SE 3070

Case studies in Software Engineering

2021s2_REG_WE_13

Background

The smart ticketing system is a system that is created for making transportation more convenient. The system lies in the center of a complex interconnected IOT network which helps to automate the process of ticketing of Metros, trains, busses and all other transportation methods. A customer of this system has 2 main methods to pay for the journeys that they take.

1. Day pass:

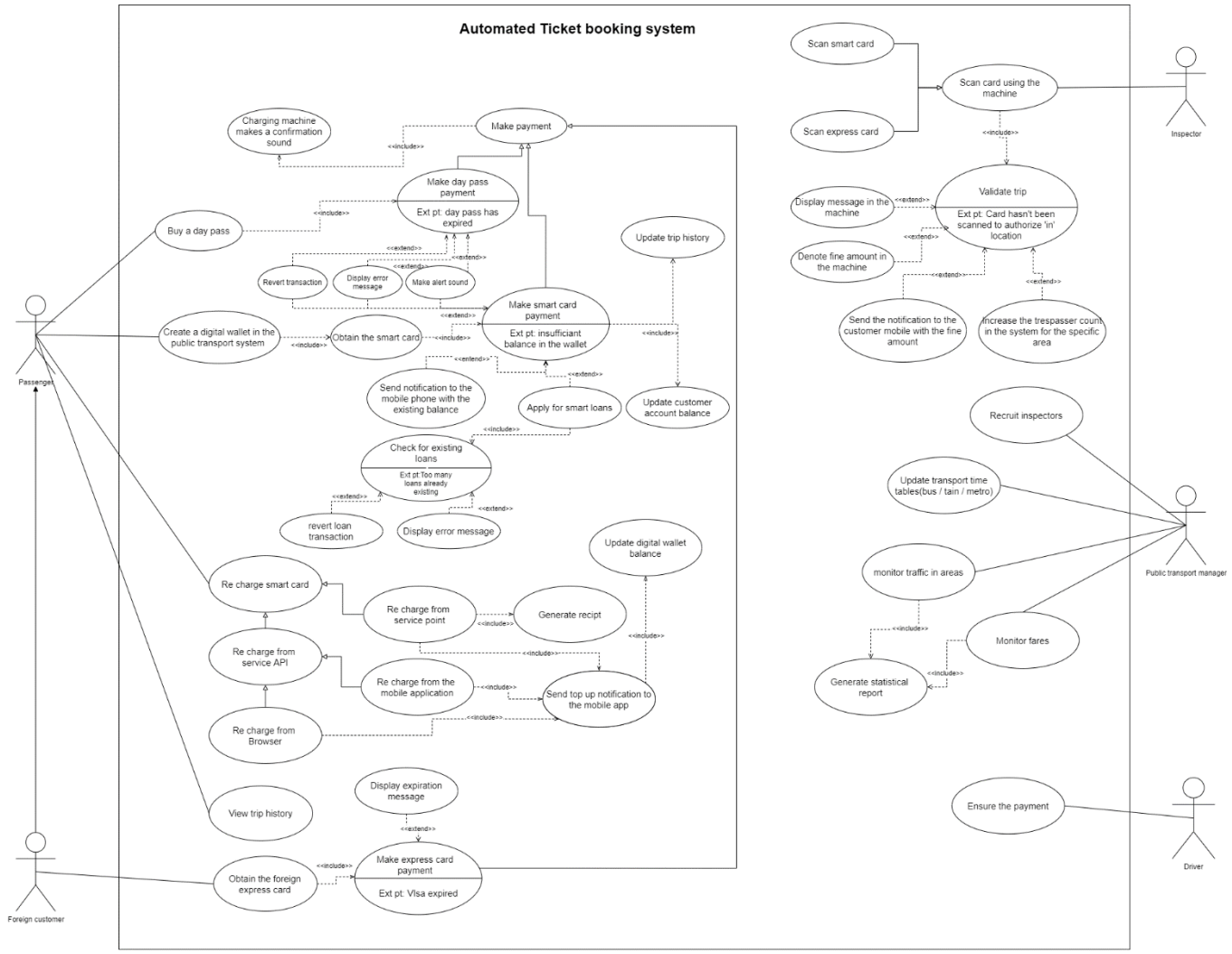
   In this method, customer can buy a day pass from a point at major transportation hubs.(bus stations / metro stations etc.). Using this pass , the customer can travel any distance in the network for 24 hours using the day pass as the payment method.

2. Smart card:

   In the smart card method, the customer can pays an initial amount for the transportation provider , and open a digital wallet. The customer can top up the wallet at a recharge point. Also the customer can recharge using the service API from the browser or from the mobile application. The customer will insert the smart card when starting the journey of any transportation mode . The customer will again insert the smart card at the exit destination. The system will calculate the prize for the journey based on the starting destination and the end destination. The calculation is done as a flat rate for a certain distance and for each distance beyond that a price for every kilometer. After making the payment the app will update the journey history of the customer.

Foringer is a special kind of customer . He can use both the above methods , but incase they don't have a personal wallet they can buy an foreign express pass. The foreign express pass can be used throughout the stay in the country and can be used to travel anywhere in the country using it as the payment method. This can only be brought by foreigners and has a price based on their visa. Once the visa expires the foreign express pass will also expire.

Use case diagram



User Scenarios

Use Case ID:	PTS001
Use Case Name:	Making payment with smart card
Summary:	This use case covers the scenario of the passenger making the payment with the with the smart card(payment token)
Priority:	1
Primary Actor:	Passenger (A registered user)
Secondary Actor:	Inspector
Frequency of Use:	Regularly

Preconditions
1. The passenger should have opened a digital wallet with the transport provider by paying the initial amount and obtained the smart card. 2. The passenger should be logged into the mobile app.

Main Success Scenario	
Step	**Actions**
1	The passenger inserts their smart card when entering to the bus
2	The passenger inserts their smart card at the exit location
3	The system calculates the price based on the exit and entrance location
4	The system checks whether the available balance is sufficient
5	The system deducts the amount from the customers wallet
6	Charging machine makes the confirmation sound

Extensions	
Step	**Actions**
4.1	If the available balance is insufficient
4.1.a	Revert the transactions in the system
4.1.b	Display an error message in the charging machine
4.1.c	Make an alert sound
4.1.d	Send notification to the mobile app with the available balance
4.1.e	Display the smart loan facility
4.1.e.i	Check for existing loans

Post conditions
1. Updated trip history information should be available for the user to view

Special Requirements
1. The passengers are privileged to take a loan during a trip too in case of a scenario they got a situation to travel longer and more expensive than they initially expected.

Other Notes (Assumptions, Issues,)
• It is assumed that the customer haven't already taken a loan

Use Case ID:	PTS002
Use Case Name:	Recharging the Smartcard account at a service point`
Summary:	A Passenger Recharges his/her Account Using a Reload Machine
Priority:	1
Primary Actor:	Passenger
Secondary Actor:	-
Frequency of Use:	Occasionally

Preconditions
1. User should know their account no in order to recharge the account. 2. Users should have valid bank notes to enter the reload machine.

Main Success Scenario	
Step	**Actions**
1	The user selects the smartcard payment option at the top-up machine.
2	The user enters the account number to the reload machine
4	The system asks the user to input the bank notes to the machine one after one.
5	The amount inputted is shown on the screen for the user to check
6	The user confirms the amount shown on the screen to be credited to his/her account.
7	The system will generate a receipt
8	The system shows the success notification for the mobile app

Post conditions
1. Update the digital wallet balance.

Special Requirements
1. Only the SriLankan currency(LKR) is accepted at service point.

Other Notes (Assumptions, Issues,)
1. The users can also top-up the account balance using a credit/debit card at the service point or using the service providers API

Use Case ID:	PTS003
Use Case Name:	Make Day Pass Payment
Summary:	This use case covers the scenario of the passenger making the payment with the day pass
Priority:	2
Primary Actor:	Passenger
Secondary Actor:	-
Frequency of Use:	Occasionally

Preconditions
• Buy a day pass.

Main Success Scenario	
Step	**Actions**
1	The user swipes the day pass at the charging machine at the exit location
2	The system checks whether the day pass is already expired
3	The charging machine makes the confirmation sound

Extensions	
Step	**Actions**
2.1	If the day pass is expired
2.1.a	Revert transaction
2.1.b	Display an error message in the charging machine
2.1.c	Make an alert sound

Post conditions
1. Update the total price of the transportation route

Use Case ID:	PTS004
Use Case Name:	Make Express Card Payments
Summary:	If the passenger is a foreign customer, he has to pay the bus fare through Express Card
Priority:	1
Primary Actor:	Foreign Passenger
Secondary Actor:	-
Frequency of Use:	Occasionally

Preconditions
• Customer should be a foreign customer • There should be sufficient balance

Main Success Scenario	
Step	**Actions**
1	Passenger makes the payment through express card
2	The system checks whether the Visa card is expired or not
3	System makes a confirmation sound when the payment is success

Post conditions
• Visa card balance must be updated

Special Requirements
• In order to use Express Cards, the passenger should be a foreign passenger

Use Case ID:	PTS005
Use Case Name:	Validate Trip
Summary:	When a passenger made
Priority:	3
Primary Actor:	Inspector
Secondary Actor:	-
Frequency of Use:	Regularly

Preconditions
• The passenger has made the payment • The payment should be successful

Main Success Scenario	
Step	**Actions**
1	The user makes a payment
2	Inspector scan the smart card or express card using a scanning machine.
3	Checks the amount with the scanned amount
4	If the value is correct, inspector validate the trip.

Extensions	
Step	**Actions**
4.1	In case if the value is incorrect a notification will be sent to the user and that additional charge will be added to the next trip.

Post conditions
• Trip confirmation message should be sent to the customer

Other Notes (Assumptions, Issues,)
• The system will auto calculate the trip fare. • If the card hasn't been scanned the location it will be notified to the inspector when he san it manually

Use Case ID:	PTS006
Use Case Name:	Generate statistical report
Summary:	Public transport manager generates a report to monitor traffic and trip fare
Priority:	5
Primary Actor:	Public transport manager
Secondary Actor:	
Frequency of Use:	Regularly

Preconditions
• Should have records of trip fares and traffic around the city

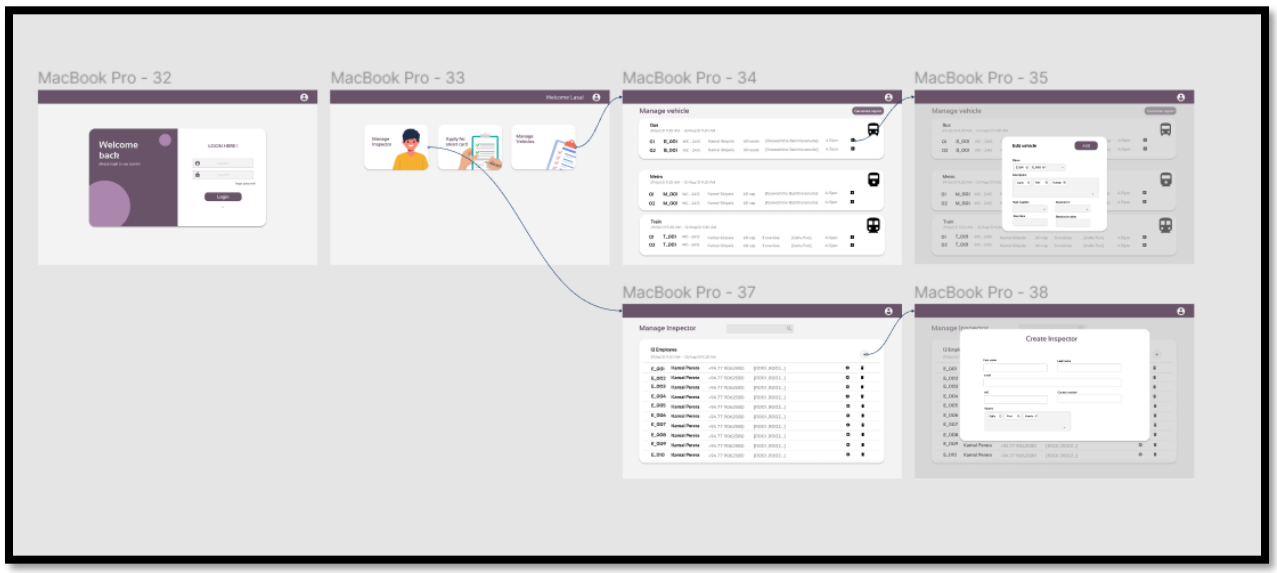
Main Success Scenario	
Step	**Actions**
1	Public transport manager takes details of trip fare
2	Public transport manager takes details of traffic details
3	After analyzing those details, he creates a statistical report
4	Updates the transport time as well

Post conditions
• Those statistical data must be taken by observing several records

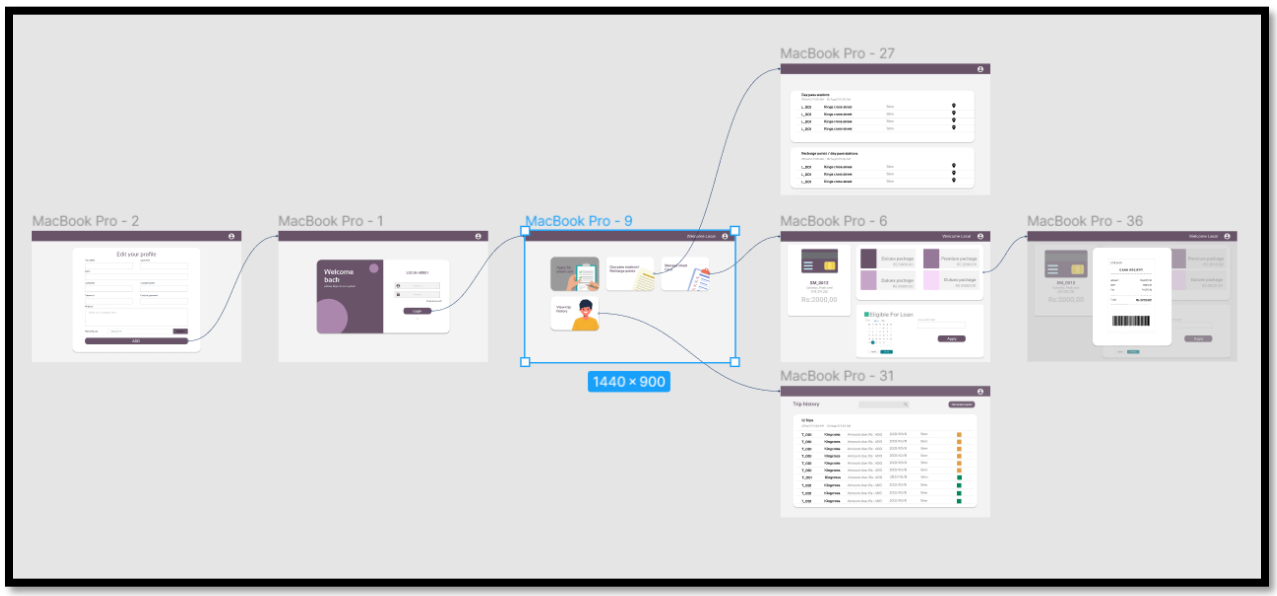
User interfaces

High fidelity interfaces

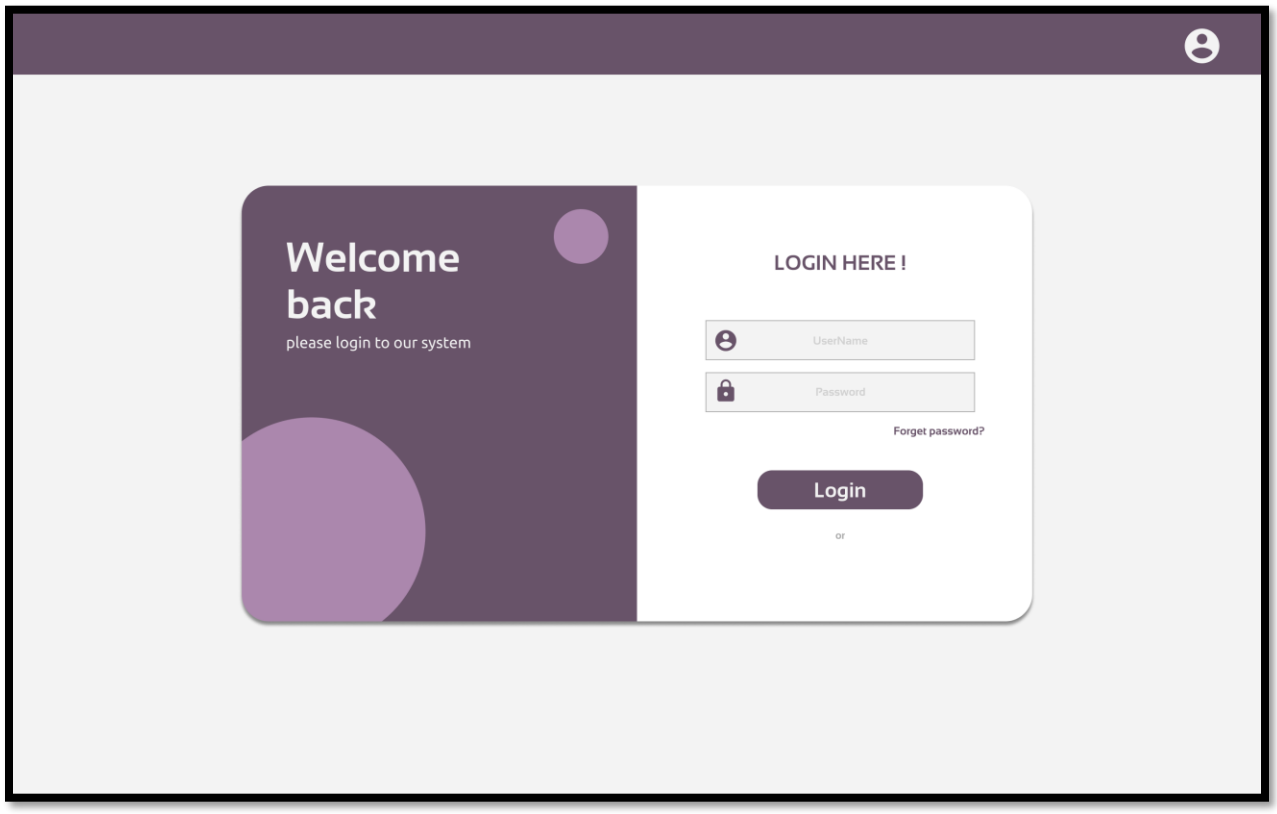
Some business functions of public transport manager



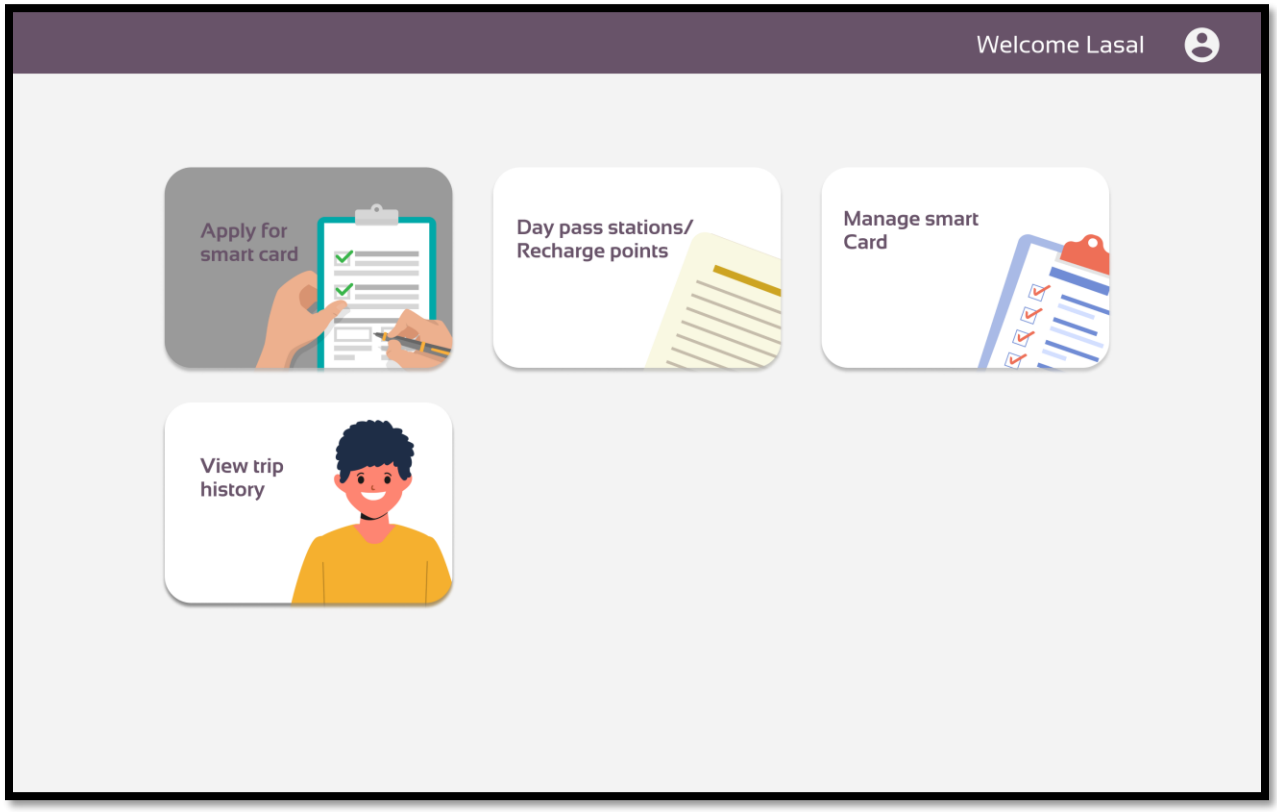
Some business functions of user

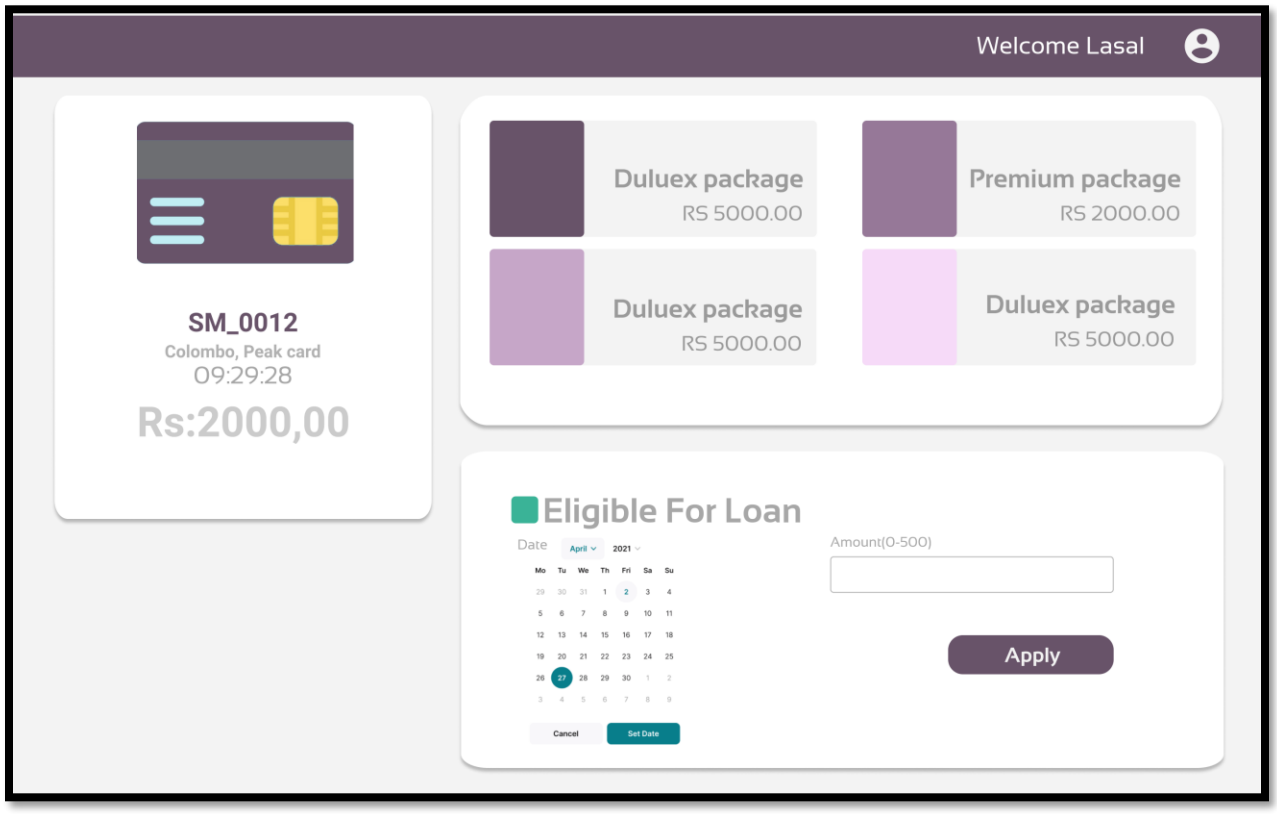


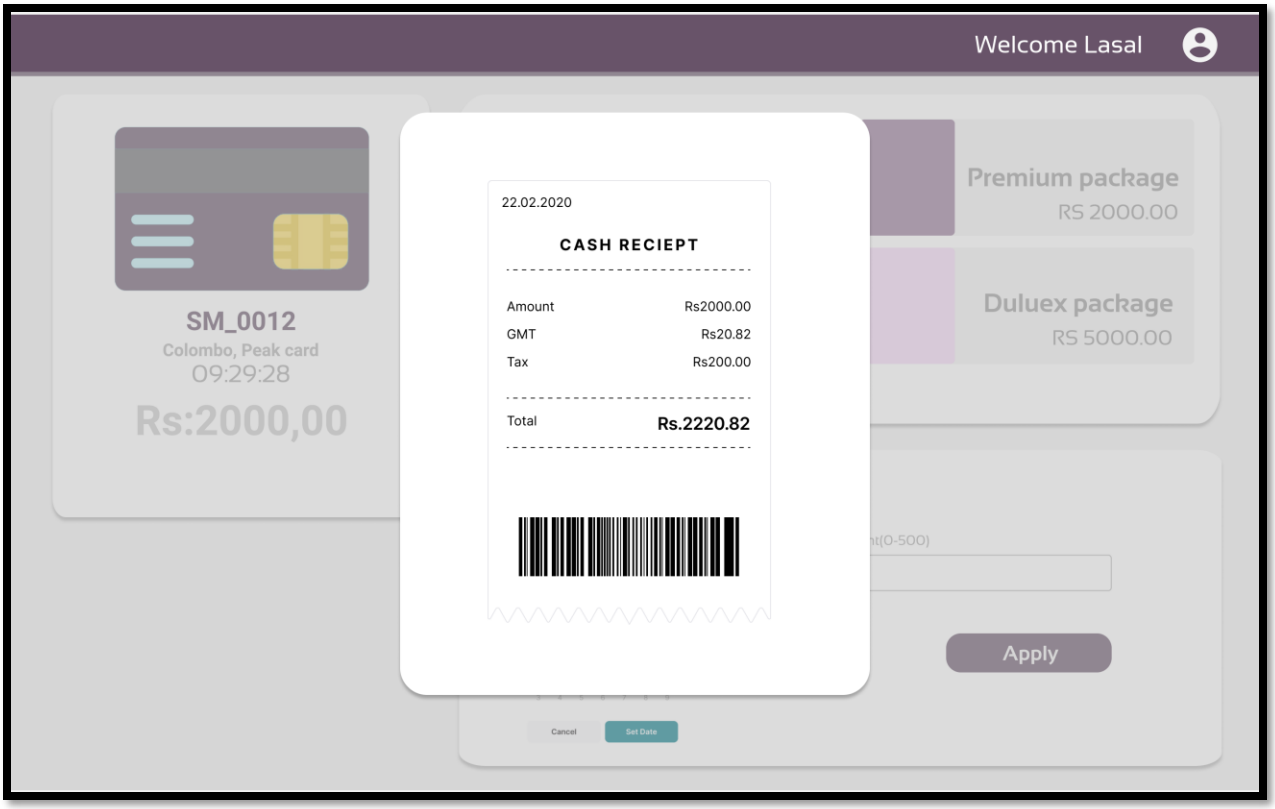
Login


Welcome back
please login to our system
LOGIN HERE !
UserName
Password
Forget password?
Login
or

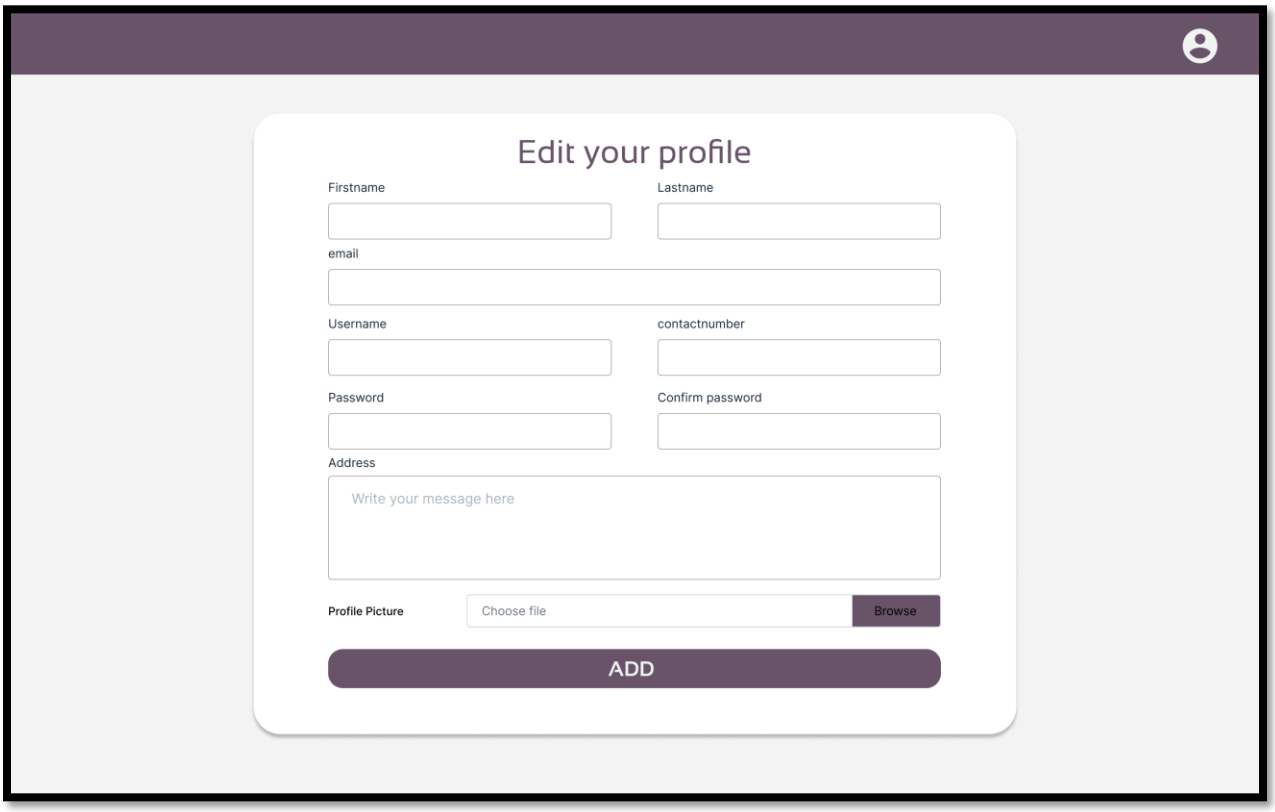
Recharge smart card



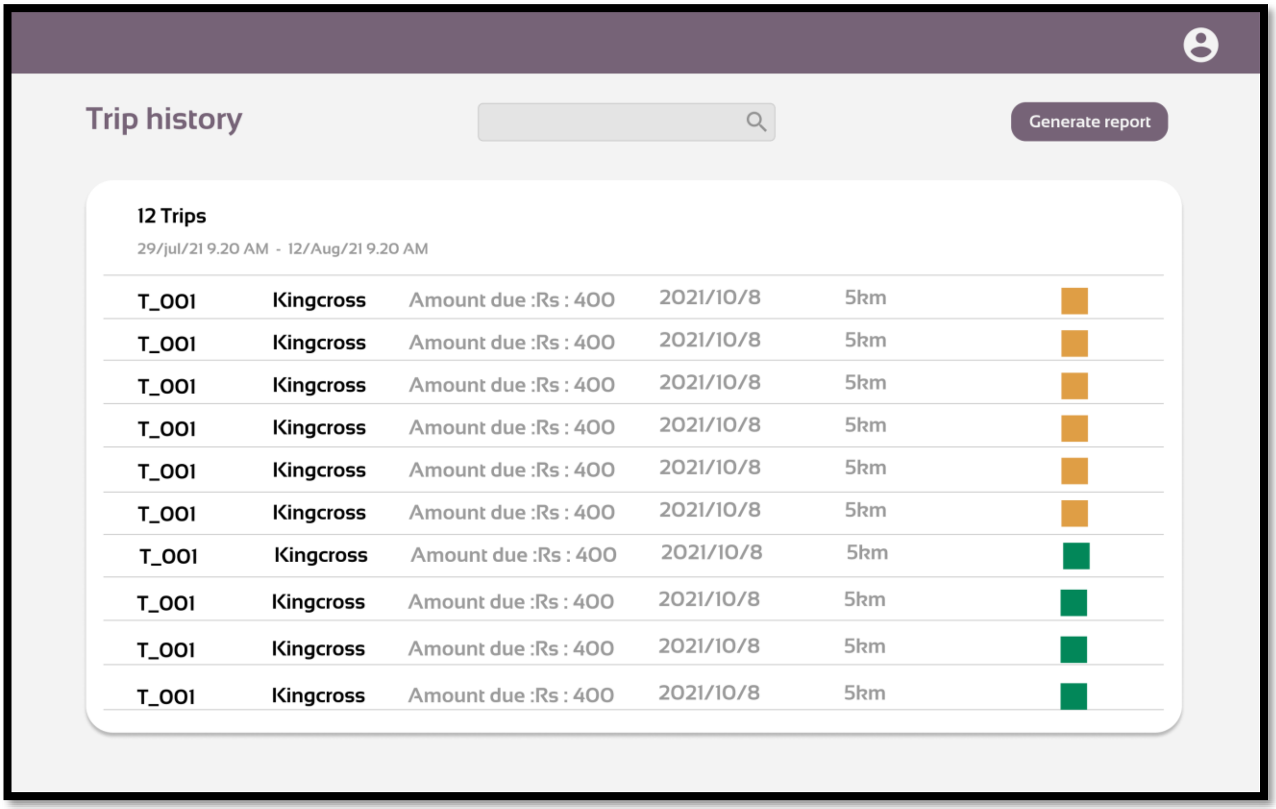




Registration

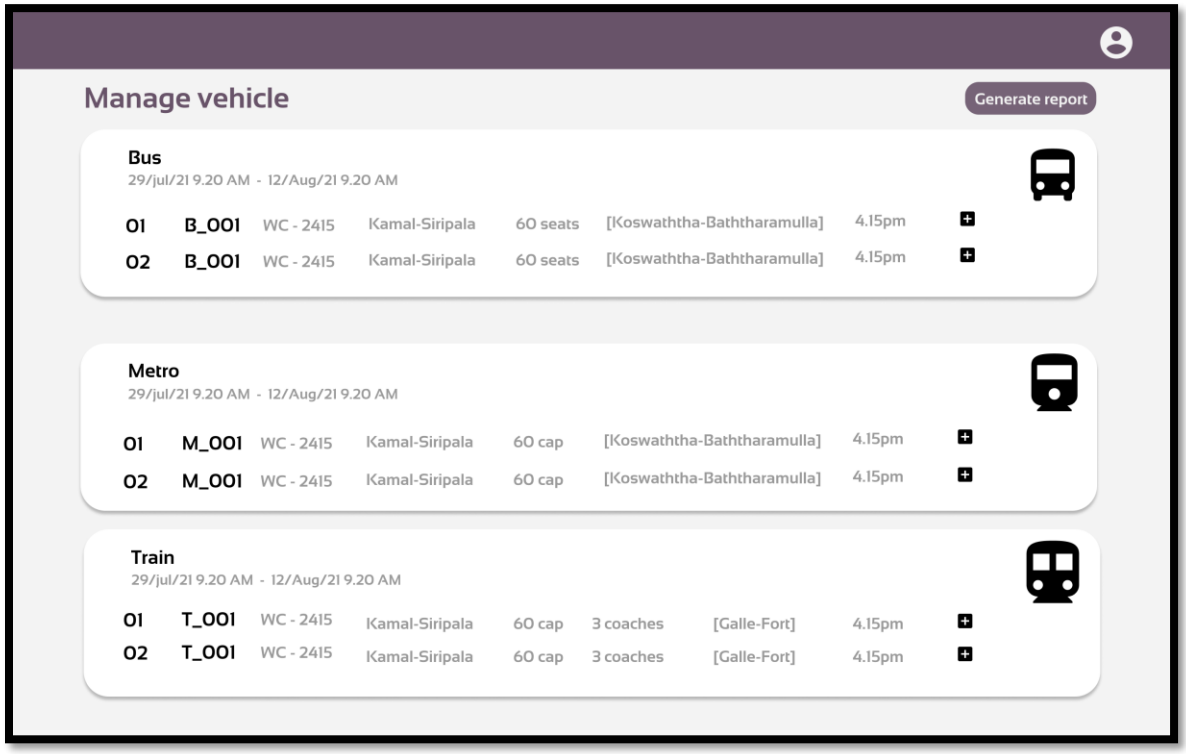


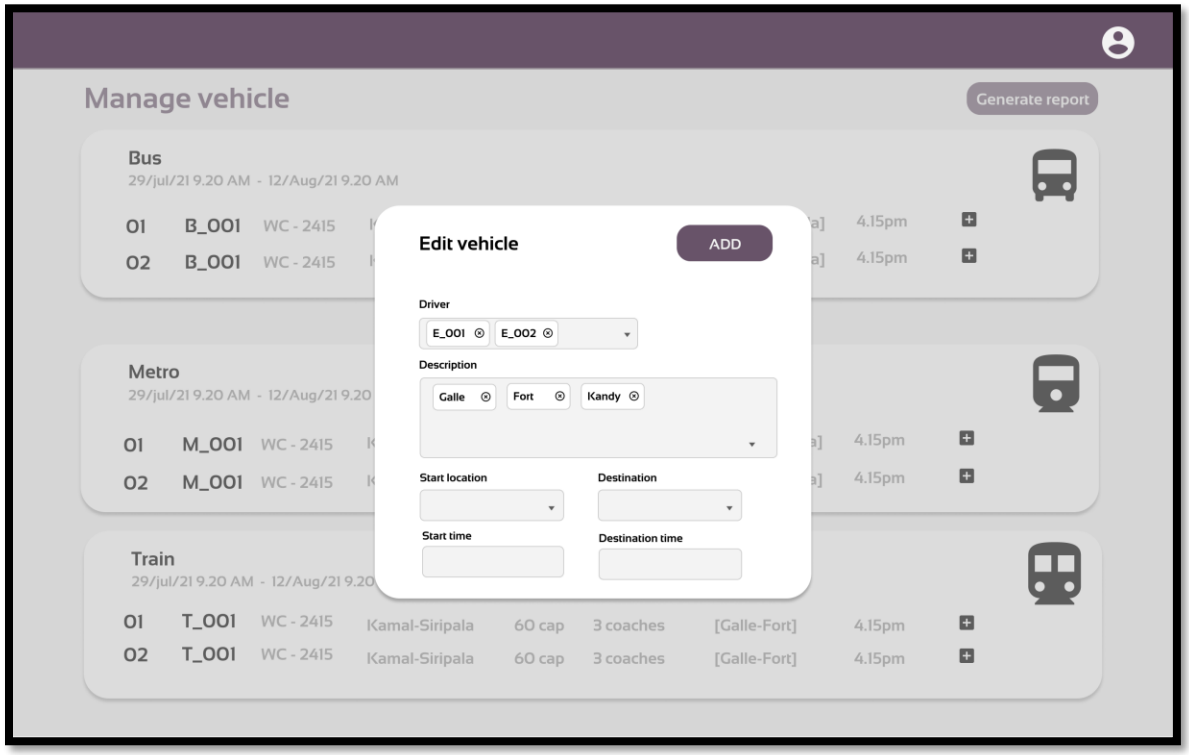
View past trips



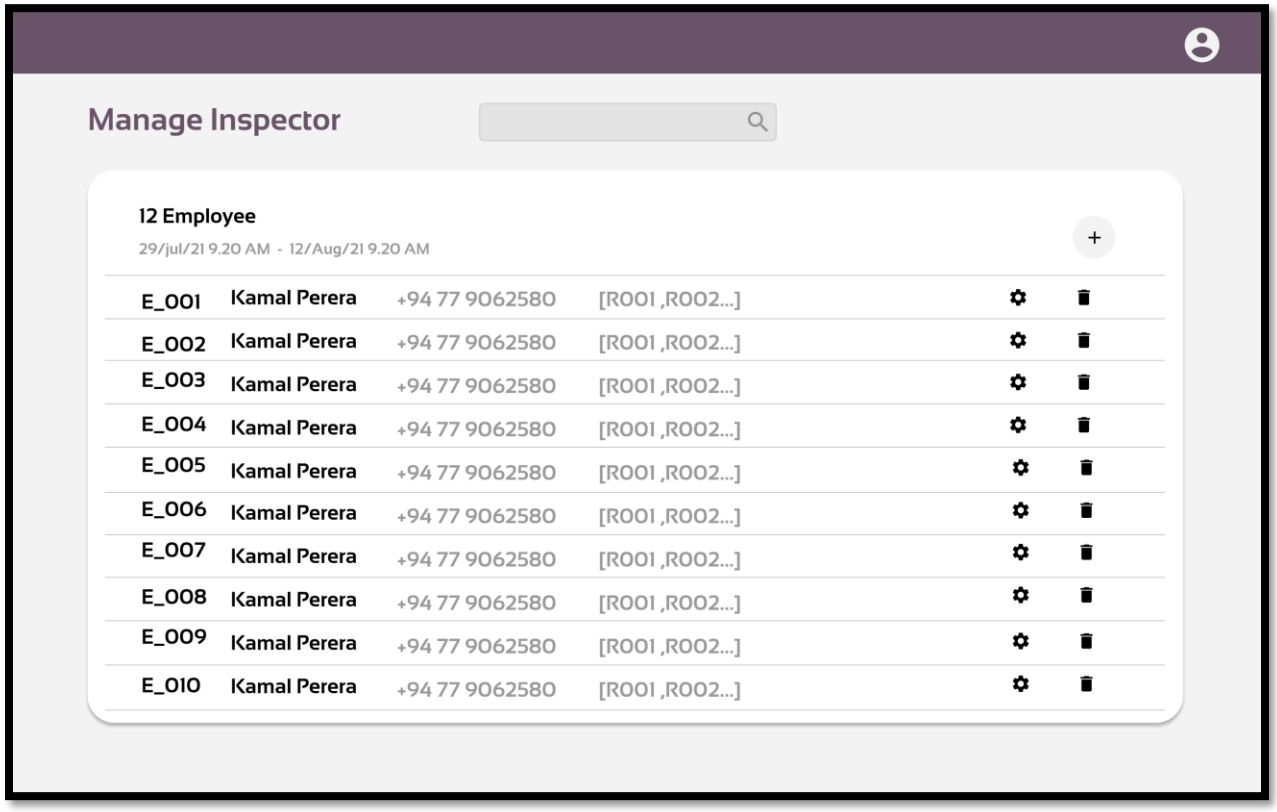
Transport manager

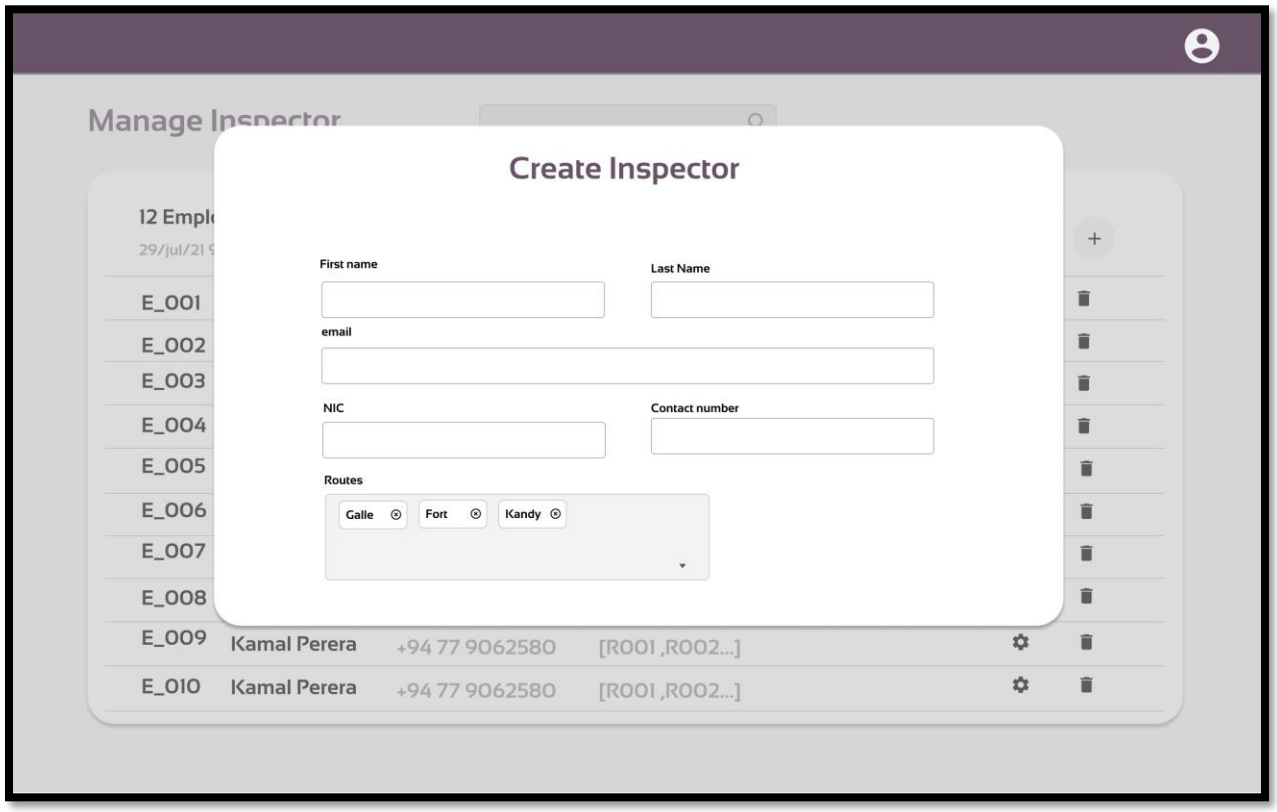
Manage vehicles / routes

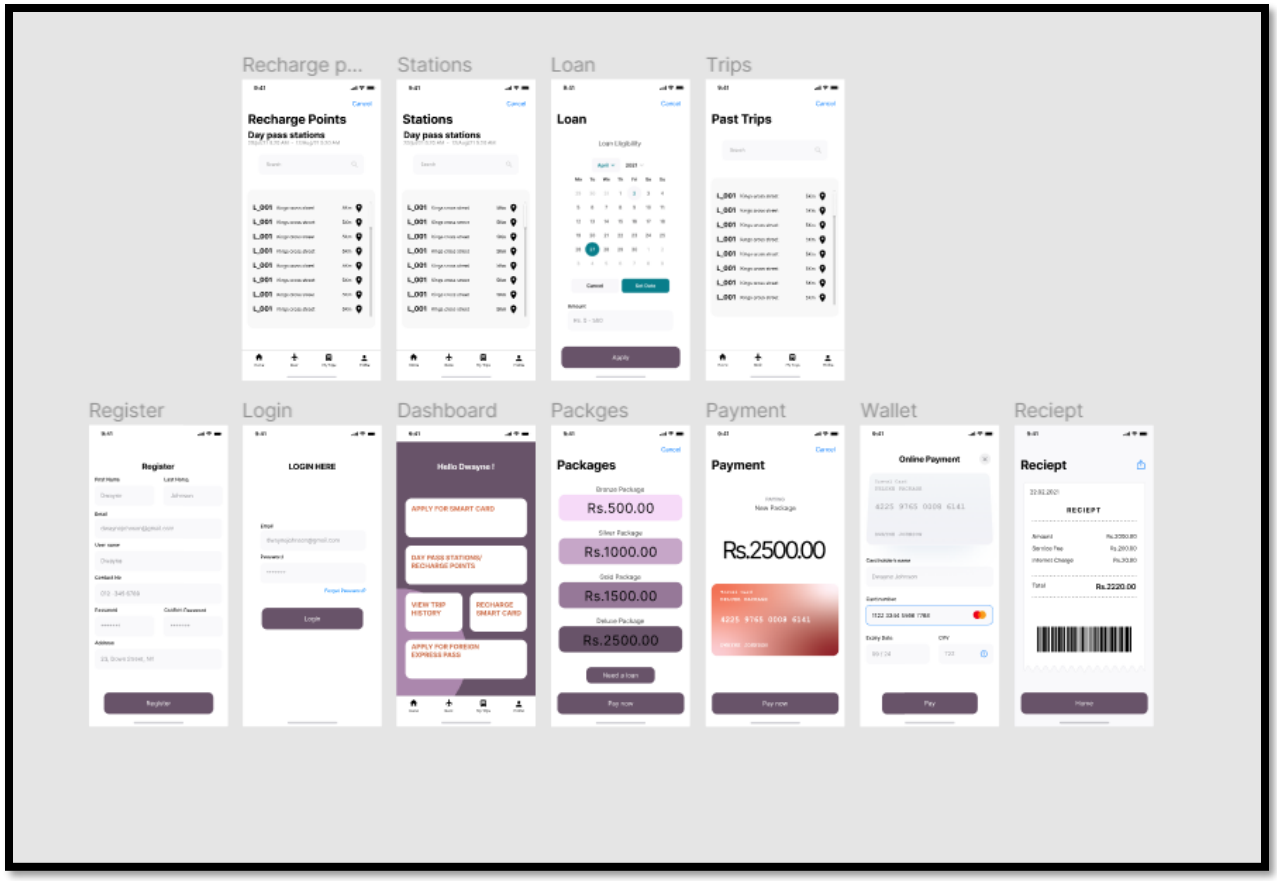


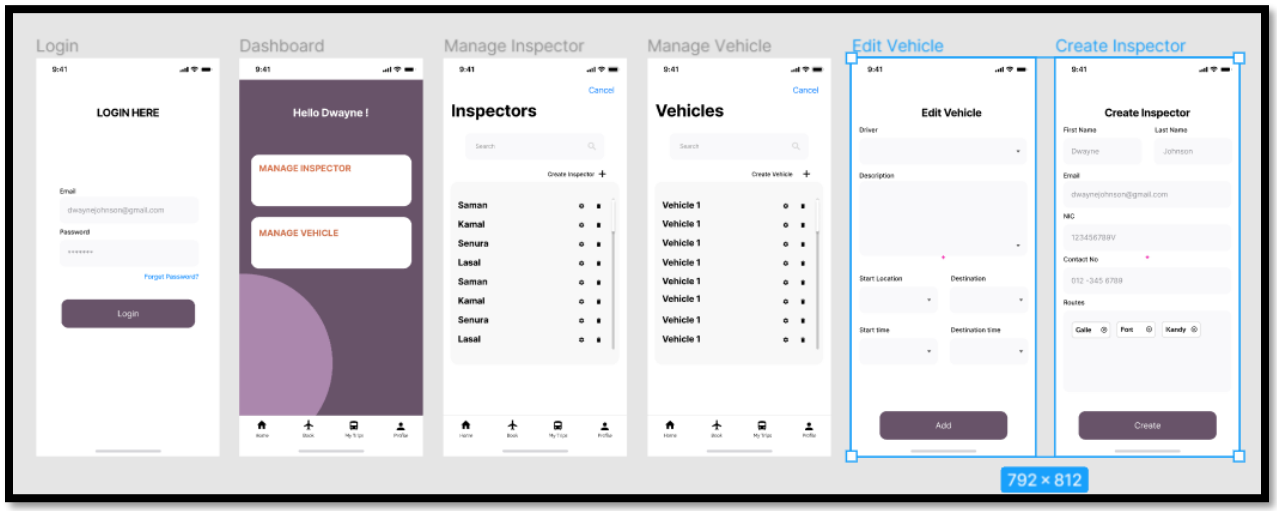


Manage Inspectors



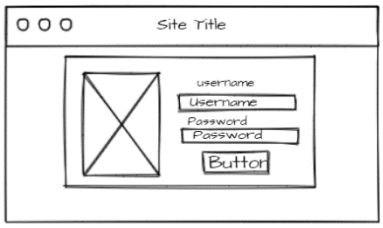


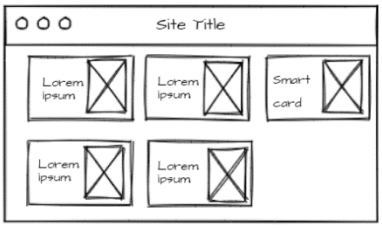

Recharge p...
Recharge Points
Day pass stations
Stations
Stations
Day pass stations
Loan
Loan
Trips
Past Trips
Register
Register
Login
LOGIN HERE
Dashboard
Hello Dwayne !
APPLY FOR SMART CARD
DAY PASS STATIONS/ RECHARGE POINTS
VIEW TRIP HISTORY
RECHARGE SMART CARD
APPLY FOR FOREIGN EXPRESS PASS
Packges
Packages
Rs.500.00
Rs.1000.00
Rs.1500.00
Rs.2500.00
Payment
Payment
Rs.2500.00
Wallet
Online Payment
Reciept
Reciept
Rs.2220.00

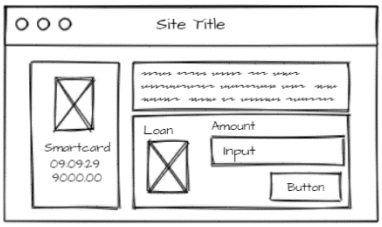

Login
LOGIN HERE
Login
Dashboard
Hello Dwayne !
MANAGE INSPECTOR
MANAGE VEHICLE
Manage Inspector
Inspectors
Saman
Kamal
Senura
Lasal
Manage Vehicle
Vehicles
Vehicle 1
Edit Vehicle
Edit Vehicle
Add
Create Inspector
Create Inspector
Create
792 × 812

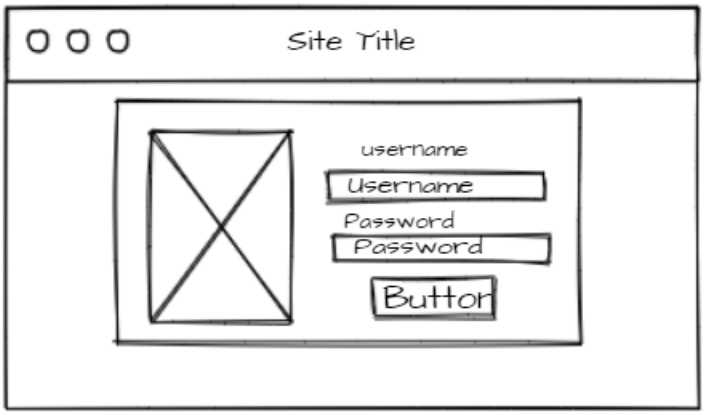
Low fidelity interfaces

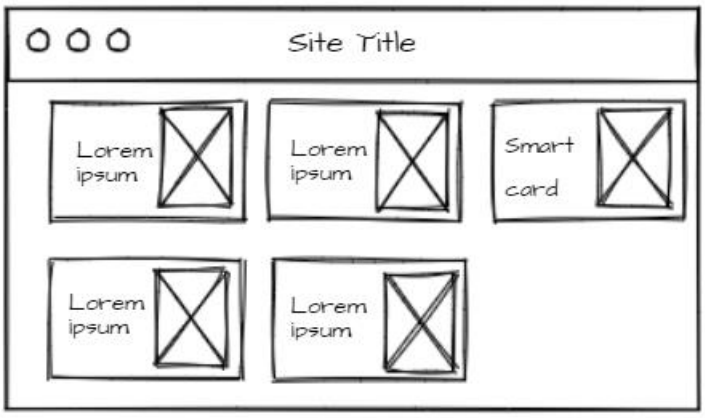
Apply for loan

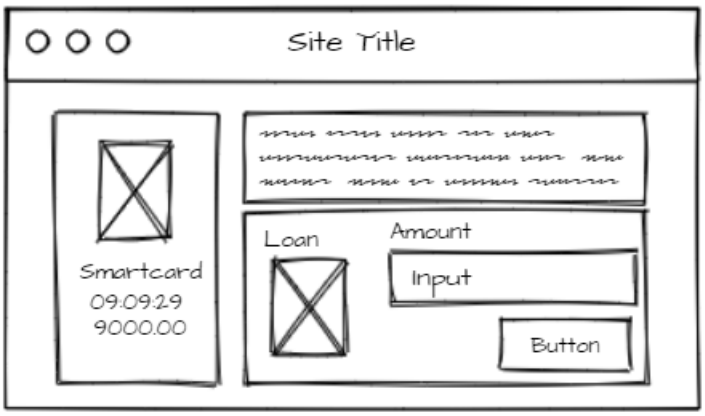




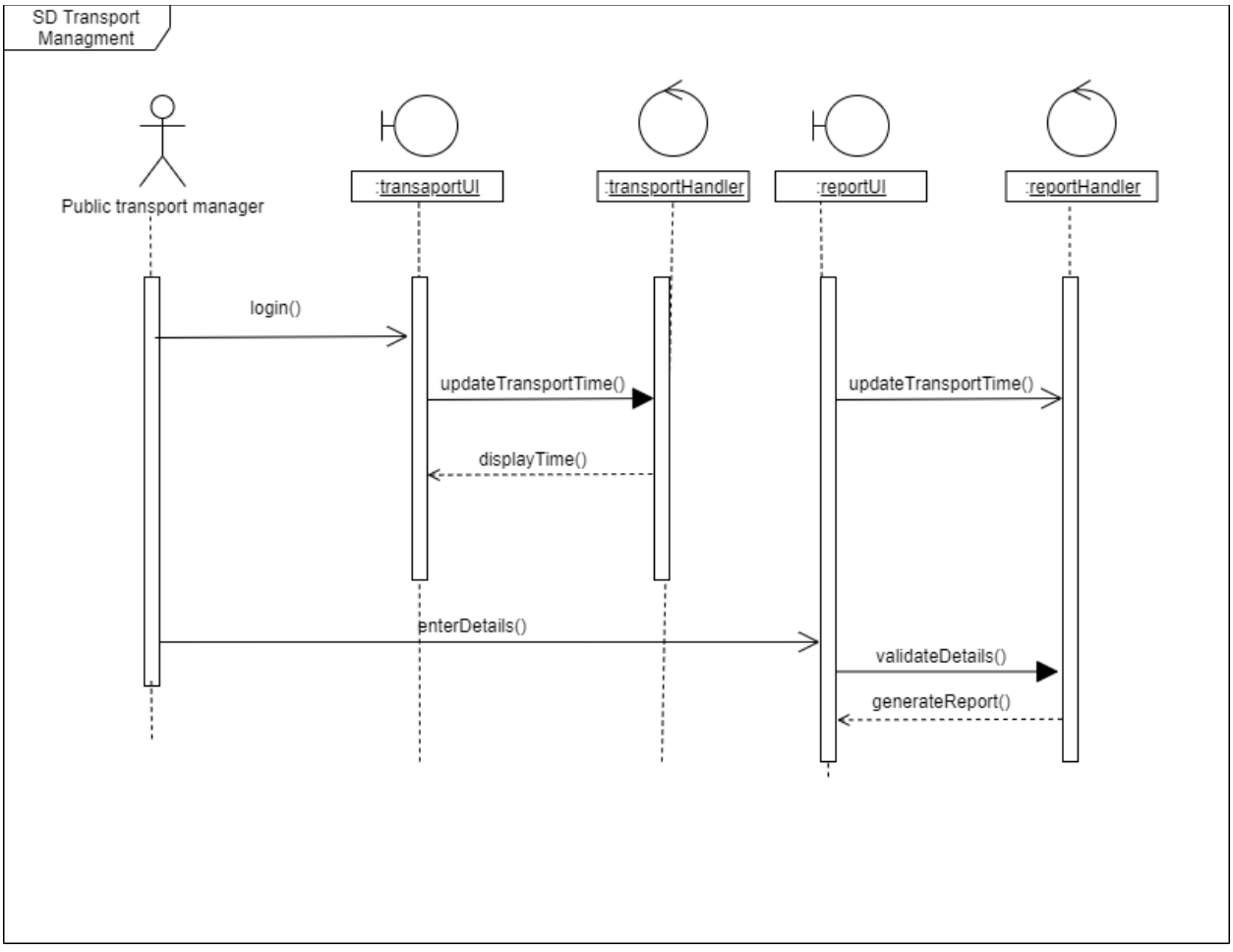


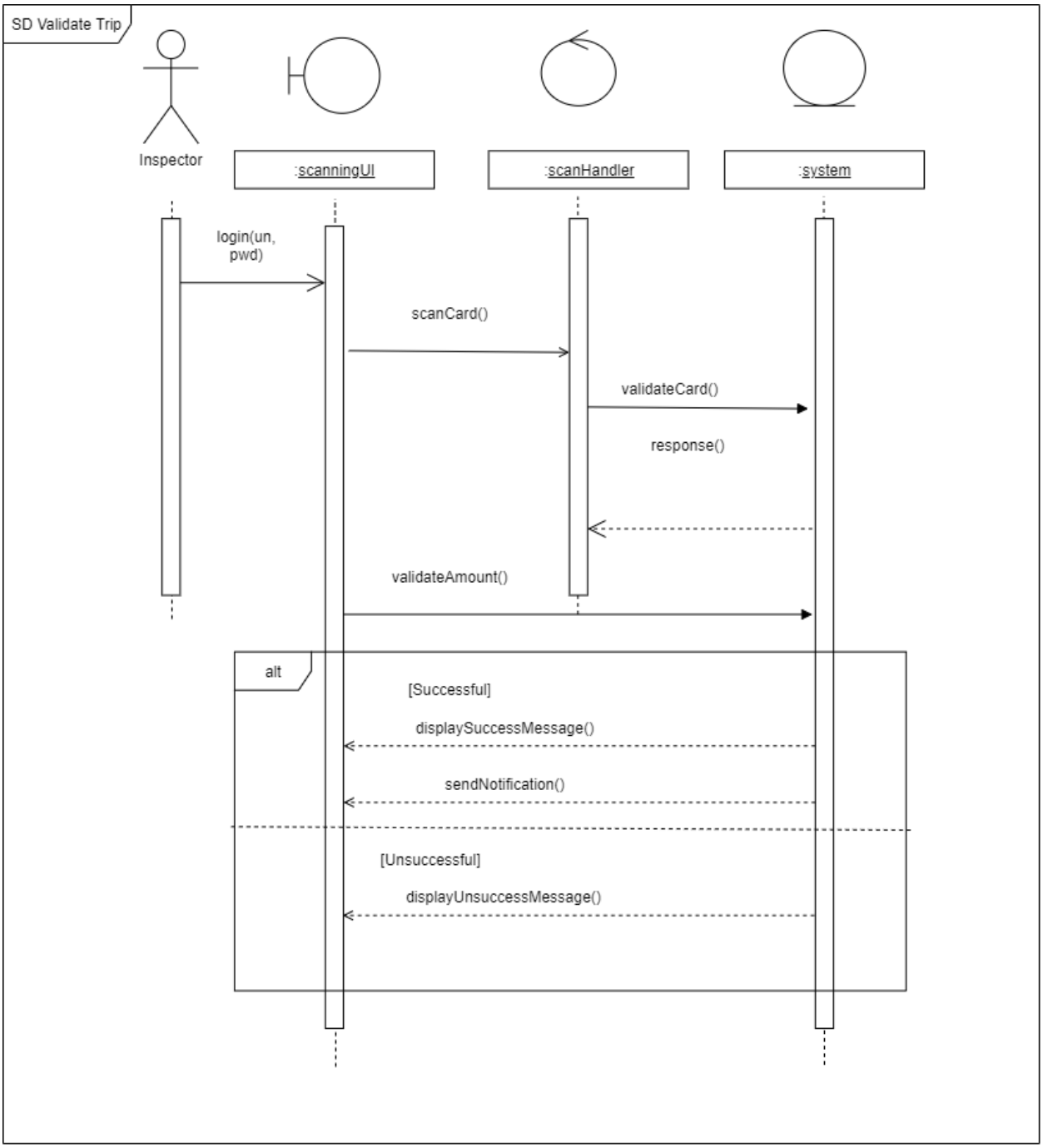


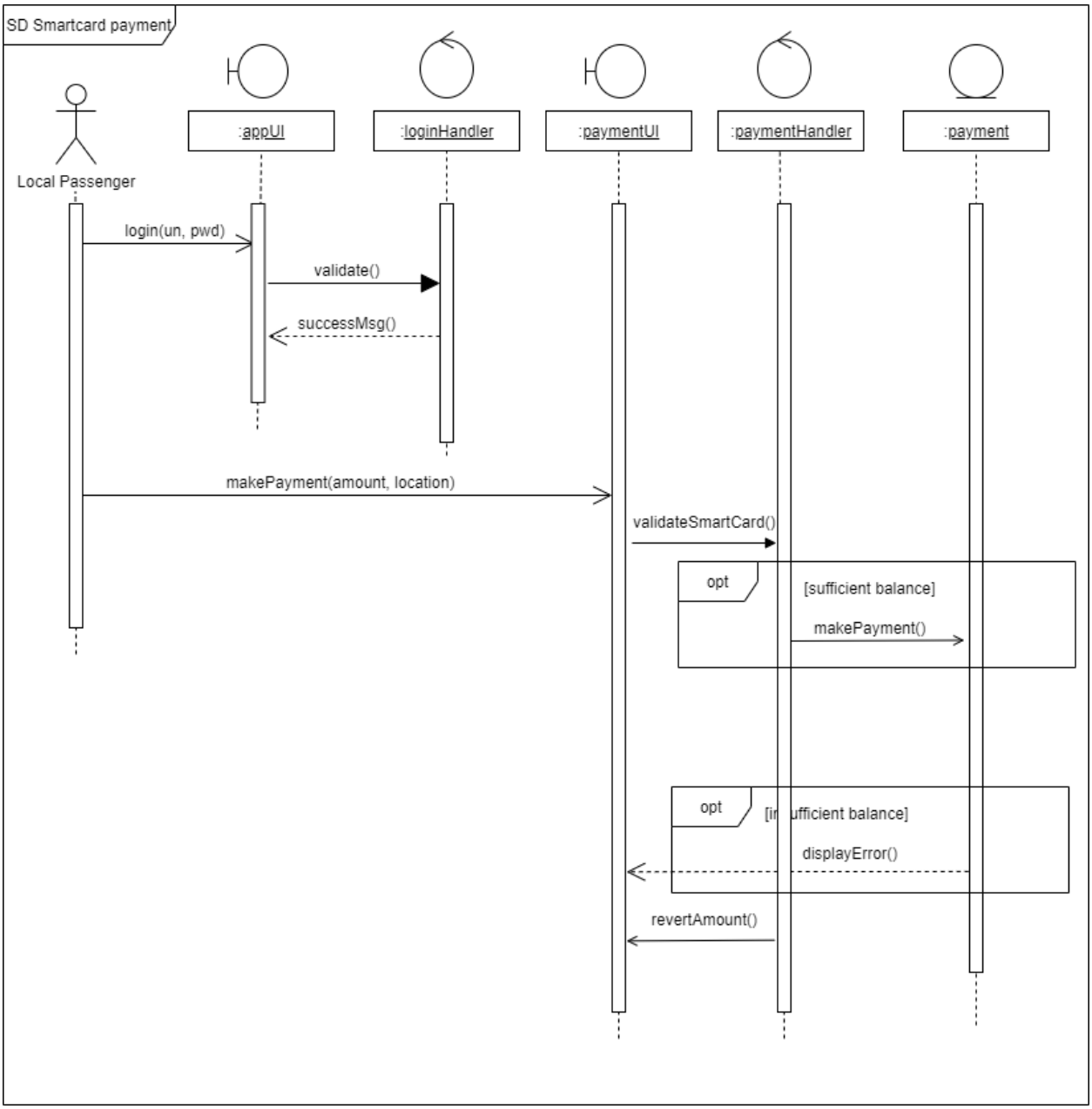




Sequence diagram




SD Validate Trip
Inspector
:scanningUI
:scanHandler
:system
login(un, pwd)
scanCard()
validateCard()
response()
validateAmount()
alt
[Successful]
displaySuccessMessage()
sendNotification()
[Unsuccessful]
displayUnsuccessMessage()


SD Smartcard payment
:appUI
:loginHandler
:paymentUI
:paymentHandler
:payment
Local Passenger
login(un, pwd)
validate()
successMsg()
makePayment(amount, location)
validateSmartCard()
opt
[sufficient balance]
makePayment()
opt
displayError()
revertAmount()

Registration number	Name	Contribution
IT19132310	Hettiarachchi L.S	• Usecase diagram • UI – Web • User scenario • Report
IT19139036	Jayadeva A.S.V	• Class diagram • User scenario • Report
IT19120980	Palliyaguruge D.N	• Sequence Diagrams • User Scenario • Report
IT19146898	Fernando K.D.A.B	• UI - mobile • Report