

SYSTEM REQUIREMENT

SPECIFICATION

Project Clean Car



Group CS 37
SCS 22202

Table of contents

Group details:	2
1) Introduction	3
1.1) Purpose	3
1.2) Acronyms, abbreviations, and similar terms	4
1.3) Domain description.....	5
1.4) Current system & It's limitations	6
1.5) Objectives & Goals.....	8
1.6) Assumptions, Constraints and Limitations.....	9
2) Feasibility Study	10
2.1) Technical Feasibility.....	10
2.2) Economic Feasibility	11
2.3) Legal and Ethical Feasibility.....	12
2.4) Operational Feasibility.....	12
2.5) Scheduling Feasibility.....	13
3) Requirements	14
3.1) Stakeholders (Actors)	14
3.2) Use cases and Use case diagram	15
3.3) Functional Requirements	29
3.4) Quality Attribute Requirements	31
4) Proposed System Architecture	33
5) Design of the System.....	36
5.1) Class Diagram	36
5.2) Entity-Relationship Diagram.....	37
5.3) Sequence Diagrams	40
5.4) Activity Diagrams	49
5.5) State Transition Diagrams.....	72
6) User Interface Flow diagram and Wireframes	75
6.1) Flow Diagram.....	75
6.2) Wireframes	76
References	93

Group details:

	Full Name	Registration Number	Index No
1)	U.W.T.O Weerasinghe	2018/CS/191	18001912
2)	T.W.T.Dulshan	2018/CS/048	18000487
3)	W.M.D.M.Y.Wickramanayaka	2018/CS/192	18001922
4)	W.K.B.K.Madhushanka	2018/CS/096	18000967

Details of Project Supervisor, Co- Supervisor and Client:

Project Supervisor: Ms. Sanduni Thrimahavithana

Project Co-Supervisor: Mr. Roshan Abeyweera

Client(s):

As a general local product for car service stations in Sri Lanka

1)Introduction

1.1) Purpose

The purpose of this document is to give a detailed description of the requirements for “**Project Clean Car: A simple web application reservation system + leave request handling system for car service stations**”. It will illustrate the purpose and complete declaration for the development of system. It will also explain system constraints, low fidelity wireframes, and the UI flow along with all required diagrams.

This document aims to provide concise description of system requirements, system feasibility and architecture of the proposed system.

1.2) Acronyms, abbreviations, and similar terms

- NIC: Network Interface Card
- OO: Object Oriented
- IEEE: Institute of Electrical and Electronics Engineers

Following are some similar terms used in the context of the system

- Receptionist : System handler
- Booking : Reservation

1.3) Domain description

In the current automobile service industry of Sri Lanka, the vehicles that come to the service station are taken into consideration on a **first-come first-serve** basis.

Services range from **full service, body wash** to **cut and polish** and there are lift equipment for separate vehicle classes. (**light vehicle, heavy vehicle** etc.)

Most Service stations do not have an online reservation system. However, the flagship companies (such as Kleen Park, Auto Miraj) that do have, the customer cannot see the availability and crowded nature of the service station at that time.

Also, all records of services done, reservations, employee data are maintained on paper and book-kept by a staff member. So, managers find it difficult to keep them updated and use the current paper data to make decisions for the benefit of the company.

Employees are required to meet their superiors to ask for leave. For this face-to-face meeting is needed. This could be conflicting since managers are extremely busy with the customers or with other business matters.

1.4) Current system & It's limitations

Since most customers tend to visit these stations or weekends or public holidays to get their services done, the station becomes extremely busy and long vehicle queues can be observed. Let us consider this situation as **scenario 01**.

But almost no customers visit the service station during some selected hours (normally considered as day hours of weekdays). Let this be **Scenario 02**



Figure 1: Scenario 01



Figure 2: Scenario 02

In **Scenario 01**, some customers may even have to stay at the service stations for hours just to get their turn and they may not return to that station due to that waste of time. This will directly affect the customer retention of that station. Even the employees may become fatigued after working without a break for hours

However, in **Scenario 02** this is quite the opposite.

There are almost no customer vehicles at the service premises this time and Employees have no work and resources of the service station are wasted. There is a huge difference of supply and demand among these 2 scenarios.

Even in higher end service stations with online systems available our group found out the following key problem when discussed with **Mr. Charith Perera the finance manager of Auto Miraj Pvt. Ltd** [1] in the context of making online reservations:

*“Although Auto Miraj has an online reservation system, customers do not pay an **advance amount** just for reservation when they reserve online. They could even not turn up for their reserved time slot even though our system will send a notification message ignoring it. This will result in the service center losing a customer who would have been able to come for the time slot booked by the earlier person initially but decided not to turn up seeing it was already reserved”*

-Mr. Charith Perera
finance manager
Auto Miraj Pvt. Ltd

We identified that if a proper reservation system along with the **facility for the customer to check the vacancy of the service station** could be implemented (Similar to a seat reserving system at a movie theatre) this gap can be fulfilled.

1.5) Objectives & Goals

Project goal:

To produce a **fully functioning, user friendly** system to operate in a car service station that helps users **solve the current problems in service stations** whilst helping to **maximize the efficiency** of the business by saving the customers time.

Objectives:

- To save the time of customers of car service stations and give them a pleasant impression of the service center and allow willing customers to make advance payments through the **online reservation system**.
- To help managers as well as organization employees save their time and help focus on tasks through the **leave request handling system**.
- To help managers take strategical decisions by **generating reports** from existing data.
- Produce Clean Car system with every component fully functional according to the project proposal.
- To make the system ‘user-friendly’ to the user as much as possible by creating easy to use and efficient user screens.
- To gain a learning experience on how software is made by **working together** and increase web developing knowledge.

1.6) Assumptions, Constraints and Limitations

Assumptions:

- **Time slots** are allocated for each lift and time-period for easy referencing
E.g.: Time slot 1 = lift no 1; 8.00 a.m.- 9.00 am
Time slot 10 = lift no 3; 2.00 p.m.- 3.00 pm
- A separate role will manage the handling of the system (known as “**receptionist**” or “**system handler**” in diagrams).
- General time of service opening will be from **8.00 a.m.** to **6.00 p.m.** for demonstration.
- Even though the manager may not physically be able to handle the system, the receptionist may be authorized to use the system through the manager’s login in extreme cases.
E.g.: Similar to Supermarkets where cashiers ask manager’s login to clear a mistake

Constraints and limitations:

- The System will not cover aspects related to salary calculation, stock management or promo code generation.
- A working PC/Laptop with an internet connection will be needed to run the web system.
- Due to the loss that can occur when customers **cancel their reservation at the last minute** or **not turning up at the service station**, a section of **terms and conditions** will be displayed. In correspondence to that, following are some constraints we had to arrive after carefully collecting feedback from local Car Service Stations (Kleen Park, AMW, Auto Miraj)
 - I. A customer will only be able to cancel his reservation only before a “**concession time period**”.
 - II. The customer will have to pay an **advance amount** (Either through the online payment or physically to the counter of the service station before the concession period).
 - III. The advance payment will be a reasonable amount depending on that particular service station (Rs.500 in our case) and will be deducted from the final bill.
 - IV. If the customer **has not made the payment before the concession period**, the reservation **will be automatically programmed to be cancelled**.
 - V. However, in exceptional cases, the System administration can reconsider whether to cancel or let the customer pay at the desk the whole amount when they bring in the vehicle,
E.g.: Loyal customers, customers who are busy but confirm by phone
- For development and demonstration, the **concession time** will be considered as **48 hours**.

2) Feasibility Study

2.1) Technical Feasibility

HTML, PHP, JavaScript will be used to implement the web system. All IDEs used for development are free and open-source and are considered simple to handle for CS students.

Laptops and desktops that are already owned will be used as our project hardware requirements.

IDEs:

- Visual Studio Code
- Notepad++
- Sublime text

Tools & Utilities:

- XAMPP
- Version management- GitHub
- Draw.io – UMLs & diagrams
- Balsamiq – UI wireframes
- Adobe Illustrator- for logo making
- Microsoft Office 365 (Student edition provided free for university email)
- Notepad
- Grammarly -Free edition to eliminate grammar mistakes

Hardware (strictly for development):

- Network equipment: (NIC), cables (e.g.: RJ45) and routers.
- Personal laptops

2.2) Economic Feasibility

Two main minor costs will have to be incurred from the client service stations:

Reason	Cost
PayHere module as a platform for paying the advance for reservation	Roughly LKR39
Digital Ocean hosting for online hosting	Maximum \$10 per month

- Free, and Open Source Software and applications will be used. Therefore, no costs will be incurred for Software.

Development:

- Our own routers and internet plans will be used. Data usage might increase more than normal but will not be a huge unbearable amount.
- In case of any hardware failure there might be costs for replacement (this is very unlikely to happen).
- For the 1st part of the project communication cost might be high because of the current Covid-19 situation as we are forced to use distance communication via mobile phones and zoom meetings.
- Paperwork cost is planned to be reduced by using electronic media (notebook, word editor) as much as possible.

2.3) Legal and Ethical Feasibility

Access to customer data will not be allowed for any employee of the car service except for the following logins:

- Manager - Since this is the admin of the system all access will be granted
- Receptionist -no modification to records, only ‘view’ is allowed to facilitate issues such as password reset, change, emergency contacting etc.
- All login, credit card details will be sent through an encrypted medium when doing online payments.

The only part in which users will have to provide data to 3rd parties will be for the **online advance payment** function, it will require user consent. All transfers will be done with trusted, standardized payment providers over a secured connection.

2.4) Operational Feasibility

To use the system,

- Manager should have medium knowledge in IT and English.
- Need a system handler(receptionist) with medium knowledge in IT and English.
- A Personal Computer is required with an internet connection **when operating the system**.
- Employees should have a basic knowledge of IT (Selecting something from screen)
- If the manager has a separate PC it will be an added advantage.

Having an additional display at the premises (A monitor, LCD screen) so that the service employees can view which reservation is currently going on, the type of service to be done next and which employee is allocated can be an added advantage for the system but is not considered as mandatory.

2.5) Scheduling Feasibility

- A time span of 10 months is available to complete the system and the **Gantt chart will represent our time schedule.**
- There are 4 members in the group so there is adequate time therefore **the project is operationally feasible.**
- The timeline may slightly deviate due to the current **Covid-19 situation.**

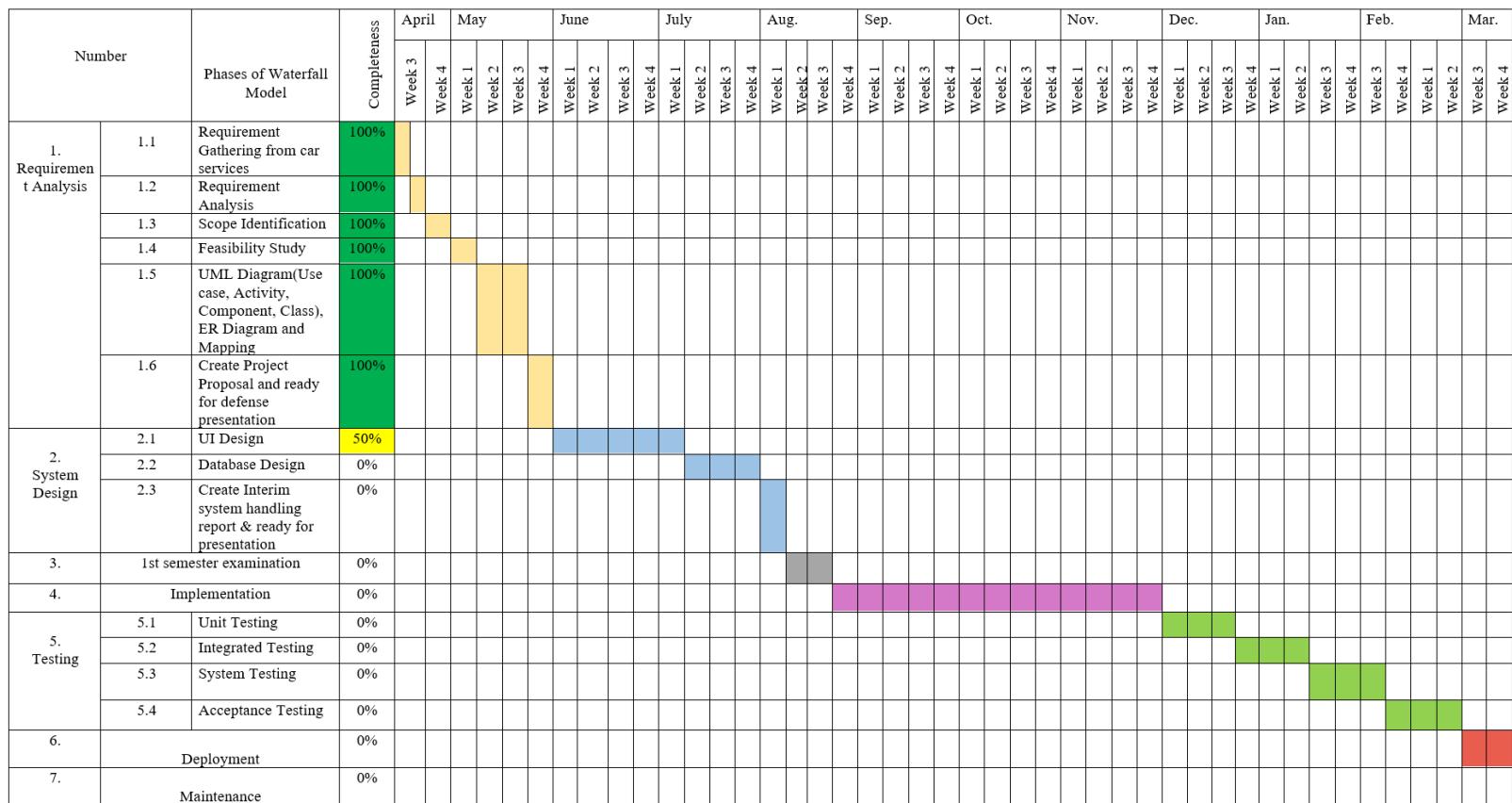
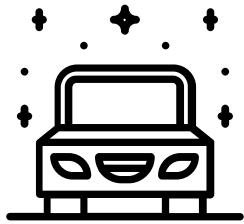


Figure 1 :Gantt Chart for timeline

3) Requirements

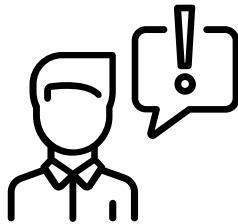
3.1) Stakeholders (Actors)

The system is usable for the following parties as user roles:



Customer

Customers of the service station who make online reservations through the system.



**Manager
(Admin)**

Administrator of the System. Has access to most functions and database records



**Receptionist
(System handler)**

Handles system with reservations accounting for delays etc. IT knowledge of this role can be beneficial for the efficient handling of the system.

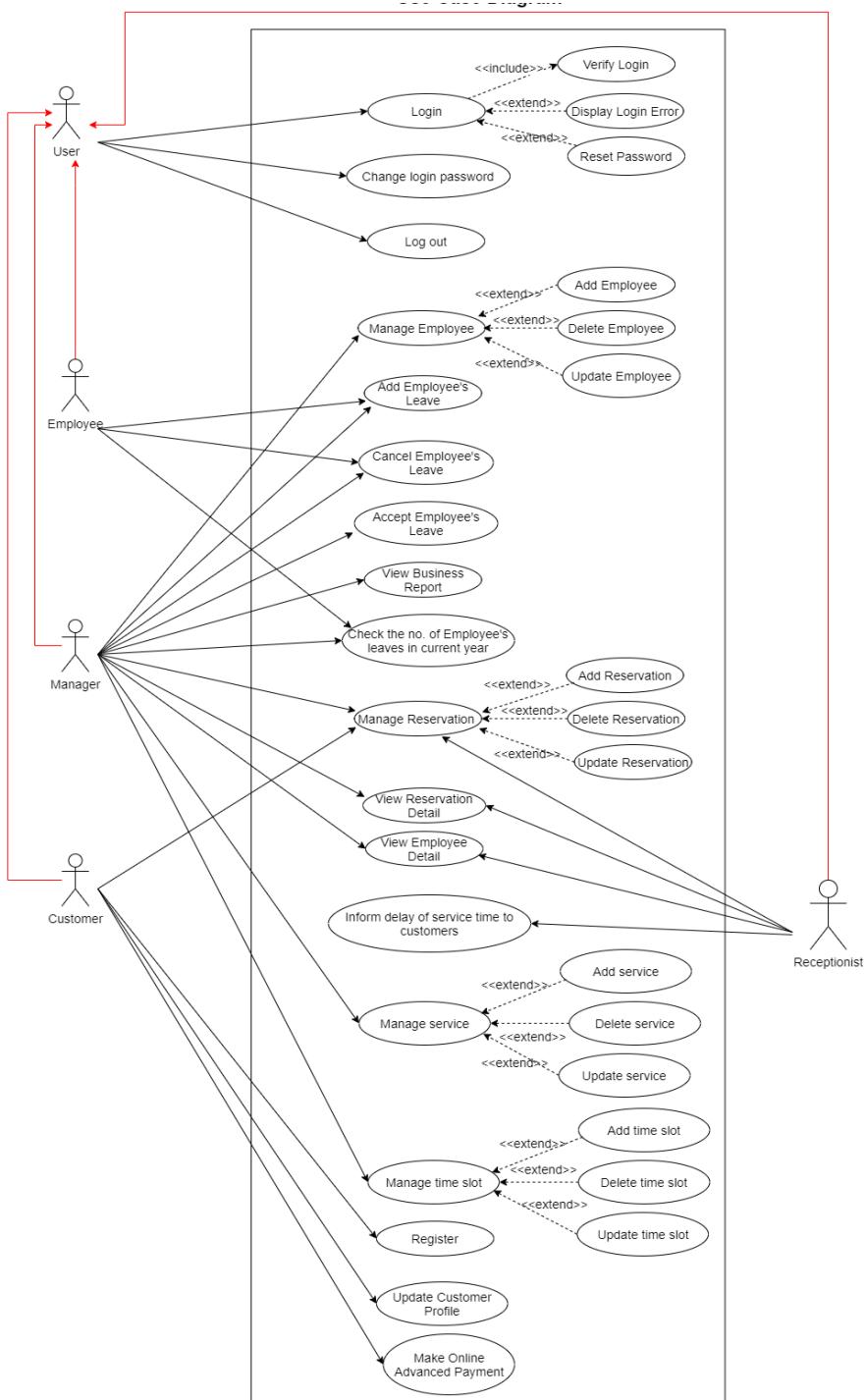


**Employee
(Service Employee)**

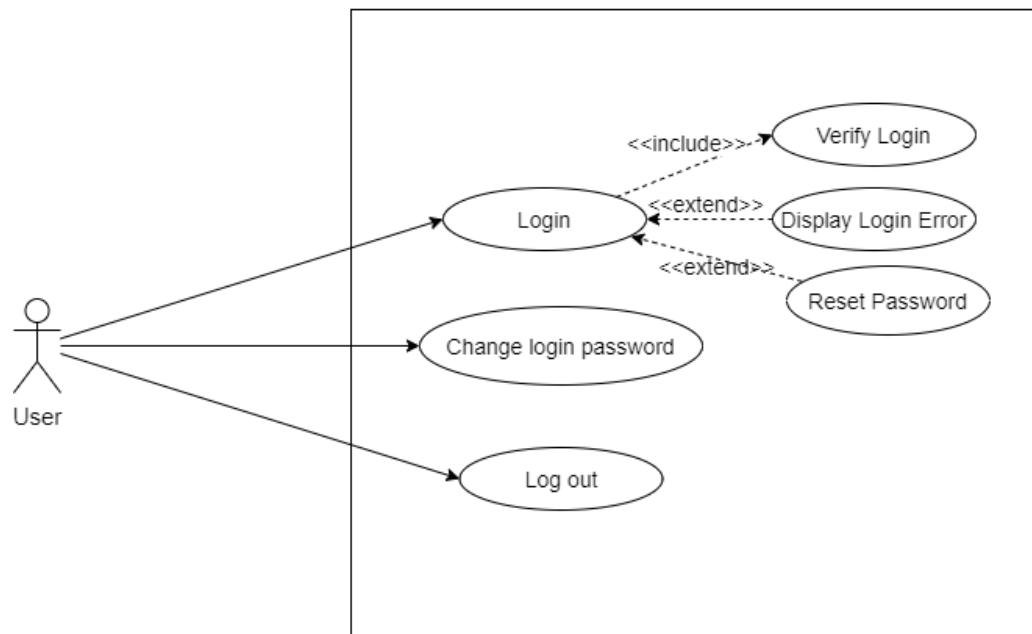
Workforce of the service station. Uses the system to apply for leave and check how many leaves they have

3.2) Use cases and Use case diagram

Use Case diagram for entire system:



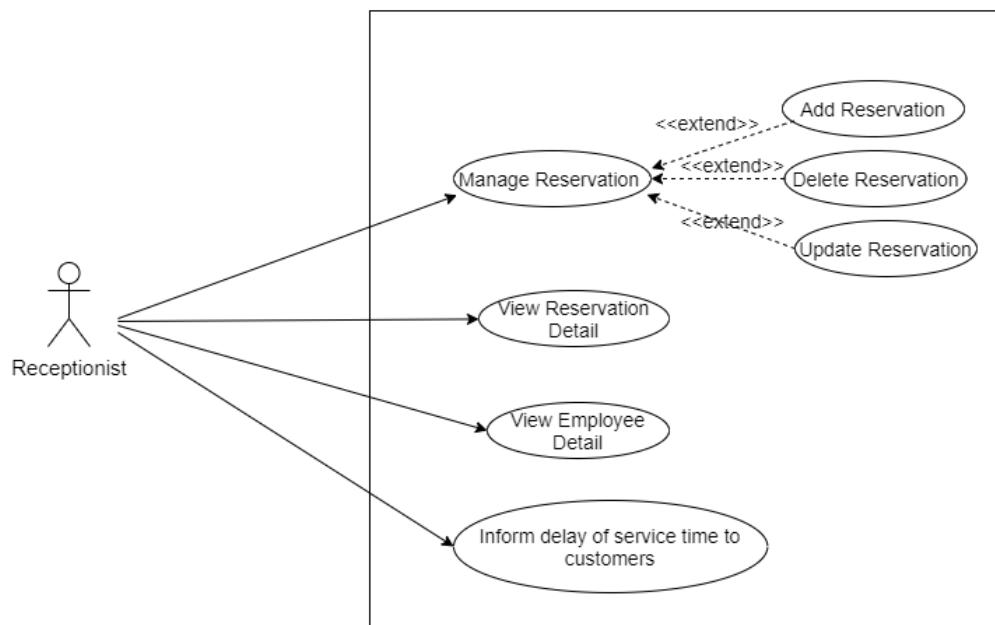
Use case diagram for User role:



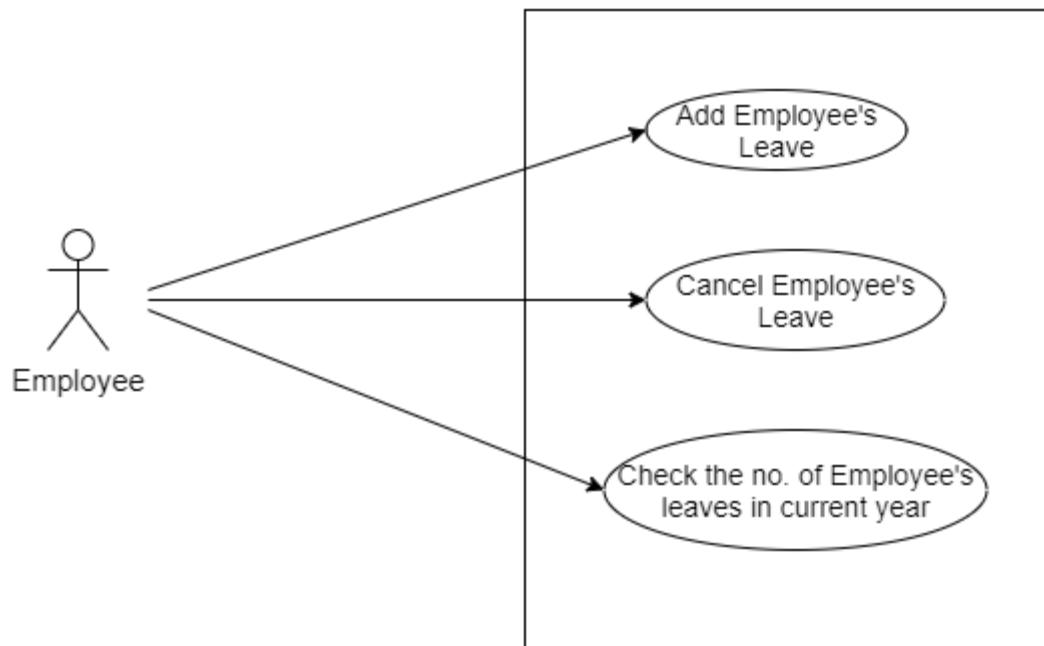
Use case diagram for Customer role:



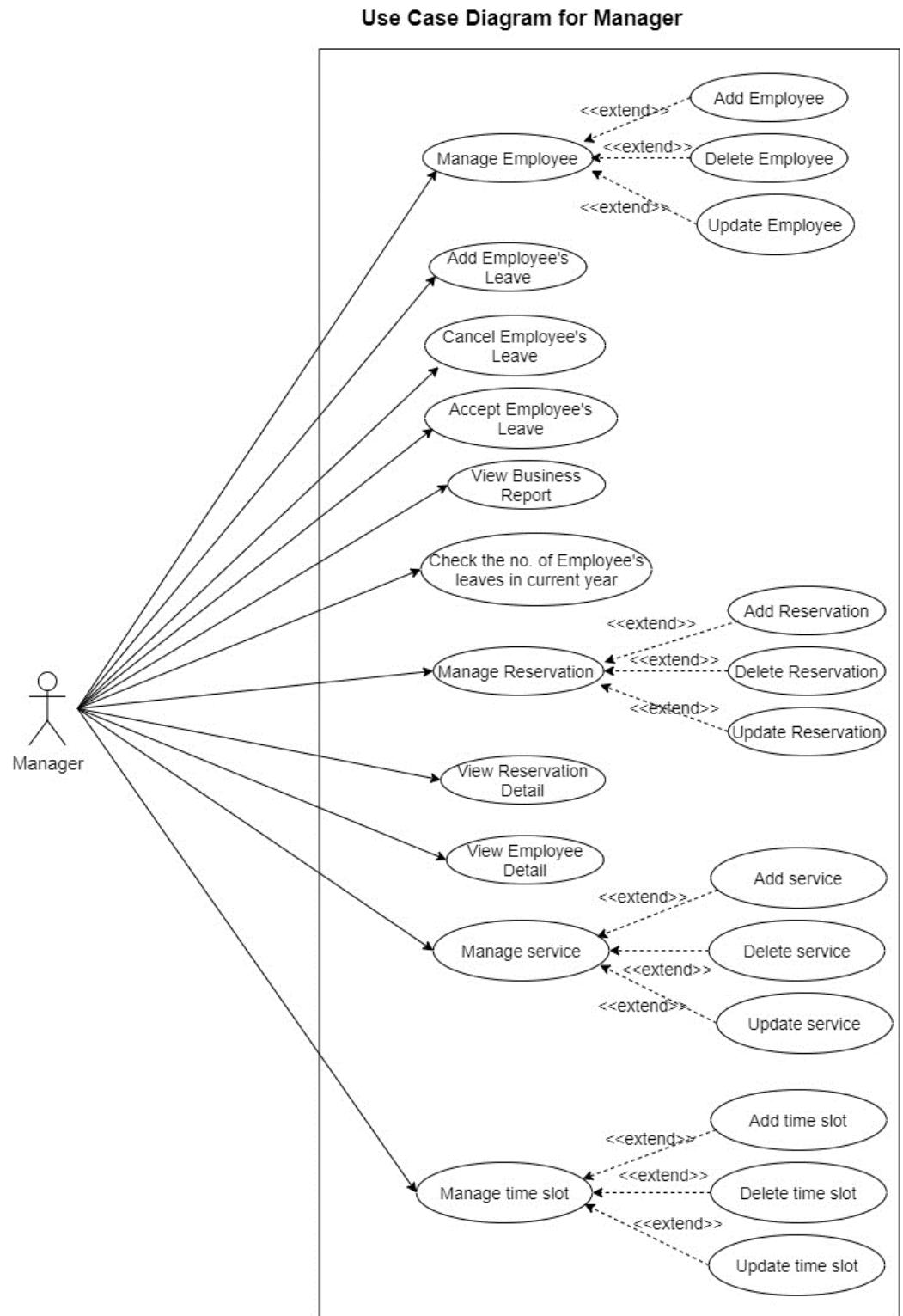
Use Case diagram for Receptionist (system handler):



Use Case diagram for Service Employee:



Use case diagram for Manager role:



Narratives:

Use Case	Login	Summary
Use Case ID	01	Need username and password to login (security). User can reset password when he or she forget password (security).
Actors	Employee, manager, receptionist, customer account.	
Preconditions	Registered as Employee, manager, receptionist, or customer.	
Description	All users can login giving username and password. User can reset password when he or she forget password.	
Exceptions	User has not been registered.	
Post conditions	Display you have logged in successfully.	

Use Case	Change Login password	Summary
Use Case ID	02	User can change own password(security).
Actors	Employee, manager, receptionist, customer account.	
Preconditions	Login done through Employee, manager, receptionist, or customer account.	
Description	User can change their password	
Exceptions	Forgot previous password	
Post Conditions	If not any other matters to attend to, can logout.	

Use Case	Logout	Summary User can logout of profile after using the system(security).
Use Case ID	03	
Actors	Employee, manager, receptionist, customer account.	
Preconditions	Login done through Employee, manager, receptionist or customer account.	
Description	User can logout own profile after this use web system.	
Exceptions	-	
Post Conditions	Login before reuse the system	

Use Case	Add Employee	Summary Manager can add employees who are joining newly to the database.
Use Case ID	04	
Actors	Manager	
Preconditions	Login to the system	
Description	When a new employee joins the company, Manager can add the employee to the database by adding his details.	
Exception	-	
Post Conditions	Issue Employee Id & password to Employee via SMS and update database.	

Use Case	Delete Employee	Summary Manager can remove employees from system.
Use Case ID	05	
Actors	Manager	
Preconditions	Login through manager account	
Description	Manager able to get decision whether employee is necessary or not	
Exception	-	
Post Conditions	Send an information message to the employee and if there's no other matters to attend to, can logout	

Use Case	Update Employee	Summary Manager can update employee personal details.
Use Case ID	06	
Actors	Manager	
Preconditions	Login through manager account	
Description	Only Manager able to update employee personal details. It will ensure the confidentiality of the employee details.	
Exception	-	
Post Conditions	Send an information message to the employee and if not any other matters to attend to, can logout	

Use Case	Add Employee Leave	Summary Employee can request for leave through the system which will be accepted/rejected by the manager. Manager can apply leave to Employees' directly (who have technological issues).
Use Case ID	07	
Actors	Employee, Manager	
Preconditions	Login done through Employee or manager account	
Description	Employee can request leaves from manager. Employee can request from leaves from manager from without the system. Then manager can update the calendar and database from manager login	
Exception	Employee leave limit exceeded	
Post Conditions	Display Leave date & update calendar	

Use Case	Cancel Leave	Summary
Use Case ID	08	Employee can cancel leave which they applied for priorly. Manager can cancel employees' leaves which were accepted before.
Actors	Employee, Manager	
Preconditions	Login done through Employee or manager account	
Description	Employee can cancel their pre requested leaves. If Employee does not have technology facilities, they can cancel their leave through manager. As well as manager can cancel leaves from Employees for an urgent reason.	
Exception	Day/Time of leave date is illogical.	
Post Conditions	Update calendar & if not any other matters to attend to, can logout.	

Use Case	Accept Employee leaves	Summary
Use Case ID	09	Manager can check employee leaves person-wise date wise.
Actors	Manager	
Preconditions	Login through manager account	
Description	Manager able to get decision whether leave reason and date are acceptable or not.	
Exception	Employee leave limit exceeded	
Post Conditions	Send an information message to the employee and if not any other matters to attend to, can logout	

Use Case	View Business Report	Summary
Use Case ID	10	Manager can view reports about the service station.
Actors	Manager	
Preconditions	Login through manager account	
Description	Only manager can view the business reports. Then manager able to get some feedback By using this business reports	
Exception	-	
Post Conditions	If not any other matters to attend to, can logout.	

Use Case	Check the Number of employees' leaves in current year	Summary Employee can check the number of leaves which they applied for in the current year.
Use Case ID	11	Manager can check employee leaves person-wise and date wise.
Actors	Employee, manager	
Preconditions	Login done through Employee or manager account	
Description	Employee can check the number of leaves which get before in current year & they can plan how can get their leaves in current year. Manager can check the Employee leaves, search some categories. From it he can calculate Additional allowances of End the year.	
Exception	-	
Post Conditions	If not other matters to attend to, can log out	

Use Case	Inform delay of service time to the customer	Summary If actual time is delayed while servicing a vehicle, receptionist can inform to another customer about delay by sending a message.	
Use Case ID	12		
Actor	Receptionist		
Preconditions	Login done through receptionist account		
Description	Receptionist can log to her/him account and search about delays from delay time table and then inform to customers about delay by sending a message.		
Exception	Not delay of service		
Post Conditions	-		

Use Case	Add Service	Summary
Use Case ID	13	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can add a new service type to the system from manager login. Then the service list is updated with newly added service type.	
Exception	-	
Post Conditions	-	

Use Case	Delete Service	Summary
Use Case ID	14	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can delete a service from the system by login through manager account. Then the list is updated.	
Exception	-	
Post Conditions	-	

Use Case	Update Service	Summary
Use Case ID	15	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can update a service in the system by login through manager account. Then the list is updated with new updates.	
Exception	-	
Post Conditions	-	

Use Case	Add Time slot	Summary If service center wants to add a new time slot to a new lift, manager can add the new time slot to the system.
Use Case ID	16	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can add a new time slot to the system from manager login. Then the system is updated.	
Exception	-	
Post Conditions	-	

Use Case	Delete Time slot	Summary If service center wants to delete a time slot from system which not use any more, manager can delete the time slot.
Use Case ID	17	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can delete a time slot from the system by login through manager account. Then the system is updated.	
Exception	-	
Post Conditions	Confirm deletion	

Use Case	Update Time slot	Summary If service center wants to update a time slot with new details, manager can update the time slot.
Use Case ID	18	
Actor	Manager	
Preconditions	Login done through manager account	
Description	Manager can update a time slot by login through manager account. Then the system is updated with new updates.	
Exception	-	
Post Conditions	-	

Use Case	Reserve booking	Summary
Use Case ID	19	Customer can reserve a date/time priorly for their vehicle to have a service.
Actors	Customer, manager, receptionist	Manager and receptionist can also make reservations for customers through system.
Pre-Conditions	Should be logged in as customer or by receptionist	
Description	User can reserve the date/time for their car service priorly for an available timeslot. Online payment for an advance is possible and conditions (advance should be paid 48 hours before time of booking online or otherwise method), details, other ways of payment will be displayed. Main functionality of system. Receptionist and manager can also book for TP calls received from customers and for inquiries.	
Exception	Invalid date/time	
Post Conditions	If not other matters to attend to, can log out	

Use Case	Delete, update booking	Summary
Use Case ID	20,21	•Customer can delete, update the date a reservation made by them.
Actors	Customer, Manager, Receptionist	•Manager, Receptionist can also delete, update a reservation made by a customer.
Pre-Conditions	Should be logged in as customer	
Description	User can delete reserve the date/time for their car service priorly for an available timeslot. Customer can readily change the time to another available time slot if there's more than 48 hours from current time. If not he/she is given a single chance to change/delete. If not, it cannot be changed. Deletion is possible here, but no refunds will be settled.	
Exception	Invalid date/time	
Post Conditions	Log out If successful: Update Calendar	

Use Case	View booking Detail	Summary Both Manager and Receptionist can view relevant booking details which are reserved by customers.	
Use Case ID	22		
Actors	Manager, Receptionist		
Preconditions	Login as Manager or Receptionist		
Description	If there is a need to view details of booking which are reserved by customers, Manager or Receptionist can log to system and view detail about booking by searching relevant booking detail		
Exception	-		
Post Conditions	If not any other matters to attend to, can logout.		

Use Case	View Employee Detail	Summary Both Manager and Receptionist can view relevant details of employees which are included in database.	
Use Case ID	23		
Actors	Manager, Receptionist		
Preconditions	Login as Manager or Receptionist		
Description	If there is a need to view details of employees who works in the company, Manager and Receptionist can search the employee detail and then view the relevant detail.		
Exception	-		
Post Conditions	If not any other matters to attend to, can logout.		

Use Case	Register	Summary Can create accounts for user groups.	
Use Case ID	24		
Actors	Customer		
Preconditions	-		
Description	Customer can create an account with his details (TP no, email address, vehicles) which would facilitate in future orders.		
Exception	Invalid data for fields		
Post Conditions	If success: account created in database.		

Use Case	Update Customer profile	Summary Customer can change his account details.	
Use Case ID	25		
Actors	Customer, Manager		
Preconditions	Login through customer account		
Description	Customers can change their TP no, email, vehicles etc. this does not affect already booked reservations. Manager can even update the profiles for customers when said through telephone.		
Exception	-		
Post Conditions	Update database		

Use Case	Make Online advance payment	Summary Can pay advance even online (quality)	
Use Case ID	26		
Actors	Customer		
Pre-Conditions	Should be in 'reserve booking'		
Description	User can select a payment method and pay the advance. All authentication will be handled by the online payment module.		
Exception	<ul style="list-style-type: none"> • Payment method error • Insufficient balance error etc. 		
Post Conditions	If success: Perform transaction		

3.3) Functional Requirements

The identified requirements are as follows:

For all users:

- Shall have Register, Login and Logout for their accounts.
- Shall be able to change their passwords in accounts.
- Shall be able recover forgotten password through email.

Customer

- Shall be able to reserve a date/time priorly for their vehicle to have a service.
- Shall be able to view their account details and reservations they have made.
- Shall allow deletion, updating of the reservation date made by them within certain terms and conditions imposed by the car service station.
- Shall be able to change his/her account details.

Manager

- Shall be able to add/delete new types of services with description, cost etc.
- Shall be able to add/delete new time slots when adding lift equipment for the service station.
- Shall be able to add employee records to the system.
- Shall be able to remove employees from system.
- Shall be able to update employee personal details.
- Shall be able to check employee leaves person-wise and date wise.
- Shall be able to cancel employees' leaves which were accepted before.
- Should be able to apply leave for employees' directly (who have technological issues).
- Should be able to view reports about the service station.

Manager and Receptionist

- Shall be able to make reservations for customers through system.
- Shall be able to view reservations made by customer.
- Shall be able to delete, update a reservation made by a customer.

Receptionist

- Shall be able to send messages to relevant customers through the system if a delay in timetable occurs.

Employee

- Should be able to check the number of leaves which they applied for in the current year.
- Shall be able to view their account details and leaves they have applied for from the calendar.
- Should be able to cancel leave which they applied for priorly.
- Shall be able to request for leave through the system which shall be accepted/rejected by the manager.

System

- Shall be able to cancel reservations that have not been paid for if it is less than 48 hours of current time while sending an SMS notification.
- Shall be able to generate a calendar with the reservation details denoting available, reserved, and blocked time slots.
- Shall be able to generate a calendar with the leave request details of employees on each date.
- Should generate reports based on leave data of employees for manager role when necessary.
- Should facilitate online method for advance payment.

3.4) Quality Attribute Requirements

Following are the relevant quality attributes planned to be achieved using the system according to ISO standards [2].

- Availability
- Usability
- Modifiability
- Security
- Testability

Availability:

- The system and reservation system are easily accessible since it is a website. The customers can access the system by simply typing the website URL.
- The online payment function will be done using the PayHere module [3]. Even though it is a 3rd party integration, reliability is ensured.
- The system databases will be programmed to back up on a regular basis.
- System will be optimized to give best resolution across different devices for the website.

Usability –

- The website will be made using simple User-friendly interfaces so that it will be pleasant for the customers to view and understand the system without confusion
- The System will display calendar dates and reservations in an easily distinguishable manner (green for available, red for blocked dates etc.)

Modifiability –

- As the system is made using an OO development approach it will be made component by component so that each component can be modified accordingly.
E.g.: The price of a certain service could be changed accordingly after some time
- New components and functionalities can be added as future enhancements later.
E.g.:
 - Promo code generation based on previous customer orders
 - Choosing Employee of the month based on employee leave taking

Security:

- All user credentials from logins and registrations will be sent securely encrypted from the frontend (Hashing mechanisms will be used).
- Sensitive fields, elements will be kept encrypted in the database (User logins, passwords).
- Only the **manager** will be allowed all administrative roles such as access to user records, employee information and reservation data
- Following are the only 3rd party modules used and reasons as to why:
 - PayHere: For online advance payment functionality
 - Nexmo [4]: Text message notifications for reservations, password changes etc.

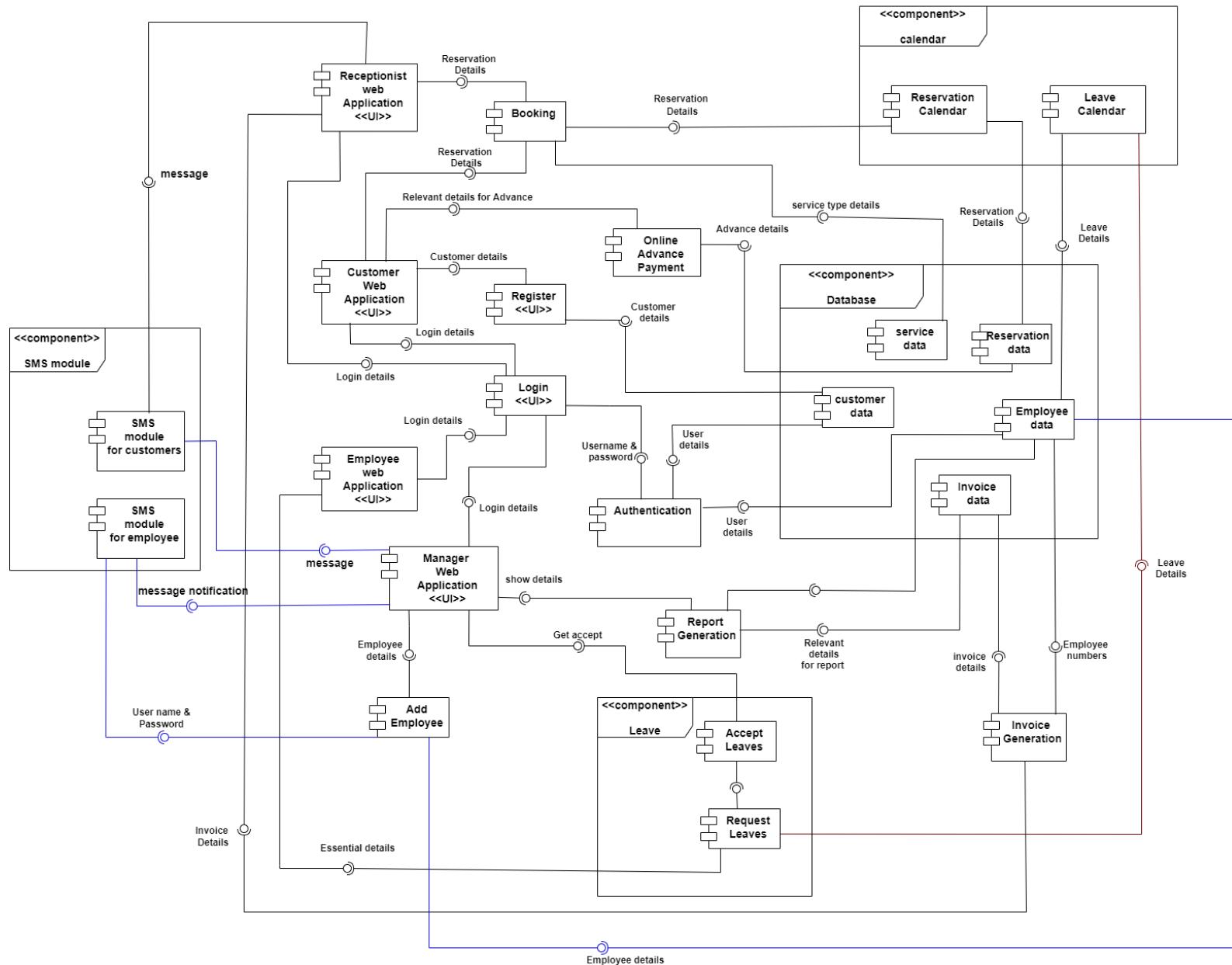
Both above modules are in correspondent to data security measures and details regarding them are available in the references.

Testability-

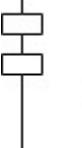
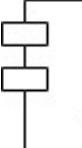
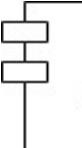
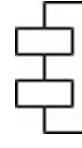
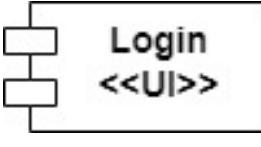
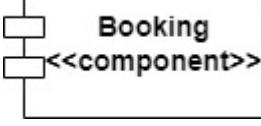
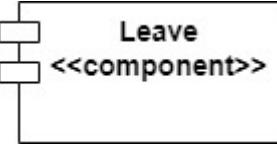
- In case of system failures, error detection and debugging will be easier due to modularity.

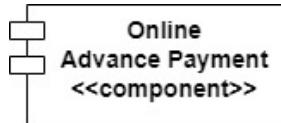
4) Proposed System Architecture

Component Diagram

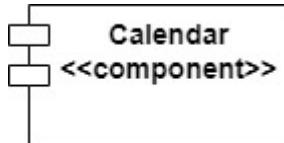


Following are the respective **individual components and their respective responsibilities**:

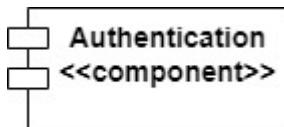
 Manager Web Application <code><<UI>></code>	UI Component for manager which shows the view of functionalities the user role can perform
 Customer Web Application <code><<UI>></code>	UI Component for customer which shows the view of functionalities the user role can perform
 Employee web Application <code><<UI>></code>	UI Component for Employee which shows the view of functionalities the user role can perform
 Receptionist web Application <code><<UI>></code>	UI Component for receptionist which shows the view of functionalities the user role can perform
 Register <code><<UI>></code>	Component which performs customer registration
 Login <code><<UI>></code>	Web page for all users to login to the system
 Booking <code><<component>></code>	Component which handles customer reservations (Add, Update, Delete).
 Leave <code><<component>></code>	Component which handles leave request system.



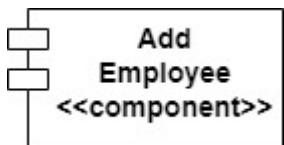
Handle online advanced payment along with PayHere module.



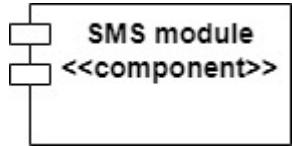
Display interactive calendar for users.



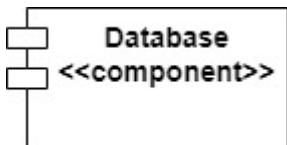
Handles authentication and security functions with the database (hashing).



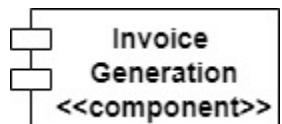
SMS - To send notifications through text messages.



SMS - To send notifications through text messages.



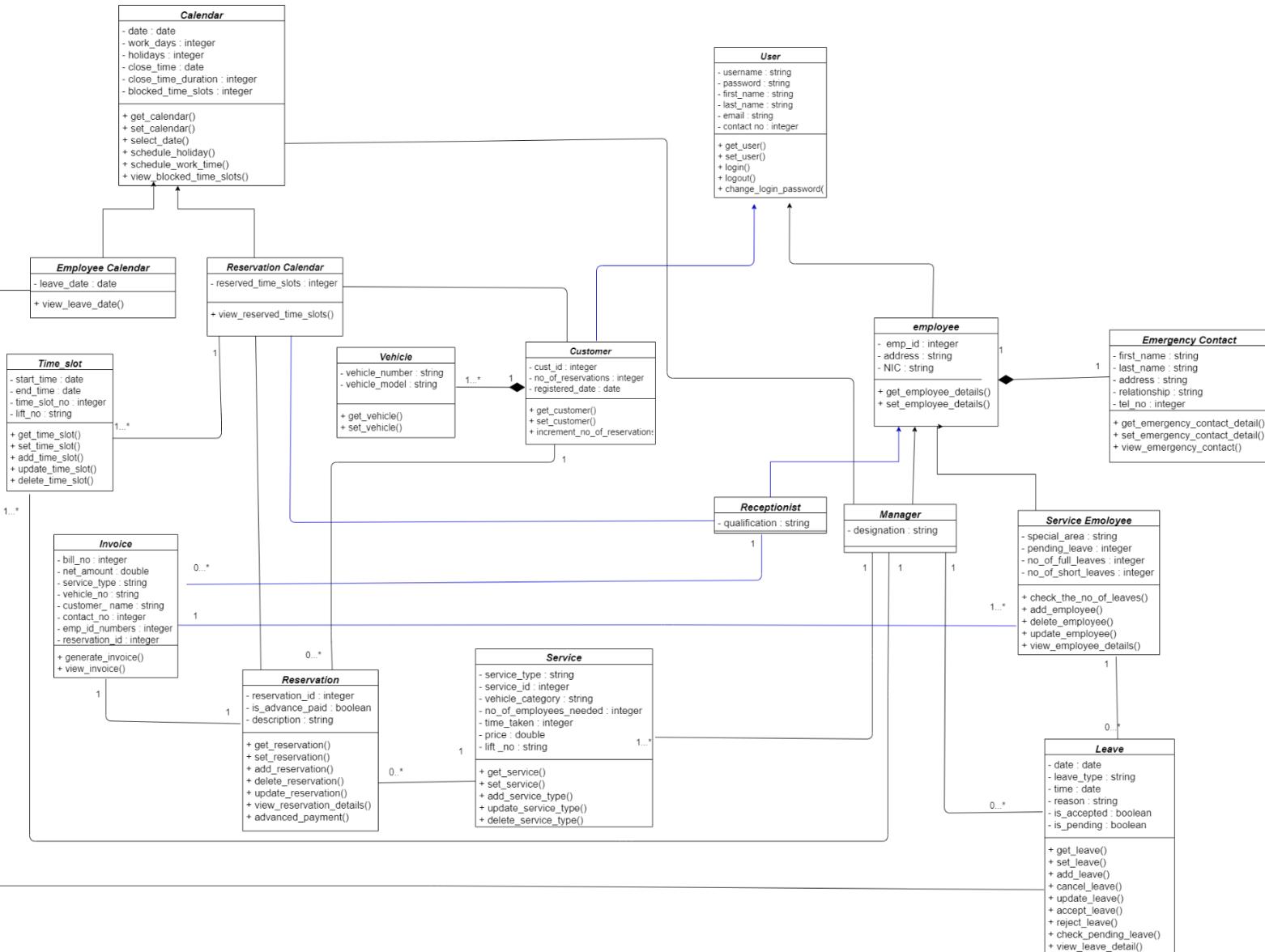
Save necessary data about the service center and customers.



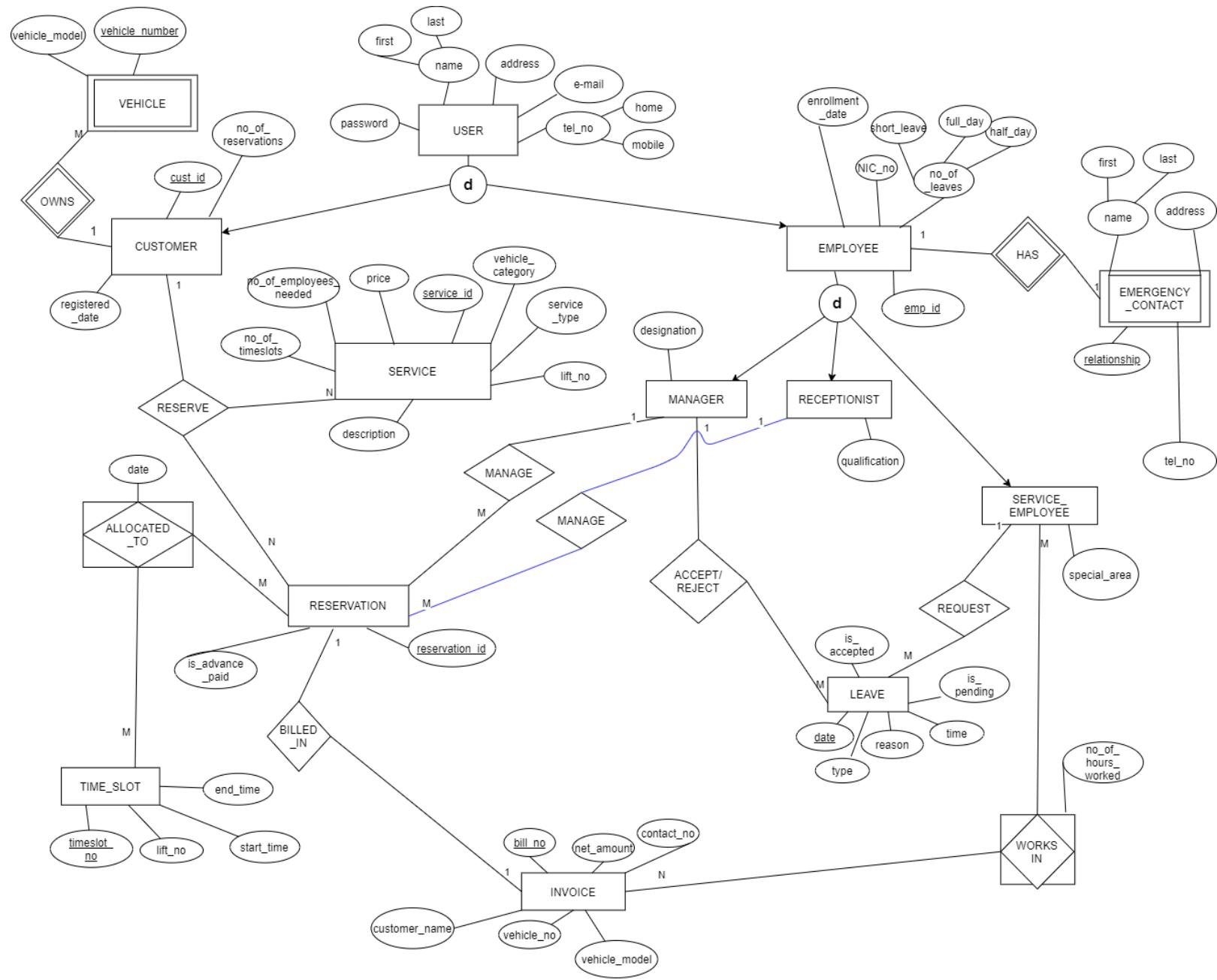
To generate invoice ,bill details about the current service (will also have details on which employees worked on each service).

5) Design of the System

5.1) Class Diagram



5.2) Entity-Relationship Diagram



Logical Mapping:

CUSTOMER

<u>cust_id</u>	first_name	last_name	address	e-mail	home_tel_no	mobile_tel_no
<u>no_of_reservations</u>	registered_date	password				

MANAGER

<u>emp_id</u>	first_name	last_name	address	e-mail	home_tel_no	mobile_tel_no	NIC_no
<u>no_of_leaves_short</u>	<u>no_of_leaves_halfday</u>	<u>no_of_leaves_fullday</u>					enrollment_date
designation	password						

RECEPTIONIST

<u>emp_id</u>	first_name	last_name	address	e-mail	home_tel_no	mobile_tel_no	NIC_no
<u>no_of_leaves_short</u>	<u>no_of_leaves_halfday</u>	<u>no_of_leaves_fullday</u>					enrollment_date
qualification	password						

SERVICE_EMPLOYEE

<u>emp_id</u>	first_name	last_name	address	e-mail	home_tel_no	mobile_tel_no	NIC_no
<u>no_of_leaves_short</u>	<u>no_of_leaves_halfday</u>	<u>no_of_leaves_fullday</u>					enrollment_date
Special_area	password						

EMERGENCY_CONTACT

<u>emp_id</u>	relationship	first_name	last_name	address	tel_no
---------------	--------------	------------	-----------	---------	--------

SERVICE

<u>service_id</u>	service_type	description	price	vehicle_category	address	lift_no
<u>no_of_timeslots</u>	<u>no_of_employees</u>		Cust_id (FK)			

RESERVATION

<u>reservation_id</u>	is_advance_paid	<u>cust_id (FK)</u>	<u>emp_id (FK)</u>
-----------------------	-----------------	---------------------	--------------------

INVOICE

<u>bill_no</u>	customer_name	vehicle_no	vehicle_model	contact_no	net_amount
----------------	---------------	------------	---------------	------------	------------

<u>reservation_id</u> (FK)

EMPLOYEE_PER_SERVICE (WORKS-IN)

<u>emp_id</u>	<u>bill_no</u>	<u>no_of_hours_worked</u>
---------------	----------------	---------------------------

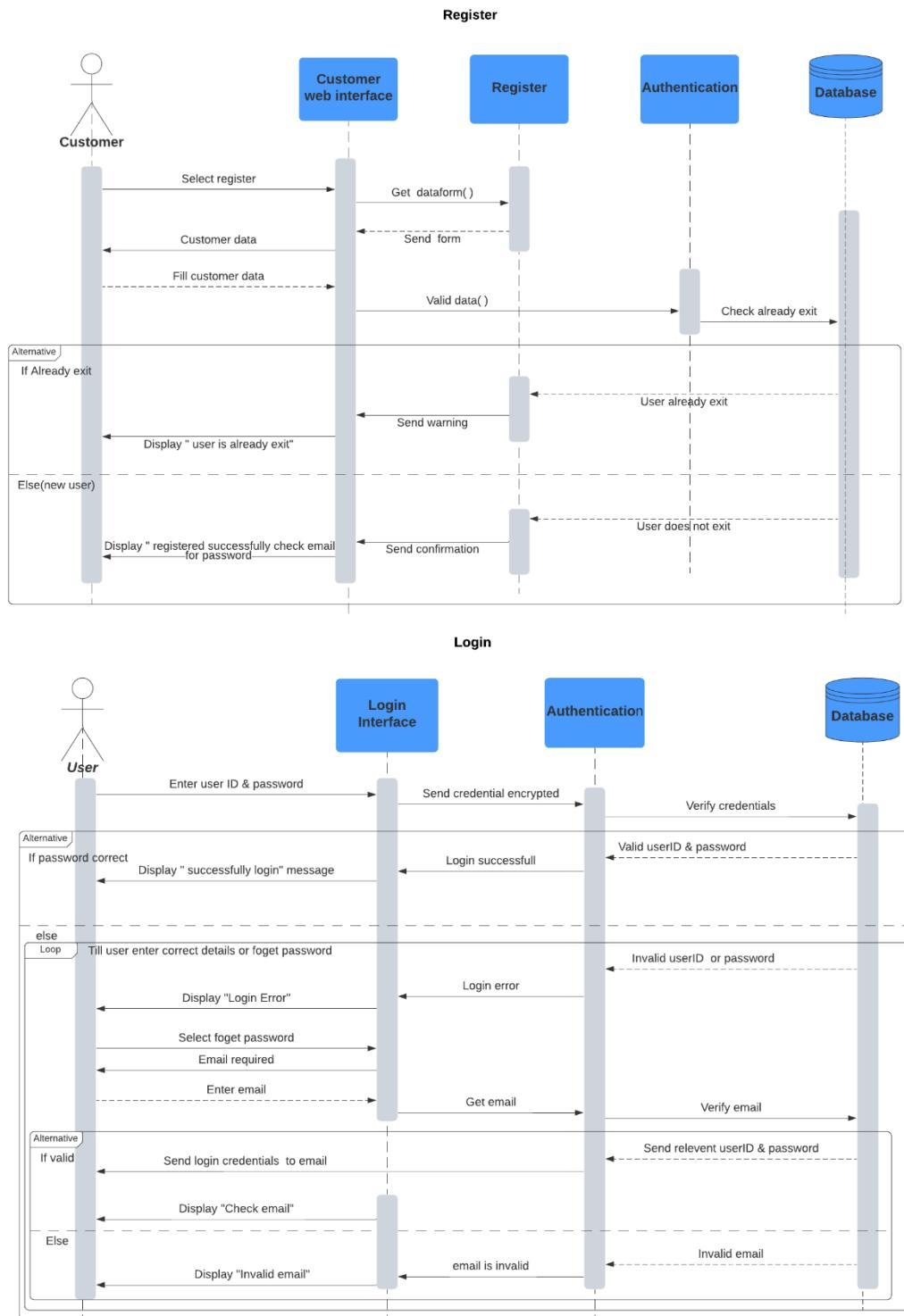
TIME_SLOT

<u>timeslot_no</u>	<u>lift_no</u>	<u>start_time</u>	<u>end_time</u>
--------------------	----------------	-------------------	-----------------

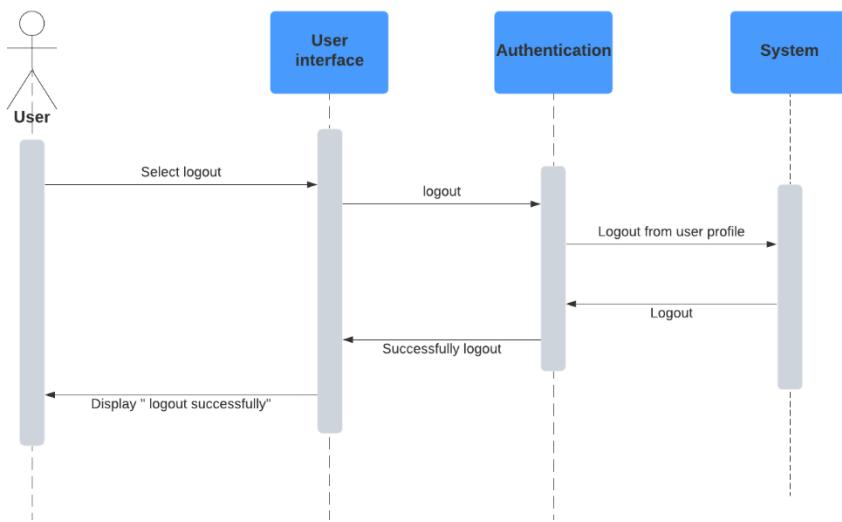
RESERVATION-TIME_SLOT

<u>reservation_id</u>	<u>timeslot_no</u>	<u>date</u>
-----------------------	--------------------	-------------

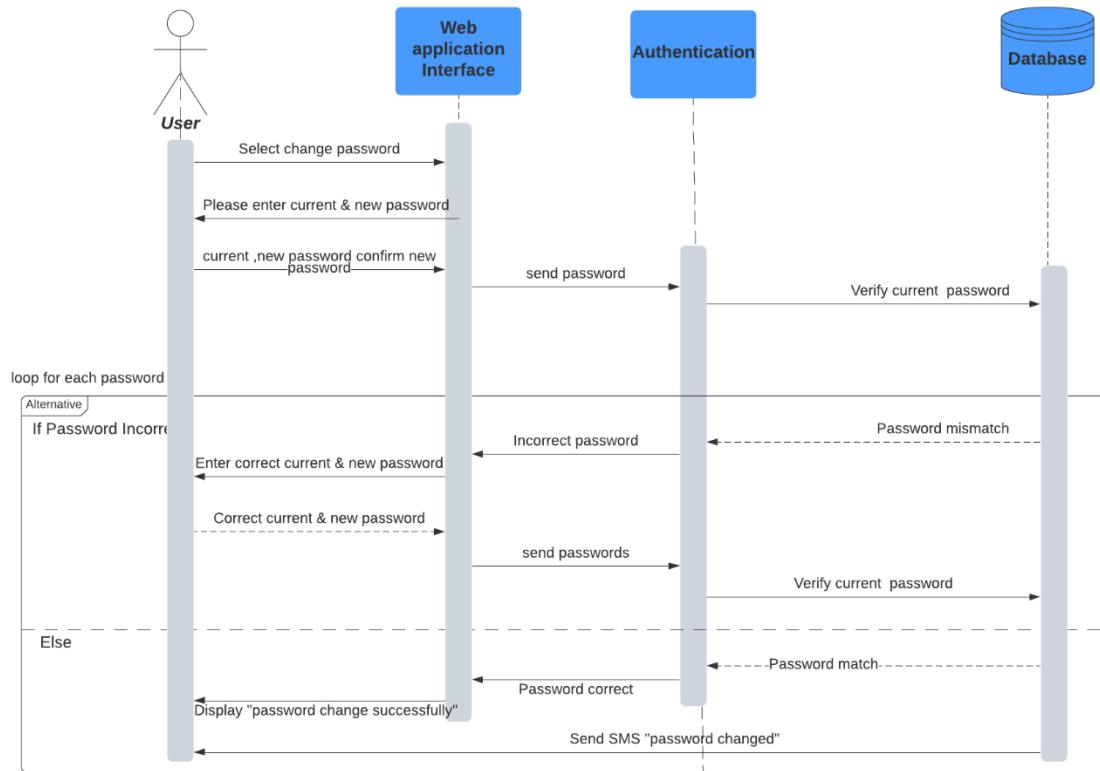
5.3) Sequence Diagrams

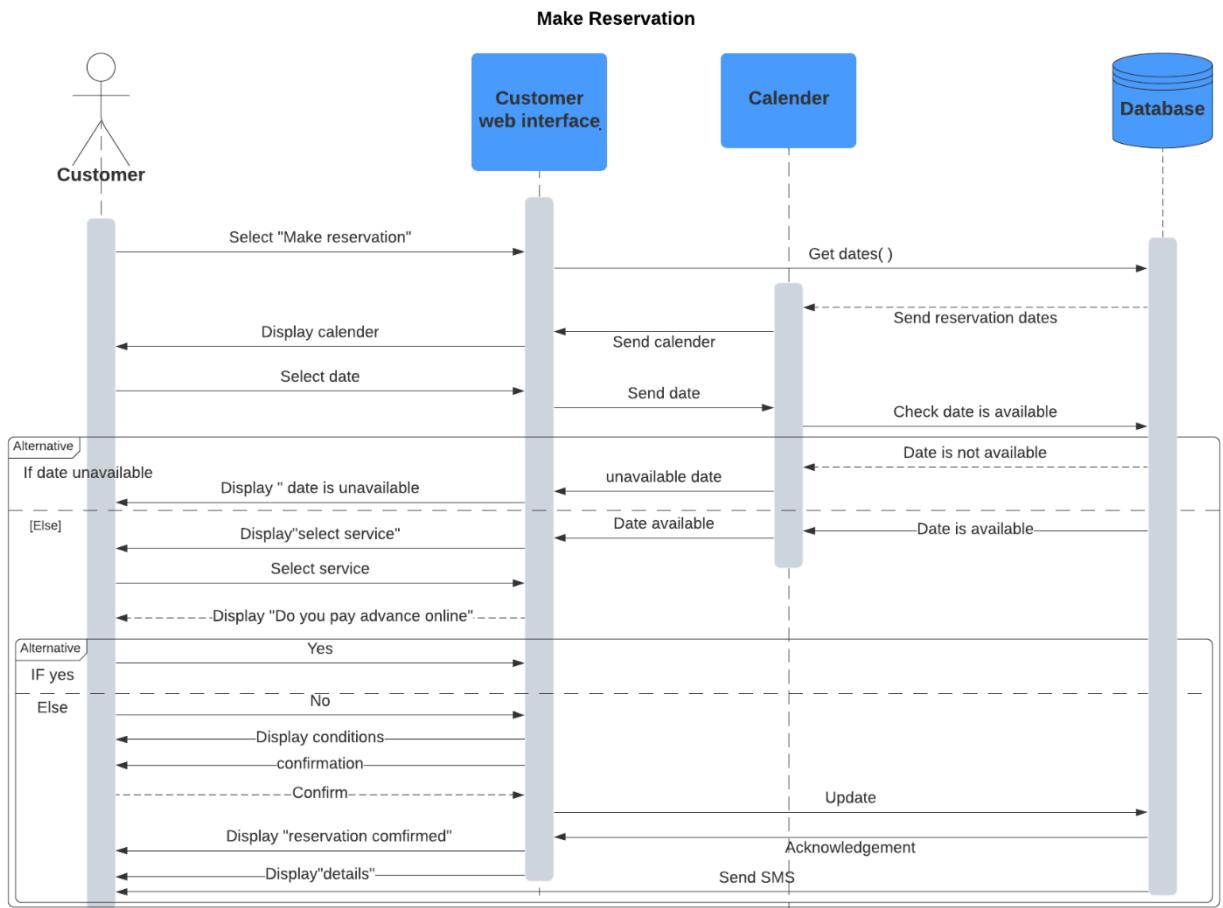


Logout

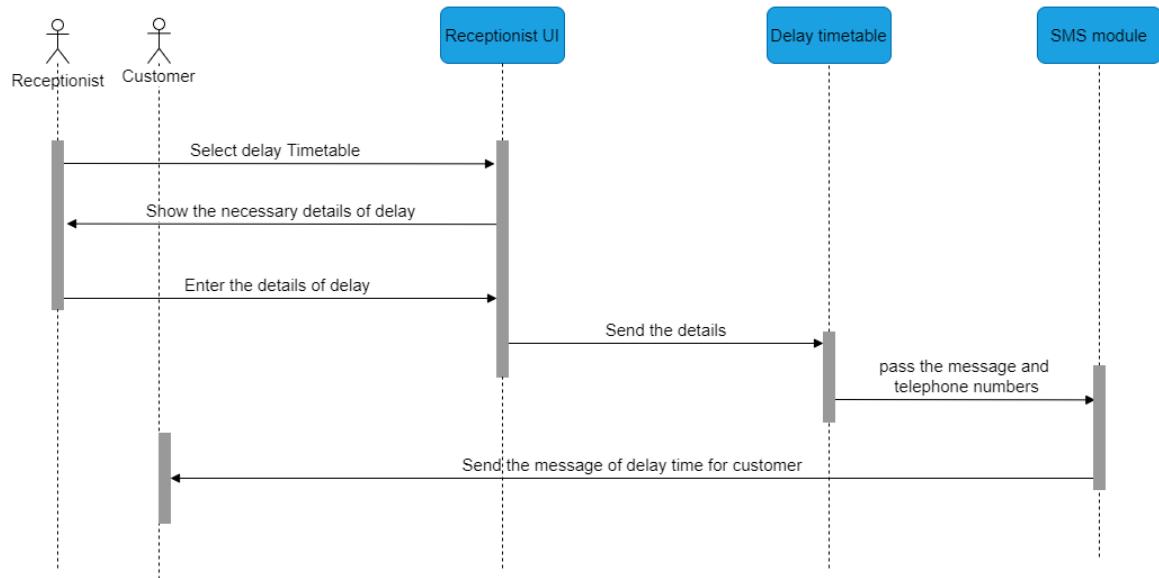


Change Login Password

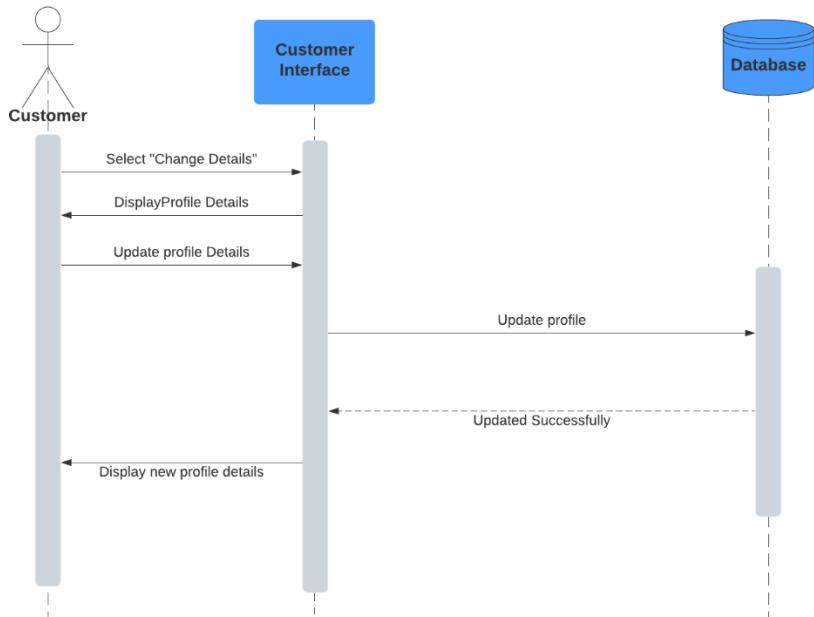


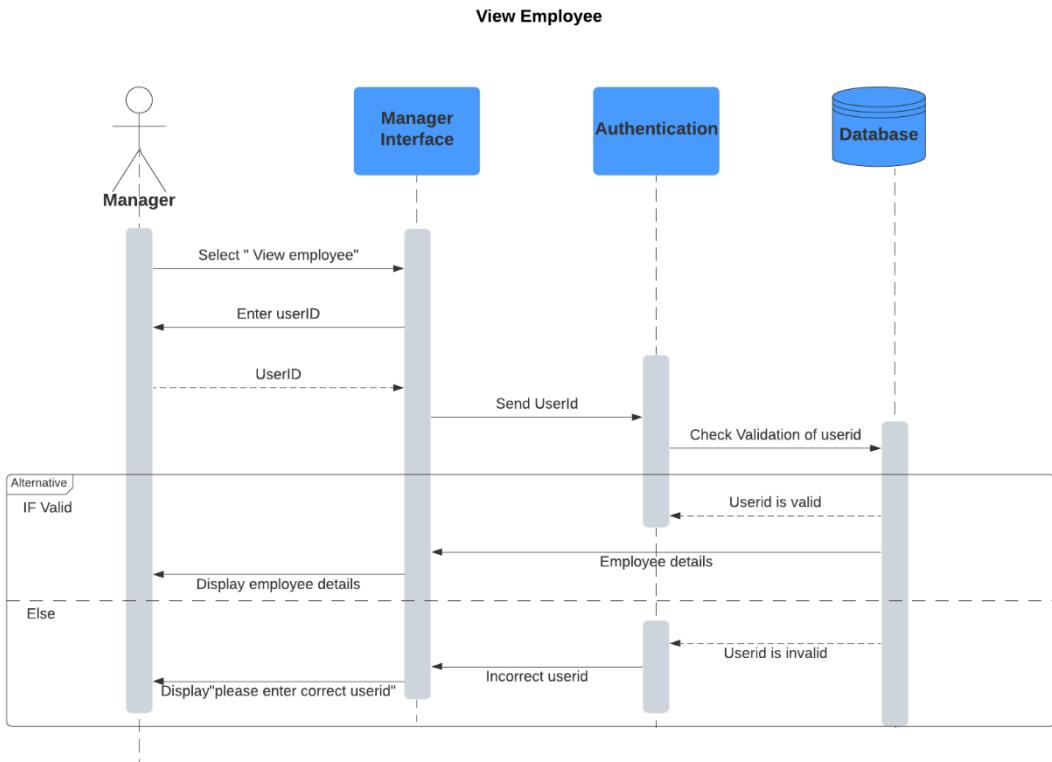
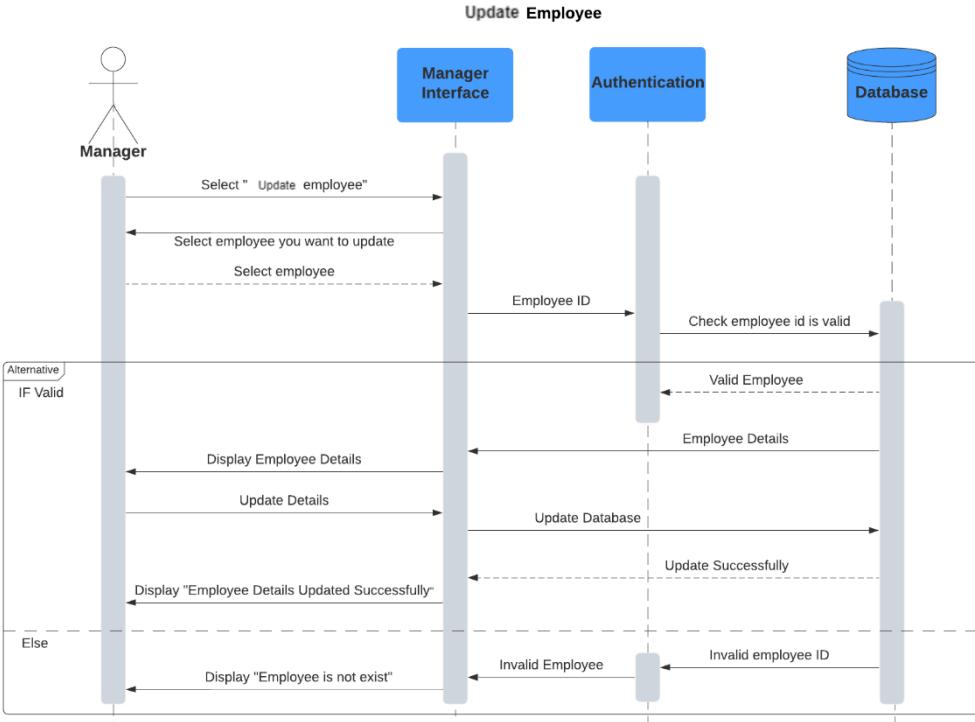


Delay Timetable

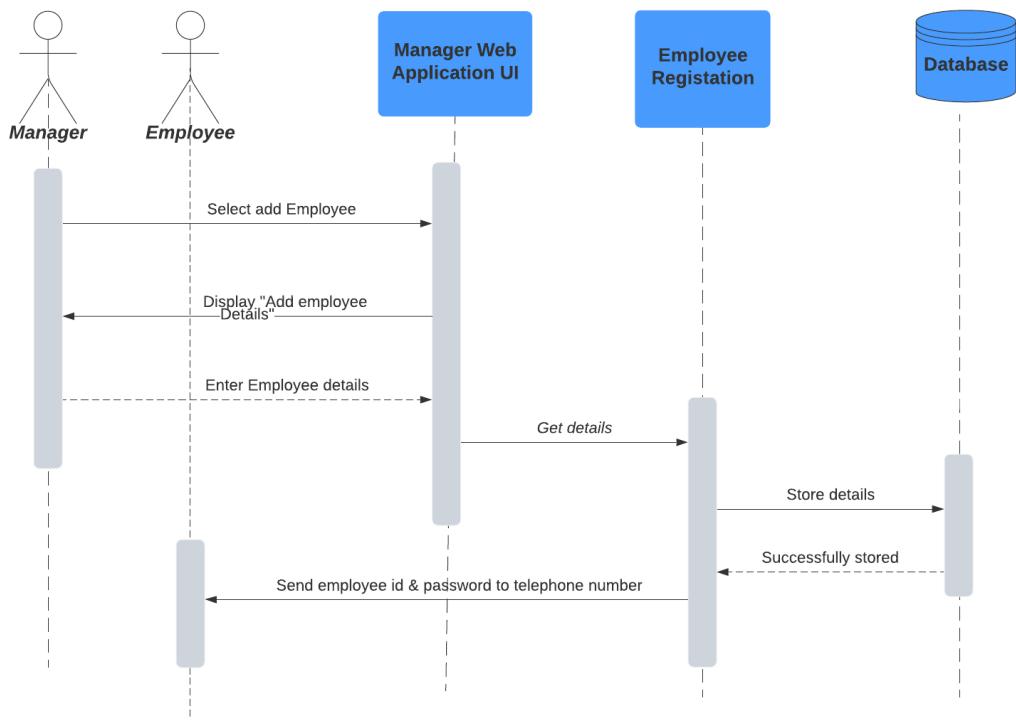


Update Profile

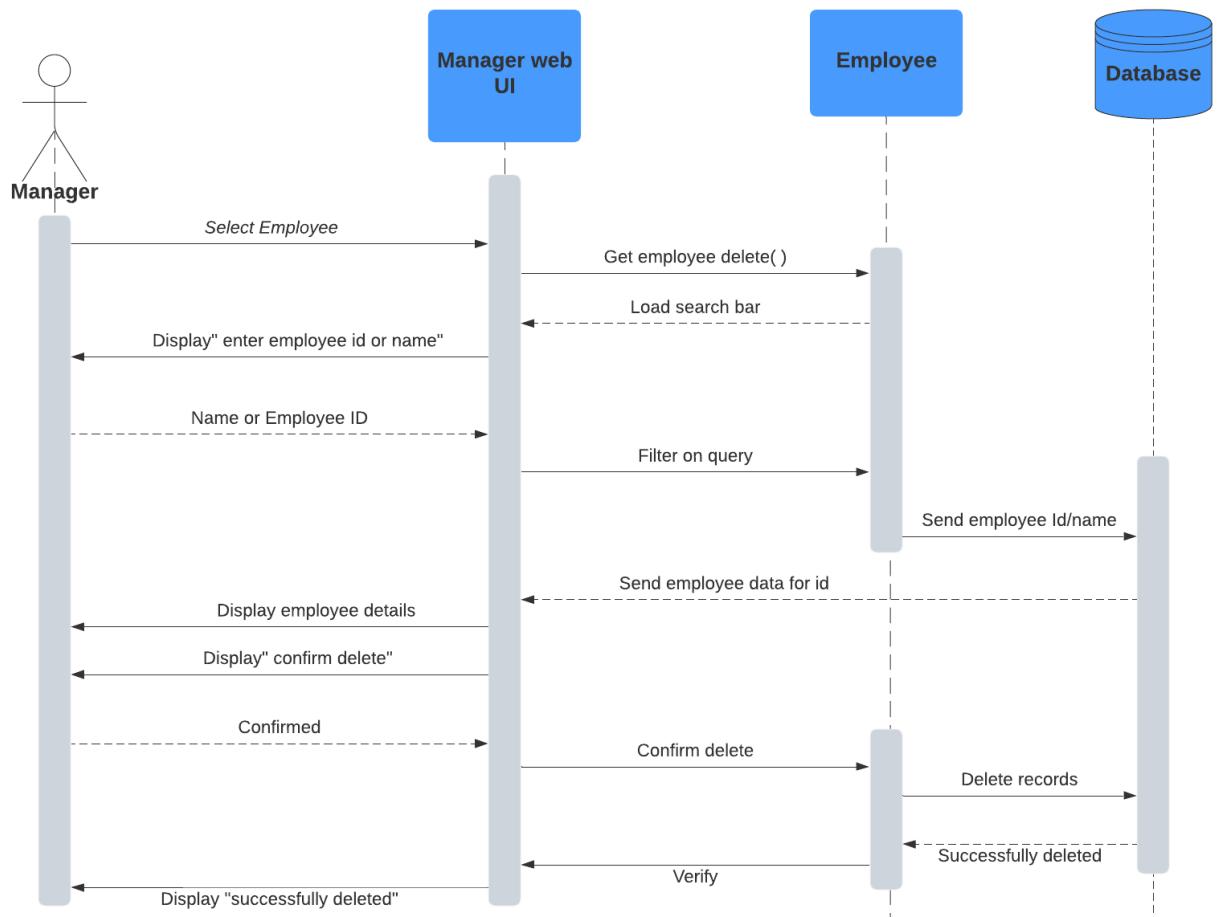


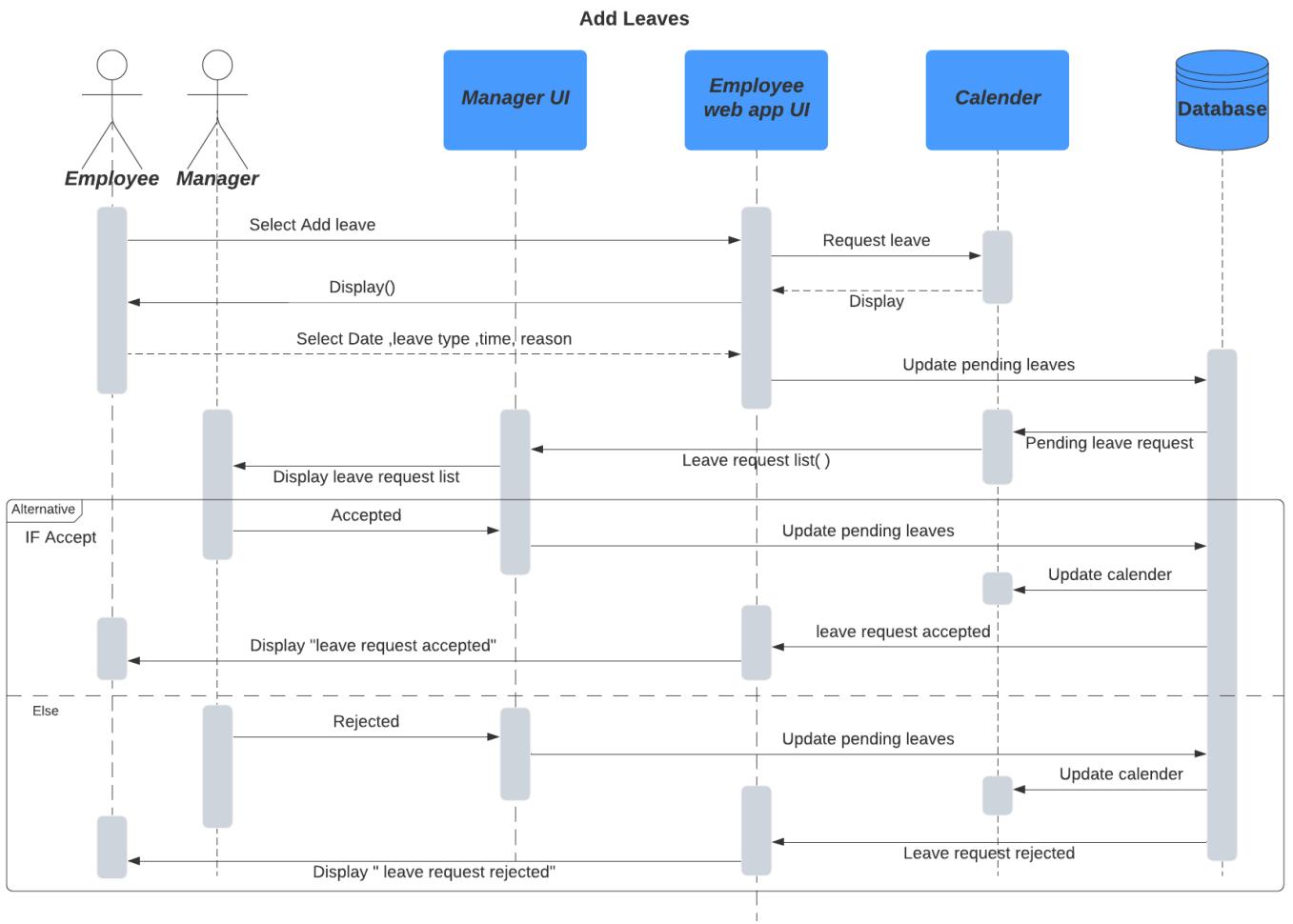


Add New Employee

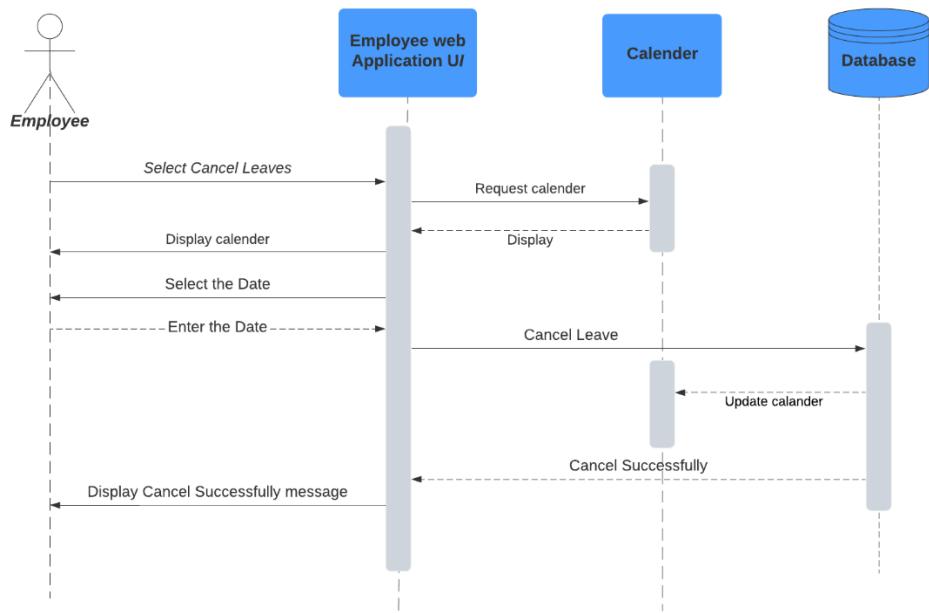


Delete Employee

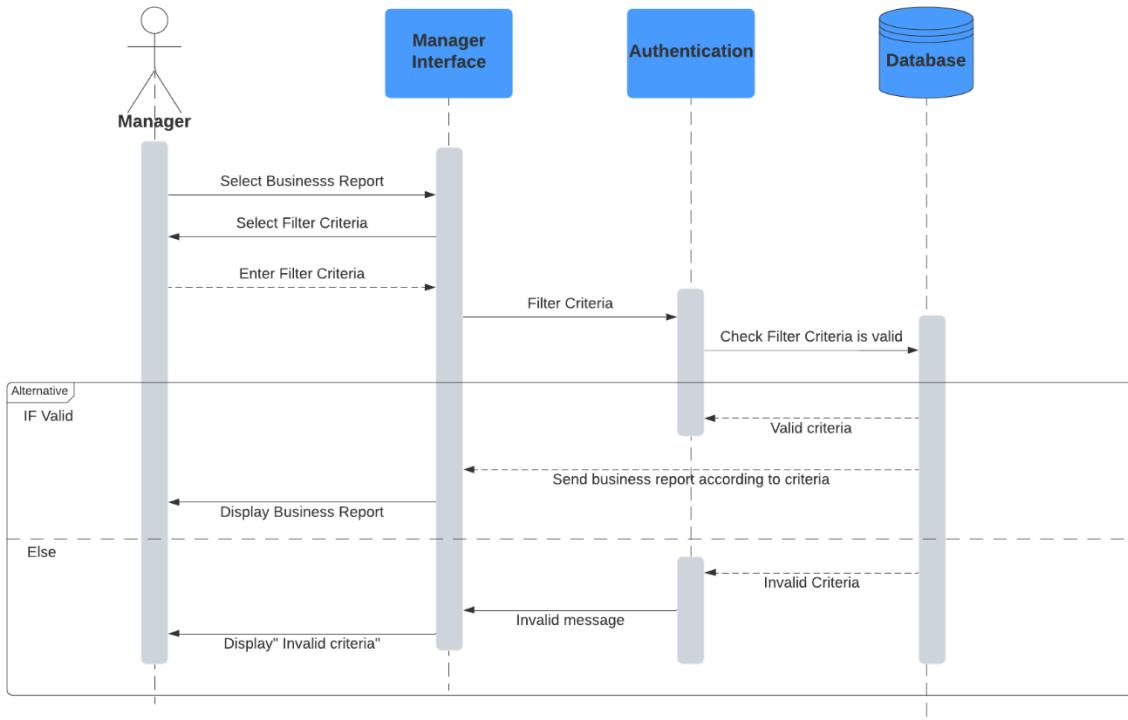




Cancel Leaves

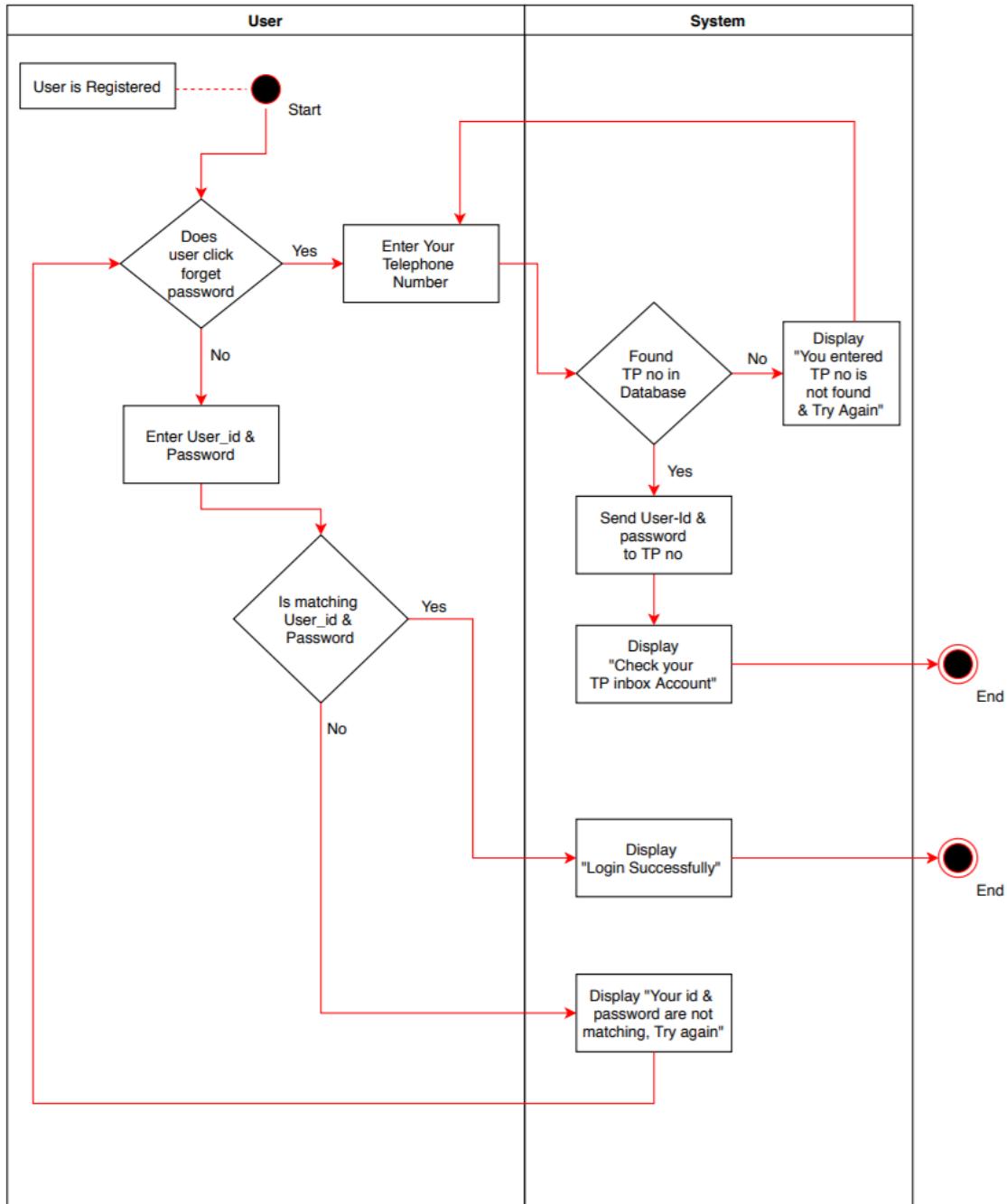


View Business Report

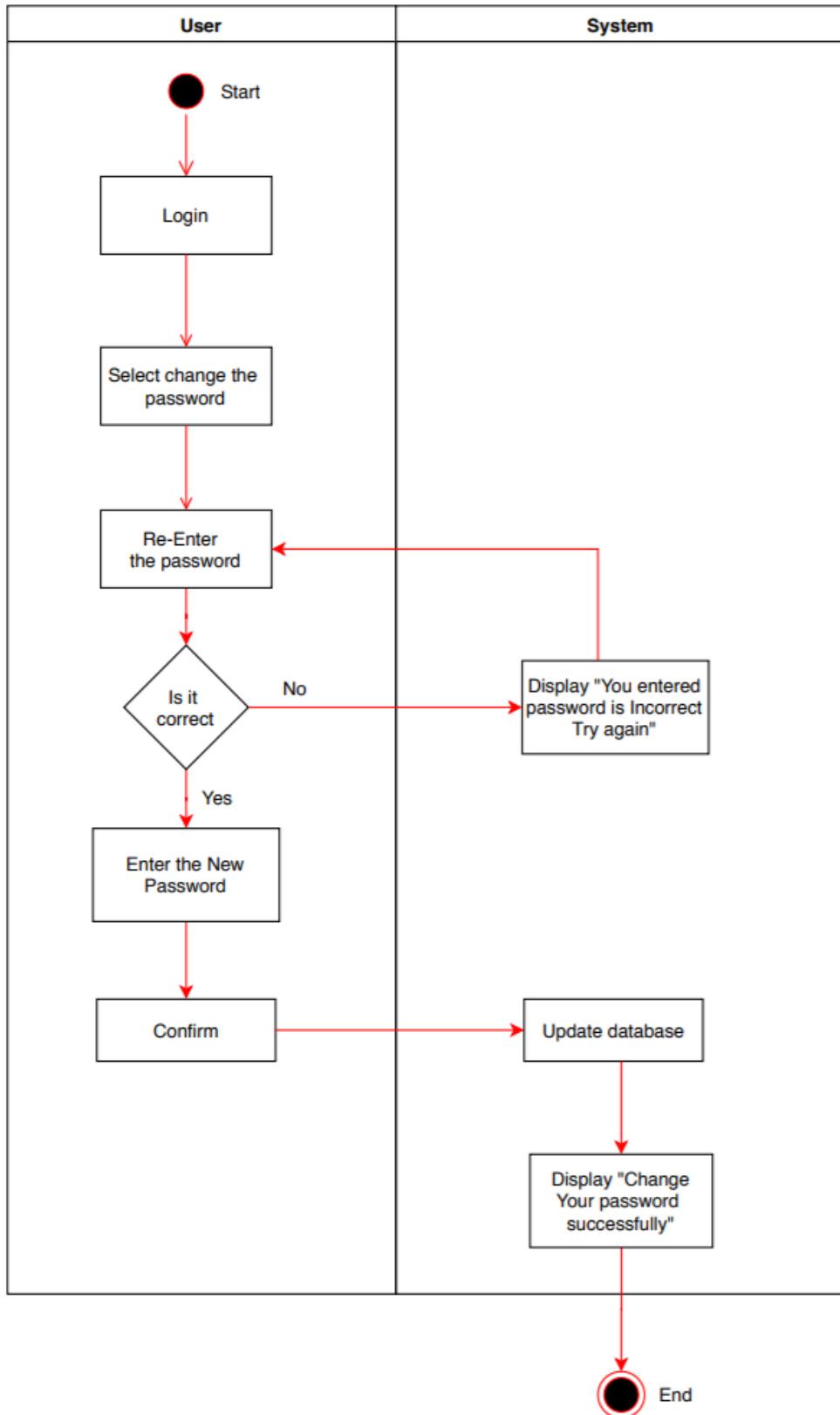


5.4) Activity Diagrams

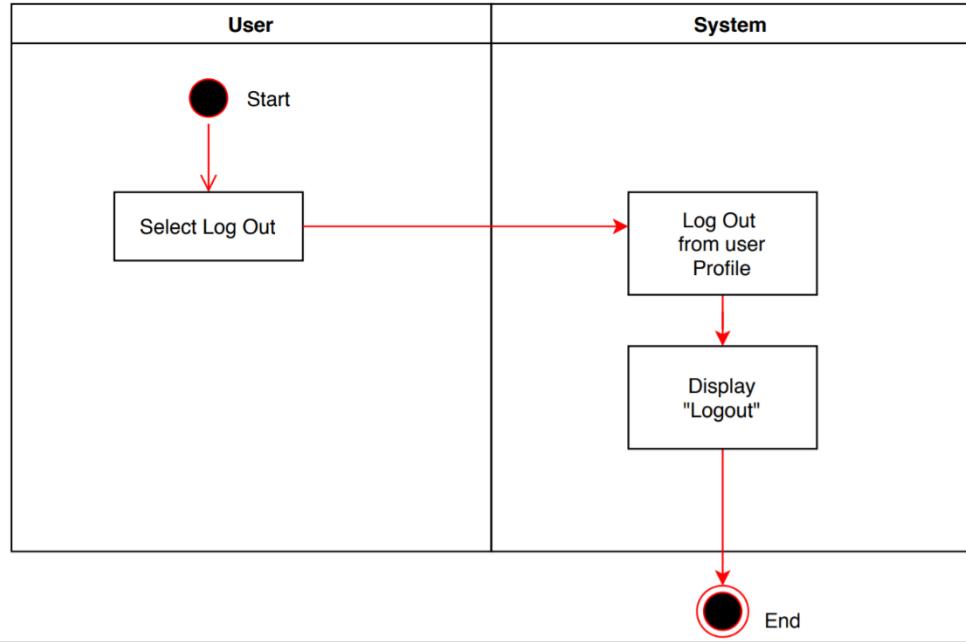
Login – All users



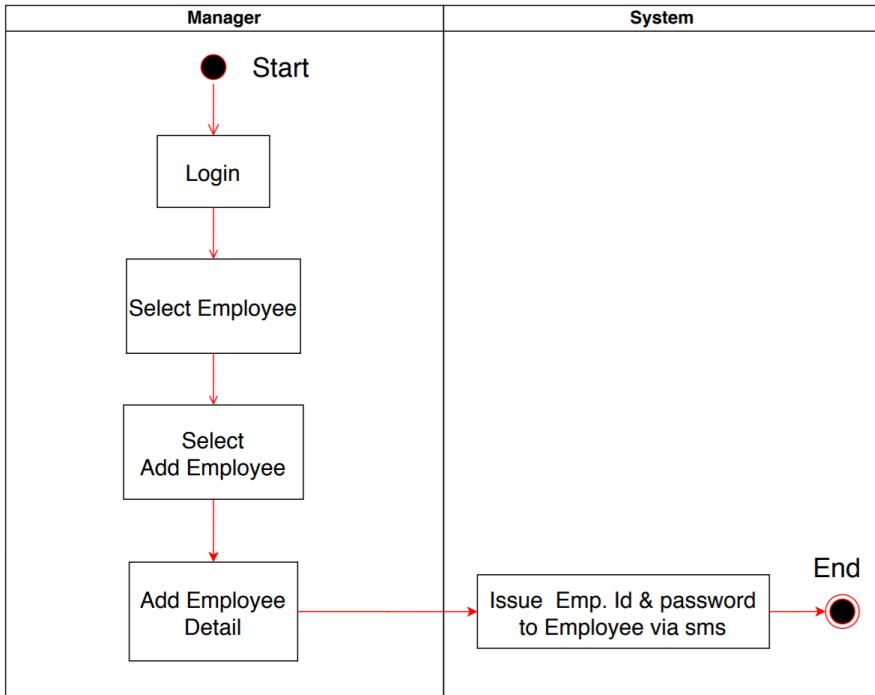
Change Login password - User



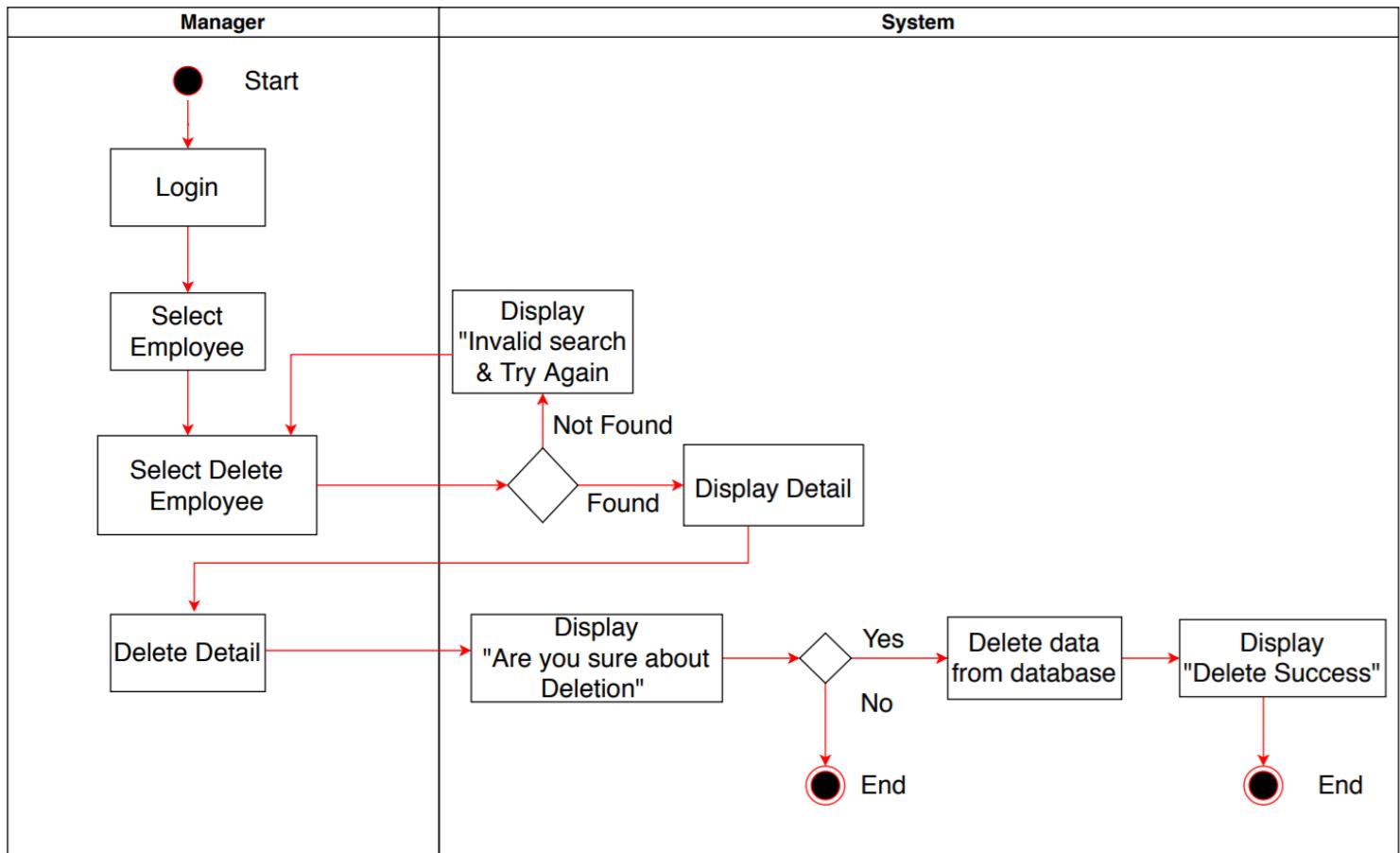
Logout - User



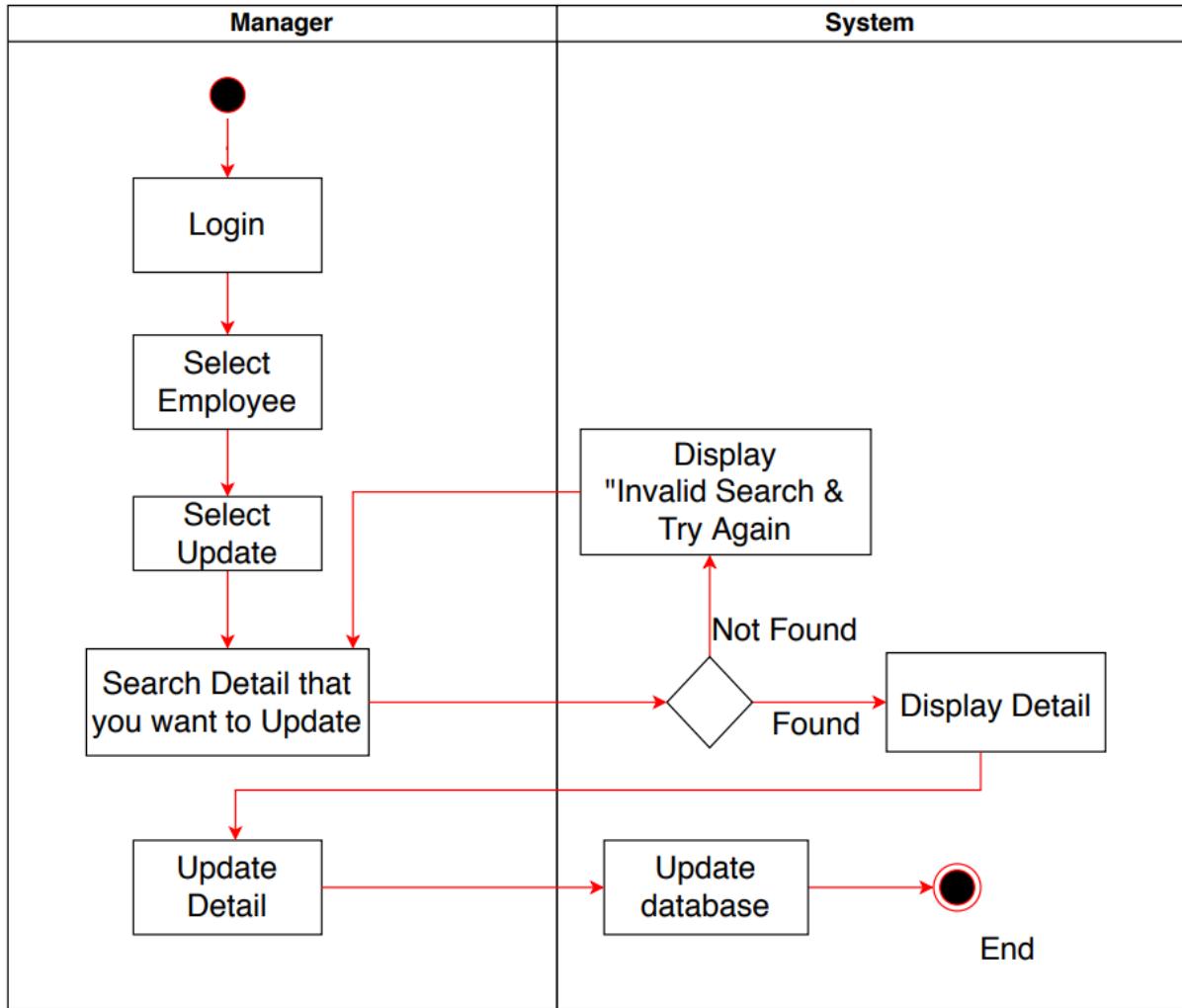
Add Employee - Manager



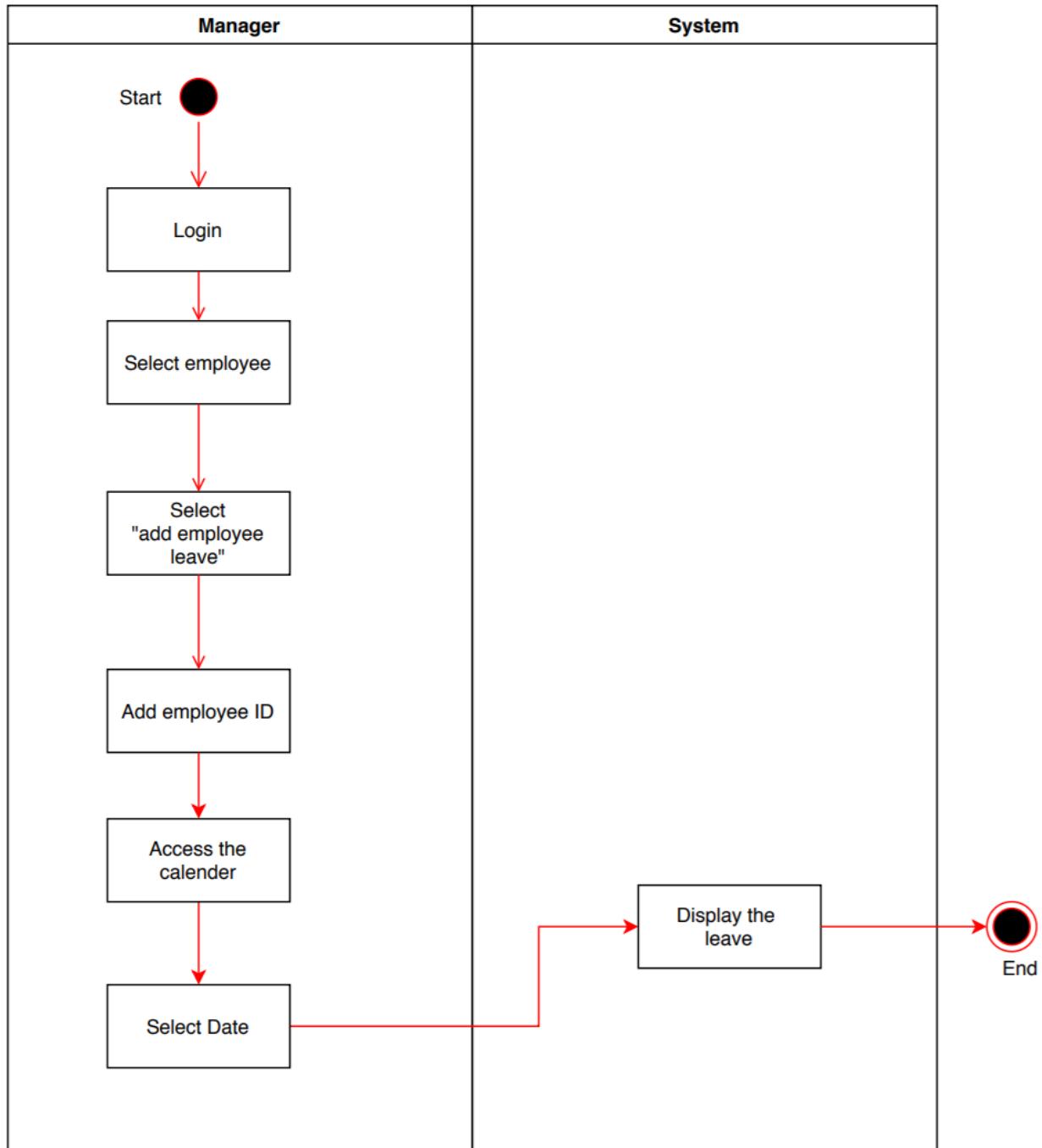
Delete Employee - Manager



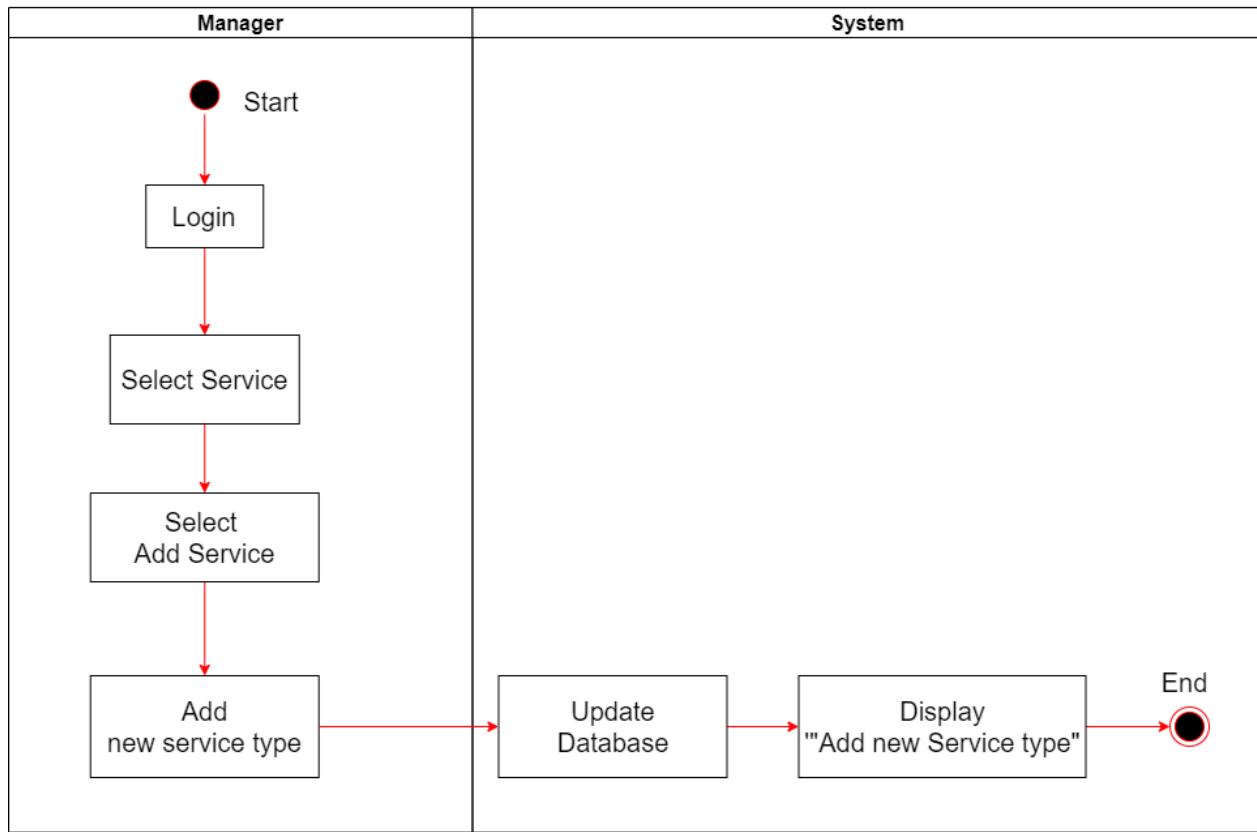
Update Employee - Manager



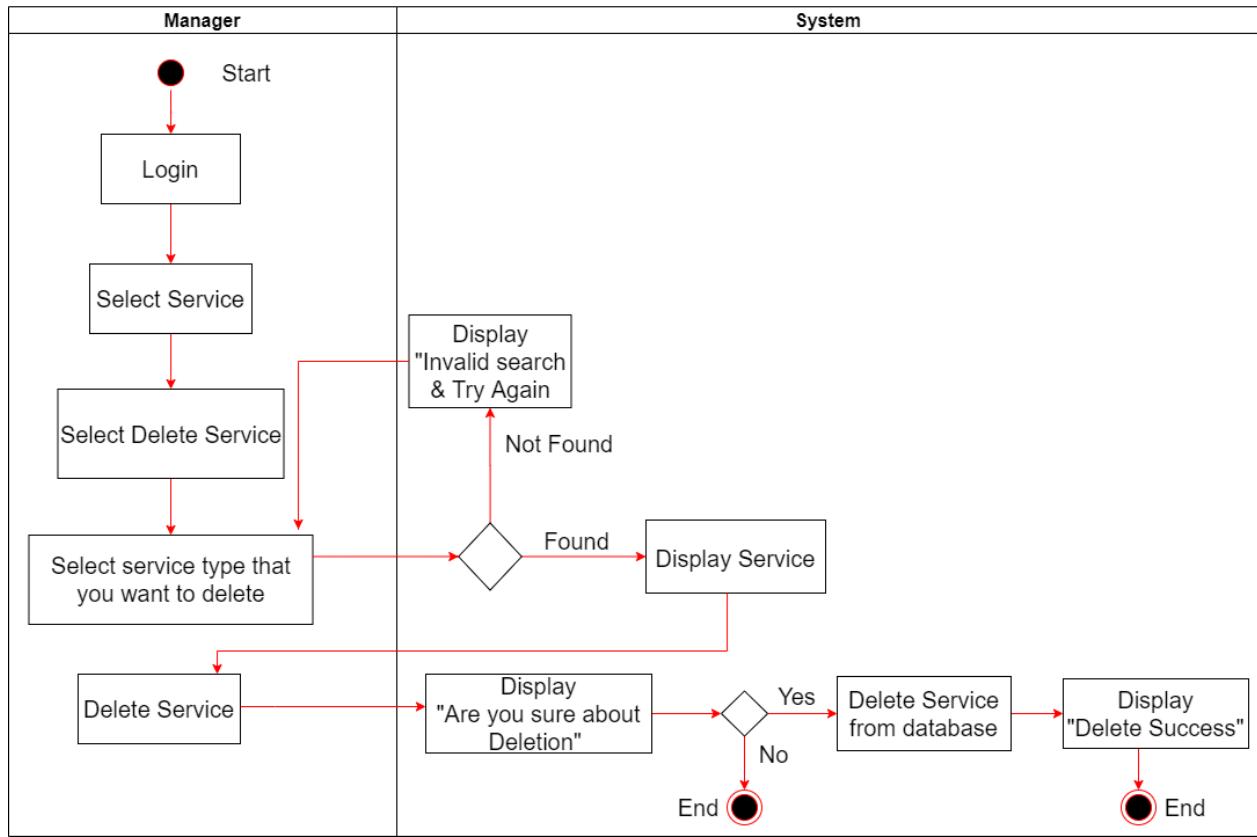
Add Employee leave – Manager



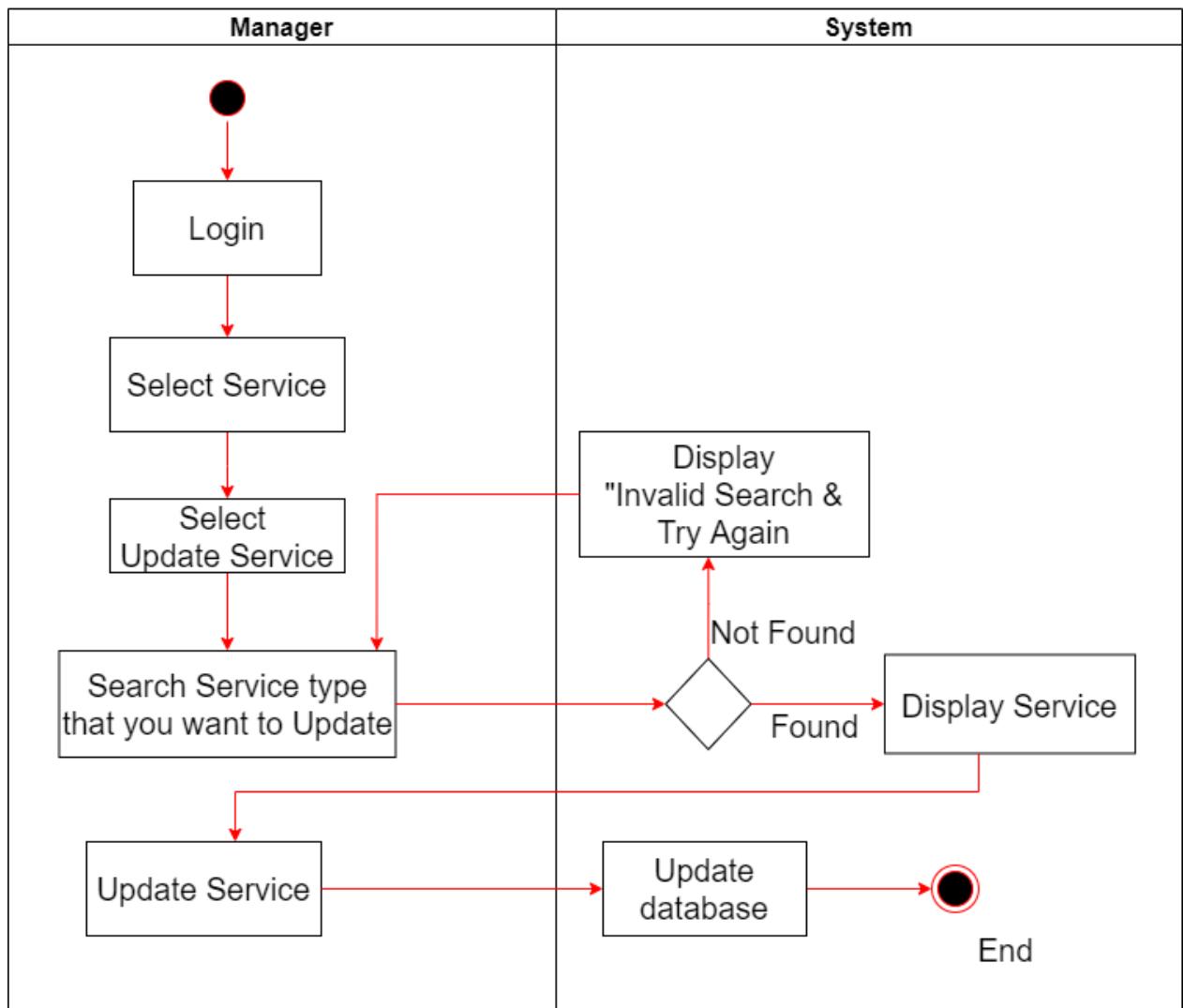
Add Service - Manager



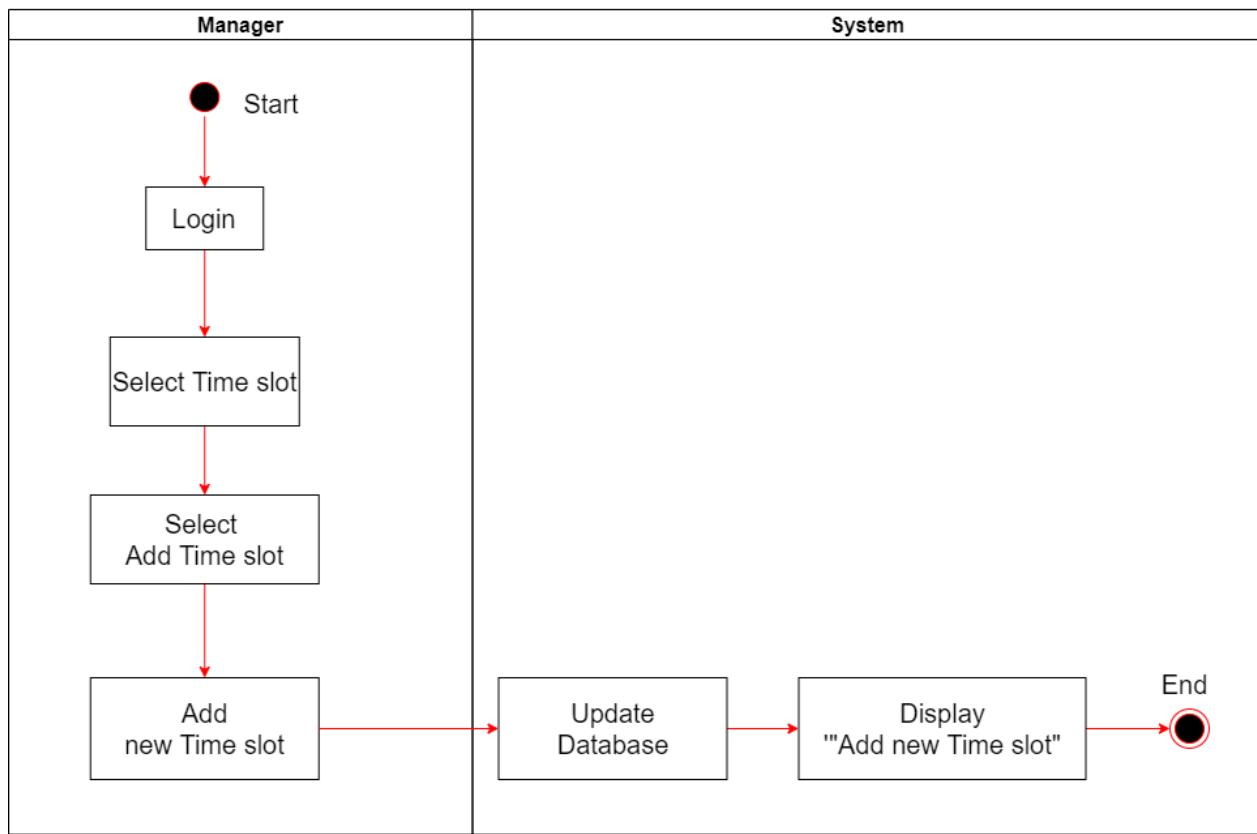
Delete Service - Manager



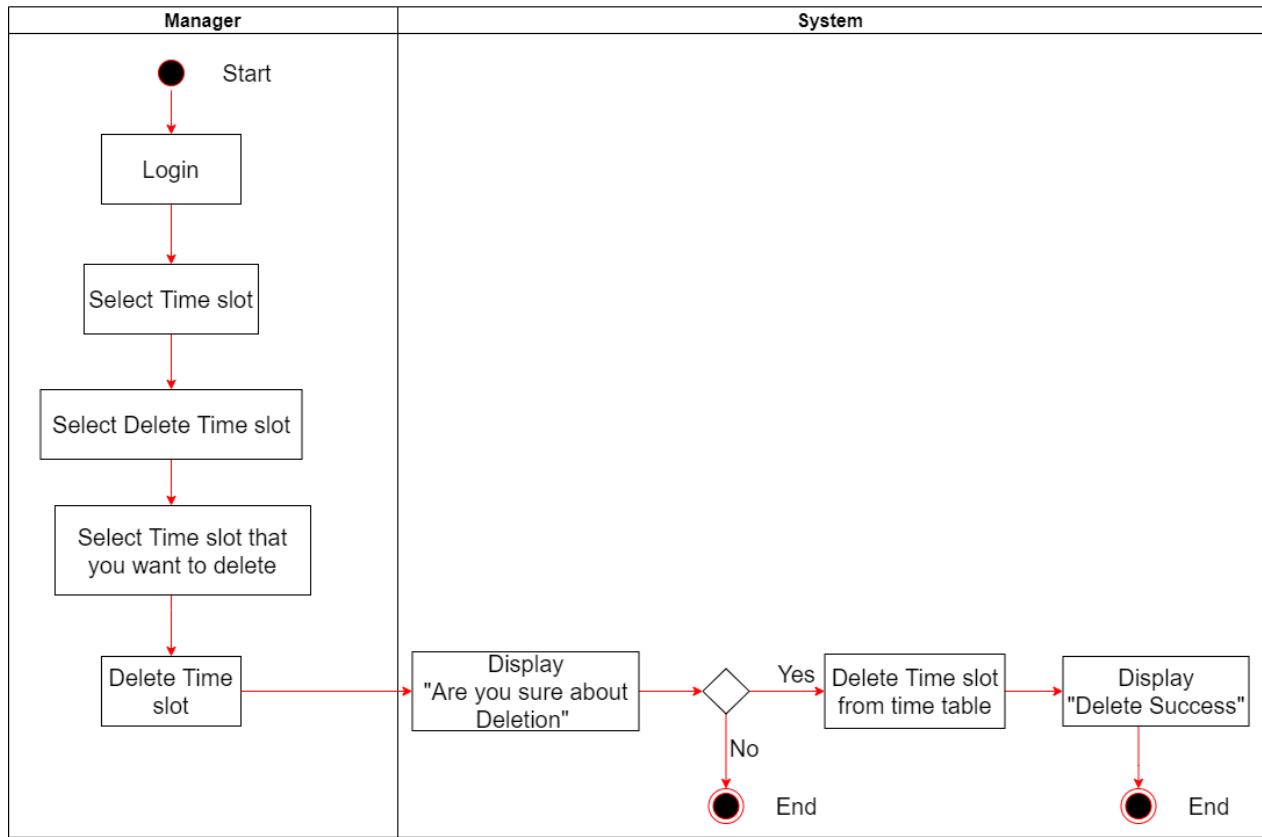
Update Service - Manager



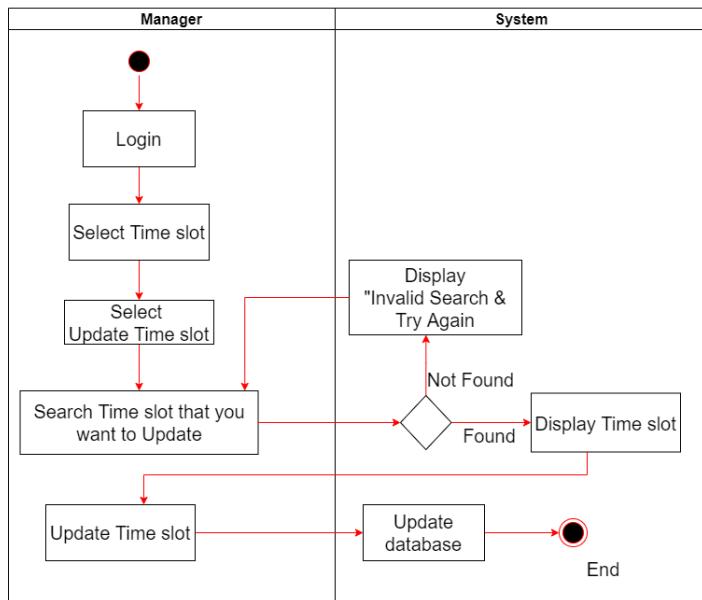
Add Time slot - Manager



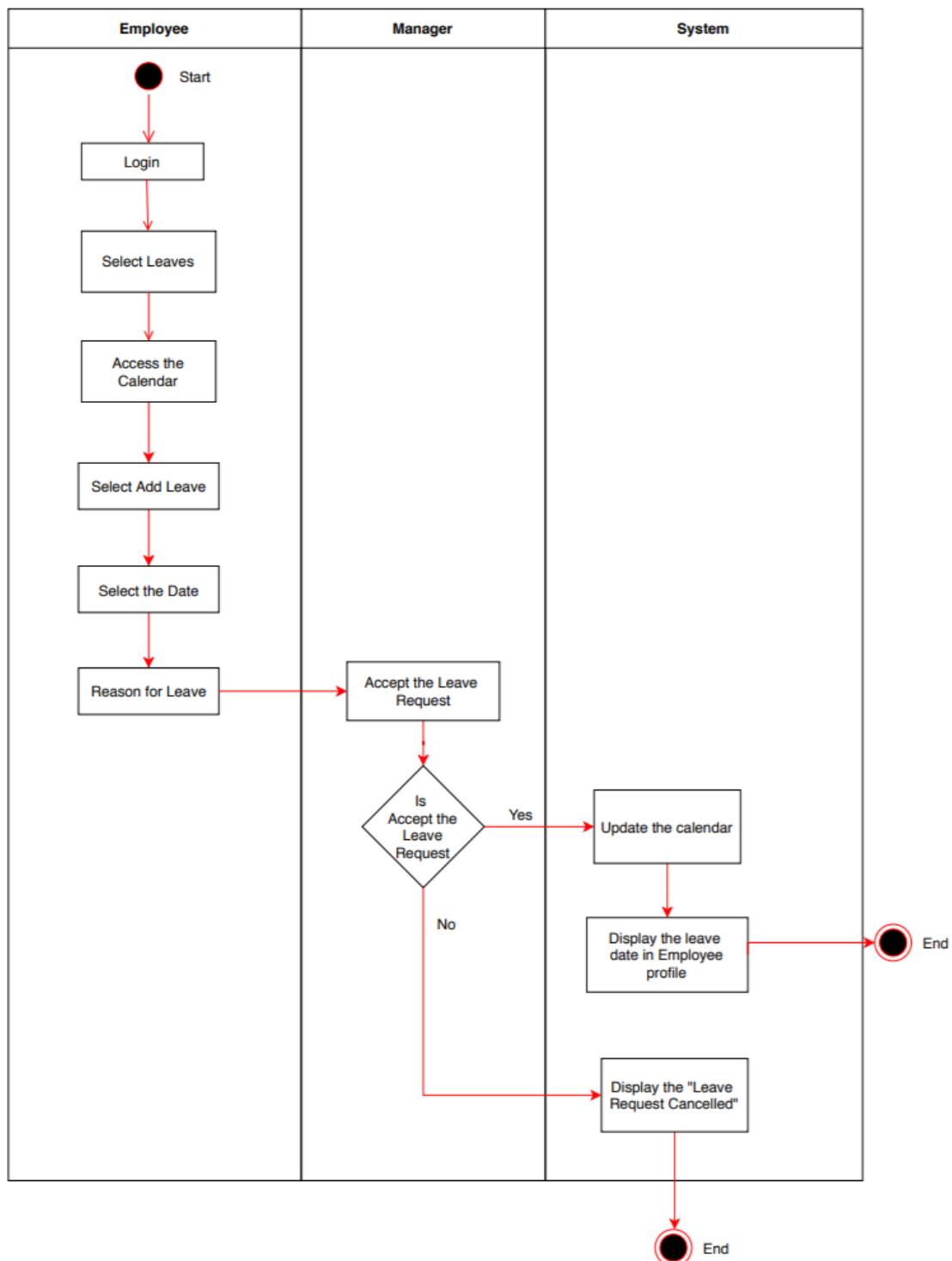
Delete Time slot - Manager



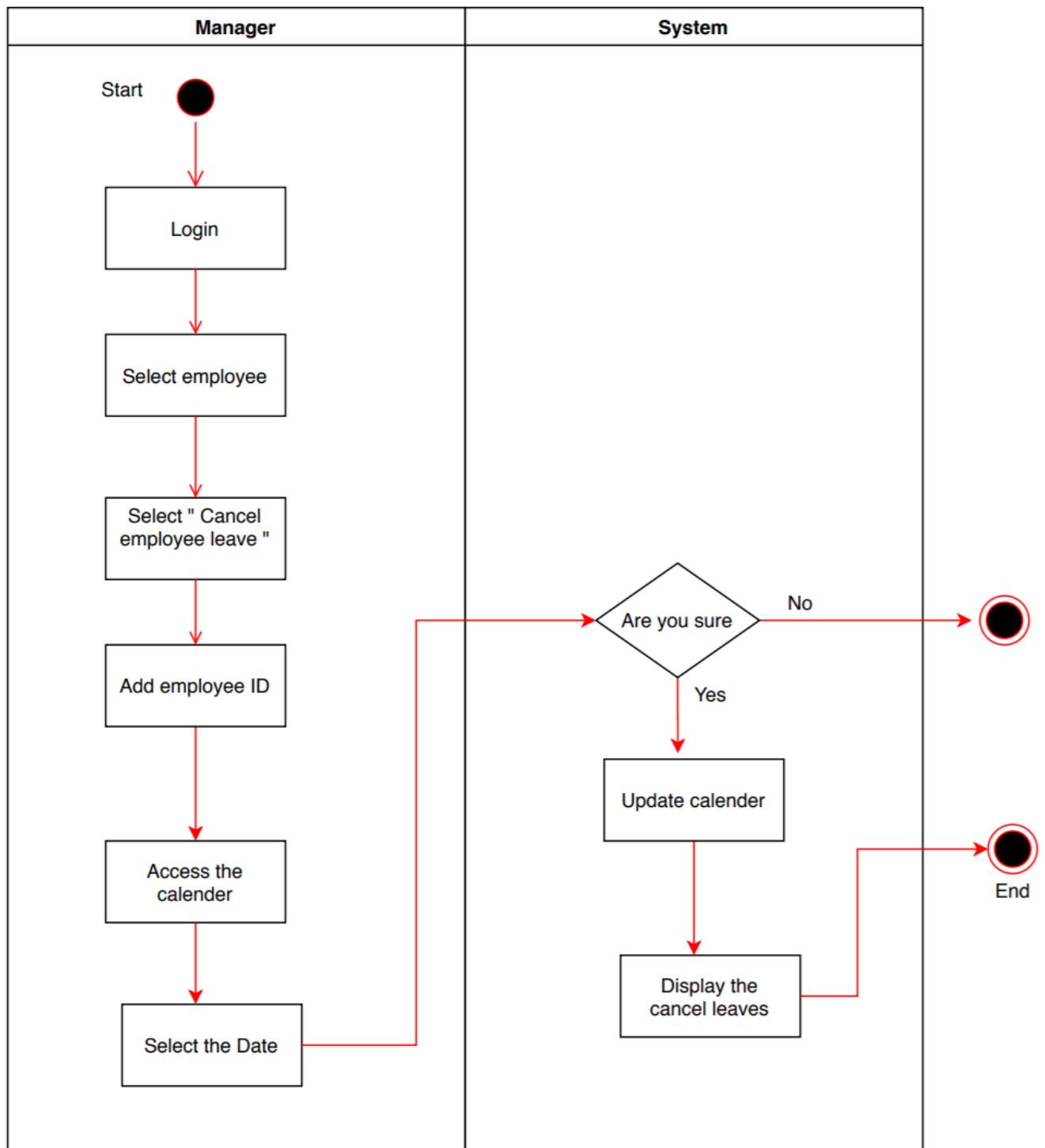
Update Time slot - Manager



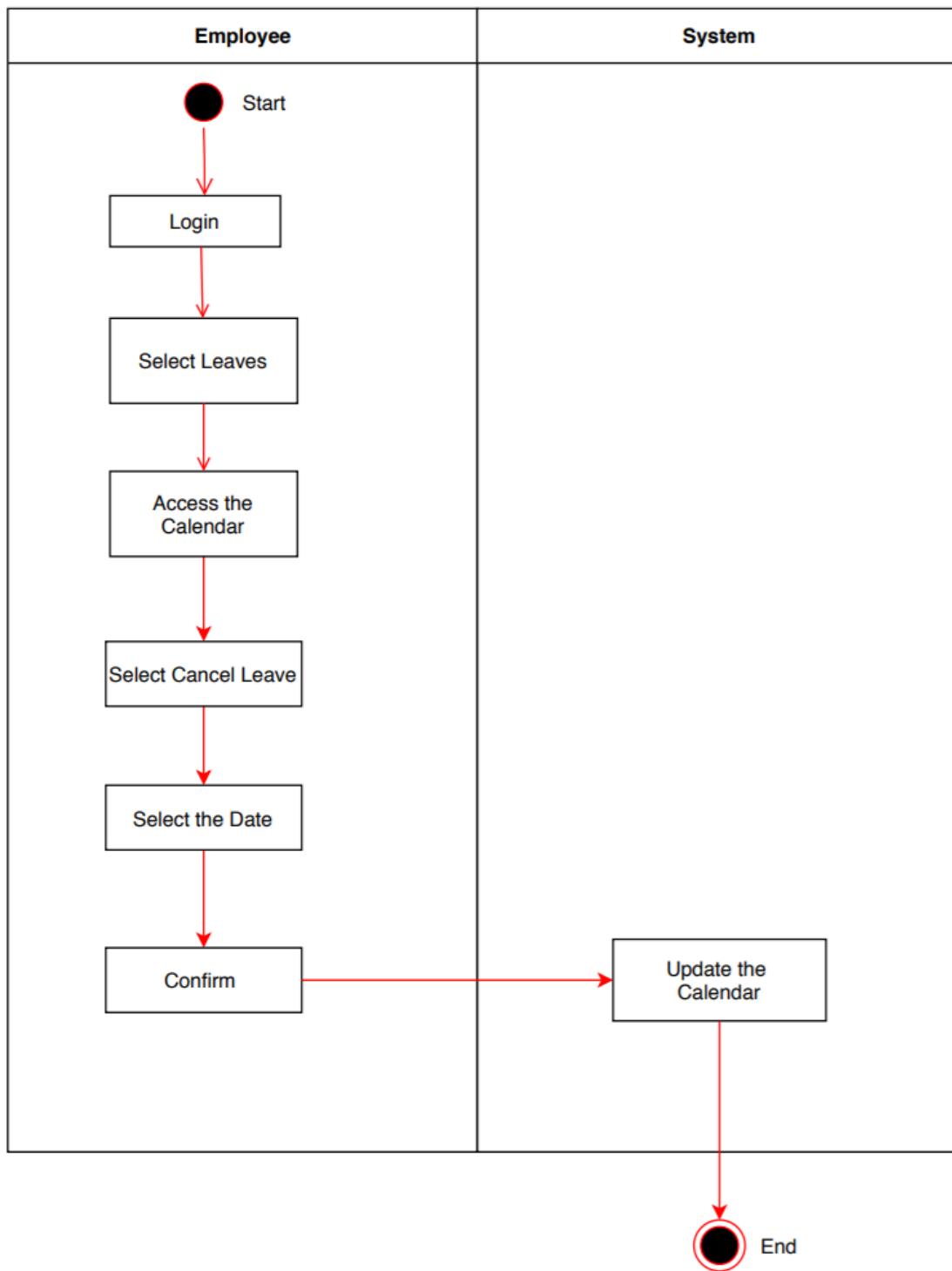
Add leave – Employee



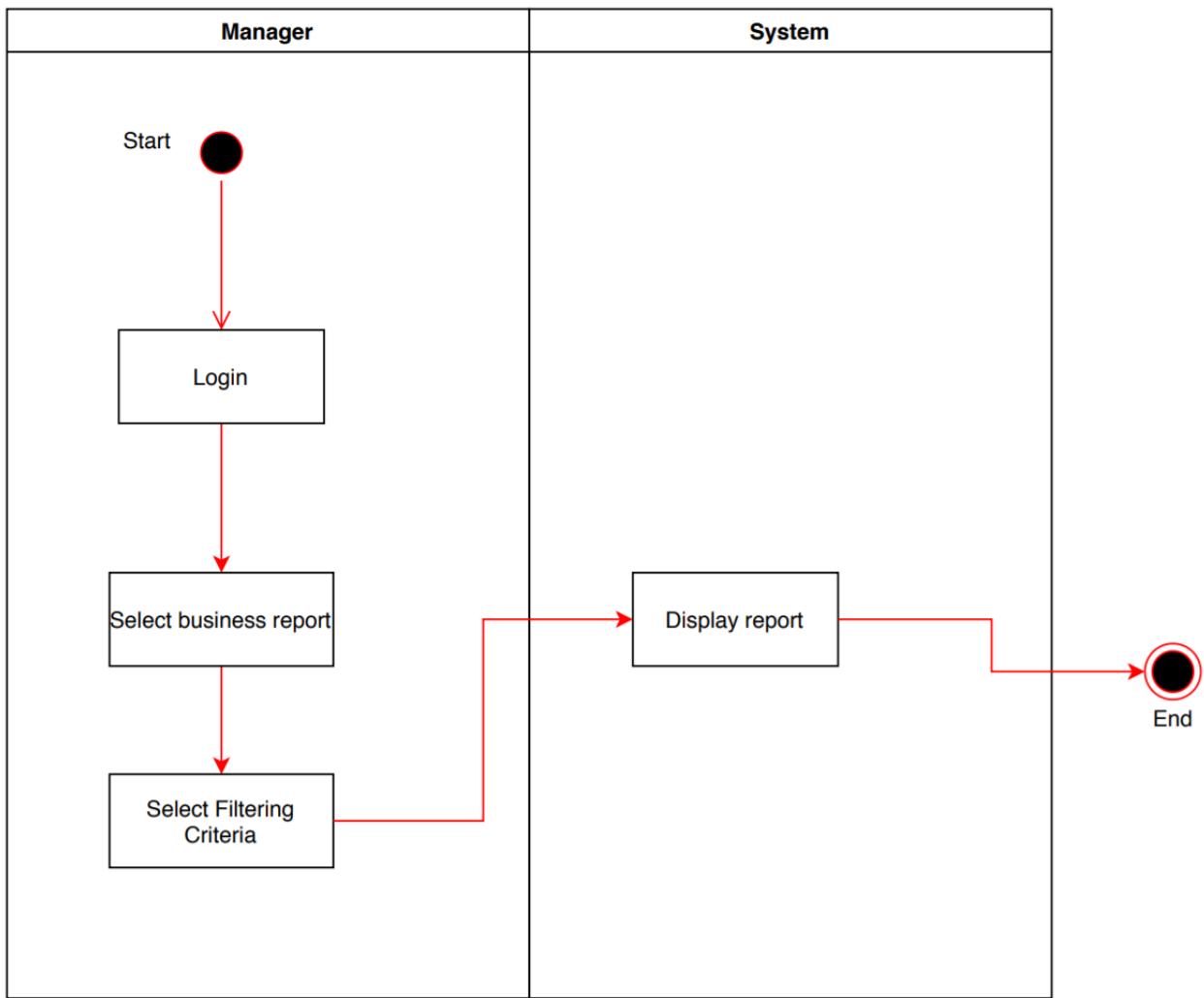
Cancel Leave- Manager



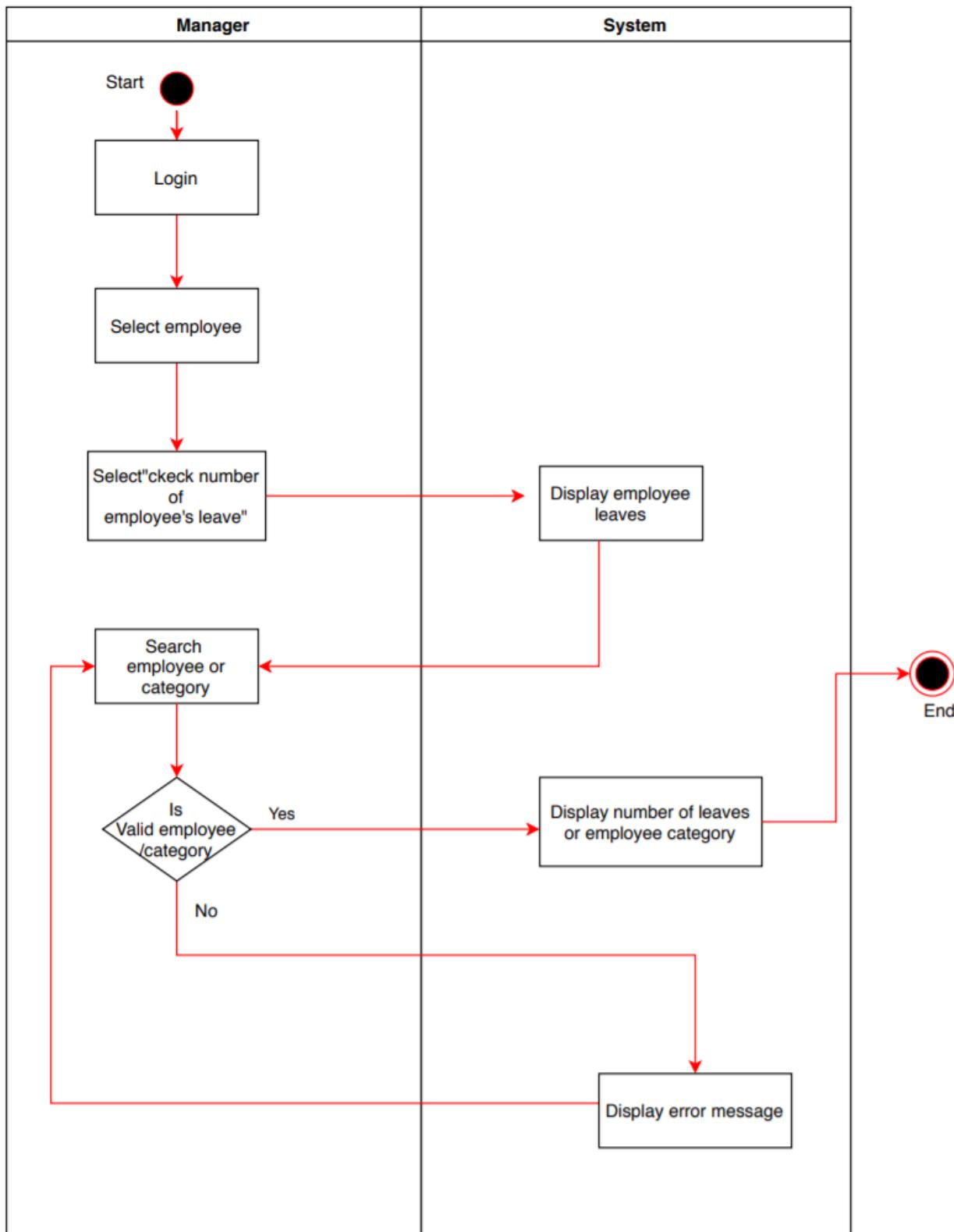
Cancel leave- Employee



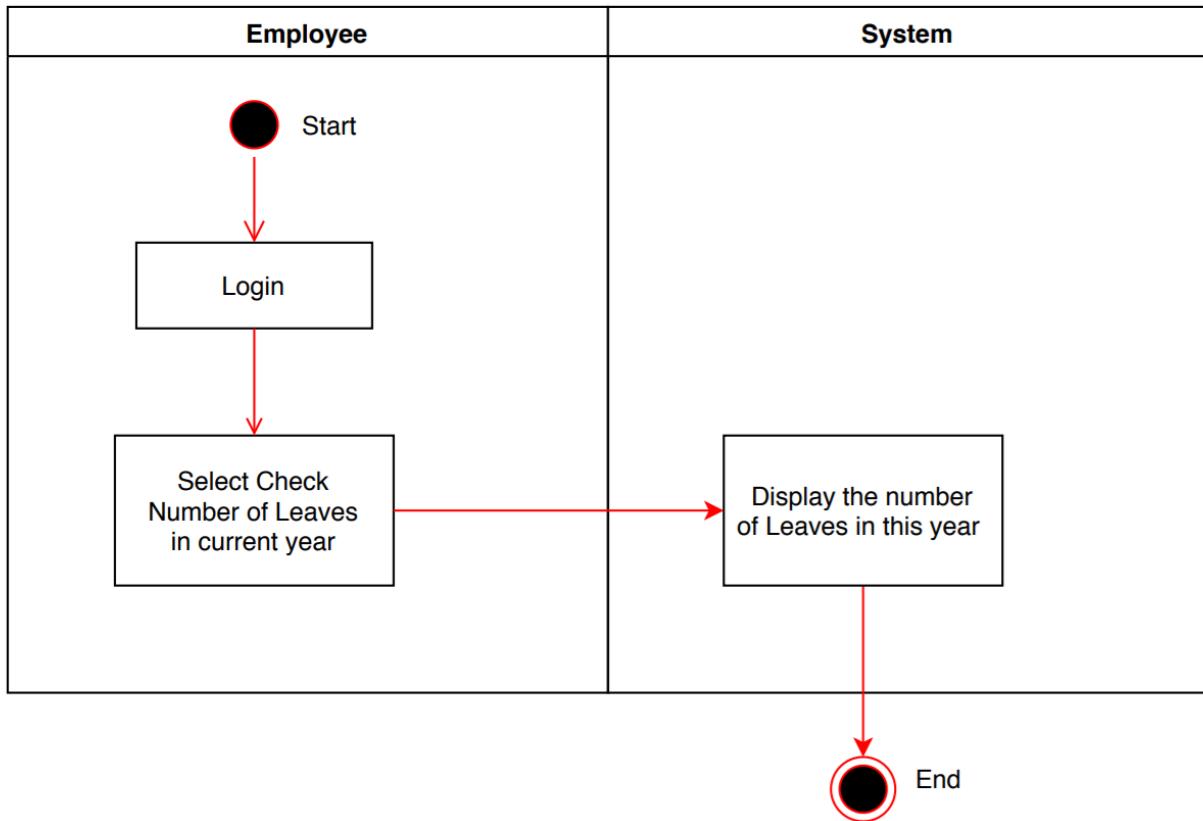
View business report- Manager



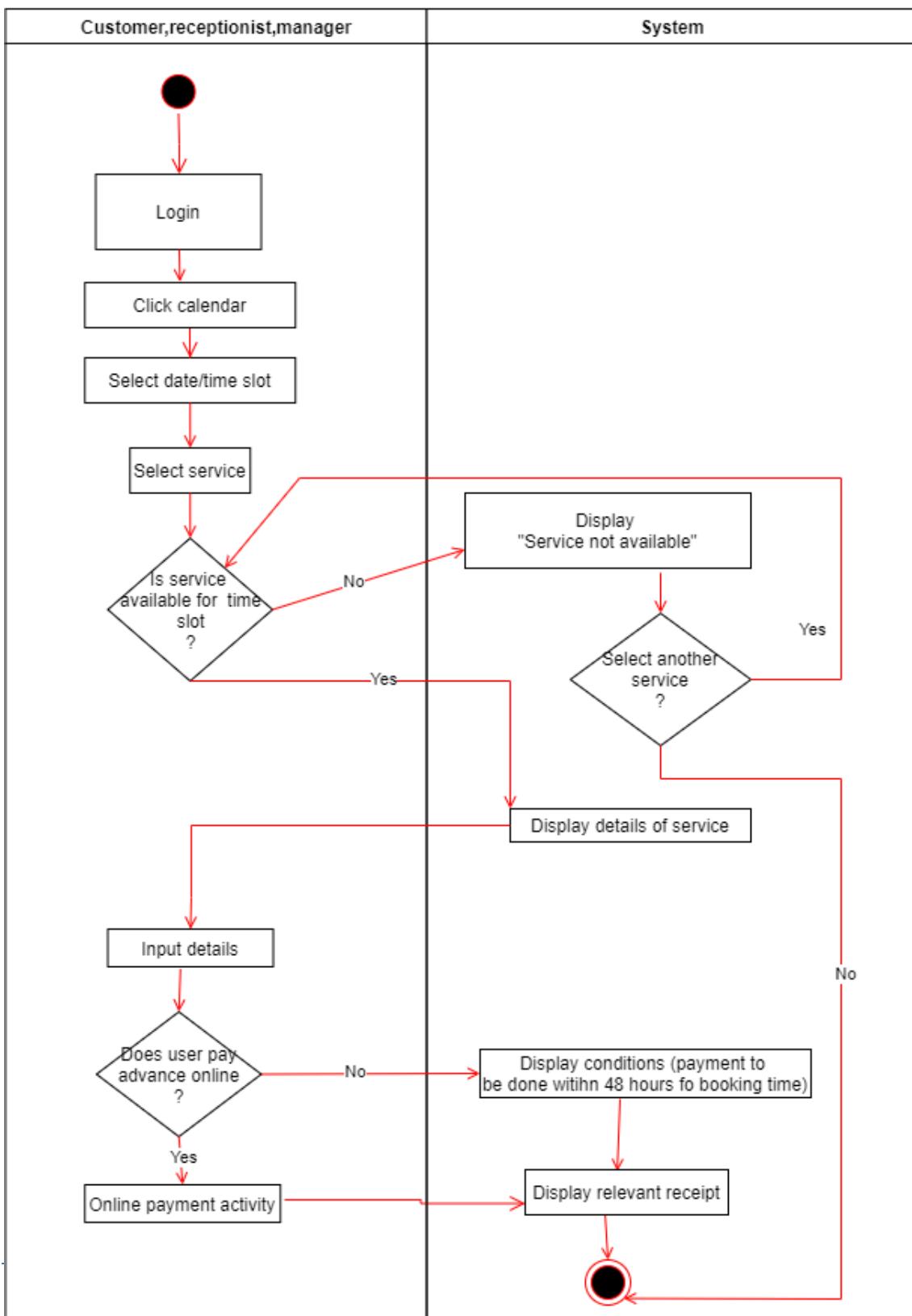
Check The Number of Employees' Leaves In Current Year - Manager



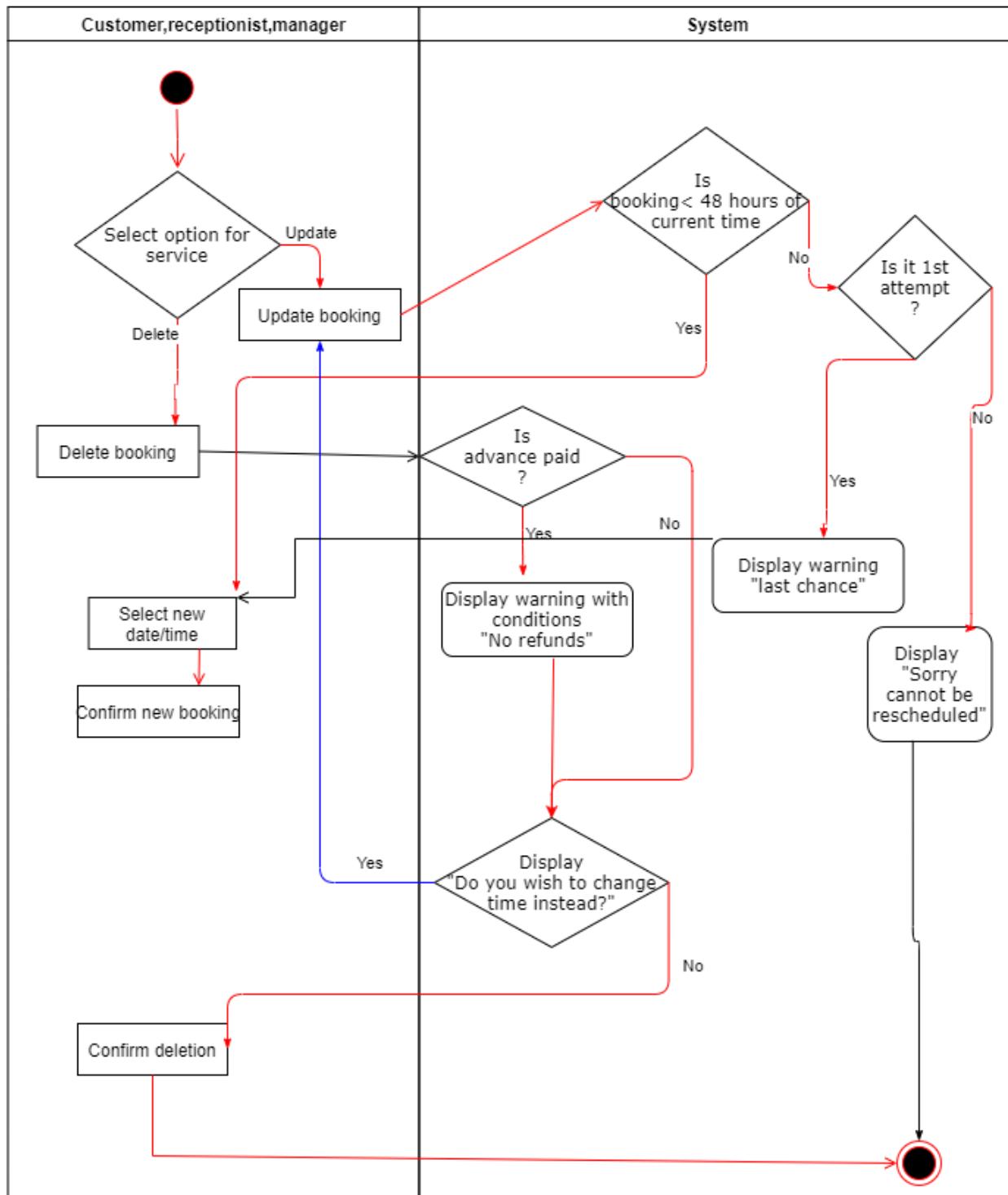
Check Leaves in Current year - Employee



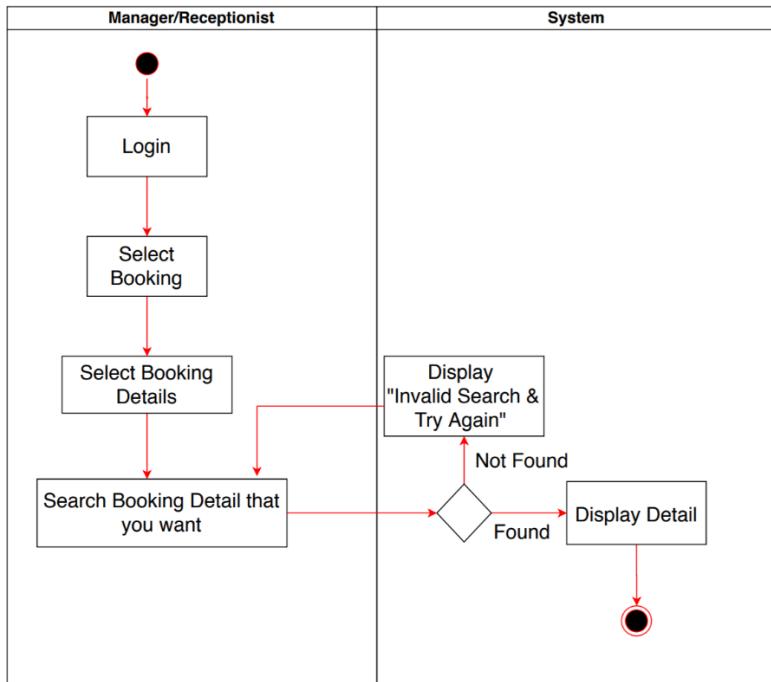
Reserve booking-Customer,receptionist,manager



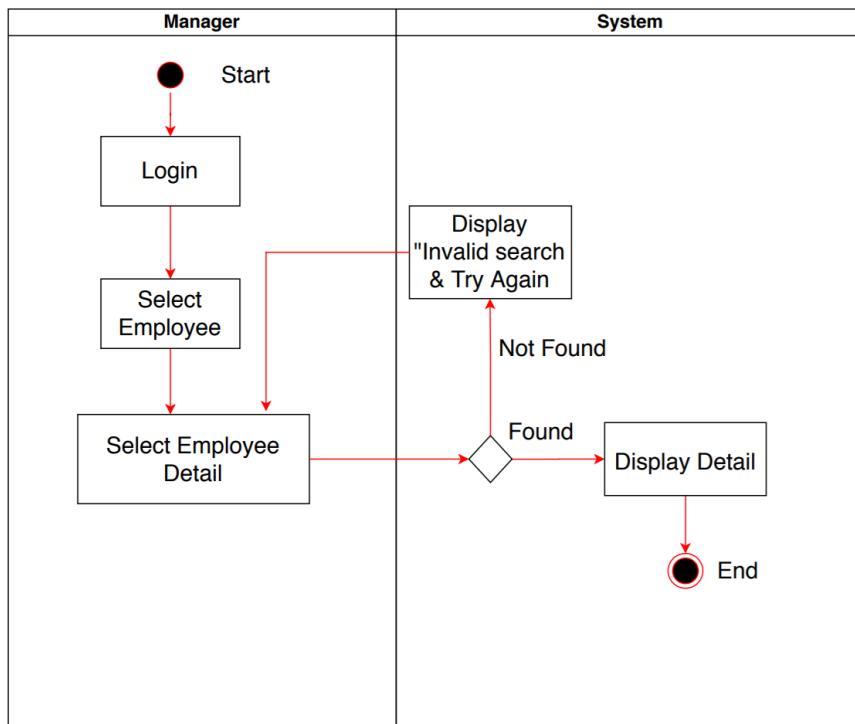
Delete/Update booking – Customer, Receptionist, Manager

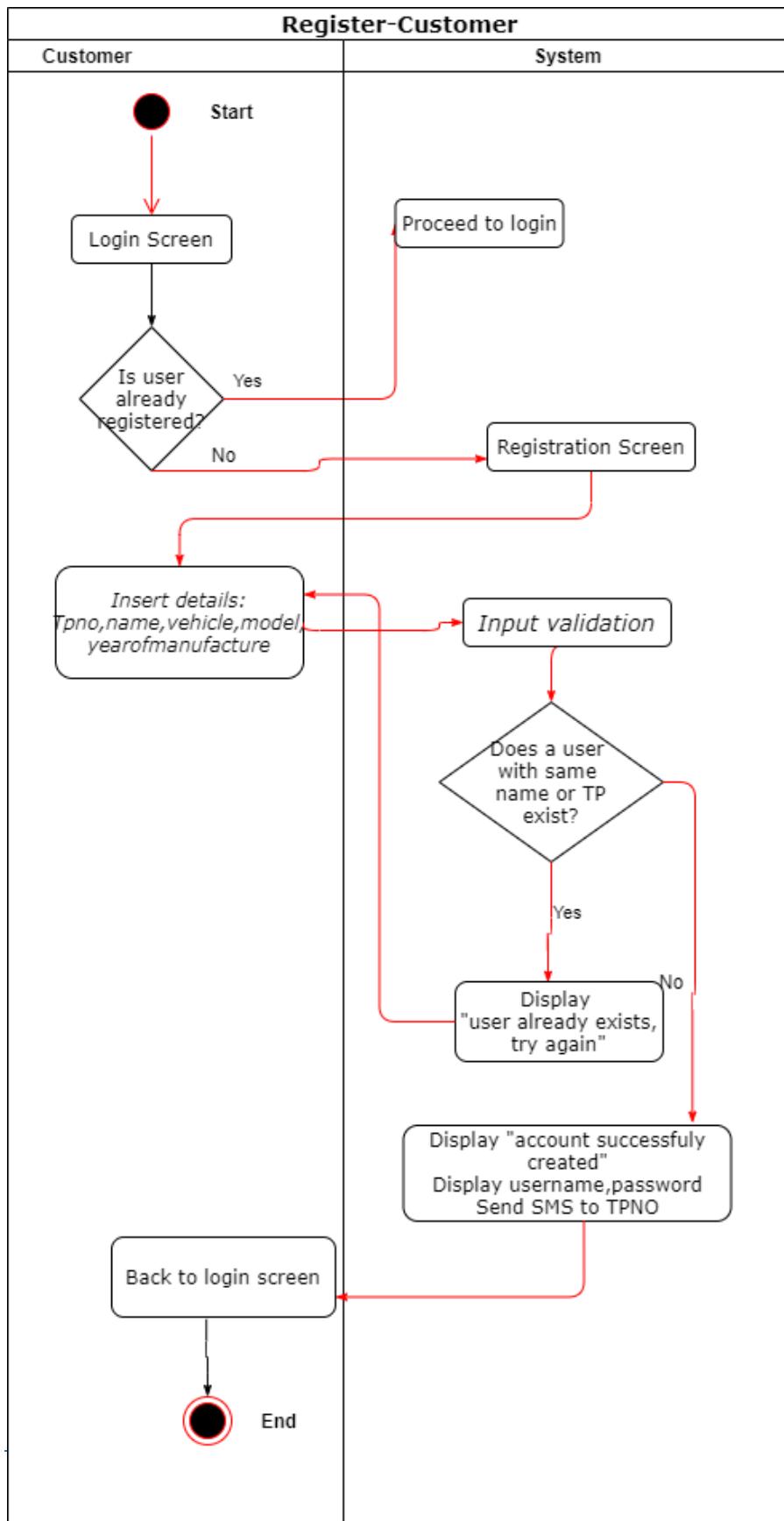


View booking – Manager, Receptionist

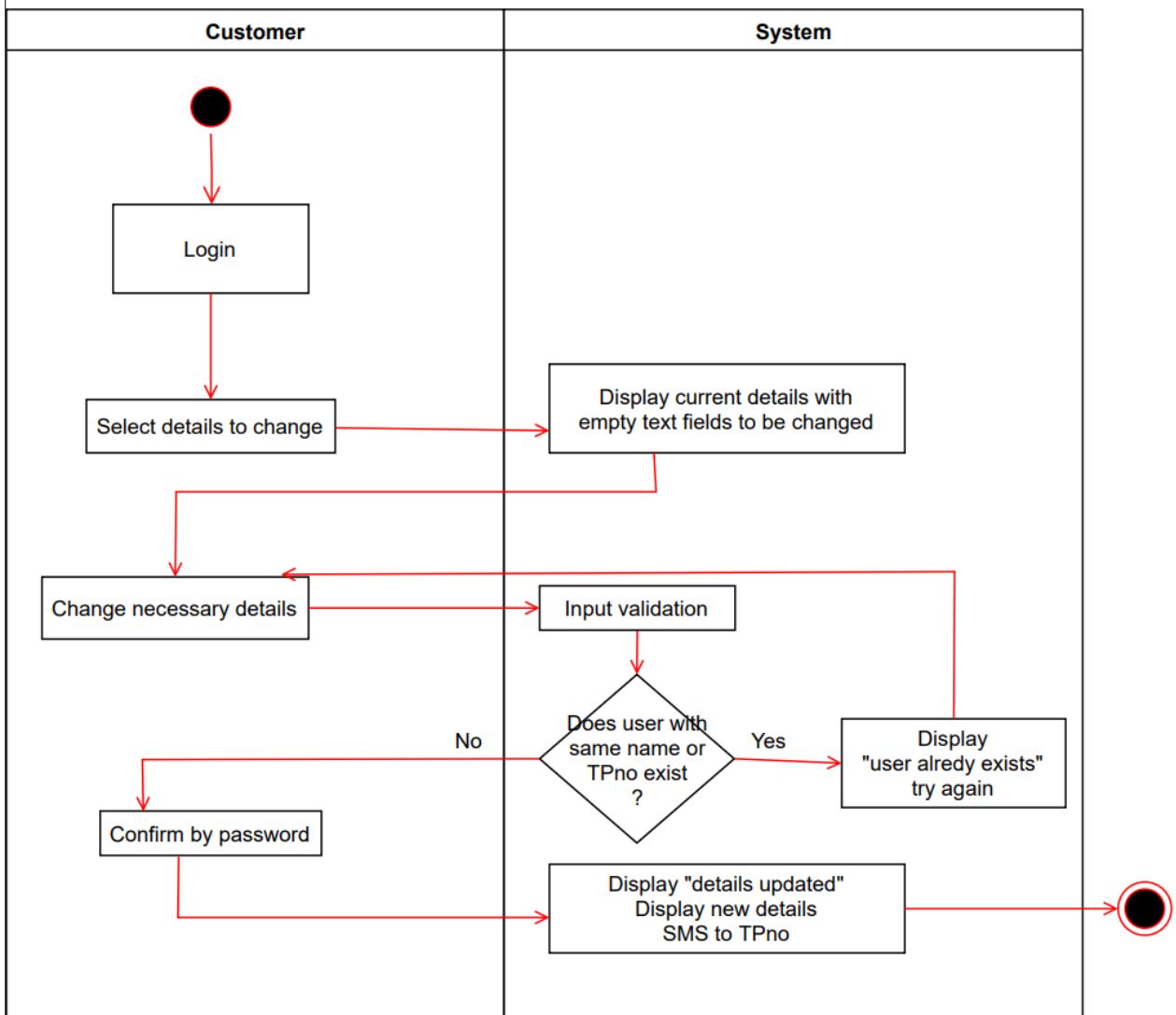


View Employee - Manager, Receptionist

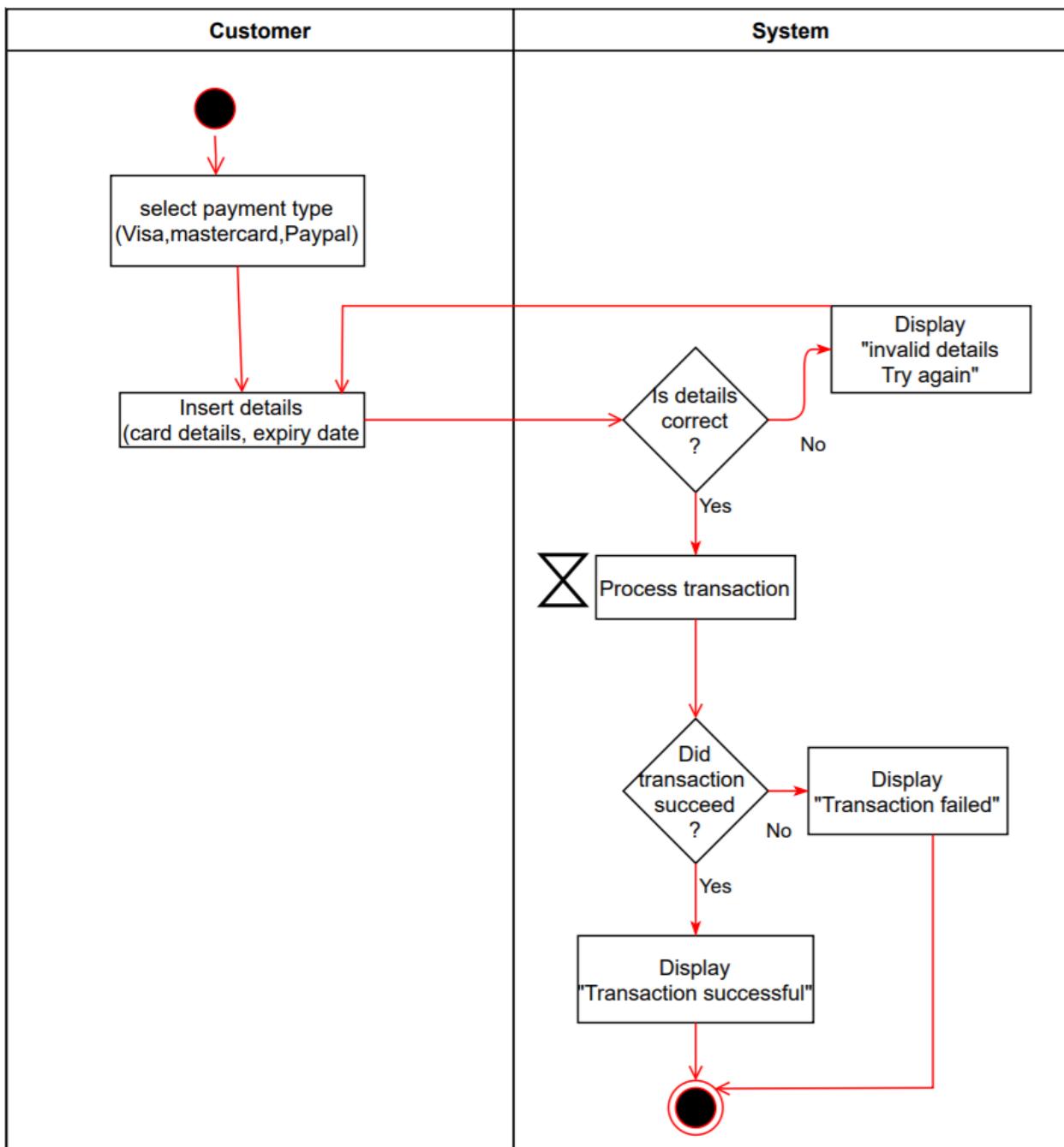




Update profile-Customer

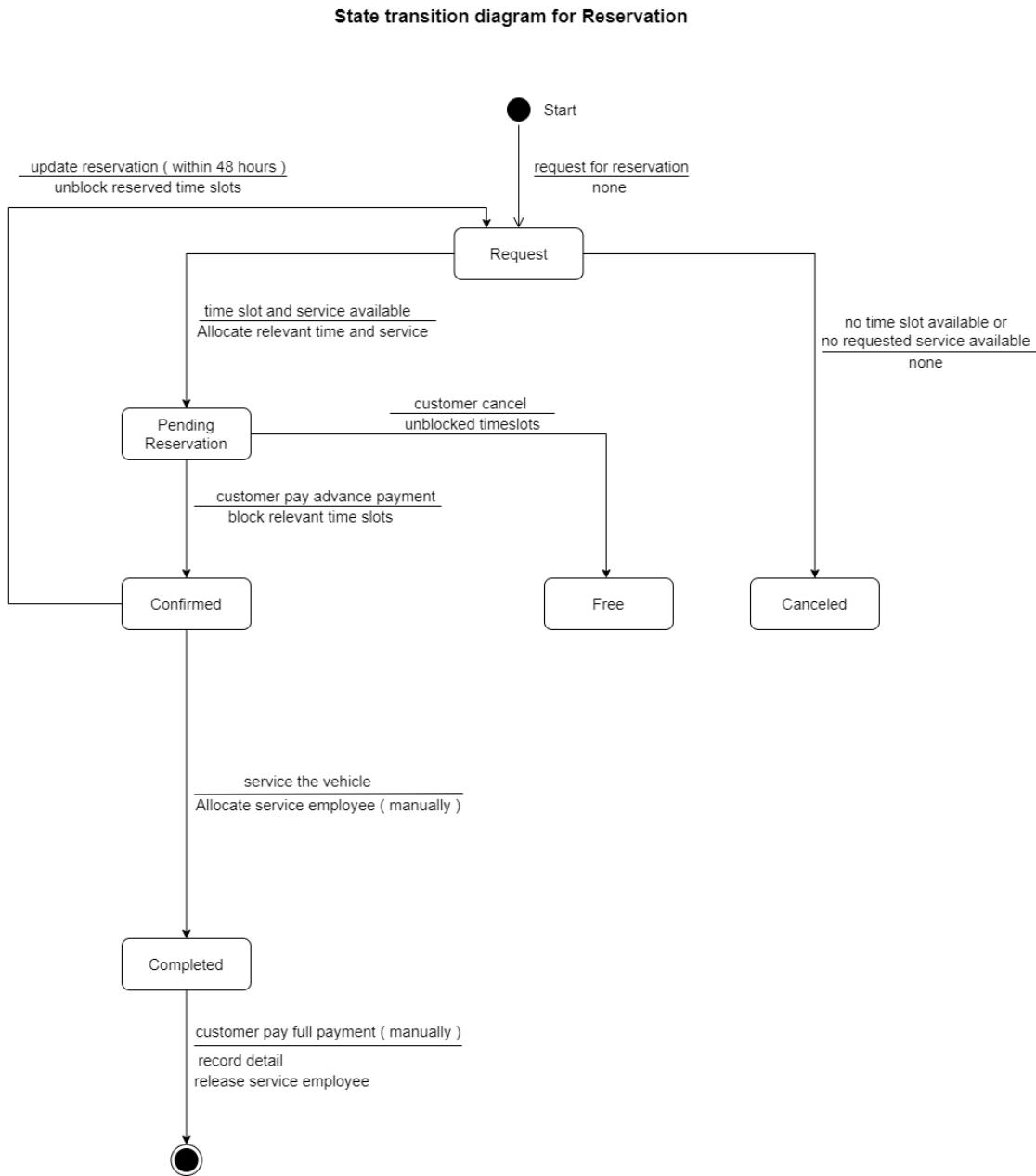


Online advance payment-Customer

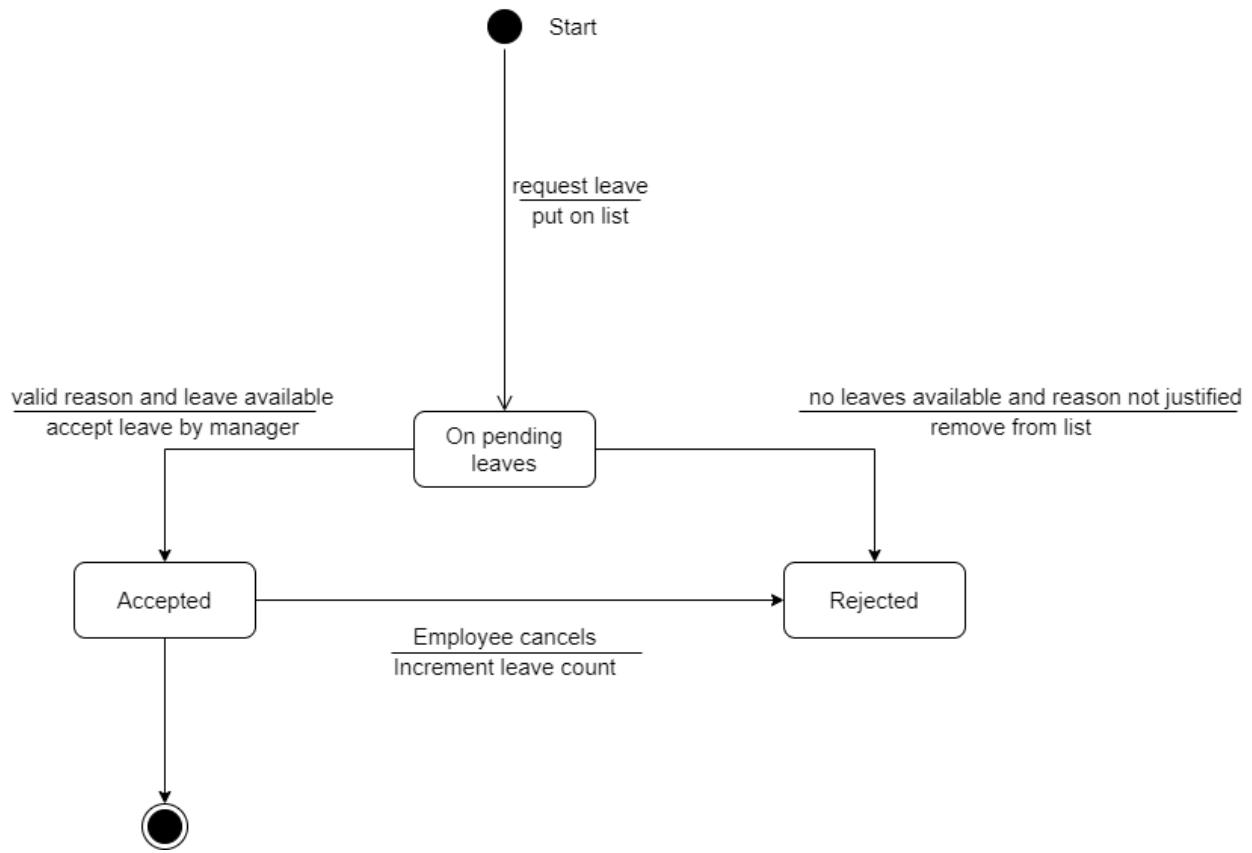


5.5) State Transition Diagrams

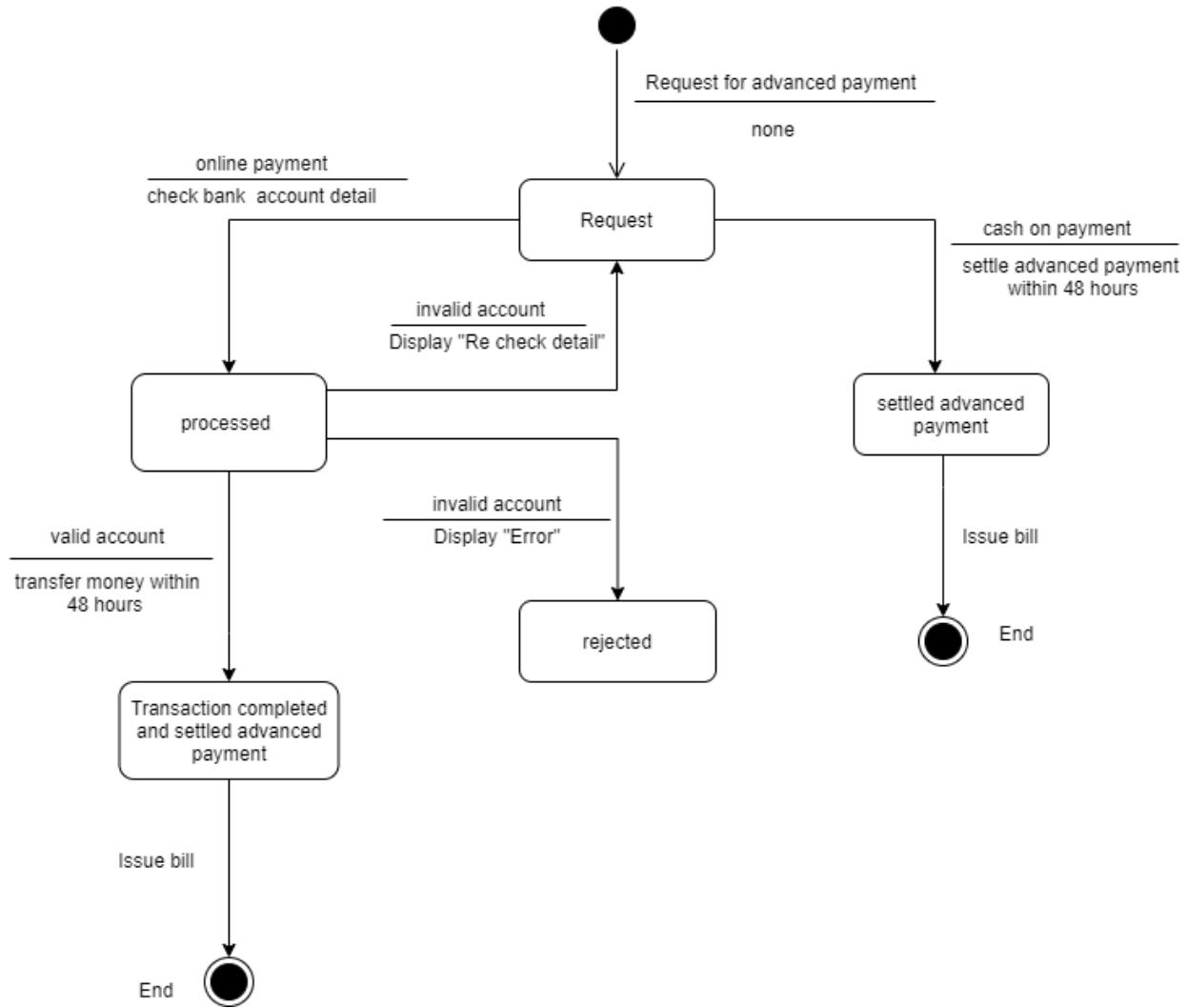
Following are the state transition diagrams for the only 4 dynamic components of the system.



State transition diagram for requesting leave

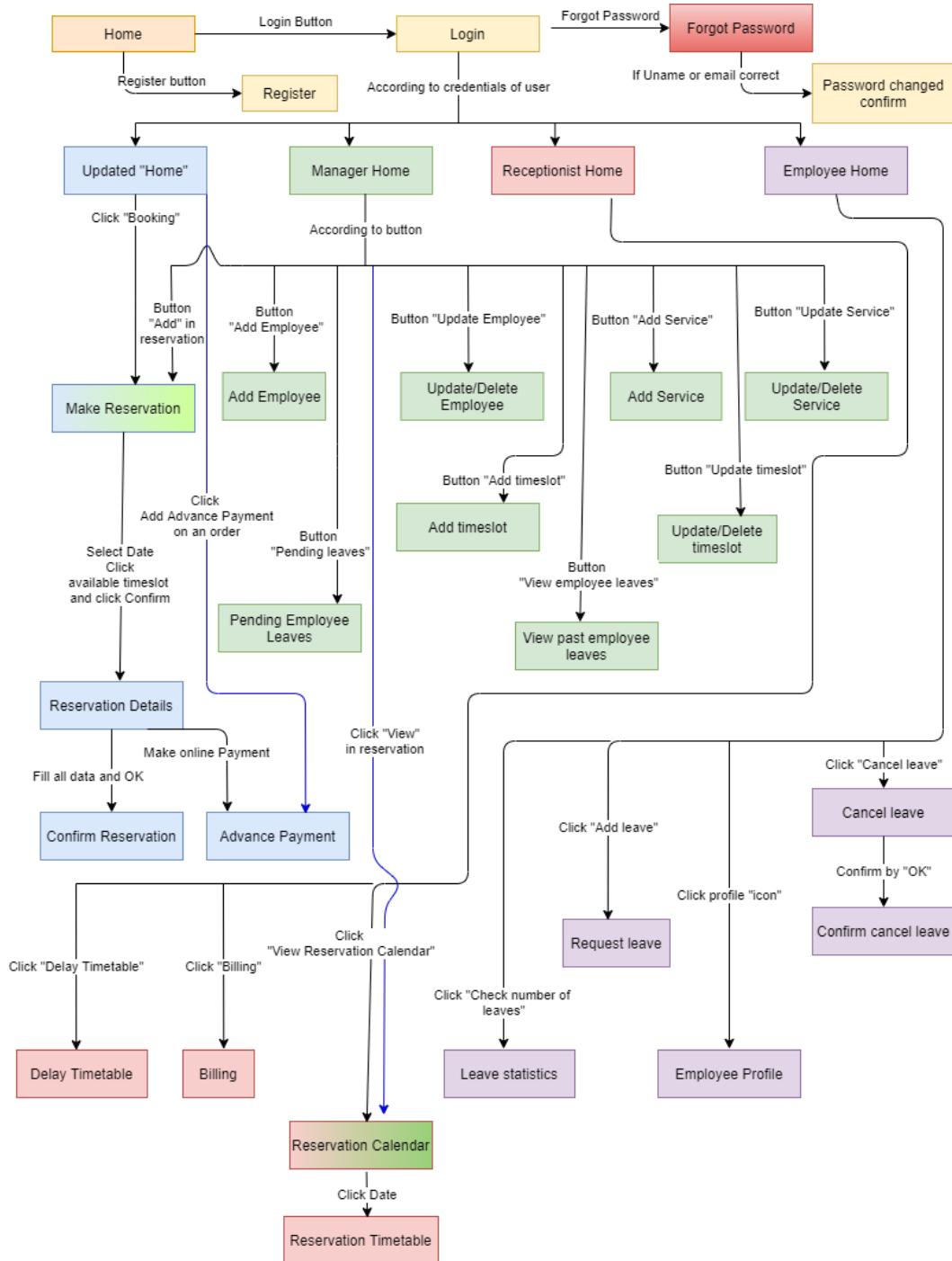


State Transition Diagram for Advanced Payment Method



6) User Interface Flow diagram and Wireframes

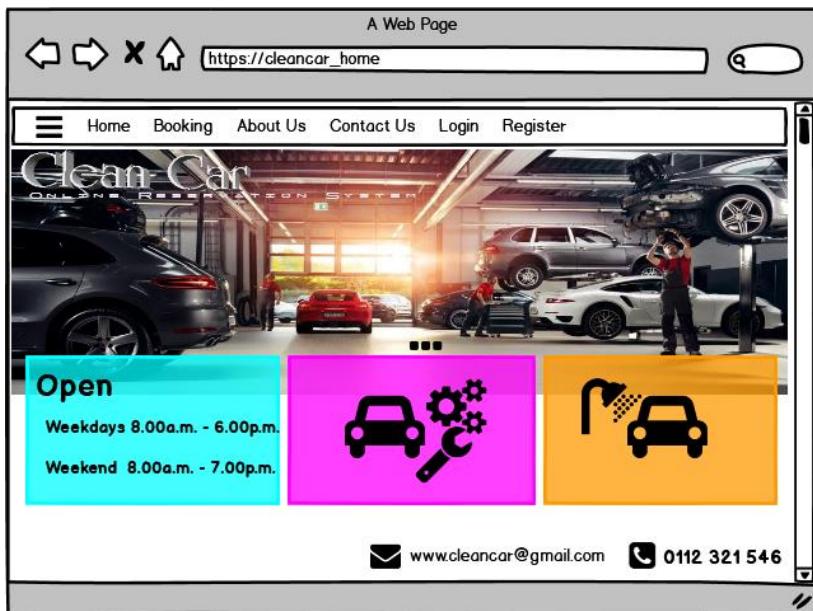
6.1) Flow Diagram



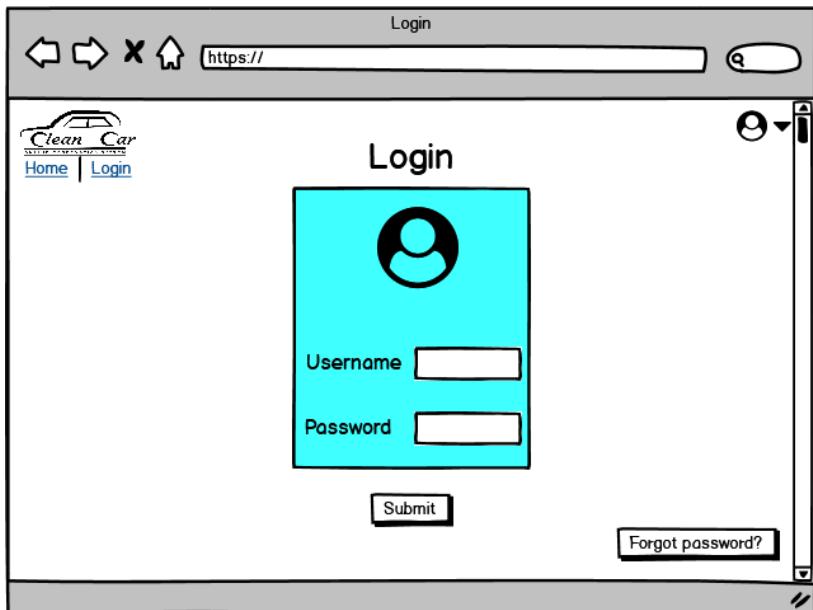
6.2) Wireframes

Following are the **low-fidelity** wireframes implemented to give a basic view of the UI components.

Home

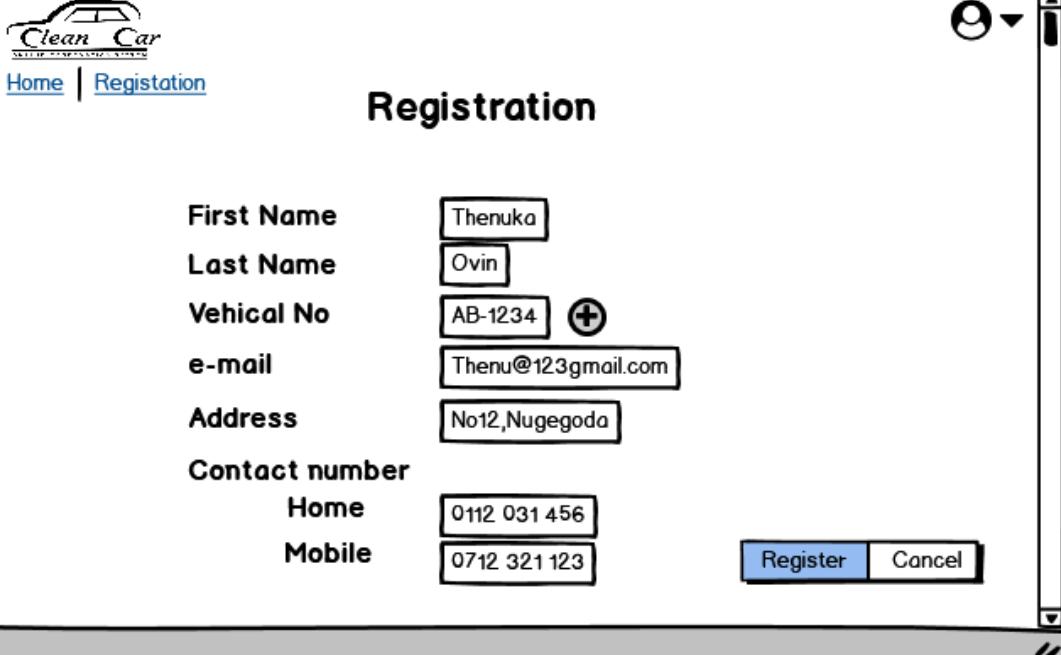


Login



Register-Customer

A Web Page
https://



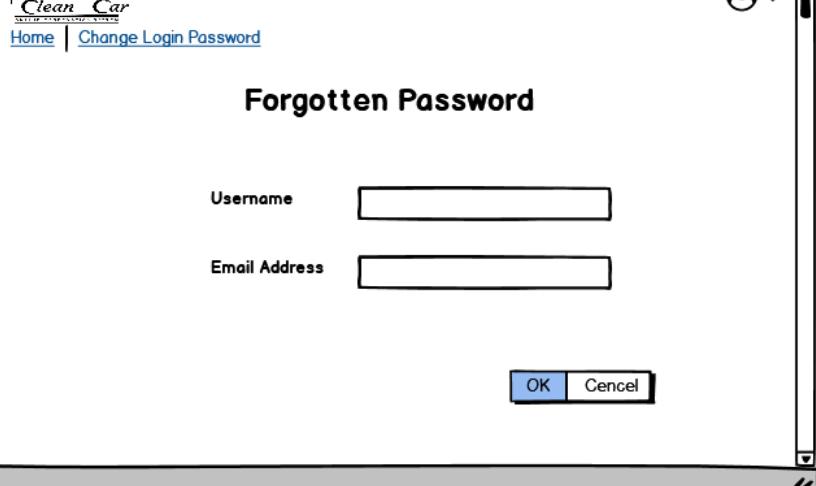
The registration form is titled "Registration". It includes fields for First Name (Thenuka), Last Name (Ovin), Vehical No (AB-1234) with a plus sign, e-mail (Thenu@123gmail.com), Address (No12,Nugegoda), Contact number (Home: 0112 031 456, Mobile: 0712 321 123), and two buttons: "Register" and "Cancel".

First Name Thenuka
Last Name Ovin
Vehical No AB-1234 +
e-mail Thenu@123gmail.com
Address No12,Nugegoda
Contact number
Home 0112 031 456
Mobile 0712 321 123
Register Cancel

Forgot

password -All Users

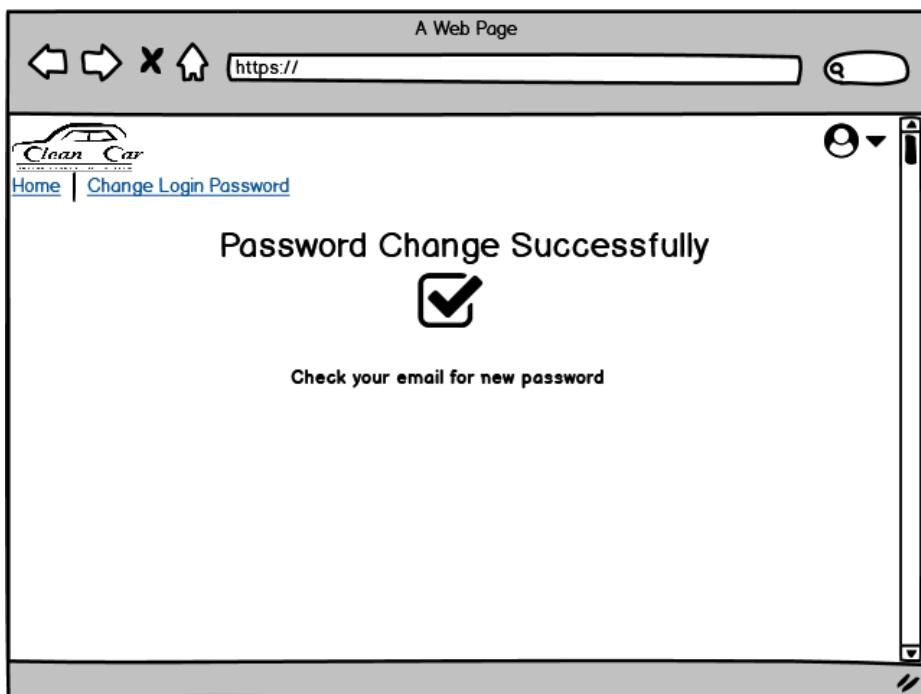
A Web Page
https://



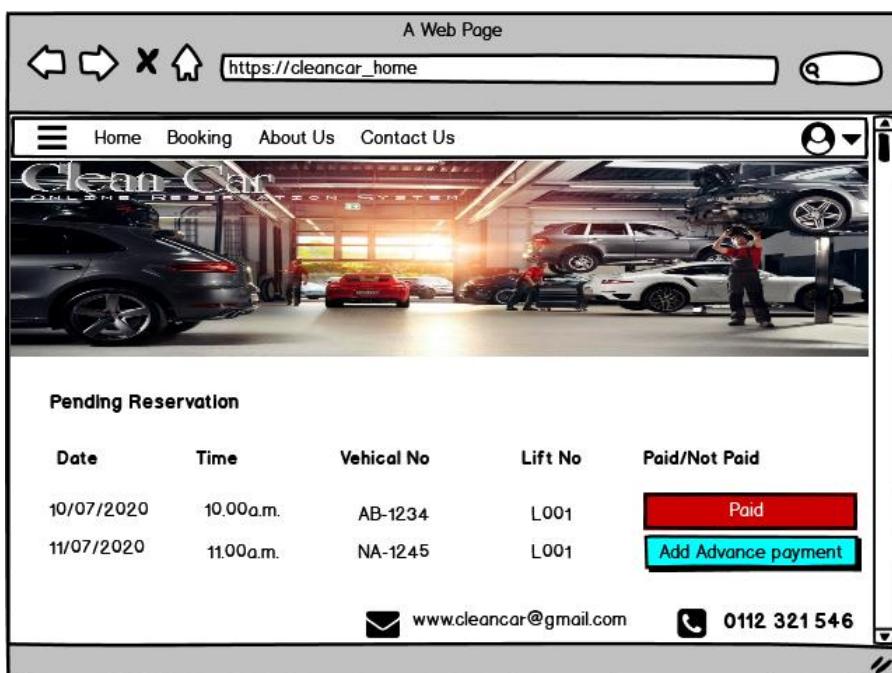
The forgotten password form is titled "Forgotten Password". It has fields for Username and Email Address, and two buttons: "OK" and "Cancel".

Username
Email Address
OK Cancel

Password changed confirm -All users



Updated Home- After Customer logging in



Make Reservation – Customer, Manager, Receptionist

Reservation Calendar

Select Reservation

Select Service type:

Please select a time slot:

- 8.00 A.M - 10.00 A.M**
- 10.00 A.M - 12.00 P.M** Selected
- 1.00 P.M - 3.00 P.M**
- 3.00 P.M - 5.00 P.M**

Number of time slots change according to the type of service (5 slots for full becomes 7 slots for Busy Wash)

In the timeslots, customer can select the available time slots in blue. The booked ones will be displayed in red(or any other matching colour) once selected they can confirm

Reservation details -Customer

Make Reservation

Clean Car

First Name *

Last Name *

Vehicle Model *

e-mail *

Date and time

Service Type *

Contact number *

After selecting an available time slot from the above timetable, user can make the reservation

Confirm Reservation – Customer

A Web Page
https://ConfirmReservation

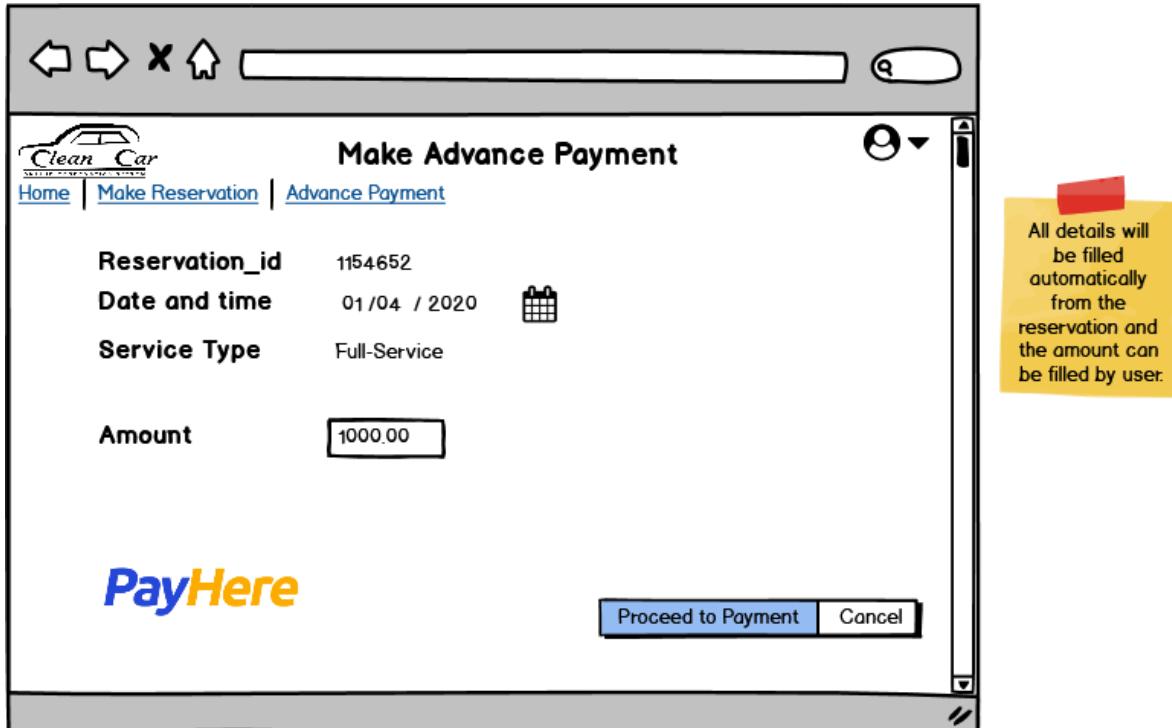
The screenshot shows a web browser window with the URL https://ConfirmReservation. At the top, there are navigation icons (back, forward, search) and a title bar. Below the title bar, the header includes a logo for 'Clean Car' and the text 'Customer 1'. A yellow callout box on the right side contains the following text: 'Terms of condition are the refund policy and description on how reservations are cancelled if concession time is expired and telephone number to contact the service station'. The main content area displays vehicle details: Vehicle Model (Nissan GT-R), Vehicle number (KN-1212), Date (01/04/2020), Time (8.00 A.M.), and Service Type (Full Service). There is also an 'Edit' button. To the right, a box titled 'Terms of Conditions' contains a large amount of illegible text. Below this, a question 'Confirm Reservation?' is displayed with three buttons: 'Make Advance Payment' (disabled), 'YES', and 'NO'.

Update Reservation – Customer

← → X ↗

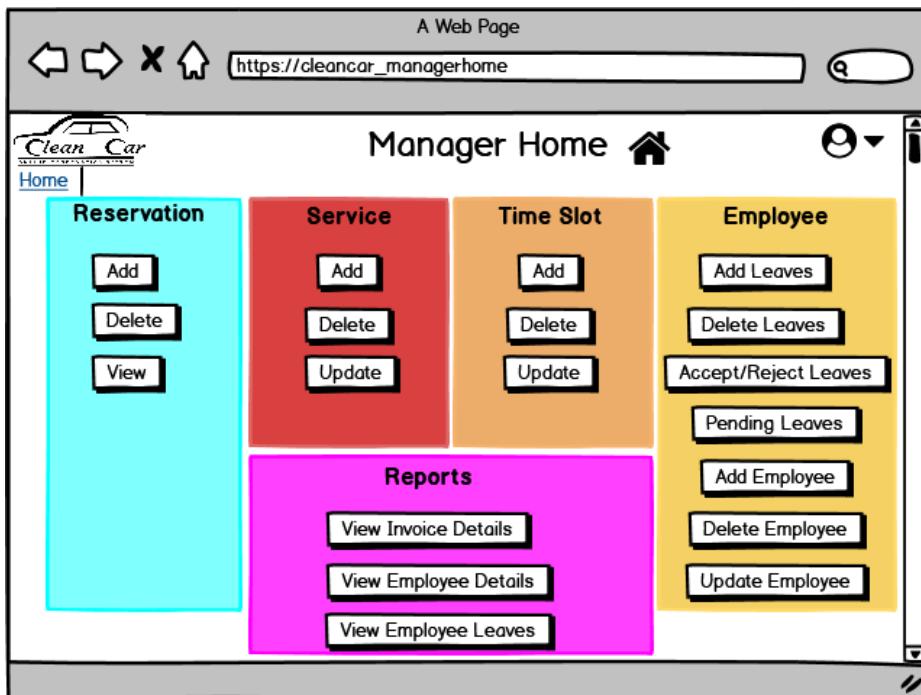
The screenshot shows a web browser window with the URL https://UpdateReservation. At the top, there are navigation icons (back, forward, search) and a title bar. Below the title bar, the header includes a logo for 'Clean Car' and the text 'Customer 1'. A yellow callout box on the right side contains the following text: 'Customers can go to their timetable and change their reservation or make online payment here'. The main content area is titled 'Update Reservation' and contains form fields for updating a reservation: First Name (Thenuka), Last Name (Ovin), Vehicle Model (FOO-BAR), e-mail (Thenu@123gmail.com), Date and time (01/04 / 2020), Service Type (Full-Service), and Contact number (0712 729 729). There is also a 'Make Advance Payment' button and 'OK' and 'Cancel' buttons at the bottom.

Make Advance Payment – Customer



The screenshot shows a web browser window for 'Clean Car' with the title 'Make Advance Payment'. The URL bar shows 'https://cleancar_customerhome'. The page has a header with a car icon and the text 'Clean Car'. Below the header, there are navigation links: 'Home' (underlined), 'Make Reservation', and 'Advance Payment'. The main form fields are: 'Reservation_id' (1154652), 'Date and time' (01/04 / 2020 with a calendar icon), 'Service Type' (Full-Service), 'Amount' (1000.00). To the right of the form is a yellow callout box with the text: 'All details will be filled automatically from the reservation and the amount can be filled by user.' At the bottom left is a large blue button labeled 'PayHere'. At the bottom right are 'Proceed to Payment' and 'Cancel' buttons.

Manager Home



The screenshot shows a web browser window for 'Clean Car' with the title 'Manager Home'. The URL bar shows 'https://cleancar_managerhome'. The page has a header with a car icon and the text 'Clean Car'. Below the header, there are navigation links: 'Home' (underlined). The main interface is divided into four colored sections: 'Reservation' (cyan), 'Service' (red), 'Time Slot' (orange), and 'Employee' (yellow). Each section contains several buttons: 'Add', 'Delete', 'View' for Reservation; 'Add', 'Delete', 'Update' for Service; 'Add', 'Delete', 'Update' for Time Slot; and 'Add Leaves', 'Delete Leaves', 'Accept/Reject Leaves', 'Pending Leaves', 'Add Employee', 'Delete Employee', 'Update Employee' for Employee. Below these sections is a pink 'Reports' area with buttons: 'View Invoice Details', 'View Employee Details', and 'View Employee Leaves'.

Add Employee -Manager

The screenshot shows a modal dialog box titled "Add Employee". At the top right is a close button (X). Below the title are five input fields with validation stars: "First Name" (Thenuka), "Last Name" (Ovin), "NIC" (981235420V), "e-mail" (Thenu@123gmail.com), and "Address" (No12,Nugegoda). Under "Contact number", there are two rows: "Home" (0112 031 456) and "Mobile" (0712 321 123). To the right of the form is a circular profile icon with the text "EMP001" below it. At the bottom right of the dialog are "OK" and "Cancel" buttons.

Update/Delete Employee -Manager

The screenshot shows a modal dialog box titled "Update Employee". At the top right is a close button (X). Below the title are two input fields: "Employee ID" (empty) and "Employee Name" (empty). At the bottom left is a "View" button, and at the bottom right is a "Cancel" button.

Update/Delete Employee (Profile Selected) -Manager

A Web Page
[Home](#) | [Update Employee](#) | [Profile](#)

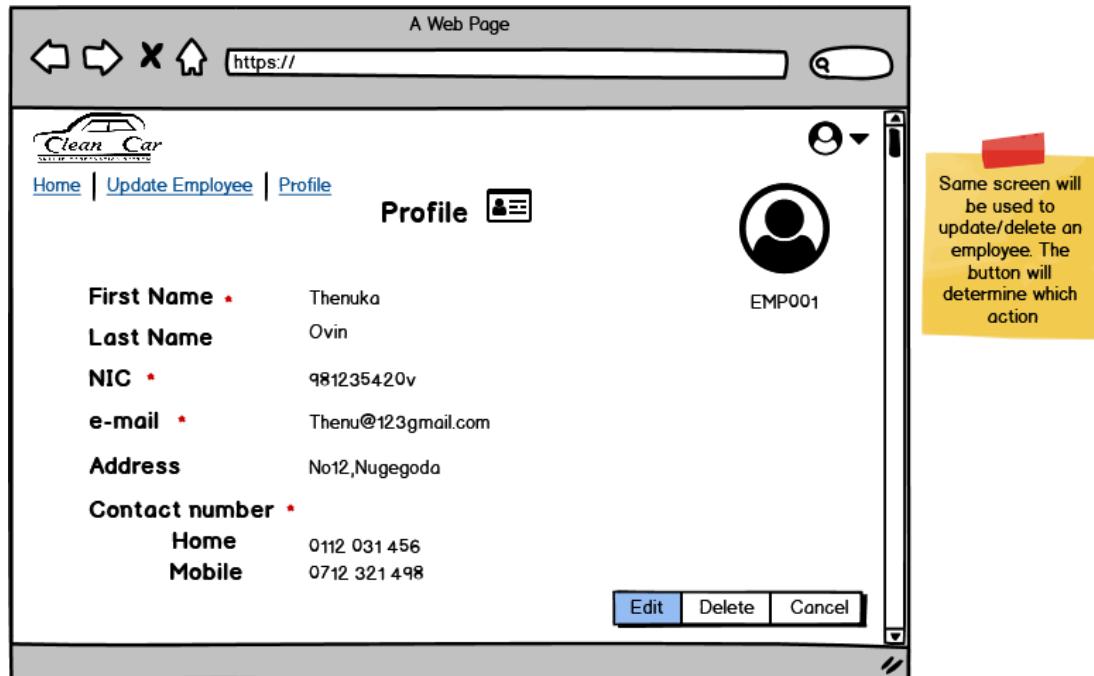
Profile 

First Name * Thenuka
Last Name Ovin
NIC * 981235420v
e-mail * Thenu@123gmail.com
Address No12,Nugegoda
Contact number *
Home 0112 031 456
Mobile 0712 321 498

EMP001

Edit **Delete** **Cancel**

Same screen will be used to update/delete an employee. The button will determine which action



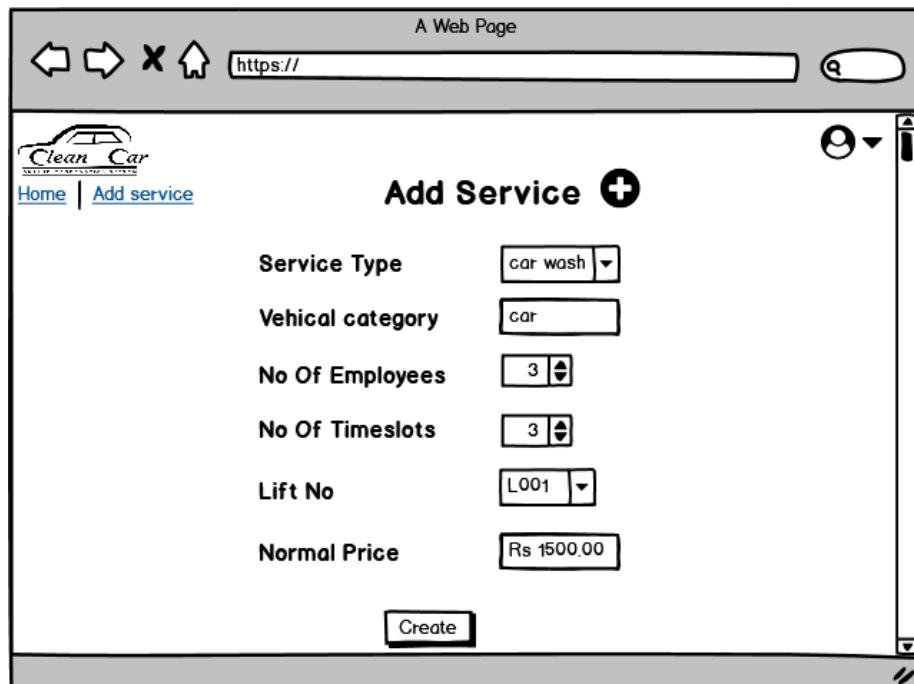
Add Service type -Manager

A Web Page
[Home](#) | [Add service](#)

Add Service 

Service Type car wash
Vehical category car
No Of Employees 3
No Of Timeslots 3
Lift No L001
Normal Price Rs 1500.00

Create



Update/Delete Service type -Manager

A Web Page

Home | Update service

Update Service

Select Service

Add time slot -Manager

A Web Page

Home | Add Timeslot

Add Time Slots

Start Time	8.00a.m.
End Time	9.00a.m.
Lift No	L001

Update time slot -Manager

A Web Page
https://cleancar_update timeslot

Update Time Slots

Exist Start Time	8.00 a.m.	New Start Time	8.30 a.m.
Exist End Time	9.00 a.m.	New End Time	9.30 a.m.
Lift No	L001		

Delete ↴ **Confirm Delete?**

Update ↴ **Confirm Update?**

When Delete button is pressed It will delete the current slot.
 When update is pressed it will update the current timeslot with values in the new one

Reservation Calendar – Manager, Receptionist

A Web Page
<https://>

Reservation Calender

SUN JUL 19	<	JULY 2020					>	SUN
	S	M	T	W	T	F	S	
	1	2	3	4				
	5	6	7	8	9	10	11	
	12	13	14	15	16	17	18	
	19	20	21	22	23	24	25	
	26	27	28	29	30	31		

Select **Cancel**

Where manager and receptionist can see which days are reserved ,holidays etc. Each date is clickable to individually view relevant timeslots and reservations.

Reservation timetable -Manager, Receptionist

A Web Page

https://

Home | View Reservation | Timetable

01/04 / 2020

Time Table

	Lift No:001	Lift No:002	Lift No:003
8.00-8.30	ABD-1234		
8.30-9.00	AH-3252		
9.00-9.30		KH-6532	KM-8564
9.30-10.00			
10.00-10.3		ZA-5423	

Delay Timetable Delete Update Exit

This time table view is also the same for customer user role except that here it denotes the time slots with the relevant vehicle no and for customer only a status of "Available" or "Booked" will be displayed. Also the "delay" timetable takes to a screen where receptionist can send a notification SMS to customers if there is a delay

Pending Employee leaves – Manager

A Web Page

https://

Clean Car

Home | Pending Leaves

Pending Leaves

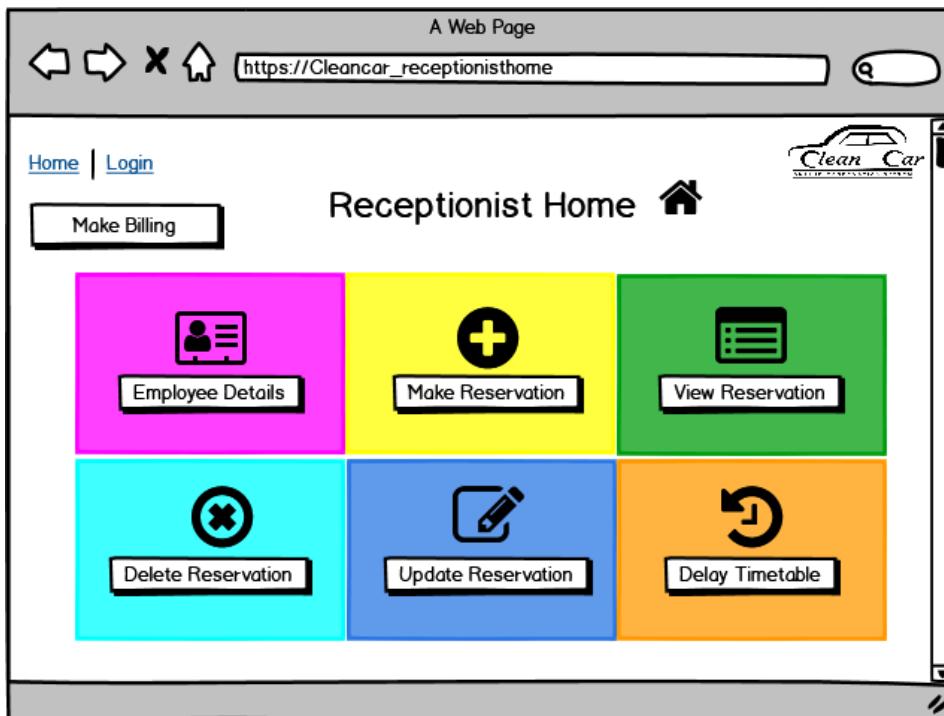
Employee no	Name	Date	Leave Type	Time	Reason	Response
E001	Thenuka	04	Full	-		<input type="button" value="Accept"/> <input type="button" value="Reject"/>
E002	Tharidu	05	Half	Morning		<input type="button" value="Accept"/> <input type="button" value="Reject"/>
E003	Kasun	05	Full	-		<input type="button" value="Accept"/> <input type="button" value="Reject"/>
E004	Ovin	05	Shortleave	Morning		<input type="button" value="Accept"/> <input type="button" value="Reject"/>

View past Employee Leaves – Manager

A Web Page
https://

Employee no	Name	Date	Leave Type	Time	Reason	Response
E001	Thenuka	01/07/2020	Full	-	Accept	
E002	Tharidu	01/07/2020	Half	Morning	Reject	
E003	Kasun	02/07/2020	Full	-	Reject	
E004	Ovin	02/07/2020	Shortleave	Morning	Accept	

Receptionist Home



Delay Timetable -Receptionist

A Web Page

https://

Clean Car

Home | Delay Timetable

Delay Timetable

Lift No: L001

Delay Time(Minuts): 10

Initial Delay Time: 08.00 a.m.

Confirm Cancel

Billing -Receptionist

A webpage

https://Cleancar_billing

Clean Car

Home | Billing

Billing

Bill no: BA-23413

reservation_id: R200623-100

vehicle_no: CAR-4565

vehicle model: Toyota Honda

Customer name: No12,Nugegoda

Contact number: 0712 321 123

Net Amount: 1250.00

OK Cancel

Used to do billing for car service functions. If it is a reservation , when reservation ID is typed relevant fields will be auto filled.

Invoice details -Receptionist

A Web Page
https://

Clean Car
Home | Invoice Details

Invoice Details

Bill No	Vehical No	Customer	Worked Employee	Service Type	Price
B001	AC-0123	Mr. Thenuka	E001 E003	Body Wash	Rs 2000.00
B003	AD-0125	Mr.Tharindu	E004 E002	Body Wash	Rs 2000.00
B002	NC-0654	Mr.kasun	E005 E003	Full Service	Rs 5000.00
B004	BC-0185	Mrs.silva	E001 E005	Body Wash	Rs 2000.00

Generate Report

Employee Home

A Web Page
https://cleancareemployeeshome

Clean Car
Home

Employee Home

Add Leave

Cancel Leave

Calender

Check the number of leaves

Employee Profile -Employee

A Web Page
https://



The screenshot shows a web browser window titled 'A Web Page' with the URL 'https://'. The page header includes a logo for 'Clean Car', a navigation bar with 'Home', 'Update Employee', and 'Profile' links, and a 'Profile' section with a user icon and the ID 'EMP001'. The main content area displays employee details:

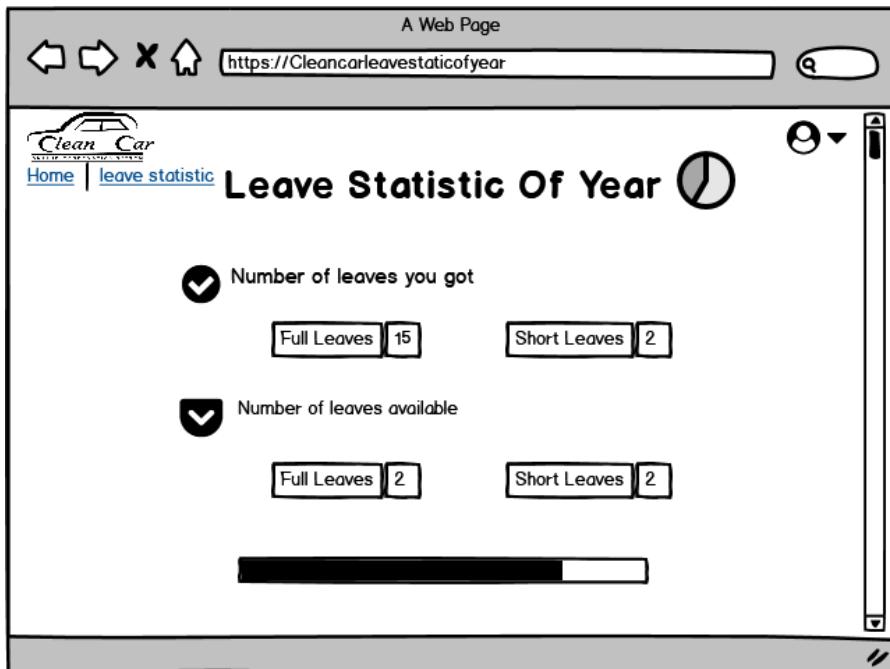
First Name *	Thenuka
Last Name	Ovin
NIC *	981235420v
e-mail *	Thenu@123gmail.com
Address	No12,Nugegoda
Contact number *	
Home	0112 031 456
Mobile	0712 321 498

At the bottom right are 'Edit' and 'Cancel' buttons.

Some screen will be used to update/delete an employee for both manager and employee. The delete button will

Leave statistics-Employee

A Web Page
https://Cleancarleavestaticofyear



The screenshot shows a web browser window titled 'A Web Page' with the URL 'https://Cleancarleavestaticofyear'. The page header includes a logo for 'Clean Car' and a navigation bar with 'Home' and 'leave statistic' links. The main content area displays leave statistics:

Number of leaves you got

Full Leaves	15
Short Leaves	2

Number of leaves available

Full Leaves	2
Short Leaves	2

Request leave -Employee

A Web Page
https://cleancaraddleaves

Clean Car
Add Leaves

Select Date 10 06 2020
Date Month Year

Leave Type Short leave

Time

Reason
Enter your reason here

Submit >

Leave accepted – Employee

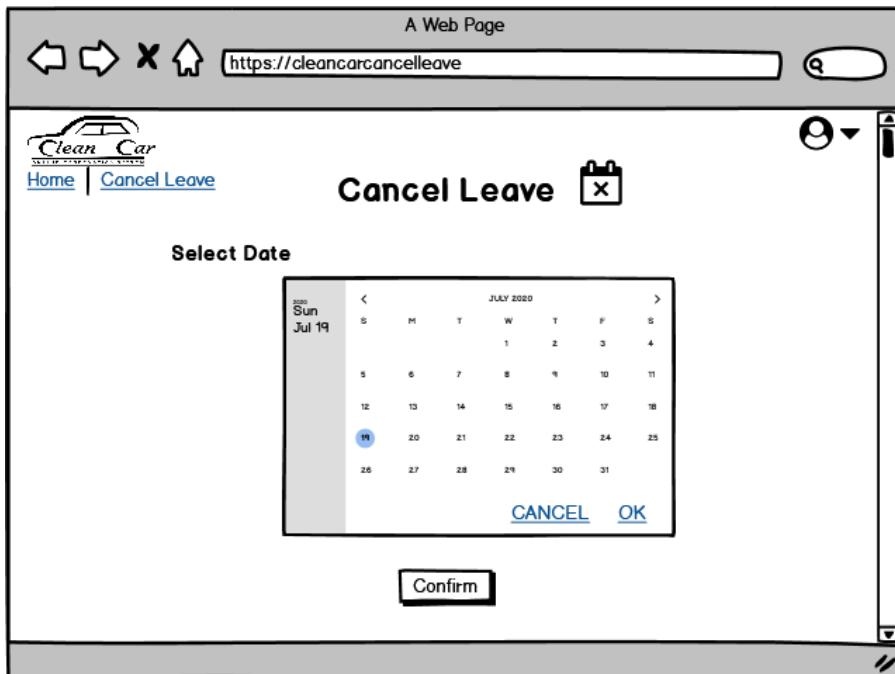
A Web Page
https://cleancaraddleaves

Clean Car
Your Leave Request Accepted

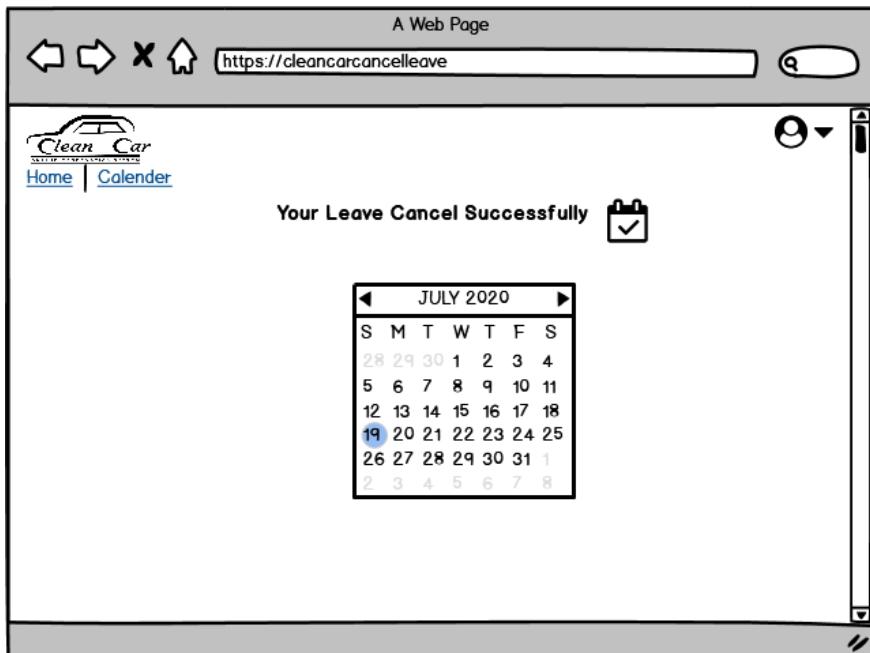
JULY 2020

S	M	T	W	T	F	S
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Cancel own leave – Employee



Confirm cancelled leave – Employee



References

- [1] "Auto Miraj - We provide total auto solutions | Over 25 years of service," [Online]. Available: <https://www.automiraj.lk/>.
- [2] L. Bass, P. Clements and R. Kazman, Software Architecture in Practice (3rd).
- [3] "PayHere - Sri Lanka's No.1 Online Payment Gateway Service," [Online]. Available: <https://www.payhere.lk/>.
- [4] M. Heap, "Sending SMS Messages with PHP," Vonage Developer Blog, [Online]. Available: <https://www.nexmo.com/blog/2017/09/20/sending-sms-messages-with-php-dr>.