IS 2900 – Project on IT Applications

Final Report

New Employee Training System (NETS)

Group Lambda

Index No	Name
205010A	Chandrasena H.S.
205039U	Ishvini A.
205074V	Pemarathna G.T.D.B.
205080K	Raguraj S.
205092A	Sagini N.

Supervised by:

Mr. S.M.U.Premasiri
Mrs. M.B.Mufitha

Client:

Intervest Software Technologies (Pvt) ltd

585, 2nd Floor, Galle Main Road, Colombo.

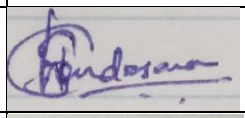
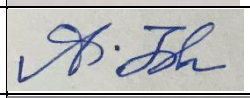
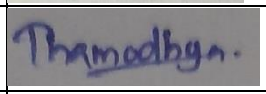
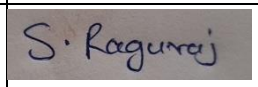
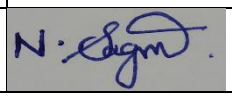
Faculty of Information Technology

University of Moratuwa

2023

Declaration

We declare that this report is our own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

Names of Students	Signatures of Students
205010A Chandrasena H.S.	
205039U Ishvini A.	
205074V Pemarathna G.T.D.B.	
205080K Raguraj S.	
205092A Sagini N.	

Supervised by:			
Name Of Supervisor		Signature	Date
IT Supervisor	Mr. S.M.U.Premasiri		
IDS Supervisor	Mrs. M.B.Mufitha		08.06.2023

Abstract

When senior personnel leave a company, it becomes difficult for the organization to retain their knowledge. There is currently no practical way to physically store or transfer knowledge that can function as anticipated. To solve this issue, the client company decided to create a new system. Additionally, the client lacks any program to organize their precious knowledge. Initially, resistance to change and communication barriers prevent newly hired employees from adjusting to new IT systems and organizational standards.

The client has trouble introducing new hires to the norms and procedures. Clients waste valuable time in an ineffective manner as a result, and employees become anxious when they struggle to comprehend newly conveyed knowledge. The client therefore wants to develop their own knowledge transfer strategy to maintain positive interactions with new hires. By arranging necessary documents and questionnaires as needed, NETS is the system that provides the platform to facilitate those requirements such as organize learning materials by chapters, evaluating employees by quizzes and project assignments, sharing knowledge through discussion forums.

The requirements were studied and UML and EER diagrams were drawn before implementation. We choose our technology stack after doing some research. The front end of the web application is built with ReactJS, while the backend is built with Node. Our database technology is Mongo DB.

Table of Contents

List of Figures/Tables

Chapter 1 Introduction

1.1 Introduction

Retaining knowledge of senior personnel becomes challenging for the organization when they depart from the company. Therefore, the knowledge cannot be tracked and transferred to newly recruited employees. The increasing number of employees joining the company has exacerbated the issue, making it a significant challenge. Additionally, the traditional method of transferring knowledge in person has proven to be unproductive. Therefore, the client is in need of an effective solution to address this problem.

NETS (New Employees Training System) will serve as the platform to fulfill this requirement by efficiently organizing essential training materials and questionnaires as needed. It aims to simplify the knowledge transfer process by incorporating testing for new employees after each knowledge transfer session, organizing competitions among employees, and fostering a joyful learning environment to enhance motivation.

By implementing such a system, employees will not only gain more knowledge but also experience a stress-free learning environment compared to traditional in-person sessions.

1.2 Problem in Brief

The company is currently experiencing challenges in acquiring knowledge from departing senior employees, and there is currently no effective physical solution in place to store or transfer knowledge efficiently. Consequently, the company has made the decision to develop a new system to address this problem. Moreover, the client lacks software to effectively manage their valuable knowledge. Initially, newly hired employees encounter difficulties in adapting to new IT systems and company protocols due to resistance to change and communication barriers. The company faces challenges in effectively communicating rules and protocols to new employees, resulting in unproductive time loss and increased stress for employees struggling to comprehend the transferred knowledge. As a result, the client interested in creating own knowledge transfer system to facilitate better interaction with new employees.

1.3 Aim and Objectives

1.3.1. Aim

The New Employee Training System (NETS) has been specifically designed to offer newly hired employees a comprehensive and engaging learning experience by consolidating all essential training materials within a centralized platform. This system aims to provide in-depth knowledge about the work environment, procedures, and specific job responsibilities, ensuring that employees receive the necessary information in an efficient and interesting manner.

1.3.2. Objectives

1. To facilitate user by providing login system based on Google integration to login easily.
2. To provide a facility for managing chapters and accept the new course request from the employee.
3. To manage learning materials (KT sessions, Articles) and quizzes to the users
4. To gain knowledge of the specific job area of a particular newly hired employee by referring learning materials
5. To get the submissions of project and submitted answers of quizzes and grades.
6. To provide a feature to add comments and ratings on learning materials.
7. To provide a platform to Get employee ideas and solve their questions through discussion forums.
8. To facilitate hired employees by providing guidance request ticket feature to get senior employee's help.
9. To evaluate quizzes and enable the supervisor to grade submissions by referring pending submissions.
10. To generate user reports, overview report and quiz report of hired employee and ratings report of content creator.
11. To give the badges to the employees who achieve the goal and show how many points they need to beat the first employee by leader board.

1.4 Proposed Solution

NETS is the system which provides the platform to facilitate those requirements by organizing essential materials and questionnaires as required.

When it comes to the operation of the NETS, hired employees, Supervisor, System admin, Content creator, Super admins are available user roles. These roles collaborate closely to maximize the system's full potential and ensure its successful implementation.

1.5 Structure of the Report

In this report, Chapter 1 provides a comprehensive introduction to the New Employee Training System (NETS) that is planned for development. Chapter 2 focuses on discussing existing applications that share similarities with our proposed system and are currently in use. Chapter 3 discusses about detailed explanation of the technology including inputs, output, and process of the system. Chapter 4 provides a thorough analysis and design overview. Finally, Chapter 5 delves into the implementation phase, exploring the steps taken to bring the system to fruition.

1.6 Summary

In the introductory section, a basic overview of the New Employee Training System (NETS) was presented, highlighting its intended purpose of addressing the challenges faced by newly hired employees as they navigate their job responsibilities and adapt to the new working environment. The primary objective of this system is to surpass these obstacles and facilitate a smoother transition for employees during their initial phases of employment.

Chapter 2 Literature Review

2.1 Introduction

In this chapter, various approaches to solving the same fundamental problem for which chosen to propose a solution are discussed. It becomes difficult for the organization to retain their knowledge when senior personnel leave a company. So, we can't track their knowledge and transfer it to newly recruited employees. It is becoming a huge problem when the company intakes more employees. Transferring knowledge in person is also unproductive. So, the client needs a proper solution to tackle this problem. As a result, we conducted some preliminary research into existing applications that are similar to the project we are working on.

2.2 Review of others' work

Some of the following software are existing systems that we discovered when addressing our problem.

2.2.1. Papyrs

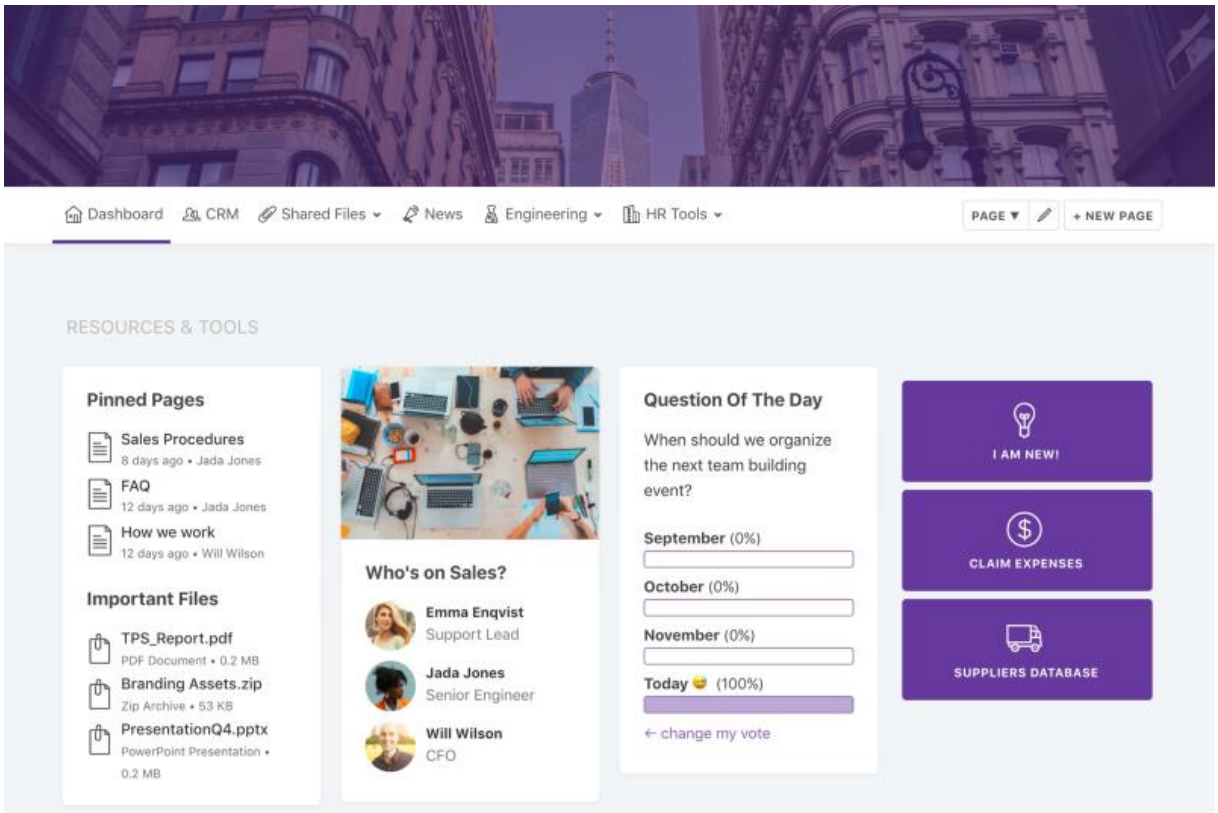


Figure 1Papyrs dashboard

Papyrs[1] is a software which is designed to create an online intranet for companies in an easy way. It is a modern take on the company intranet, internal wiki, and knowledge base. With the help of this software, we can easily create a portal with drag and drop and share knowledge, notes, news, forms, files, projects, discussions, and docs. It is a way to work remotely but together with colleagues or clients.

When considering this application, Papyrs is a paid application. Also, in that, the writing surface was irregular, and the range of media that could be used was also limited.

2.2.2. Trackstar Learn

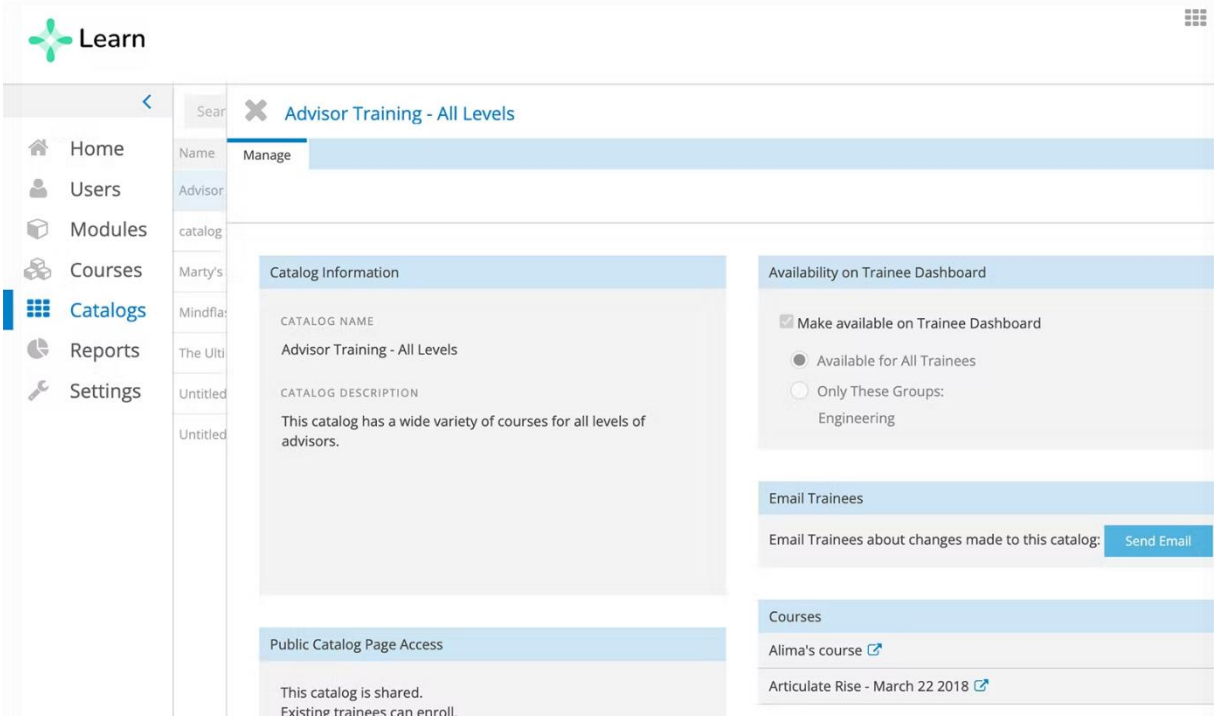


Figure 2 Trackstar Learn dashboard

Trakstar Learn[2] (formerly Mindflash) is an online training platform. It aims to be an easy-to-use solution for customer, partner, and employee training. Users can create courses, add quizzes, and track results. Users can upload PowerPoint, Word, PDF, SCORM or video files and create an online course that can be taken on any computer or mobile device.
It saves much time that is wasted enrolling users, Course Creation, and also it provides efficient course, quizzes and assessments management facility.
When considering this application,

- Trackstar Learn is a paid application

- no facility to group modules and courses into subfolders/categories (i.e. a safety folder, an HR folder, and a work instruction folder.
- Allows only one admin account
- UI is complicated

2.2.3. 360Learning

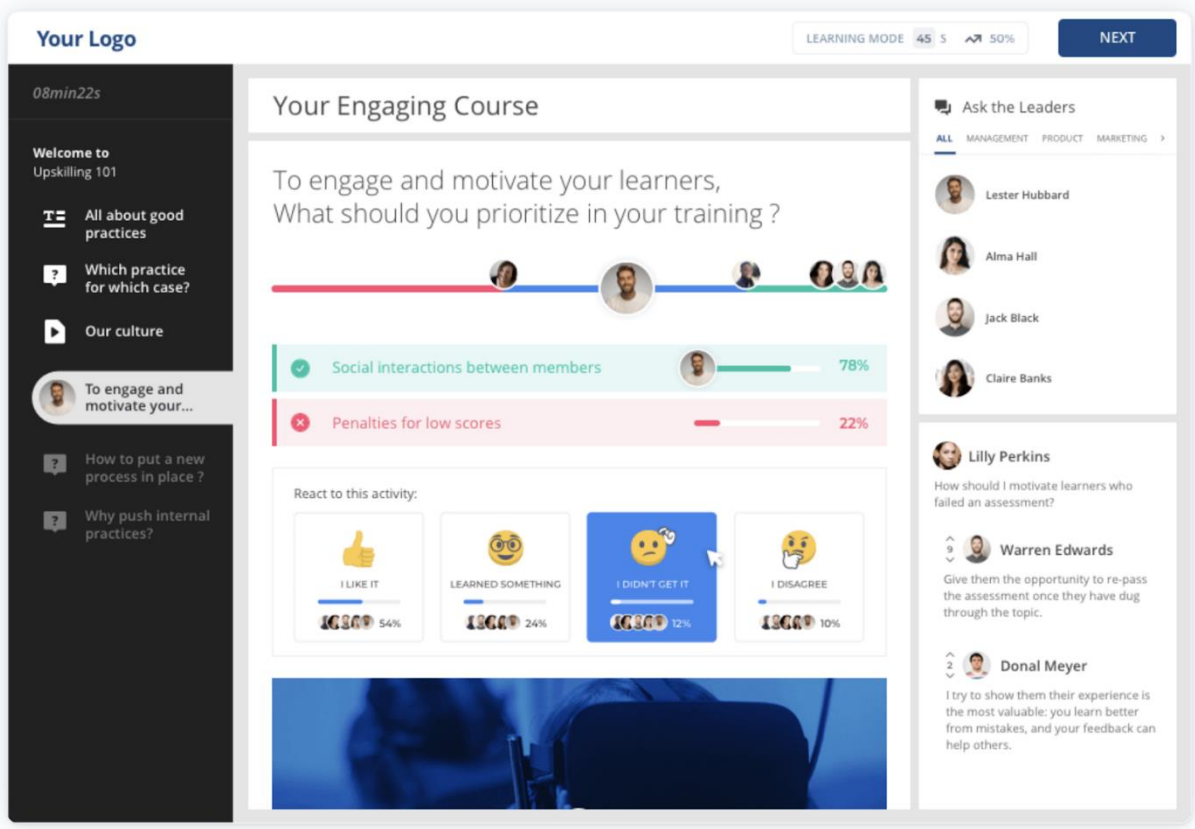


Figure 3 Learning dashboard

Companies use the employee training program 360Learning[3] to upskill staff members internally by converting experts in their fields into champions of partner, customer, and employee growth. With the aid of internal specialists, learning and development teams can expedite upskilling through the use of this system, as opposed to slow top-down training. With 360Learning, you can train teams that interact with customers, onboard new hires, and upgrade existing ones, all in one location.

But this system doesn't have a leaderboard to compare the score that each employee scored. In that case it is a bit difficult to check the rankings of employees. And also, the navigation within the system is complex.

2.3 Summary

According to the findings, each employee training system has a similar set of capabilities. We can illustrate certain specific properties of our system when considering it. The features such as document management, leaderboard, guidance request ticket is some of the unique features that we have within our application. As a result, our system differs from the existing products we looked into previously.

Chapter 3 Technologies Adapted

3.1 Introduction

The technologies that utilized to develop the system will be the subject of this chapter. The technology stack that using can be classified into the following sections.

1) Frontend Technologies
    a. React Framework
2) Backend Technologies
    a. Node JS– Express Framework
3) Database Technology
    a. Mongo DB

3.2 Frontend Technologies

Front-end web development is the process of creating a website's graphical user interface using HTML, CSS, and JavaScript so that people can view and interact with it. However, there are different JavaScript libraries and frameworks (technologies) available for developers to make front end development easier. And for the front end of our project, we're going to utilize react.

3.2.1. React Framework

React[4] is a free and open-source JavaScript front-end library for creating user interfaces based on UI components. Meta and a community of individual developers and corporations maintain it. It is now one of the most widely used libraries in the front-end industry. With frameworks like Redux, react can be quickly extended to integrate functionality like routing and state management techniques. React has a small footprint yet can be tailored to practically any project. The reasons for the selection of React as frontend are,

1. Reusable Components: With React, you can build encapsulated components that manage their own state and can be easily reused throughout your application. This helps to make your code more maintainable and scalable.
2. Virtual DOM: React uses a virtual DOM (a lightweight in-memory representation of the actual DOM) to improve performance by minimizing the number of DOM manipulations required when rendering a component.
3. Simple to create interactive user interfaces.
4. Strong community and there are many useful libraries to develop the frontend easily.

3.3 Backend Technologies

The backend is the software's server-side that stores and analyzes data while also ensuring seamless application performance. Backend development is responsible for a variety of tasks, including the creation of APIs and libraries, as well as the interaction with system components, business processes, and data architecture. Backend development is a process that is unseen to users. It transmits and receives information, connects with the frontend, and presents the data as a web page.

3.3.1. Node JS

Node.js[5] is an open-source server environment. Node.js is a cross-platform and runs on Windows, Linux, Unix, and macOS. Node.js is a back-end JavaScript runtime environment. Node.js runs on the V8 JavaScript Engine and executes JavaScript code outside a web browser. The reasons for the selection of Node JS as backend are,

1. High Performance: Node.js is built on top of Chrome's V8 JavaScript engine, which is designed to execute JavaScript code quickly. This makes it well-suited for building high-performance backend applications.
2. Asynchronous and Event-Driven: Node.js is asynchronous and event-driven, which makes it efficient for handling multiple connections at the same time and makes it well-suited for building real-time applications such as chat applications and online games.
3. Large and Active Community: Node.js has a large and active community of developers who contribute to the development of the platform and create a variety of helpful tools and resources. This makes it easier to get help and find solutions to problems you may encounter while building your application.

3.4 Database Technology

3.4.1. MongoDB Cloud

MongoDB[6] cloud services include a complete suite of analytics techniques that enhance and speed up building data for any application. Atlas Database (MongoDB's core Database-as-a-Service), Search, and Data Lake can all service any type of demand via a single API. Furthermore, bidirectional sync between Atlas and the Realm Mobile Database enables the cloud backend to be extended to the edge and mobile devices. The reasons for the selection of Mongo DB as database are

1. Document-Oriented: MongoDB stores data in the form of documents, which are JSON-like objects with optional schemas. This can make it easier to store and query data that has a complex structure or that changes frequently.
2. High Performance: MongoDB is generally fast and efficient, which makes it well-suited for applications that require high performance. It is also designed to handle many concurrent reads and writes, which can be beneficial for applications that receive a lot of traffic.
3. Strong Community: MongoDB has a large and active community of developers who contribute to the development of the platform and create a variety of helpful tools and resources. This makes it easier to get help and find solutions to problems you may encounter while working with the database.

3.5 User Input, Output of the System

Table 1 Input Process Output Table

User Roles		
Hired Employee	Activities	• Login to the system • View Learning Materials • Attempt Quiz • Rate on Learning Materials • Comment or Replying on Learning Materials • Request for additional chapters • Attempt the final project assignment • Check Profile Overview • Post or Reply on Discussion forum • View the Leaderboard • Request for Guidance • view the other department's chapter • view their profile details
	Inputs	• Company email address • Star Ratings • Comments • Replies

		• Submissions • Chapter request • Department • Request Title • Request Type • Short Description about the Request
	Outputs	• Dashboard • Allowed Chapter Page • Unit Pages • Article Page • Discussion Forums • Leader Board • Profile Page • Quiz review Page • Submission grade • Reports • Request Guidance Page
Content Creator	Activities	• Login to the system • Check Profile Overview • Create Discussion Forum • Edit Discussion Forum topic (If no replies) • Post or Reply on Discussion forum • Comment or Replying on Learning Materials • Create Learning Materials • View Created Learning Materials by that User • Update Learning Materials • Delete Learning Materials • Lock Discussion Forum

		• View guidance requests directed to themselves • Mark guidance requests as completed
	Inputs	• Company email address • Comments • Replies • Submissions • Title of the Discussion Forum • Discussion Forum Permissions • Discussion Forum Topic • Quizzes and Answers • Learning Materials
	Outputs	• Dashboard • Allowed Chapter Page • Unit Pages • Article Page • Discussion Forums • Profile Page • Quiz input page • Reports • Guidance request page
Supervisor	Activities	• Login to the system • Create Discussion Forum • Edit Discussion Forum topic (If no replies) • Post or Reply on Discussion forum • Comment or Replying on Learning Materials • Lock Discussion Forum • View guidance requests directed to their department

		• Direct guidance requests to relevant content creators • Create Learning Materials • View Created Learning Materials by that User • Update Learning Materials • Delete Learning Materials • Give permissions to additional chapters • Evaluate Hired Employee • Give final project assignment to Hired Employee • Grade final project assignment submissions • View report • View profile details
	Inputs	• Company email address • Final project topic • Learning materials • Allow/deny requested chapters • Star ratings • Final grades • Comments & replies • Submissions
	Outputs	• Reports • Leaderboard • Profile Page • Chapter page • Unit page • Grade page • Discussion forum • Article page

		• Notifications • Request guidance page
System Admin	Activities	• Login to the system • create chapters for their department • Assign Default Chapters to job titles • Edit Default Chapters to job titles • Delete chapters temporarily which is created by themselves. • Edit chapters which is created by themselves. • View Available Chapters • Entitle Employee to Supervisor • Allow and Verify designations of the User • View profile details.
	Inputs	• Company email address • Chapter name • Chapter description • Reason to edit hide delete chapters • Employee details
	Outputs	• Dashboard • Profile page • Chapter management page • Entitlement page • Verification page
Super Admin	Activities	• Login to the system • view all department's chapters. • Create common chapters for all departments. • Delete chapters permanently. • Edit any department's chapters.

		• create, edit, delete departments. • create, edit, delete job titles. • Entitle Employee to Supervisor • Entitle Employee to System Admin
	Inputs	• Company email address • Chapter name • Reason to edit hide delete chapters. • Employee details
	Outputs	• Chapter management page • Entitlement page

3.6 Summary

In this chapter, the technologies that needed to produce the web application and reasons to choose such technologies, and the strategy of the proposed solution have been discussed.

Chapter 4 Analysis and Design

4.1 Introduction

After the requirement gathering with clients and further studying about the system, diagrams were designed. In this section, the UML and design diagrams are provided. Both structural and behavioral diagrams regarding each subsystem where needed are given below.

4.2 Analysis

At the client's request, the system's functional and non-functional requirements were identified before proceeding with the design phase. This was achieved through the creation of an SRS document that precisely outlines these requirements.

4.3 Design

In this chapter, the focus will be on the diagrams created to represent the functional and non-functional requirements. The diagrams were generated using Lucid Charts and serve as visual representations of the system's needs. Here are some diagrams:

1. Use case Diagram
2. Class Diagram
3. Activity Diagram
4. Sequence Diagram
5. EER Diagram

After the completion of the aforementioned diagrams, the next step involved designing the mockups for the system. For this purpose, Figma was used as the preferred tool. The mockups, which showcase the system's interface and design, have been included as attachments in Chapter 5.

4.3.1. Use Case Diagram

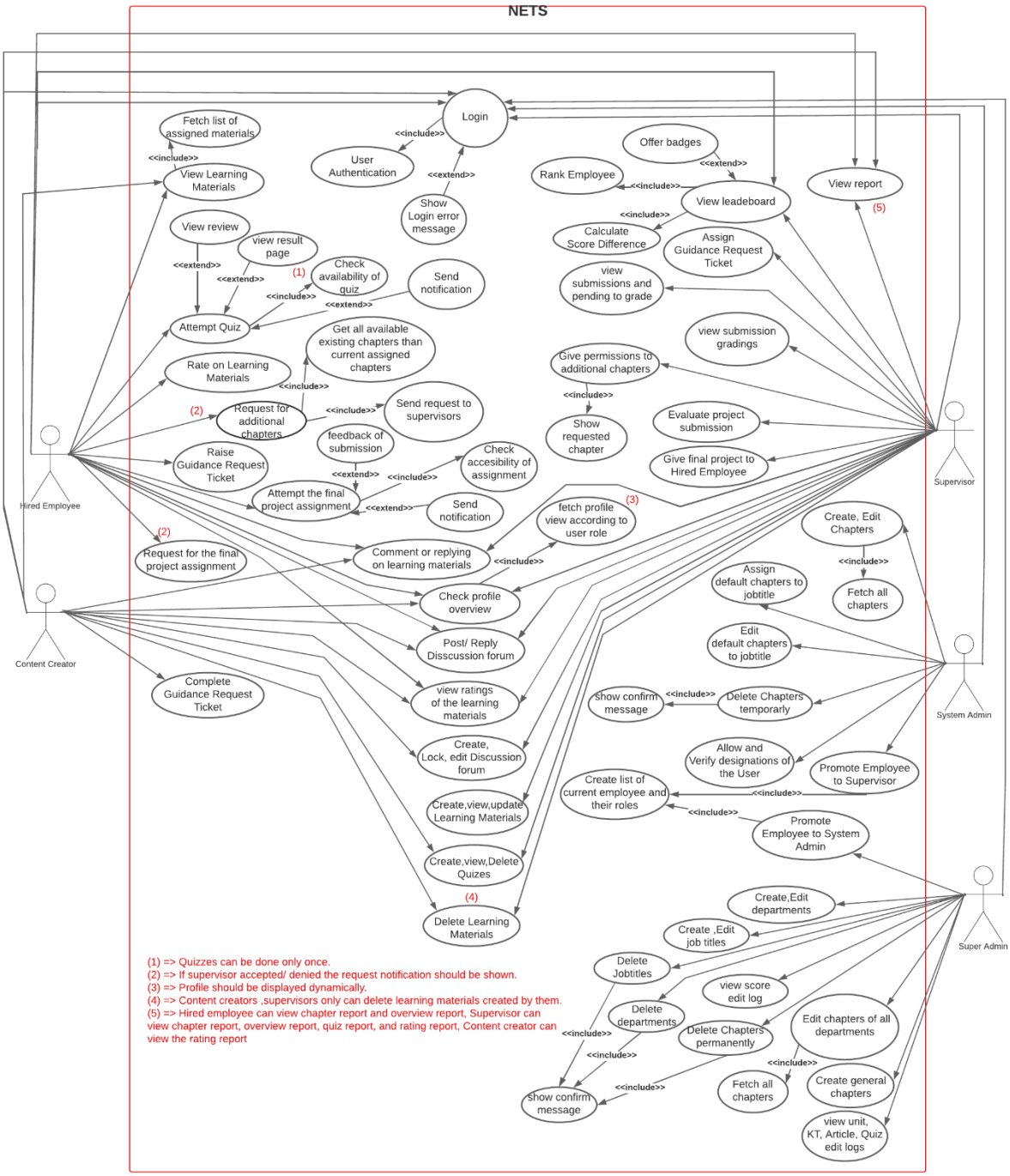


Figure 4 Usecase Diagram

4.3.2. Class Diagram

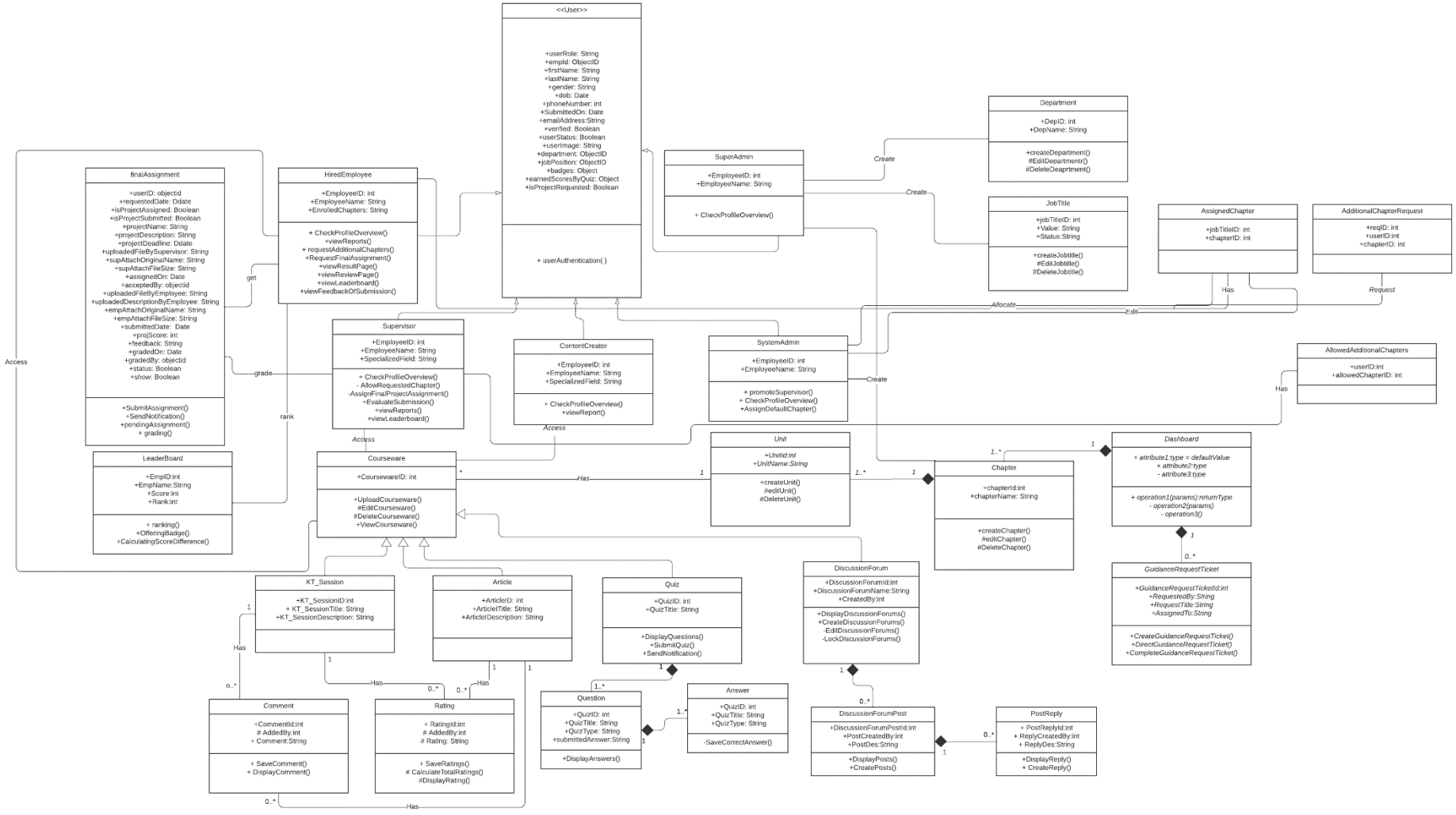


Figure 5 Class Diagram

4.3.3. Activity Diagrams

These are the activity diagrams to demonstrate the main features of the system.

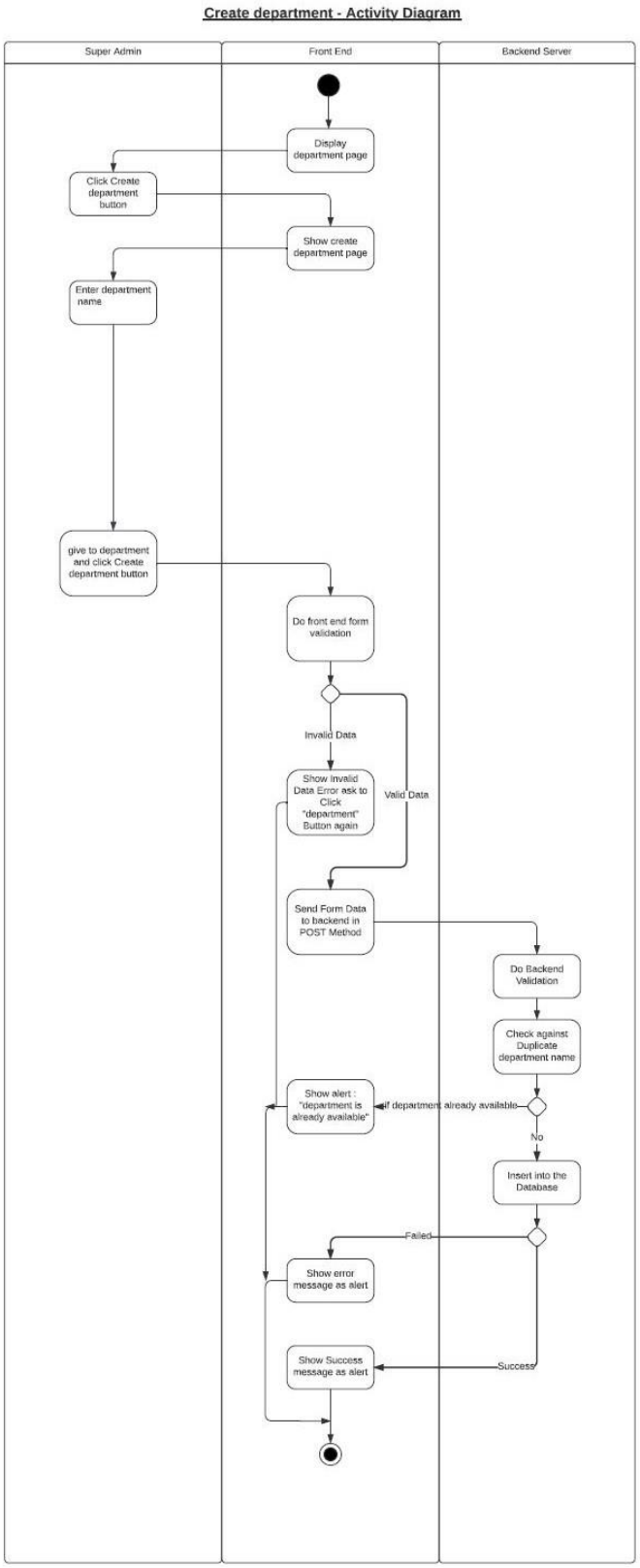


Figure 6 Activity Diagram - Create Department

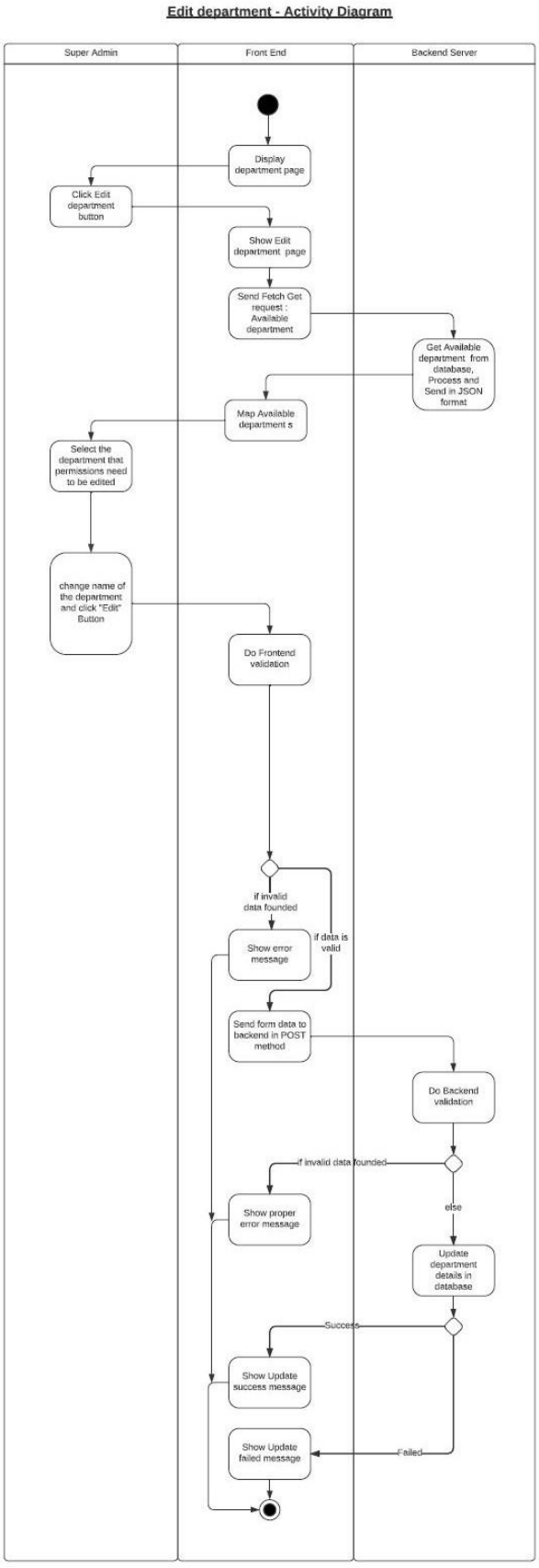


Figure 7 Activity Diagram - Edit Department

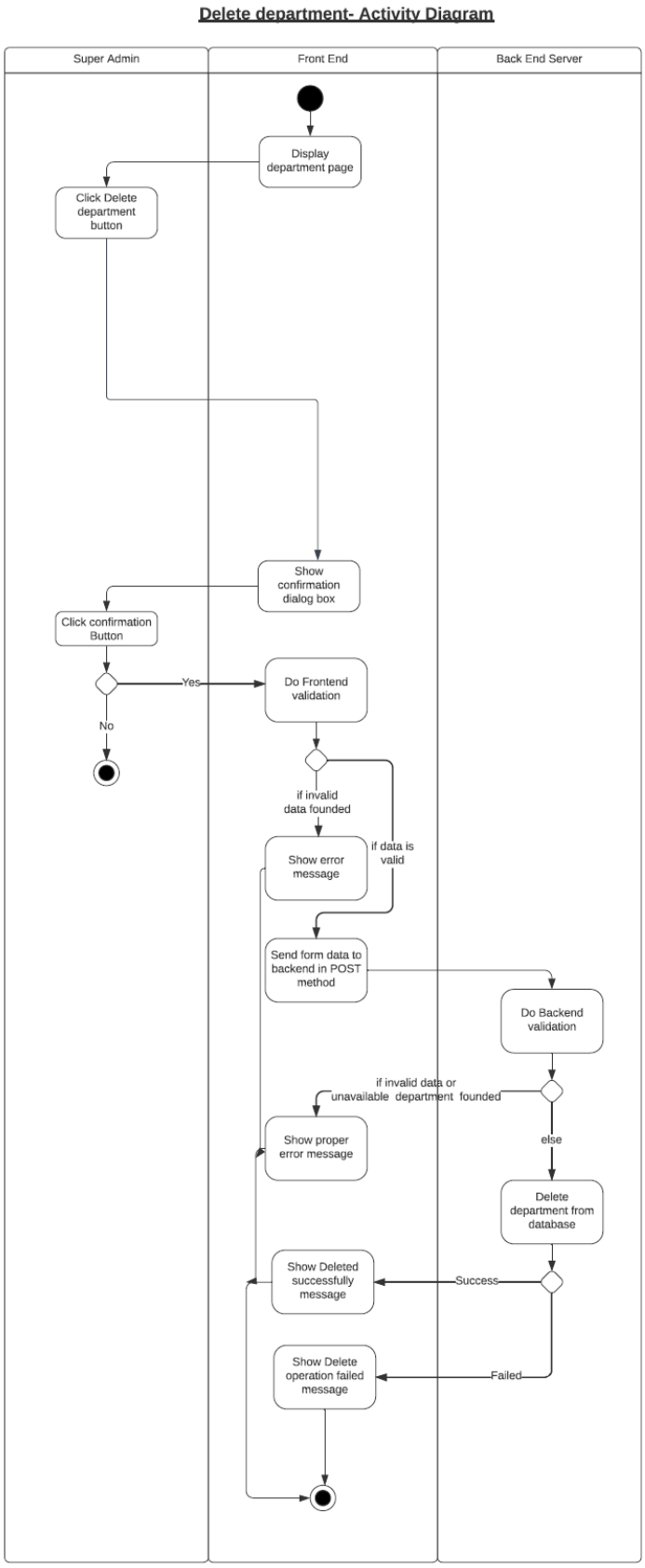


Figure 8 Activity Diagram - Delete Department

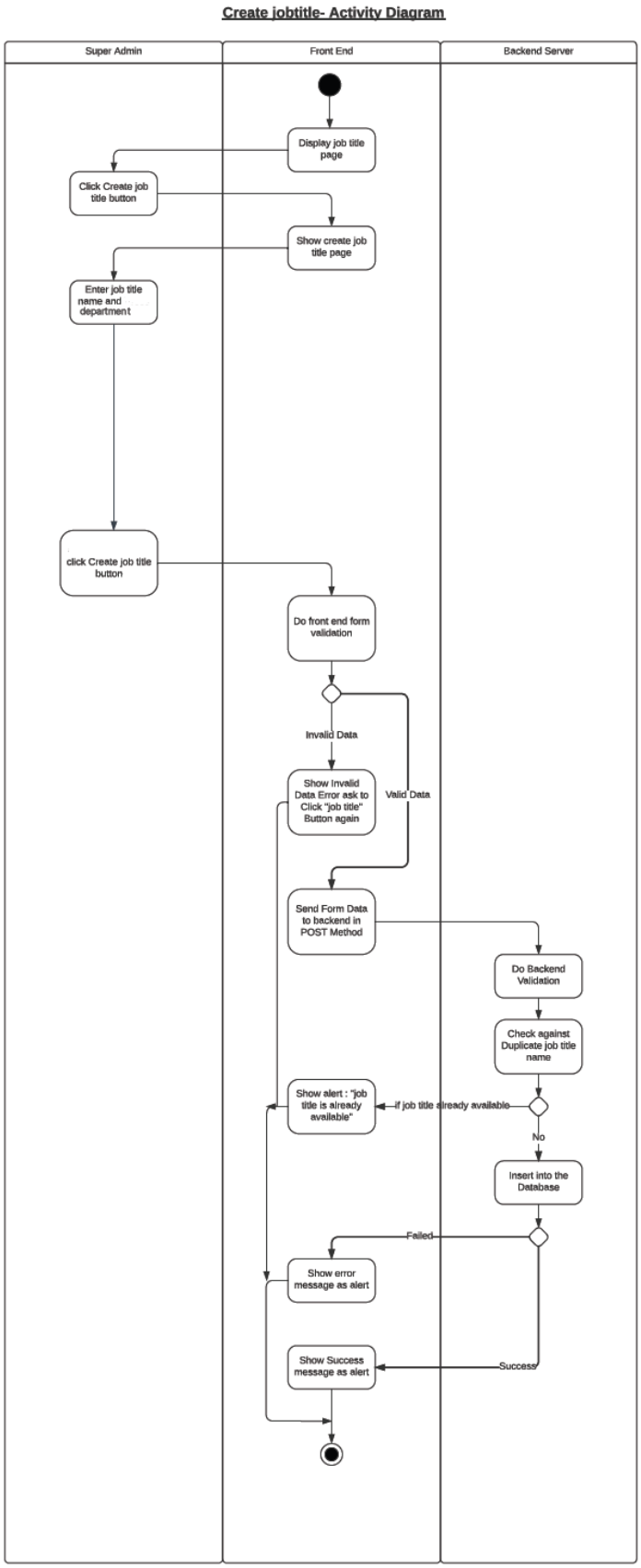


Figure 9 Activity Diagram - Create Job Title

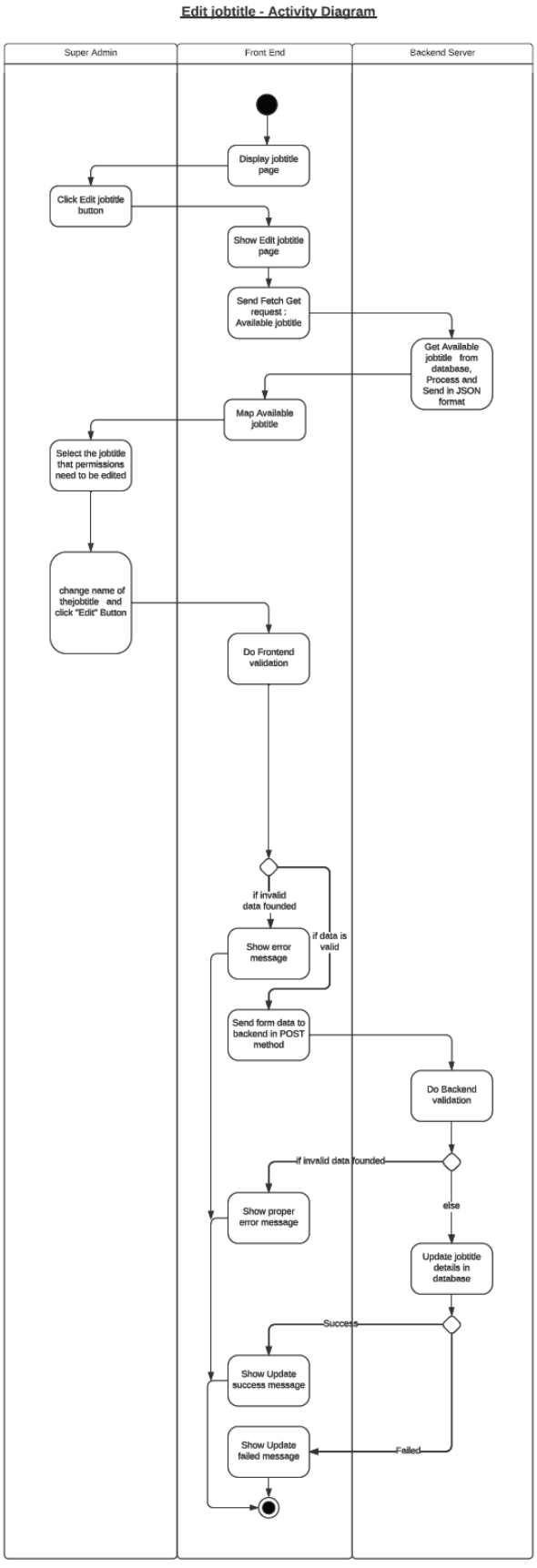


Figure 10 Activity Diagram Edit Job Title

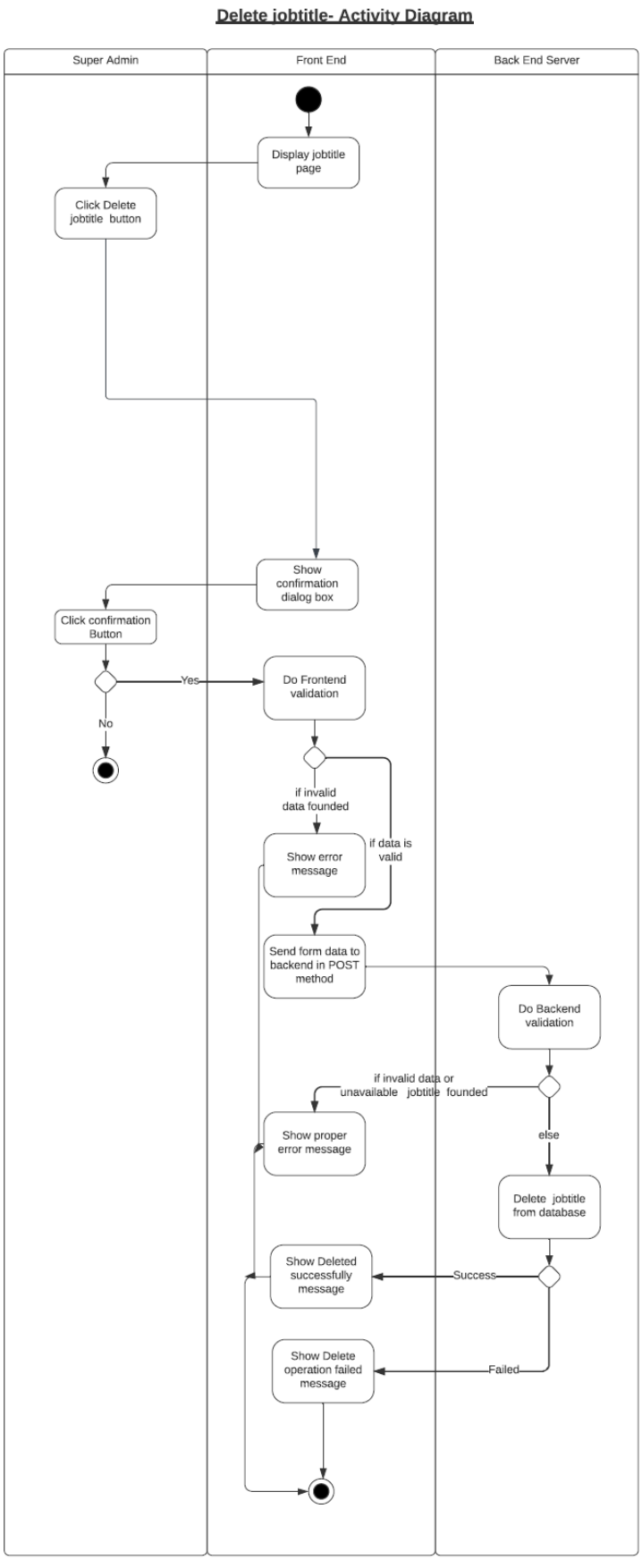


Figure 11 Activity Diagram Delete Job Title

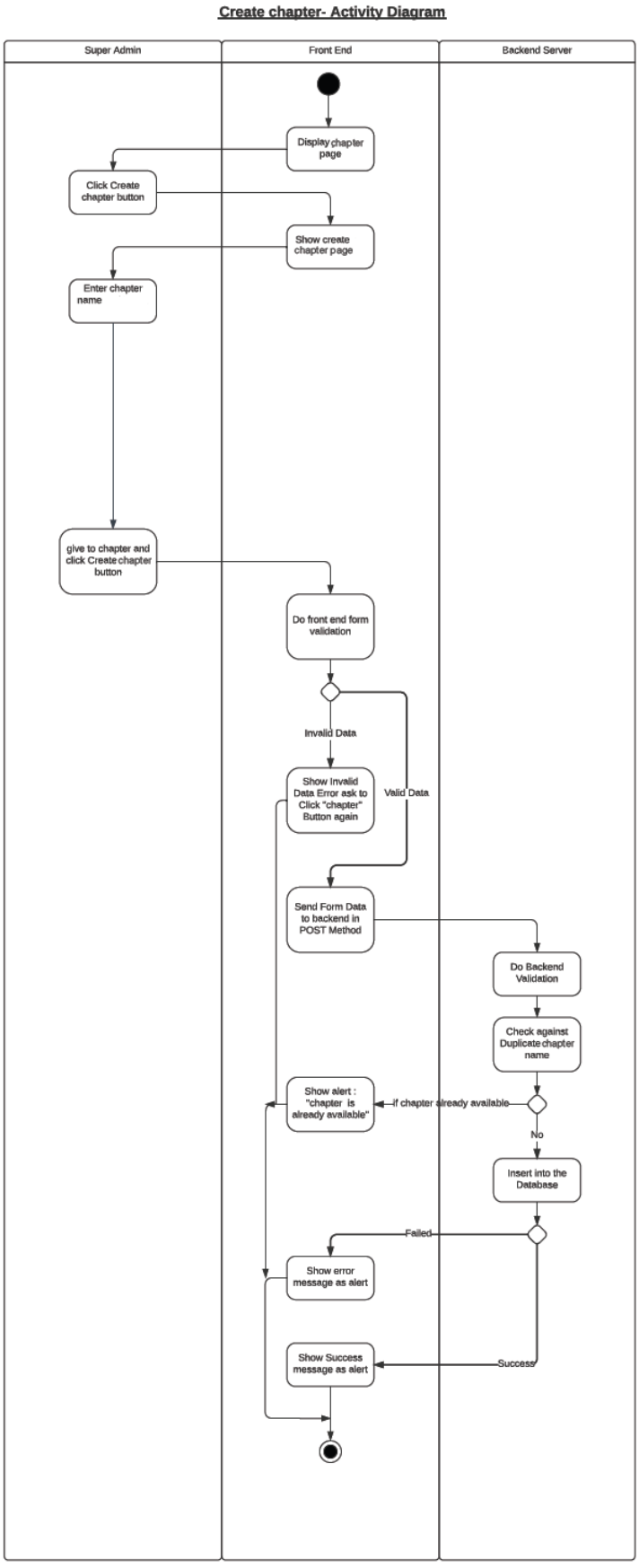


Figure 12 Activity Diagram - Create Chapter

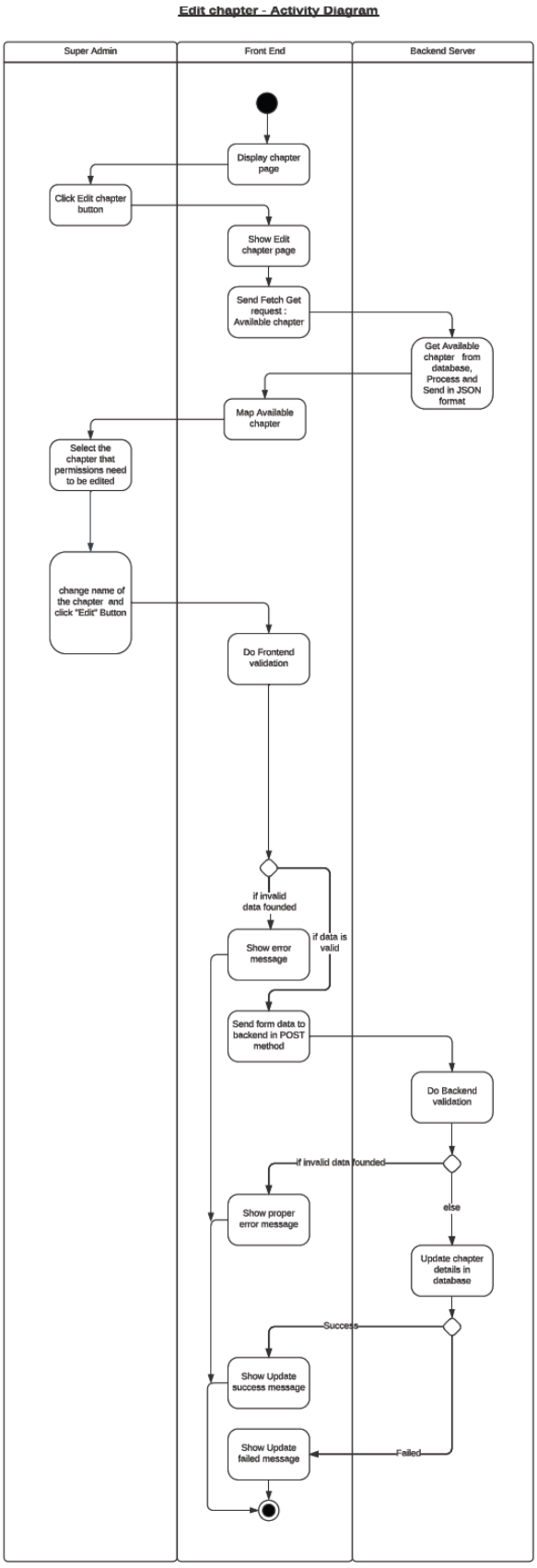


Figure 13 Activity Diagram - Edit Chapter

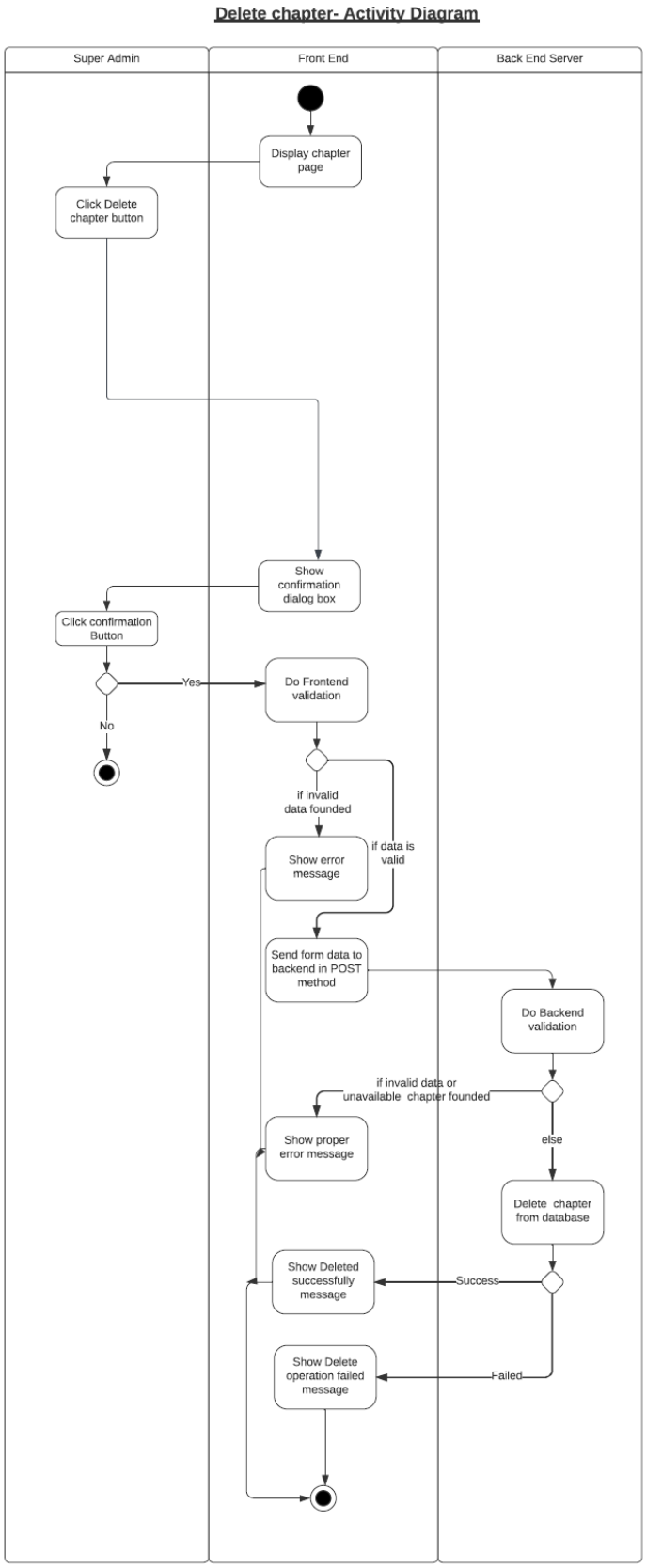


Figure 14 Activity Diagram - Delete Chapter

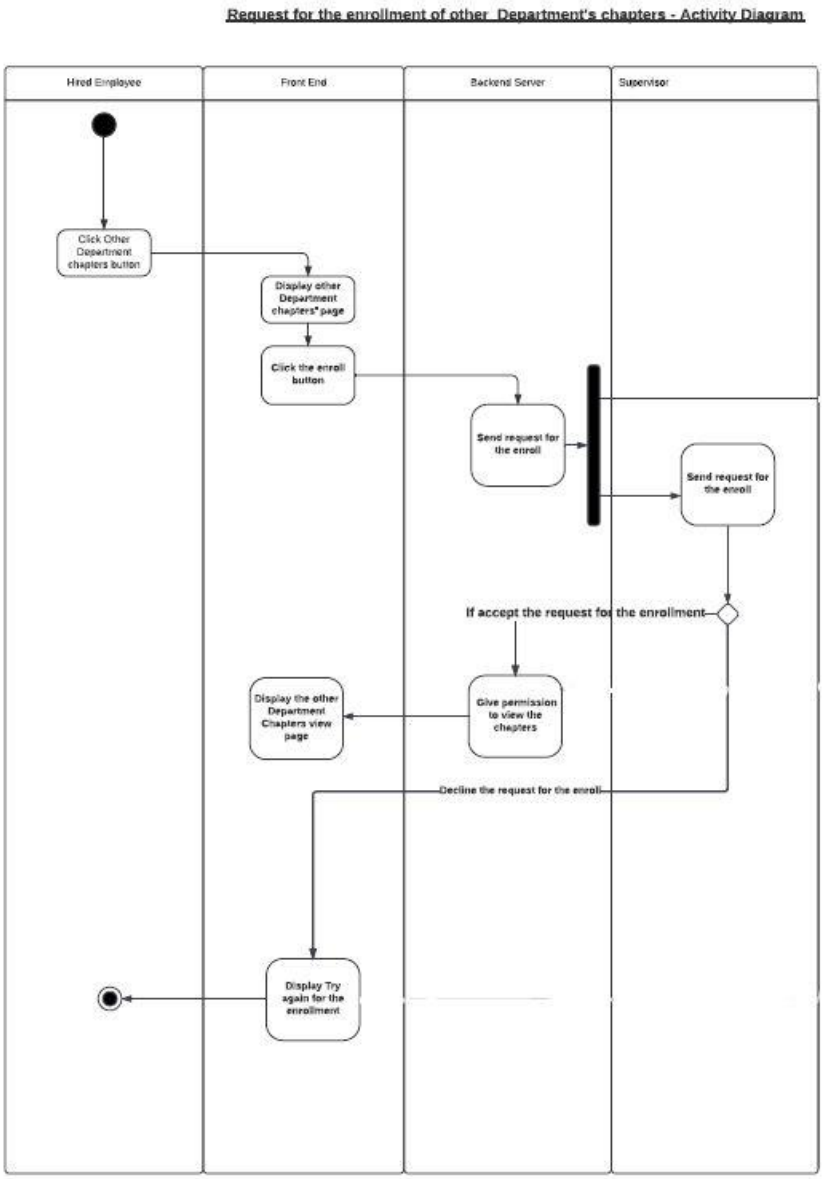


Figure 15 Activity Diagram - Other Chapter Enrollment

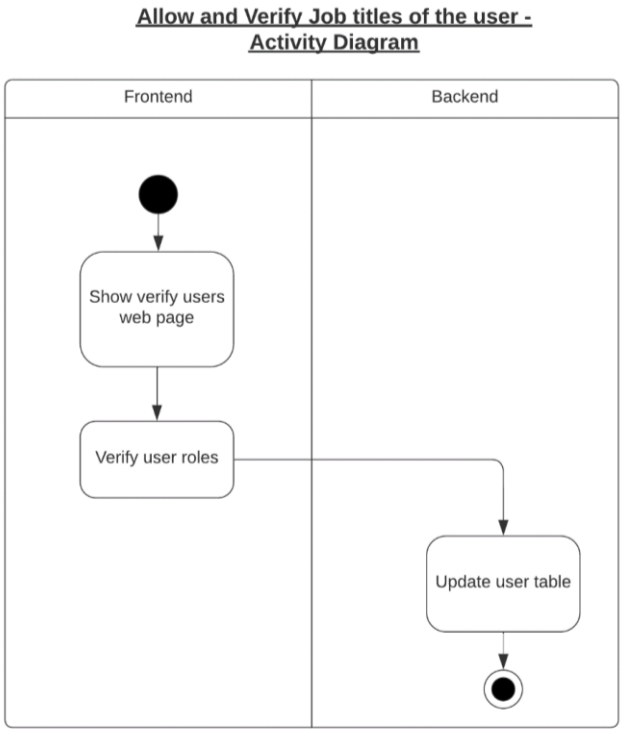


Figure 16 Activity Diagram - Allow and Verify Jobtitles of the user

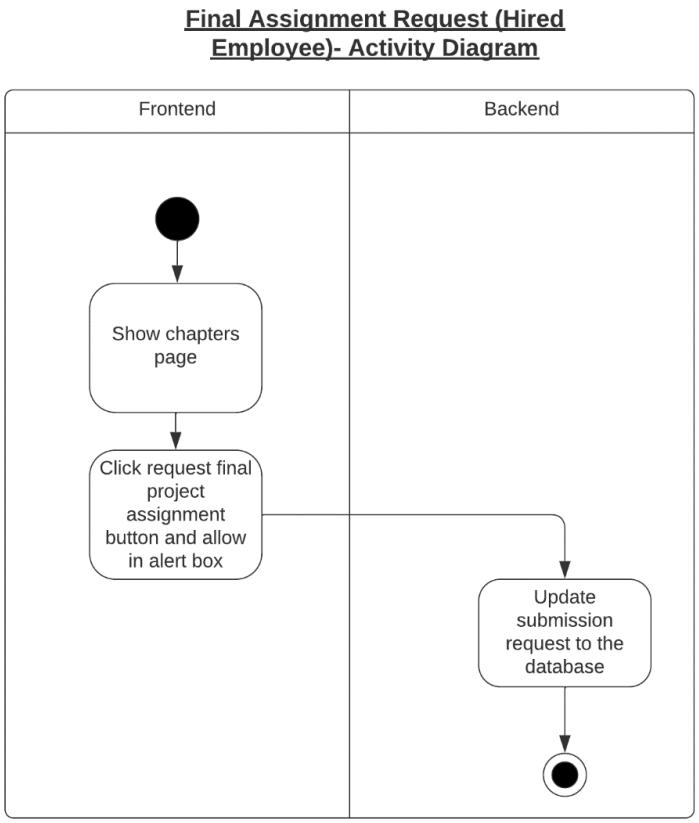


Figure 17 Activity Diagram - Final Project Assignment Request

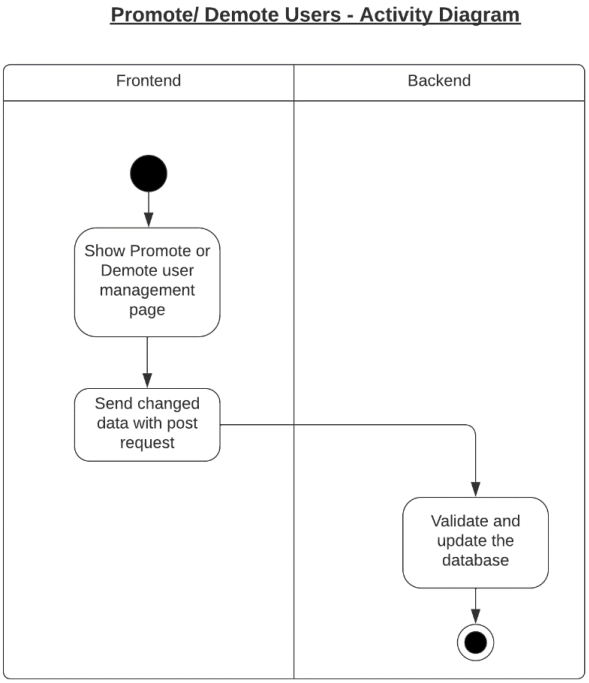


Figure 18 Activity Diagram - Promote or Demote Users

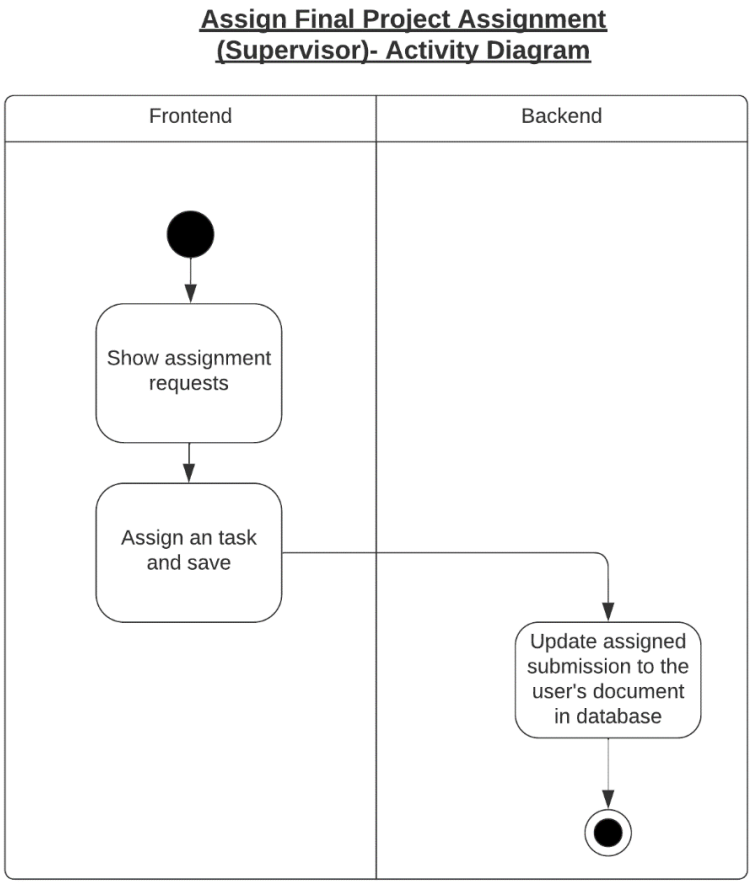


Figure 19 Activity Diagram - Assign Final Project Assignment

Login - Activity Diagram

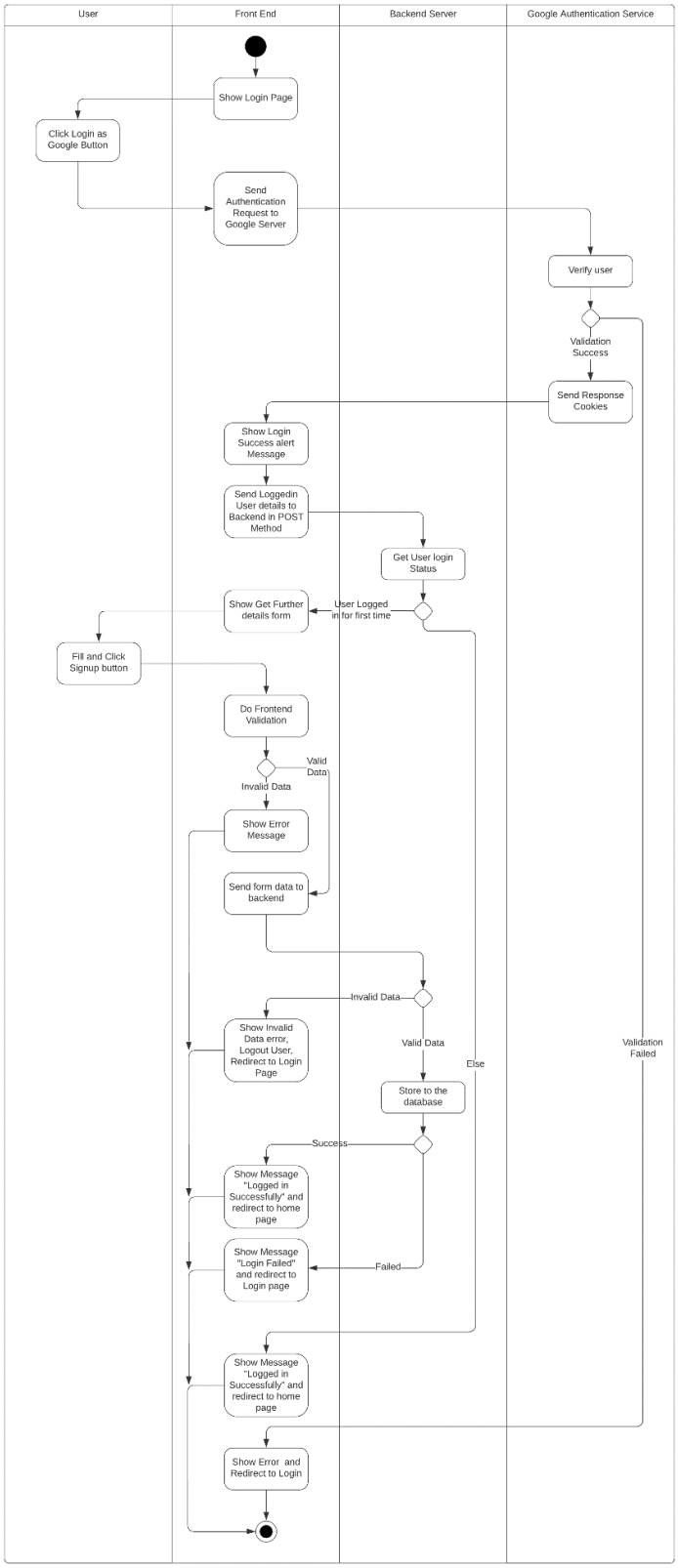


Figure 20 Activity Diagram - Login

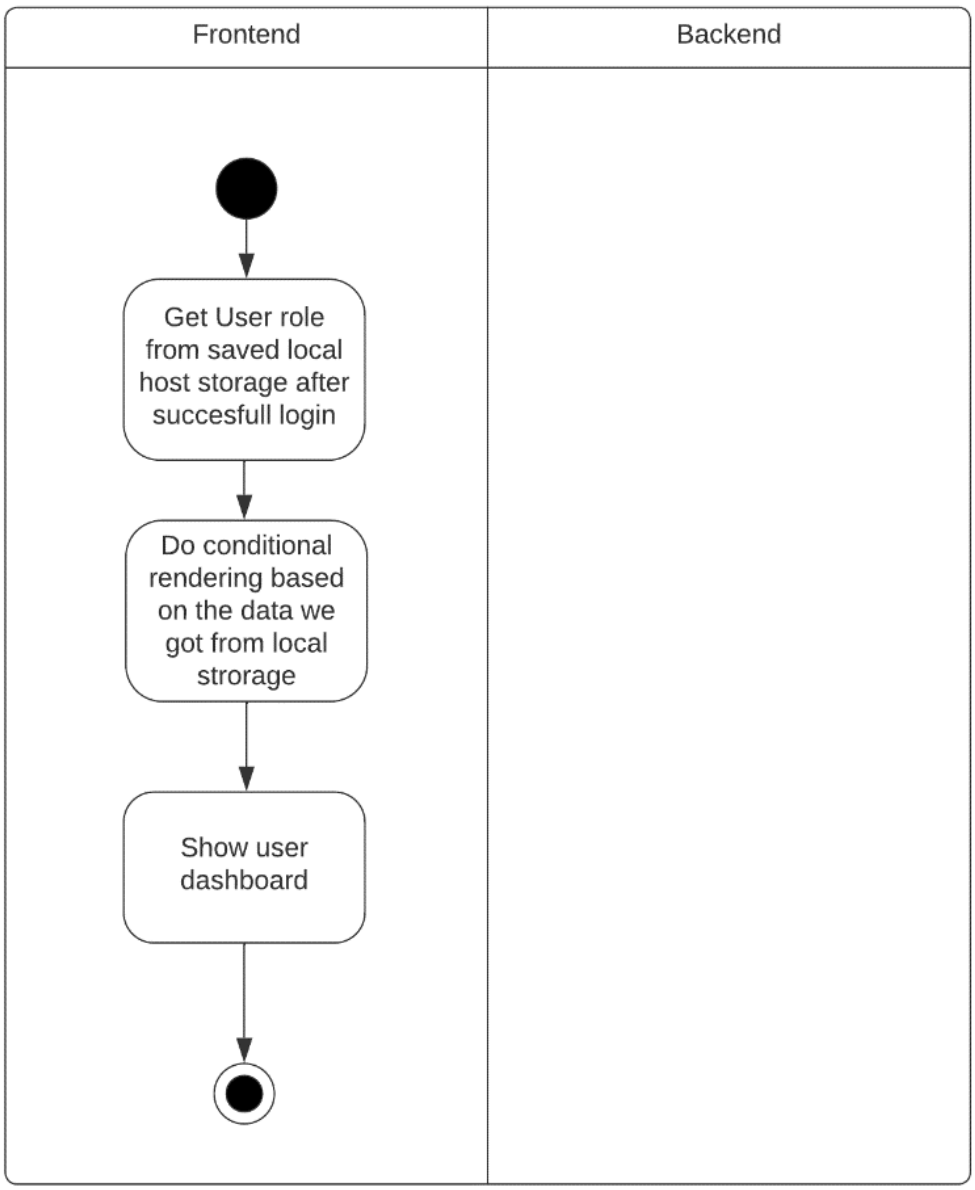


Figure 21 Activity Diagram - Show Dashboard

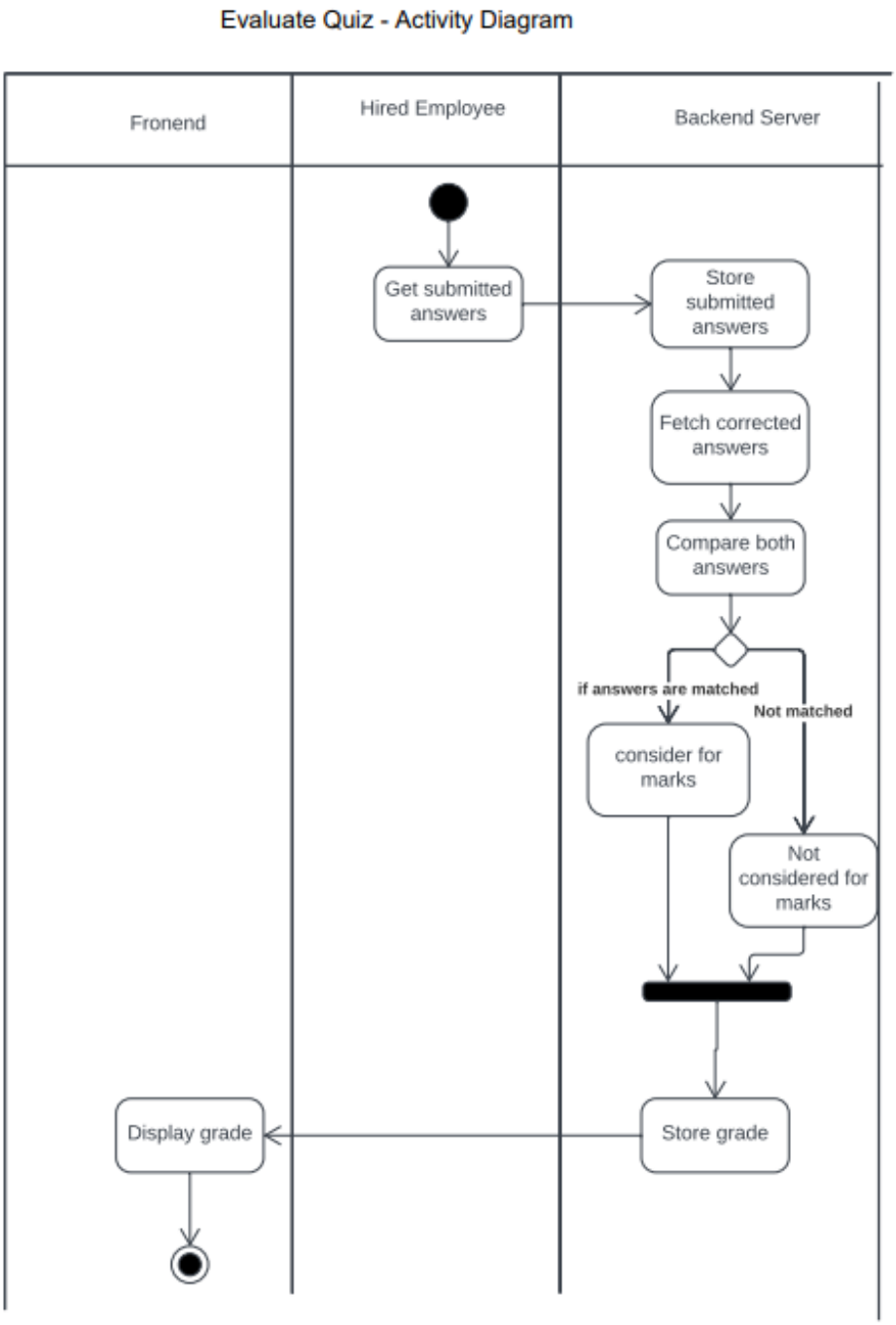


Figure 22 Activity Diagram - Evaluate Quiz

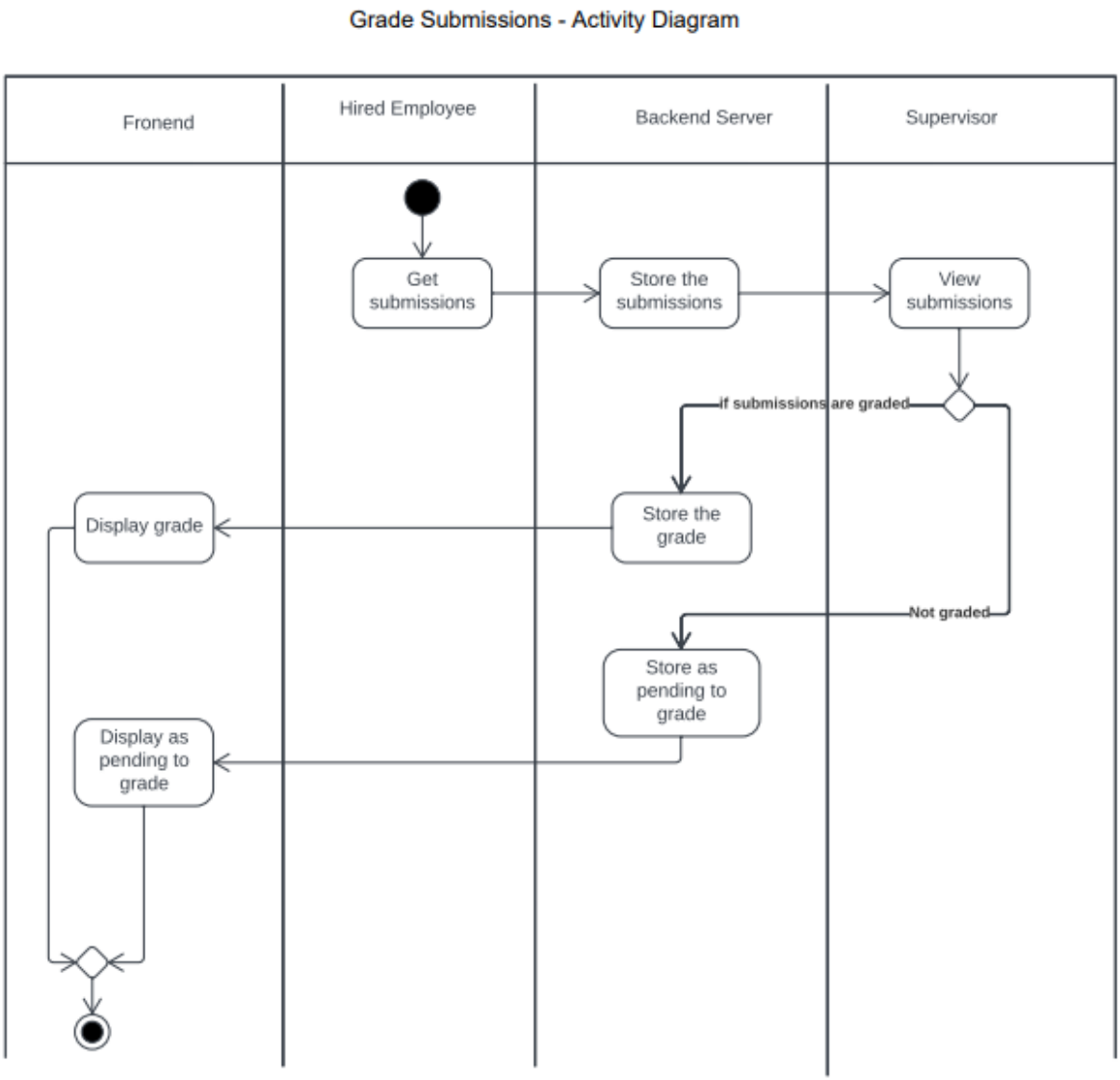


Figure 23 Activity Diagram - Grade Submissions

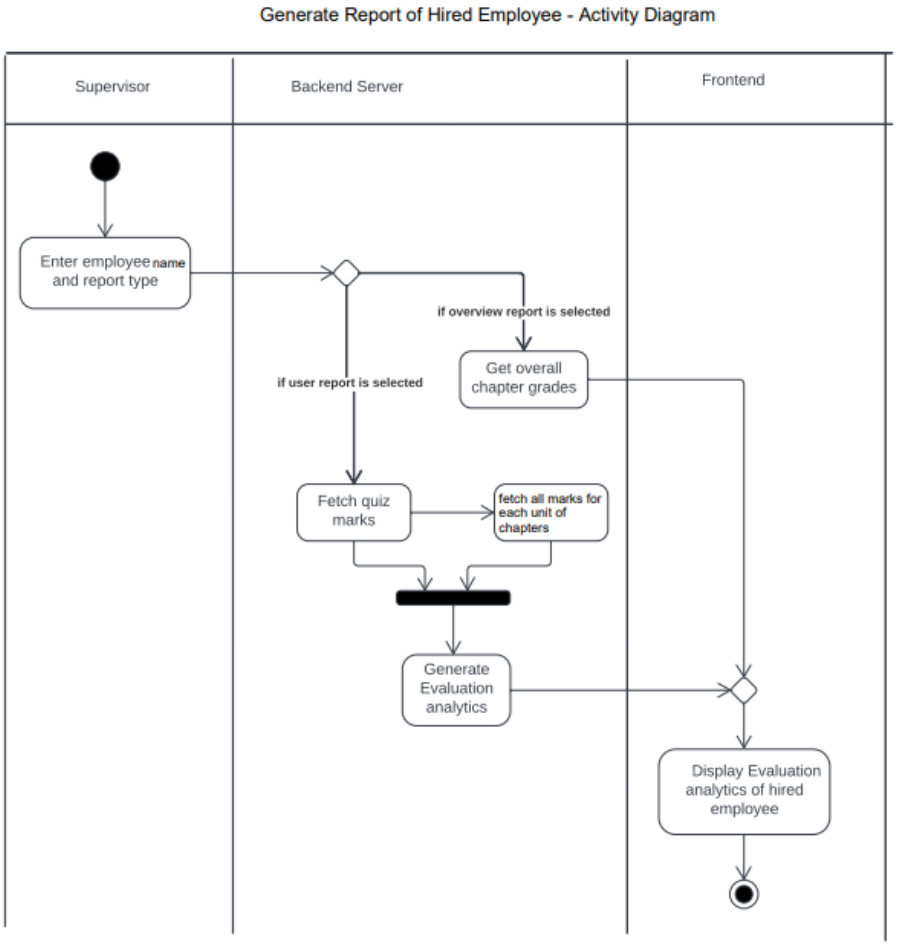


Figure 24 Activity Diagram - Generate Report of Hired Employees

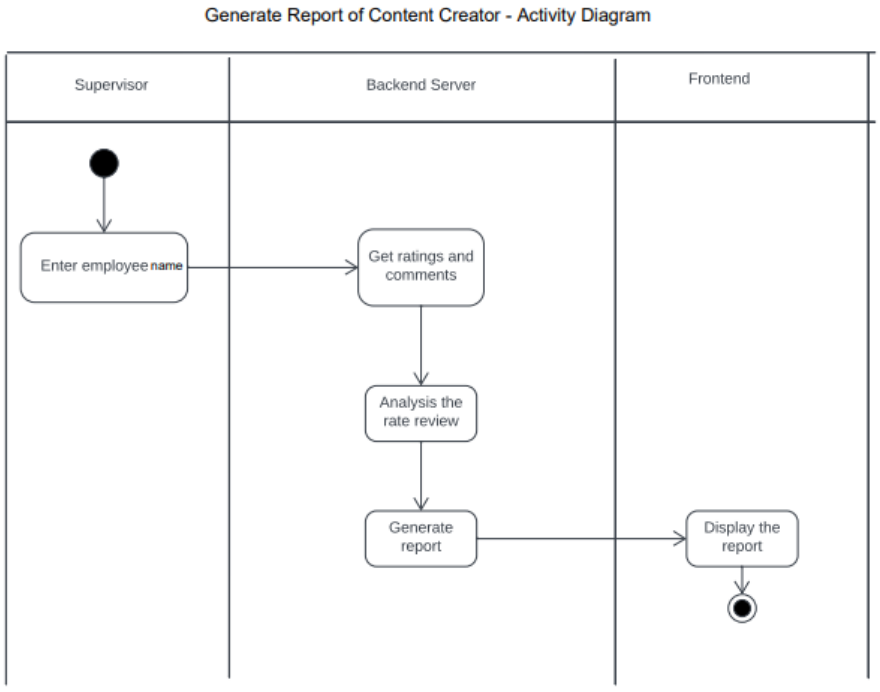


Figure 25 Activity Diagram - Generate Report of Content Creator

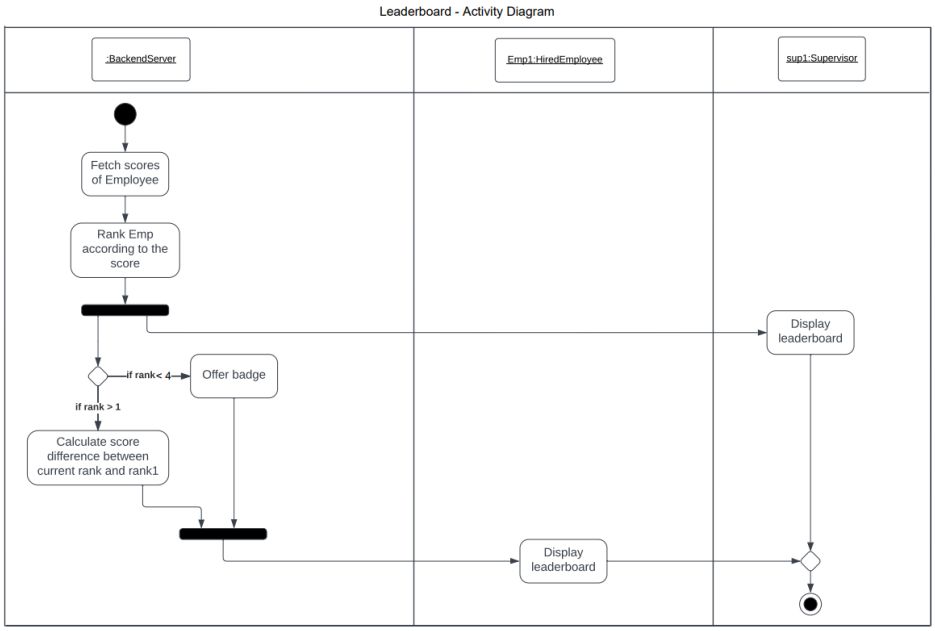


Figure 26 Activity Diagram - Leader Board

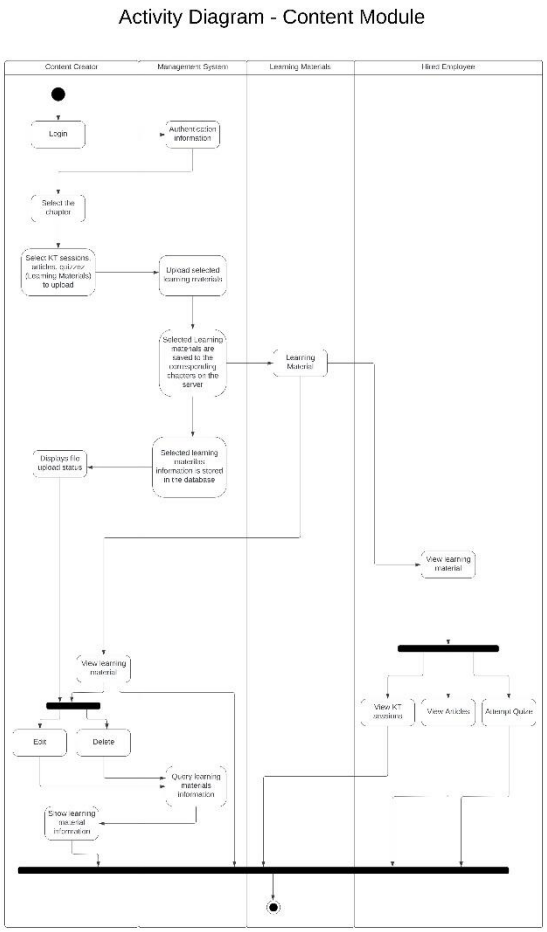


Figure 27 Activity Diagram - Content Module

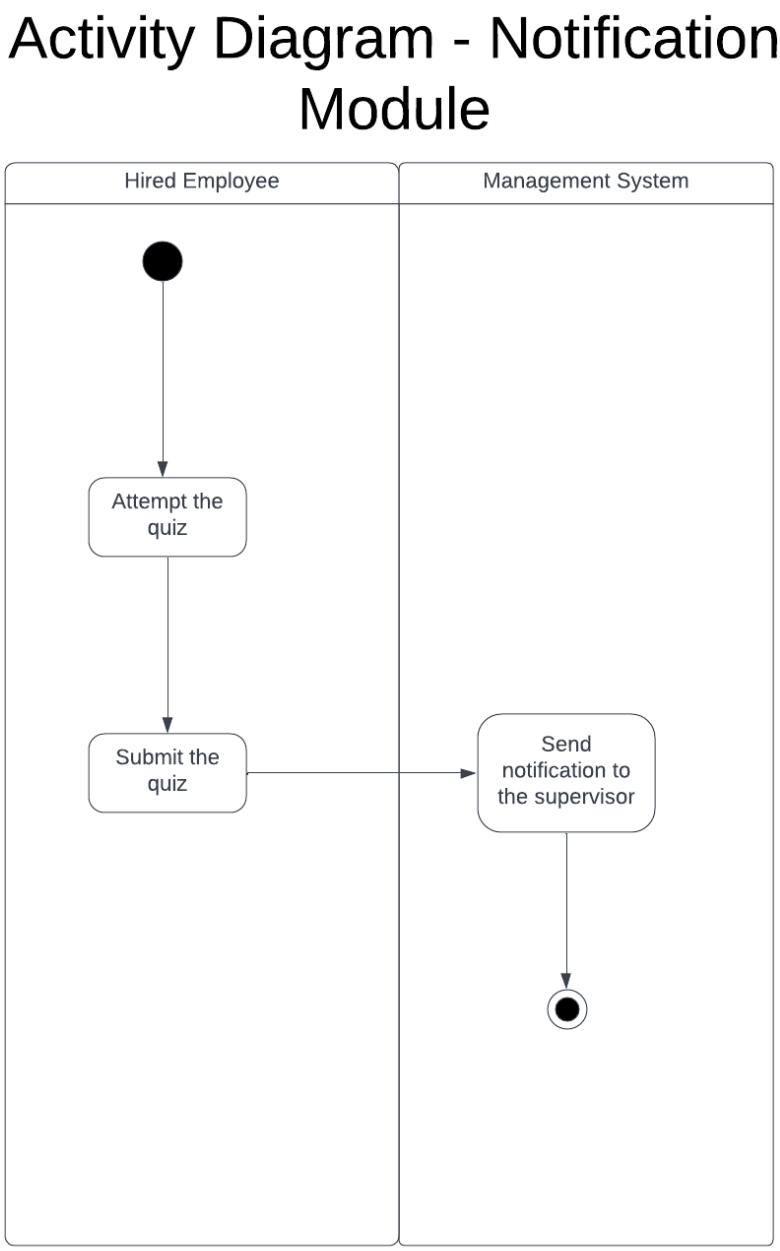


Figure 28 Activity Diagram - Notification Module

Activity Diagram to get feedbacks

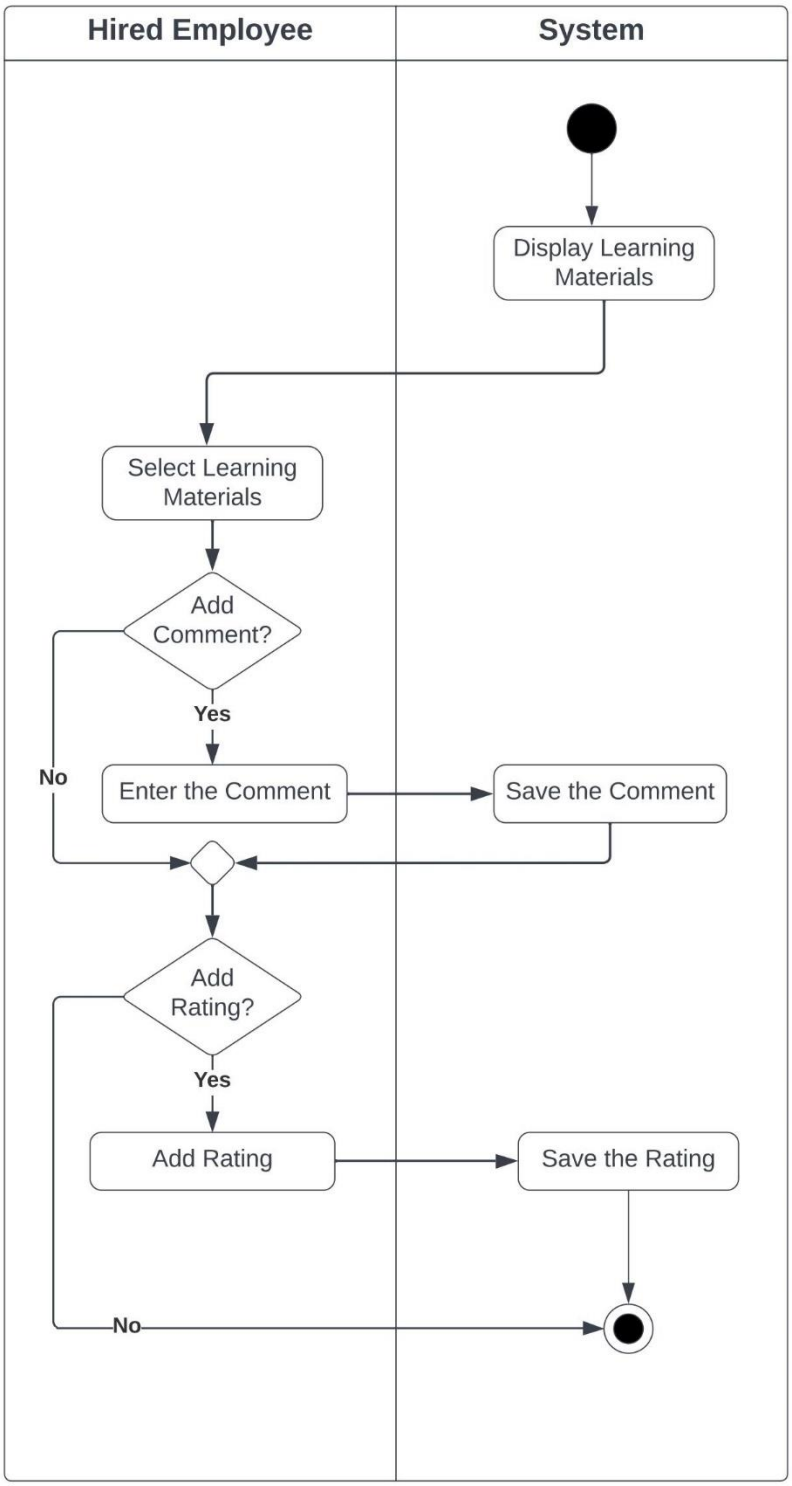


Figure 29 Activity Diagram - Get Feedbacks

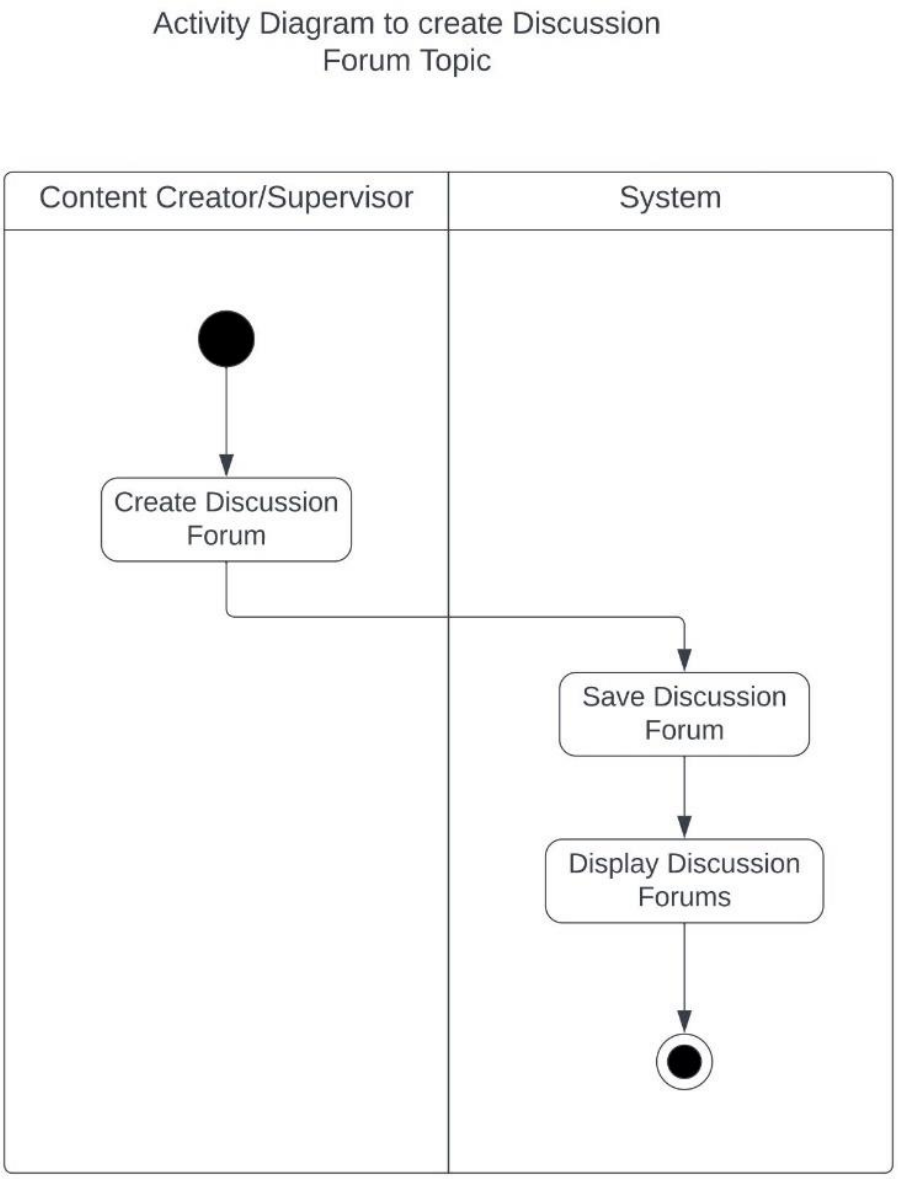


Figure 30 Activity Diagram - Create Discussion Forum Topics

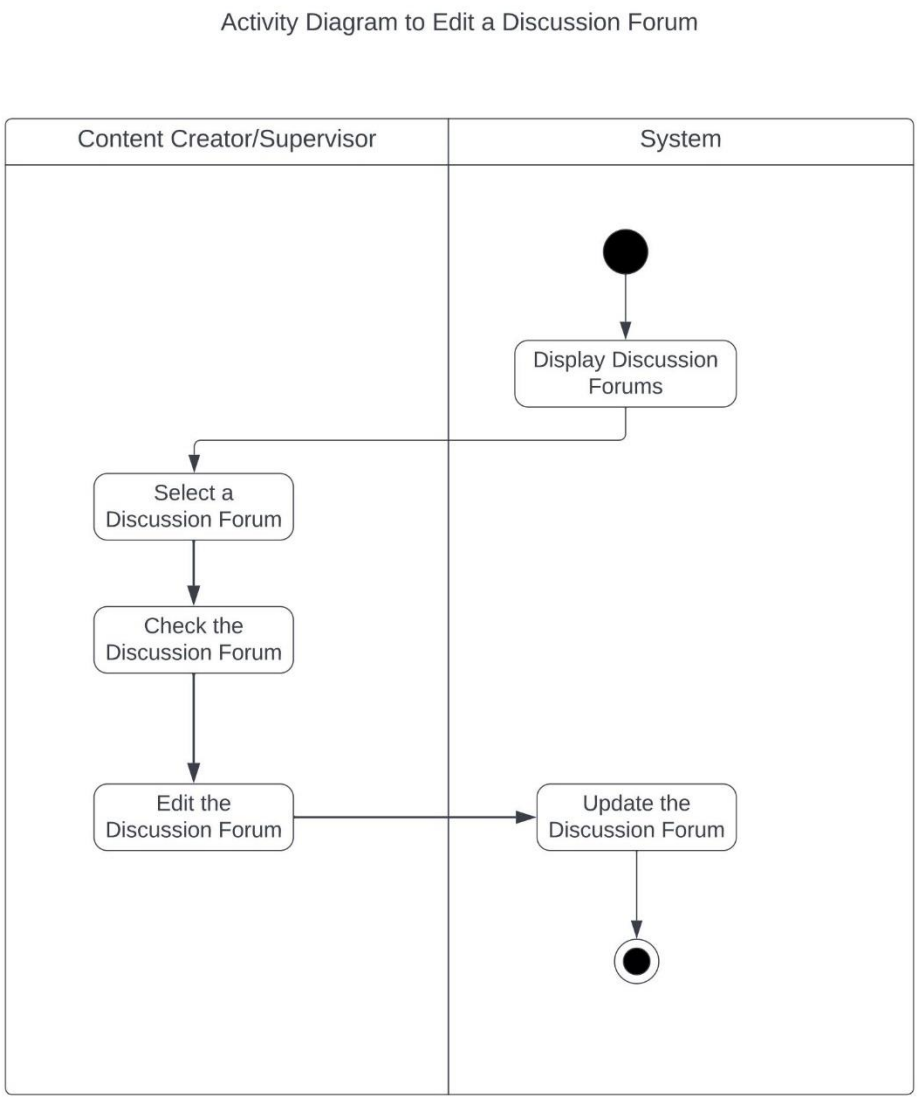


Figure 31 Activity Diagram - Edit Discussion Forum

Activity Diagram to Lock a Discussion Forum

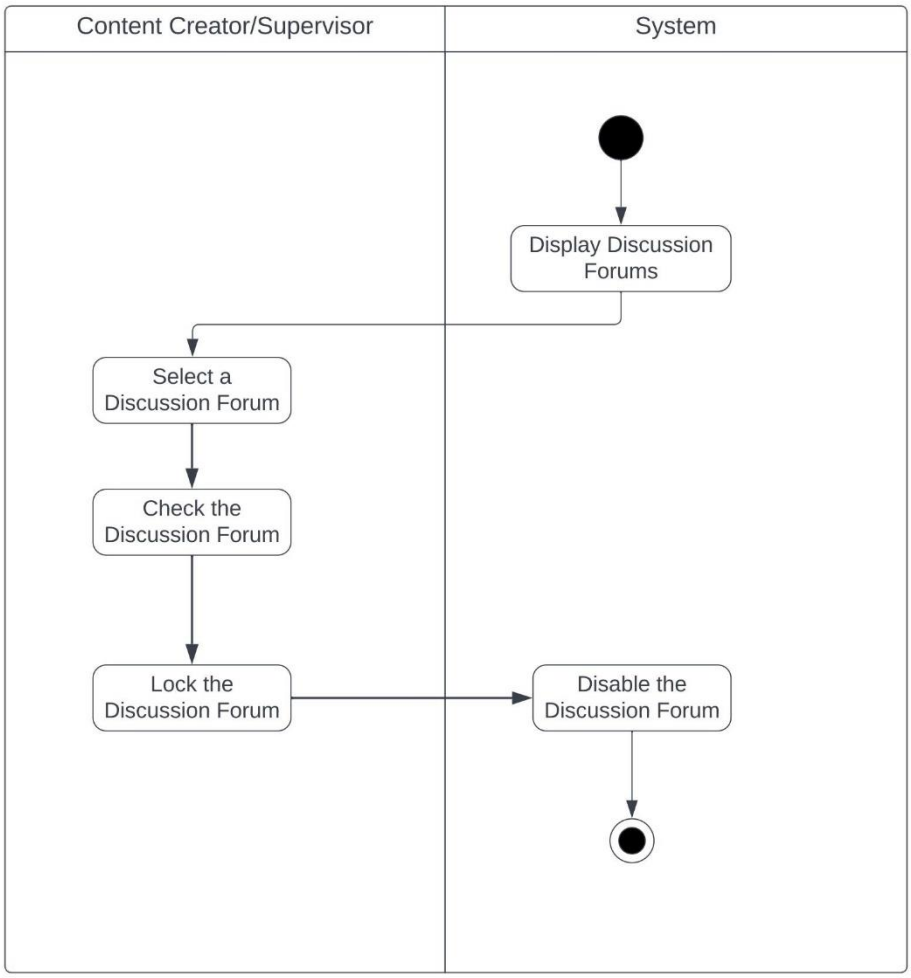


Figure 32 Activity Diagram - Lock Discussion Forum

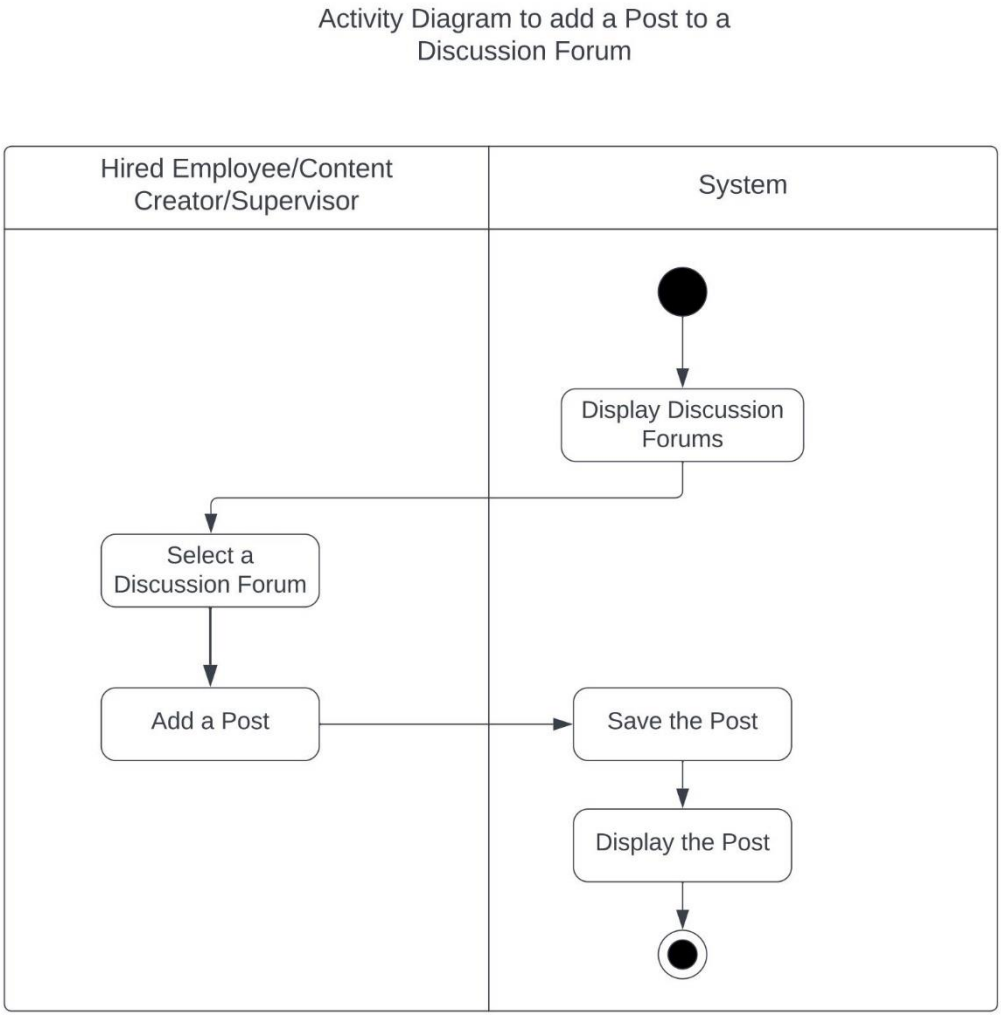


Figure 33 Activity Diagram - Add Post to Discussion Forum

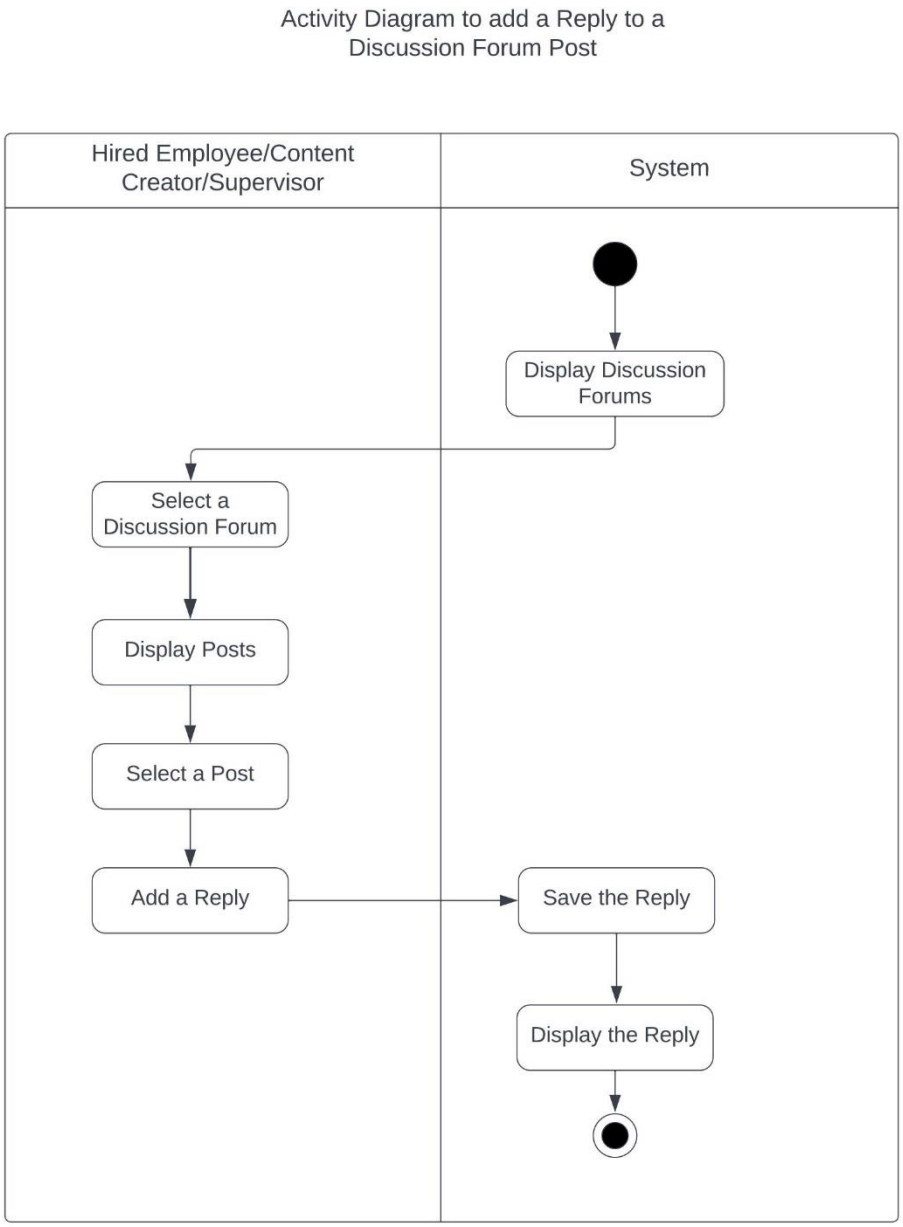


Figure 34 Activity Diagram - Add Reply to Discussion Forum

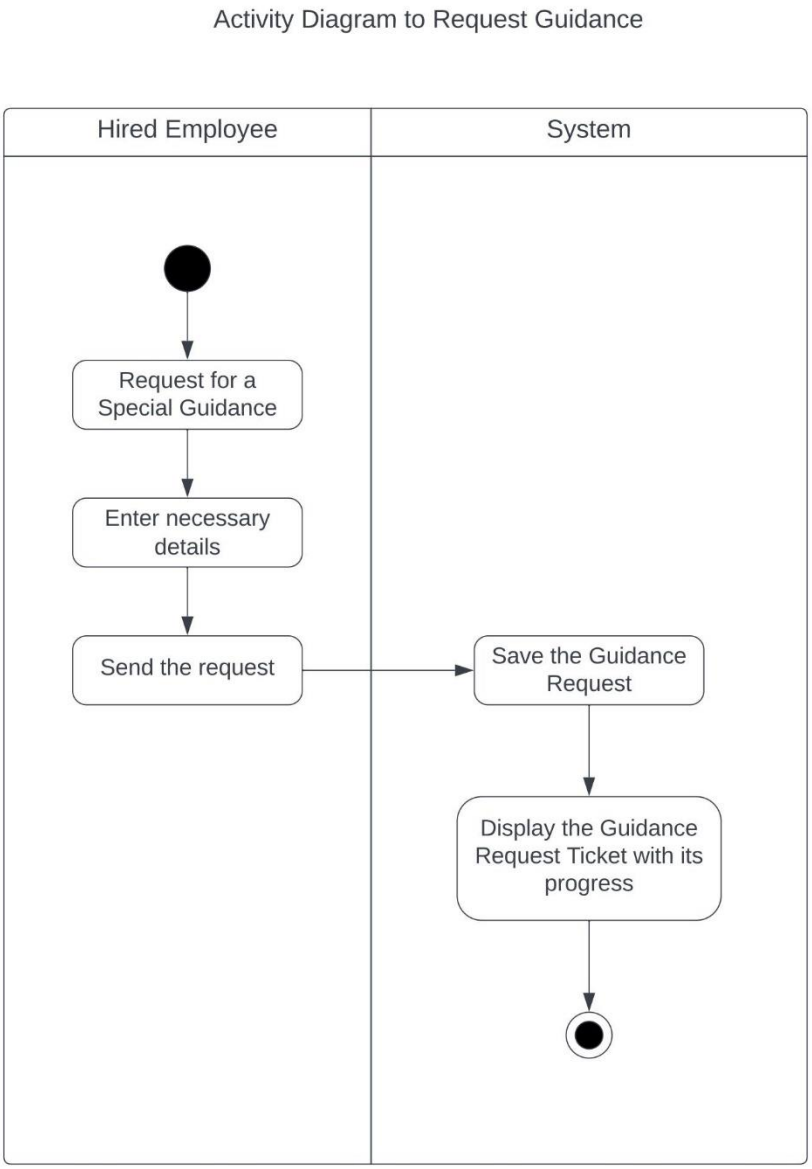


Figure 35 Activity Diagram - Request Guiudance

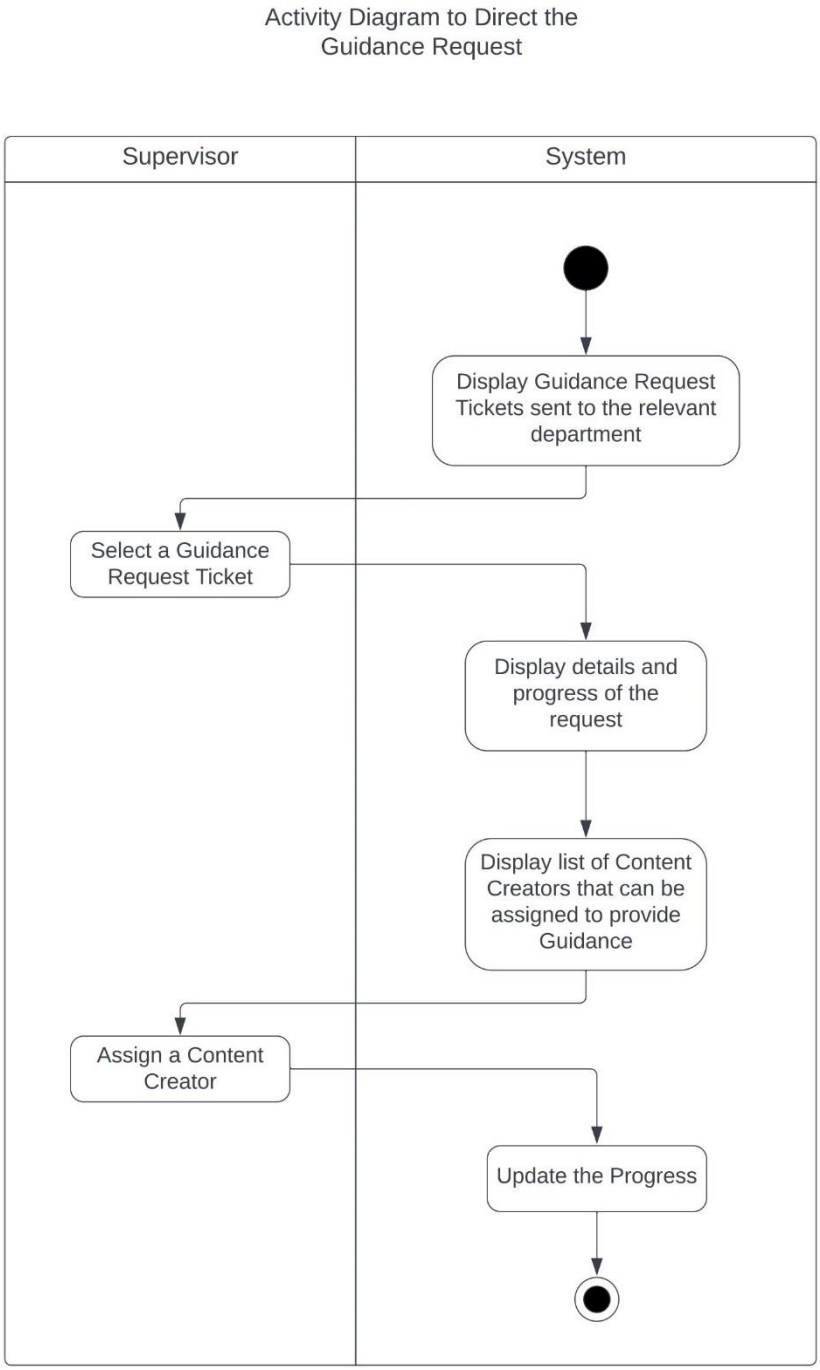


Figure 36 Activity Diagram - Direct Guidance Request

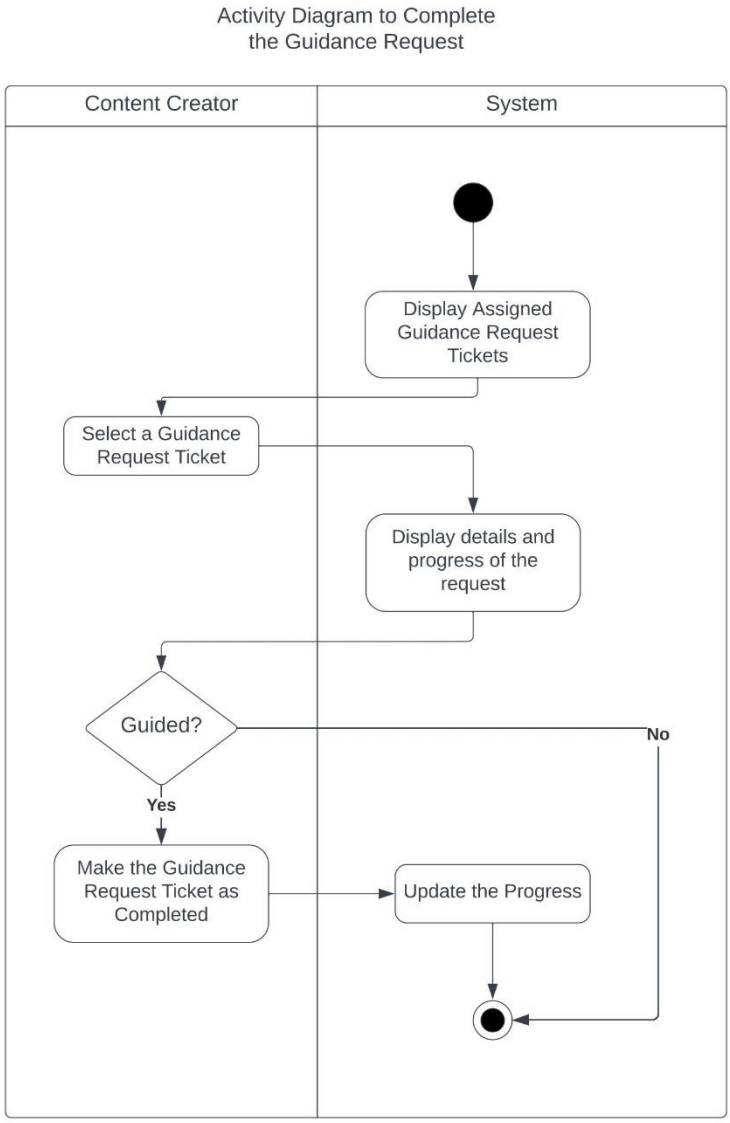


Figure 37 Activity Diagram - Complete Guidance Request

4.3.4. Sequence Diagram

These are the sequence diagrams to demonstrate the main features of the system.

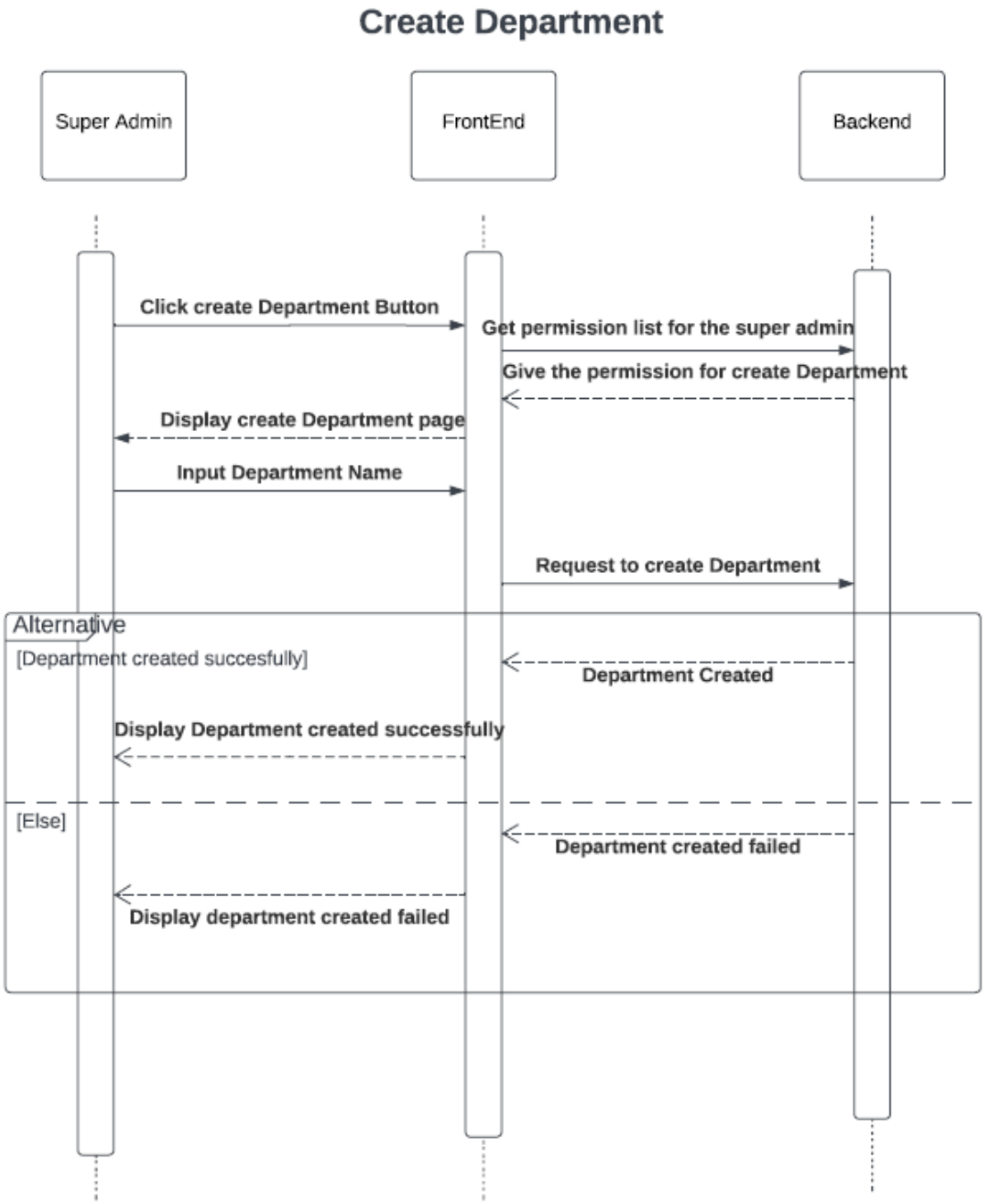


Figure 38 Sequence Diagram - Create Department

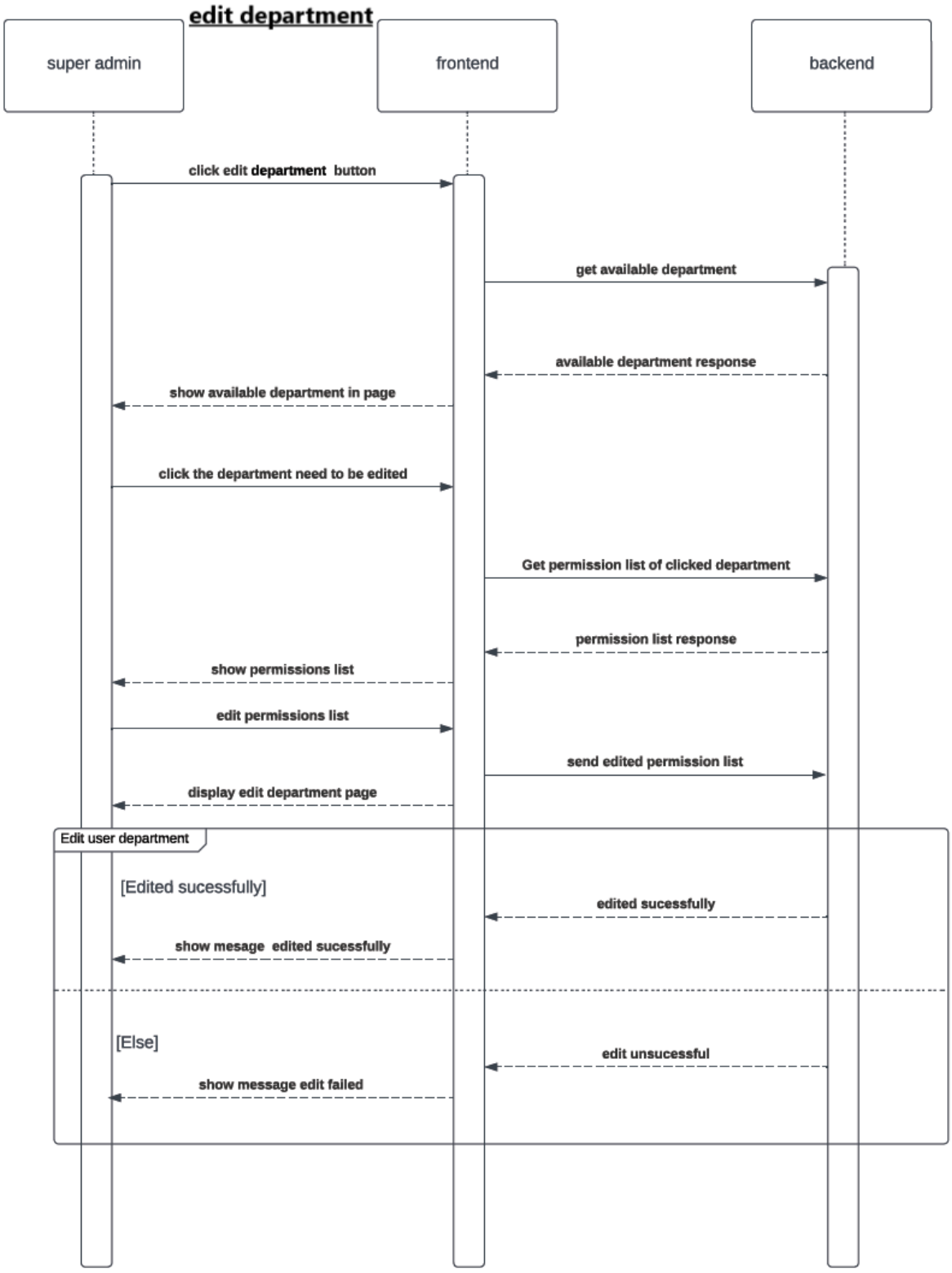


Figure 39 Sequence Diagram - Edit Department

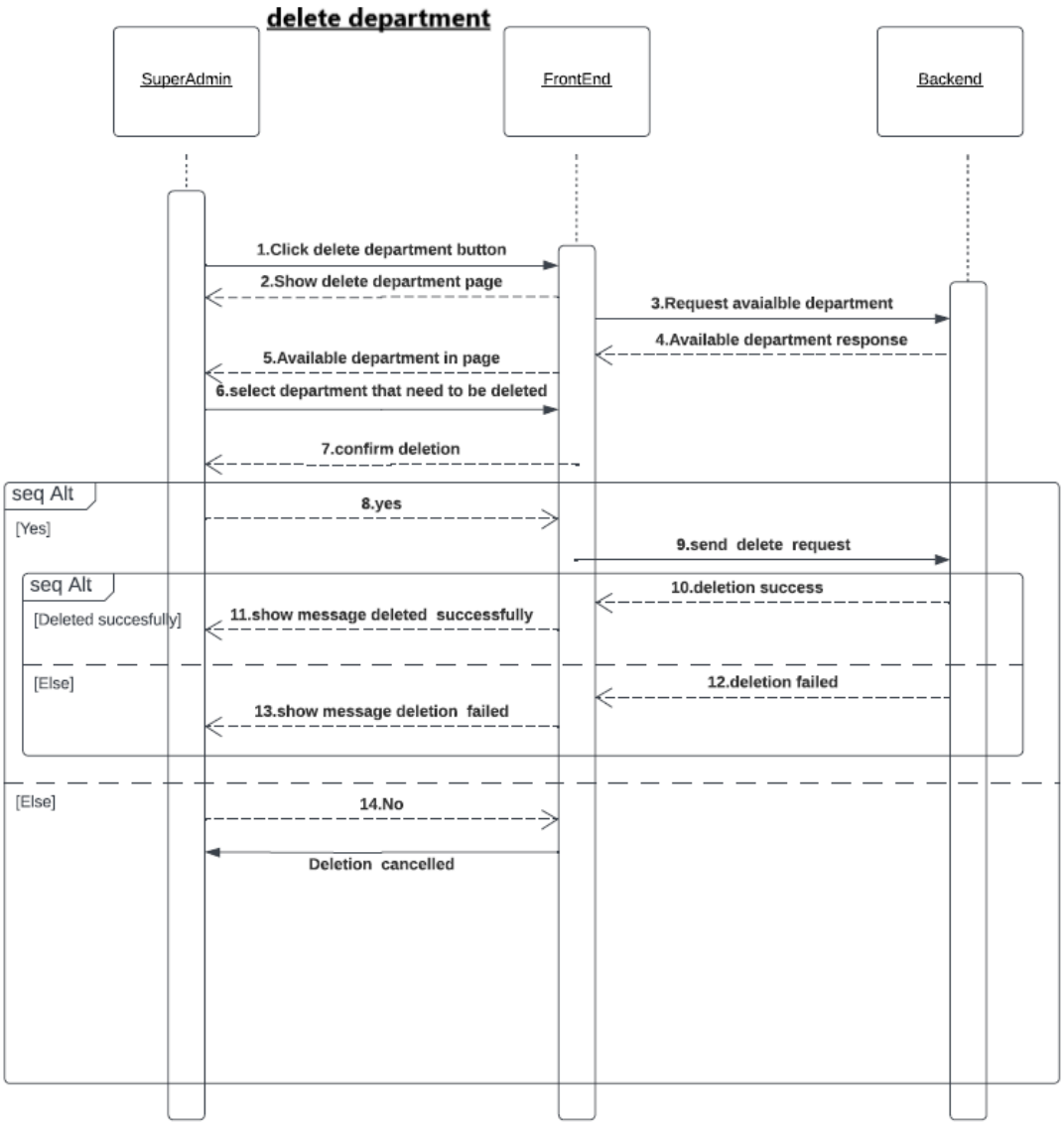


Figure 40 Sequence Diagram - Delete Department

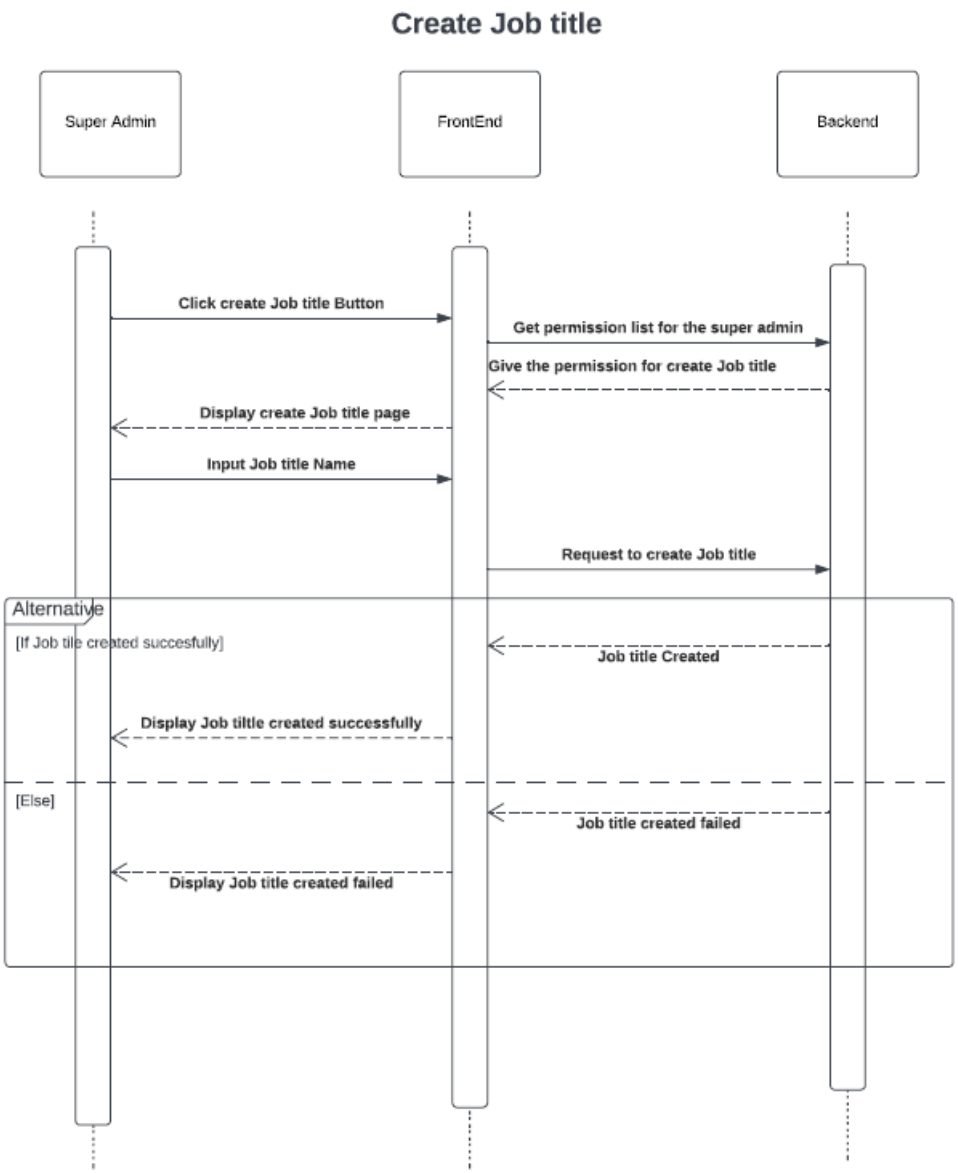


Figure 41 Sequence Diagram - Create Job Title

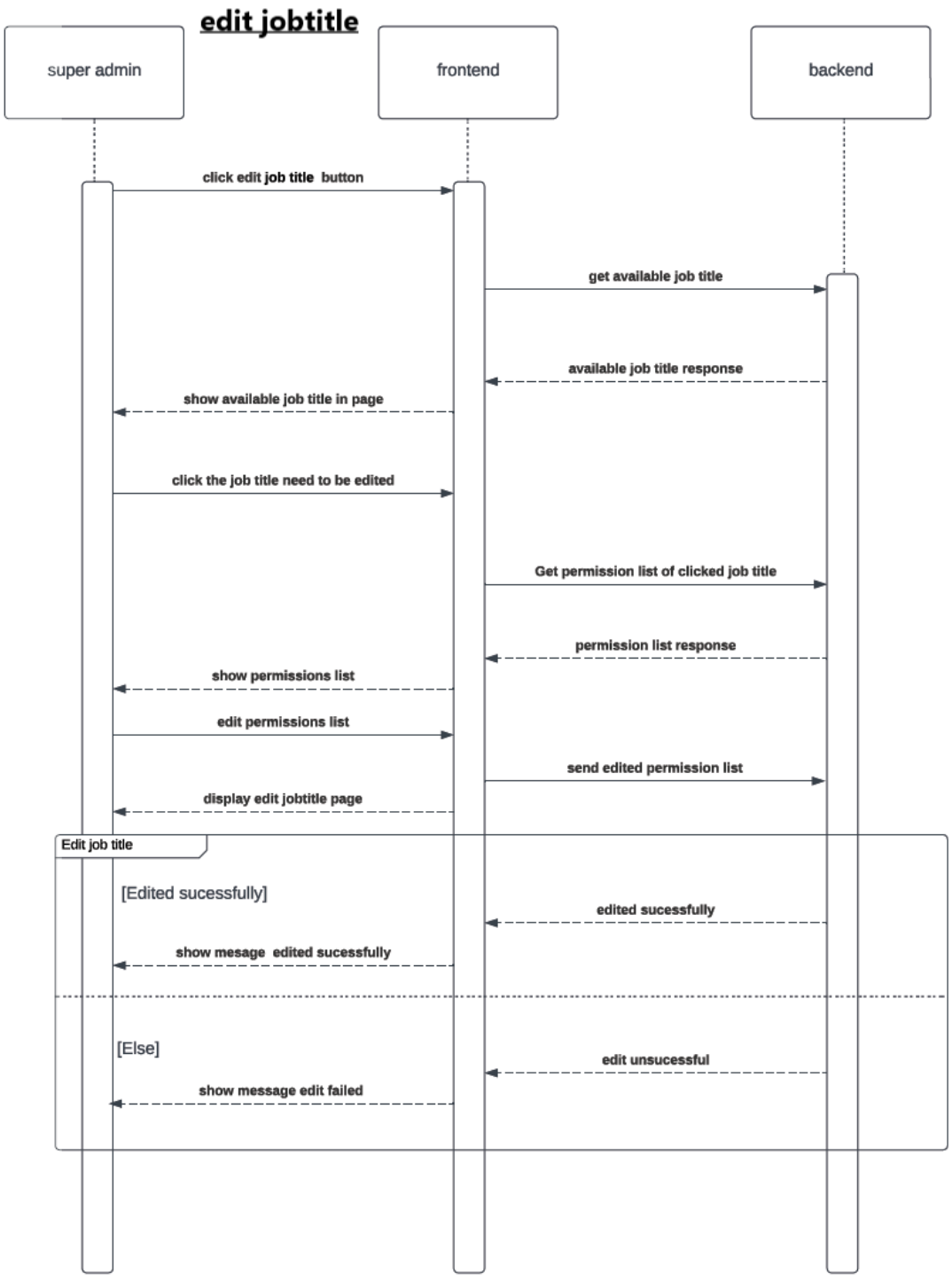


Figure 42 Sequence Diagram - Edit Job Title

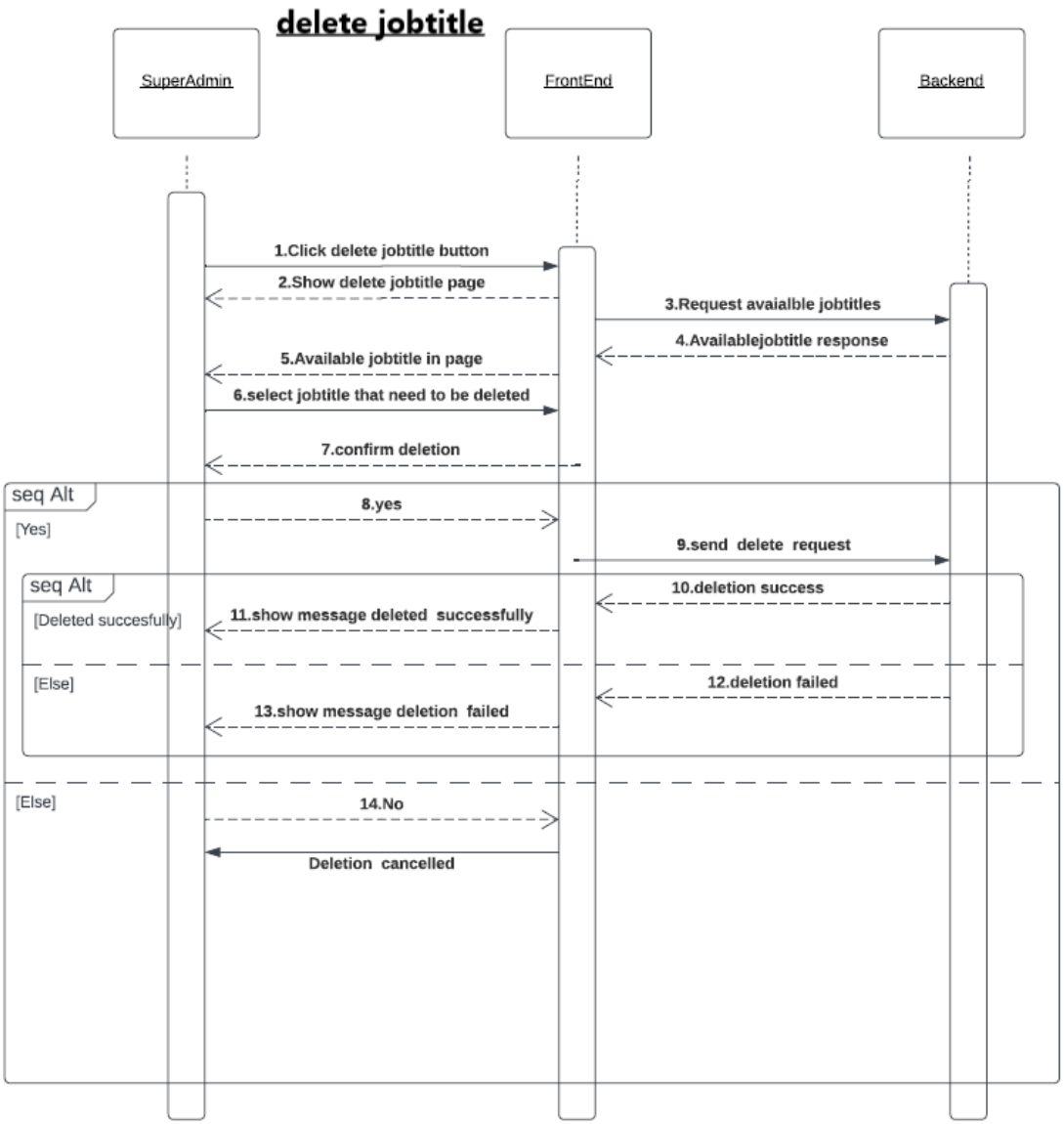


Figure 43 Sequence Diagram - Delete Job Title

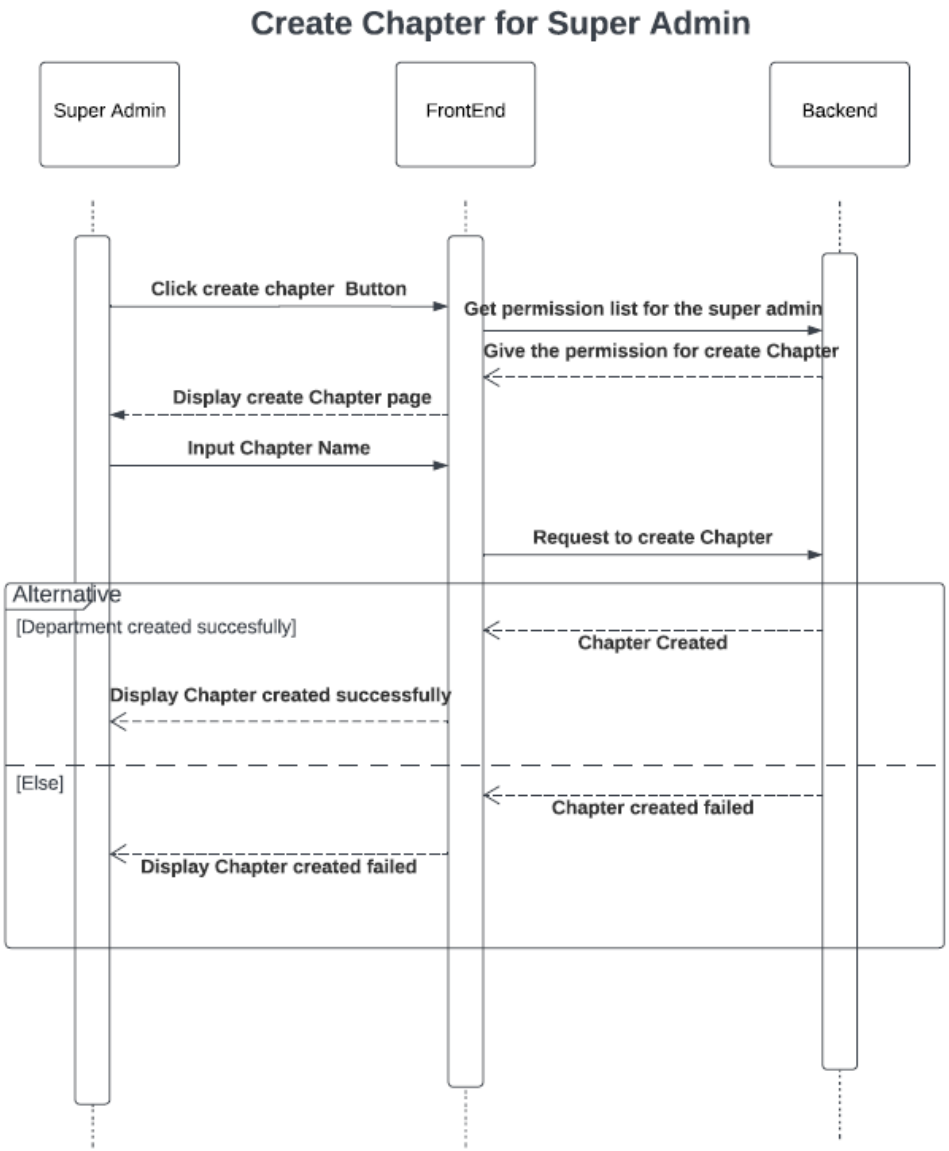


Figure 44 Sequence Diagram - Create Common Chapters

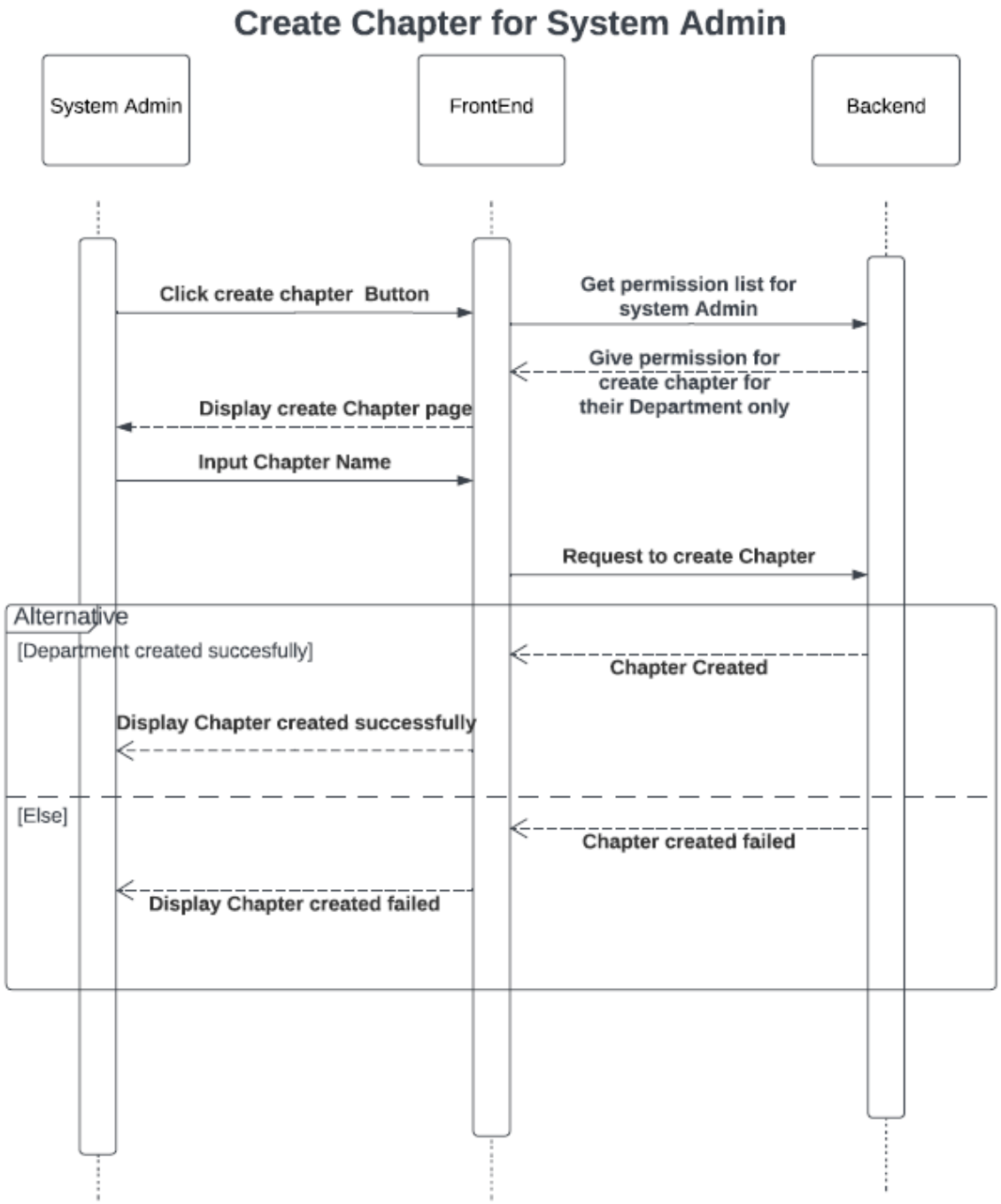


Figure 45 Sequence Diagram - Create Chapter - System Admin

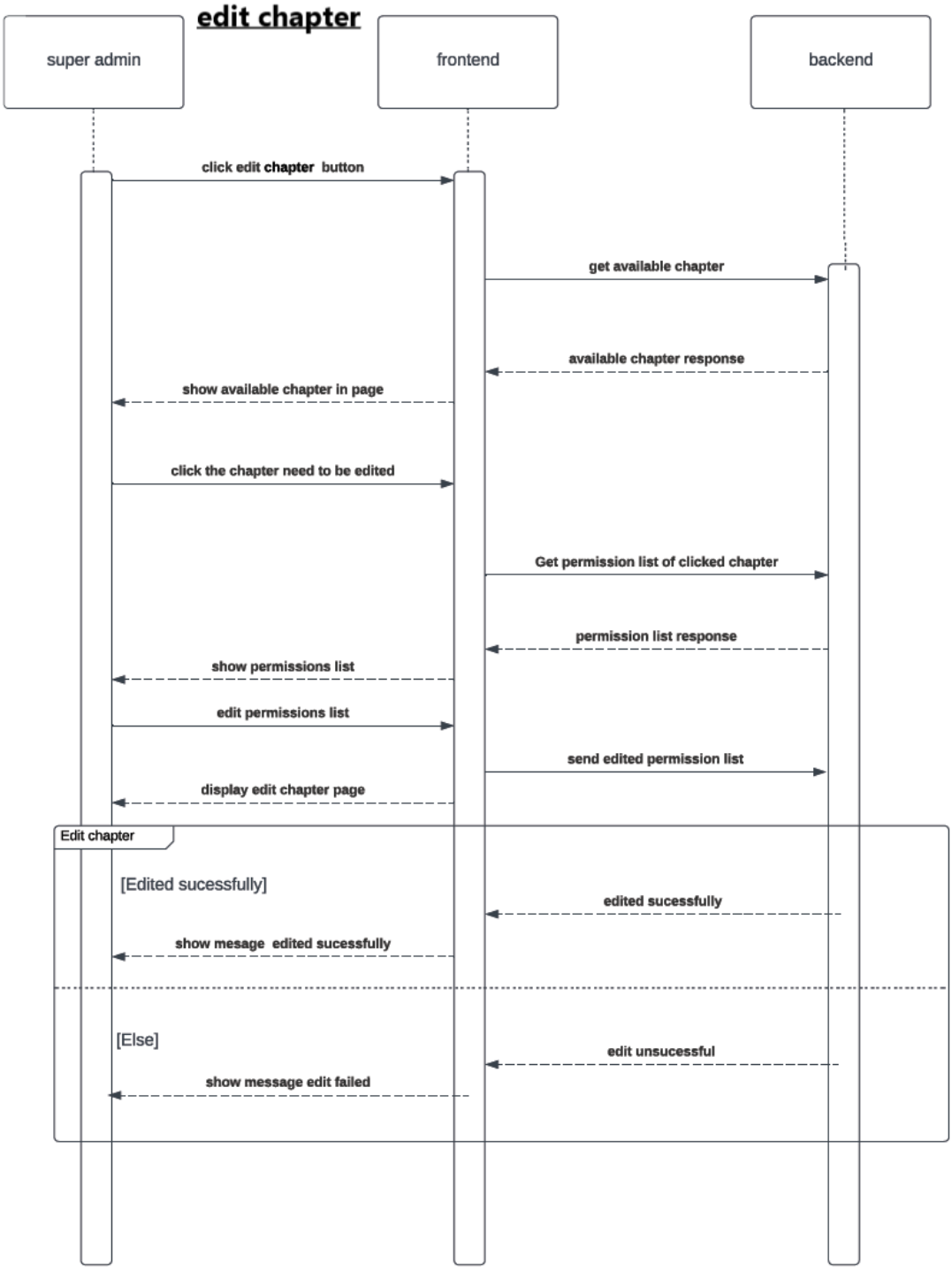


Figure 46 Sequence Diagram - Edit Chapter

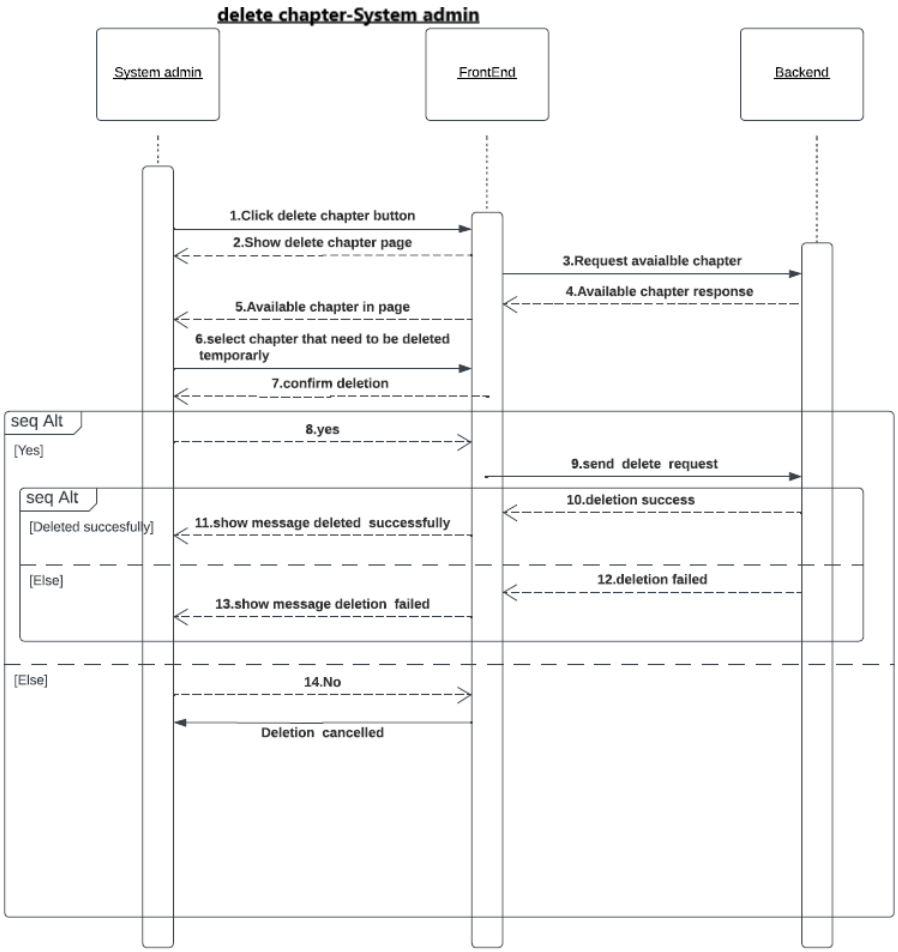


Figure 47 Sequence Diagram - Delete Chapter

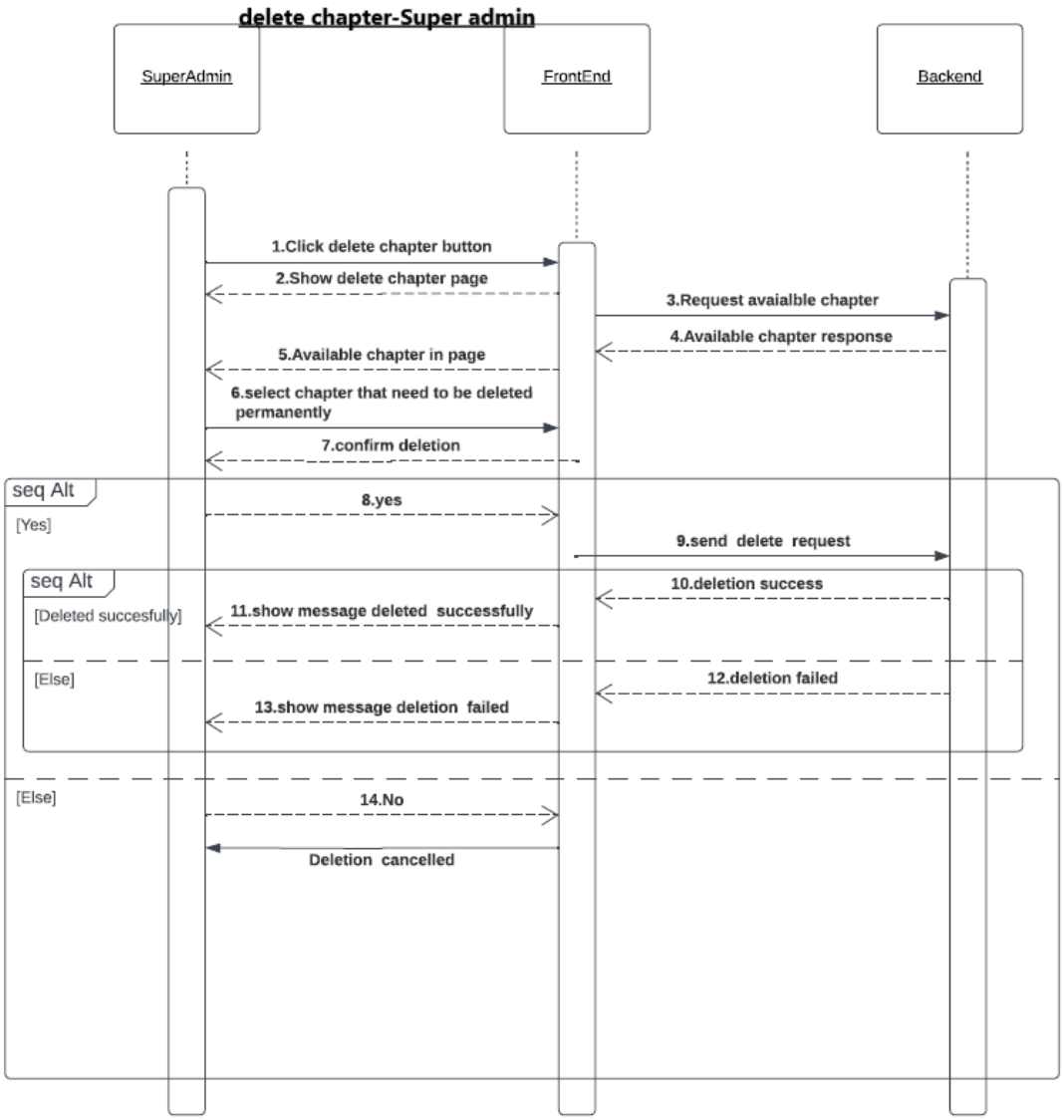


Figure 48 Sequence Diagram - Delete Chapter

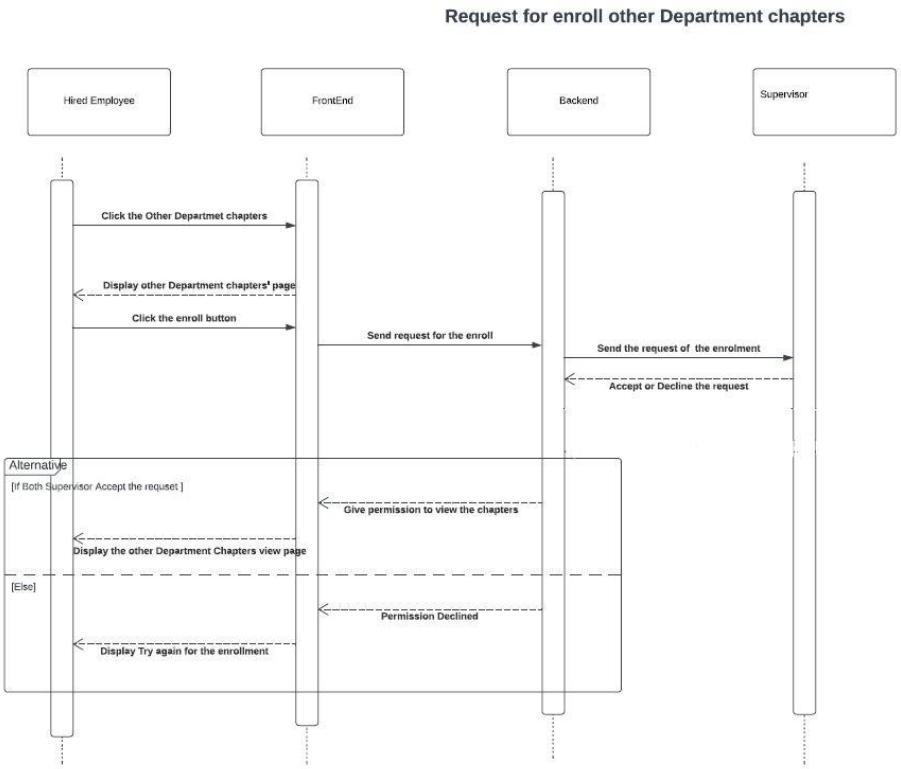


Figure 49 Sequence Diagram - Request for enroll other department chapters

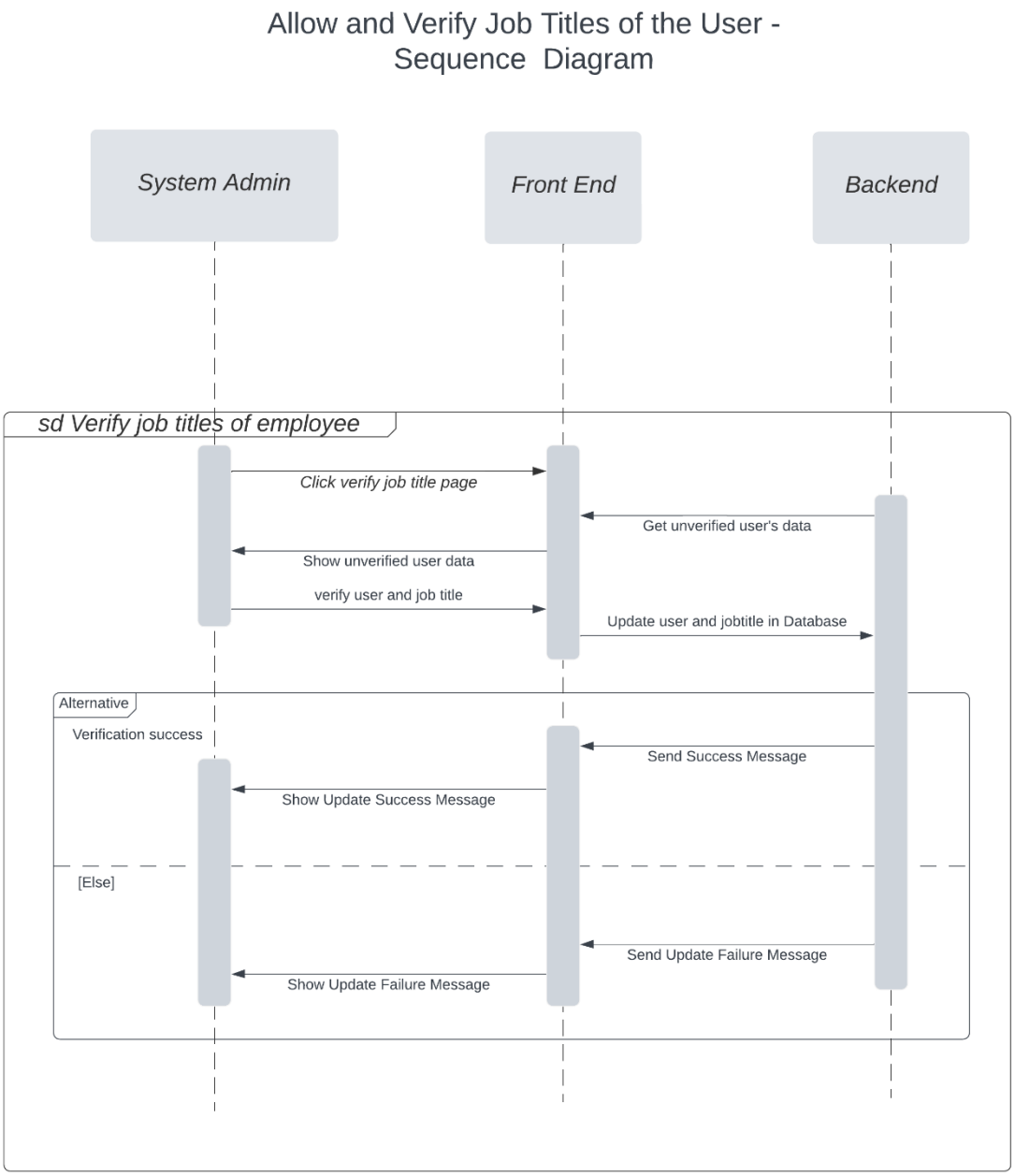


Figure 50 Sequence Diagram - Allow and Verify Job titles of the user

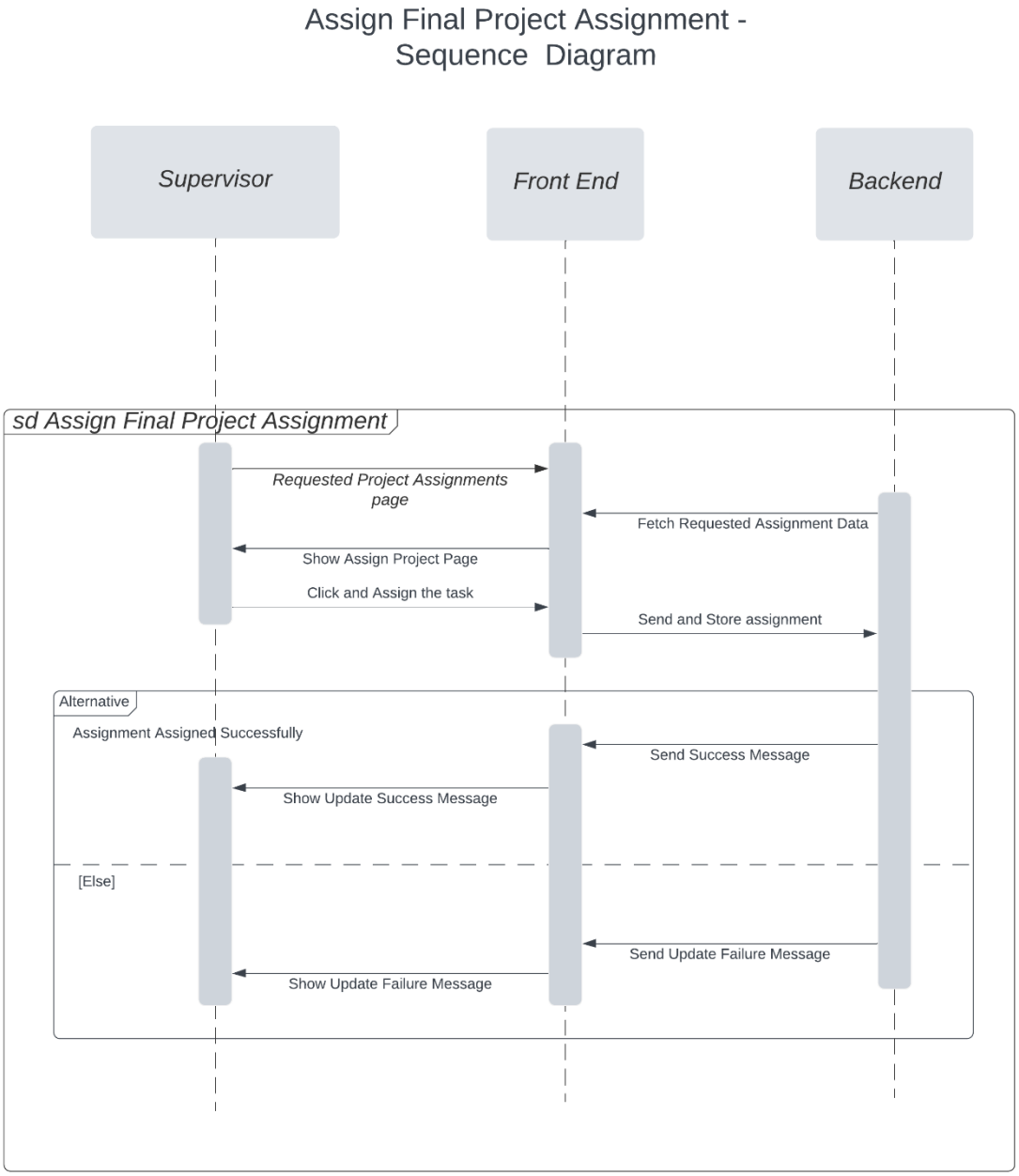


Figure 51 Sequence Diagram - Assign final project assignment

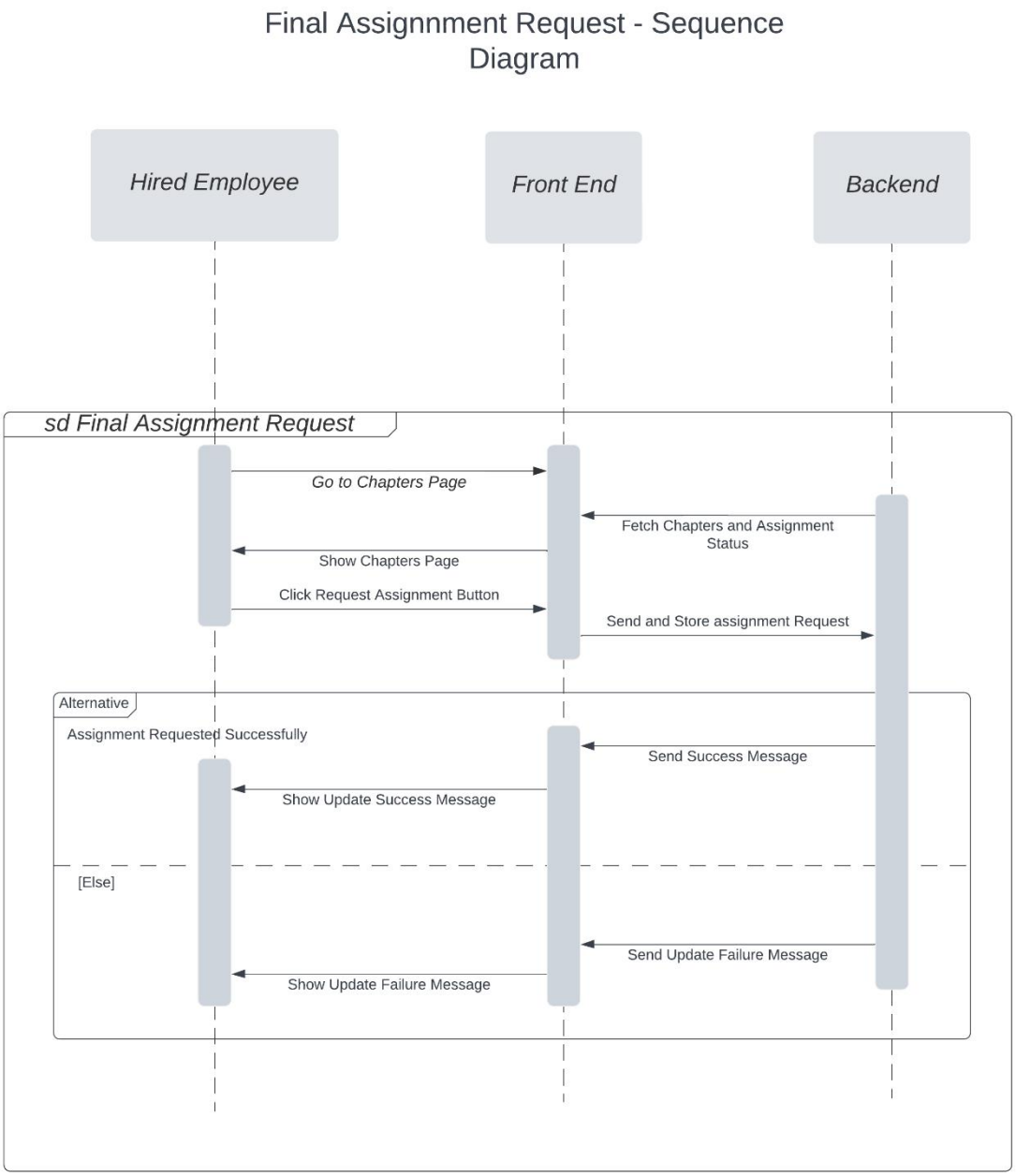


Figure 52 Sequence Diagram - Final Project Assignment Request

Login page - Sequence Diagram

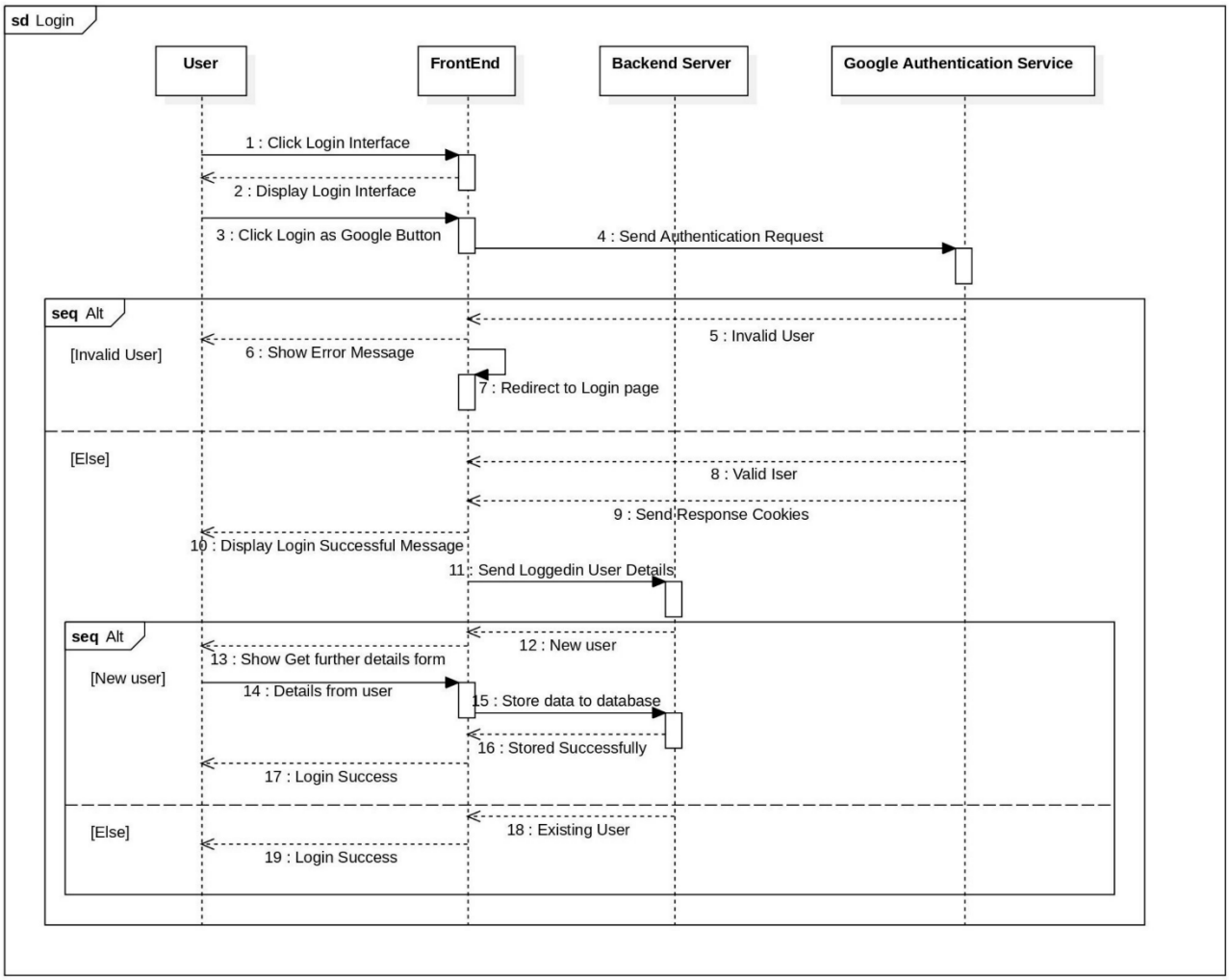


Figure 53 Sequence Diagram - Login Page

Promote or Demote Employees

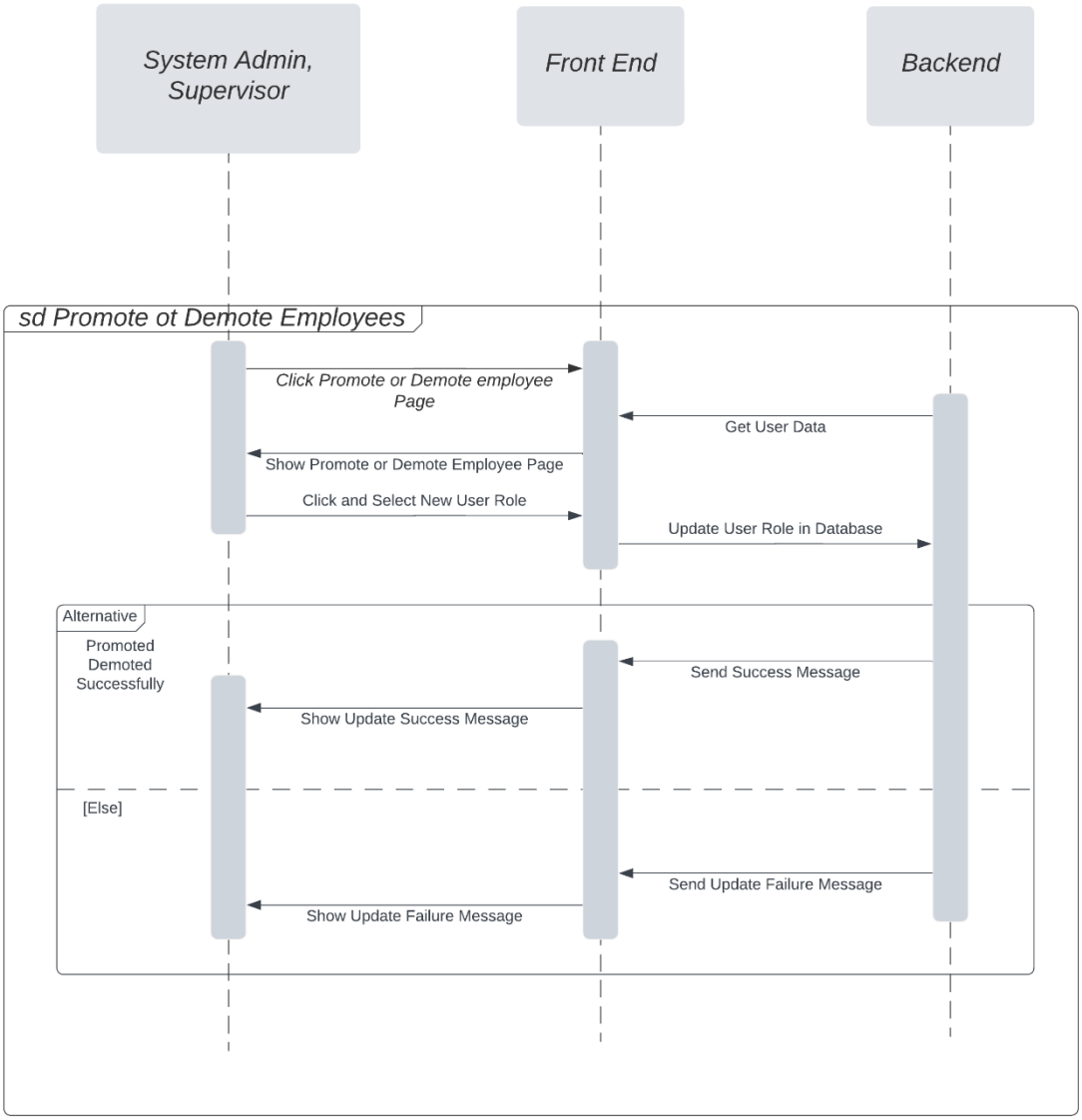


Figure 54 Sequence Diagram – Promote or Demote Employees

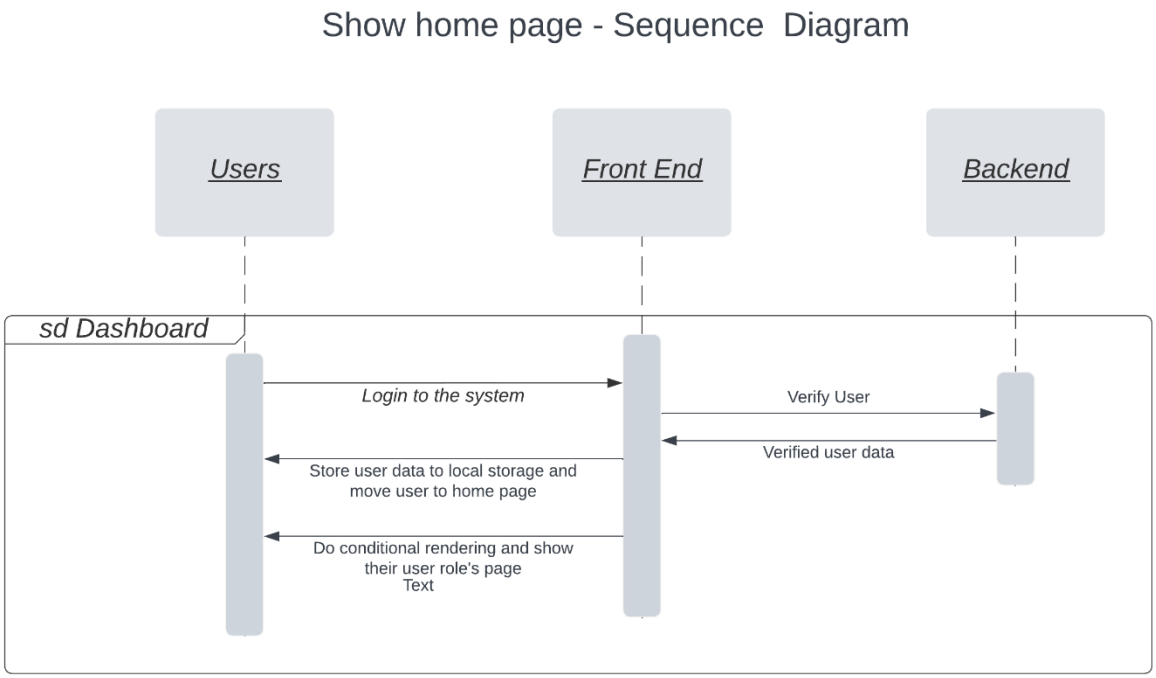


Figure 55 Sequence Diagram - Show Home Page

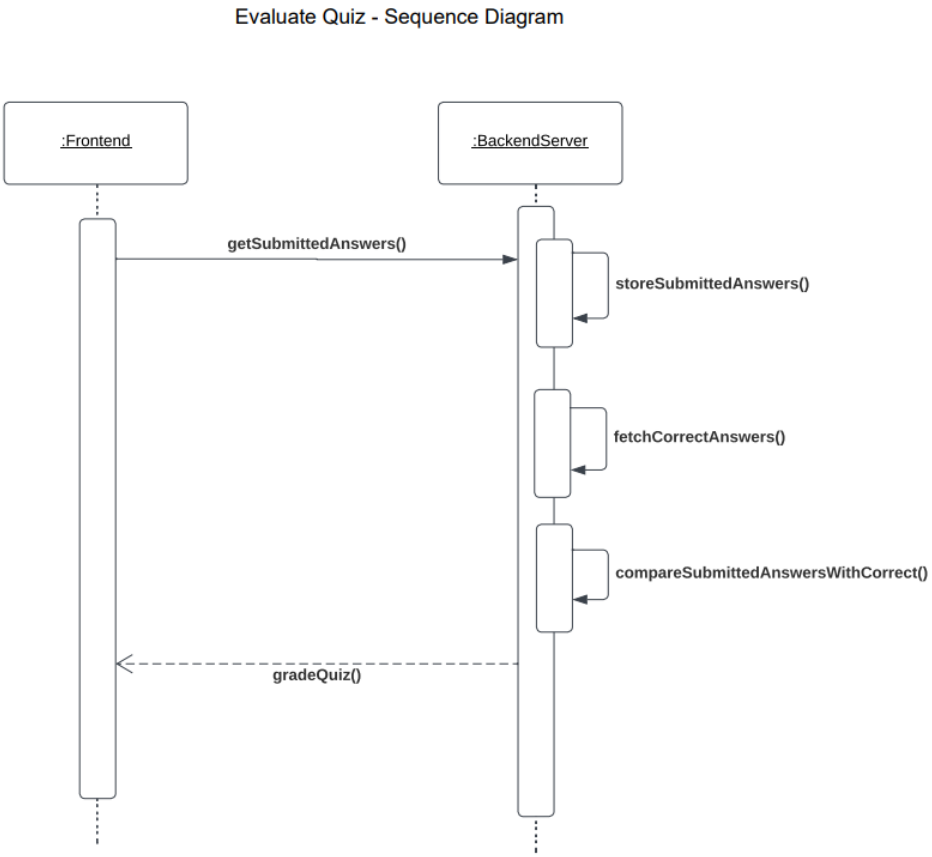


Figure 56 Sequence Diagram - Evaluate Quiz

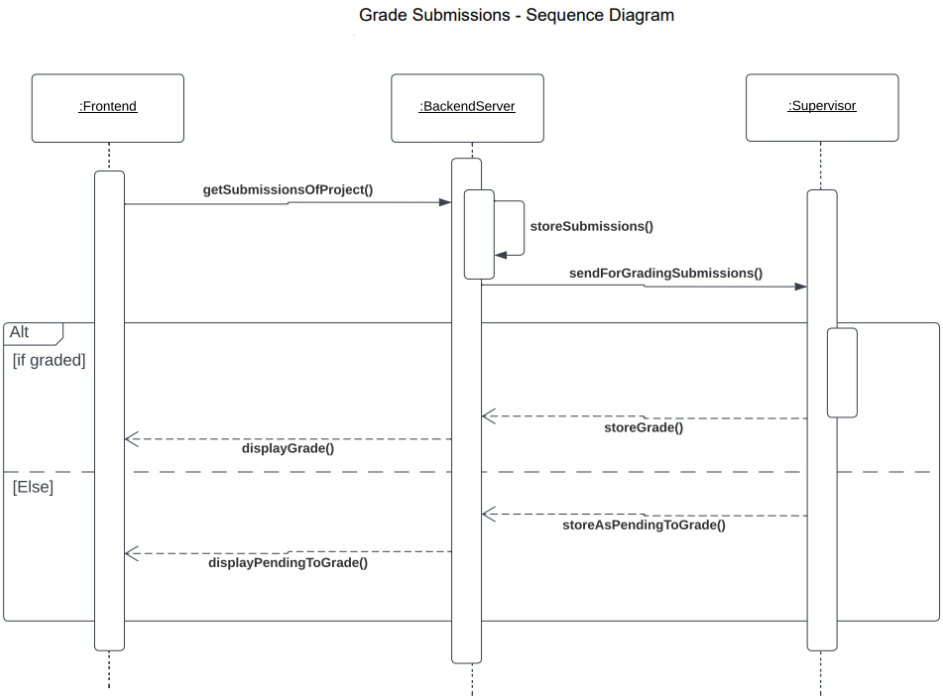


Figure 57 Sequence Diagram - Grade Submissions

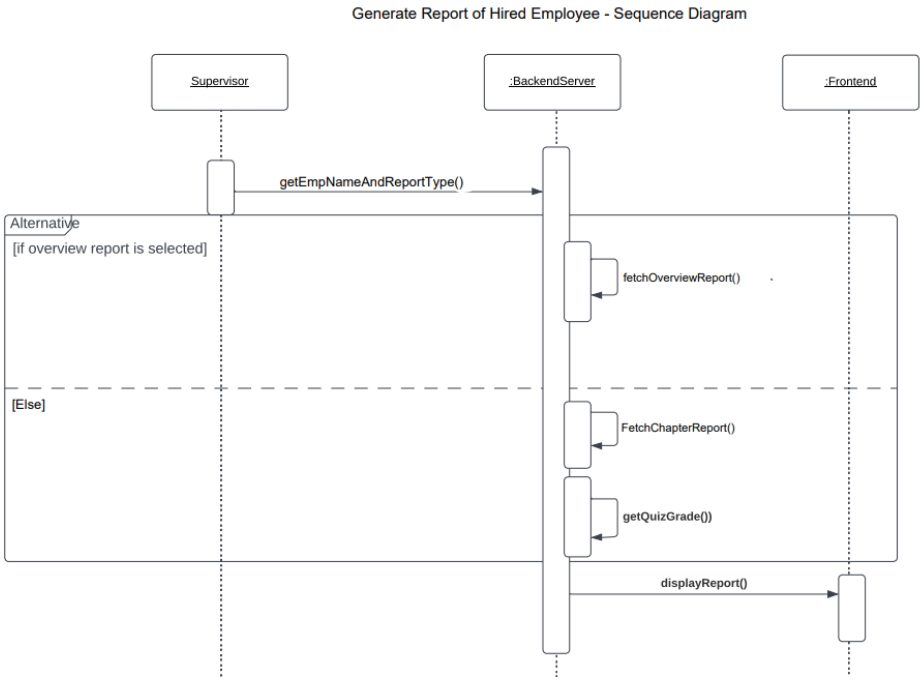


Figure 58 Sequence Diagram - Generate Hired Employee Report

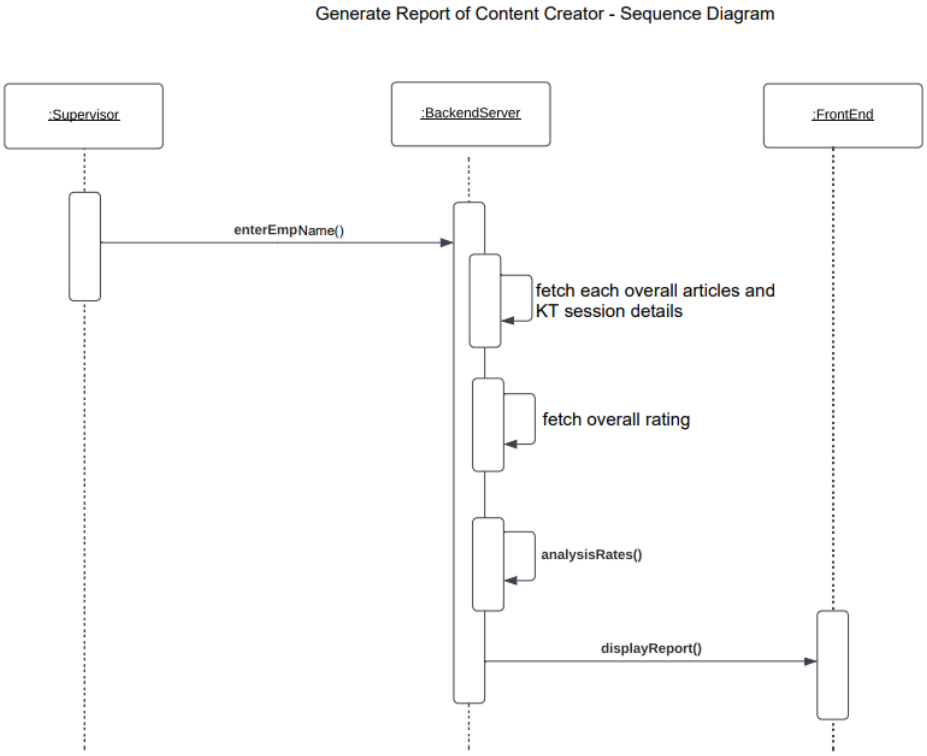


Figure 59 Sequence Diagram - Generate Content Creator Report

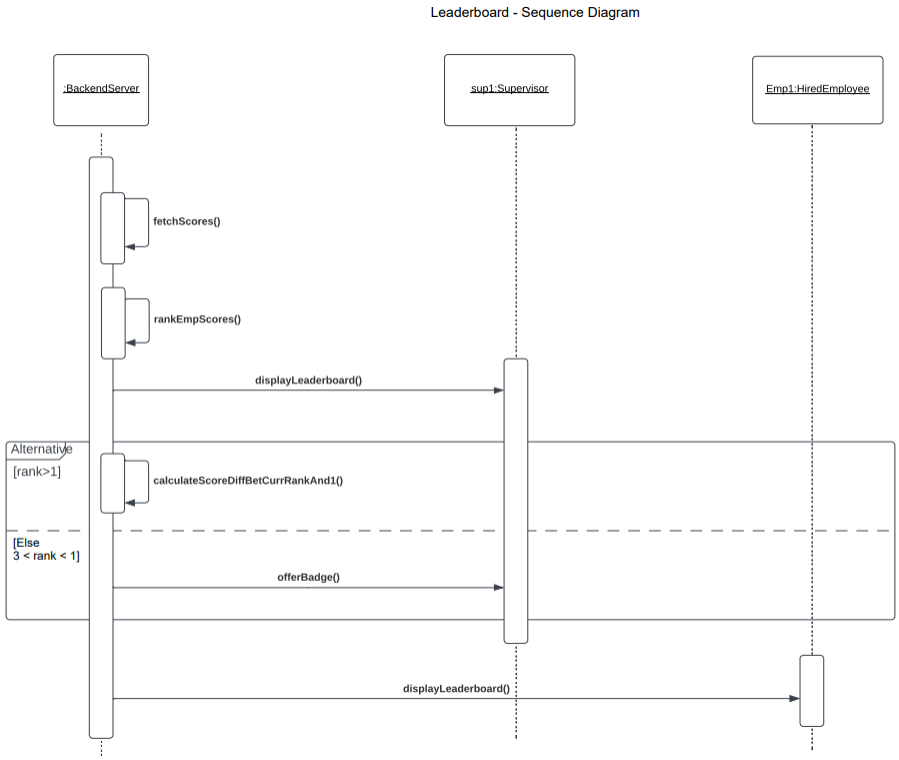


Figure 60 Sequence Diagram - Leader Board

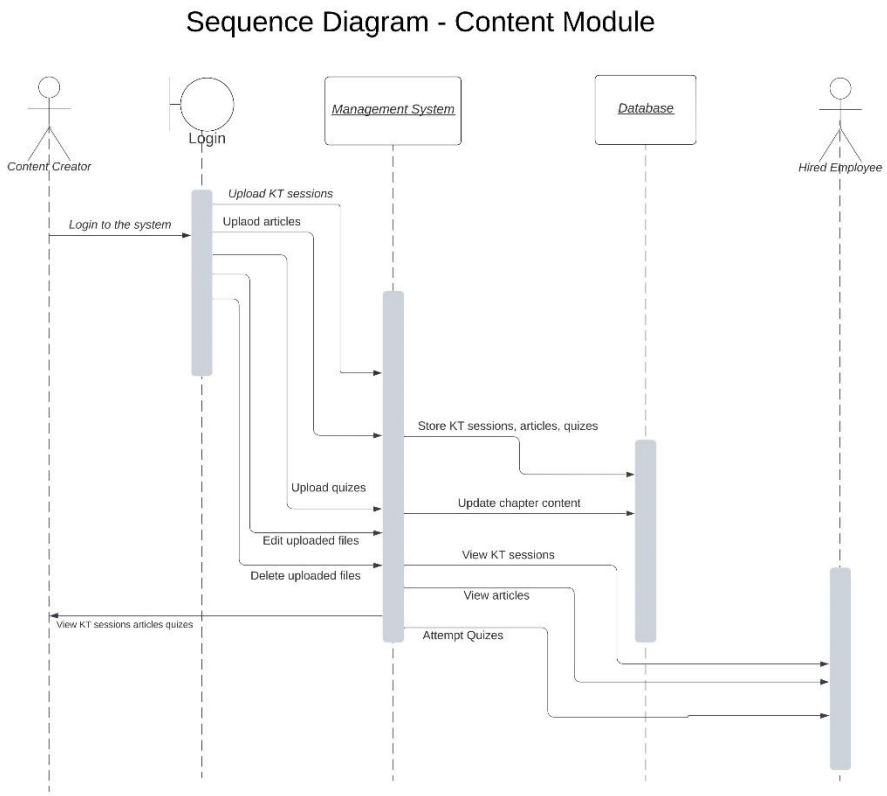


Figure 61 Sequence Diagram - Content Module

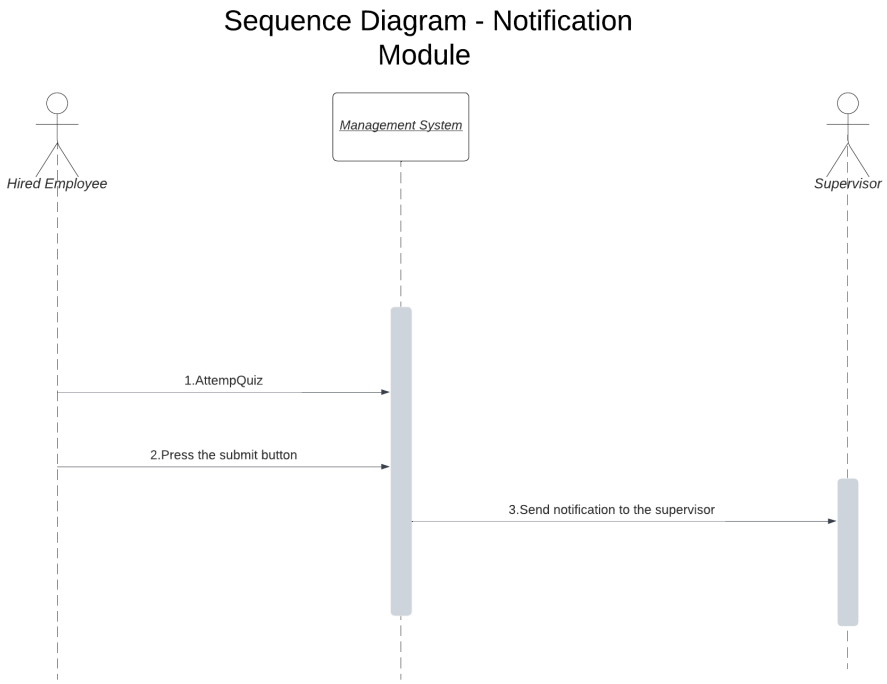


Figure 62 Sequence Diagram - Notification Modul

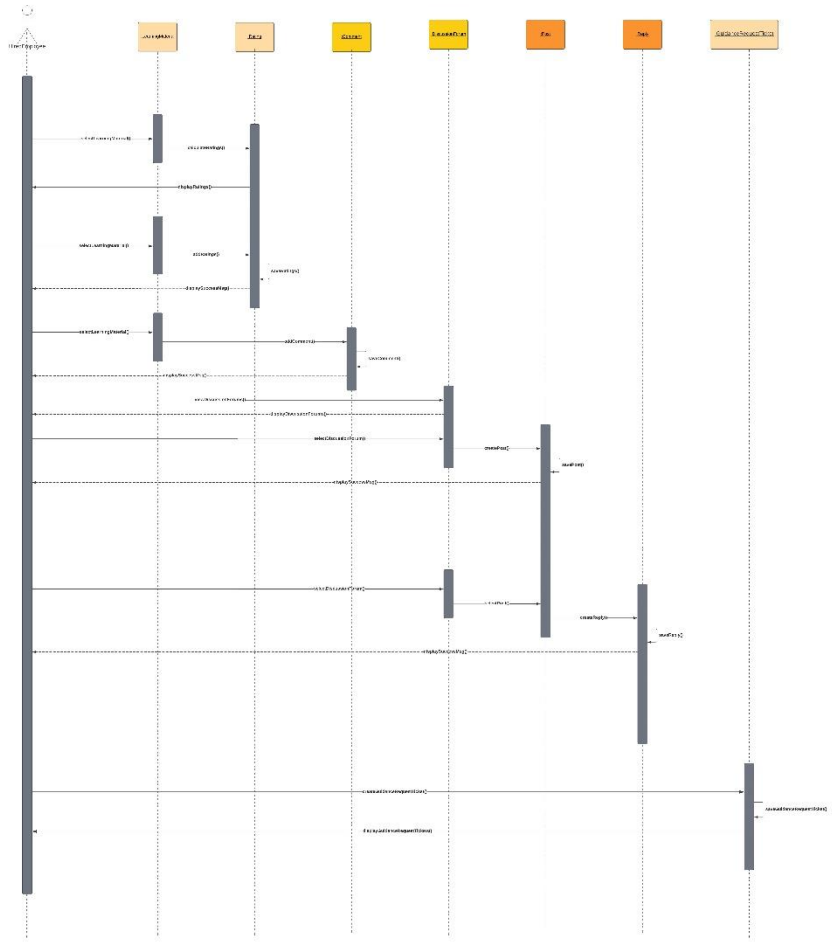


Figure 63 Sequence Diagram

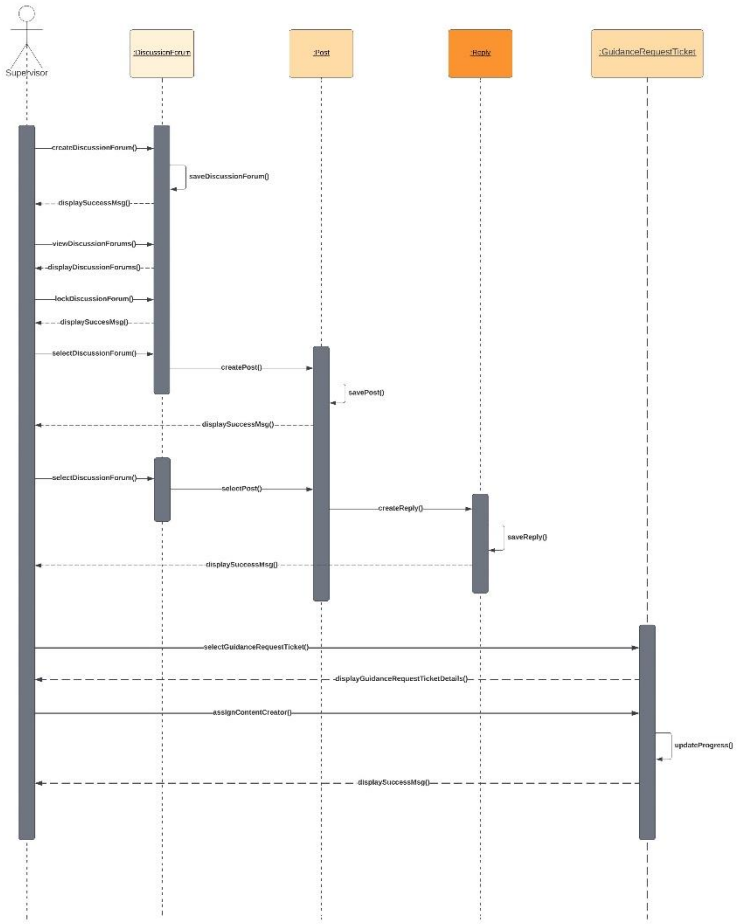


Figure 64 Sequence Diagram

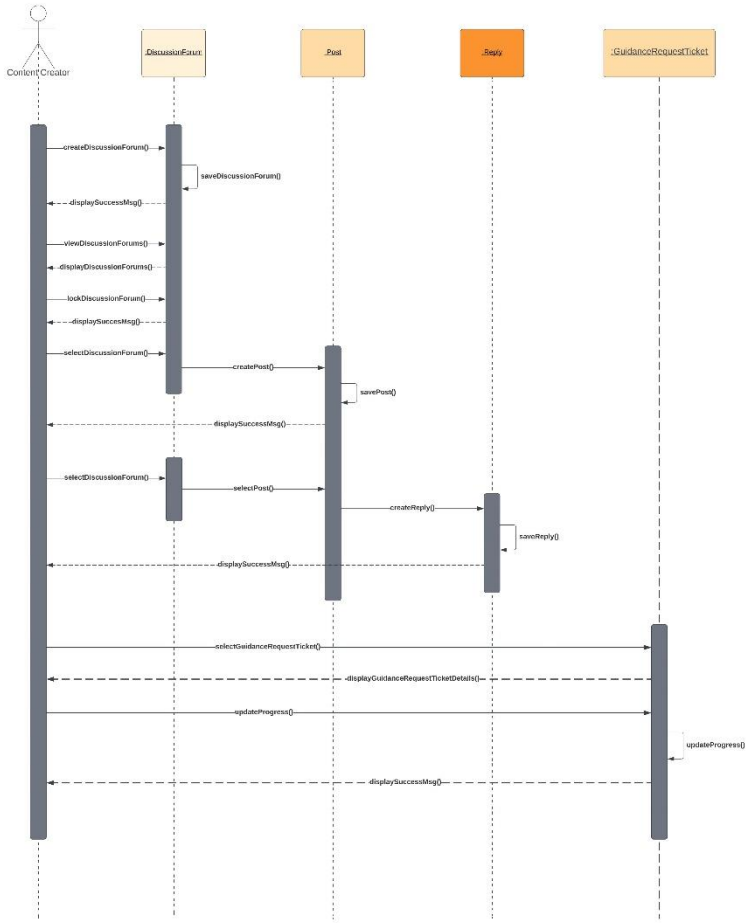


Figure 65 Sequence Diagram

4.3.5. ER Diagram

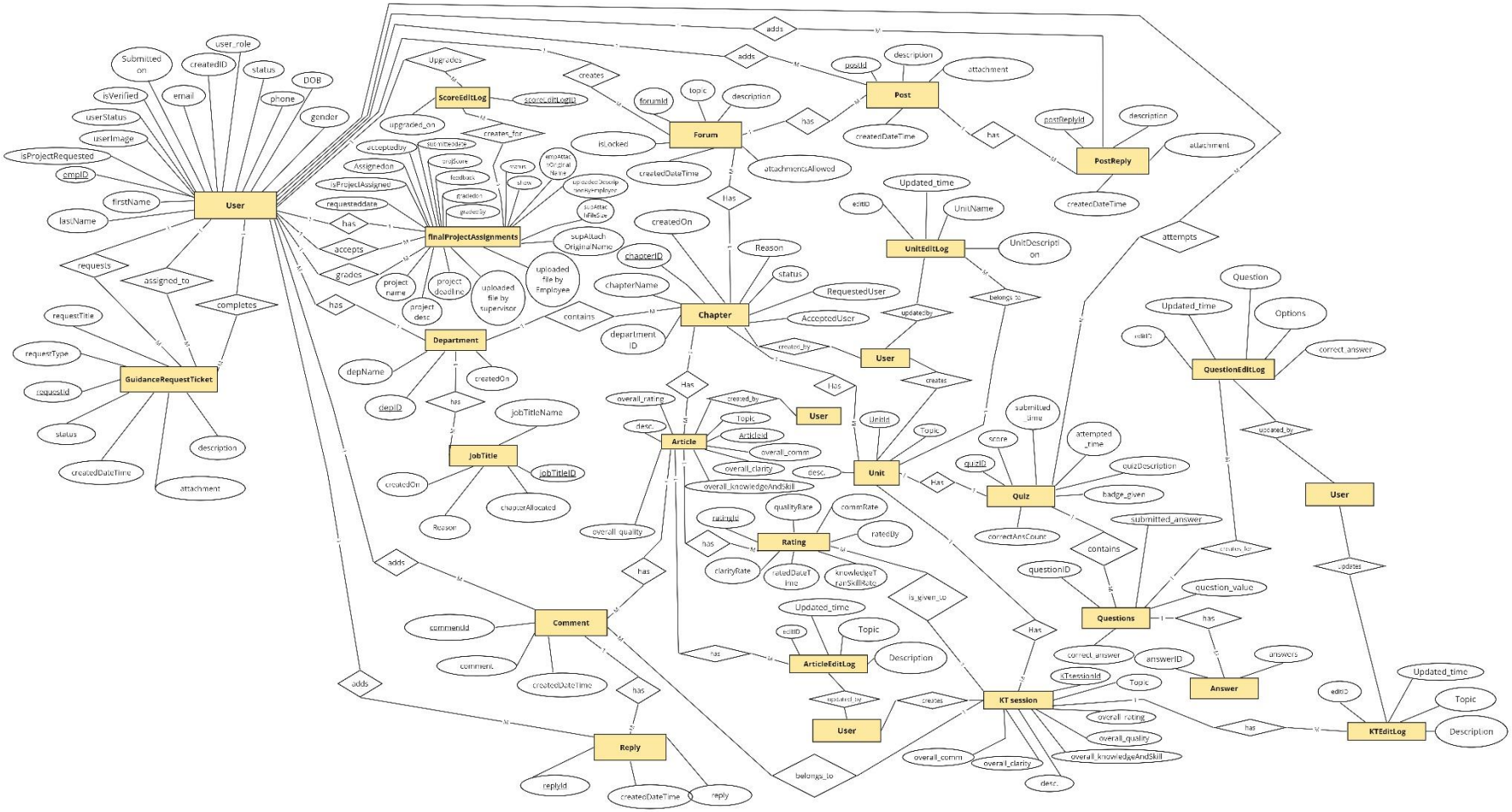


Figure 66 ER Diagram

Chapter 5 Implementation

5.1 Introduction

After identification of all user needs, this chapter describes the implementation of our system. We selected the Agile Model (Kanban with Scrum) as our software process model. We designed a use case, activity, sequence, class UML diagrams and EER diagram to clearly visualize our solution. It will be helpful for our development process. We are supposed to implement our solution as a PWA (Progressive Web Application). Currently we are developing the front end of the system.

5.2 Triggers and Implementation

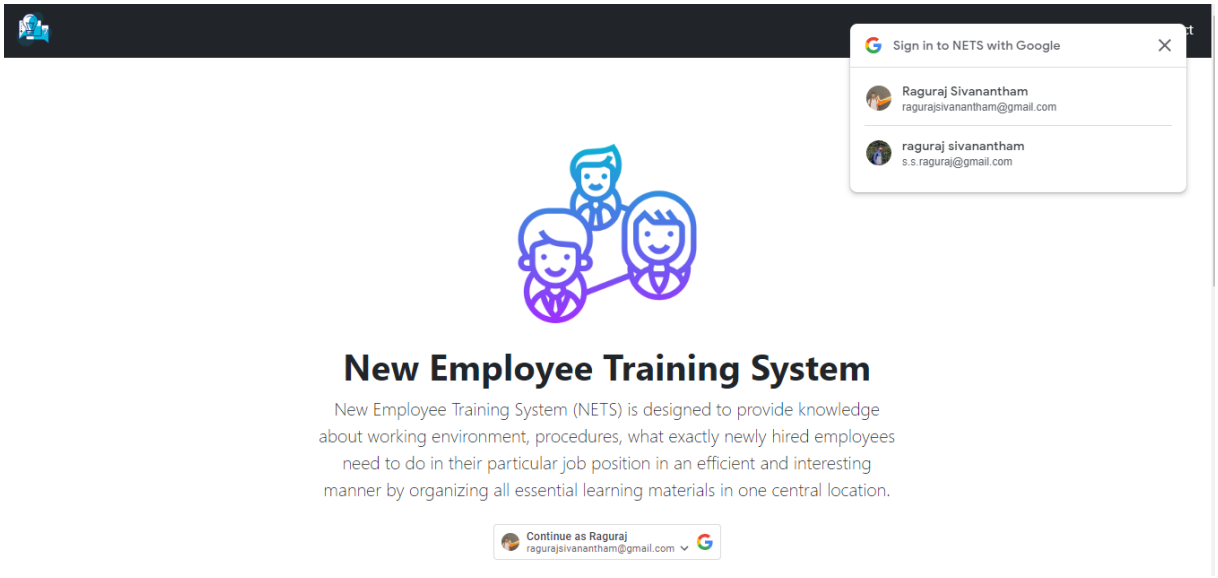


Figure 67 Implementation 1

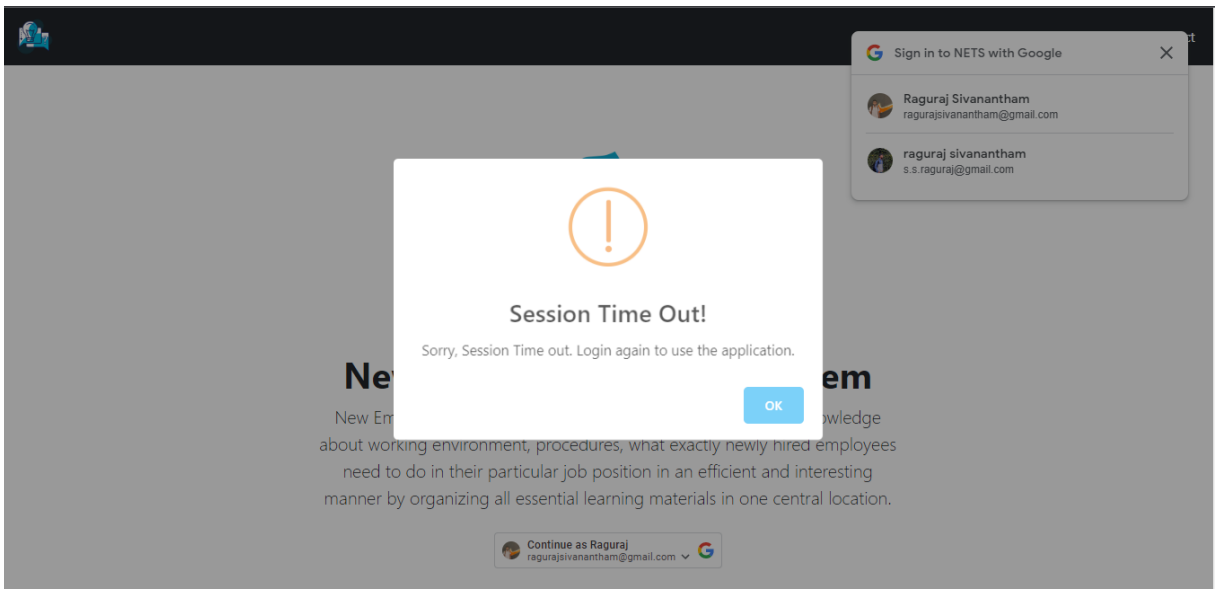


Figure 68 Implementation 2

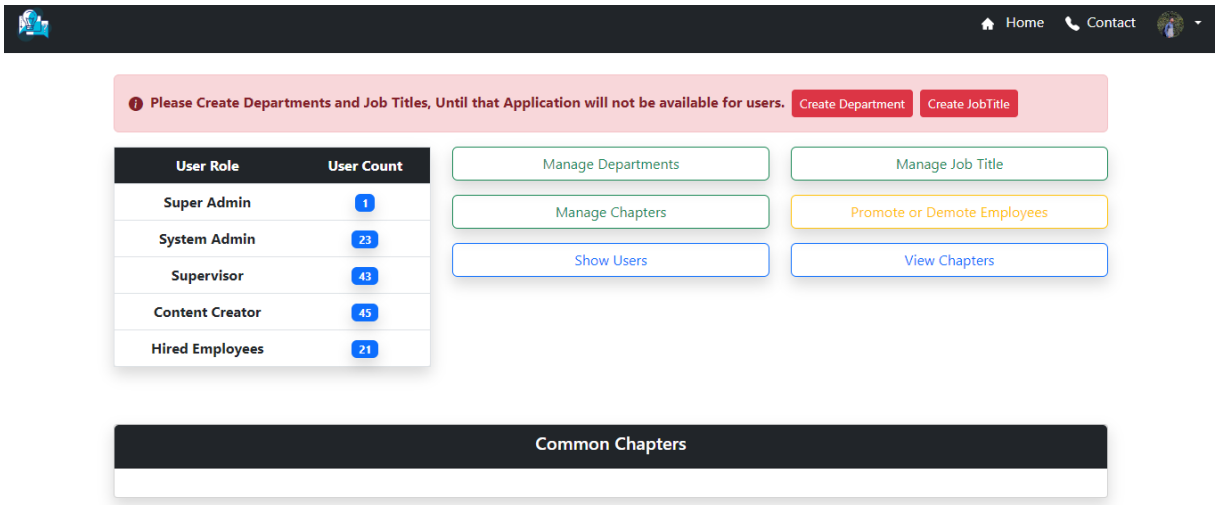


Figure 69 Implementation 3

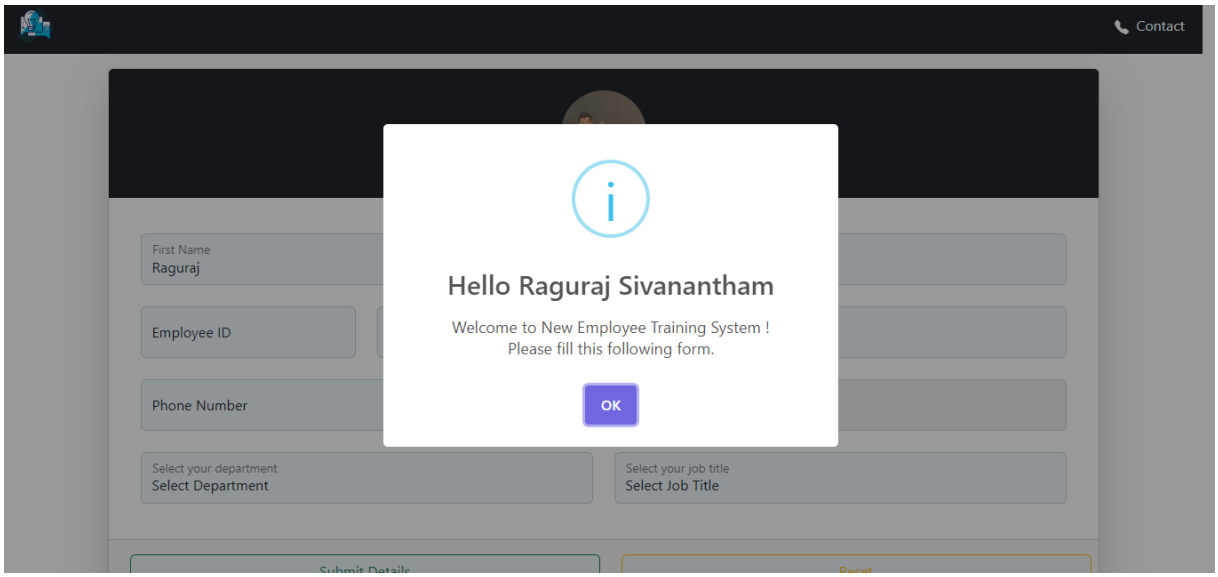


Figure 70 Implementation 4

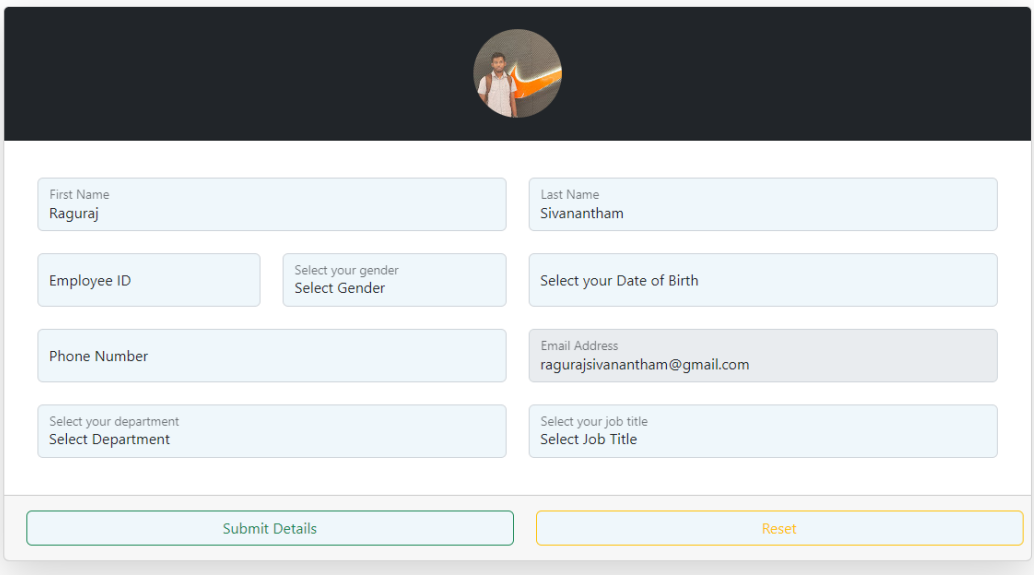


Figure 71 Implementation 5

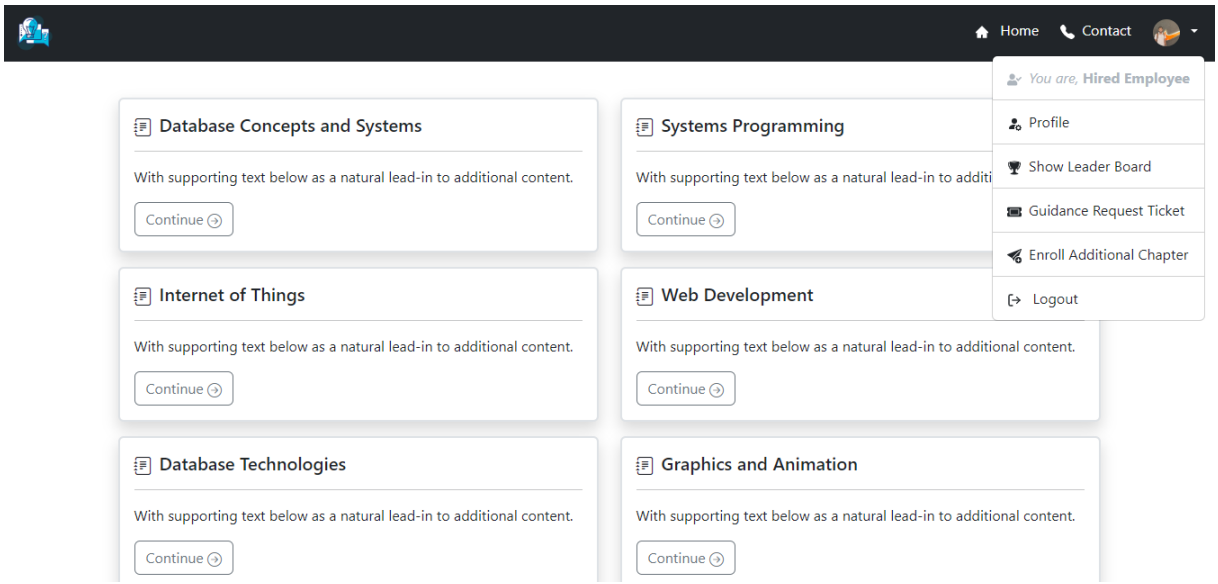


Figure 72 Implementation 6

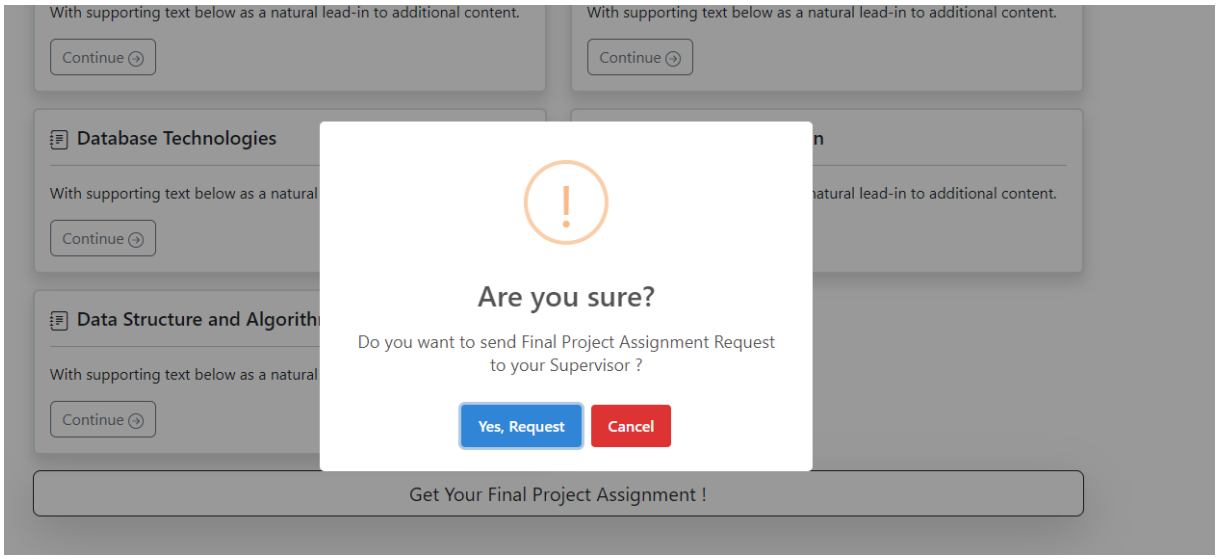


Figure 73 Implementation 7

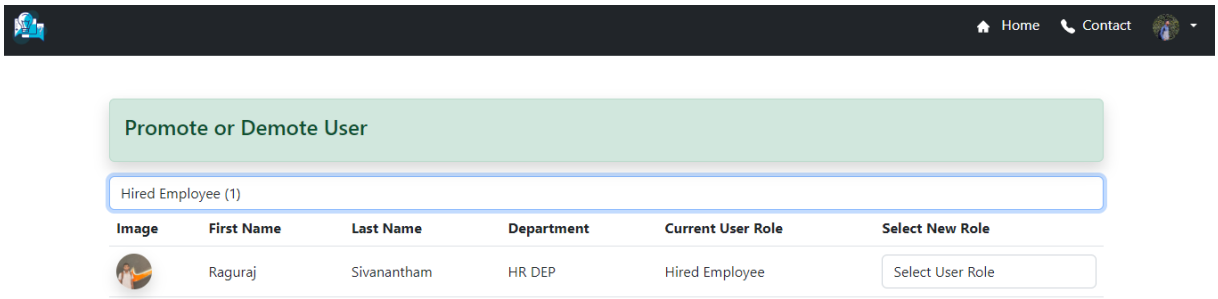


Figure 74 Implementation 8

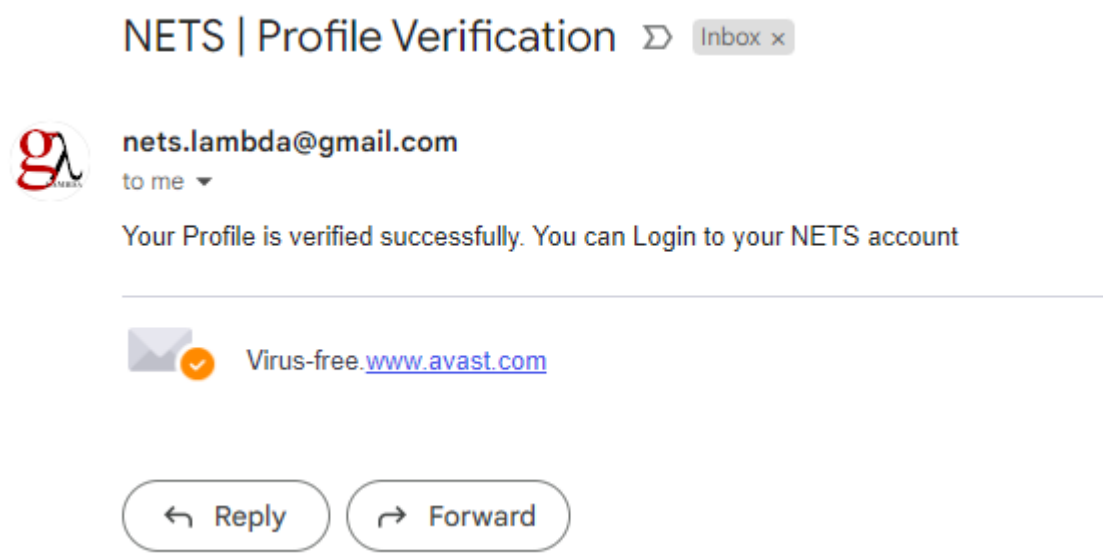


Figure 75 Implementation 9

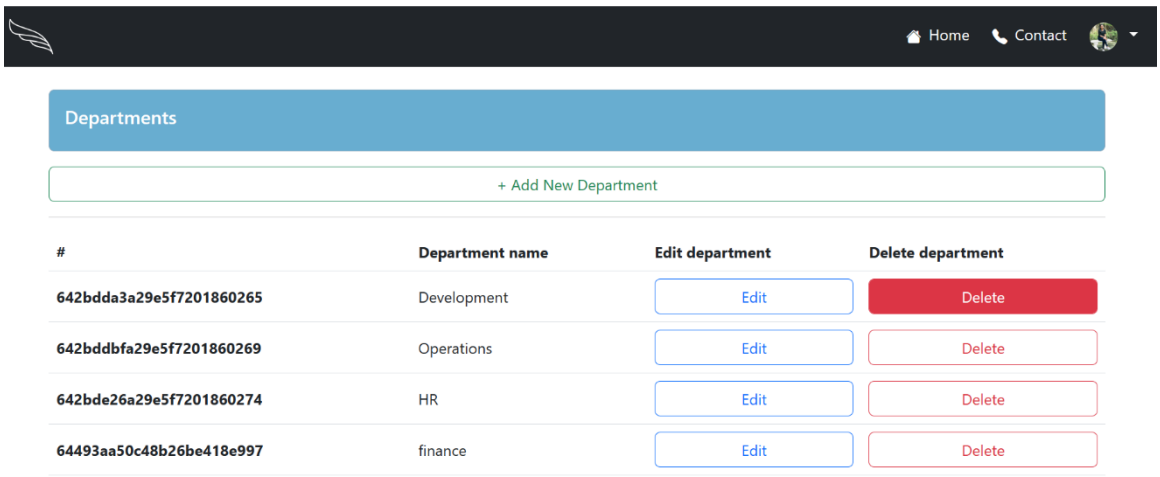


Figure 76 Implementation 10

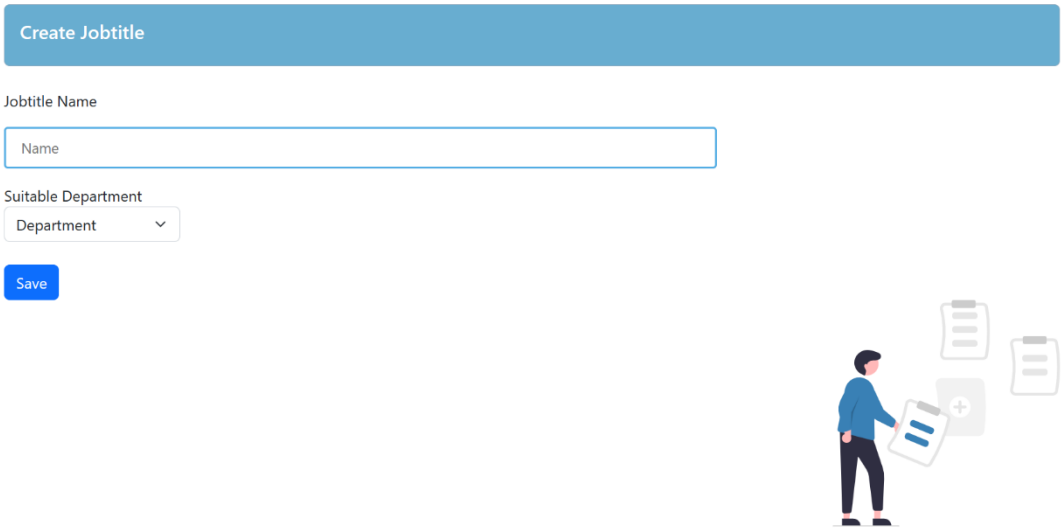


Figure 77 Implementation 11

Figure 78 Implementation 12

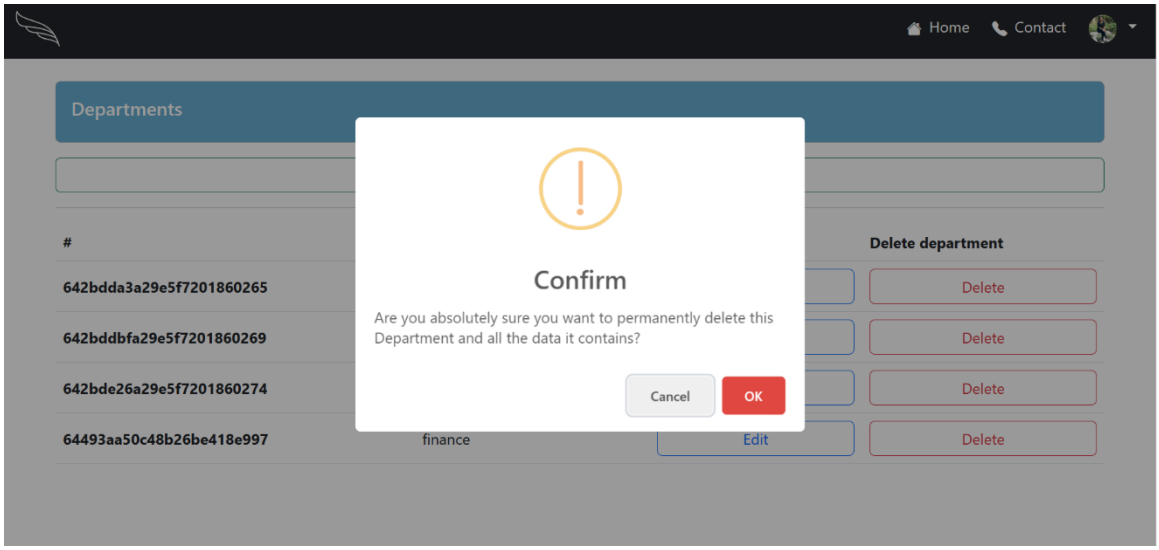


Figure 79 Implementation 13

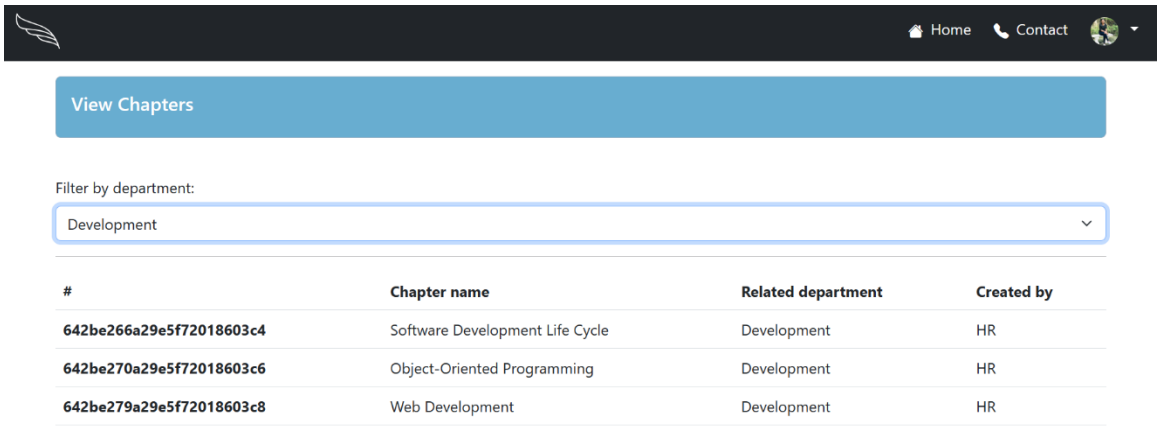


Figure 80 Implementation 14

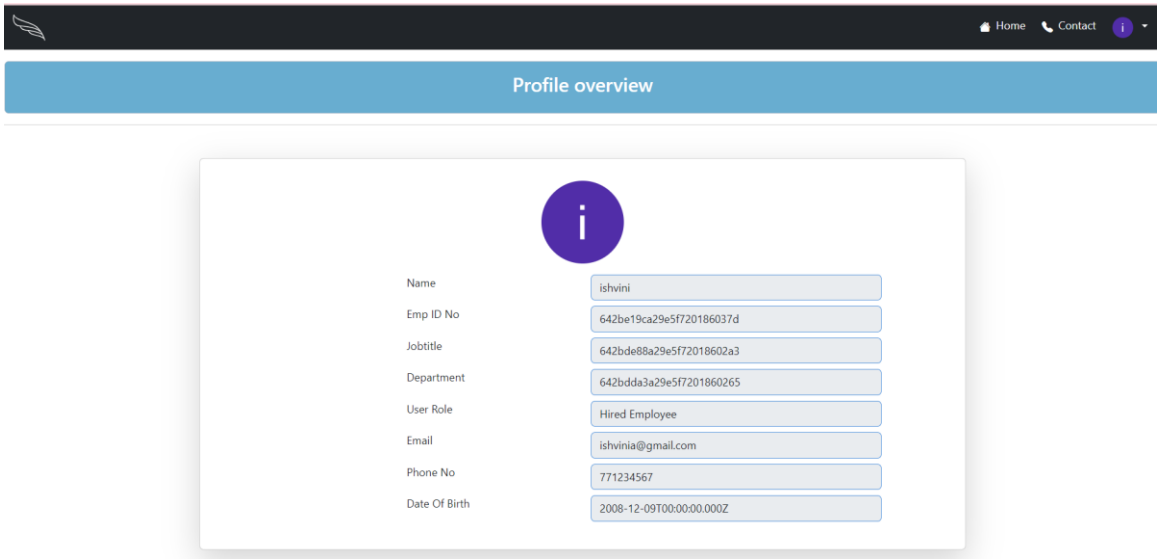


Figure 81 Implementation 15

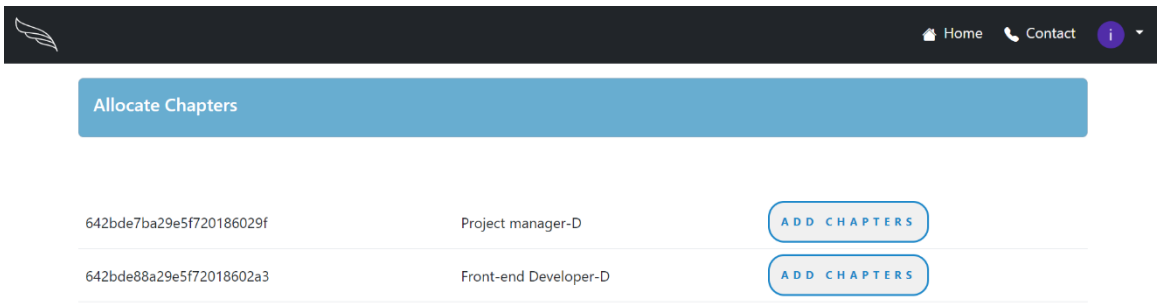


Figure 82 Implementation 16

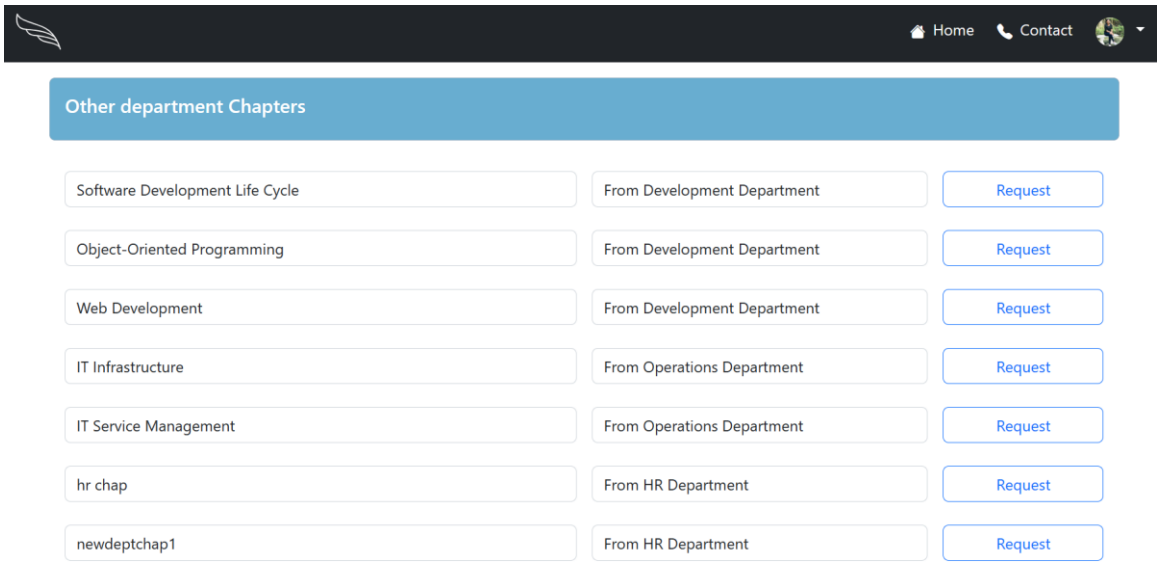


Figure 83 Implementation 17

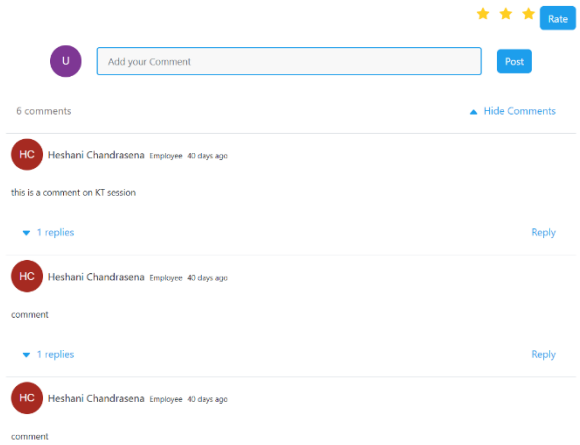


Figure 84 Implementation 18

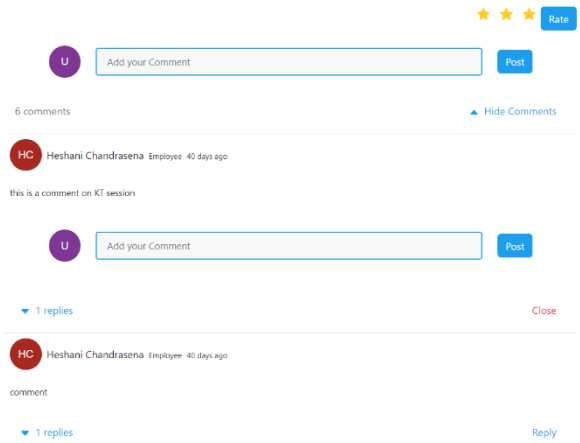


Figure 85 Implementation 19

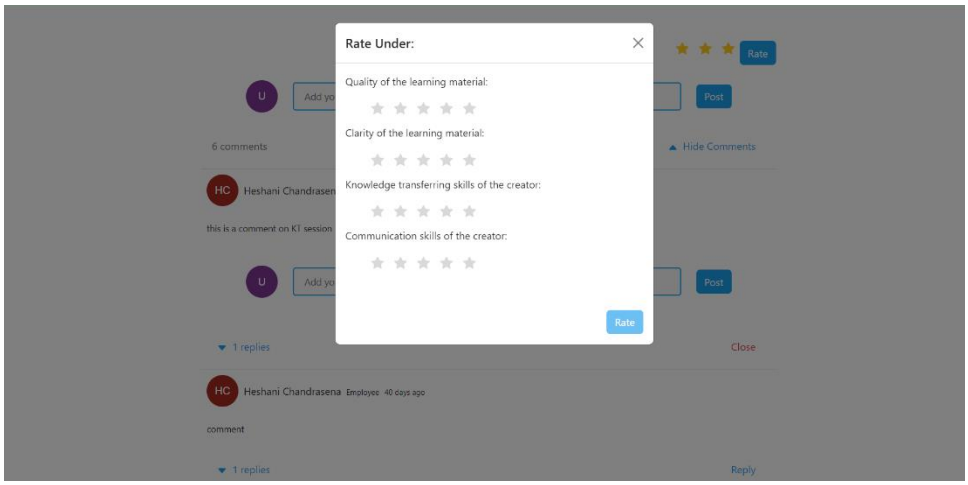


Figure 86 Implementation 20

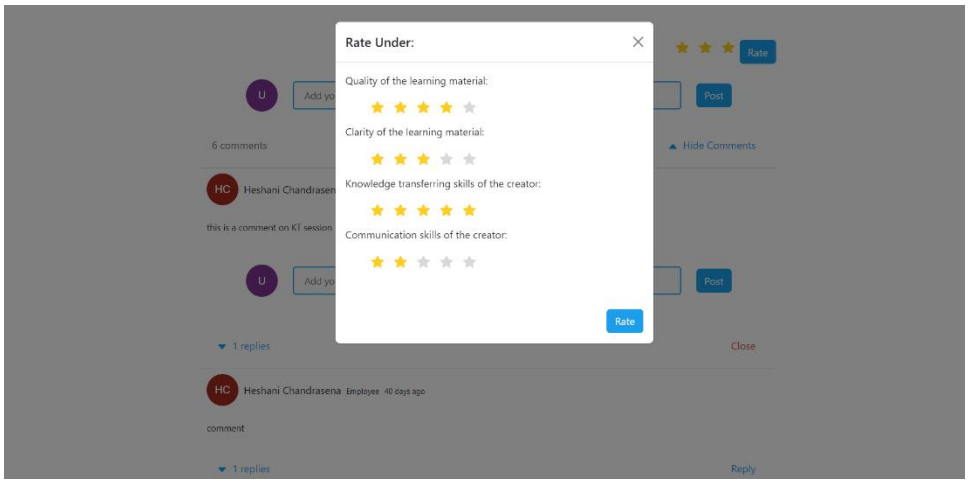


Figure 87 Implementation 21

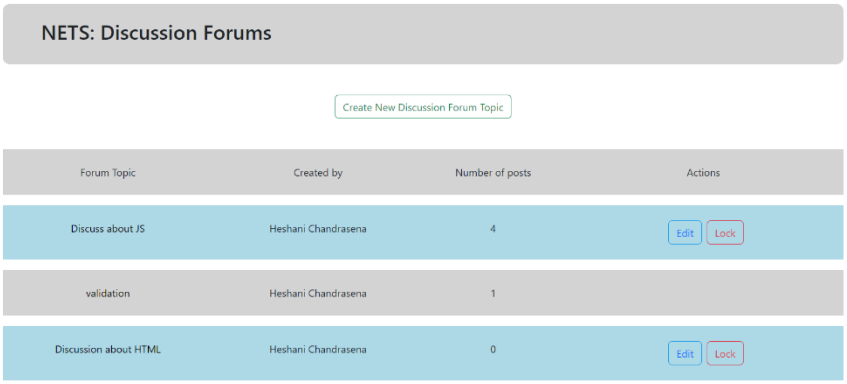


Figure 88 Implementation 22

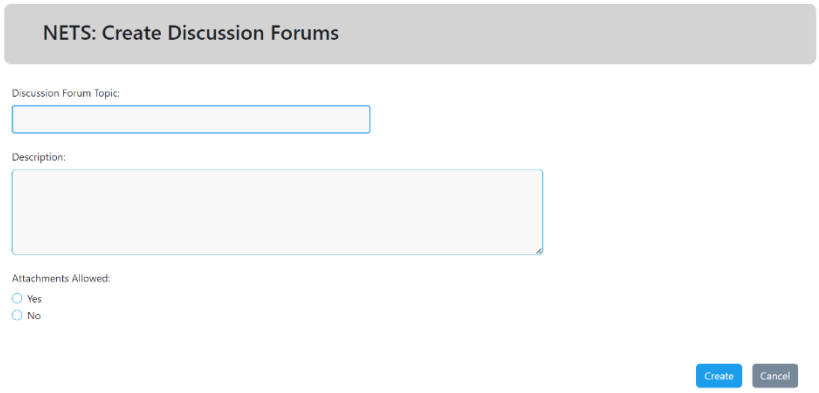


Figure 89 Implementation 23

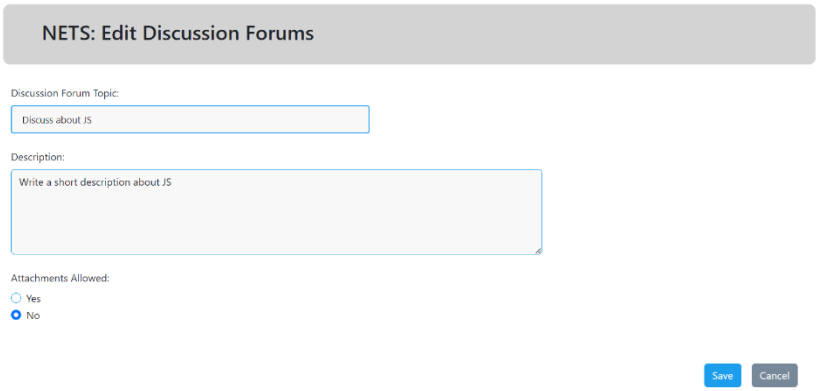


Figure 90 Implementation 24

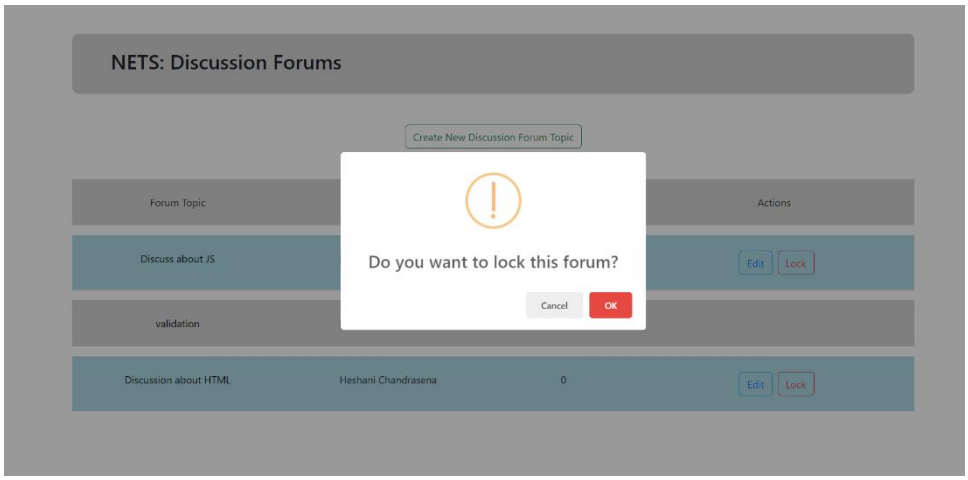


Figure 91 Implementation 25

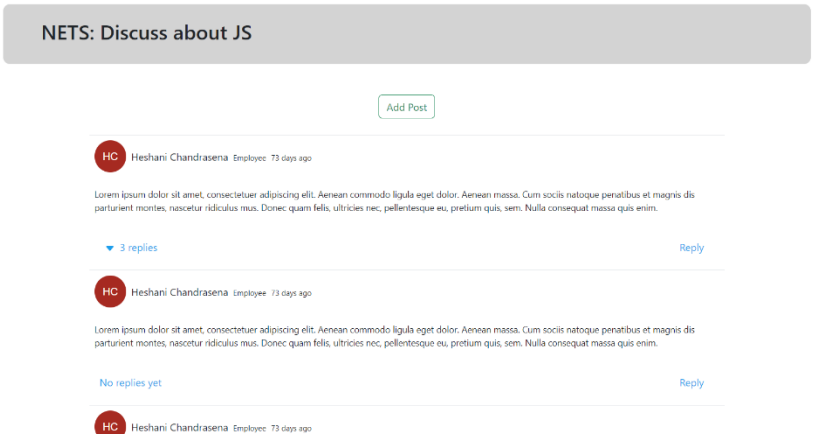


Figure 92 Implementation 26

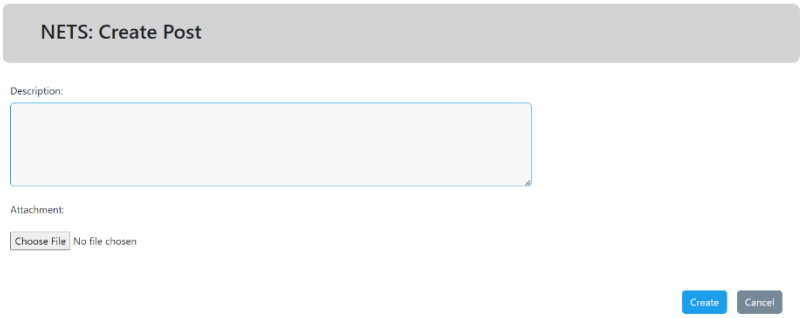


Figure 93 Implementation 27

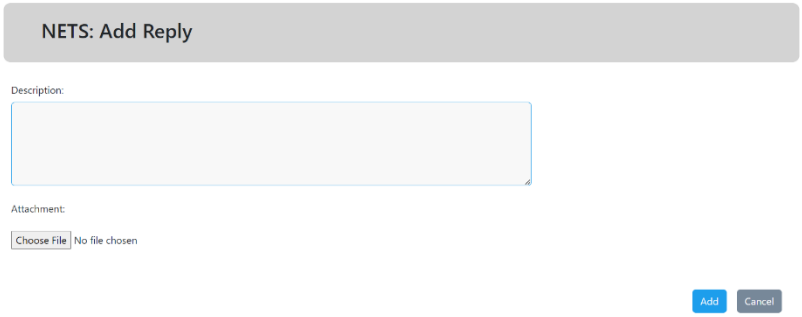


Figure 94 Implementation 28

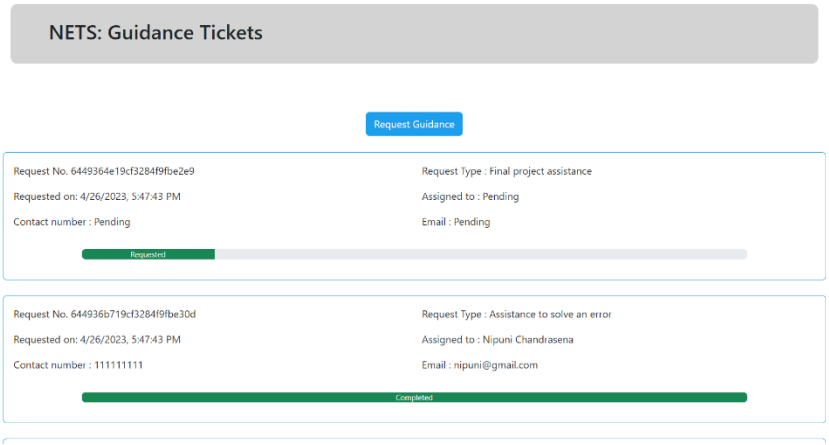


Figure 95 Implementation 29

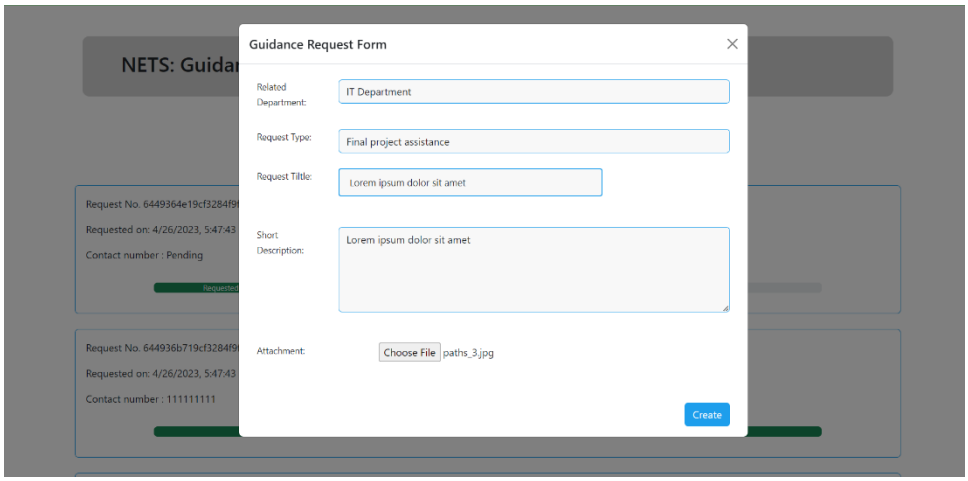


Figure 96 Implementation 30

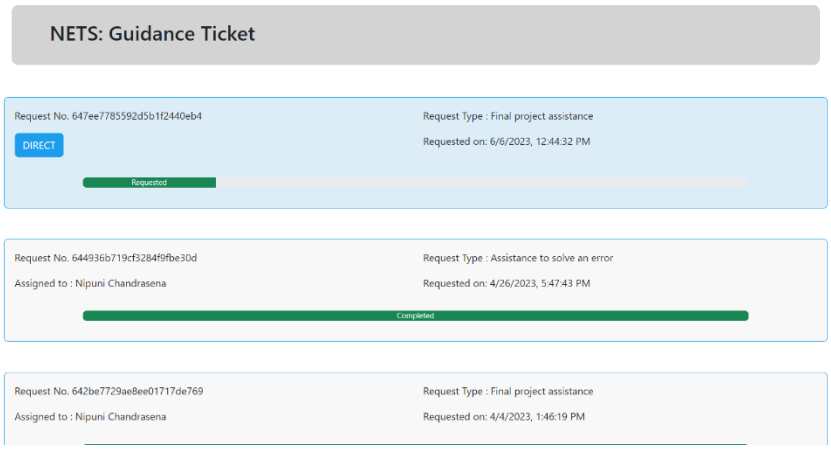


Figure 97 Implementation 31

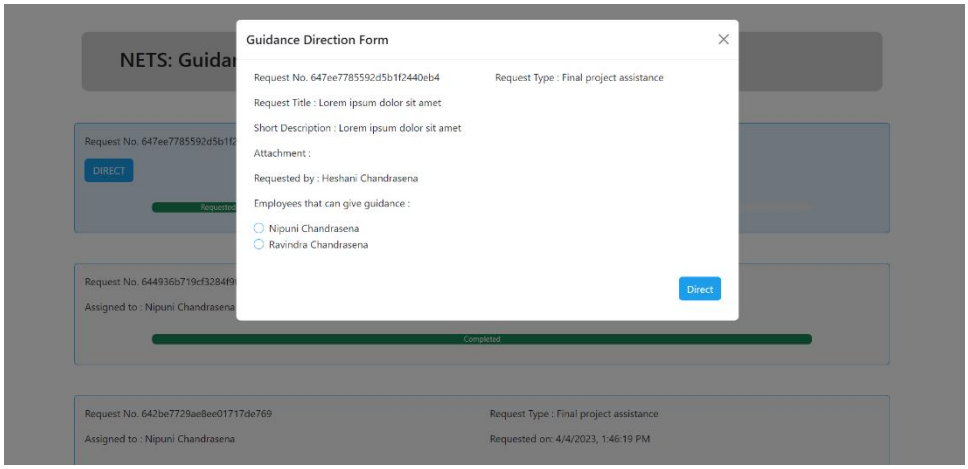


Figure 98 Implementation 32

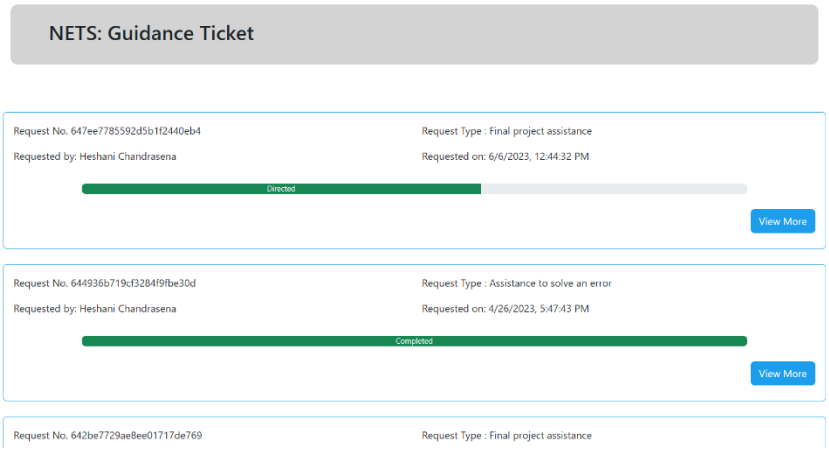


Figure 99 Implementation 33

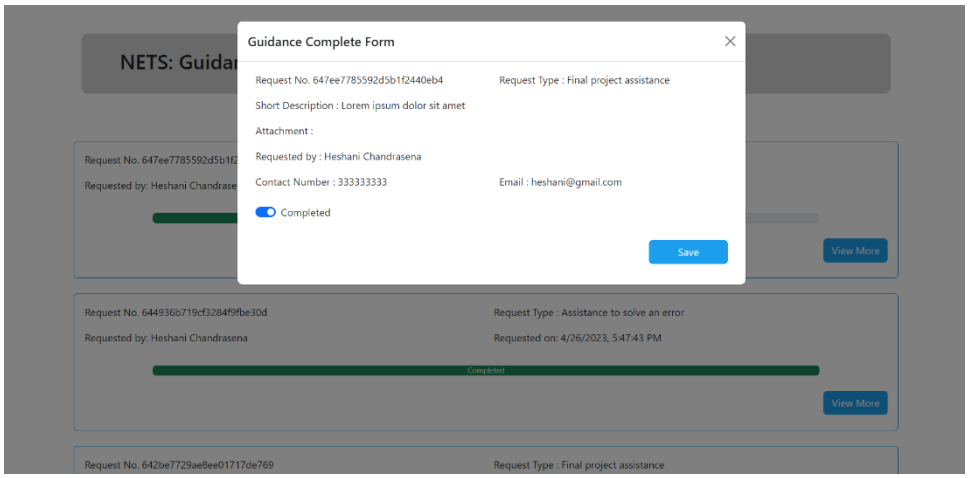


Figure 100 Implementation 34

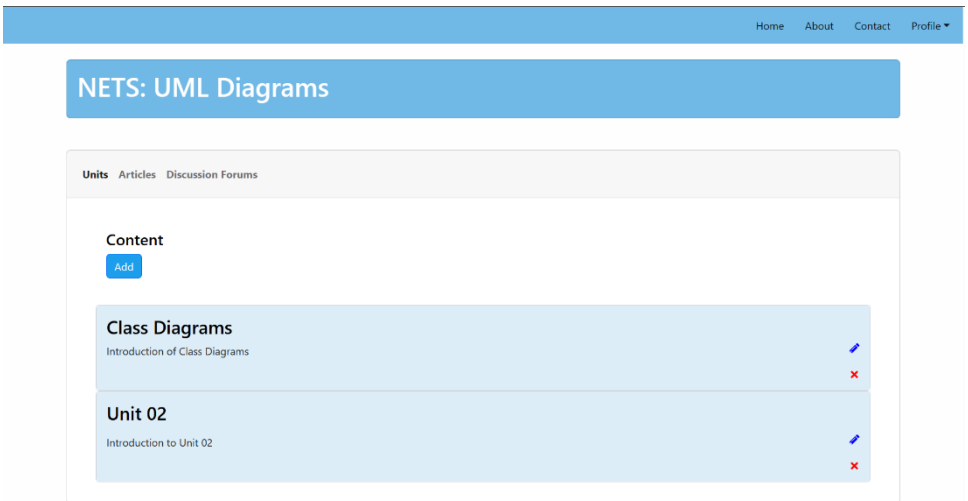


Figure 101 Implementation 35

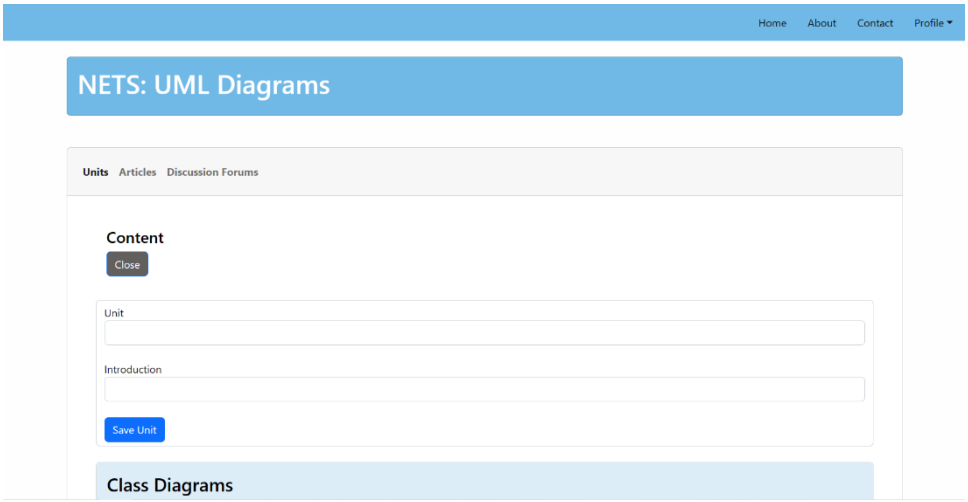


Figure 102 Implementation 36

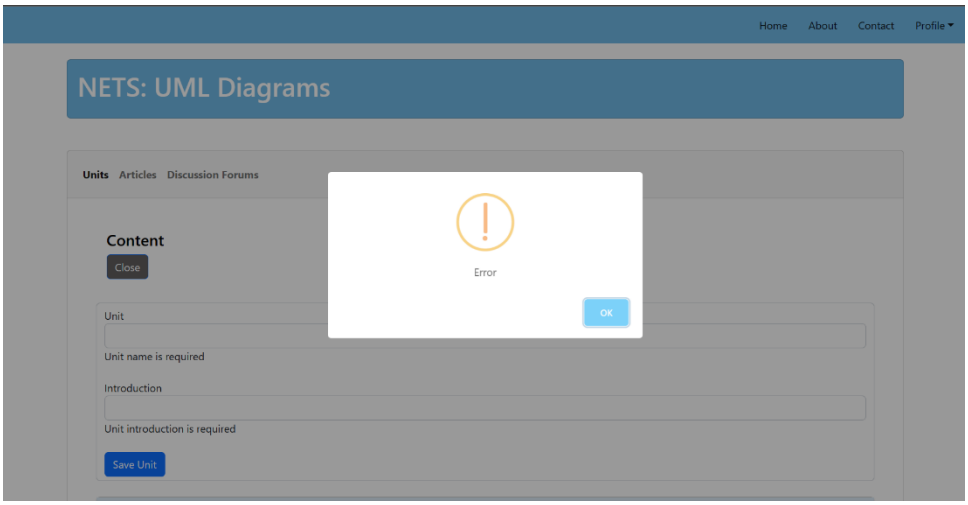


Figure 103 Implementation 37

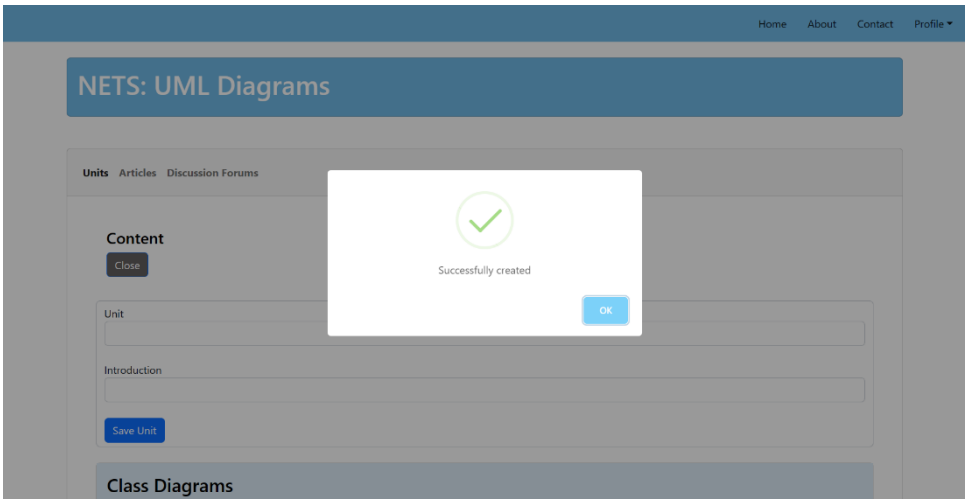


Figure 104 Implementation 38

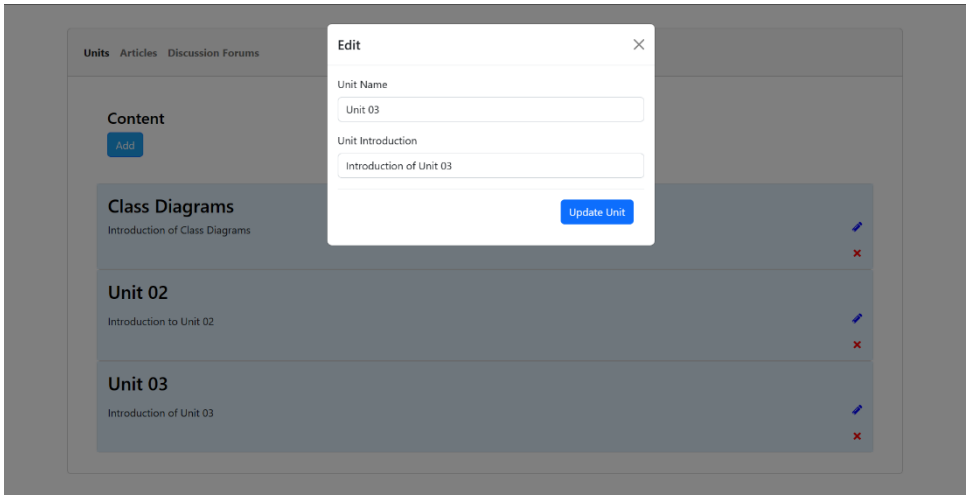


Figure 105 Implementation 39

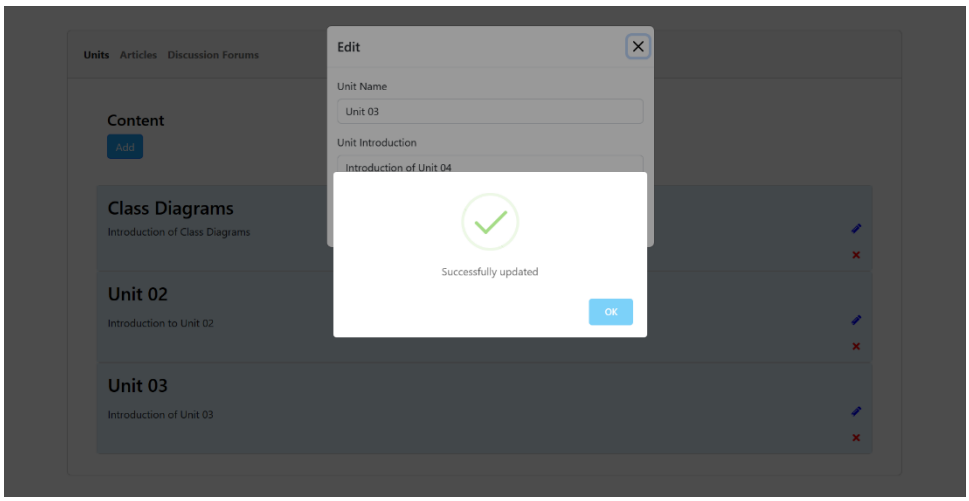


Figure 106 Implementation 40

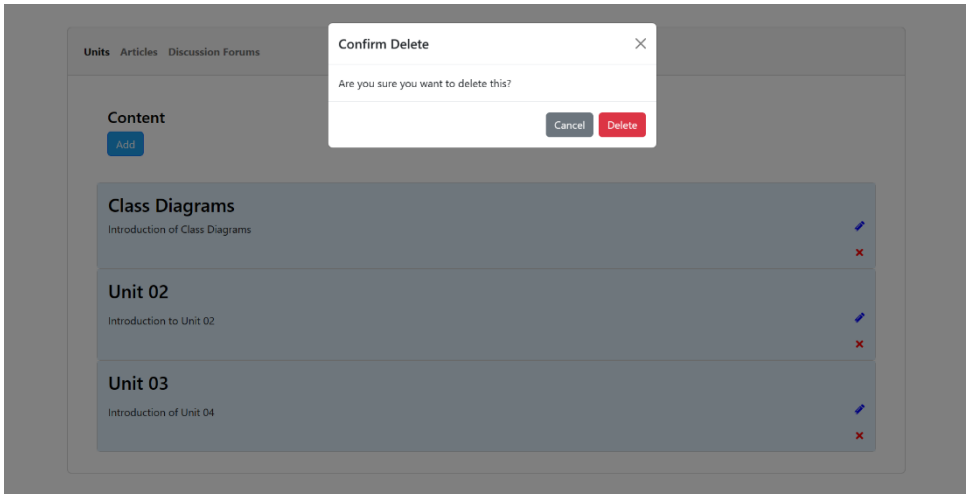


Figure 107 Implementation 41

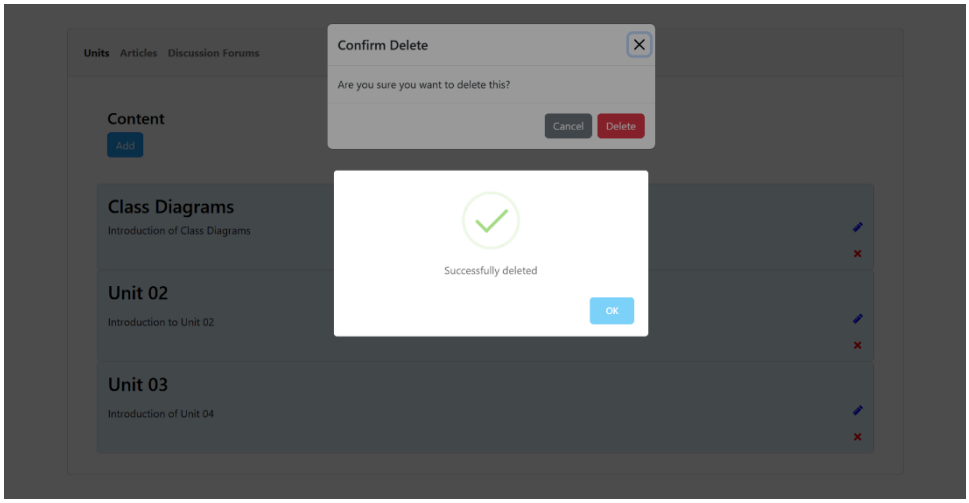


Figure 108 Implementation 42

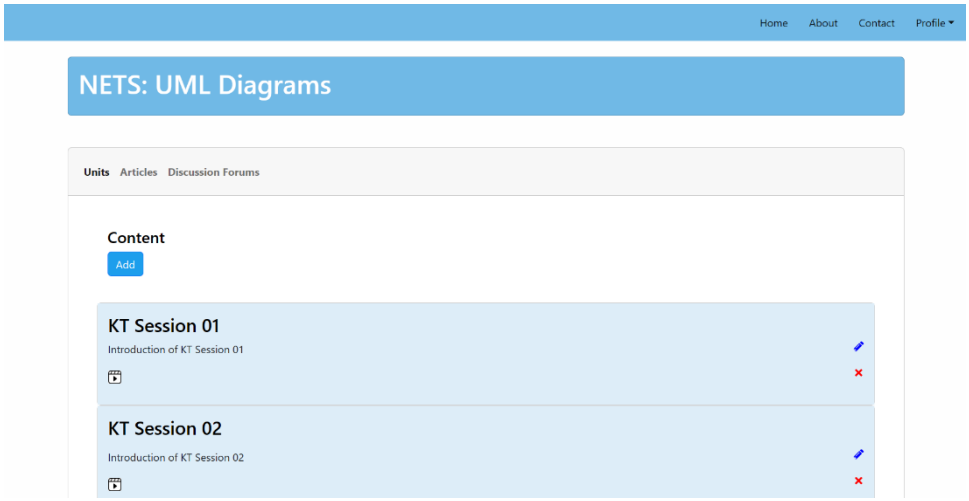


Figure 109 Implementation 43

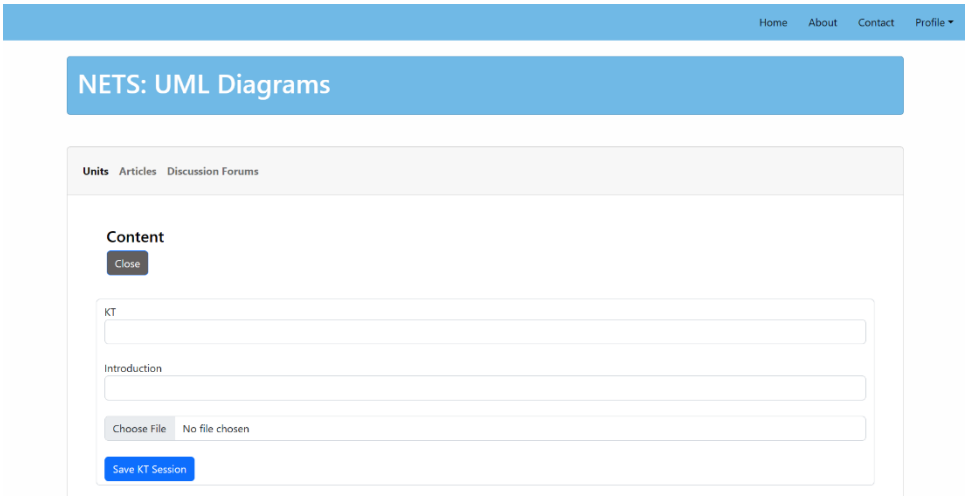


Figure 110 Implementation 44

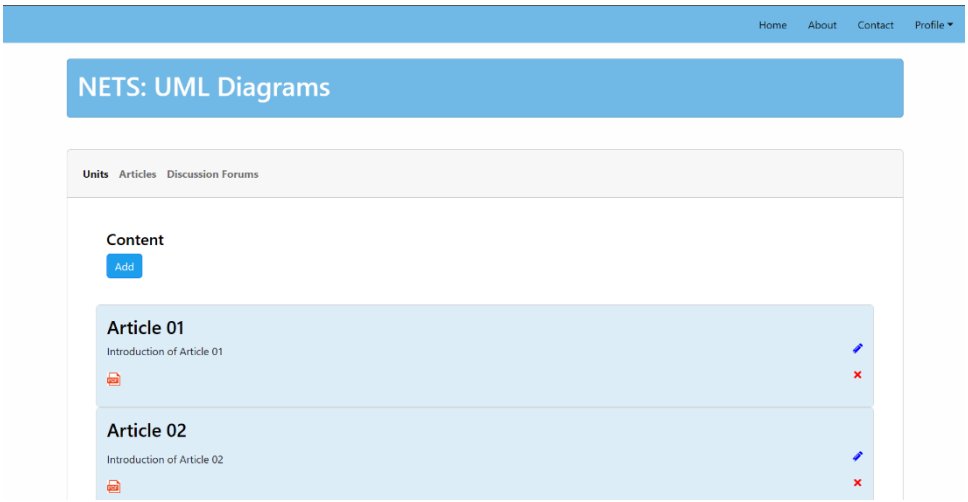


Figure 111 Implementation 45

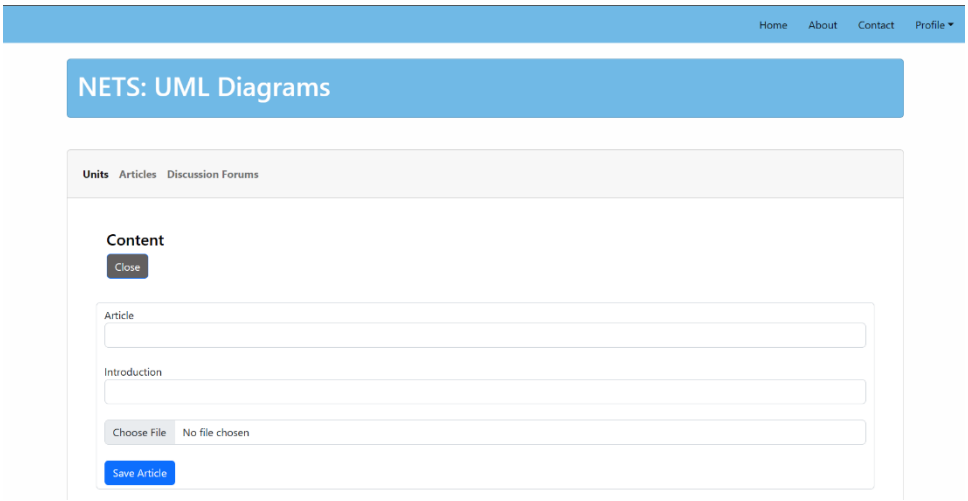


Figure 112 Implementation 46

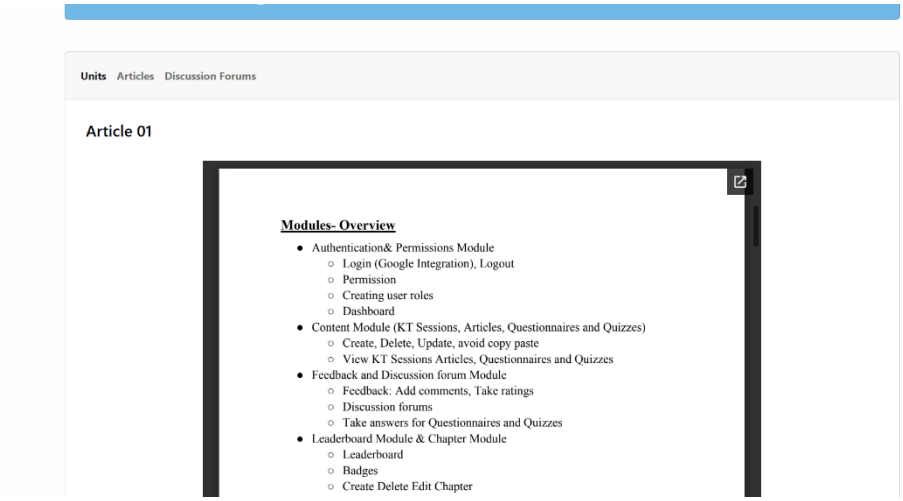


Figure 113 Implementation 47

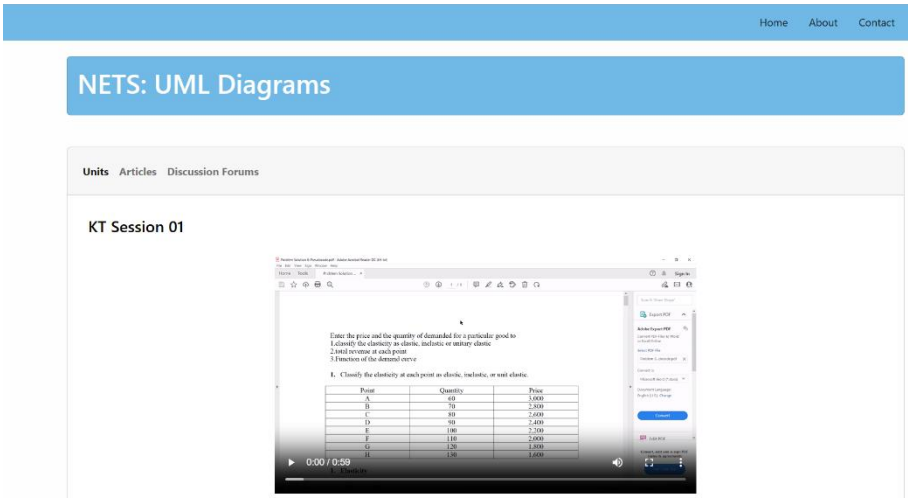


Figure 114 Implementation 48

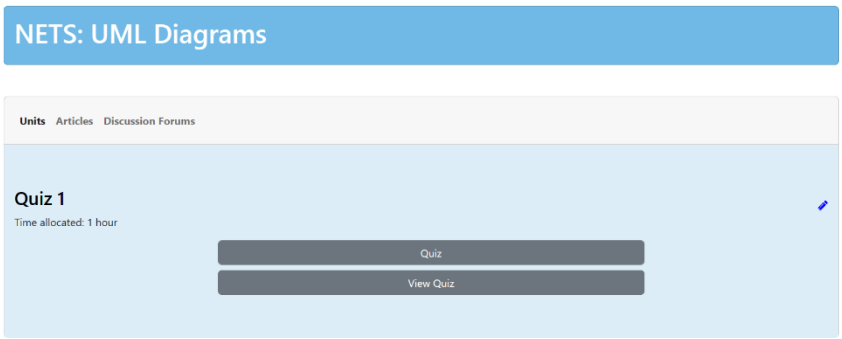


Figure 115 Implementation 49

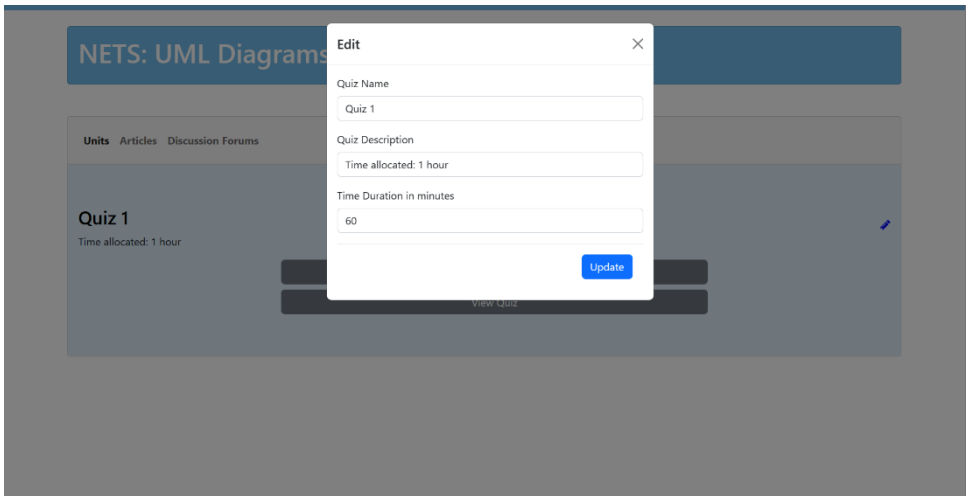


Figure 116 Implementation 50

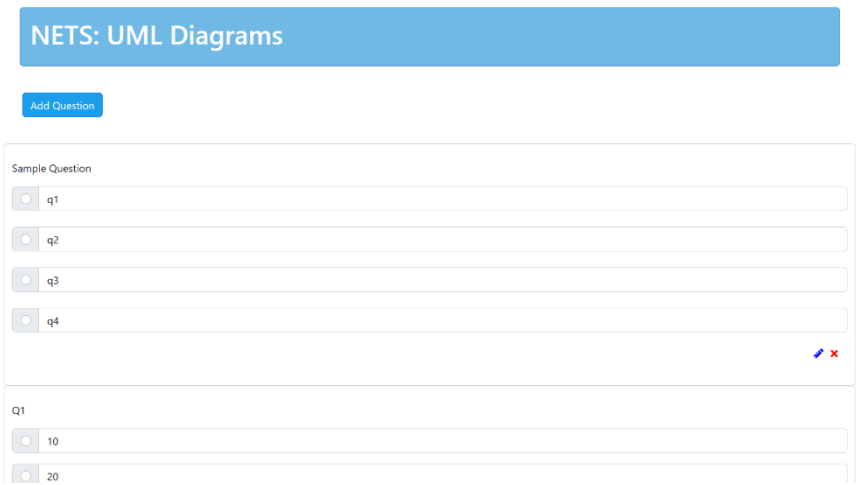


Figure 117 Implementation 51

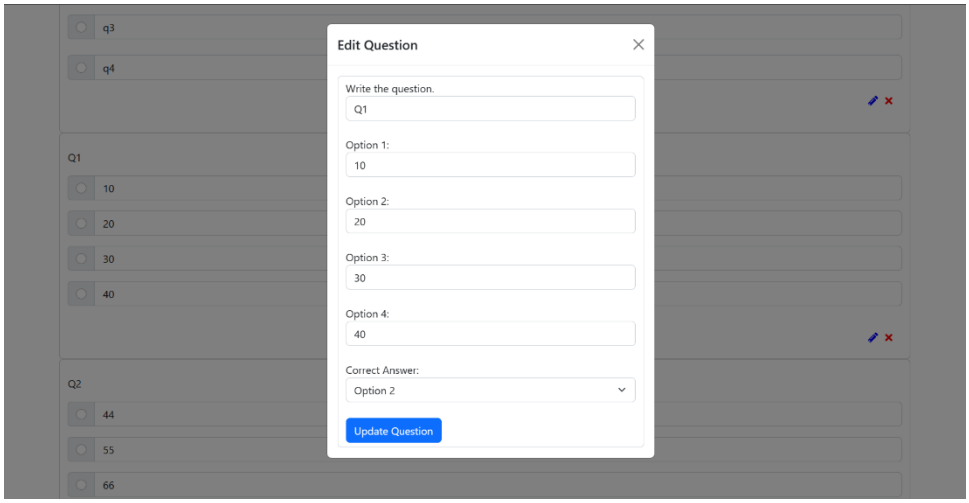


Figure 118 Implementation 52

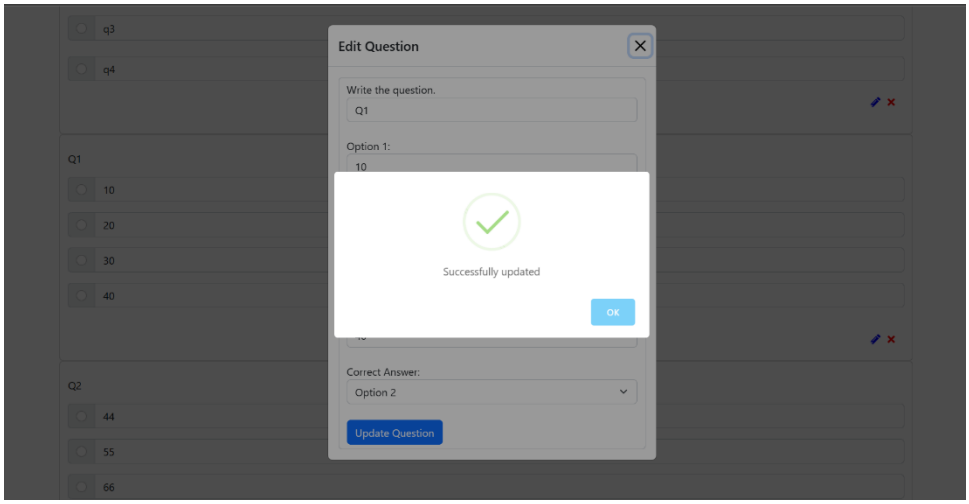


Figure 119 Implementation 53

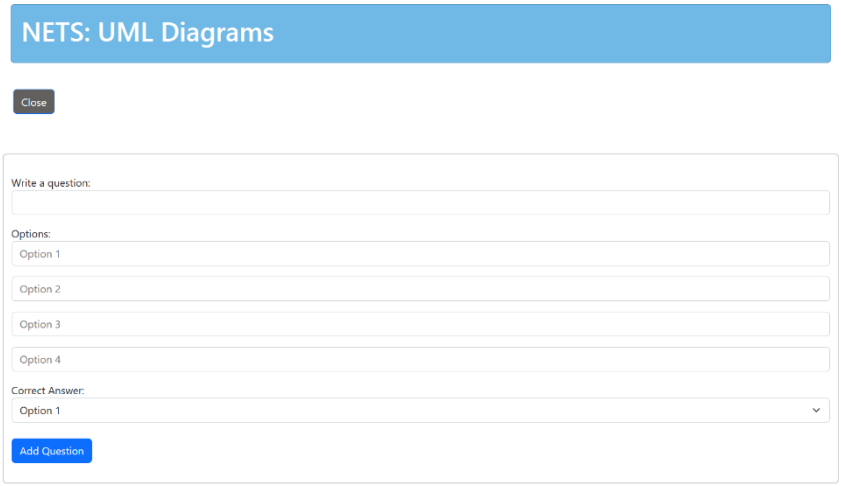


Figure 120 Implementation 54

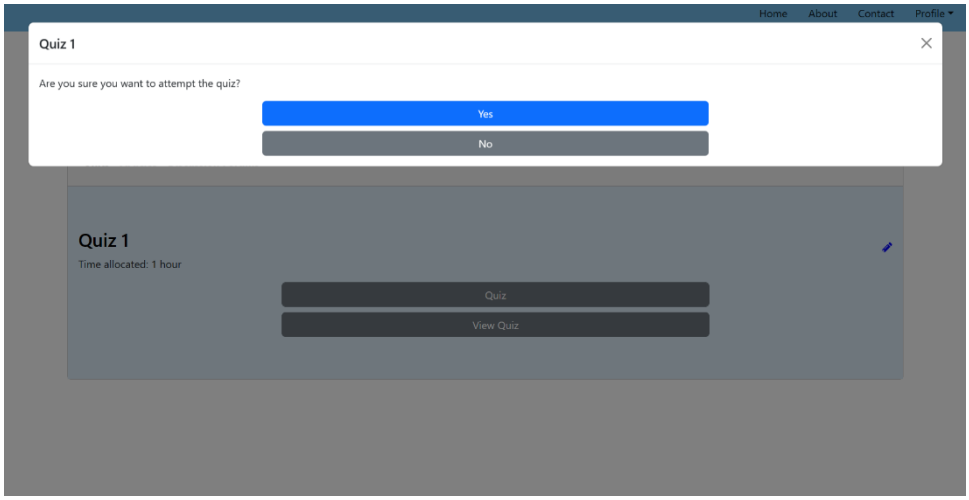


Figure 121 Implementation 55

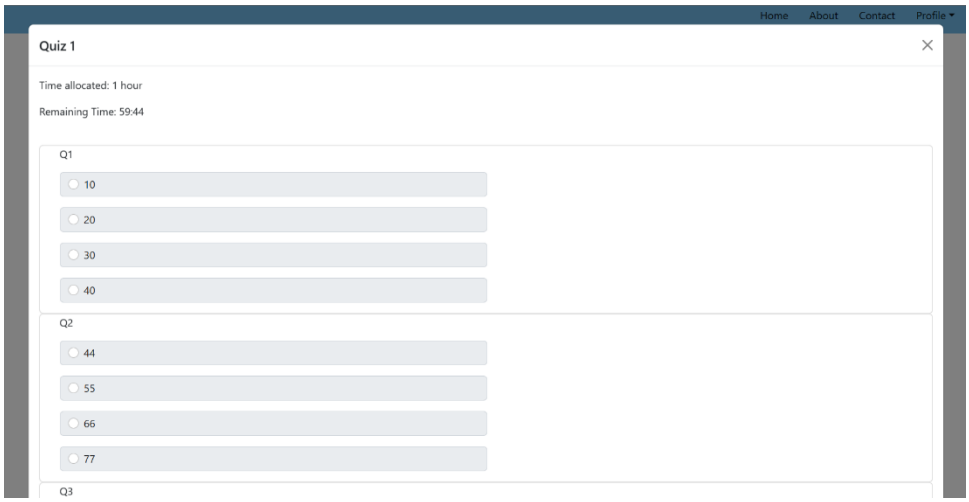


Figure 122 Implementation 56

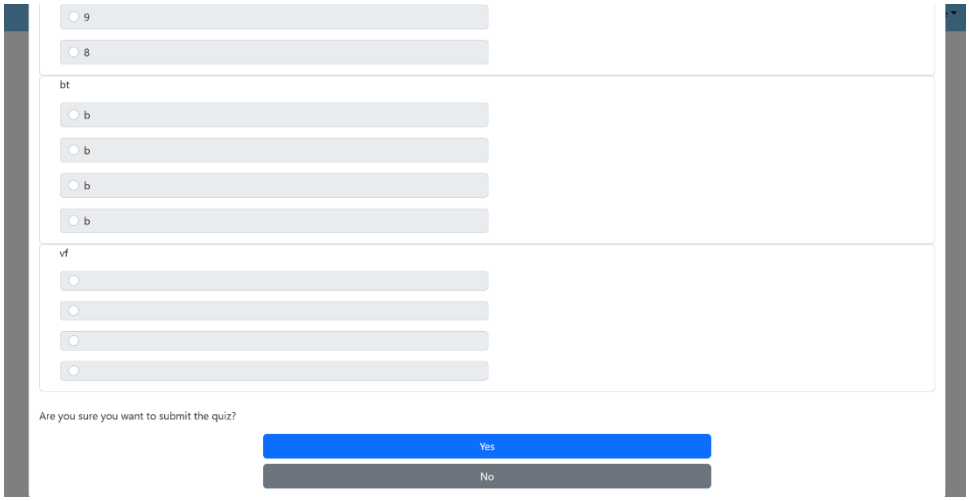


Figure 123 Implementation 57

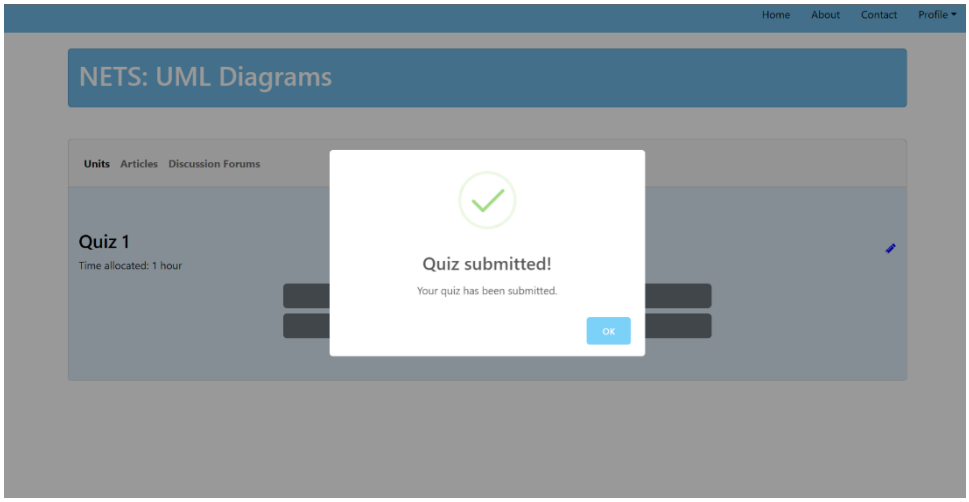


Figure 124 Implementation 58

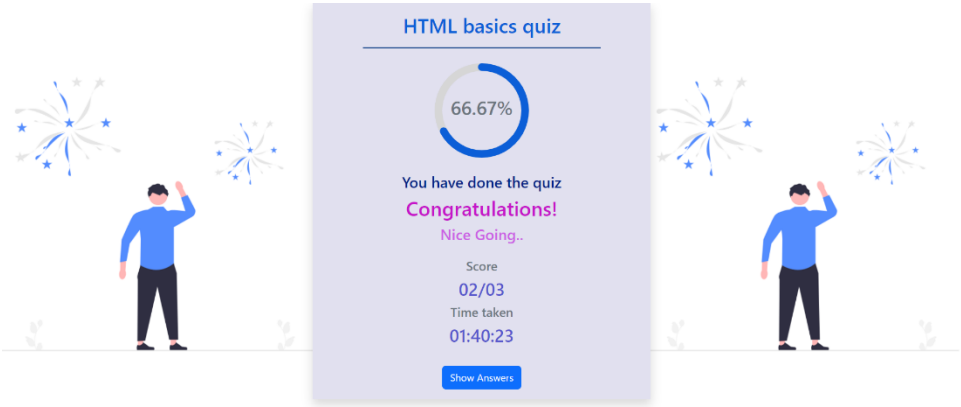


Figure 125 Implementation 59

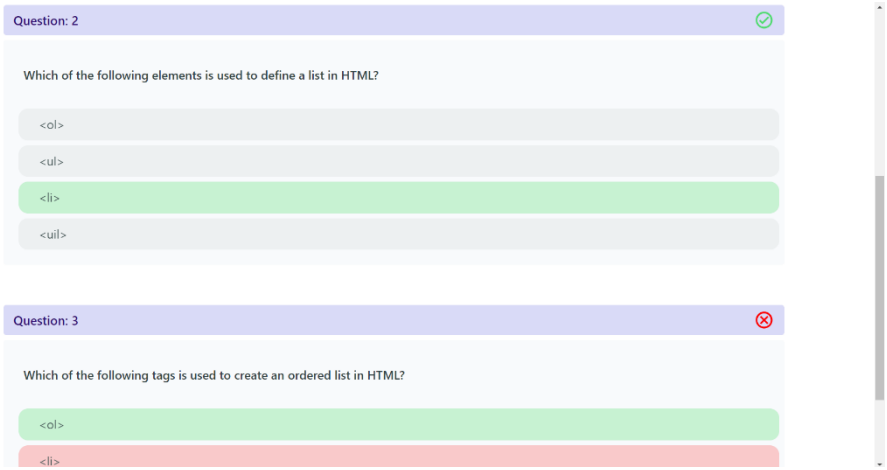


Figure 126 Implementation 60

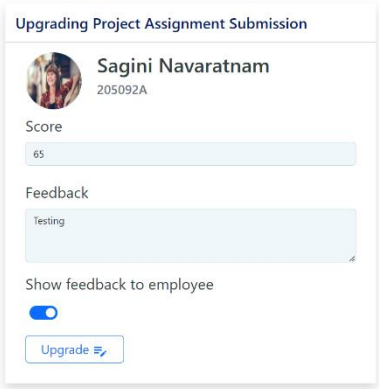


Figure 127 Implementation 61

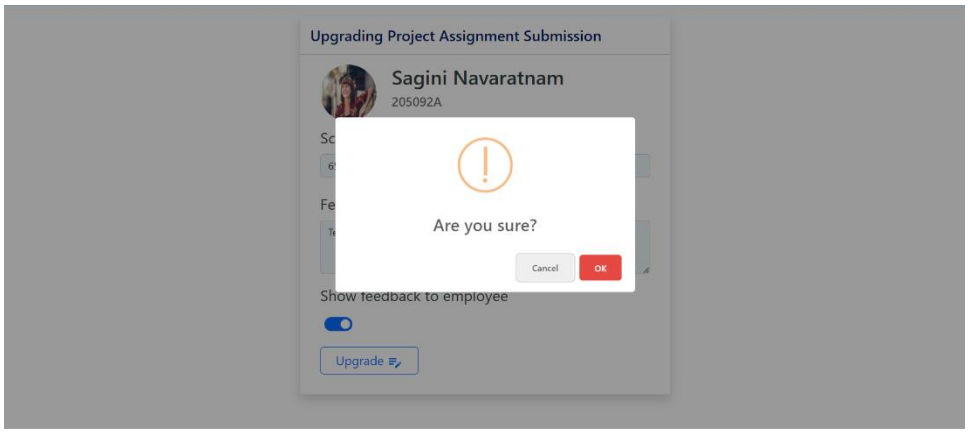


Figure 128 Implementation 62

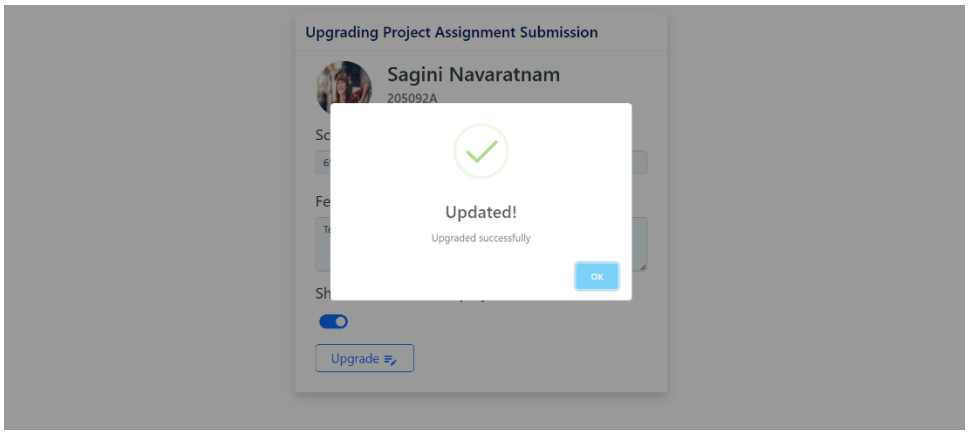


Figure 129 Implementation 63

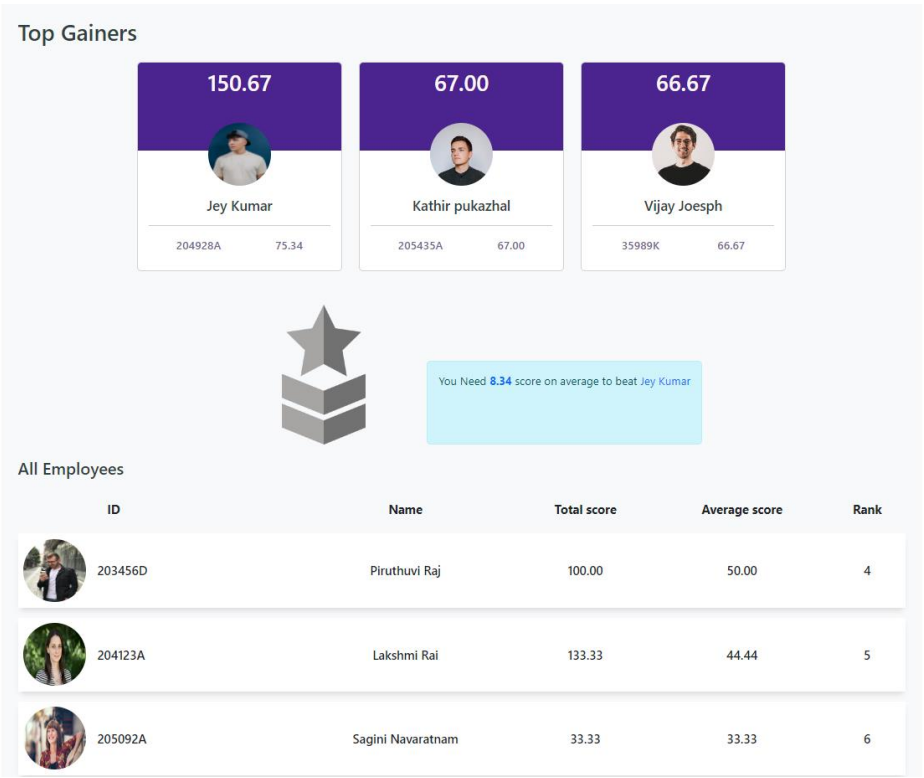


Figure 130 Implementation 64

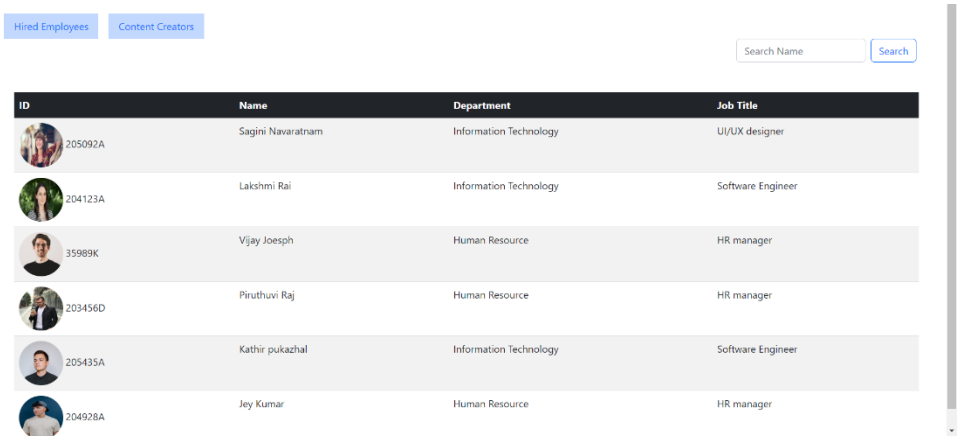
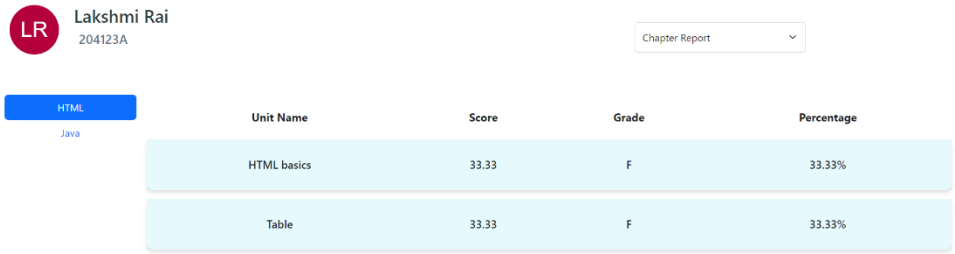


Figure 131 Implementation 65



er

Figure 132 Implementation 66

Figure 133 Implementation 67

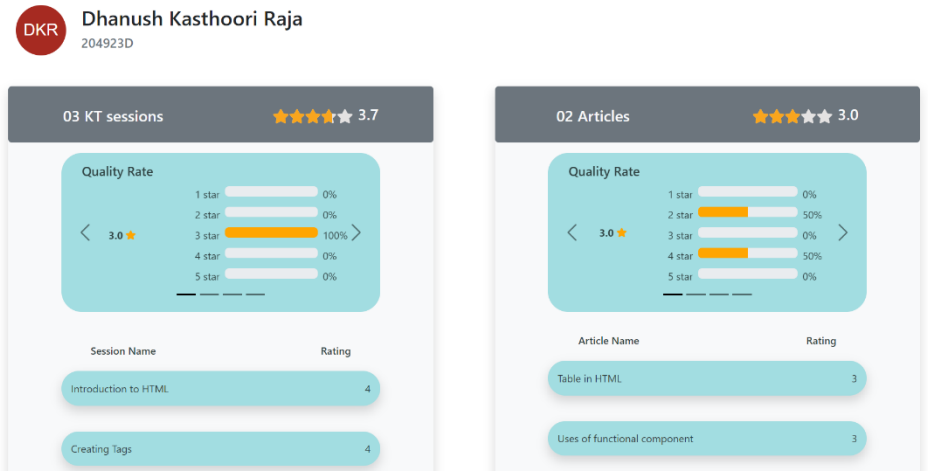


Figure 134 Implementation 68

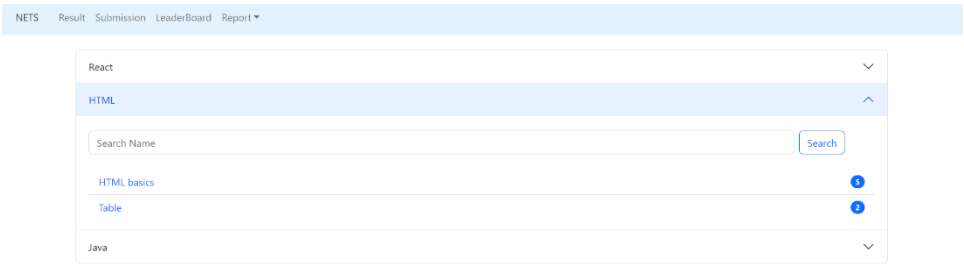


Figure 135 Implementation 69

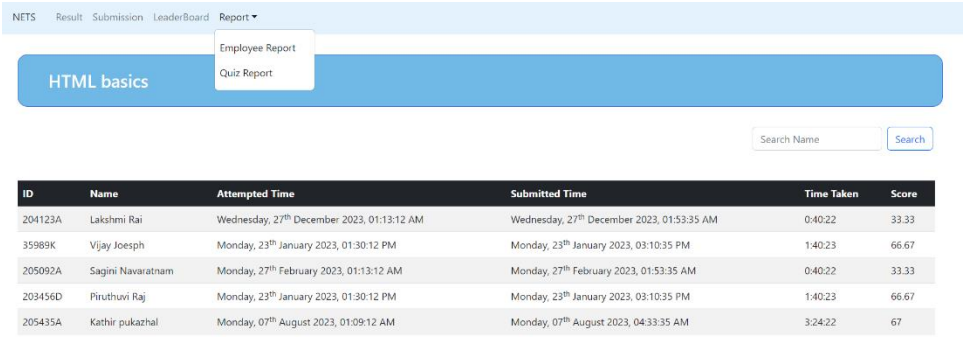


Figure 136 Implementation 70

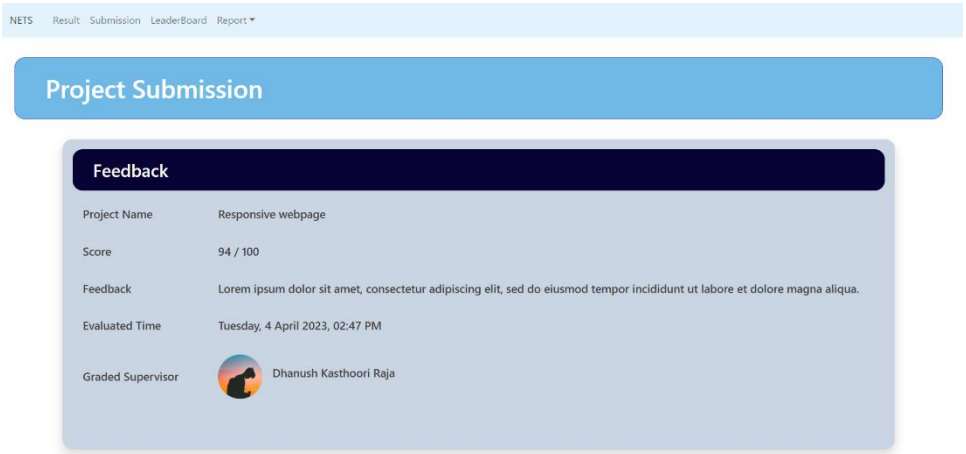


Figure 137 Implementation 71

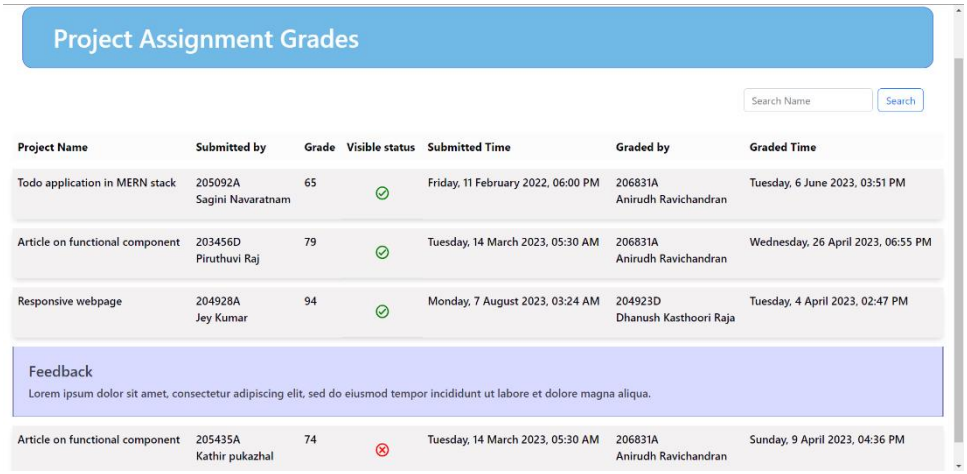


Figure 138 Implementation 72

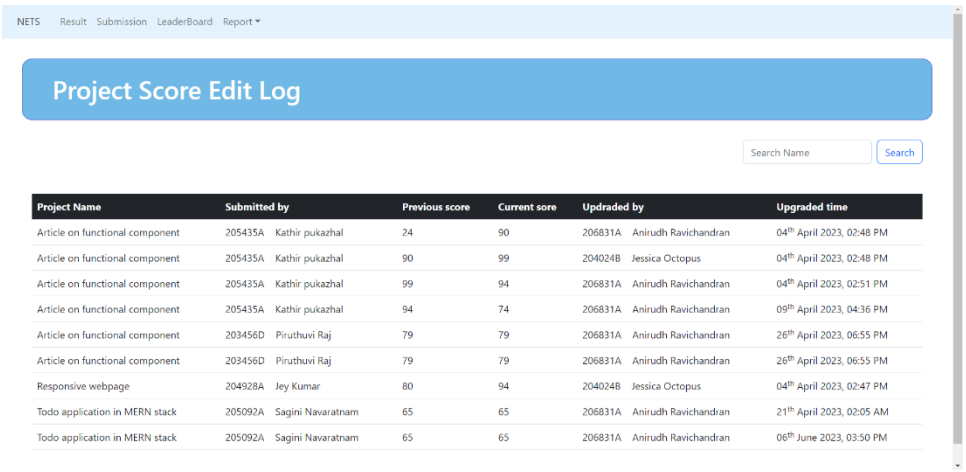


Figure 139 Implementation 73

Chapter 6 Discussion and Conclusion

6.1.1. Objective Achievements

1. **Objective 1: To facilitate user by providing login system based on Google integration to login easily.**

   The Objective is completely 100% achieved. When first user enters the system, User need to fill the further details form and the first user will be assigned as Super admin. After super admin enters the system, Super admin need to create department and job title. Until that other user can't enter the system. Then Super admin create the Job titles and Department, Other users can enter the system. Those users will be considered as Hired Employee by default. Super admin can promote those users to other user roles. And Permission based user access control is also implemented successfully. It prevents accessing unauthorized web pages by irrelevant user roles. (i.e.: Hired employee can't access promote or demote employee page).

2. **Objective 2: To provide a facility for managing chapters and accept the new course request from the employee.**

   The Objective is completely 100% achieved. Super admin can create, edit, delete department and job title. After that system admin can create the chapters for their department. They can edit, delete the chapters temporarily which are created by themselves. Super admin can be able to delete the chapters permanently and edit the chapters which are created by any system admin. Default chapters for each job titles are allocated by the system admin. After that hired employee can request to learn other department chapters. Requests send to the supervisor and he can able to accept or reject their request.

3. **Objective 3: To manage learning materials (KT sessions, Articles) and quizzes to the users.**

   The objective is completely achieved. When the chapters are created, inside the chapters unit can be created by supervisors and content creators. Moreover, content creators and supervisors can edit and delete the units. For each unit, there are KT Sessions uploaded by content creators and supervisors. Hired employees can watch KT sessions. KT sessions can't be downloaded. For each chapter, there are articles uploaded by supervisors and content creators. Hired employees can read the articles. However, Articles can't be copied or downloaded. Supervisors and content creators can edit and delete the KT sessions and articles. For each unit, there is a

quiz. Supervisors and content creators can add questions to the quiz, edit and delete. Hired employees can attempt the quizzes. They have the facility to see the remaining time. When the quiz is submitted, hired employee will get a success message and a notification will be sent to supervisors.

4. **Objective 4: To gain the knowledge of the specific job area of a particular new hired employee by referring learning materials.**

   The objective is successfully achieved. Newly hired employees have access to chapters according to their departments and specific job area. Hired employees can get the knowledge from the content (KT Sessions, Articles) inside the chapters. Moreover, hired employees can test their knowledge by attempting the quizzes under each unit. By referring the KT sessions and articles available under their specific job area and attempting quizzes under each unit, newly hired employees can gain a knowledge of their job area.

5. **Objective 5: To get the submissions of project and submitted answers of quizzes and grades.**

   The objective is successfully achieved. When the hired employee submits a quiz, the system takes the record of the quiz submission. Moreover, a notification will be sent to the supervisors when a hired employee submits a quiz. Then, supervisors are able to grade the quizzes.

6. **Objective 6: To provide a feature to add comments and ratings on learning materials.**

   The Objective is completely 100% achieved. Hired employees, content creators and supervisors can add comments for KT sessions and articles under the comment section of each KT session or the article. Furthermore, hired employees, content creators and supervisors can reply to existing comments. Hired employees can give star ratings for each learning material under 4 criteria as Quality of the content, Clarity of the content, Knowledge transferring skills of the content creator and Communication skills of the content creator. Average calculation of star rating will be displayed under each learning material.

7. **Objective 7: To provide a platform to Get employee ideas and solve their questions through discussion forums.**

   The Objective is completely 100% achieved. There is a discussion forum activity under every chapter. Under discussion forums, content creators and supervisors can add discussion forum topics. Further content creators and supervisors can edit or lock discussion forum topics. Hired employees, content creators and supervisors can access discussion forums and add posts or can reply to an existing post.

8. **Objective 8: To facilitate hired employees by providing guidance request ticket feature to get senior employee's help.**

   The Objective is completely 100% achieved. Hired employees can request special guidance from content creator on error or failure or assistance on final assignment by creating a guidance request ticket. The requested tickets will be sent to the supervisors of the respective department and supervisor will direct that to a suitable content creator. Content creators can view the guidance requests directed to themselves. After providing the guidance respective content creator can make the guidance request ticket as completed. Hired employees, content creators and supervisors can see the progress of the guidance request.

9. **Objective 9: To evaluate quizzes and enable the supervisor to grade submissions by referring pending submissions.**

   The objective has been successfully achieved in its entirety. After clicking the submit button, the system efficiently retrieves the submitted answers and the corresponding correct answers for the quiz. By comparing both sets of answers, the system accurately evaluates the quiz by determining the number of correctly answered questions out of the total number of questions, as well as the percentage of the score achieved. The result page provides this information to the newly hired employee, who can also review the quiz by clicking the show answers button in the result page.

   Regarding grading submissions for project assignments, the system indicates whether the submission has been graded or not. Additionally, the supervisor can access and download the submissions, review them, and assign a score along with feedback. If needed, the supervisor has the capability to edit the grades, and these edit logs are displayed to the system admin for reference and tracking purposes.

10. **Objective 10: To generate user reports, overview report and quiz report of hired employee and ratings report of content creator.**

    The objective has been successfully accomplished. The system allows the supervisor to access various reports, including the chapter report that presents quiz results organized by chapters. Additionally, the overview report provides the average scores for each chapter, while the ratings report offers comprehensive information on the overall ratings

for each Knowledge Transfer (KT) session and article. These ratings encompass categories such as quality, communication, knowledge and skill, and clarity.

Moreover, the quiz report provides detailed information on the individuals who attempted each chapter's unit quiz, including their scores, attempted time, submitted time, and time taken. The supervisor has the capability to review these quizzes and assess the performance of the employees accordingly. Both the chapter report and overview report are accessible to the hired employee and the content creator has the privilege to access the ratings report too.

11. **Objective 11: To give the badges to the employees who achieve the goal and show how many points they need to beat the first employee by leader board.**

    This objective has also been successfully achieved. The system includes a badge feature for the hired employee. If the employee secures the top position in the leaderboard, they will be awarded a gold badge. Similarly, if they rank second, they will receive a silver badge, and if they rank third, they will be presented with a bronze badge. The hired employee has the ability to view the number of points they need to surpass the first-ranked employee in the leaderboard.

6.1.2. Limitations of Solution

1. Limited integration options: The system currently only supports Google integration for user login. This may restrict users who do not have Google accounts or prefer alternative login methods.
2. Limited content variety: The system currently focuses on KT sessions, articles, and quizzes as learning materials. It may not cater to other types of content, such as interactive simulations, or virtual labs, which could enhance the learning experience.
3. Lack of advanced analytics: The system currently provides basic reporting features such as user reports and quiz reports. However, it lacks advanced analytics capabilities, such as personalized recommendations based on user preferences, performance trends, or learning pathways to optimize the learning experience.
4. Limited communication channels: The system primarily relies on discussion forums for employee questions and idea sharing. Additional communication channels such as chat or direct messaging could facilitate quicker and more interactive discussions.

6.1.3. Further Works

1. Expand login options: Integrate with other popular authentication methods, such as social media accounts or email-based login systems, to provide more flexibility for users.
2. Diversify learning content: Incorporate various multimedia formats, including videos, interactive simulations, and virtual labs, to cater to different learning preferences and create a more engaging learning environment.
3. Advanced analytics and personalization: Utilize data analytics and machine learning algorithms to offer personalized recommendations, adaptive learning paths, and performance insights for both employees and content creators.
4. Enhanced communication channels: Introduce additional communication channels like chat or direct messaging to facilitate real-time discussions, collaboration, and faster problem resolution.
5. Gamification elements: Implement a gamification system with badges, leaderboards, and progress tracking to motivate employees, foster healthy competition, and encourage continuous learning.
6. Integration with external tools: Integrate with other learning management systems, productivity tools, or HR systems to streamline data exchange, user management, and reporting processes.
7. Accessibility and localization: Ensure the system meets accessibility standards and supports localization to accommodate users with disabilities and users from different regions or languages.

References

[1]	"Papyrs - Google Workspace Marketplace," *Google.com*. [Online]. Available: https://workspace.google.com/marketplace/app/papyrs/797743634207. [Accessed: 05-Jan-2023].
[2]	"Learning management software," *Trakstar*. [Online]. Available: https://www.trakstar.com/go/learning-management-software-2/?utm_source=peoplemanagingpeople&utm_medium=cpc&utm_campaign=pmp-trakstar-learn&utm_term=online-learning. [Accessed: 05-Jan-2023].
[3]	F. Campbell, "360Learning," *eLearning Industry*. [Online]. Available: https://elearningindustry.com/directory/elearning-software/360learning-lms. [Accessed: 05-Jan-2023].
[4]	"React," *Reactjs.org*. [Online]. Available: https://reactjs.org/. [Accessed: 05-Jan-2023].
[5]	"Node.Js," *Node.js*. [Online]. Available: https://nodejs.org/en/. [Accessed: 05-Jan-2023].
[6]	"MongoDB atlas: Cloud document database," *MongoDB*. [Online]. Available: https://www.mongodb.com/cloud/atlas/lp/try4?utm_source=google&utm_campaign=search_gs_pl_evergreen_atlas_core_prosp-brand_gic-null_ww-multi_ps-all_desktop_eng_lead&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624584&adgroup=115749713703&gclid=CjwKCAiAh9qdBhAOEiwAvxIokxgw53JaPmk2pM8O1fk3Ke2urmCz3u1o9-Frz1Pt8S90_Zxo_nQsuBoCC4oQAvD_BwE. [Accessed: 05-Jan-2023].

Appendix A: Individual Contribution to the Project

205080K Raguraj S

I am responsible for developing Authentication module, Authorization module, Promote or Demote employee form one user role to another user role, allow and verify job titles, final assignment module and mailing system. After finding the requirements from clients, we divided the scope among group members fairly and started to draw UML diagrams. We draw ER Diagram, Class Diagram, Use case Diagram as a group and Activity diagram, Sequence Diagram individually. From that we could be able to get more understanding about the system. Then, we started to design wireframes using Figma software to get understanding about how NETS project is going to look like. The technology of the project is MERN stack. I decided to learn React.js to enhance my skills in developing front-end components for my assigned areas of responsibility. Alongside that, I devoted time to studying Express.js and MongoDB, referring to YouTube channels to gain a deeper understanding of backend development. When developing the backend for my scope, I focused on establishing the database structure and creating schemas relevant to my scope of work. I'm pleased to report that I have successfully completed my assigned tasks, including thorough unit testing using Postman. At present, the remaining tasks involve conducting integration testing and performing comprehensive system testing across all modules to ensure a robust and seamless implementation.

205039U Ishvini A

I am responsible for developing the Chapter module, Department& job title module, and Profile overview of the New Employee Training System (NETS). In the beginning, I started by researching various current systems that are relevant to our project. Then, after analyzing everything, make a list of the modules' scopes. I defined the scope of the following features after determining the requirements. comprehensive understanding of the project's fundamental requirements. To provide clarity and visualize the system's flow and interactions within my modules, I created activity and sequence diagrams for my scope of our system which can help effectively communicate the logical sequence of tasks. I took the initiative to learn and utilize Figma. After that, I created visually appealing and user-friendly interfaces for my modules. To implement the user interfaces, I mastered React and Bootstrap CSS by leveraging online resources. I applied my knowledge of these technologies to develop the front-end components of my modules. For the back-end development, we decided to use Node.js. To familiarize

myself with this framework, I followed an online tutorial and acquired the necessary skills. Subsequently, I began coding and have made significant progress, with approximately 90% completion of the development tasks. In the current phase, I am actively working on implementing validation and error-handling functionalities.

205092A Sagini N

As part of my responsibilities, I have been assigned the development tasks (Evaluating quiz, grading submission, view pending grading submissions to supervisor, generating user reports, overview report and quiz report of hired employee, and ratings report of content creator, and take the submitted answers of quizzes and submissions of project assignment) for the evaluation module and (display ranking of hired employee, offer badges and show how many points he/ she needs to beat the first employee in the leaderboard) leaderboard module within the New Employee Training System (NETS). Initially, I created the activity diagram and sequence diagram to outline the functionality within my scope. Additionally, I collaborated with the group in creating the use case diagram, class diagram, and ER diagram. Subsequently, I conducted research on existing systems' user interfaces to gather inspiration for creating prototypes using Figma. Following that, I embarked on learning React.js, enabling me to develop the front-end components for the areas under my responsibility. Simultaneously, I dedicated time to studying Express.js and MongoDB by referring to YouTube channels, focusing on the backend aspects. During this period, I established the database structure and schema for my assigned scope. This provided the foundation for further progress in the backend development. Ultimately, I successfully completed my portion of work, including thorough unit testing using Postman. Currently, the remaining tasks include integration testing and conducting comprehensive system testing across all modules.

205074V Pemarathna G.T.D.B

I am responsible for developing the Content module and notification module of New Employee Training System (NETS). In the beginning, I researched some existing content management systems. Then by analyzing these existing features' scope, I figured out the scope of the content module. After identifying the requirements, I planned the scope of above features. In order to understand the basic requirements of the project, we started to draw UML and EER diagrams as a team. I contributed to drawing the EER diagram, Use case diagram, and class diagram. Then I designed activity diagrams and sequence diagrams for the above two features of the

system. After that, I was able to design the UI for the two features using the Figma designing tool by discussing with the team. I developed eye-catching and user-friendly interfaces for my modules by utilizing my UI/UX abilities. Since we built the front-end of our application using React, I referred some tutorials and YouTube videos in order to develop the user interfaces. To develop the backend, we used Node and I followed a course on Node to learn and develop the content and notification modules. I have finished developing the whole scope of my part and now am working hard to create functionality for handling errors and validation.

205010A Chandrasena H.S

I am responsible for developing the Feedback & Discussion Forum module and Guidance module of NETS. To fulfill my role, I carefully evaluated the necessary functions and established the proper scope for each feature. I analyzed various elements including comment sections, star ratings, discussion forums, and help request tickets on current websites to acquire insight and inspiration. To establish a clear understanding of the project's fundamental requirements, our team collaboratively constructed UML and EER diagrams. I actively contributed to the creation of the EER diagram, Use Case diagram, and Class diagram. In addition, I meticulously designed activity diagrams and sequence diagrams to the functions I was in responsible for in the system. To ensure a user-friendly interface, I engaged in group discussions to finalize the UI design. We utilized Figma, a widely used design tool, to facilitate this process. Throughout the UI design phase, I prioritized effective communication and incorporated feedback from team members to create an optimal user experience. I acquired knowledge in React and Bootstrap CSS through extensive online research, which enabled me to implement the user interfaces for my modules. Leveraging my knowledge of these technologies, I successfully developed the front-end components of the project. As for the back-end development, our team decided to utilize Node.js. To familiarize myself with this framework, I diligently followed an online tutorial and acquired the necessary knowledge. I am currently in the process of thoroughly testing my functionalities and implementing necessary improvements.