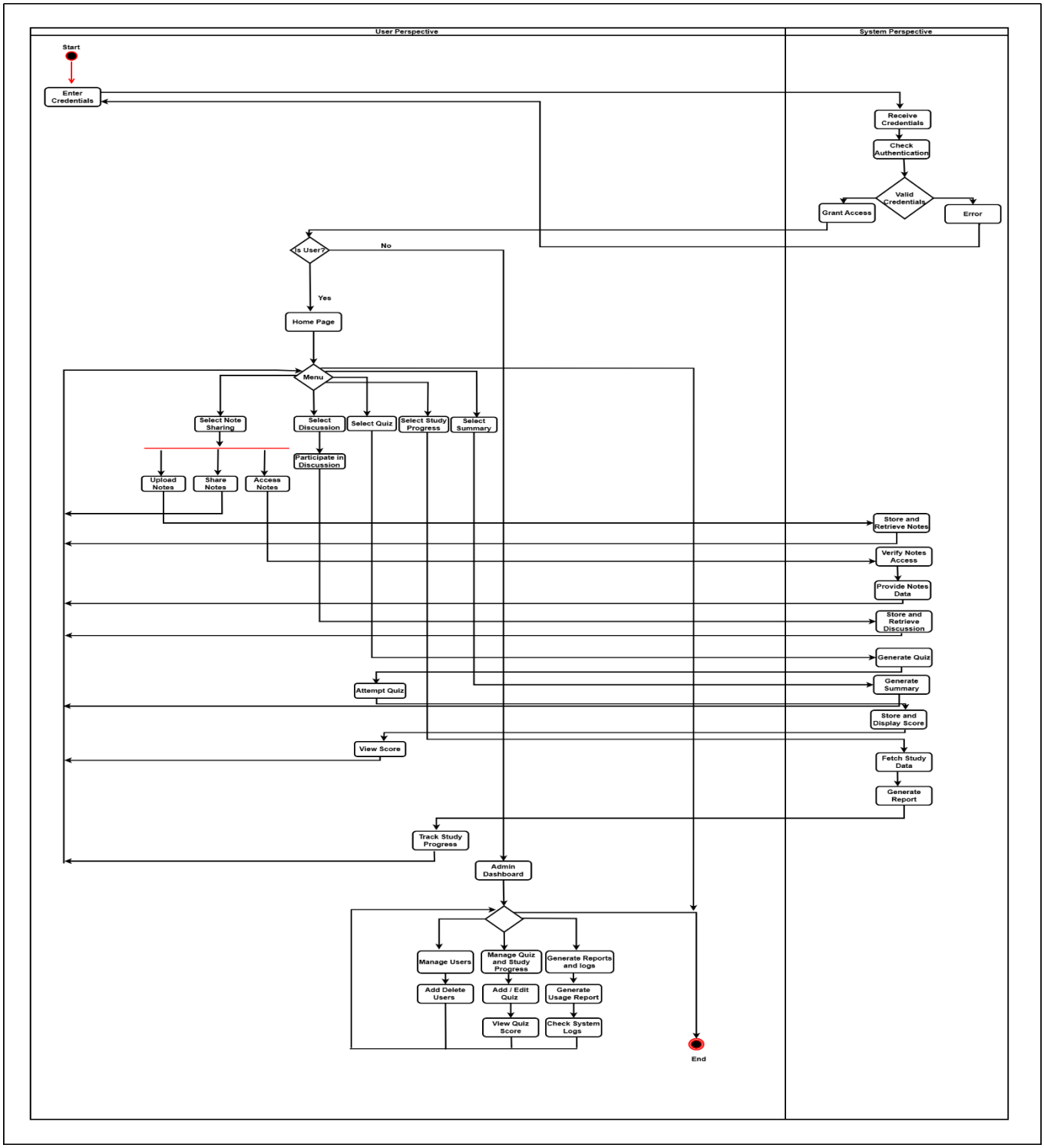

Figure 5.7: Activity Diagram of the System

5.6.2 Pseudocode of the System

BEGIN

DISPLAY "Login Page"

PROMPT user to Enter Credentials

SYSTEM: Receive Credentials

SYSTEM: Check Authentication

IF Credentials are Valid THEN

SYSTEM: Grant Access

DISPLAY "Home Page"

ELSE

DISPLAY "Invalid Credentials. Try Again"

TERMINATE

DISPLAY "Main Menu Options"

LOOP UNTIL user selects "Logout"

DISPLAY options:

- Note Sharing
- Discussion Forum
- Quiz
- Study Progress
- Summary Generation

- Admin Dashboard (if user is Admin)

PROMPT user to select an option

SWITCH user_selection

CASE "Note Sharing":

DISPLAY Note Sharing Options: Upload, Share, Access Notes

PROMPT user for action

IF Upload THEN

PROMPT for file

SYSTEM: Store Note

ELSE IF Share THEN

PROMPT for note and recipient

SYSTEM: Share Note

ELSE IF Access THEN

PROMPT for access request

SYSTEM: Verify Access

SYSTEM: Provide Note

CASE "Discussion Forum":

PROMPT user to join or create discussion

SYSTEM: Store or Retrieve Discussion Threads

CASE "Quiz":

SYSTEM: Generate Quiz

PROMPT user to Attempt Quiz

SYSTEM: Store Quiz Score

DISPLAY "View Score" Option

IF selected THEN

DISPLAY Score

CASE "Study Progress":

SYSTEM: Fetch Study Data

DISPLAY Study Analytics

DISPLAY "Track Progress"

CASE "Summary Generation":

PROMPT user to select study topic

SYSTEM: Generate Summary from study data and content

DISPLAY Summary

CASE "Admin Dashboard":

IF user_role == "Admin" THEN

DISPLAY Admin Options:

- Manage Users (Add/Edit/Delete)

```
            - Monitor User Progress
            - Manage Quizzes (Add/Edit/View Scores)
            - Generate Reports
            - View System Logs
          PROMPT for admin action
          PROCESS Admin action accordingly
        ELSE
          DISPLAY "Access Denied"

    END SWITCH
  END LOOP

  DISPLAY "Logged out successfully"
ENDBEGIN
  DISPLAY "Login Page"
  PROMPT user to Enter Credentials

  SYSTEM: Receive Credentials
  SYSTEM: Check Authentication

  IF Credentials are Valid THEN
    SYSTEM: Grant Access
    DISPLAY "Home Page"
```

```
ELSE
    DISPLAY "Invalid Credentials. Try Again"
    TERMINATE

DISPLAY "Main Menu Options"
LOOP UNTIL user selects "Logout"
    DISPLAY options:
        - Note Sharing
        - Discussion Forum
        - Quiz
        - Study Progress
        - Summary Generation
        - Admin Dashboard (if user is Admin)

    PROMPT user to select an option

    SWITCH user_selection
        CASE "Note Sharing":
            DISPLAY Note Sharing Options: Upload, Share, Access Notes
            PROMPT user for action
            IF Upload THEN
                PROMPT for file
                SYSTEM: Store Note
```

ELSE IF Share THEN

PROMPT for note and recipient

SYSTEM: Share Note

ELSE IF Access THEN

PROMPT for access request

SYSTEM: Verify Access

SYSTEM: Provide Note

CASE "Discussion Forum":

PROMPT user to join or create discussion

SYSTEM: Store or Retrieve Discussion Threads

CASE "Quiz":

SYSTEM: Generate Quiz

PROMPT user to Attempt Quiz

SYSTEM: Store Quiz Score

DISPLAY "View Score" Option

IF selected THEN

DISPLAY Score

CASE "Study Progress":

SYSTEM: Fetch Study Data

DISPLAY Study Analytics

```
            DISPLAY "Track Progress"


        CASE "Summary Generation":
            PROMPT user to select study topic
            SYSTEM: Generate Summary from study data and content
            DISPLAY Summary


        CASE "Admin Dashboard":
            IF user_role == "Admin" THEN
                DISPLAY Admin Options:
                    - Manage Users (Add/Edit/Delete)
                    - Monitor User Progress
                    - Manage Quizzes (Add/Edit/View Scores)
                    - Generate Reports
                    - View System Logs
                PROMPT for admin action
                PROCESS Admin action accordingly
            ELSE
                DISPLAY "Access Denied"
    END SWITCH
  END LOOP
  DISPLAY "Logged out successfully"
END
```