

# FUEL SUPPLY MANAGEMENT SYSTEM

## Project Report



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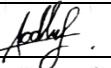
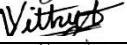
## Appendix 2 – Declaration

### Declaration

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### Abstract

The current economic crisis of Sri Lanka has elevated to a harsh day to day challenge to fulfil basic needs such as food, electricity, water supply, etc. One of the key challenges that the country is facing is acquiring fuel, where the high demand for the small amount of fuel in the country has resulted in massive queues outside fuel stations. This project is revolving around providing a solution for this fuel crisis by managing the process of supplying fuel to all the necessary consumers. Hence the website we created is a fuel supply management system which is finely adapted to provide fuel in an orderly manner. Apart from the functionalities we have provided clean, calm and consistent user interfaces to keep the consumer focused on the process of payments and fuel supply. Additionally, user's time is finely managed by the user friendliness, rapid flow of the website. The process of acquiring fuel has been simplified through the efficient flow, clear management and comprehensible user instructions. All in all, the end goal which was to launch a full fledged application to make the process of supplying fuel easier, was successfully achieved by our team.

## Acknowledgement

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## List of Abbreviations

SQL	Structured Query Language
DBA's	Database Administrator's
CRUD	Create, Read, Update and Delete Operations
OTP	One Time Password
QR	Quick Response Card
EER Diagram	Enhanced Entity Relationship Diagram
DBMS	Database Management System
UI	User Interface
JDBC	Java Database Connectivity
DB	Database
OT	Overtime(Measurement of productivity at workplace)
API	Application Programming Interface
pid	Payment identity

# 1 Introduction

## 1.1 Background

The inflation in Sri Lanka caused the country to experience a major economic crisis ever recorded in history. The crisis has gradually worsened and elevated to a major scarcity, drop-down in energy resources and food supply. Due to this the fuel supply in the country has collapsed and has been regarded as a grave shortage. Therefore, there is a high demand for the slight amount of fuel we are receiving into the country. Nevertheless, the process of obtaining fuel has become a chaotic process that there have been multiple deaths recorded, by staying in queues lined up outside gas stations. Additionally, the downfalls of this system have created a black market for the distribution of fuel. Therefore, we launched this website with the intention of providing a solution to get make the process of maintaining fuel details and distributing fuel more convenient and easier.

The proposed system manages all business cases by providing the privilege for all type of users such as essential services and staff to register. The system also manages various business cases and handle every possible issue that could result when working with the process

## 1.1 Problem and Motivation

As students emerging to the current society, we witness a lot of downfalls in the administrations of the country. Although the current economic downfall of the country has affected us in many ways it has provided us with an opportunity as students to look into the issues and difficulties of the system. Thus, the origin of our system is the major fuel crisis which arose as a result of the economic crisis.

It is obvious that the problems we face with basic things like getting fuel is very time consuming and inconvenient and with the high demand for the very little amount of fuel that we receive to the country the current file-based systems fail to provide enough safety for the data and suitability for the consumers. The above-mentioned downfalls of the current systems implemented to manipulate the process of fuel distribution has motivated us to design and launch the Fuel Supply Management system under this module

The problems faced with the fuel supply procedure such as, the high level of fuel demand, waste of time, inefficiency to maintain physical records of fuel distribution and consumption influenced us to look into the procedure in large depth and introduce this fuel supply management system.

## 1.2 Literature Review

Sri Lanka is facing a huge economic crisis and political turmoil. It is the first-ever economic crisis that the country has witnessed after its independence. The crisis has caused a persistent lack of foreign cash and inflation has resulted in a serious scarcity of fuel. The depletion of foreign reserves has made the people spend hours and days together in long queues outside the fuel stations [1]. Considering the prevailing situation in the country our team has come up with an idea to implement a website to manage the supply of fuel. A Fuel supply management system is designed to measure the fuel in an effective way in order to reduce the queues outside the station and the black market for fuel too. The information on the fuel, vehicles, staff, and users will be stored in computerized systems, and end of each month, reports can be generated with available data.

The government of Sri Lanka has designed a website for fuel management in the last month [2]. Although they implemented a website, users cannot register for the website at the same time. If so, the register button will be disabled. So, we have planned to design a website that will be more user-

friendly. And we have planned to store the staff details, manage their attendance and salary also in one system which was not an available feature on the government website. Another drawback of the government website is we can register only the vehicles to get fuel. But we have planned to register a company which comes under essential service. So that essential services also can get fuel without any issues.

## 1.3 Aims and Objectives

### 1.3.1 Aims

Our main aim is to create a user-friendly fuel supply management application in order to distribute fuel among the public in a fair manner. Which would eventually result in the decrease of massive queues lined up outside gas stations, where numerous numbers of deaths were even reported. Also, we aim to reduce the fraud in distributing fuel to clients as well as reducing riots caused by various activities occurred in these long queues such as inappropriately skipping in lines.

### 1.3.2 Objectives

- To make people aware of this application and educate them about the process of fuel distribution.
- To get a detailed understanding about the fuel crisis by performing thorough literature survey.
- To convince people to use online systems by simplifying the user-experience
- To make sure the activities of fuel distribution is transparent and easy
- To get monthly reports about fuel distribution, users, and staff etc.

## 1.4 Solution Overview

### 1.5.1 Overall Product Scope

The Fuel supply management system is implemented with a main goal of providing a coordinated procedure for the process of distributing fuel and manipulating the activities of a fuel station. Another goal of this system is to transform all the manual process inside a fuel station into an automated process to make our daily life easier.

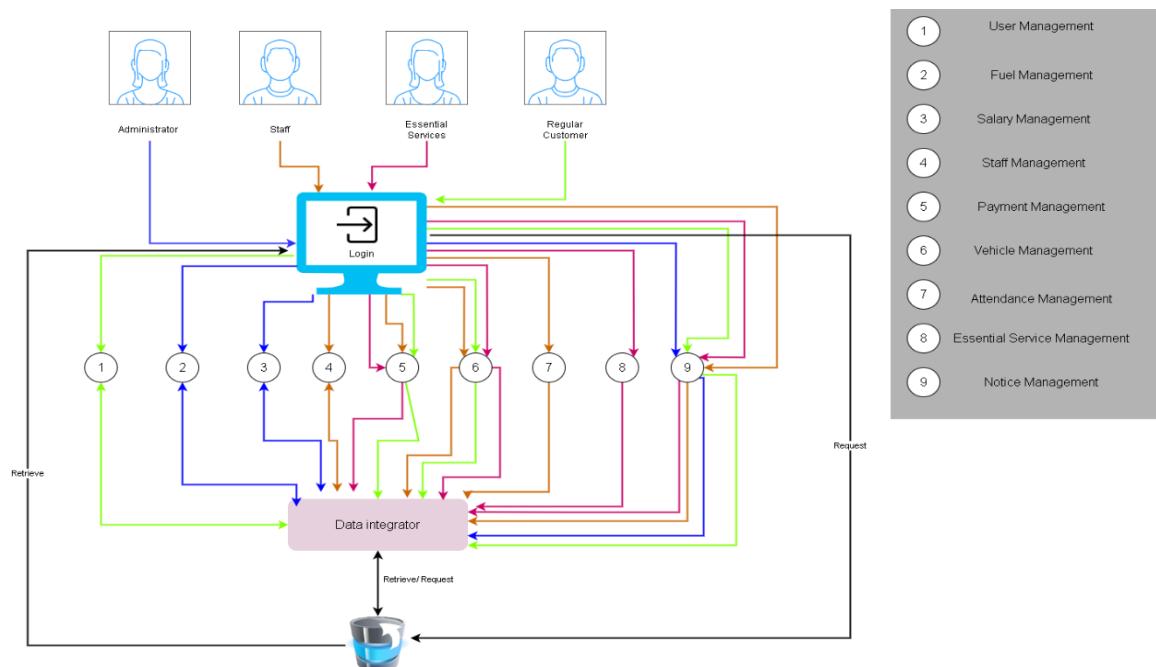


Figure 0-1 – System overview diagram

### 1.5.2 Individual Scope

	<b>Name with Initials</b>	<b>Brief Description of the Function</b>
1.	Yusri M.A.M	<p><b>User management</b></p> <ul style="list-style-type: none"> <li>• User registration.</li> <li>• Send OTP.</li> <li>• Login.</li> <li>• Search fuel distributing places.</li> <li>• View time and dates.</li> <li>• Update/delete profile details.</li> <li>• Report – Monthly report (frequently searched locations)</li> </ul>
2.	Sameer M.M	<p><b>Salary Management</b></p> <ul style="list-style-type: none"> <li>• Create salary slip.</li> <li>• Search staff attendance details.</li> <li>• Update/delete records.</li> <li>• Report – Monthly report (Average, Maximum. salary, Minimum Salary).</li> </ul>
3.	Aadhil M.M	<p><b>Fuel Management</b></p> <ul style="list-style-type: none"> <li>• Create fuel type record.</li> <li>• Search fuel type.</li> <li>• View fuel stock.</li> <li>• Record fuel refill date.</li> <li>• Stock management (update/delete).</li> <li>• Report – Monthly report (Fuel distributed amount).</li> </ul>
4.	Sangkavi S.V.	<p><b>Staff Management</b></p> <ul style="list-style-type: none"> <li>• Staff registration.</li> <li>• Send email (username, password)</li> <li>• Update/delete staff details.</li> <li>• Search staffs.</li> <li>• Report – Monthly report (number of permanent staffs, contract basis staffs).</li> </ul>
5.	Rahul.J	<p><b>Attendance management</b></p> <ul style="list-style-type: none"> <li>• Create Attendance slip.</li> <li>• search staff details.</li> <li>• retrieving working hours/OT.</li> <li>• Record in time, out time.</li> <li>• update/delete Attendance slip.</li> <li>• Report – Monthly report (Total OT, Total Days Worked, Total leave taken).</li> </ul>

6.	Zamly M.Z.M	<p><b><u>Payment Management</u></b></p> <ul style="list-style-type: none"> <li>• Create payment receipt.</li> <li>• Search pid</li> <li>• Edit / delete payment details.</li> <li>• Report – Monthly report (Monthly revenue)</li> </ul>
7.	Fahmi M.F.A.	<p><b><u>Vehicle management</u></b></p> <ul style="list-style-type: none"> <li>• Vehicle registration.</li> <li>• View vehicle details.</li> <li>• Delete/Update vehicle details.</li> <li>• Search vehicles.</li> <li>• Generate QR code.</li> <li>• Report – Monthly report (Average fuel consumption of a user).</li> </ul>
8.	Wijesundara W.M.R.L	<p><b><u>Essential service Management</u></b></p> <ul style="list-style-type: none"> <li>• Company Registration</li> <li>• Retrieve details</li> <li>• Edit/delete details</li> <li>• Search fuel distributing places and time</li> <li>• Report – Monthly purchased report (frequently searched locations)</li> </ul>
9.	Navaratne U.D.K	<p><b><u>Notice Management</u></b></p> <ul style="list-style-type: none"> <li>• Create notices.</li> <li>• Search notices.</li> <li>• Retrieve staff/user notices.</li> <li>• Edit/delete notices.</li> <li>• Report – Monthly report (frequently viewed notices).</li> </ul>

*Table 1 – Individual scope*

## 1.5 Methodology

### SE related method

#### Requirements Gathering

- Gathering the requirements of the system.
- Drawing ER Diagram.

#### Software Design

#### Software Development

- Agile development methodology

#### Test and Integration

#### Deployment

### Tools

- GitHub
- MySQL workbench
- Trello

### Technologies

- Java servlet API
- Java JSP
- JDBC

## 1.7 Project Report Structure

The rest of the report is created to explain the software development lifecycle of Fuel Supply Management System which is developed by our team by finding a real-world problem. Initially the relevant stakeholder of the system is analysed using an onion diagram along with the RE for each function. In this part requirements are identified for each function and the CRUD operations relating to each function is listed down. The use case diagram is included in order to clarify each function along with the EER diagram explaining each entity involved in the system. Later, the report explains, each function with the help of activity diagrams and sequence diagrams.

The testing of the system is explained after that with each test inputs along with graphical representations of the result. The final chapter under this report explains the technologies, implementations and languages used to produce the final product

## 1.8 Final project link (Github)

[https://github.com/SLIITITP/kandy-kdy\\_2022\\_wd\\_g2.git](https://github.com/SLIITITP/kandy-kdy_2022_wd_g2.git)

## 2 Requirements

### 2.1 Stakeholder analysis

#### Stakeholders for the system

- System admin
- Users
- Gas station manager
- Regular staffs
- Payment manager
- Essential service manager

#### Onion Diagram

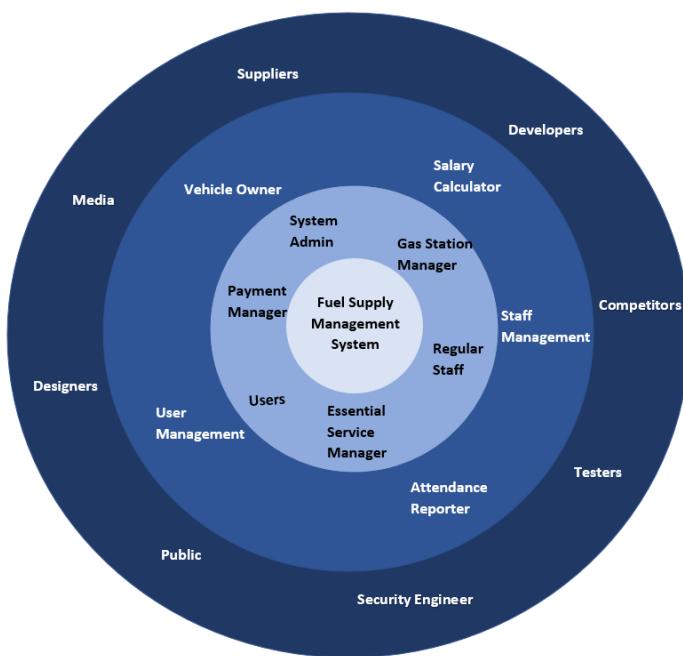


Figure 2-1 – Onion diagram

### 2.2 Requirement analysis

#### 2.2.1 User Management

##### User

##### **Functional Requirements (CRUD operations)**

- **Create:** By entering user details (Name, Address, Phone Number, NIC, password, OTP). The user can register to the system.
- **Retrieve:** User can retrieve user details.
- **Update:** Details of the registered user can be updated.
- **Delete:** User account can be deleted.
- Admin can generate reports for frequently searched locations.

## **Non-Functional Requirements**

- Security
- Availability
- Performance
- Usability
- Manageability

## **Technical Requirements**

- Access control
- Information security
- Data quality
- Human error

### **2.2.2 Salary Management**

#### **Admin**

##### **Functional Requirements (CRUD operations)**

- Create: By entering the required salary slip details (date, deduction amount, reason for deduction)
- Retrieve: Admin can information from staff database and attendance database
- Update: Admin can update the date, deduction amount and the reason for the deduction.
- Delete: Admin can delete a salary slip if there's an issue with the amount of salary transferred.
- Admin can search salary details by entering salary ID.
- Admin can generate a monthly report to show the average, total salary.

## **Non-Functional Requirements**

- Capacity Requirement
- Availability Requirement
- Data integrity Requirement
- Usability Requirements
- Performance

## **Technical Requirements**

- Privacy
- Productivity
- Access Control
- Data quality
- Information security

## 2.2.3 Fuel Management

### Admin

#### **Functional Requirements (CRUD operations)**

- **Create:** By entering ( gas station ID /new Fuel type) admin can add new gas station and fuel type for the system.
- **Retrieve:** Admin can view New gas stations , fuel type , fuel refilled amount , stock details from the database.
- **Update:** Admin can update the Fuel stock details.
- **Delete:** When the admin included the wrong Fuel Records he can remove it from the DB.
- Admin can Generate Monthly fuel records and the fuel price up/down ranges.

#### **Non-Functional Requirements**

- Capacity Requirement
- Availability Requirement
- Data integrity Requirement
- Usability Requirements
- Performance

#### **Technical Requirements**

- Privacy
- Productivity
- Access Control
- Data quality
- Information security

## 2.2.4 Staff Management

### Admin

#### **Functional Requirements (CRUD operations)**

- **Create :** By entering staff details (first name, last name, dob, address, email, joined year, staff type, contract years) admin can register new staffs for the system.
- **Retrieve :** Admin can retrieve information about staffs from the database.
- **Update :** Details of the registered staff can be updated by the admin.
- **Delete:** When a person is no more a staff, admin can remove or delete that particular staff from the system.
- Admin can search staffs by entering staff IDs.
- Admin can generate reports for permanent staffs and contract basis staffs.

#### **Non-Functional Requirements**

- Security
- Availability
- Performance

- Usability
- Manageability

## **Technical Requirements**

- Access control
- Information security
- Data quality
- Human error

### **2.2.5 Attendance Management**

#### **Direct System Users**

- Staff

#### **Functional Requirement:**

- **Create** – Create attendance slip for each employee.
- **Delete**- Delete attendance slip.
- **Update**- Update attendance slip.
- **Read**-Retrieve attendance date and read the data which are inserted.

#### **Non - Functional Requirement:**

- Maintainability
- Security
- Reliability

#### **Technical Requirement:**

- Productivity
- Data Quality
- Serviceability

### **2.2.6 Payment Management**

#### **Admin**

#### **Functional Requirements (CRUD operations)**

- **Create**: By entering (Vehicle Number) admin can view vehicle Details and Remaining Fuel details.
- **Retrieve**: Admin can view the entire Vehicle and their payment Details in the System.
- **Update**: Admin can update the Fuel amount and recalculate the payment.
- **Delete**: When the admin Enter the wrong Records he can press Delete to remove it from The DB.
- Admin can Generate Monthly Payment records of the all vehicles.

## **Functional Requirements**

- Portability
- Usability
- Maintainability
- Availability

## **Non-Functional Requirements**

- Security and Integrity
- Reliability
- Performance
- Usability
- Scalability

## **Technical Requirements**

- Privacy
- Information security
- Authentication
- Integrity

### **2.2.7 Vehicle Management**

#### **User**

##### **Functional Requirements.**

- **Create** – User can register his/her vehicle to the system.
- **Retrieve** – User can see his/her vehicle details.
- **Update** – User can edit his/her vehicle details.
- **Delete** – User can delete his/her vehicle details.
- User can be able to make a renew request.
- User can be able to generate QR-Code.
- Admin can generate monthly report for average fuel consumption of each user

##### **Non-Functional Requirements.**

- Our system will respond to user immediately as much as possible.
- User can be able to navigate our system easily.

##### **Technical Requirements.**

- Our system load time is less than 5 seconds.
- Availability of our system is 24/7
- Uptime of our system is 99%.

## 2.2.8 Essential Service Management

### Essential Service Manager

#### **Functional Requirements (CRUD operations)**

- **Create** : By entering company details (company name, manager/director first name, manager/director last name, company address, service type, fuel type, fuel limit, phone number and a letter from the municipal council ) manager can register their company into the system.
- **Retrieve** : Manager can view the company profile. retrieve information about their fuel quota.
- **Update** : Manager can update the company details and update the fuel limit they want.
- **Delete** : When manager wants to remove the company profile from the system they can delete the company details by clicking the delete profile option.
- Admin can generate reports for frequently viewed gas stations/locations by the company users.

#### **Non-Functional Requirements**

- Security
- Reliability
- Availability
- Performance
- Usability
- Manageability
- speed

#### **Technical Requirements**

- Access control
- Information security
- Data quality
- Web base application

## 2.2.9 Notice Management

### User

#### **Functional Requirements**

1. A user can View their Normal Notices through the Notice List [*Read*]
2. A user can View Priority Notices through a special window [*Read*]
3. A user can search notices in there notice List [*Read*]

#### **Non-functional Requirement**

1. The special Window to indicate Priority Notices satisfies usability Requirements
2. The Special Window is indicated in the user profile which satisfy Performance Speed
3. The notices can only be accessed by properly logged in user which satisfies Security Requirements

## **Technical Requirements**

1. 1.Data quality
2. 2.Access Control
3. 3.Performance Speed

## **Staff**

### **Function Requirements**

1. A Staff can View their Normal Notices through the Notice List [*Read*]
2. A Staff can View Priority Notices through a special window[*Read*]
3. A Staff can search notices in there notice List [*Read*]

### **Non-functional Requirement**

1. The special Window to indicate Priority Notices satisfies usability Requirements
2. The Special Window is indicated in the user profile which satisfies Performance Speed
3. The notices can only be accessed by properly logged in user which statisfies Security Requirements

## **Technical Requirements**

1. 1.Data quality
2. 2.Access Control

## **System Admin**

### **Functional Requirements**

1. A System Admin can insert a notice using priority level[*Create*]
1. A system Admin can update a notice as he/she prefers[*Update*]
2. A System Admin can delete a notice as he/she prefers[*Delete*]
3. A System admin can view All the notices posted with that month through the noticeboard[*Read*]
4. A System Admin can Search every notice including overdue notices through a search bar[*Read*]
5. A system Admin can download a monthly report indicating Number of notices within that month and the most accessed notices[*Read*]

### **Non-functional Requirements**

1. The System admin can View overdue notice which would satisfy Usability Requirements
2. The System only shows notices posted within that month which would satisfy Reliability Requirements
3. Creation of the monthly report satisfies User Friendly and Usability Requirements
4. Notices can only be inserted and updated by the admin satisfies security Requirements

## **Technical Requirements**

1. Data integrity
2. Access Control
3. Performance Speed

## 2.3 Requirements Modelling

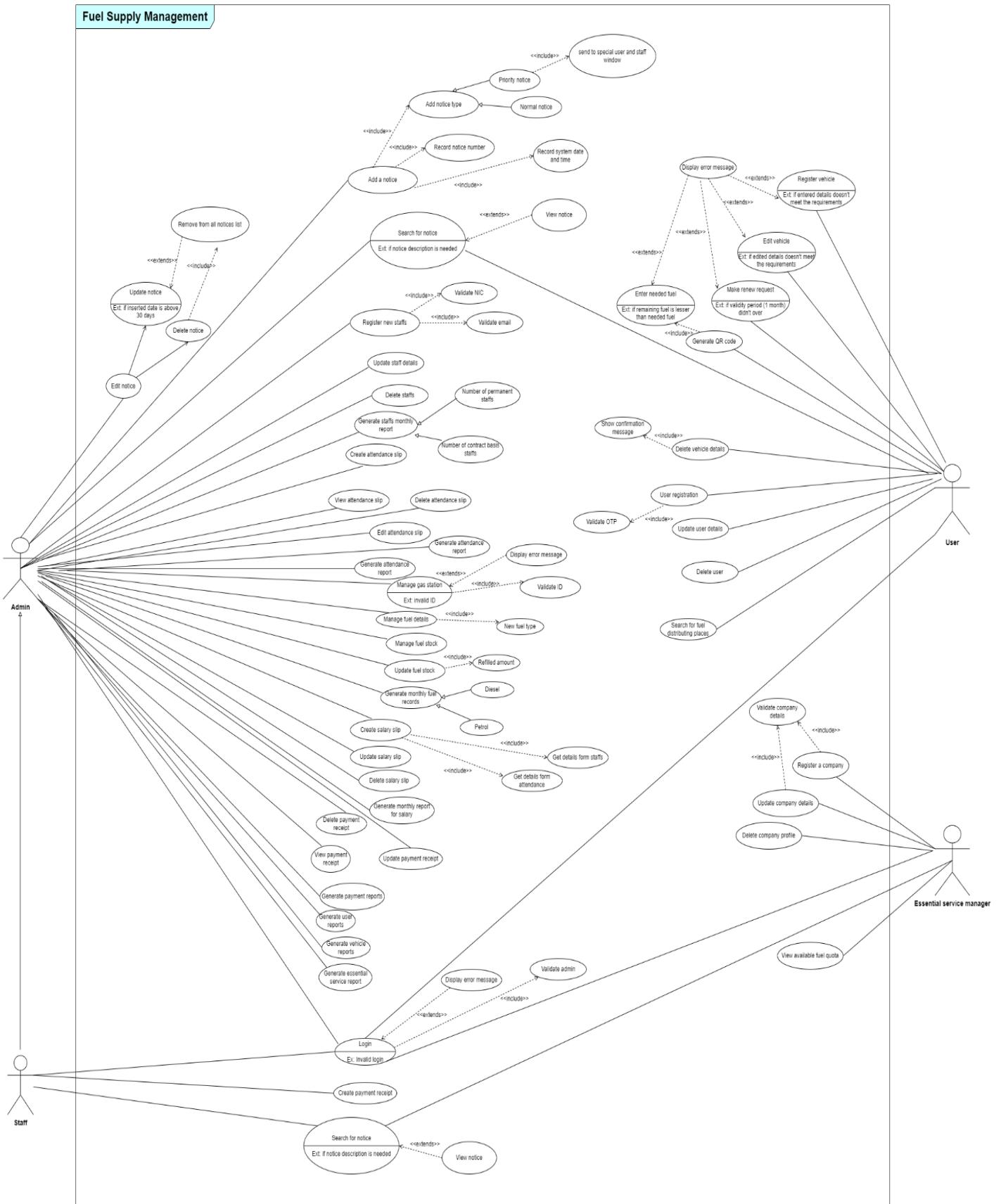


Figure 2-2 – Use case diagram

### 3 Design and Development

#### 3.1 Database Design

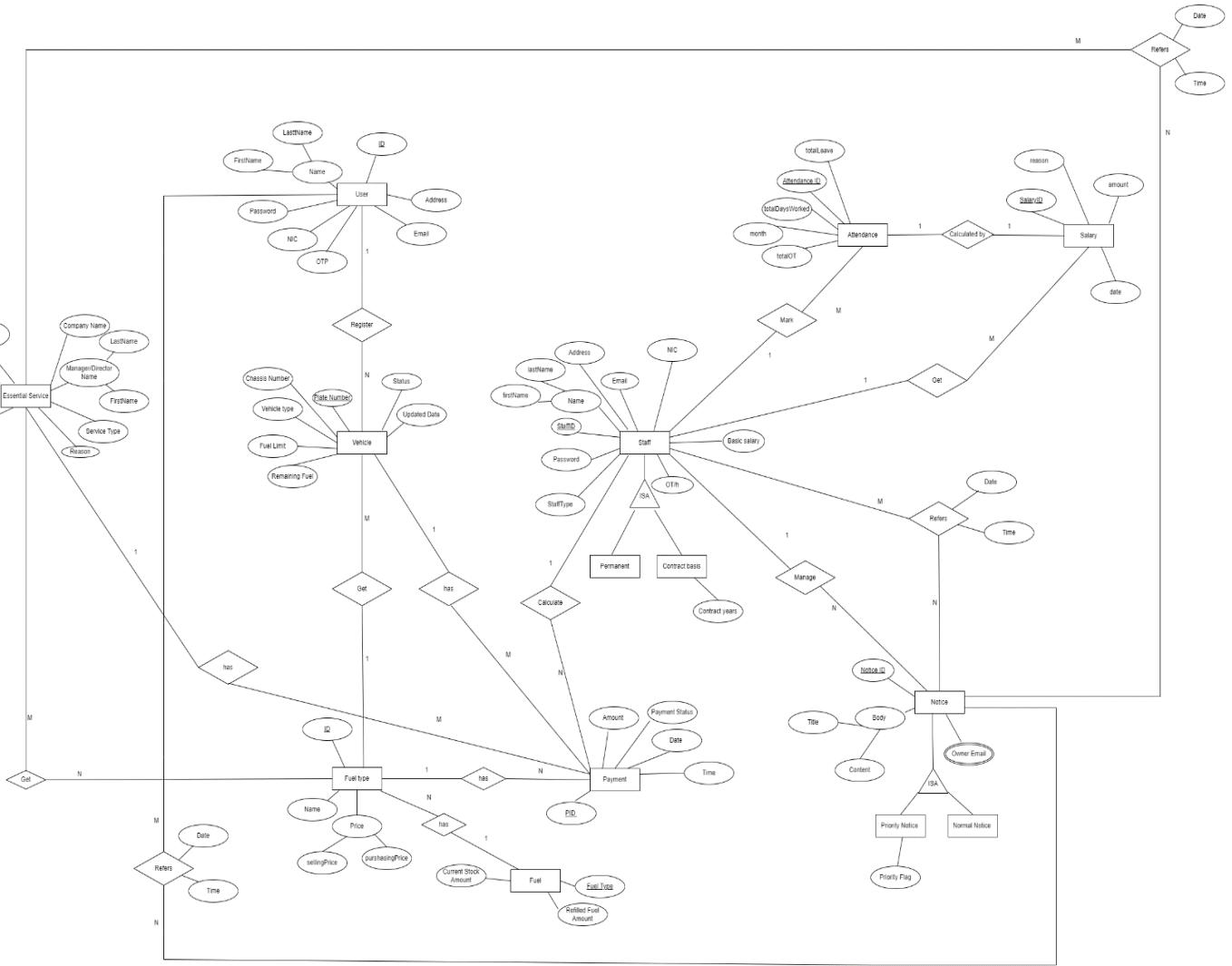


Figure 3-1 – EER diagram

## 3.2 Activity Diagrams and Sequence Diagrams

### 3.2.1 User Management

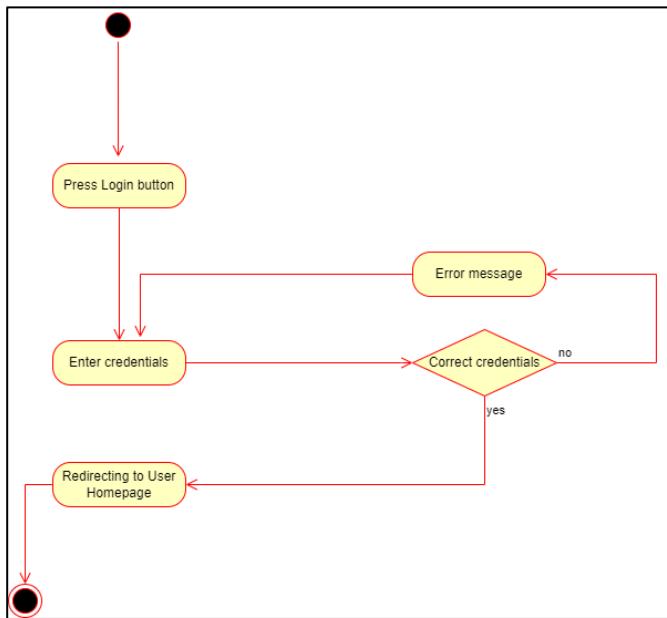


Figure 3-2 – Login activity diagram

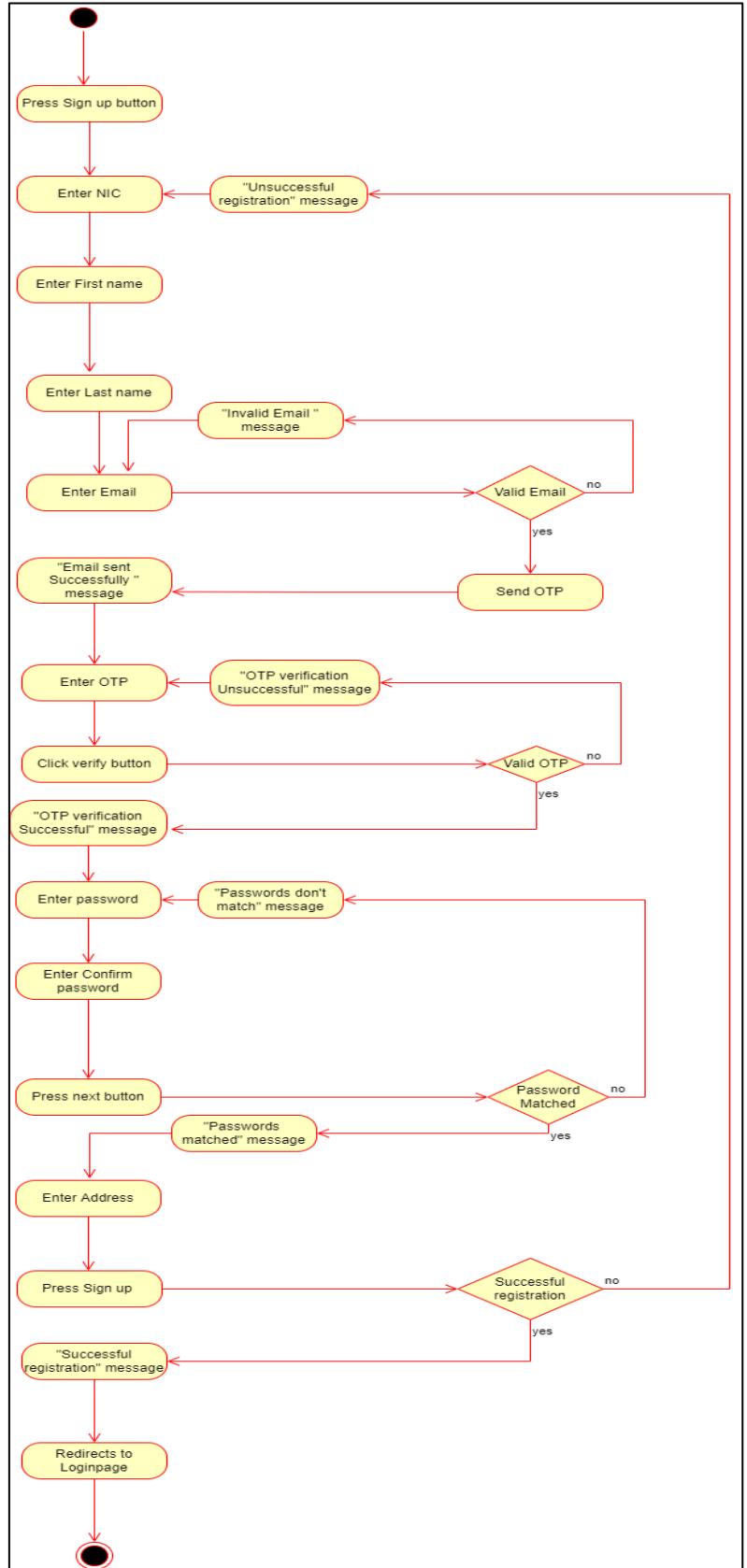


Figure 3-3 - User registration activity diagram

## Login

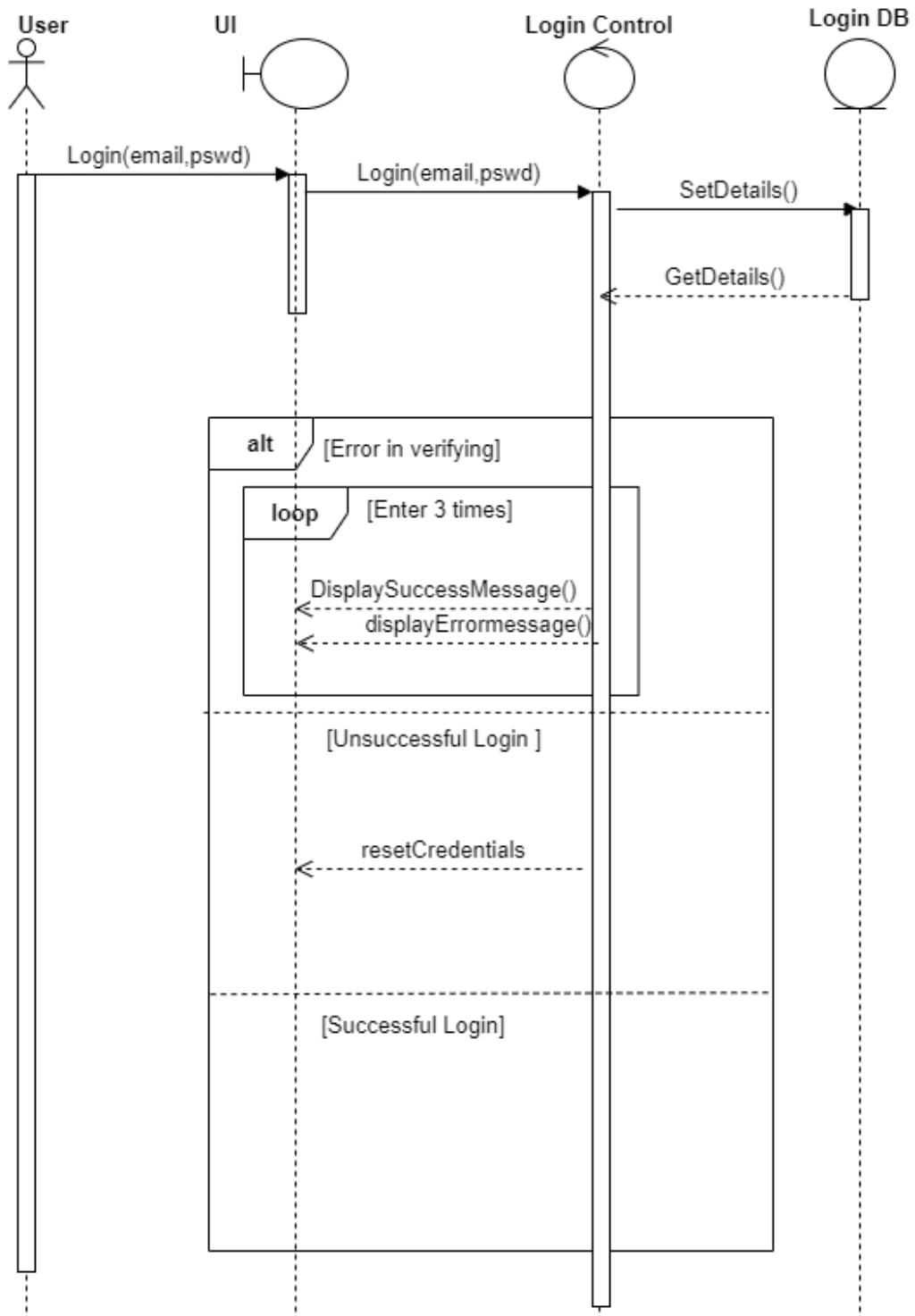


Figure 3-4 - Login sequence diagram

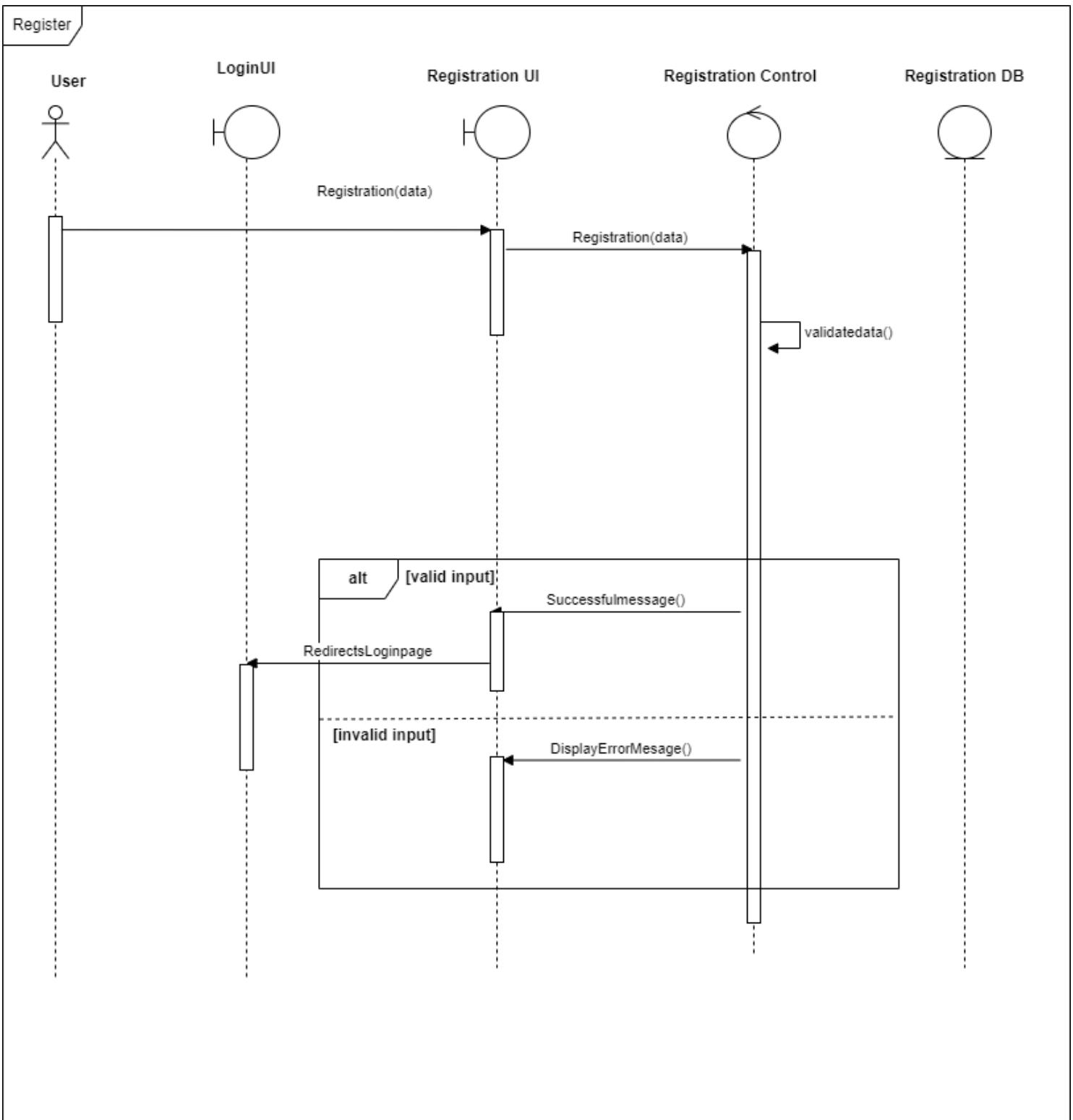


Figure 3-5 - User registration sequence diagram

### 3.2.2 Vehicle Management

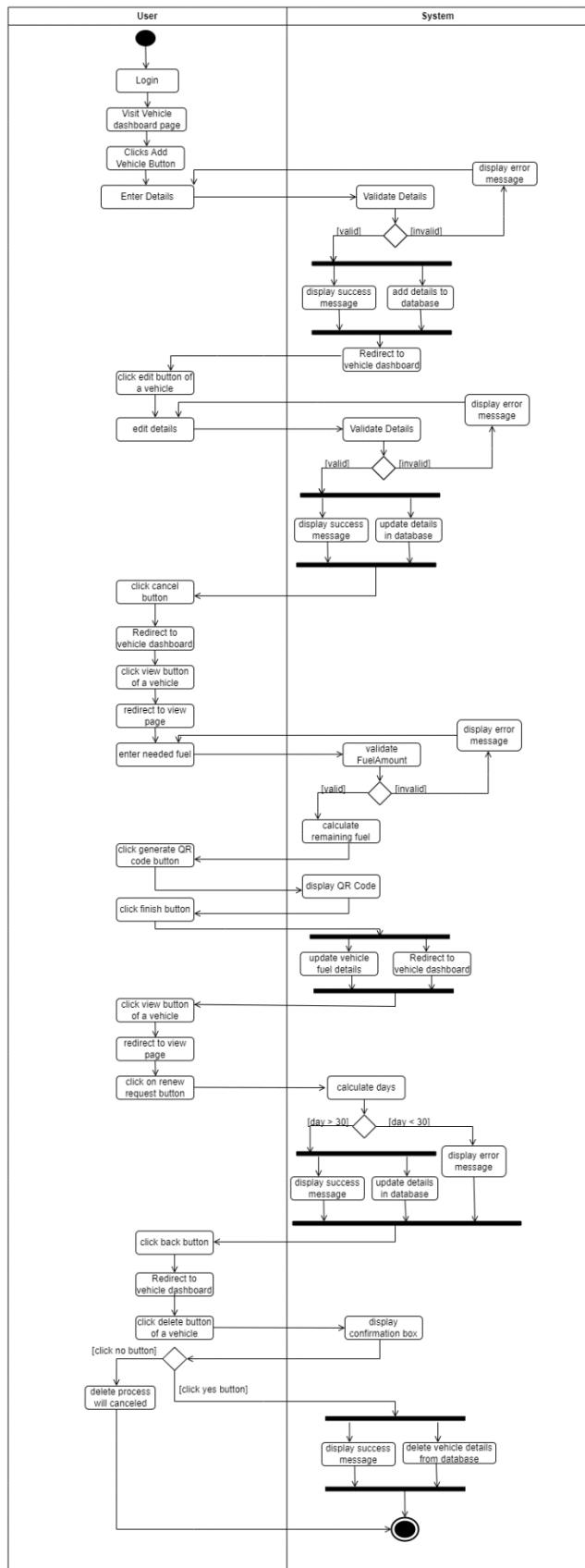


Figure 3-6 - Vehicle management activity diagram

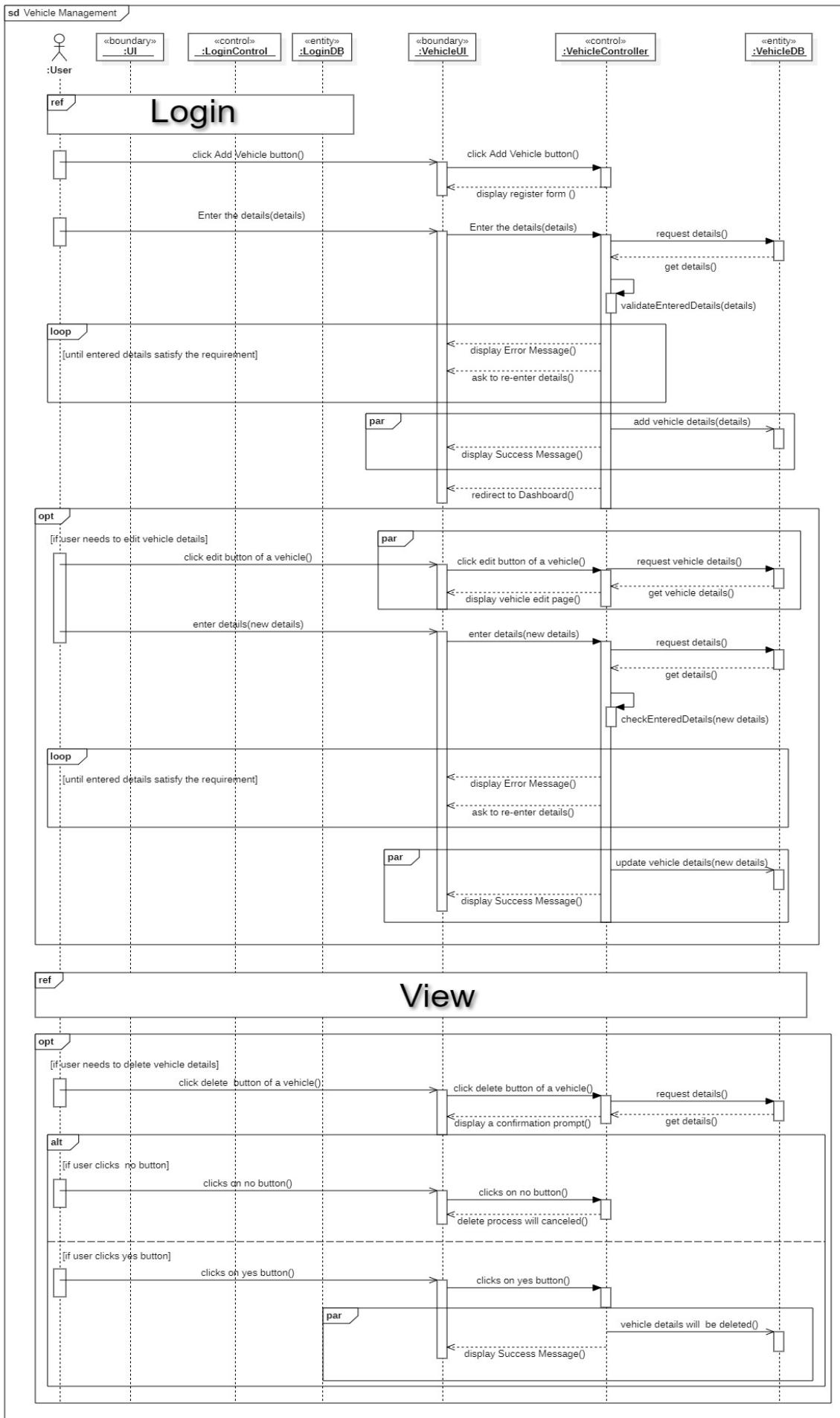


Figure 3-7 - Vehicle management sequence diagram

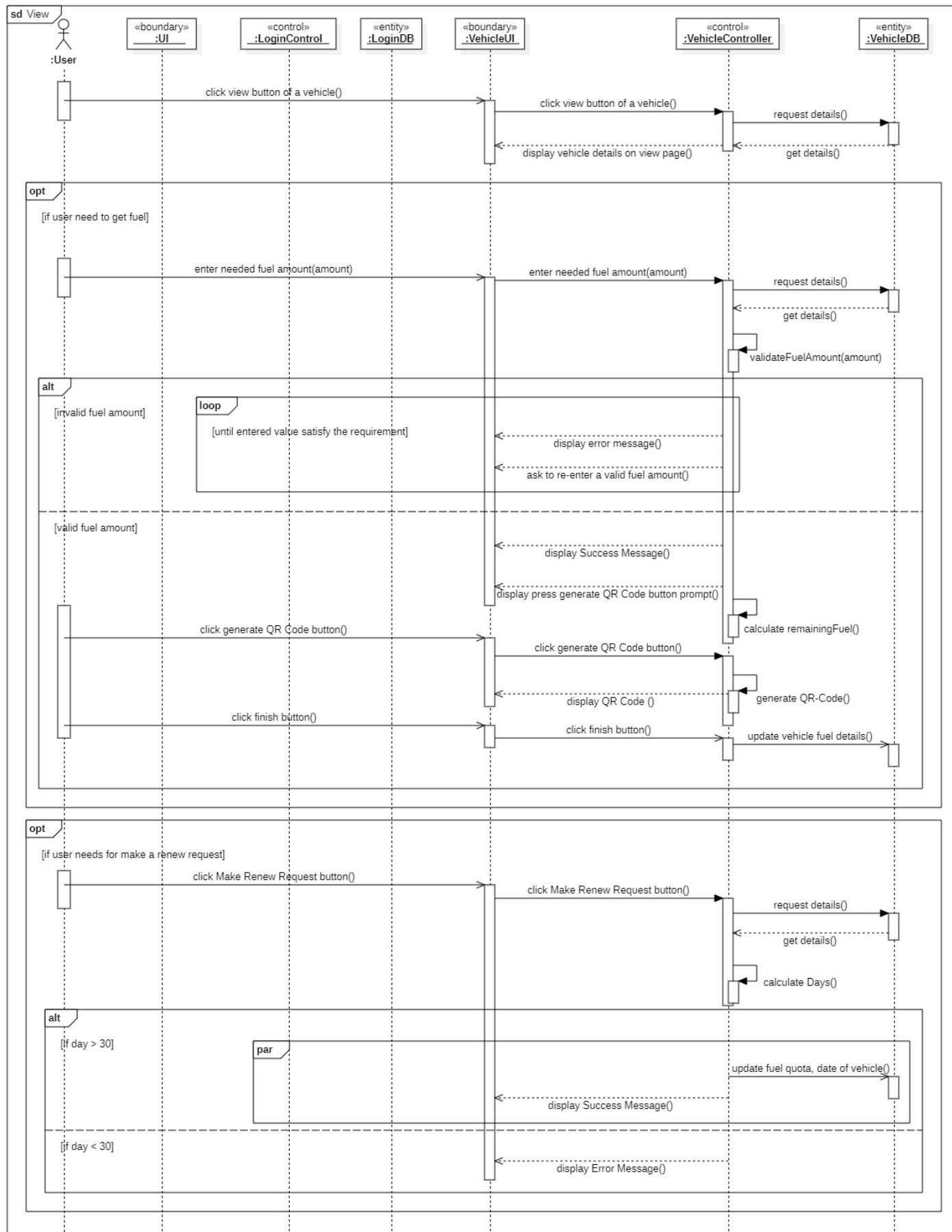


Figure 3-8 - View vehicle management sequence diagram

### 3.2.3 Essential Service Management

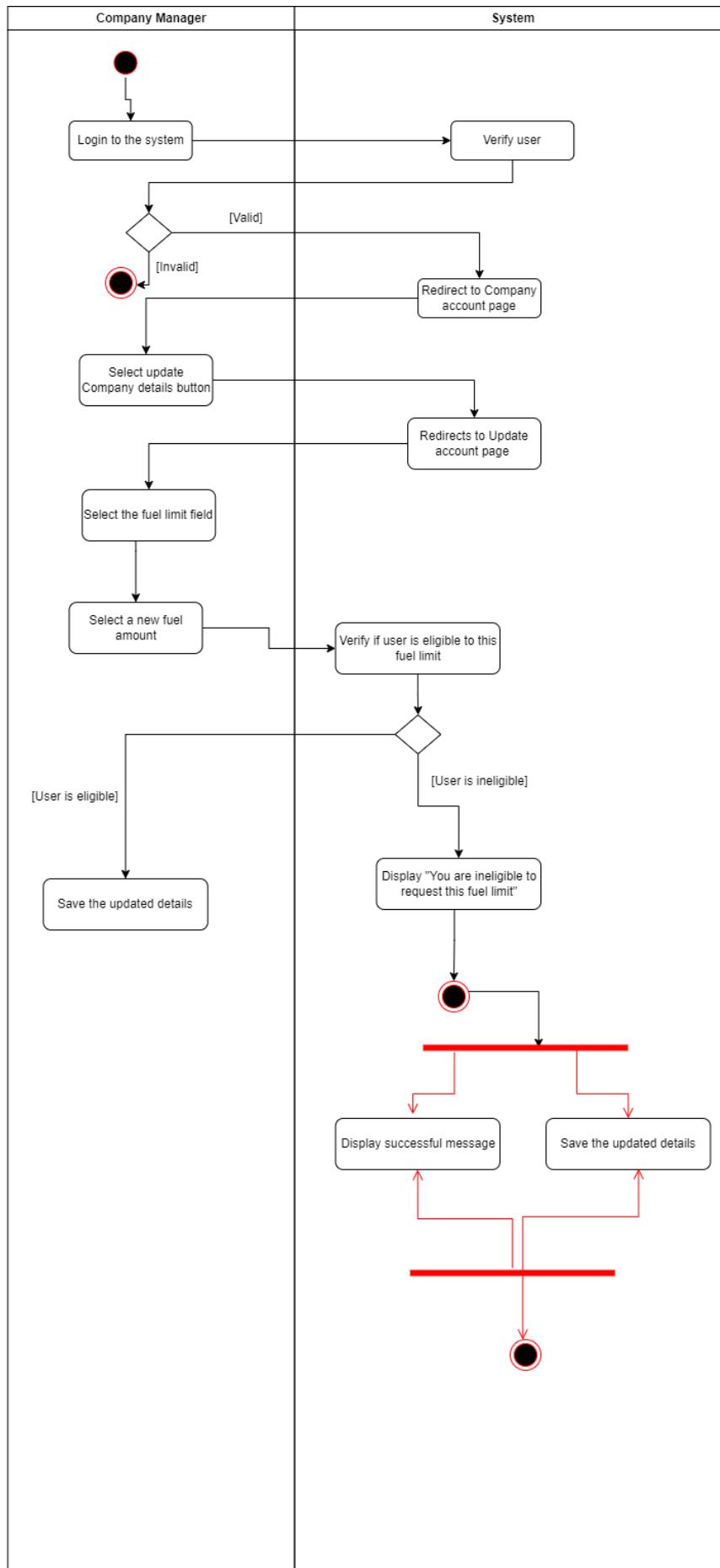


Figure 3-9 - Essential service activity diagram 1

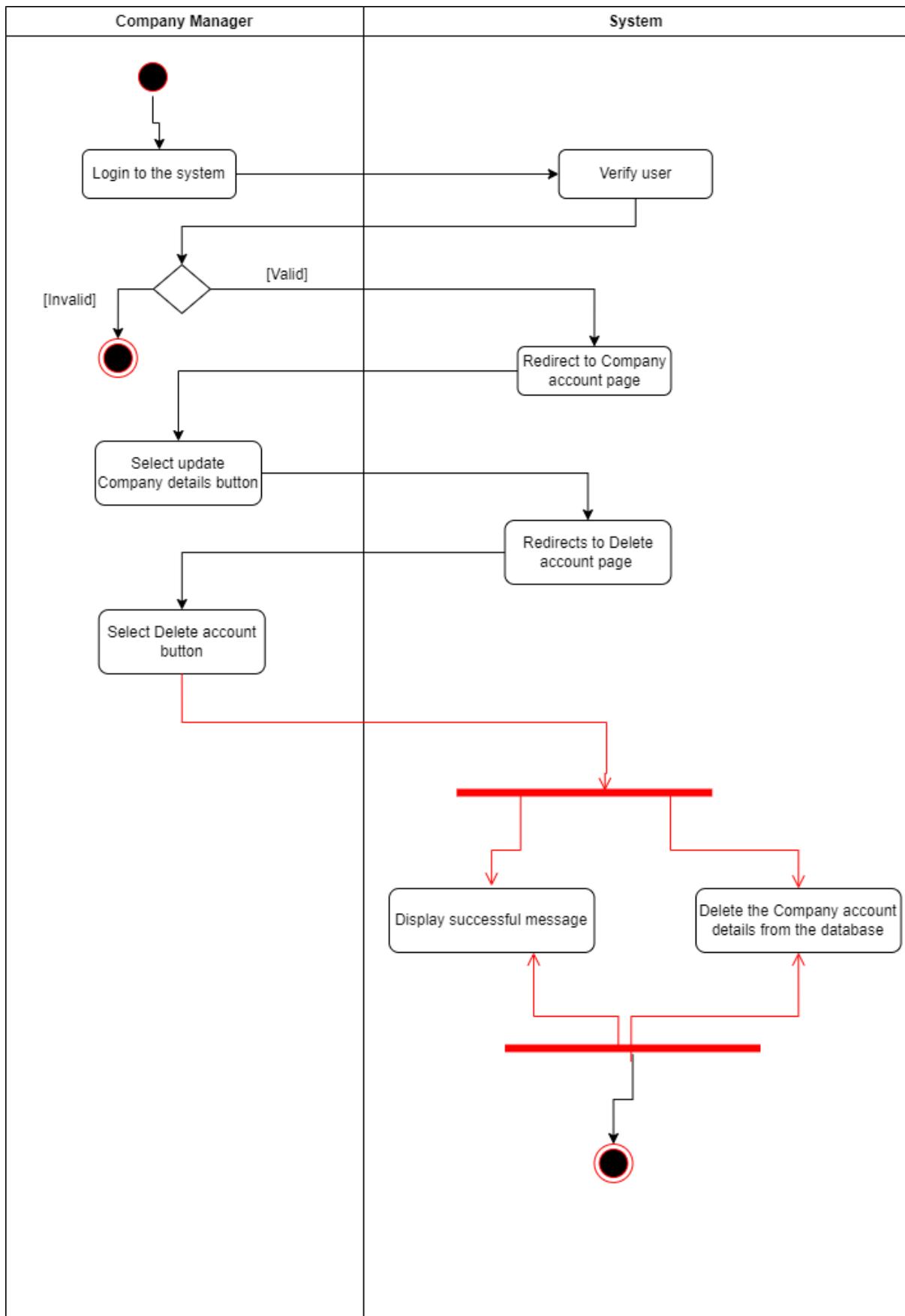


Figure 3-10 - Essential service activity diagram 2

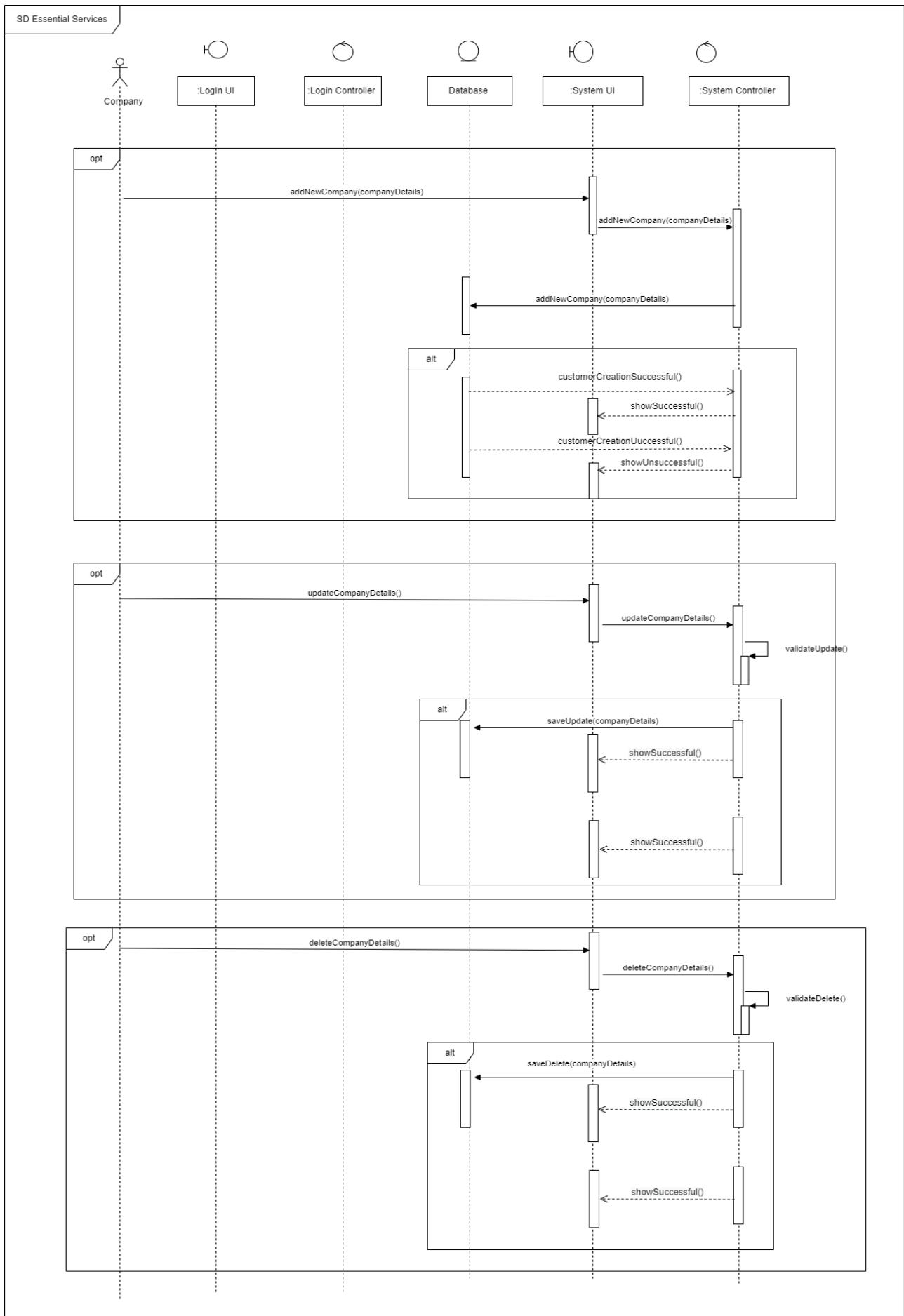


Figure 3-11 - Essential service sequence diagram

### 3.2.4 Staff Management

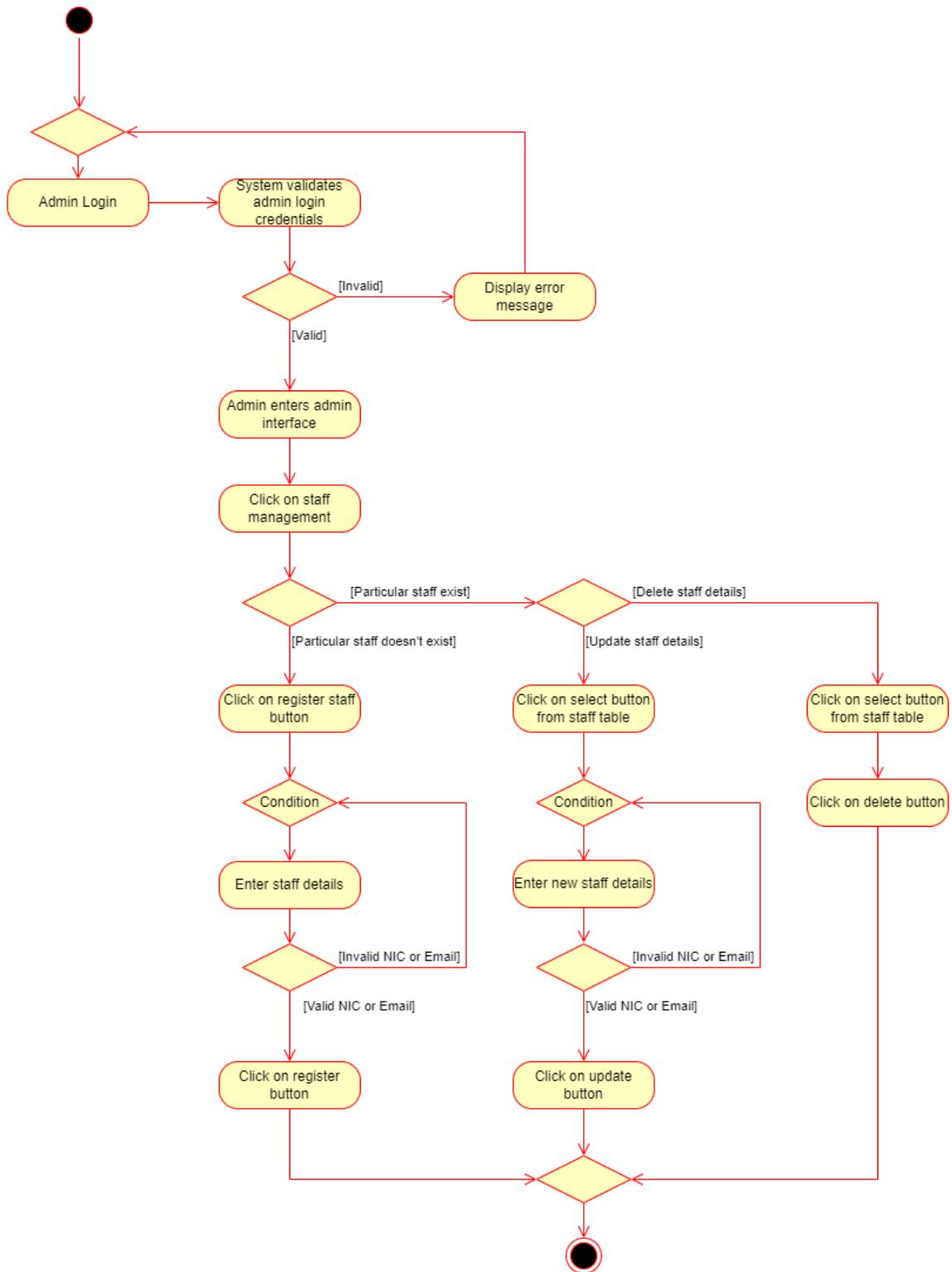


Figure 3-12 - Staff management activity diagram

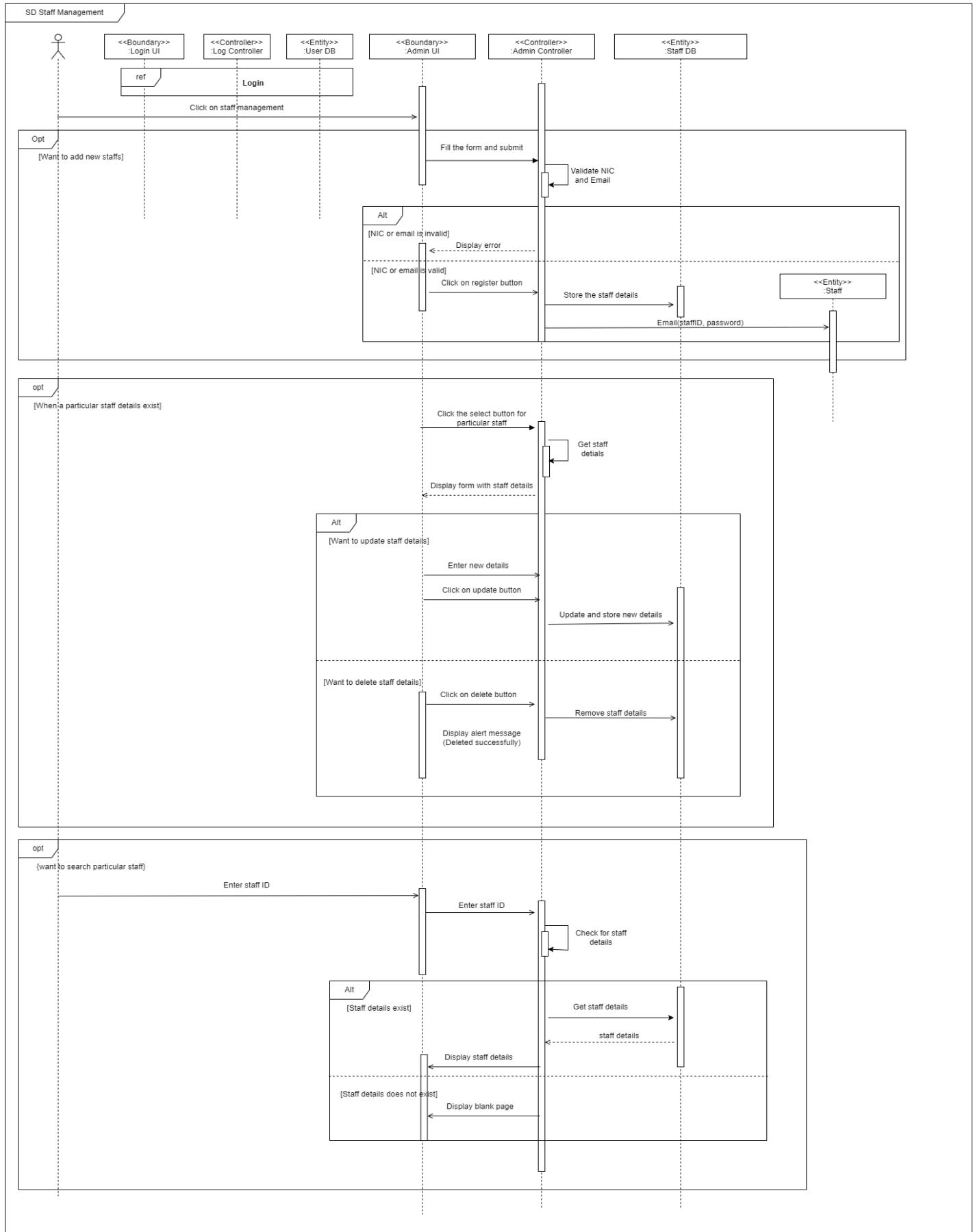


Figure 3-13 - Staff management sequence diagram

### 3.2.5 Notice Management

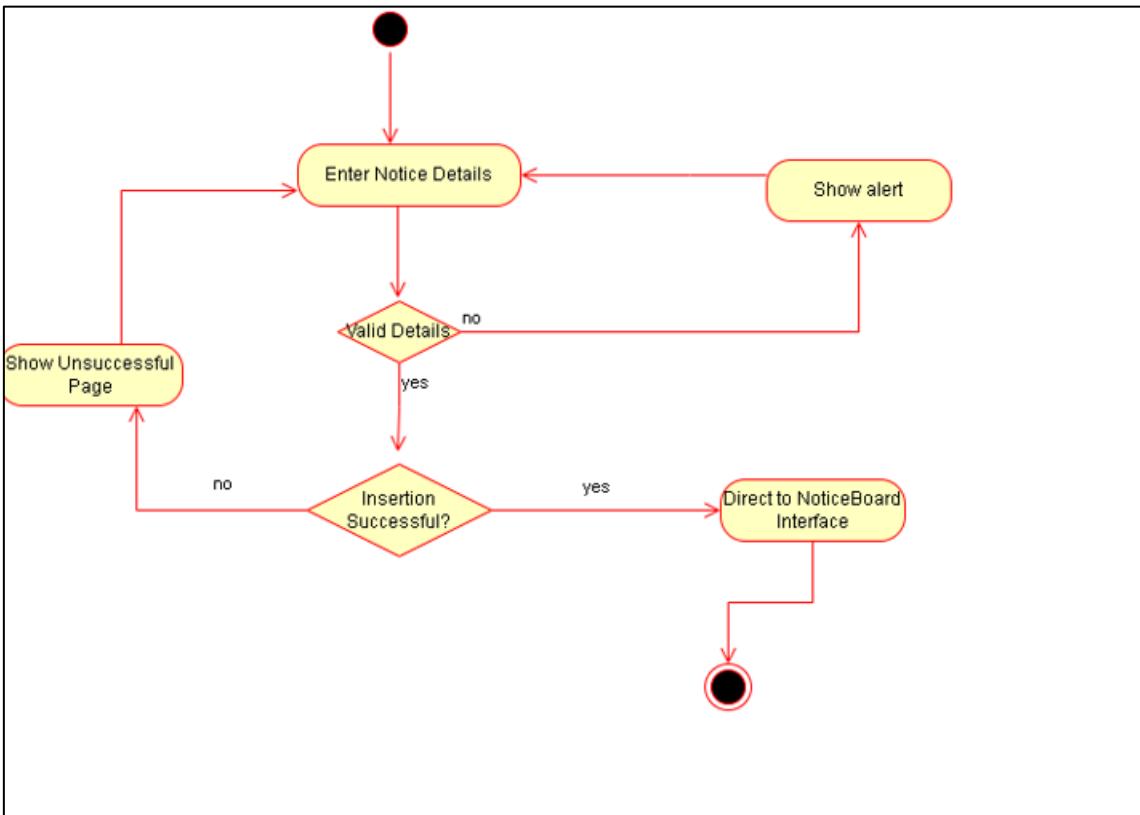


Figure 3-14 - Notice management activity diagram 1

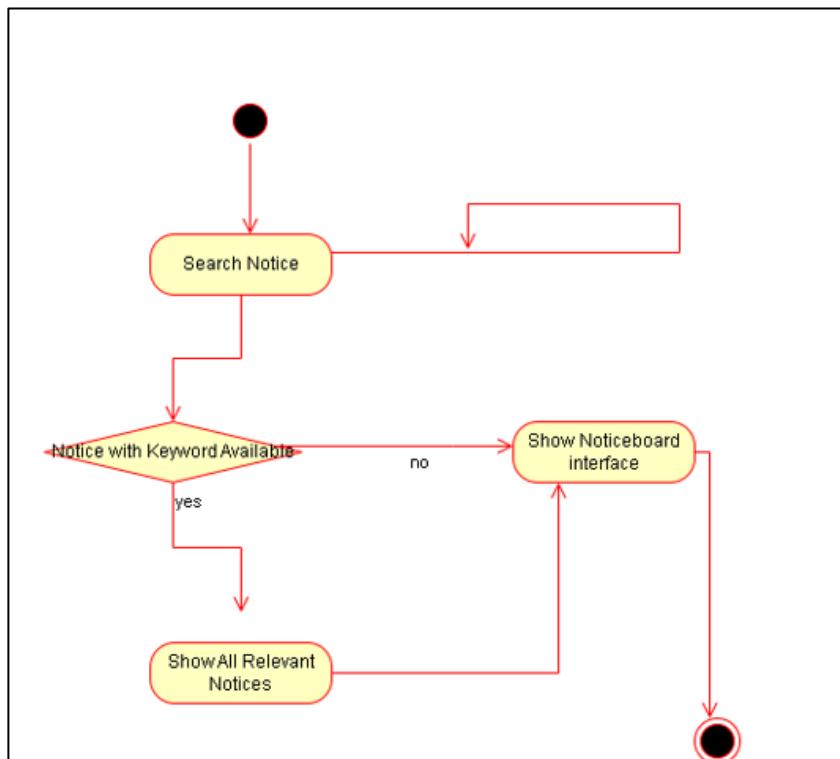


Figure 3-15 - Notice management activity diagram 2

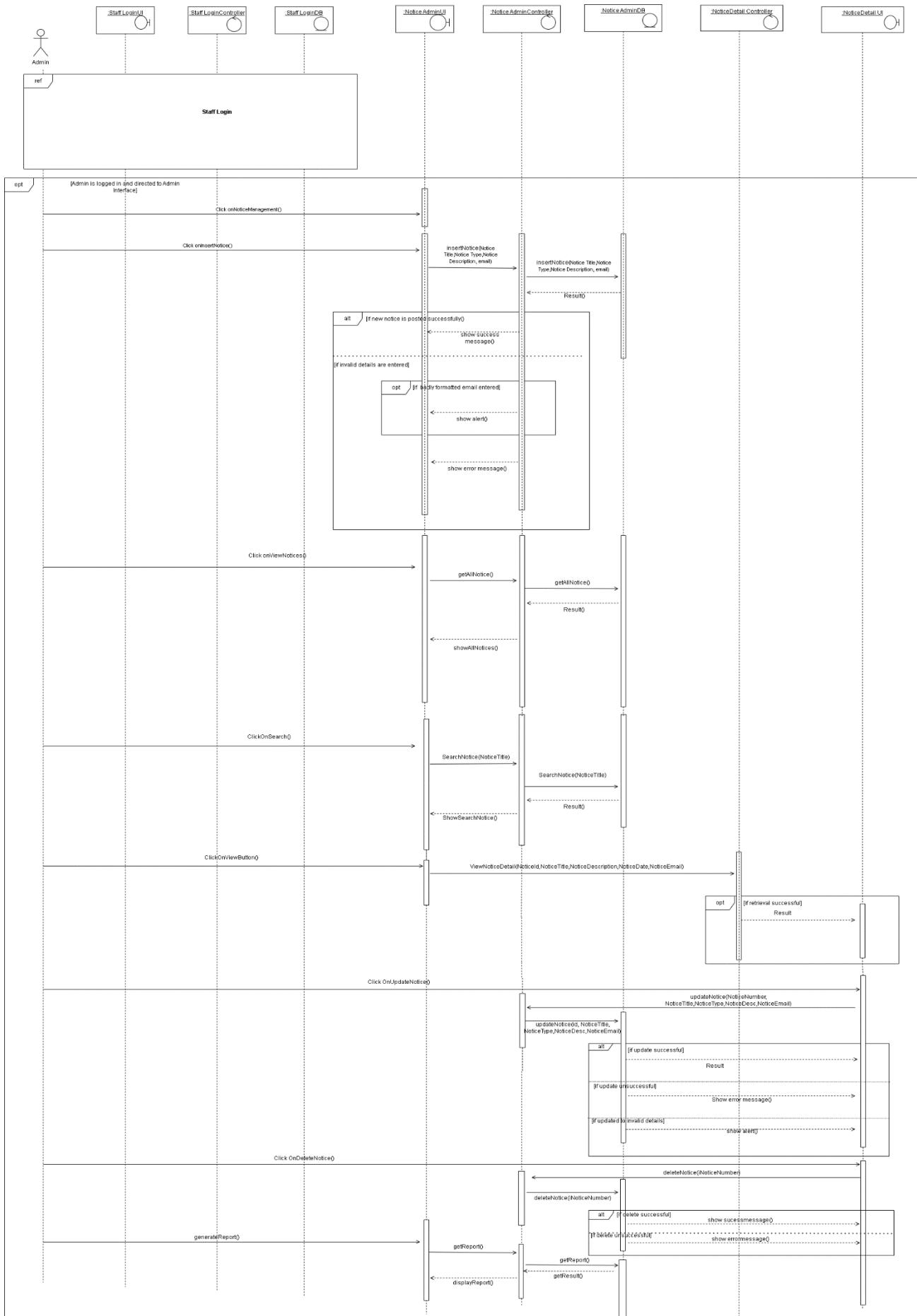
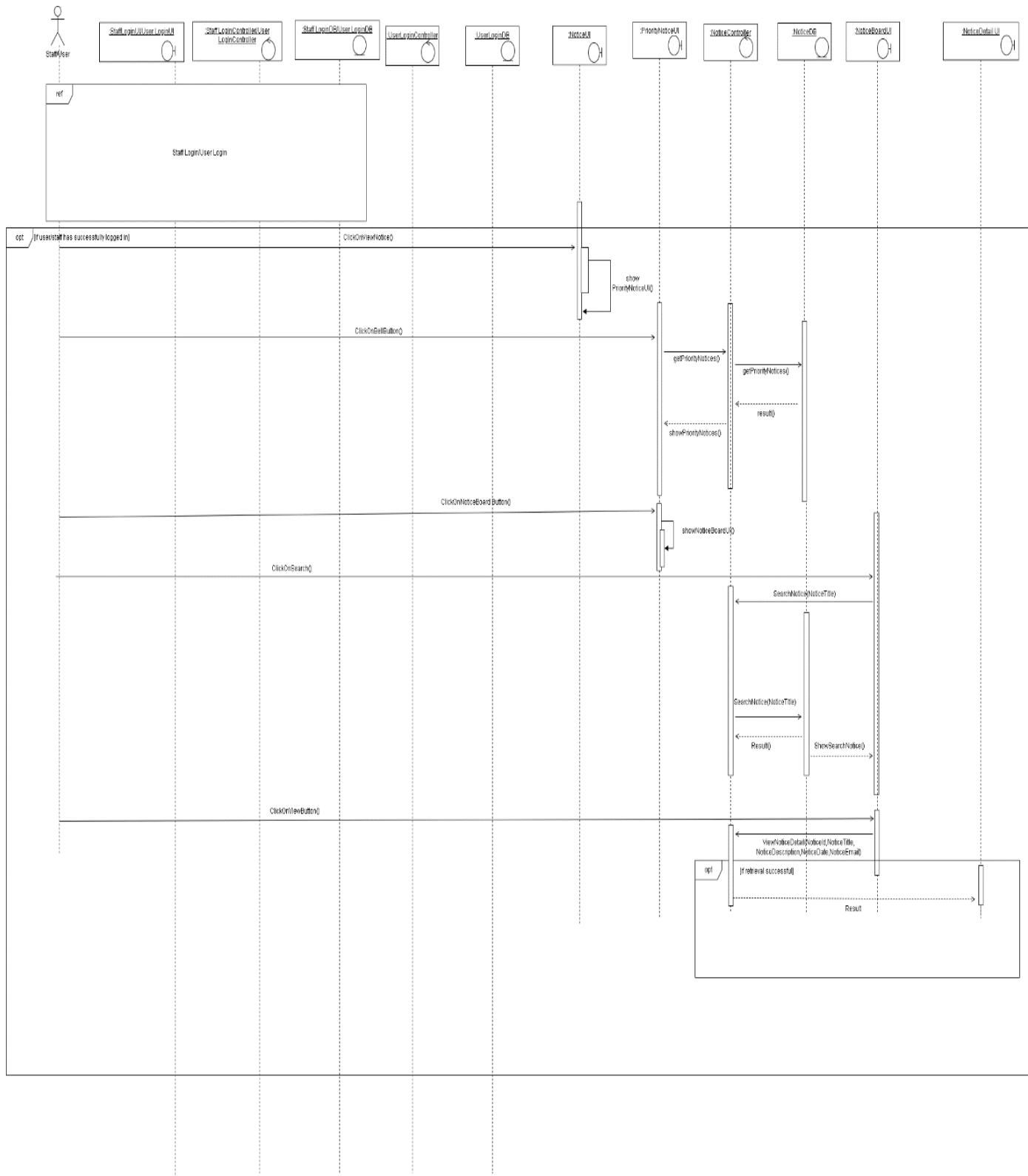


Figure 3-16 - Notice management sequence diagram 1



*Figure 3-17 - Notice management sequence diagram 2*

### 3.2.6 Attendance Management

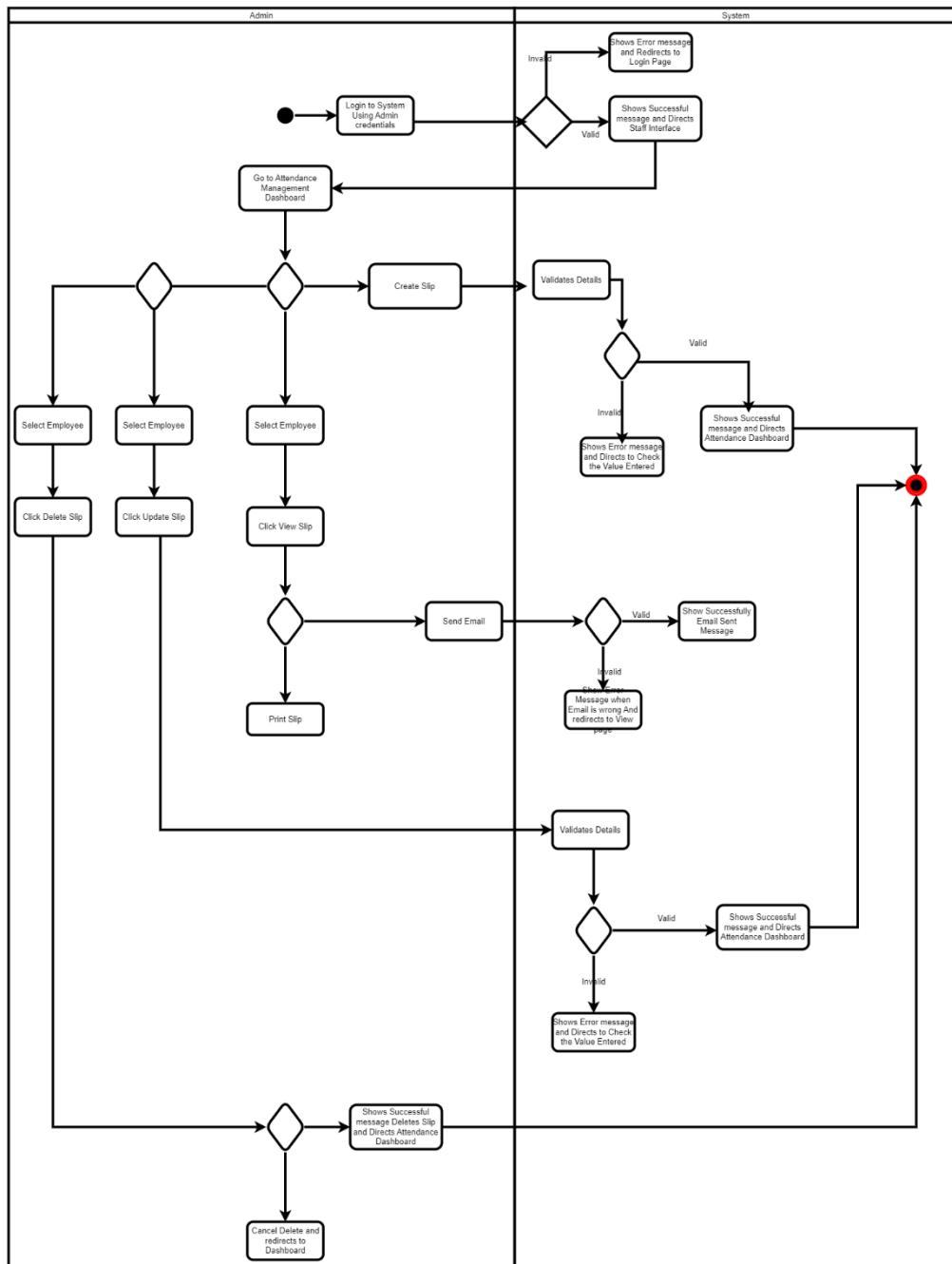


Figure 3-18 - Attendance management activity diagram

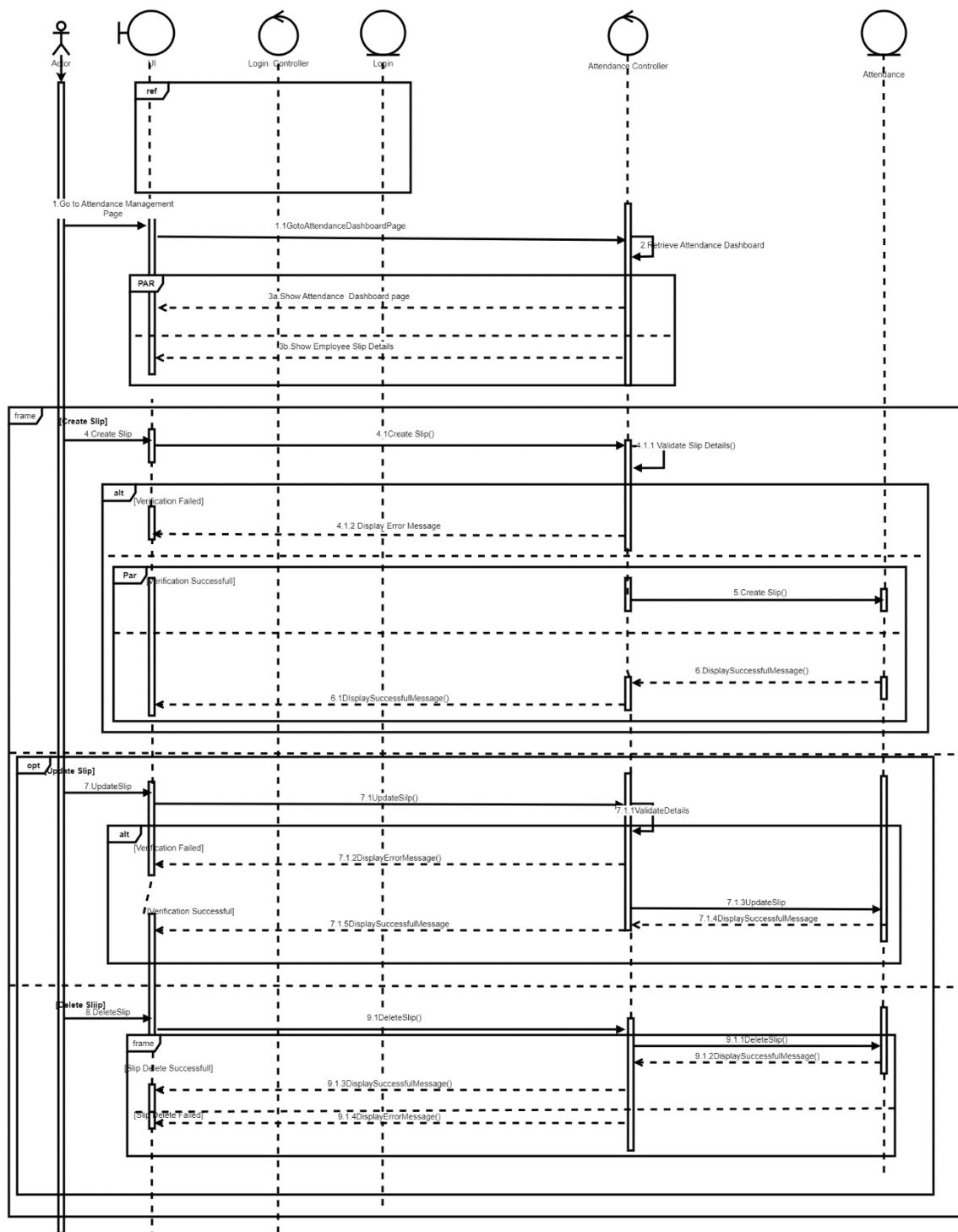


Figure 3-19 - Attendance management sequence diagram

### 3.2.7 Fuel Management

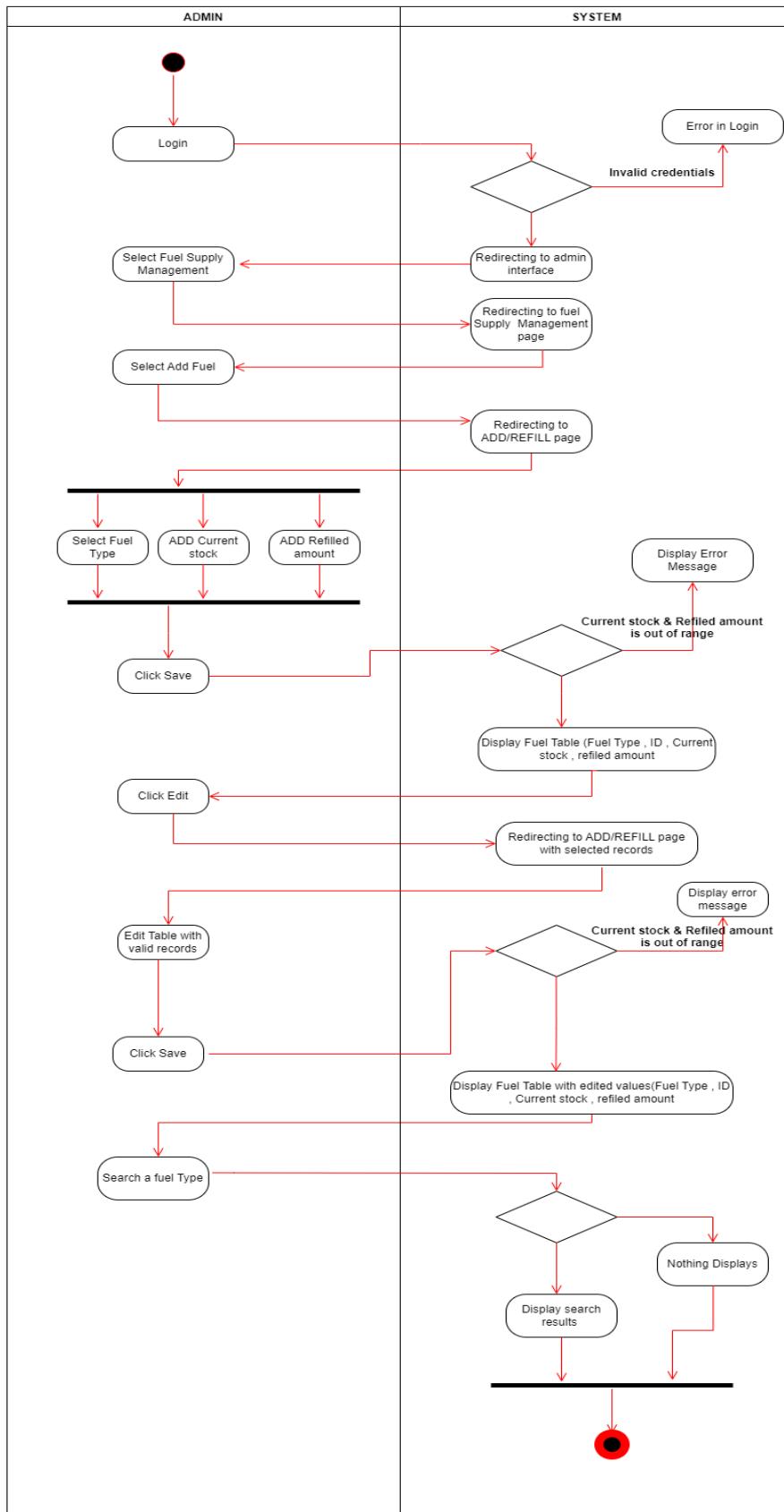


Figure 3-20 - Fuel management activity diagram

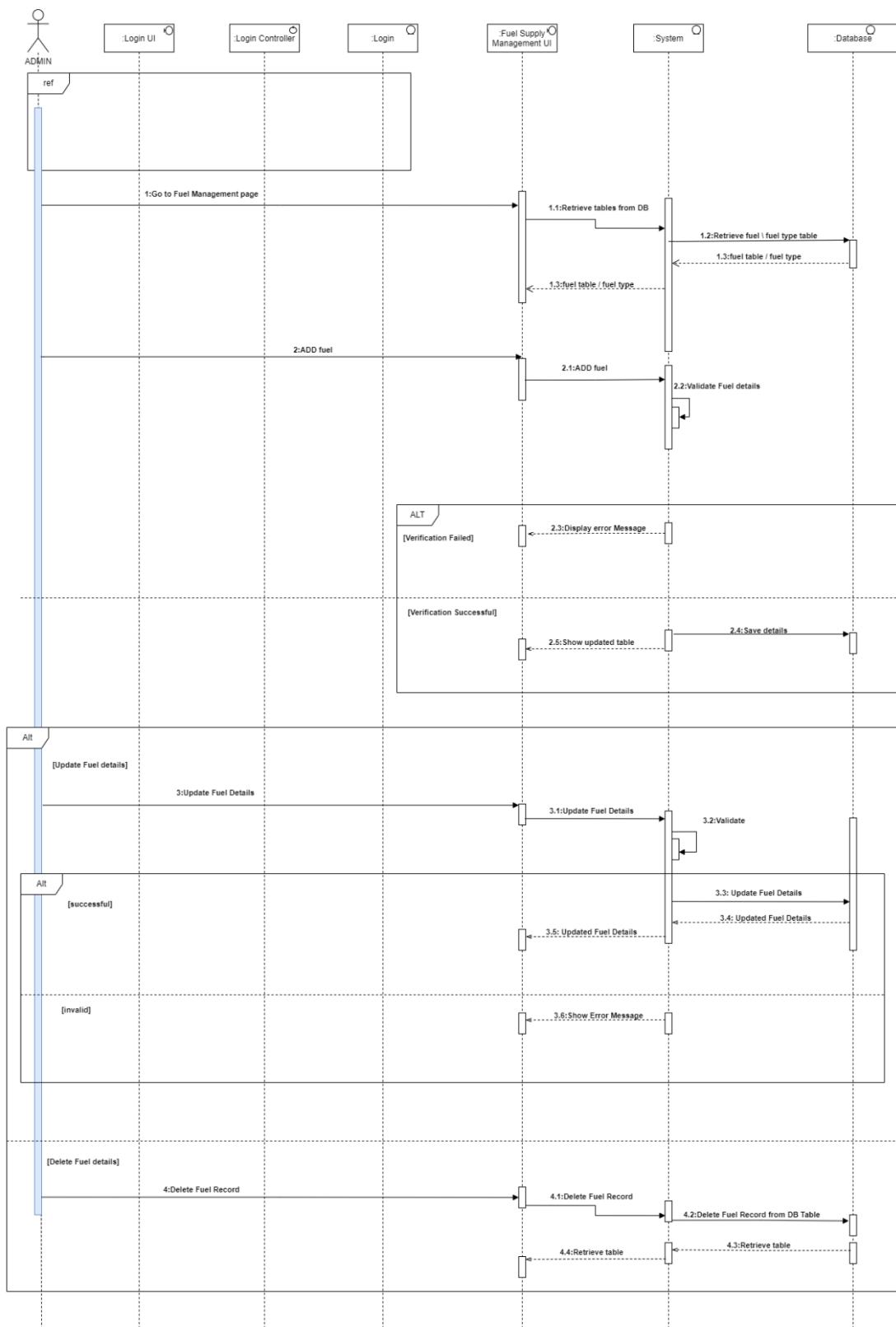


Figure 3-21 - Fuel management sequence diagram

### 3.2.8 Salary Management

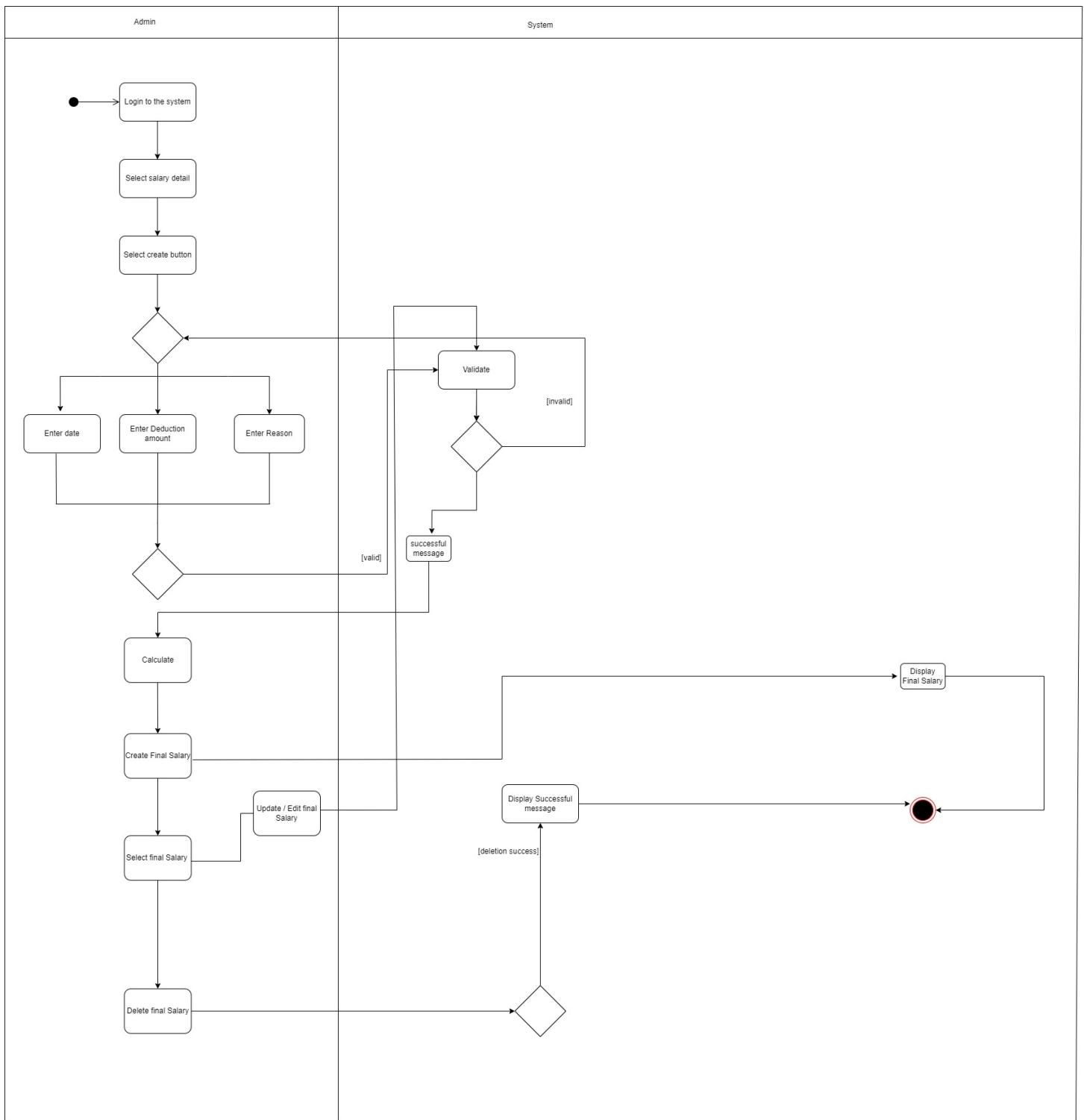
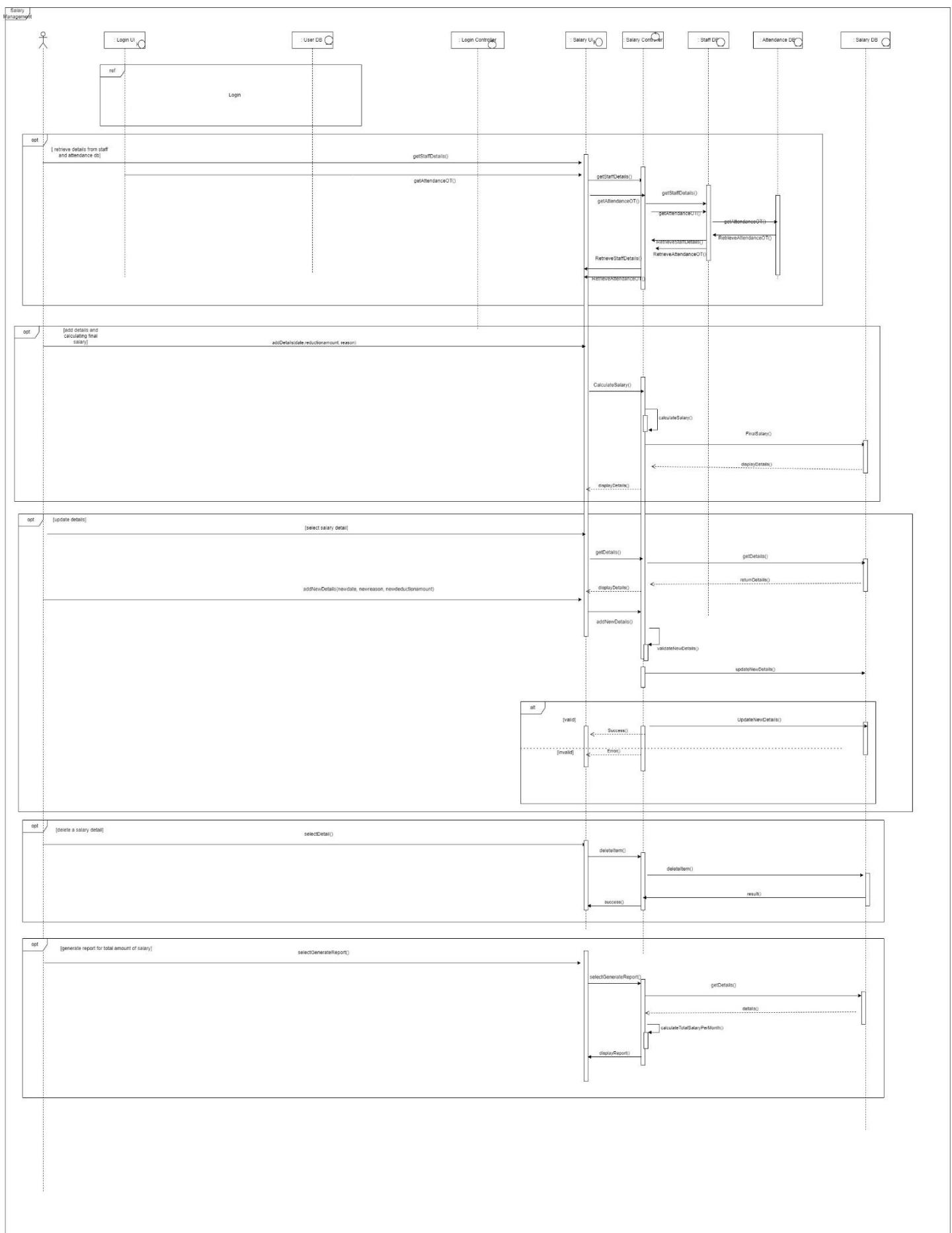


Figure 3-22 - Salary management activity diagram



*Figure 3-23 - Salary management sequence diagram*

### 3.2.9 Payment Management

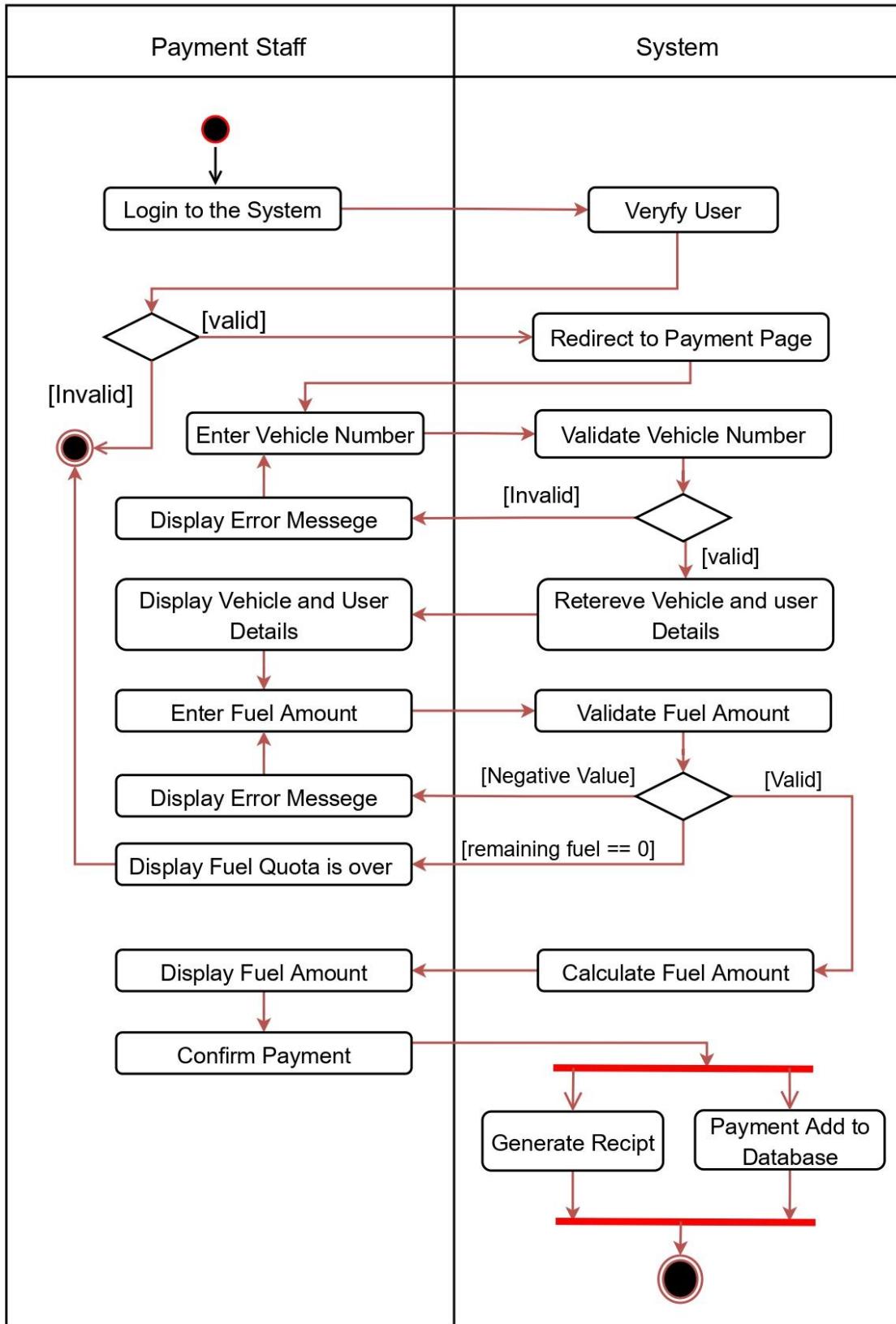


Figure 3-24 - Payment management activity diagram

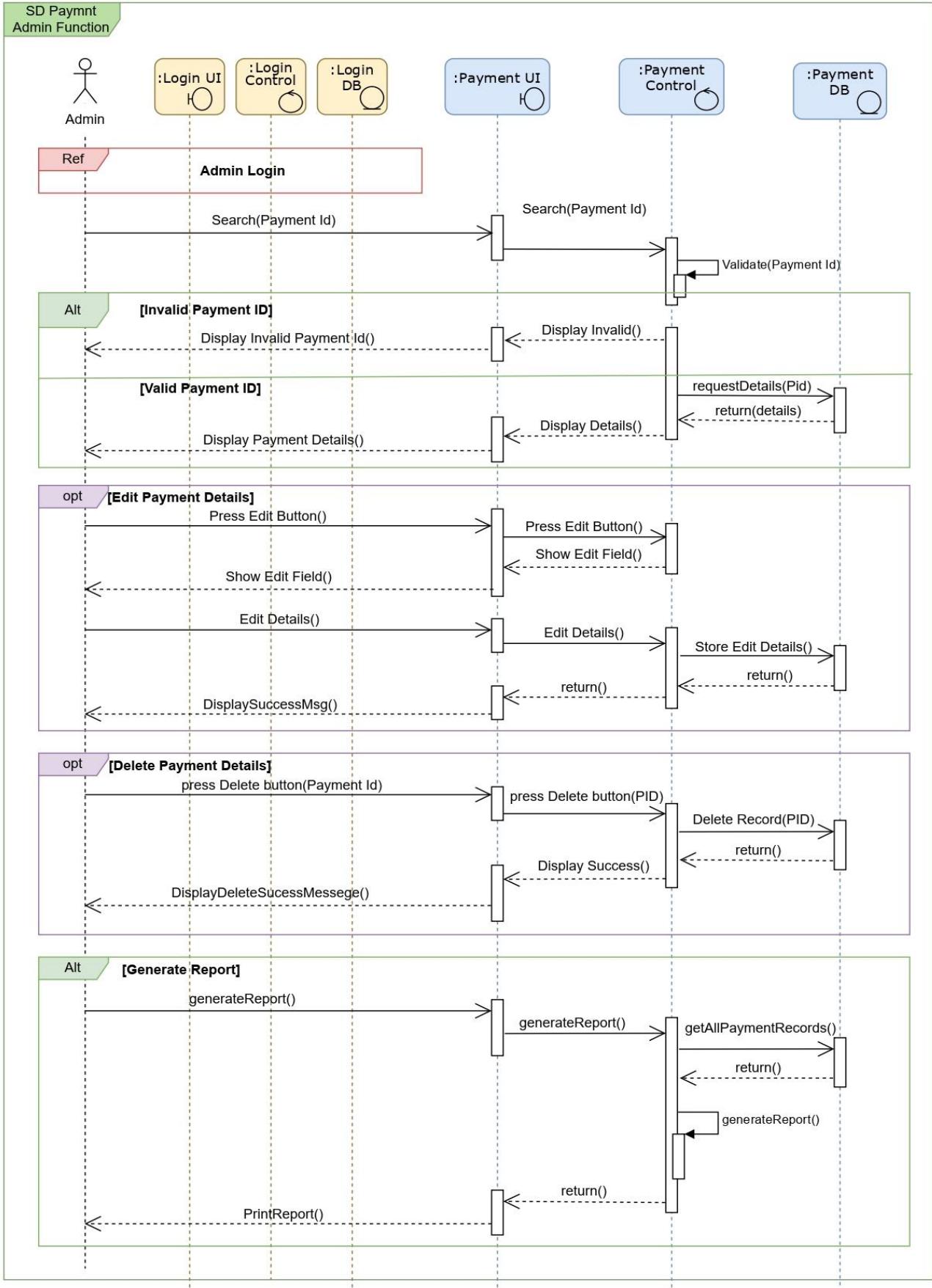
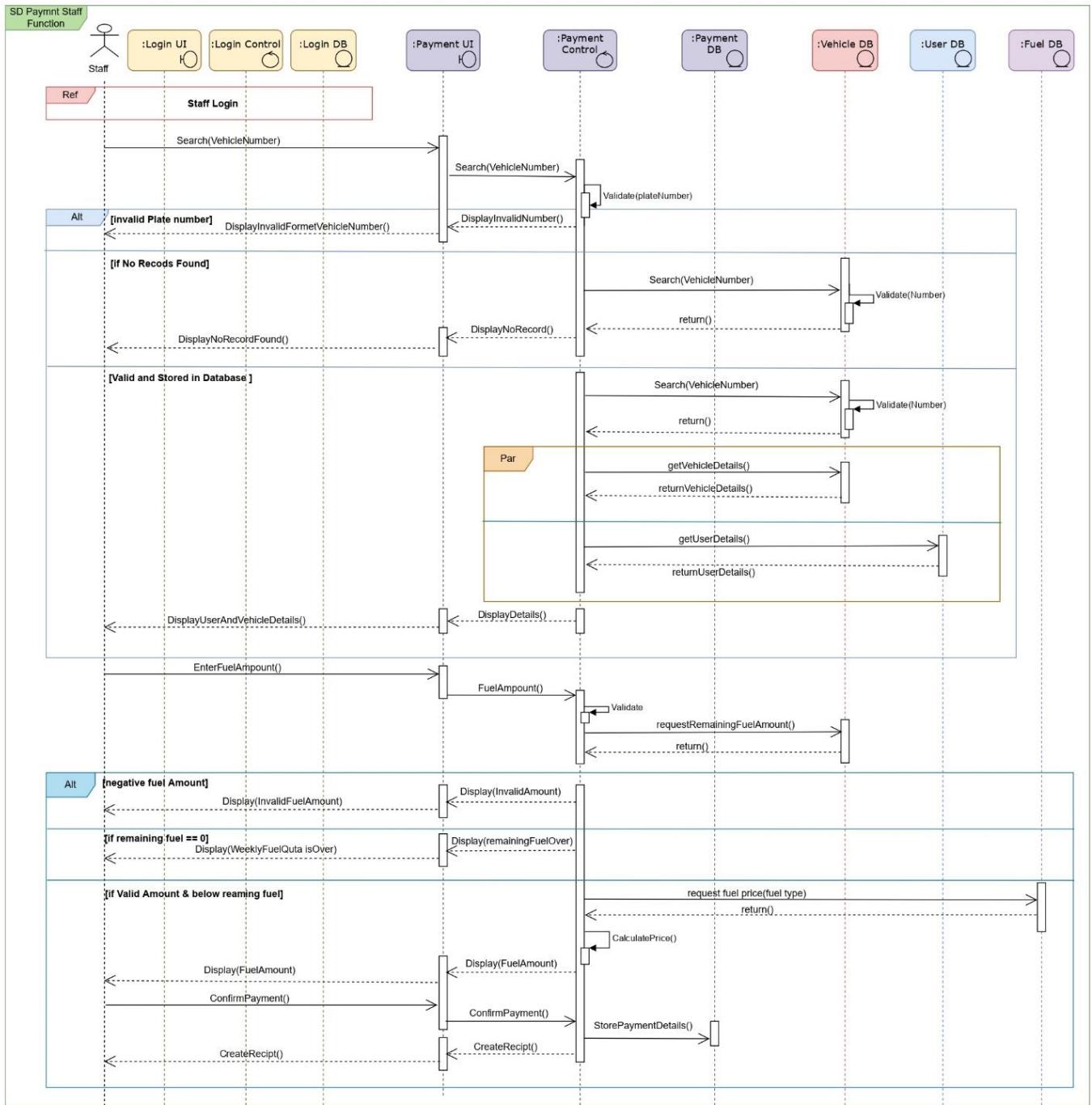


Figure 3-25 – Payment management sequence diagram 1



## 4 Testing

### 4.1 User Management

Test ID	Test Inputs	Excepted Output	Actual Output	Result (Pass/Fail)	Description
User001	Username: 2001055242 Password: abc (Correct password)	Directs the user to the homepage.	Directs the user to the homepage.	Pass	If the user has entered the correct credentials, The user will be directed to the user homepage.
User002	Username: 2001055242 Password: abc123 (incorrect password)	Show an error message as “Invalid NIC or Password”	Shows an error message as “Invalid NIC or Password”	Pass	If the user has entered the incorrect credentials, an alert message will be shown.

Table 2 – User management test case 1

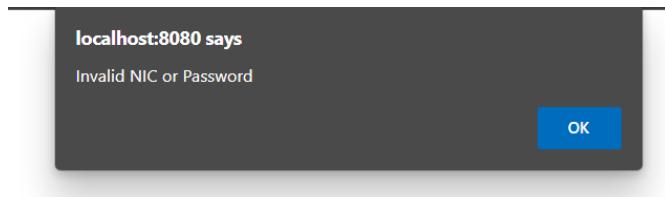


Figure 4-1 – User management test case 1

Test ID	Test Inputs	Excepted Output	Actual Output	Result (Pass/Fail)	Description
User003	NIC: 2001055242  First Name: Yusri  Last Name: Areef  Email: <a href="mailto:sajithrocks@gmail.com">sajithrocks@gmail.com</a>  OTP: 55684 (Correct OTP)  Password: abc123  Confirm Password: abc123  Address: Kandy	Shows a successful message as “OTP verification successful” and “Successful”. Finally directs user to the login page.	Shows a successful message as “OTP verification successful” and “Successful”. Finally directs user to the login page.	Pass	If the user has entered the correct credentials, and the OTP verified. The user will be directed to the user Login page.

User004	NIC: 2001055242  First Name: Yusri  Last Name: Areef  Email: <a href="mailto:sajithrocks@gmail.com">sajithrocks@gmail.com</a>  OTP: 55684 (Incorrect OTP)  Password: abc123  Confirm Password: abc123  Address: Kandy	Show an error message as “OTP verification Unsuccessful” And “Unsuccessful Registration”	Shows an error message as “OTP verification Unsuccessful” And “Unsuccessful Registration”	Pass	If the OTP verification is unsuccessful the user will not be able to proceed with the registration.
User005	NIC: 2001055242  First Name: Yusri  Last Name: Areef  Email: <a href="mailto:sajithrocks@gmail.com">sajithrocks@gmail.com</a>  OTP: 55684 (Correct OTP)  Password: abc123  Confirm Password: abc1234 (Incorrect Password)  Address: Kandy	Show an error message as “Password doesn’t match” And “Unsuccessful Registration”	Show an error message as “Password doesn’t match” And “Unsuccessful Registration”	Pass	If the password and confirm password doesn’t match, the user will not be able to proceed the registration.

Table 3 – User management test case 2

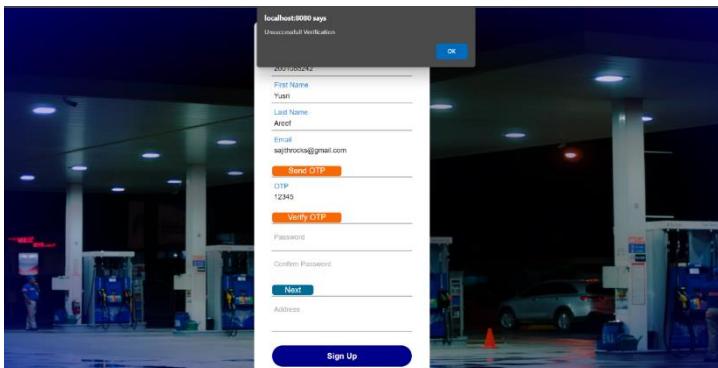


Figure 4-2 – User management test case 2

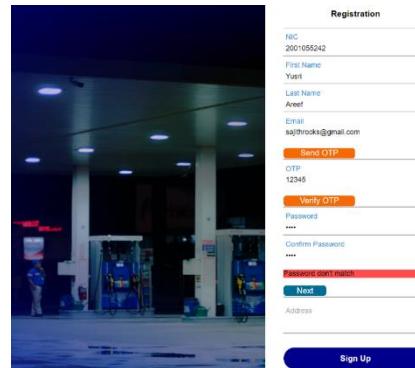


Figure 4-3 – User management test case 3



## 4.2 Vehicle Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
001	Chassis Number : LJCPCBLCX11000678 Plate Number : CP AAB 4567 Vehicle Type : Van Fuel Limit : 100 Created Date : 2022-09-14 Fuel Type : Auto_Diesel	Display a success message as "Your Vehicle is added sucessfully :)"	Displays a Success message as mentioned	Pass	If user enters valid details , user will get success message and user will be redirected to home page
001	Chassis Number : LJCPCBLCX11000 Plate Number : CP AAB 4567 Vehicle Type : Van Fuel Limit : 100 Created Date : 2022-09-14 Fuel Type : Auto_Diesel	Display an error message as “ Chassis Number should be contain 17 Characters ex: LJCPCBLCX11000237 ”	Displays an error message as mentioned	Pass	If user enters invalid details , user will get error message and user will stay at the same page until user enters valid details.
001	Chassis Number : LJCPCBLCX11000678 Plate Number : CP AAB4567 Vehicle Type : Van Fuel Limit : 100 Created Date : 2022-09-14 Fuel Type : Auto_Diesel	Display an error message as “ Plate Number should be, All Capital Letters ex: AB ABC 1234 (Only one space between each of them)”	Displays an error message as mentioned	Pass	If user enters invalid details , user will get error message and user will stay at the same page until user enters valid details.

Table 4 – Vehicle management test case 1

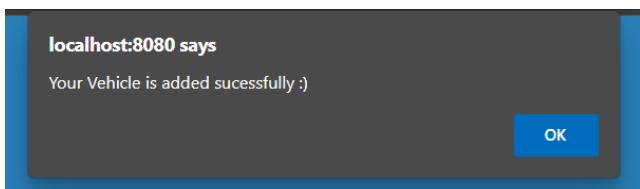


Figure 4-4 – Vehicle management test case 1

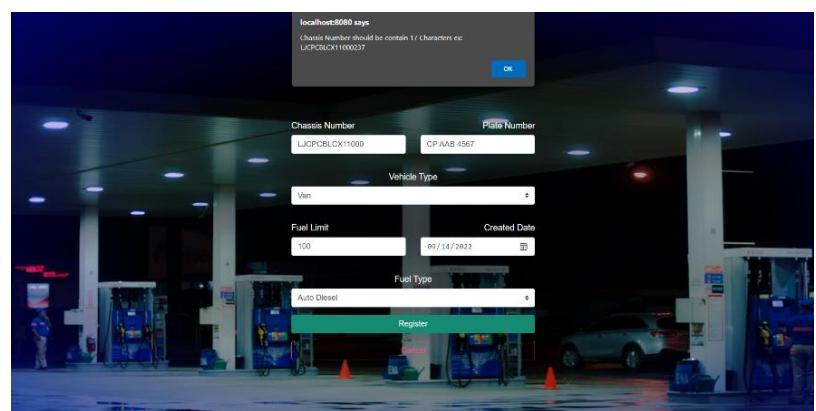


Figure 4-5 - Vehicle management test case 2

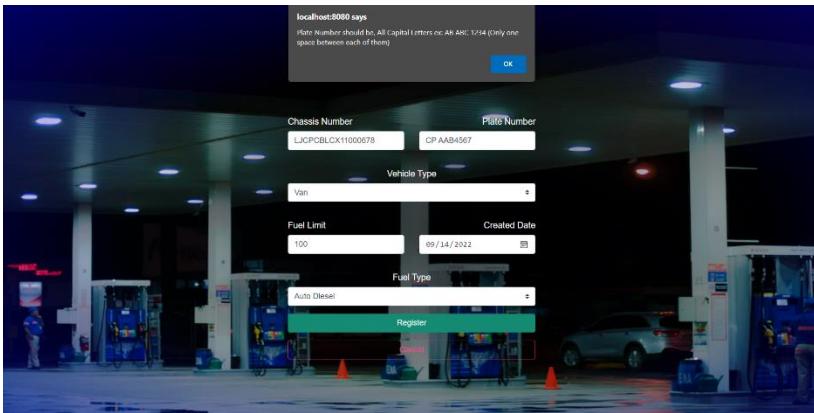


Figure 4-6 - Vehicle management test case 3

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
002	Needed Fuel: -10	Display an error message as “Negative values cannot be entered !!!”	Displays an error message as mentioned	Pass	If user enters negative values user will get error message
002	Needed Fuel:	Display an error message as “ No value inserted !!!”	Displays an error message as mentioned	Pass	If user enters no values in needed fuel field, then user will get this error message
002	Needed Fuel: 10  (Needed Fuel less than or equal to Remaining Fuel)	Display a success message as “ You can generate the qr code :)”	Displays a Success message as mentioned	Pass	If user enters valid amount, then user will get this success message and user can generate QR Code.

Table 5 – Vehicle management test case 2

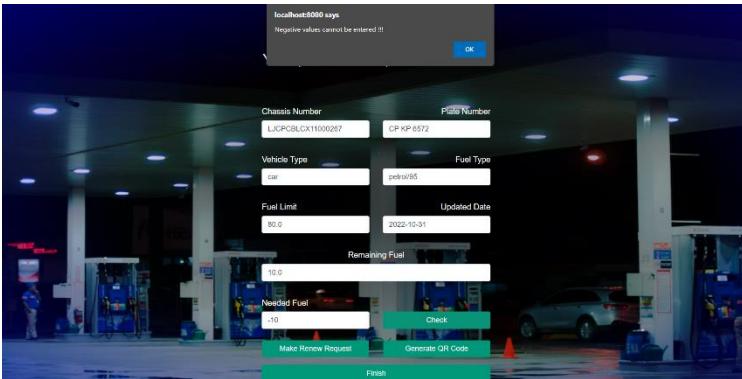


Figure 4-7 - Vehicle management test case 4

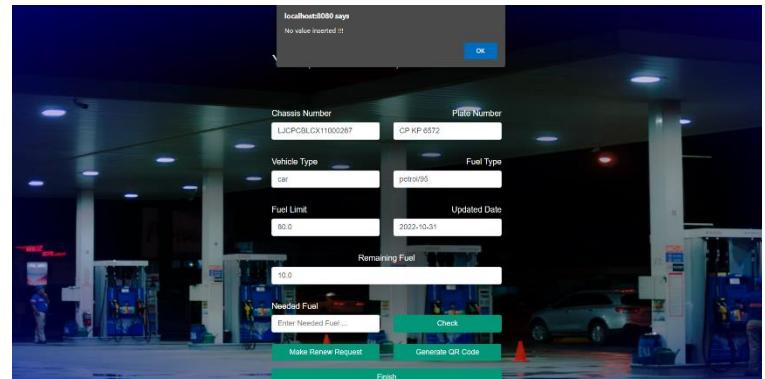


Figure 4-8 - Vehicle management test case 5

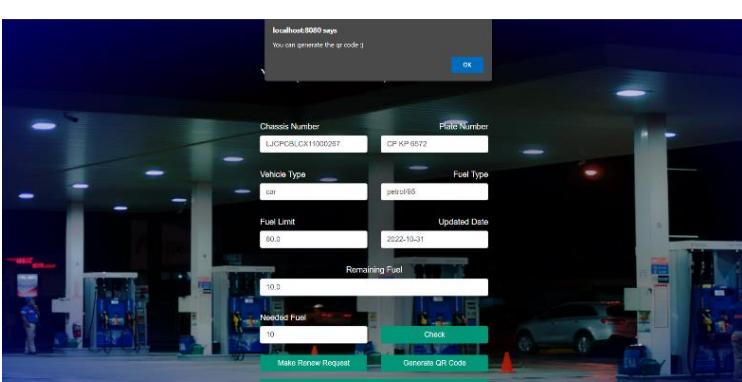


Figure 4-9 - Vehicle management test case 6

### 4.3 Essential Service Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
	Company Name- Manager First Name- Manager Last Name- Service Type- Reason- Address- Email- Fuel Limit- Letter- Password-	Show and error message	Show a successful message displaying “You have successfully registered to the system”	Fail	After the form is validated, a company cannot be added without their basic details.
	Company Name- SLIIT Manager First Name- Jude Manager Last Name- Perera Service Type- Education Reason- Transport Address- Kandy Email- SLIITkandy@gmail.com Fuel Limit- 70L Letter- Attached Password- ABC123	Show a successful message after registering a company to the system.	Show a successful message displaying “You have successfully registered to the system”	Pass	If all the details are correct and the user has entered details according to the validations, the company is added successfully to the database.

Table 6 – Essential service management test case

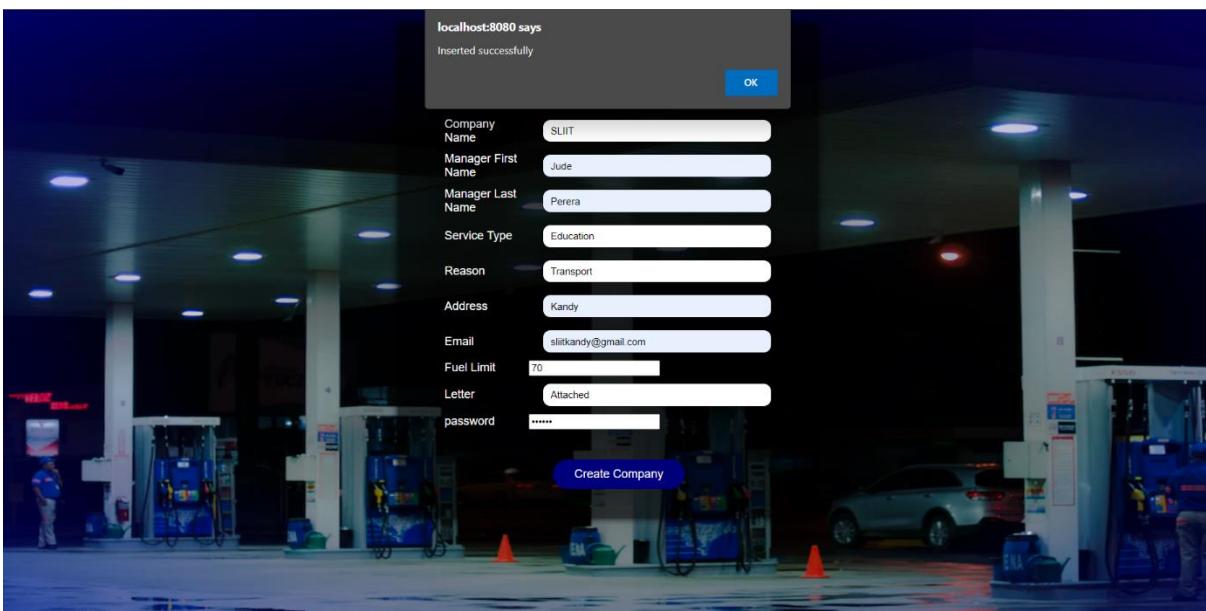


Figure 4-10 – Essential service test case

#### 4.4 Staff Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
Staff:01	<b>First name:</b> Amal <b>Last name:</b> Perera <b>NIC:</b> 12345	Displays a red border in NIC input field	Displays a red border in NIC input field	Pass	Since form is validated, admin cannot enter invalid NIC. Admin must enter a valid NIC number either the old one (995648723V) or the new one (2001526348596589)
Staff:02	<b>First name:</b> Amal <b>Last name:</b> Perera <b>NIC:</b> 995648723V <b>Address:</b> NO.15, Peradeniya road, Kandy. <b>Email:</b> amal123@	Displays a red border in email input field	Displays a red border in email input field	Pass	Since form is validated, admin cannot enter invalid email address. Admin must enter an email with valid format. Eg: amal123@gmail.com

Table 7 – Staff management test case

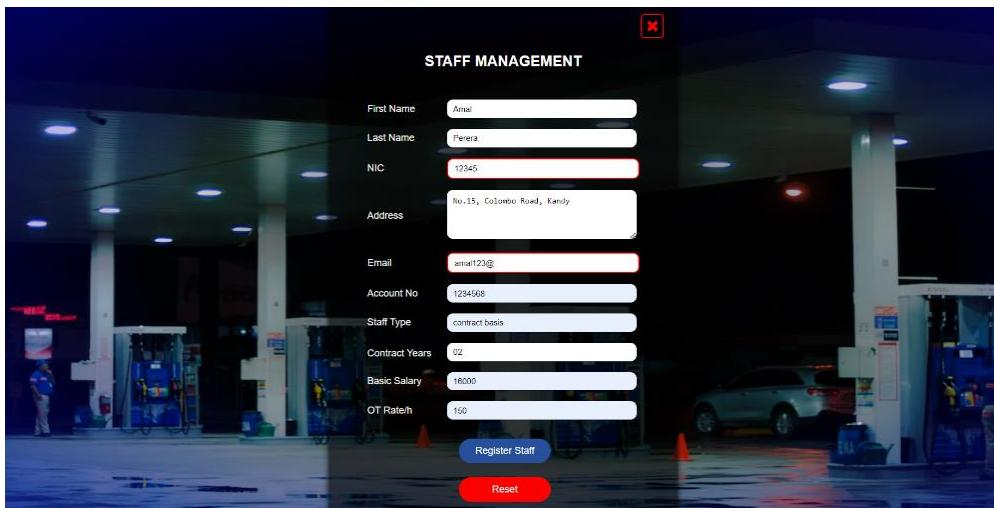


Figure 4-11 – Staff management test case 1

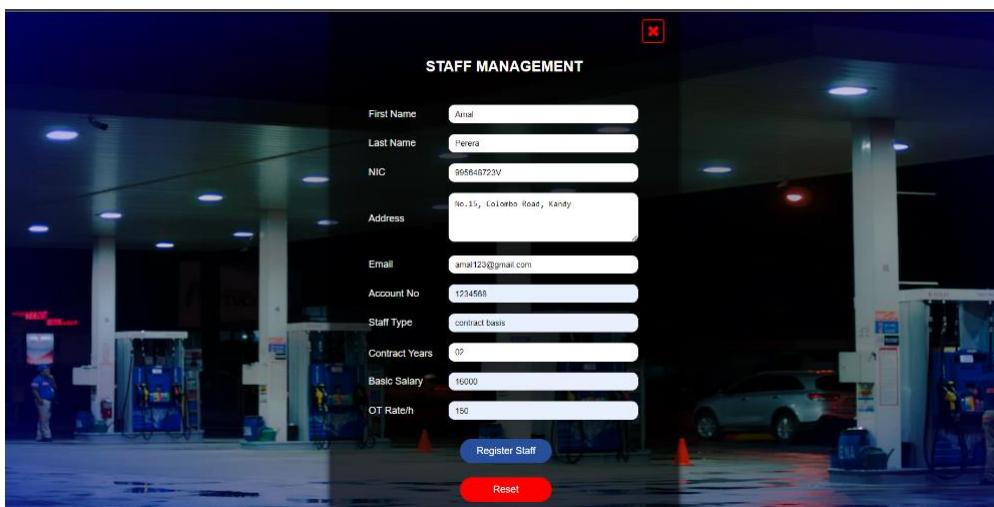


Figure 4-12 - Staff management test case 2

## 4.5 Notice Management

Test ID	Test Input	Expected Output	Actual Output	Result	Description
NotNo 1	<b>Notice Title:</b> Fuel Distribution Postponed <b>Notice Type:</b> Priority Notice <b>Notice Description:</b> Lanka IOCs petrol distribution is to be delayed by another day as a fuel ship carrying petrol has not reached the island <b>Notice Email:</b> xycz123	Notice does not successfully insert	A message with “please input a valid email address would show”	Passed	The purpose of inserting a valid email address is to help the user, staff or essential service to contact the notice owner about any concerned detail
NotNo 2	<b>Notice Title:</b> Effect of price hikes on fuel prices <b>Notice Type:</b> Priority Notice <b>Notice Description:</b> This is to inform that the Fuel prices will increase within the next few weeks due to the current economic crisis <b>Notice Email:</b> udn992110@gmail.com	The length is limited by the system	The number of characters exceeding the count could not be inserted	Passed	This will keep the notice title comprehensive yet short
NotNo 3	<b>Notice Title:</b> Fuel Distribution Postponed <b>Notice Type:</b> Priority Notice <b>Notice Description:</b> This is to inform that the Fuel prices will increase within the next few weeks due to the current economic crisis <b>Notice Email:</b> xycz123	Updating is unsuccessful	A message with “your email is out of format” would be shown	Passed	An invalid formatted email would not be inserted

Table 8 – Notice management test case

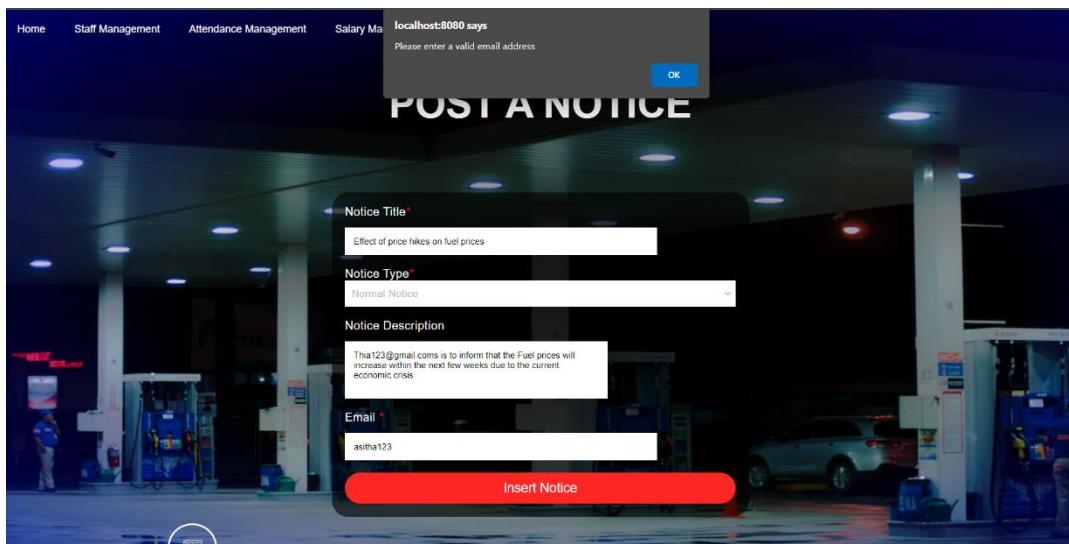


Figure 4-13 - Notice management test case 1

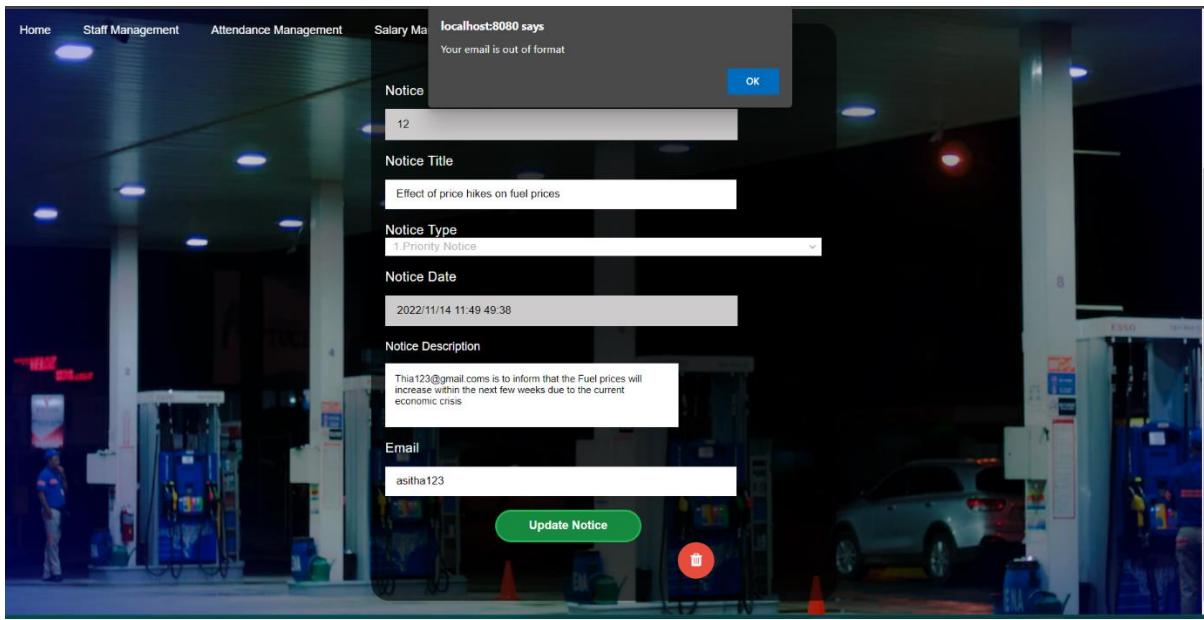


Figure 4-14 - Notice management test case 2

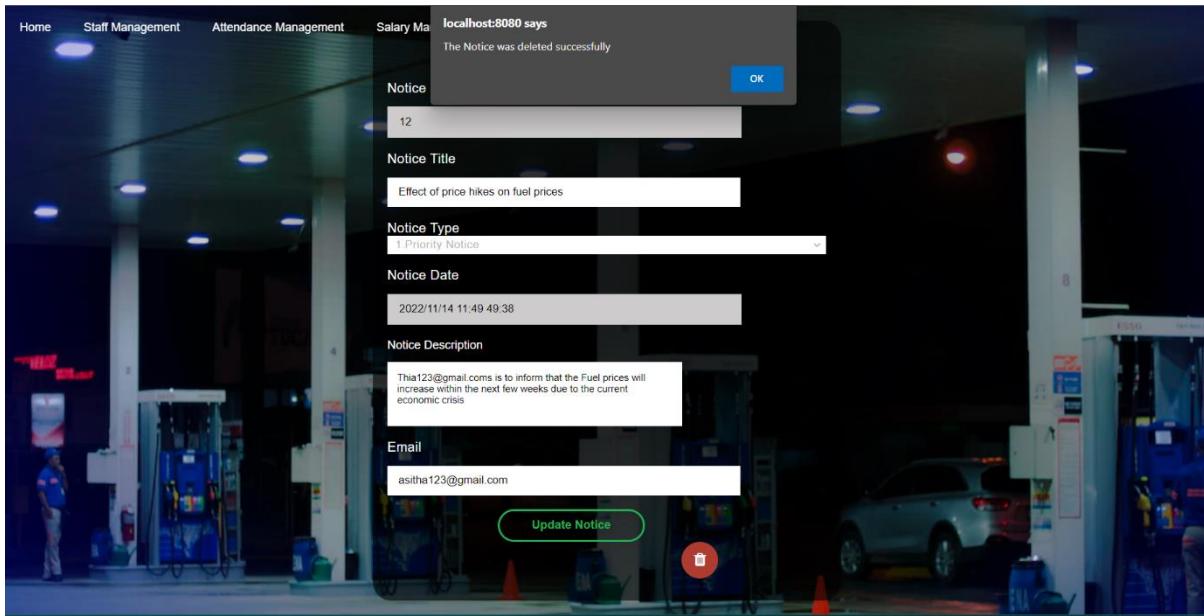


Figure 4-15 - Notice management test case 3

## 4.6 Attendance Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
SLIPP01	Employee ID: S001 TotalOT: 24h TotalLeave:5 TotalDaysWorked: 25 Month: November	Show successful message after data successfully inserted into the database.	Show successful message.	Pass	If all the details are correct and the user has a slip successfully added.
SLIPP02	Employee ID: S002 TotalOT:30h TotalLeave:32 TotalDaysWorked:45 Month: November	Show successful message after data successfully inserted into the database	Show error message showing "Please put valid inputs in Total leave and Total Days worked".	Fail	According to the system The total leave and Total days can inputed between 0 – 31only other than those inputs it shows error message

Table 9 – Attendance management test case

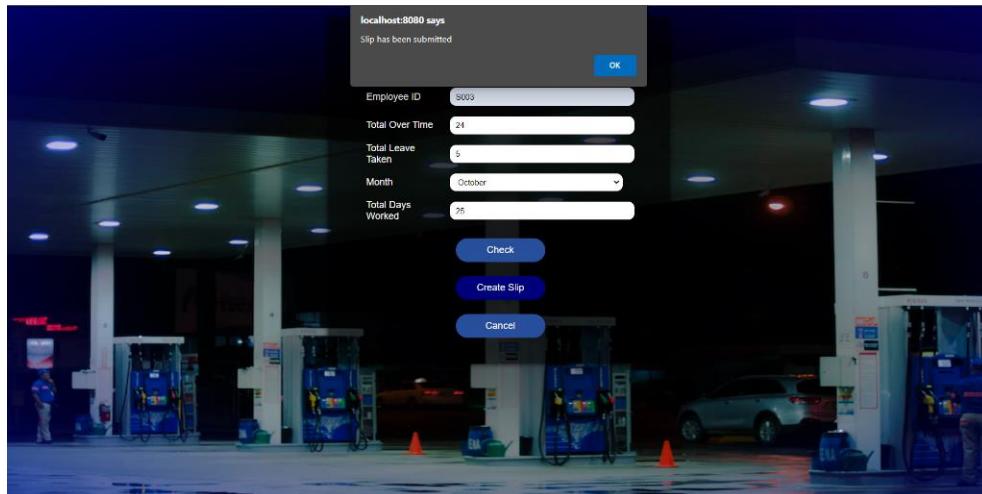


Figure 4-16 - Attendance management test case 1

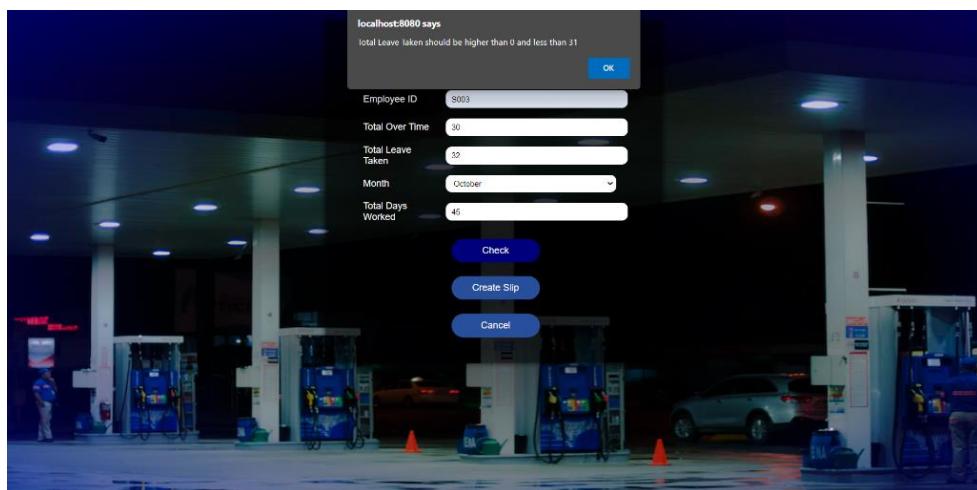


Figure 4-17 - Attendance management test case 2

## 4.7 Fuel Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (pass/fail)	comments
001	Fuel Type: Petrol92 Current Stock :1500 Refilled Amount:500	Display the entered details on the fuel details table	Display the entered details on the fuel details table	Pass	Function worked properly
001	Fuel Type :Super Diesel Current Stock : Refilled Amount:1000	Display “please fill out this field” by pointing empty field.	Display “please fill out this field” by pointing empty field.	pass	Function worked properly
001	Fuel Type :Auto Diesel Current Stock :2000000 Refilled Amount:1000	Show an alert (“check current stock value again”)	Show an alert (“check current stock value again”)	pass	Function worked properly
001	Fuel Type :Auto Diesel Current Stock :200 Refilled Amount:1000000	Show an alert (“check refilled amount value again”)	Show an alert (“check refilled amount value again”)	pass	Function worked properly

Table 10 – Fuel management test case

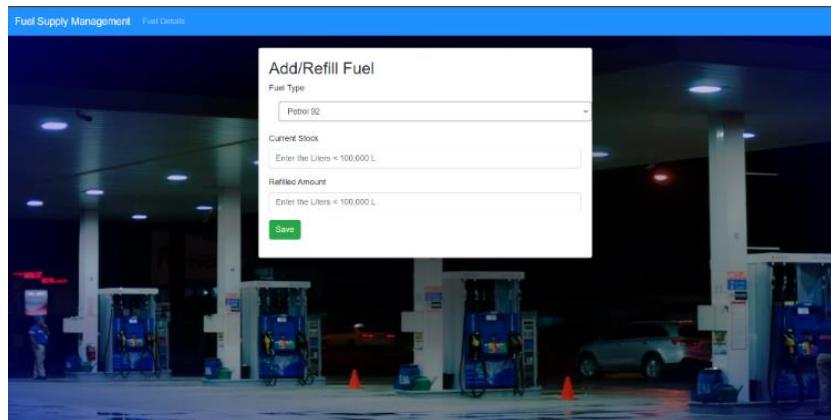


Figure 4-18 - Fuel management test case 1

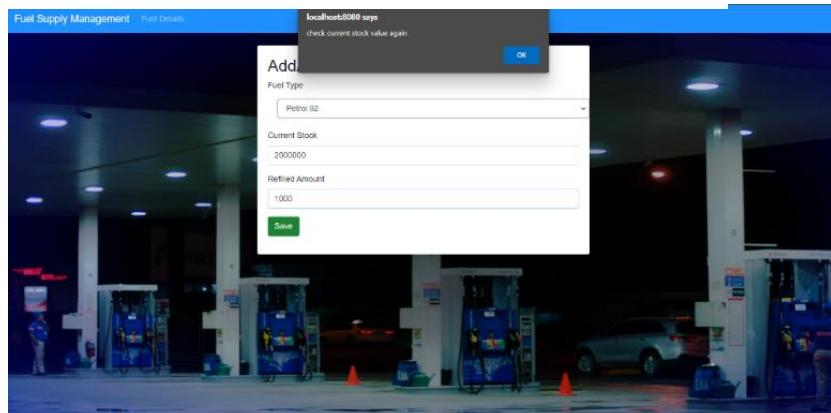


Figure 4-19 - Fuel management test case 2

## 4.8 Salary Management

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Description
	<b>Date:</b> 10/10/2022 <b>Deduction amount:</b> -500 <b>Reason:</b> Property Damage	Displays an alert box	Displays an alert which says “DEDUCTION AMOUNT IS NOT VALID”	Pass	Admin can't add a value below zero
	<b>Deduction amount:</b> 50000 <b>Reason:</b> Health Issues	Displays an alert box	Displays an alert which says “DEDUCTION AMOUNT IS NOT VALID”	Pass	Admin can't add a value above the basic salary

Table 11 – Salary management test case

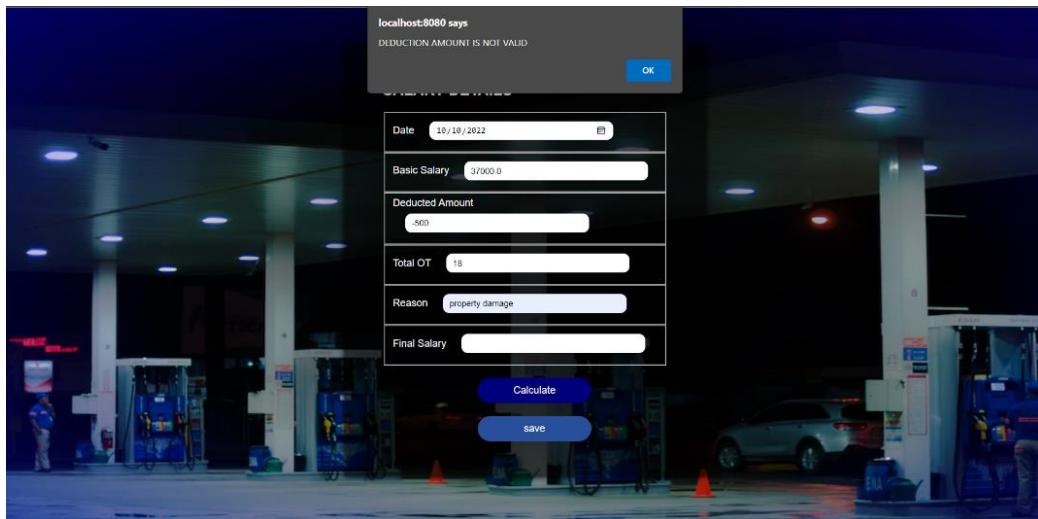


Figure 4-20 - Salary management test case 1

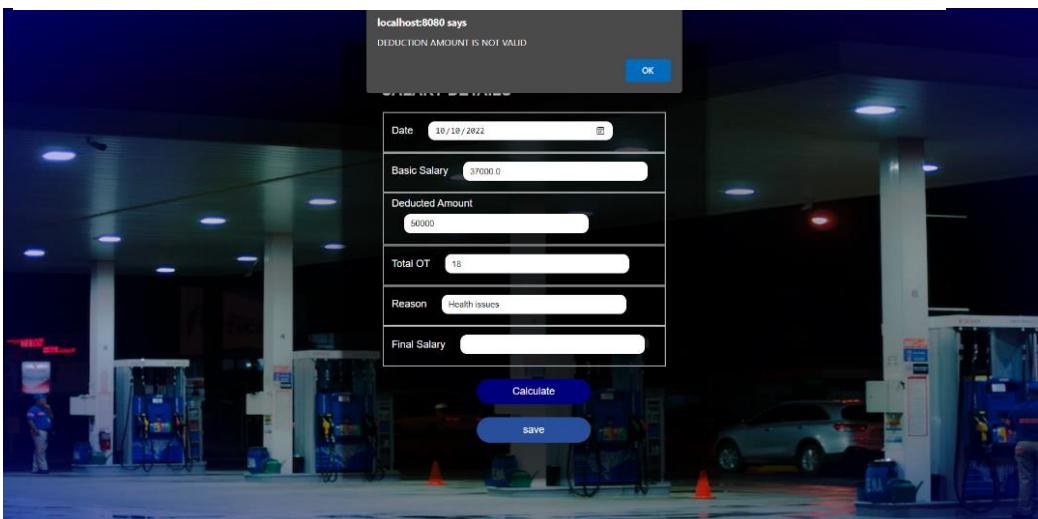


Figure 4-21 - Salary management test case 1

## 4.9 Payment Management

Test ID	Test Input	Expected Output	Actual Output	Result	Description
	Input Fuel Amount “100 Liters”	Cannot Insert fuel Amount Grater than Available fuel message Should be displayed.	“Value must be less than or Equal to Available Fuel” Message displayed.	Passed	A user cannot enter a fuel amount greater than the remaining amount of fuel left.
	Search Payment Id “102”	There are no values found message Should be Displayed	“There are no records found” Message displayed.	Passed	Admin can't search a record which is not in the database

Table 12 – Payment management test case

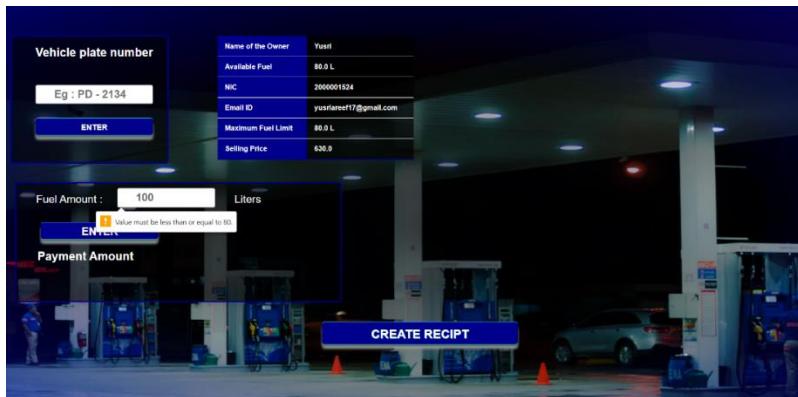


Figure 4-22 - Payment management test case 1

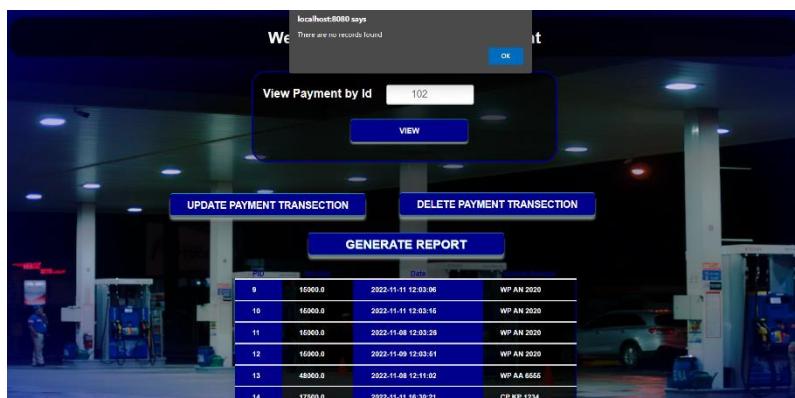


Figure 4-23 - Payment management test case 2

## 5 Evaluation and Conclusion

### 4.5 Evaluation

#### 4.5.1 Implementation

Our team has compiled a list of the top programming languages and frameworks based on the sort of development service that our clients require.

When building the project as the Fuel Supply Management system we decided to use MySQL Workbench. MySQL Workbench is a unified visual tool for database architects, developers, and DBAs. MySQL Workbench provides data modelling, SQL development, and comprehensive administration tools for server configuration, user administration, backup, and much more.

We chose MySQL Workbench as our DBMS for the following reasons:

- Workbench is a quick, dependable, and adaptable visual database creation tool.
- It restricts user access to the database.
- SQL is entirely intended to control relational databases. It is a language that is compatible with programs that handle structured data.
- Instead of many queries, we can utilize a graphical user interface to sort data into tables.

#### 6.1.2 Implementation Languages

When developing a web application, there are numerous programming languages, web development technologies, and platforms to choose from. Among these we have chosen Java and JavaScript as the languages.

## 5.2 Conclusion

Due to the economic crisis in Sri Lanka, we had only a small amount of fuel to distribute, our main objective behind developing this application is to develop a system that effectively manages to distribute fuel equally and fairly to every citizen of Sri Lanka. The 2nd main issue in the fuel distribution system is selling fuel in the black market. People buy fuel as a normal customer, and they resell it at a higher price. So, to tackle this we managed to develop an application which helps us to keep track of the number of fuel customers bought. In our system, we have included a QR code transaction method to limit a customer's fuel amount.

Working as a team presented numerous challenges for us, particularly in this pandemic situation. We have encountered numerous difficulties with our programming language during the development process. Even though we had some programming language experience, we had to solve many bugs and errors in the development process. Since we had to complete half of the job remotely. When working online as a team, especially using MS Teams, we had to make the time convenient for each member of the team, since our working hours, were not fixed most of the time. Some meetings surpassed 10 hours limit, and for the remaining, of the project, we had to allocate time on campus during lecture time and continue the project because some parts were difficult when doing online e.g.- : Integrating. Working on the project-related work we had to manage time to put the same amount of weight on the other subjects as well, therefore it was a great challenge for our team, but finally, we managed to face every problem and make our project a successful one.

## 6 References

- [1] A. Studies and A. Studies, “Raagini Sharma RIEAS 3,” no. May, pp. 1–14, 2022.
- [2] <https://fuelpass.gov.lk/>