

**NATIONAL INSTITUTE OF BUSINESS MANAGEMENT**

**HIGHER NATIONAL DIPLOMA  
IN  
INFORMATION SYSTEM MANAGEMENT**

**Trainmart – QR Code Based Train Ticket Payment App**

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## **Trainmart – QR Code Based Train Ticket Payment App**

**Management Information Systems division  
National Institute of Business Management**

### **Higher National Diploma in Information System Management**

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Supervisor: Mr. K V Narangoda

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

The project is submitted in partial fulfillment of the requirement of the Higher National Diploma of Information System Management of National Institute of Business Management.

## **Declaration**

We certify that this project does not incorporate without acknowledgement, any material previously submitted for a Diploma in any institution and to the best of our knowledge and belief, it does not contain any material previously published or written by another person or ourselves except where due reference is made in the text. We also hereby give consent for our project report, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations.

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\_\_\_\_\_

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**Supervisor**

**Consultant/ Lecturer**

**National Institute of Business Management**

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

## **Summary**

This project was undertaken to develop Trainmart android application and associated web application. The android application allows users to pay for train tickets by scanning QR code. The user only has to scan the QR code, payment only needs to be done later, which increases the speed and convenience of buying train tickets. In addition to buying tickets, users can also get seasons using this application. The web application is for admin side activities. The project was developed in Java, NodeJS and using Firebase.

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We would like to express our special thanks to Mr. K V Narangoda, consultant/lecturer at National Institute of Business Management, for directing us to complete the Innovative software engineering project and for clarifying our problems when needed.

We would like to express our gratitude to all the lecturers in the lecturer panel of MIS division of National Institute of Business Management as well as visiting lecturers for giving us the knowledge to carry out this project.

Last but not least, we would also to thank our parents, colleagues and friends, and senior students for their support and assistance.

## **Introduction**

### **Problem Overview**

In the present day where waiting in queues is considered an inconvenience, train passengers still have to do it in order to obtain tickets. This leads to the passengers having to wait for long time periods, wasting their time and even sometimes missing trains altogether. Even though booking mechanisms exist, it is only good for booking single trips. For day to day train passengers there is no quick and convenient method to purchase their train tickets.

The passengers have to pay each time when purchasing a ticket (unless a season pass is obtained) which makes it necessary to use physical money. Considering the current COVID-19 pandemic, handling notes and coins is considered not ideal, as it could carry the infection and affect the people who handle it adversely. The need exists to make the payment process more convenient and safe experience for people who travel by train.

### **Background of the project**

There exists a possibility to provide an IT based solution to the problem of inconvenience in purchasing train tickets. This project is providing such a solution with an Android mobile application and a web application serving as admin panel.

### **Weakness of the existing system**

In the current manual system, there exists no computerized database, so data viewing and sorting is difficult. The long time taken to process a transaction results in time wastage and loss of efficiency. Furthermore, the necessity to use physical money to the process adds extra delay.

### **Proposed solution**

Train Ticket Payment System is an android mobile application that allows the users to easily pay for their journeys by trains in Sri Lanka. The application uses a QR Code (Quick Response Code), a machine-readable optical label that contains information about the item



to which it is attached. The users only have to scan the QR Code at the train station (origin of journey) and select the destination, without waiting for a long time in a queue.

The user needs to register first, where an account is created through phone verification, after which he can start using the app. Once the user scans the QR code and selects the destination, the amount to pay is added to their bill which can be settled on a weekly basis. Also, after confirming the destination, the app will show the currently activated journey on its user interface along with date/time. This can be shown to the ticket inspectors upon an inspection like a virtual ticket.

The user has to settle the bill on a weekly basis. He/she can make the payment using the app itself using credit/debit card through a payment gateway. If the user fails to pay the bill on time, the app will make it unable for the user to pay for further journeys. The user can reactivate payment ability by paying the due amount.

It also has the option of obtaining a season pass, where the user has to pay the fee upfront. The app offers a form to the user to be filled and then payment has to be made. After the payment is made, the app displays the details of the season pass along with status active.

The web application will allow the user data viewing, report viewing and other admin capabilities.

### **Aims and objectives**

Create an innovative Android mobile application to make the purchasing of train tickets easier.

Provide a way for users to quickly onboard a train without waiting, using QR code.

Provide way to settle bills later instead of at the moment, expediting the ticket purchasing process.

Allow users to pay for season tickets as well using the app.

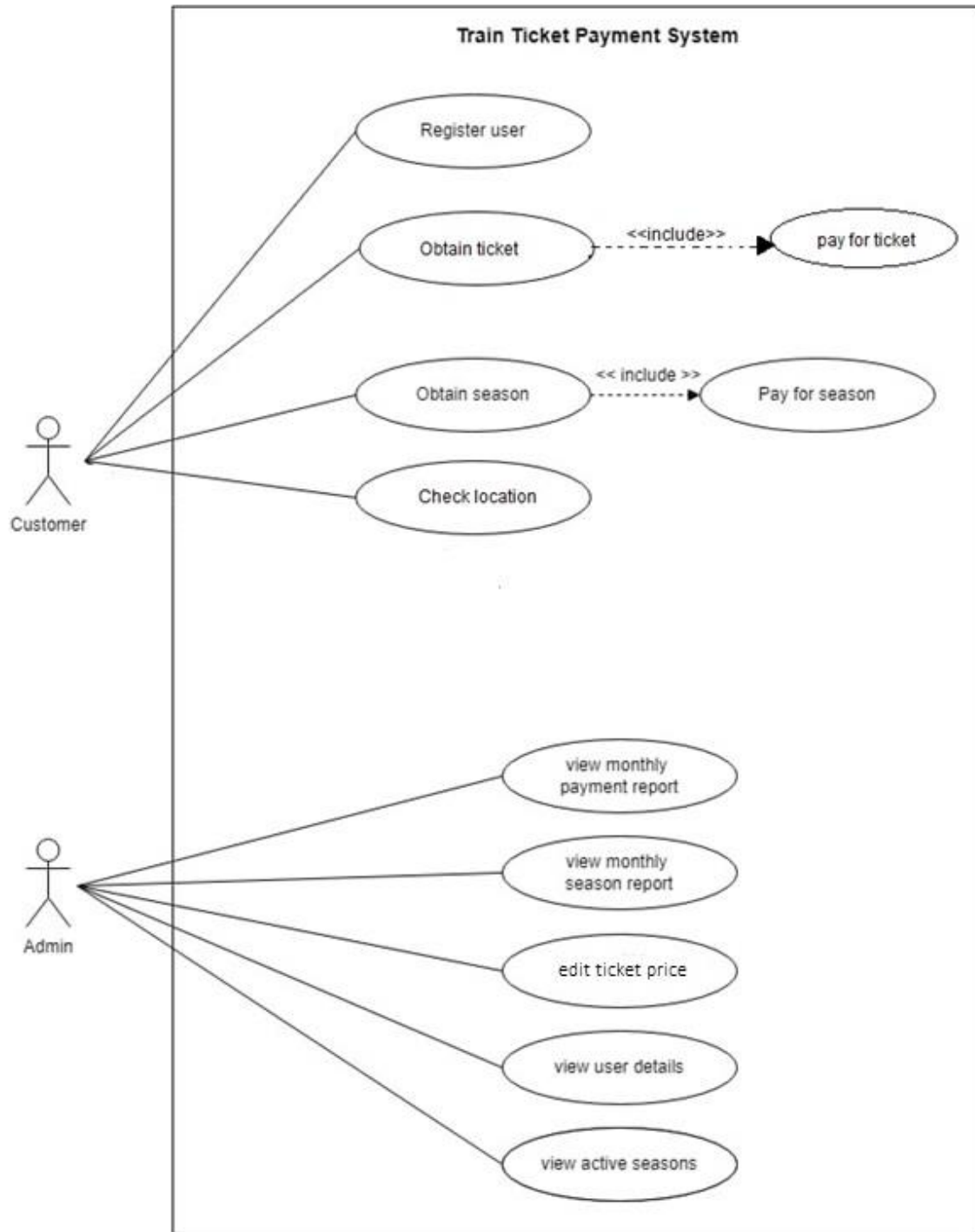
Create web application to facilitate admin activities.

**Expected outcome**

Design and develop an Android application and associated web application that solves a problem faced by train passengers in obtaining their tickets quickly and efficiently.

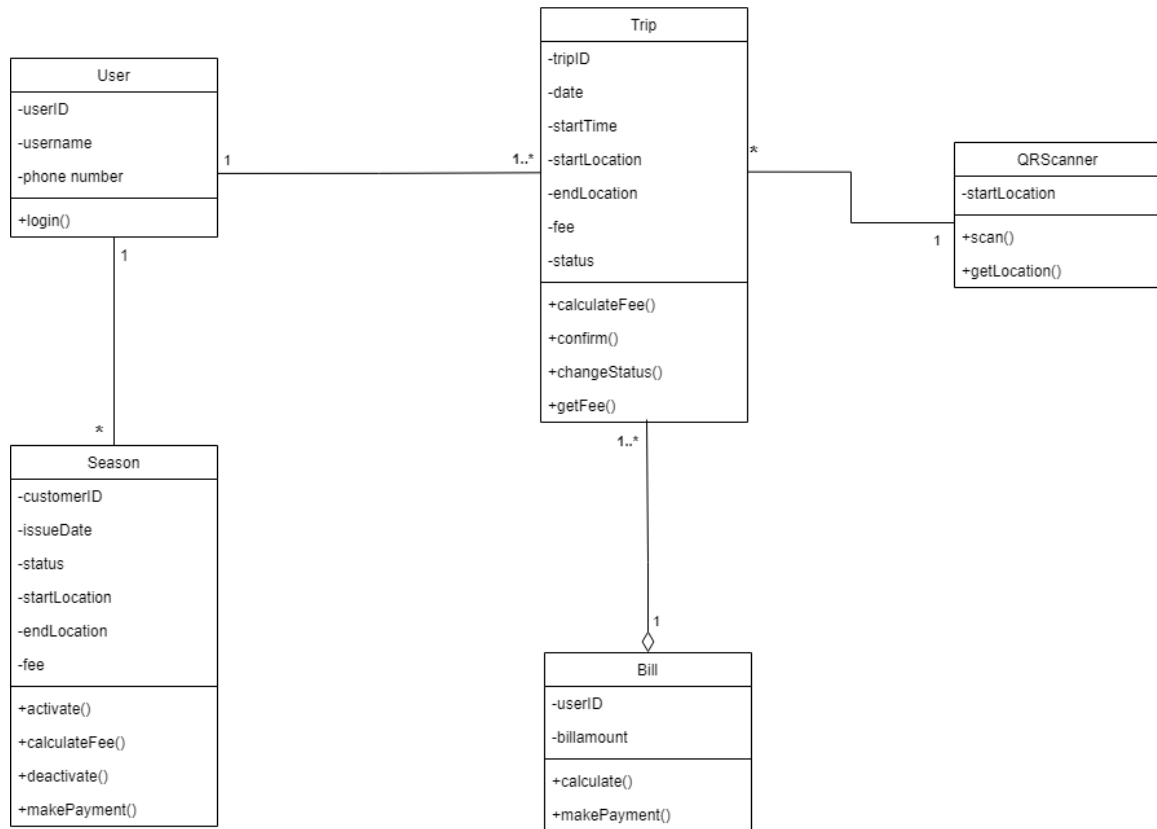
# Analysis

## Use Case Diagram



## Class Diagram

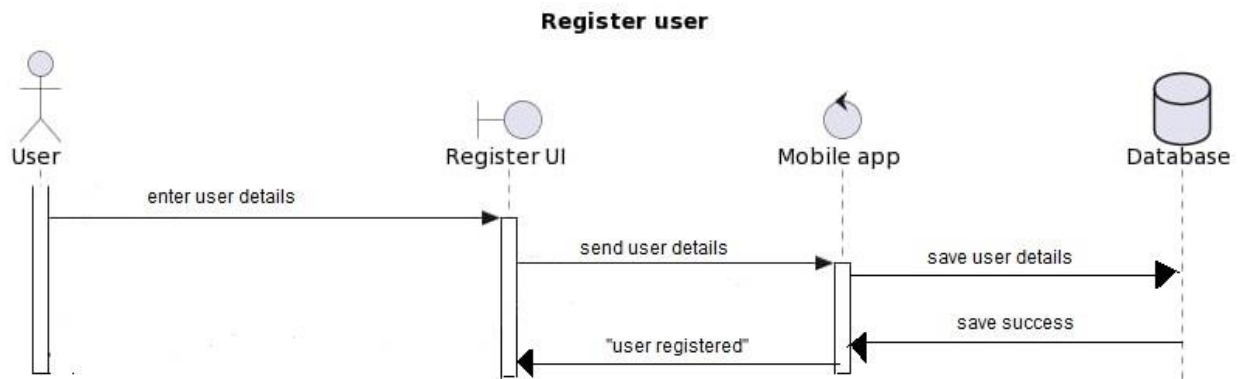
Class diagram for Train Ticket Payment System



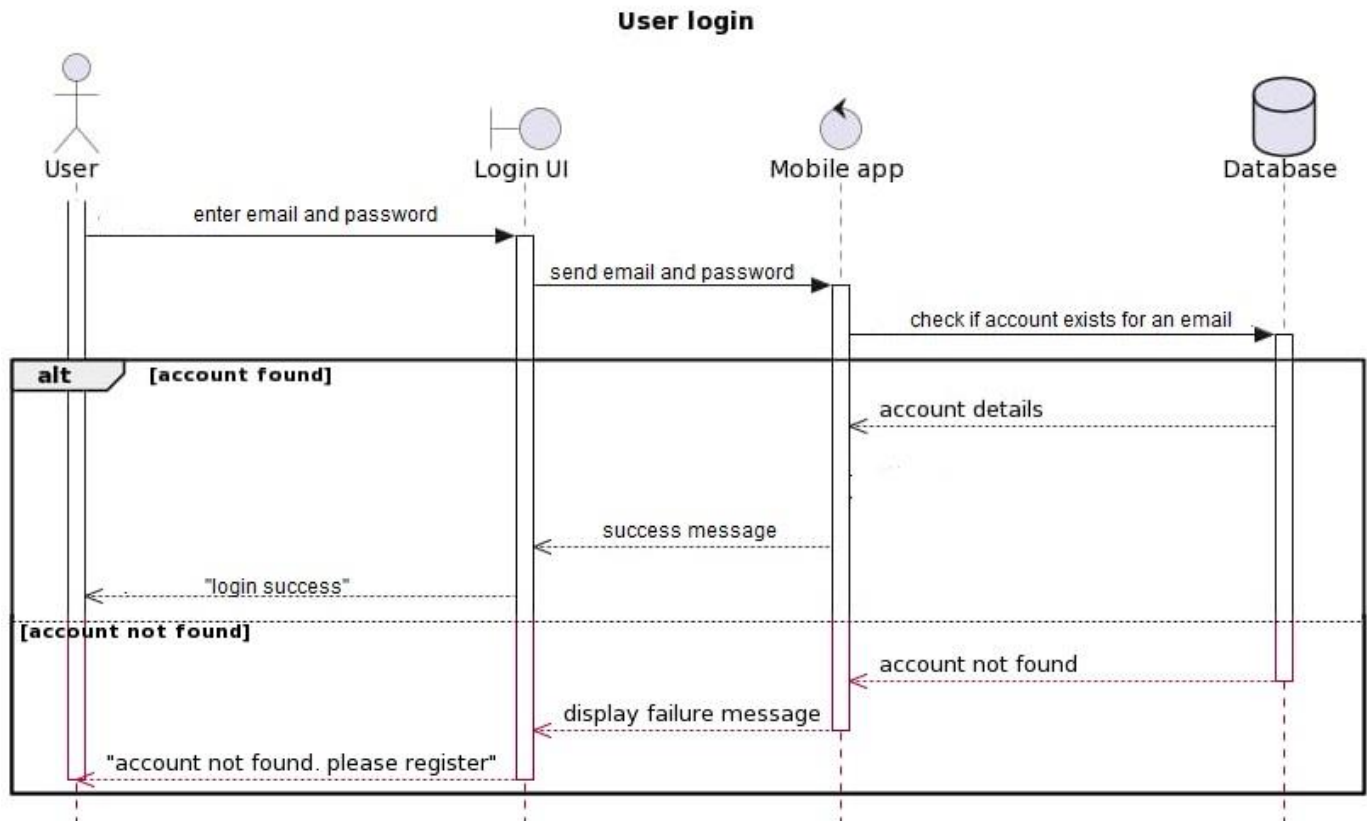
## Sequence diagrams

### Mobile App

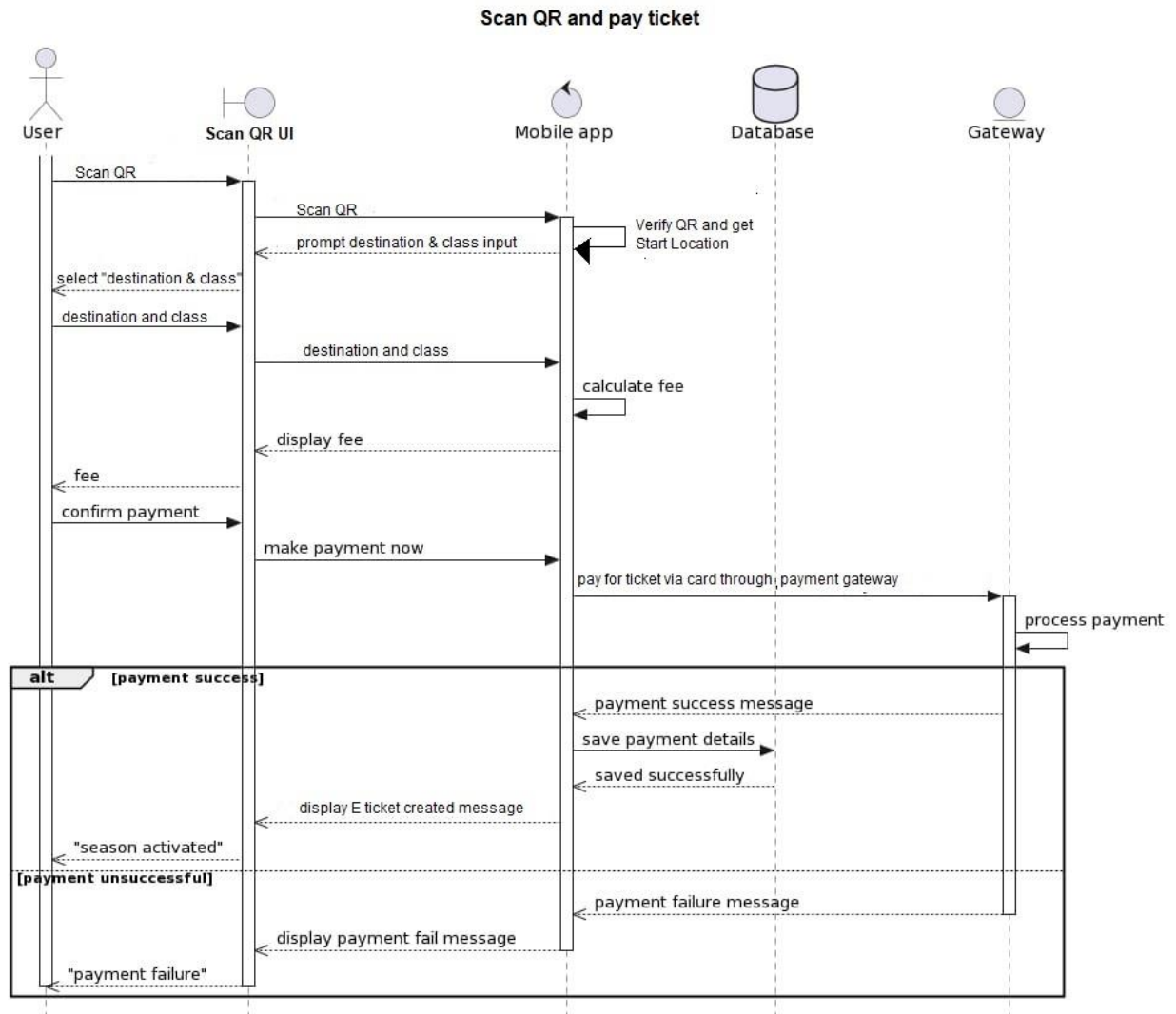
#### Register User



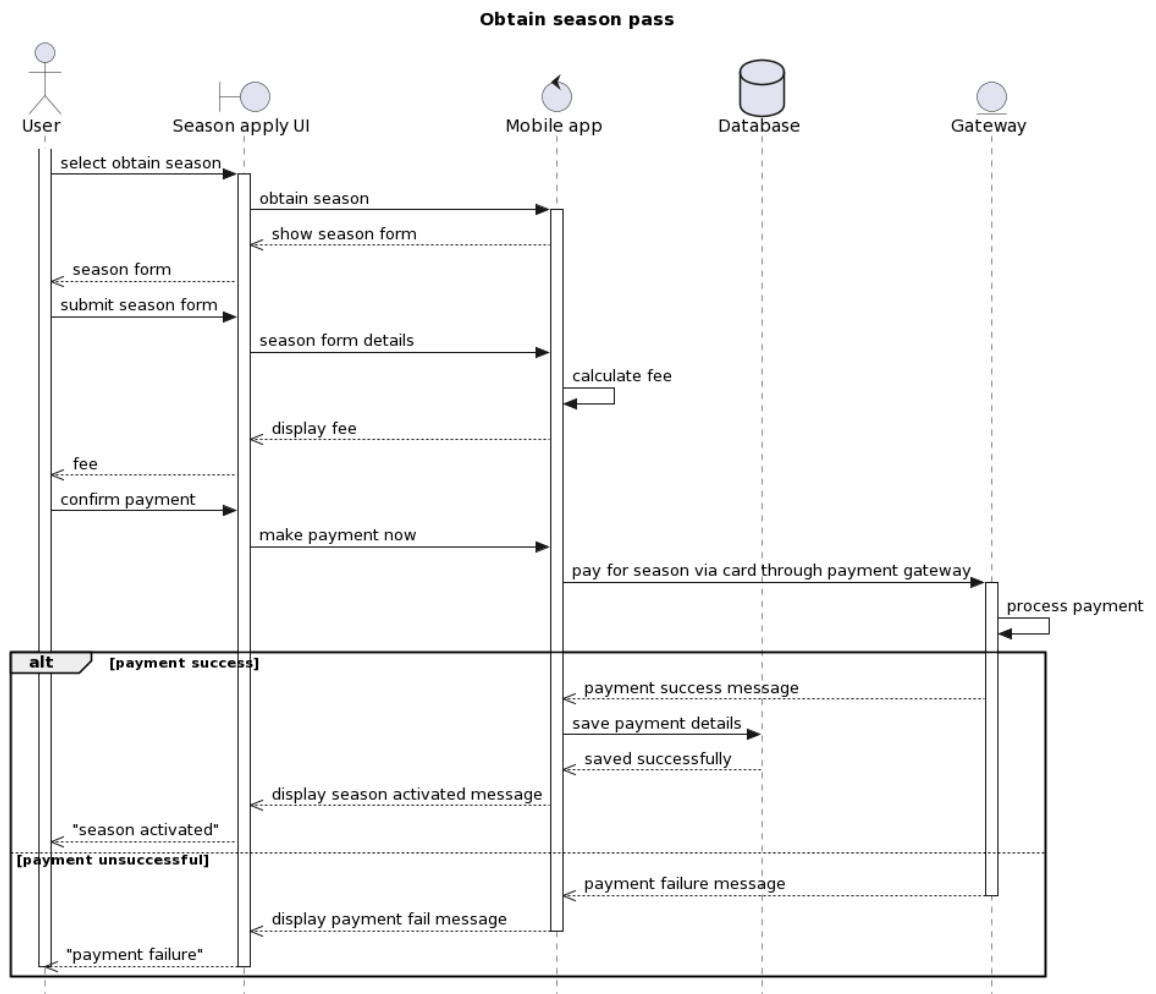
## User Login



## Scan QR and get ticket

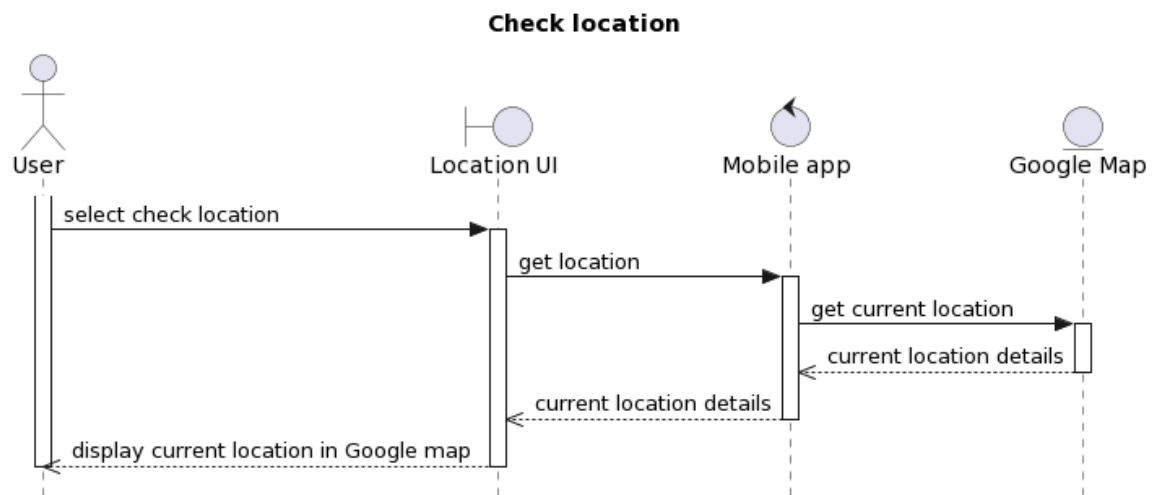


## Obtain Season Pass



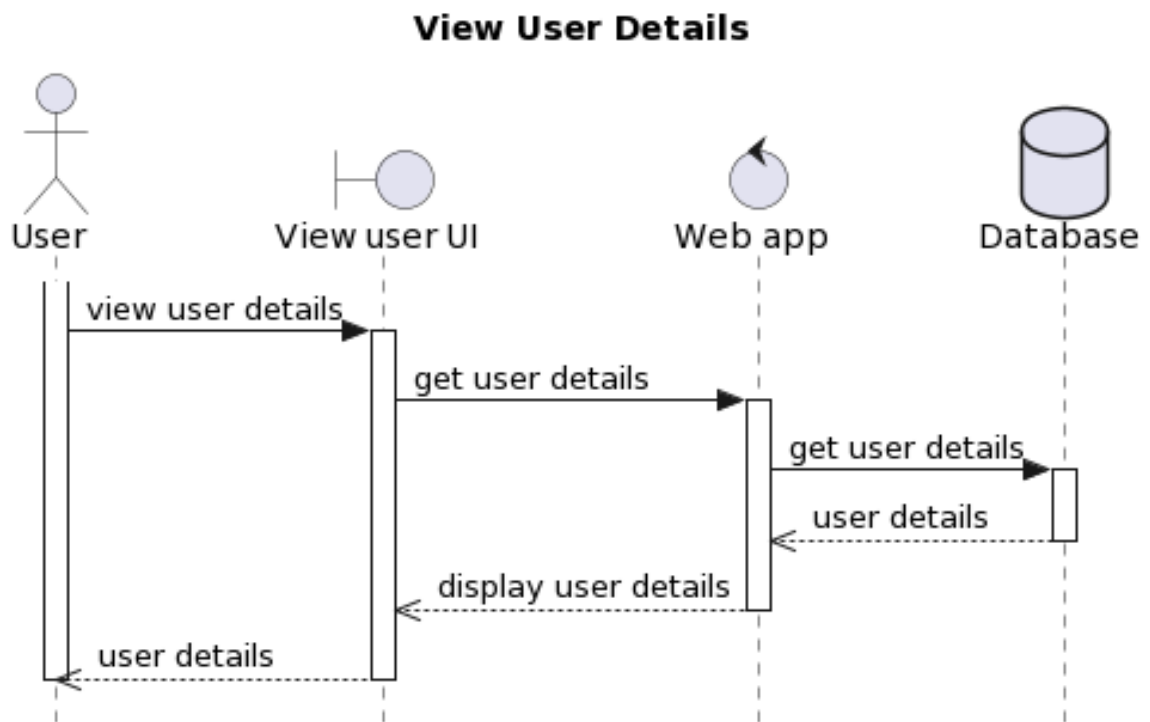


## Check location

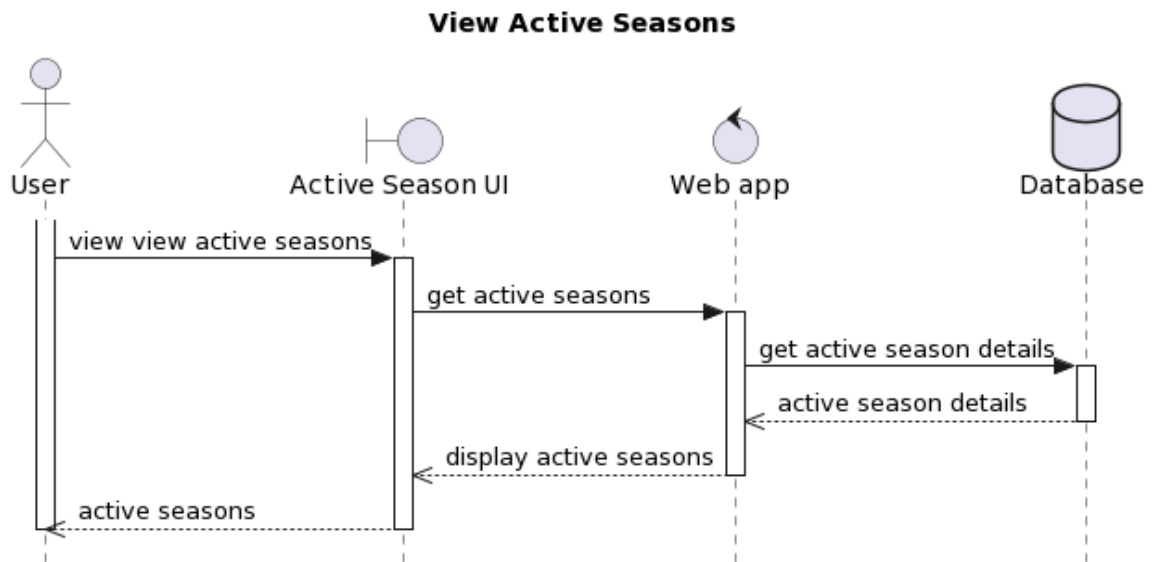


## Web App

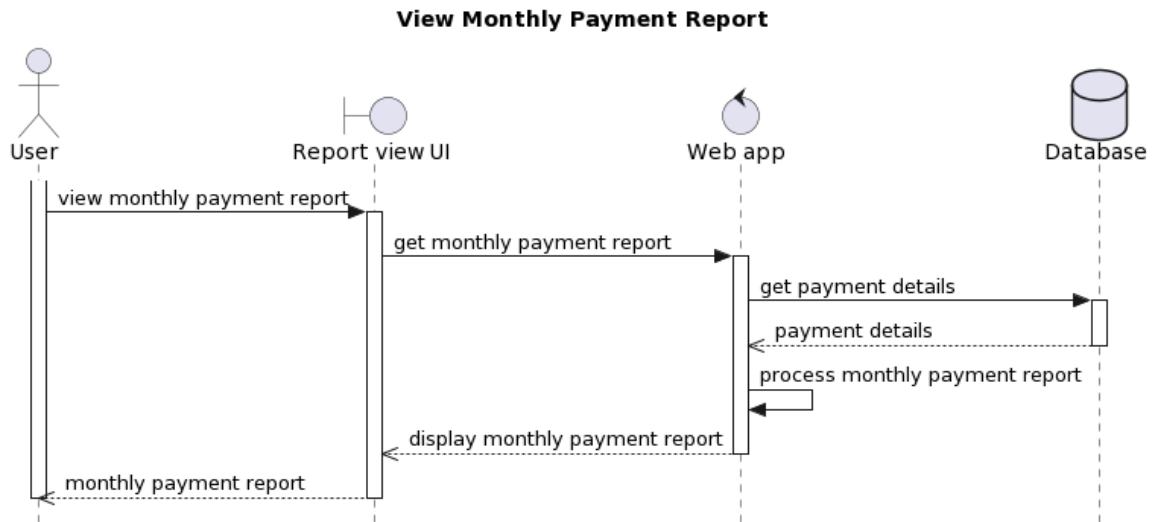
### View User Details



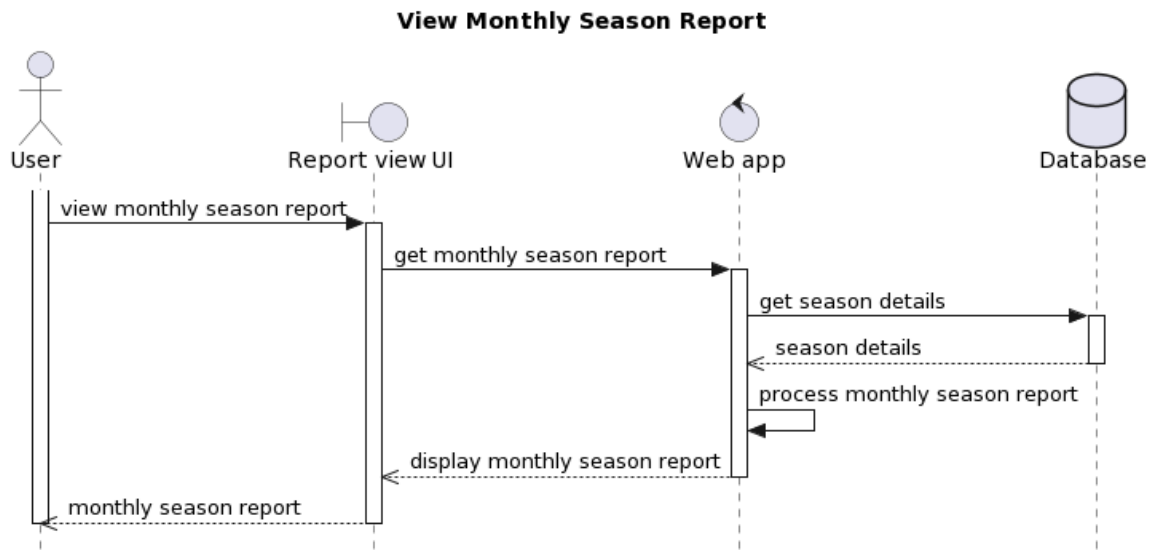
## View Active Seasons



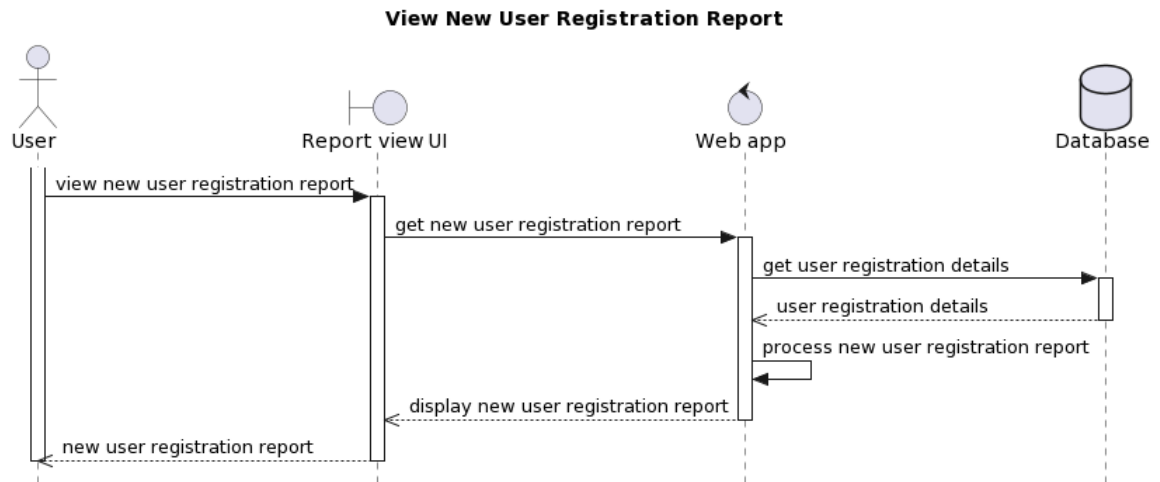
## View Monthly Payment Report



## View Monthly Season Report



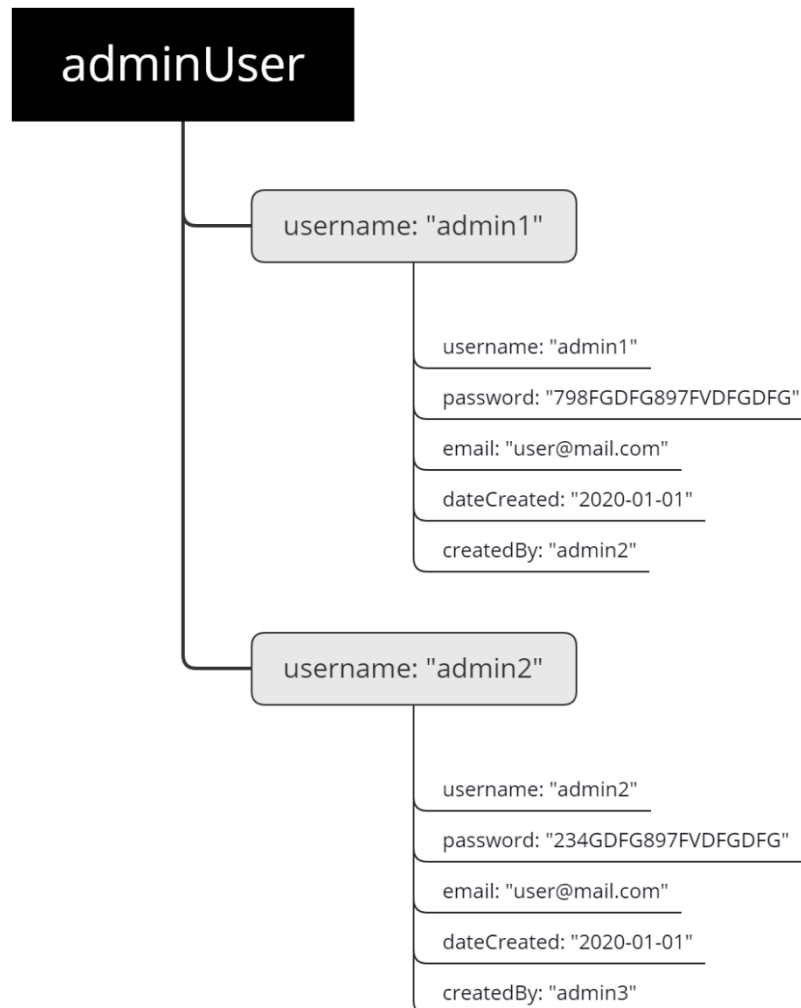
## View New User Registration Report



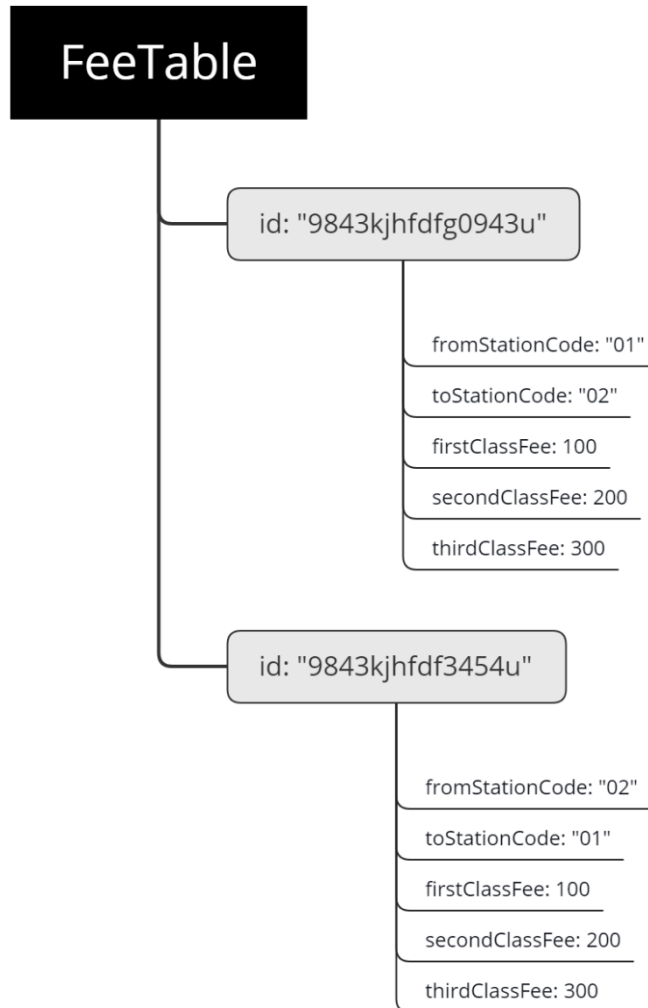
## Design

### Database design (Firebase)

#### Admin user

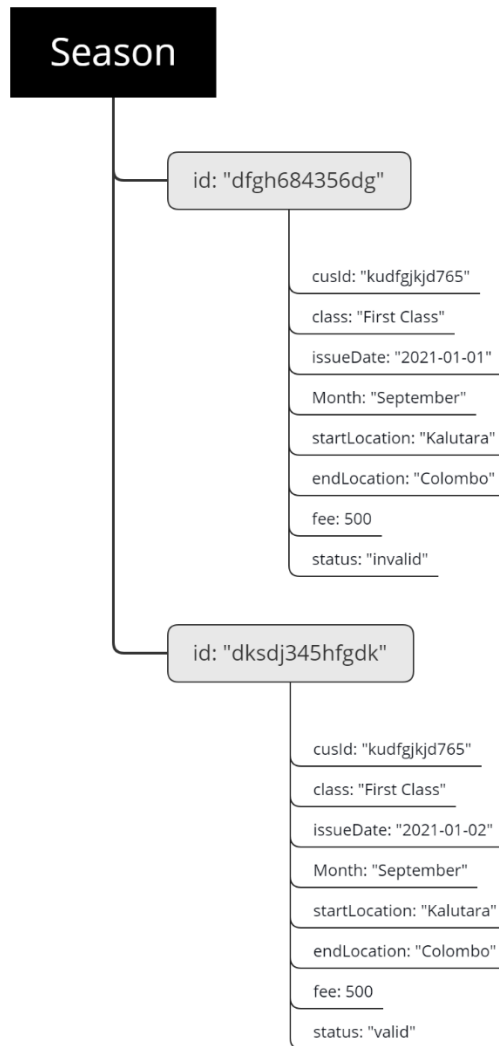


## Fees

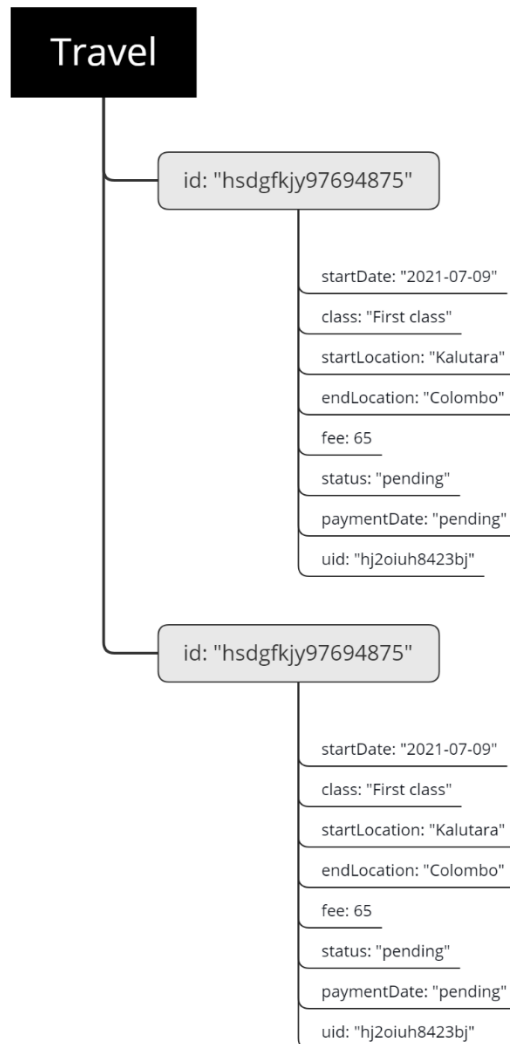




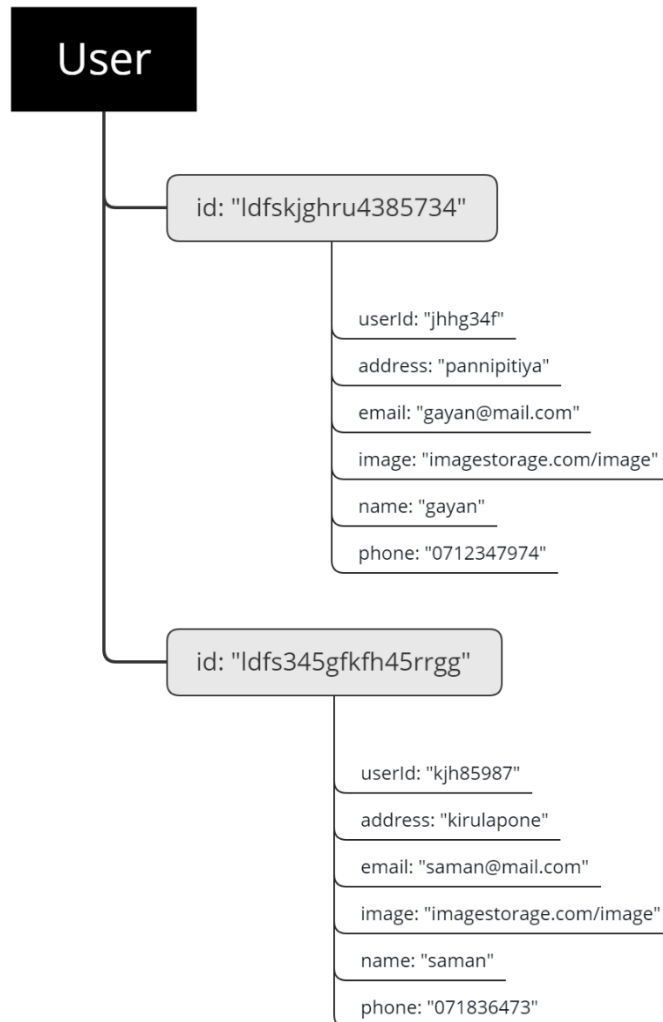
## Season



## Travel



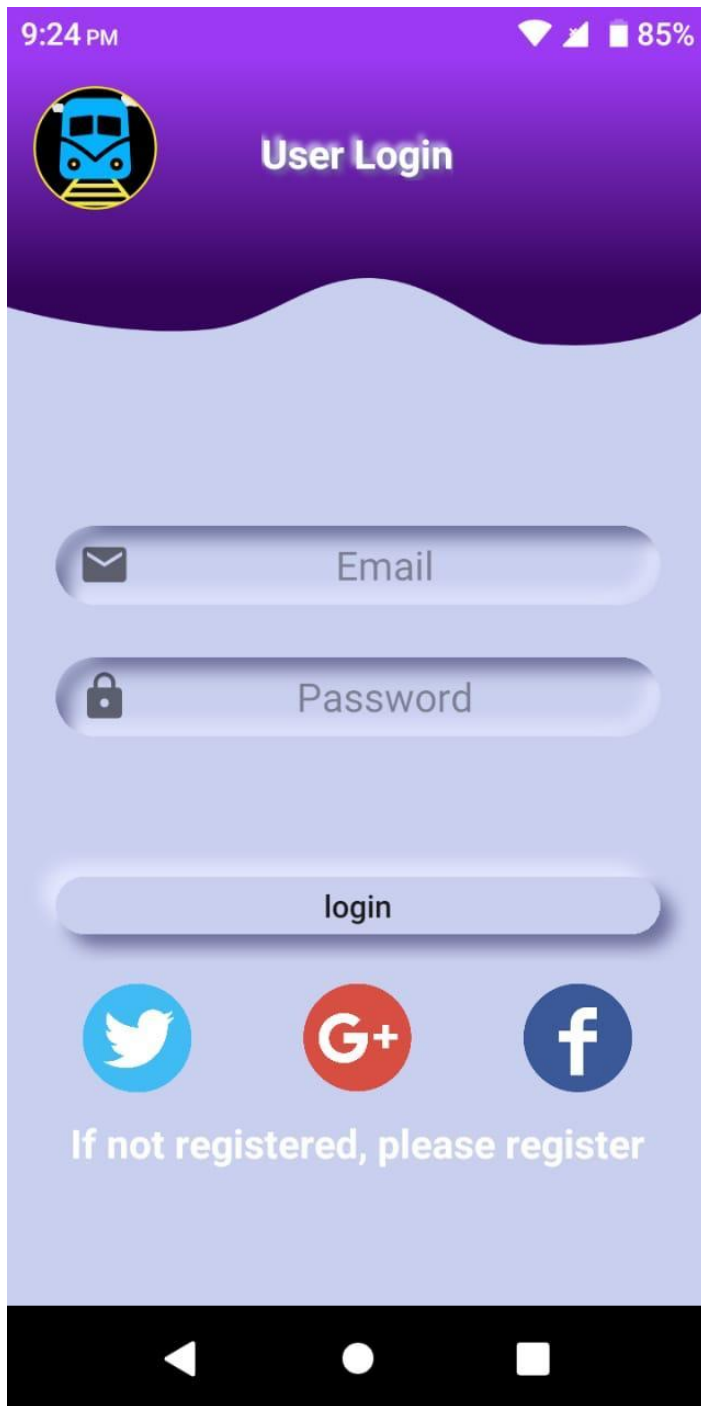
## User



## Interface design

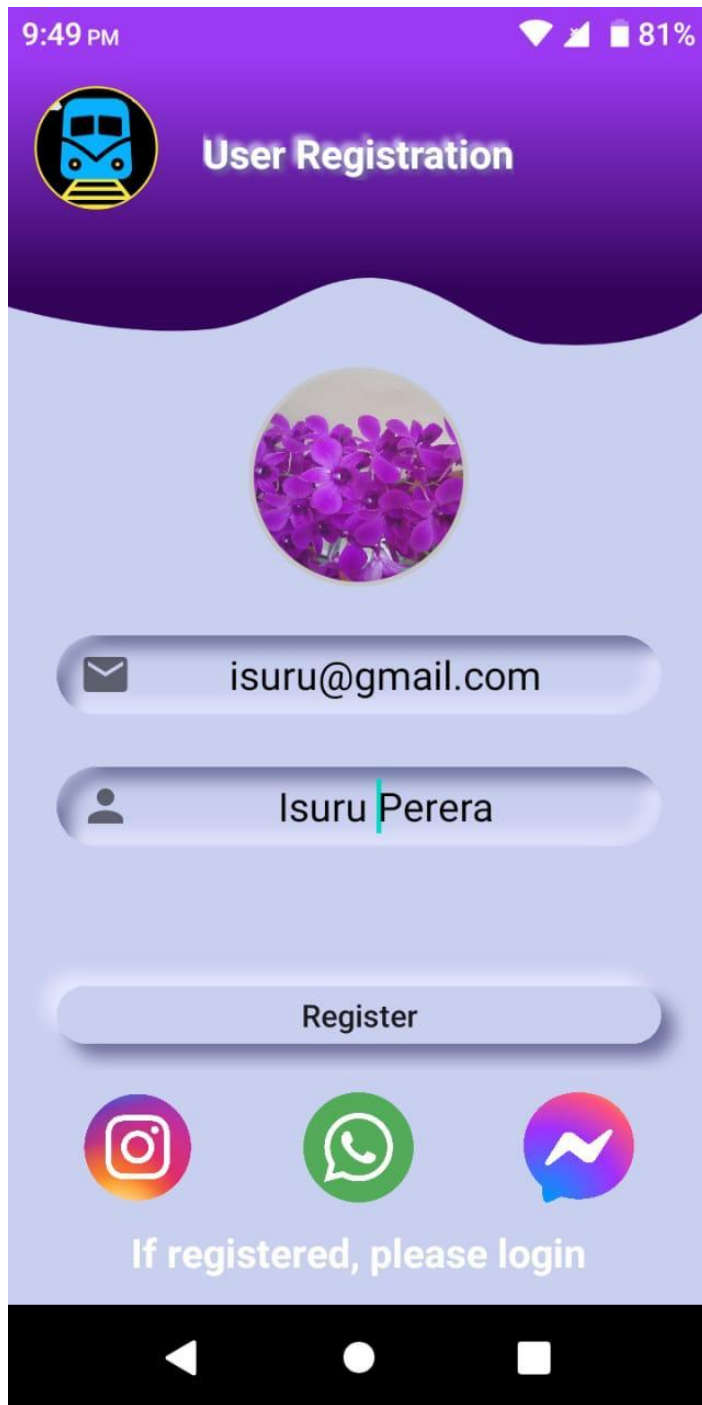
### Mobile App

#### Login UI




- User login screen


## Register UI





A screenshot of a mobile application's "User Registration" screen. The screen has a purple gradient header with a train icon and the title "User Registration". Below the header is a circular profile picture placeholder showing purple flowers. There are two input fields: one for email with the text "isuru@gmail.com" and one for name with the text "Isuru Perera". A "Register" button is located below the input fields. At the bottom, there are three social media icons (Instagram, WhatsApp, and Telegram) and a text prompt "If registered, please login". The status bar at the top shows the time as 9:49 PM and battery level at 81%.

9:49 PM 81%




 User Registration



 isuru@gmail.com

 Isuru Perera


Register


  


If registered, please login

- Registration screen for the user (i)


9:50 PM 81%

 **User Registration**




 Isuru Perera

 No 117,Galle Road,Dehiwala

 .....

 +94778993392

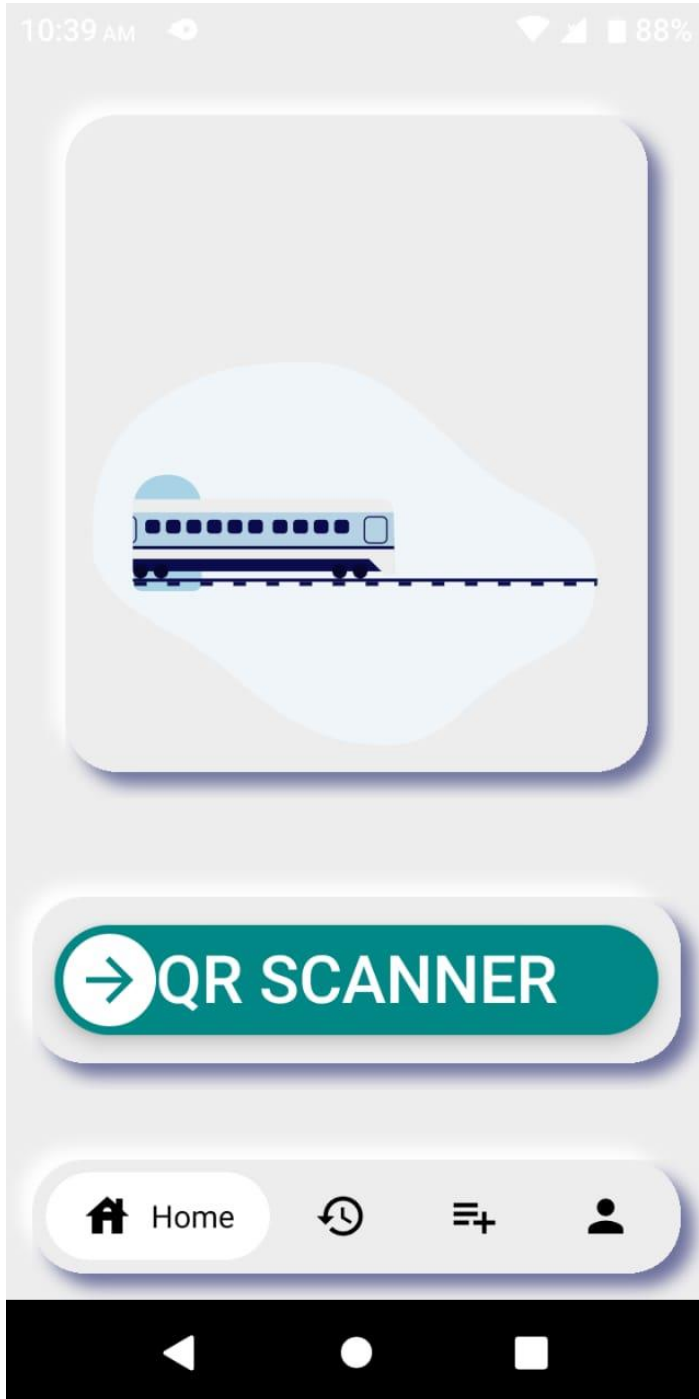
Register

If registered, please login

- Registration screen for the user (ii)

## Home UI



- Home screen for user.

## Create Ticket UI

6:01 PM 89%

**E - Ticket**

From  
**colombo\_fort**

To  
**Moratuwa**

Section  
**Third Class**

Fee in Rs:  
**60**

Create Ticket

Home

- User can select necessary parameters and confirm to obtain ticket.

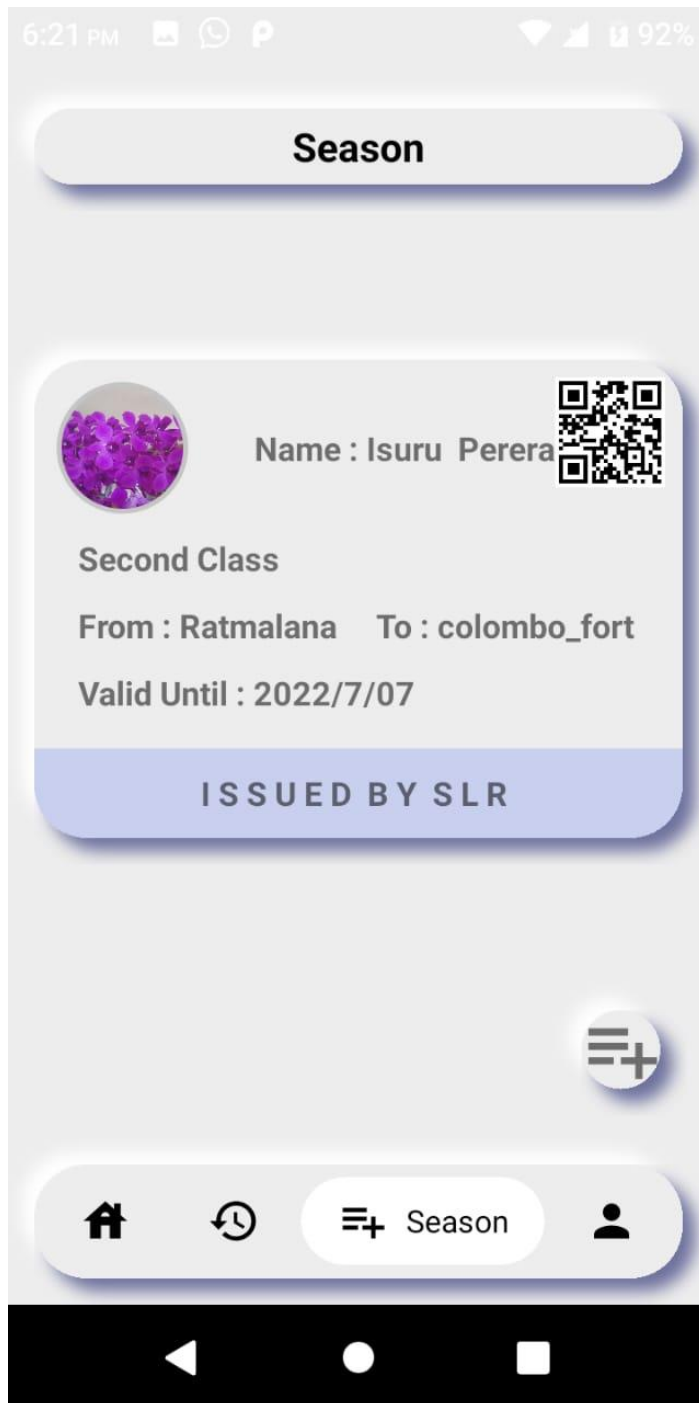


## View Paid Tickets UI



- View paid tickets.

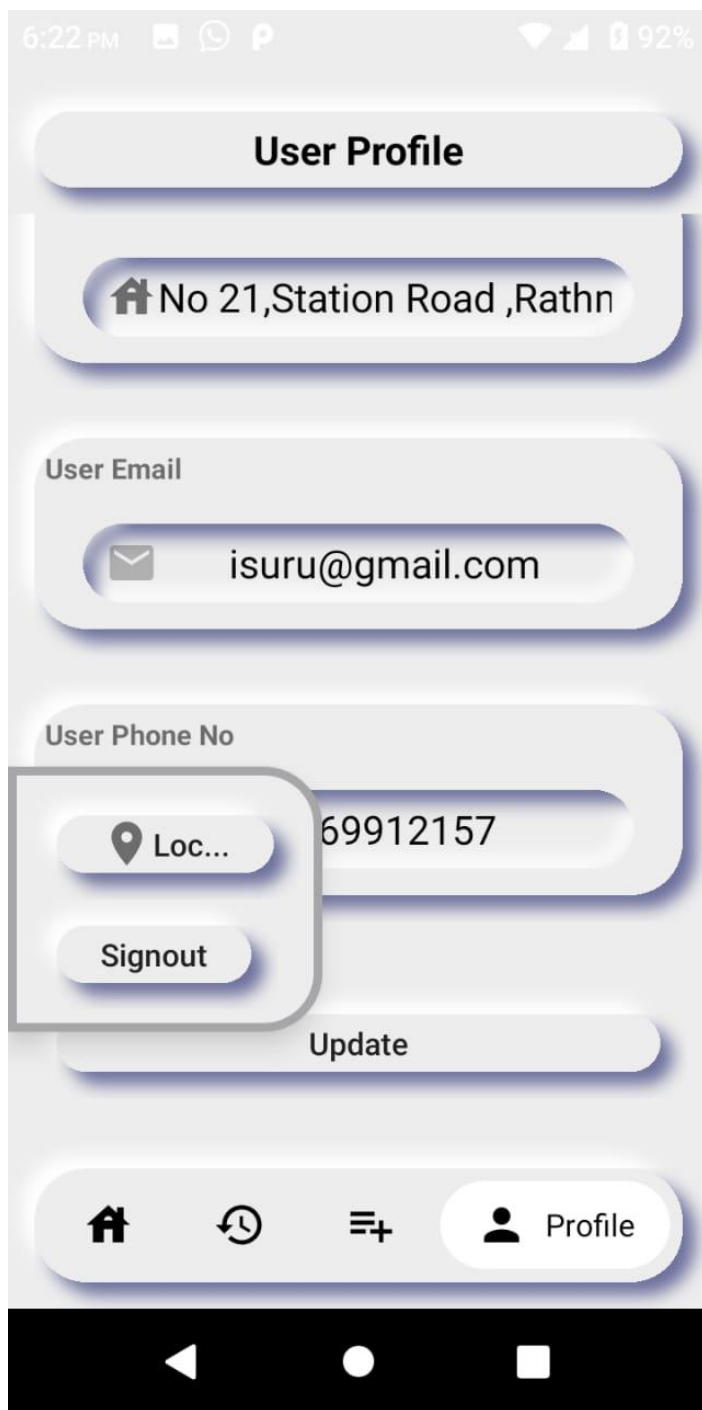
## View Season UI



- View currently obtained seasons.

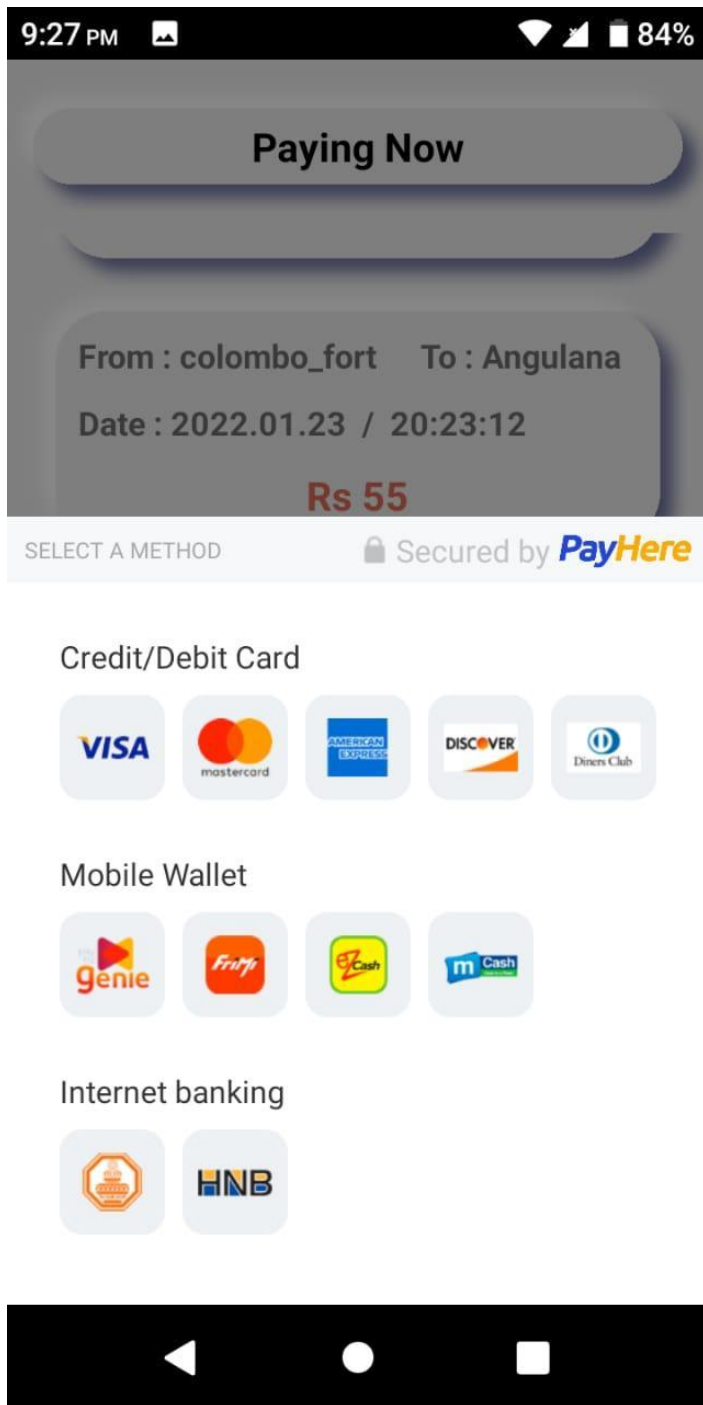
## View User Profile UI





- View users profile & Customer can update his/her new details.

## Select Payment UI



- Select a payment method to pay for ticket/season.

## Apply Season UI

6:17 PM 91%

**E - Season**

Class  
**Second Class**

From  
**Ratmalana**

To  
**colombo\_fort**

Month  
**June**

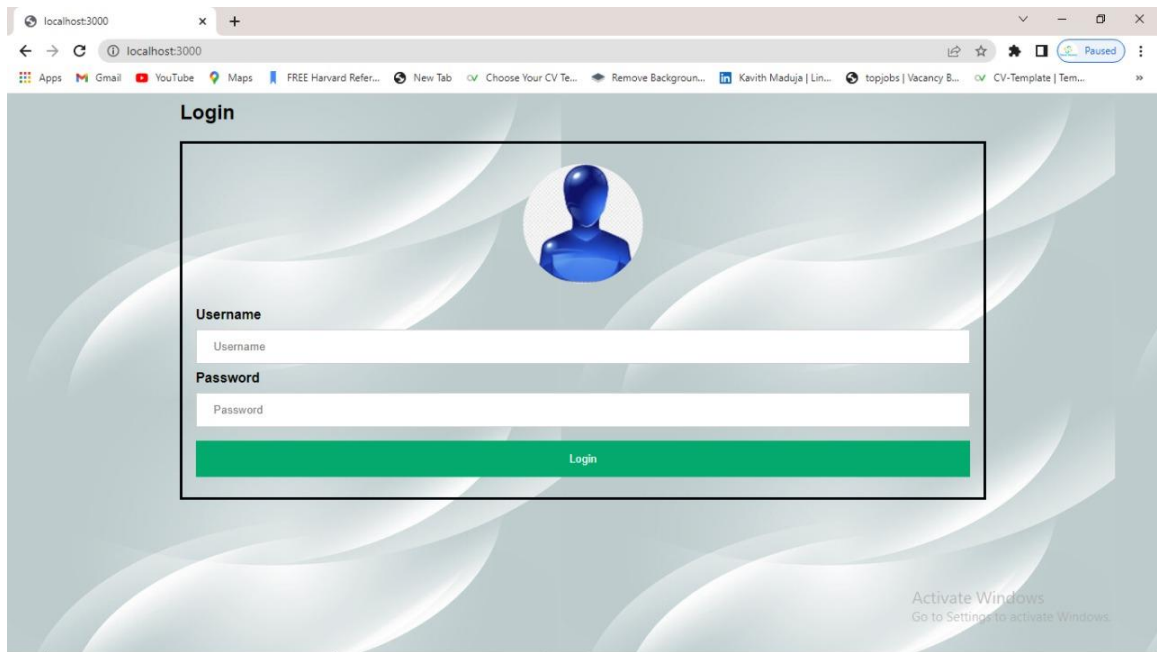
**Create Season**

Rs.520.0  
+ Season

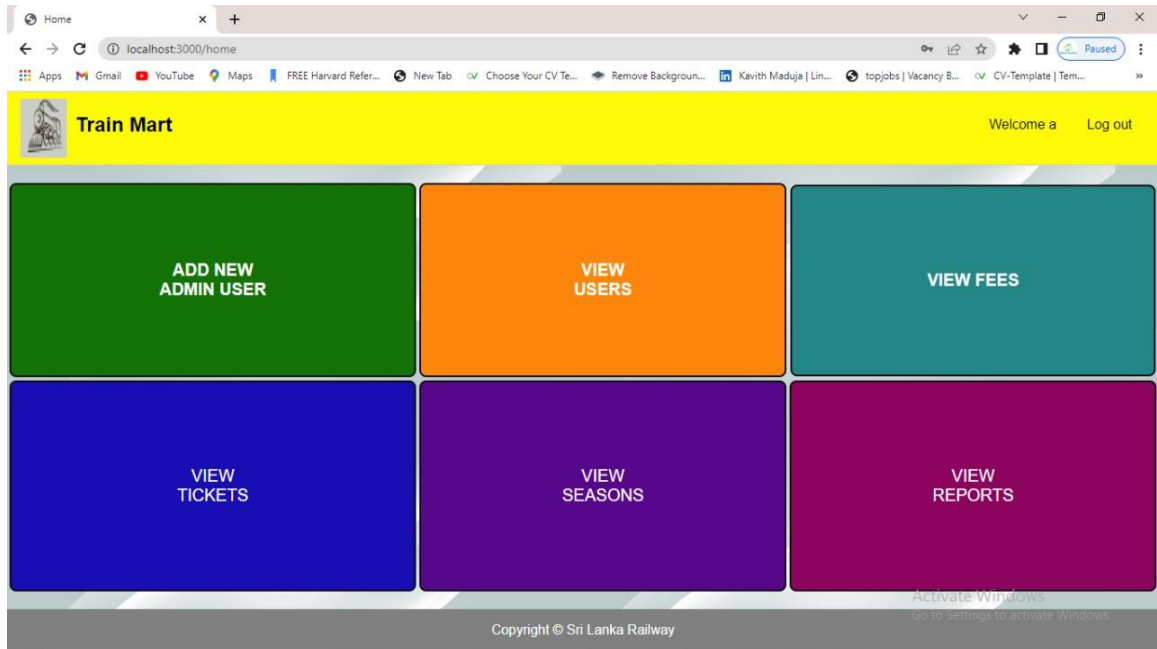
- Input necessary details for obtaining the season.

## Web App

### Login UI

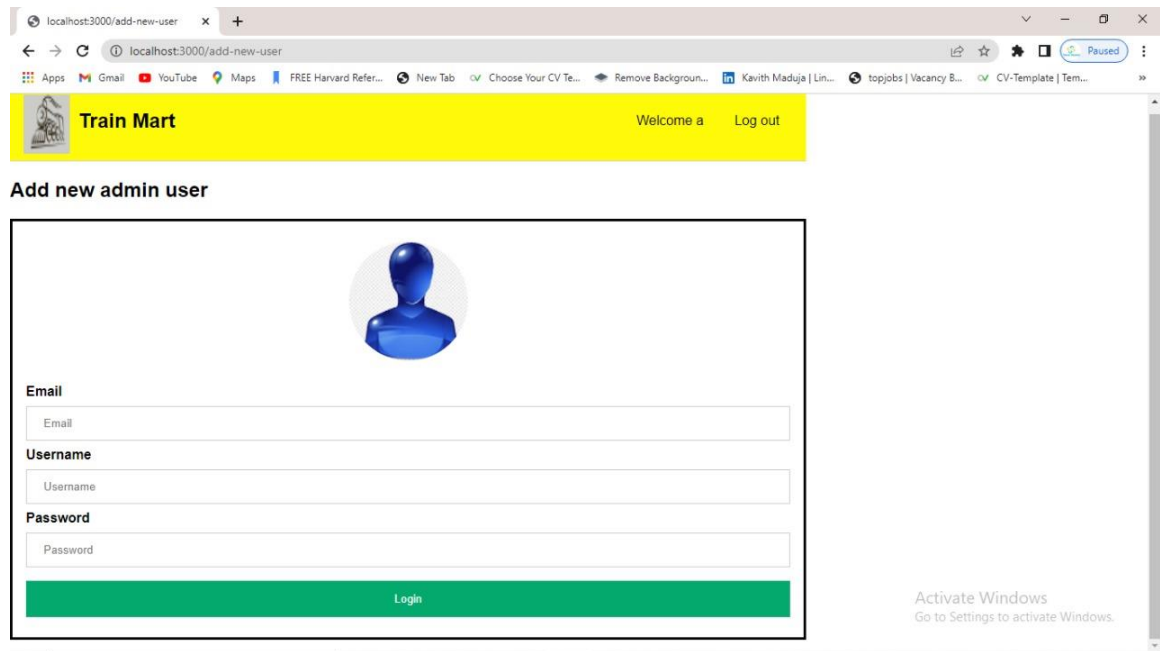


## Home UI





## Create New Admin User UI



The screenshot displays a web browser window with the address bar showing 'localhost:3000/add-new-user'. The browser's tab bar includes several open tabs, and the address bar contains navigation icons and a search bar. The application header is a yellow bar with the 'Train Mart' logo on the left and 'Welcome a' and 'Log out' links on the right. Below the header, the page title 'Add new admin user' is displayed. The main content area features a large, empty rectangular box with a blue 3D bust icon in the center. To the left of this box, there are three input fields labeled 'Email', 'Username', and 'Password'. Below these fields is a green button labeled 'Login'. In the bottom right corner of the page, there is a 'Activate Windows' watermark with the text 'Go to Settings to activate Windows.'

localhost:3000/add-new-user

Train Mart

Welcome a Log out

Add new admin user

Email

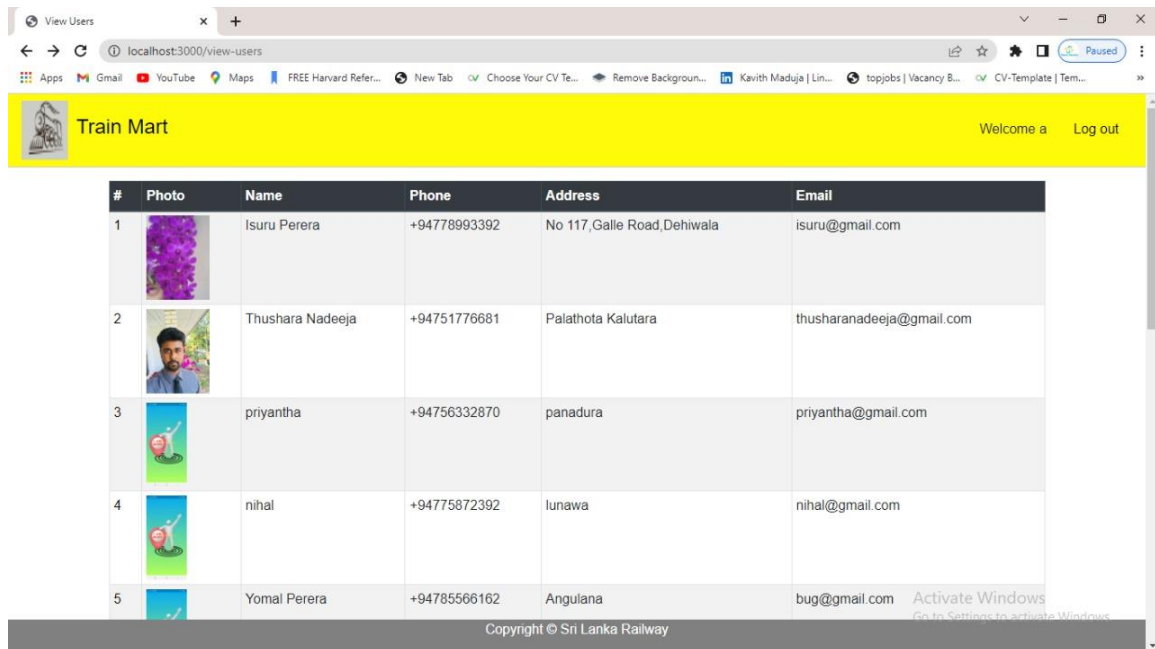
Username






Password

Login

Activate Windows  
Go to Settings to activate Windows.

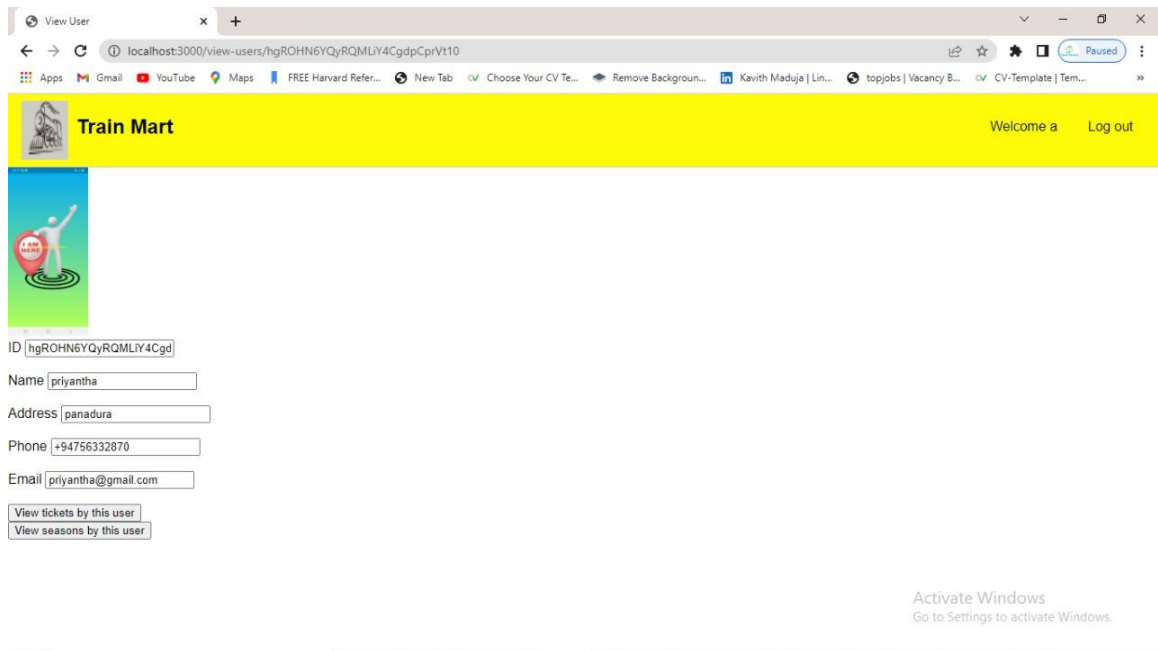
## View Users UI



#	Photo	Name	Phone	Address	Email
1		Isuru Perera	+94778993392	No 117,Galle Road,Dehiwala	isuru@gmail.com
2		Thushara Nadeeja	+94751776681	Palathota Kalutara	thusharanadeeja@gmail.com
3		priyantha	+94756332870	panadura	priyantha@gmail.com
4		nihal	+94775872392	lunawa	nihal@gmail.com
5		Yomal Perera	+94785566162	Angulana	bug@gmail.com

- View all users in the database.

## View Specific User UI



- View a certain user's details.

## View Tickets of Specific User UI

Tickets of user

localhost:3000/view-users/fiH3KI0HxyNcUx3qKKiz1oW0eG43/tickets

Train Mart

Welcome a Log out

Tickets of User: User ID fiH3KI0HxyNcUx3qKKiz1oW0eG43

Show 10 entries Search:

#	Date	From	To	Class	Fee	Payment
1	2022.03.06 / 09:57:52	colombo_fort	Moratuwa	third_class_fee	60	done
2	2022.03.06 / 10:01:56	colombo_fort	Ratmalana	second_class_fee	50	done
3	2022.03.06 / 10:54:02	colombo_fort	Kompannavediya	third_class_fee	15	done
4	2022.03.06 / 11:02:33	colombo_fort	Angulana	second_class_fee	55	done
5	2022.03.06 / 14:52:20	colombo_fort	Angulana	third_class_fee	50	done
6	2022.03.06 / 14:53:33	colombo_fort	Moratuwa	second_class_fee	55	done
7	2022.03.06 / 14:54:39	colombo_fort	Bambalapitiya	third_class_fee	35	done
8	2022.03.06 / 14:55:06	colombo_fort	Kollupitiya	first_class_fee	30	done
9	2022.03.06 / 14:55:34	colombo_fort	Wellawatta	second_class_fee	35	done
10	2022.03.06 / 14:55:48	colombo_fort	Lunawa	third_class_fee	50	done

Showing 1 to 10 of 33 entries

Previous 1 2 3 4 Next

- View all tickets purchased by a specific user.

## View Seasons of Specific User UI

Seasons of user

localhost:3000/view-users/fiH3KI0HxyNcUx3qKKiz1oW0eG43/seasons

Train Mart

Welcome a Log out

Seasons of User: User ID fiH3KI0HxyNcUx3qKKiz1oW0eG43

Show 10 entries

Search:

#	From	To	Created Date	Valid till	Class	Fee
1	Angulana	colombo_fort	2022/03/10	2022/4/10	Third Class	445.0

Showing 1 to 1 of 1 entries

Previous 1 Next

Activate Windows  
Go to Settings to activate Windows.

- View all seasons obtained by a specific user.

## View Fees UI

View Fees

localhost:3000/view-fees

Train Mart

Welcome a Log out

Show 10 entries Search:

#	#	Starting station	Ending station	First class Fee	Second class Fee	Third class Fee
1		colombo_fort	Kompannaveediya	25	20	15
2		Kompannaveediya	colombo_fort	25	20	15
3		colombo_fort	Kollupitiya	30	25	20
4		Kollupitiya	colombo_fort	30	25	20
5		colombo_fort	Bambalapitiya	35	30	25
6		Bambalapitiya	colombo_fort	35	30	25
7		colombo_fort	Wellawatta	40	35	30
8		Wellawatta	colombo_fort	40	35	30
9		colombo_fort	Dehiwala	45	40	35
10		Dehiwala	colombo_fort	45	40	35

Activate Windows  
Go to Settings to activate Windows.

- View the current fees for travels.

## Edit fees UI

 **Train Mart**

Welcome Log out

Starting station

colombo\_fort

Ending station

Kompannavediya

First class fee

25

Second class fee

20

Third class fee

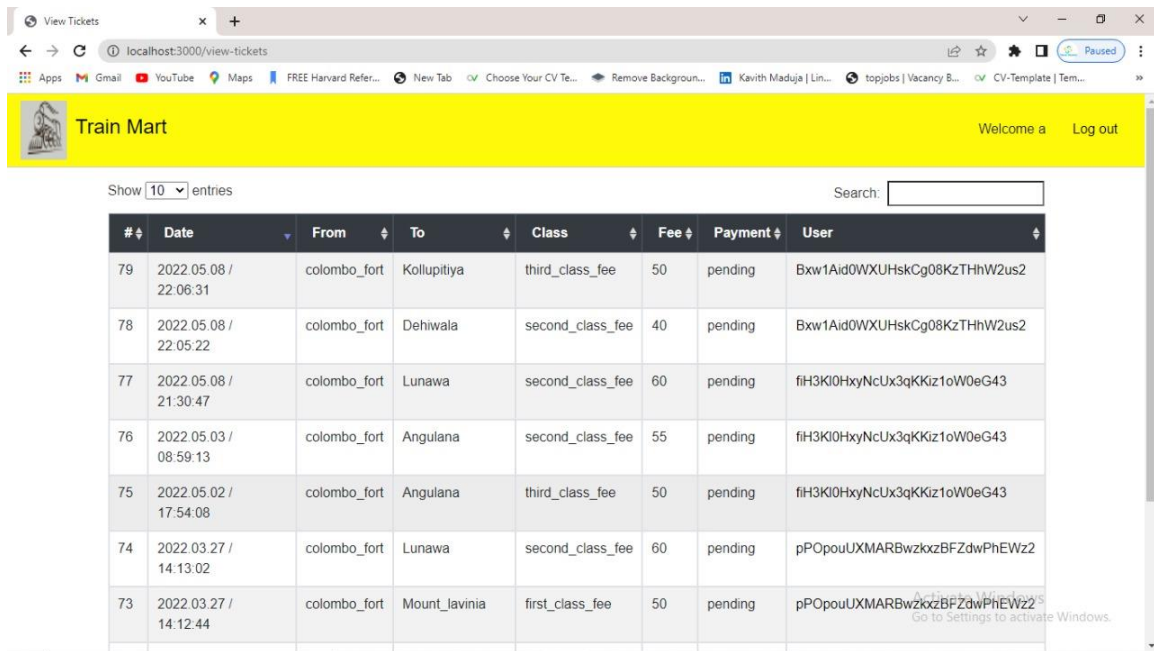
15

Update

Copyright © Sri Lanka Railway

- Edit the fee amount for a certain travel.

## View Tickets UI



View Tickets

localhost:3000/view-tickets

Train Mart

Welcome a Log out

Show 10 entries

Search:

#	Date	From	To	Class	Fee	Payment	User
79	2022.05.08 / 22.06.31	colombo_fort	Kollupitiya	third_class_fee	50	pending	Bxw1Aid0WXUHskCg08KzTHhW2us2
78	2022.05.08 / 22.05.22	colombo_fort	Dehiwala	second_class_fee	40	pending	Bxw1Aid0WXUHskCg08KzTHhW2us2
77	2022.05.08 / 21.30.47	colombo_fort	Lunawa	second_class_fee	60	pending	fiH3KI0HxyNcUx3qKKiz1oW0eG43
76	2022.05.03 / 08.59.13	colombo_fort	Angulana	second_class_fee	55	pending	fiH3KI0HxyNcUx3qKKiz1oW0eG43
75	2022.05.02 / 17.54.08	colombo_fort	Angulana	third_class_fee	50	pending	fiH3KI0HxyNcUx3qKKiz1oW0eG43
74	2022.03.27 / 14.13.02	colombo_fort	Lunawa	second_class_fee	60	pending	pPOpouUXMARBwzkzBFZdwPhEWz2
73	2022.03.27 / 14.12.44	colombo_fort	Mount_lavinia	first_class_fee	50	pending	pPOpouUXMARBwzkzBFZdwPhEWz2

- View all tickets obtained using the mobile app. (with search and sort functions)



## View Seasons UI

View Seasons

localhost:3000/view-seasons

Train Mart

Welcome a Log out

Show 10 entries

Search:

#	From	To	Created Date	Valid till	Class	Fee	User
1	Angulana	colombo_fort	2022/03/10	2022/4/10	Third Class	445.0	fiH3KI0HxyNcUx3qKKiz1oW0eG43
2	Angulana	colombo_fort	2022/03/08	2022/4/08	Second Class	520.0	hgROHN6YQyRQMLiY4CgdpCprVUJ2
3	Moratuwa	colombo_fort	2022/03/10	2022/4/10	Third Class	445.0	pPOPouUXMARBwzKxzBFZdwPhEWz2

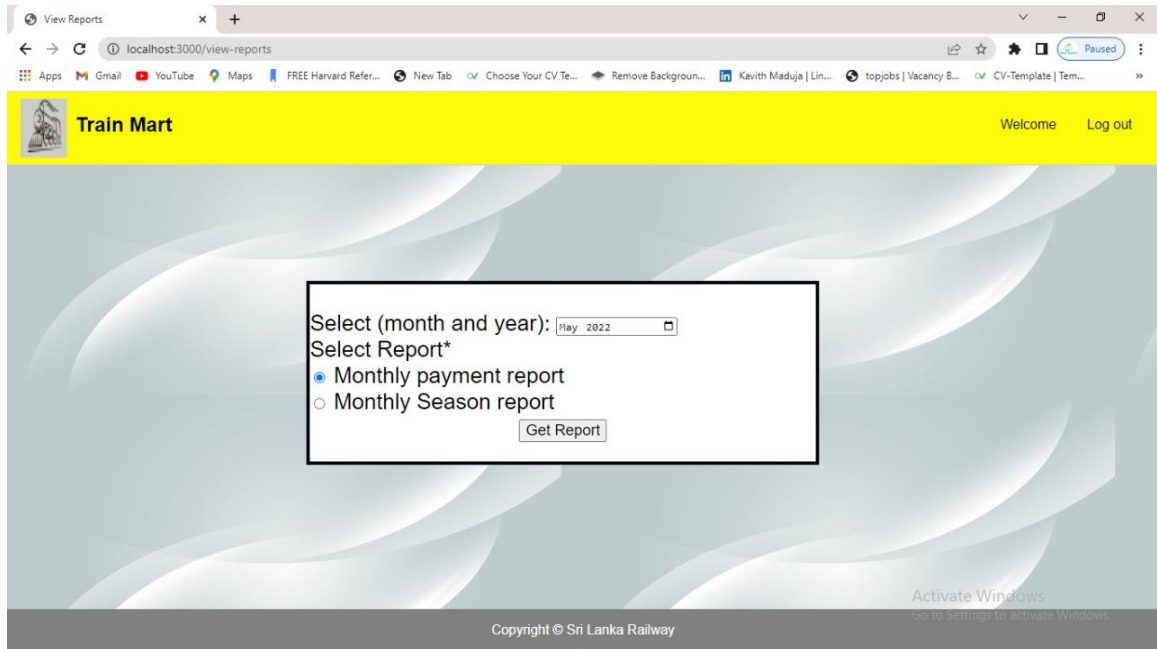
Showing 1 to 3 of 3 entries

Previous 1 Next

Activate Windows  
Go to Settings to activate Windows.

- View all seasons obtained using the mobile app. (with search and sort functions)

## View Reports UI



- View/Generate reports screen.

## Report Design

### Monthly Payment Report

#### Sri Lanka Railways

Colombo 10, Sri Lanka.

Telephones : +94 11 4 600 111

Fax Nos : +94 11 2 446490

Email : [gmr@railway.gov.lk](mailto:gmr@railway.gov.lk)

#### TrainMart - Monthly Payment Report

for the month of MM,YYYY

	1st Class	2nd Class	3rd Class	Total
Ticket Payments	9999	9999	9999	9999
Season Payments	9999	9999	9999	9999
				9999

No. of tickets issued	9999
No. of seasons issued	9999

This report was generated on YYYY-MM-DD

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Colombo 10, Sri Lanka.

Print report as PDF

## Monthly Season Report

### Sri Lanka Railways

Colombo 10, Sri Lanka.

Telephones : +94 11 4 600 111

Fax Nos : +94 11 2 446490

Email : [gmr@railway.gov.lk](mailto:gmr@railway.gov.lk)

### TrainMart - Monthly Season Report

for the month of MM,YYYY

	1st Class	2nd Class	3rd Class	Total
No. of seasons				
Income				

This report was generated on YYYY-MM-DD

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Colombo 10, Sri Lanka.

Print report as PDF

## New User Registration Report

### Sri Lanka Railways

Colombo 10, Sri Lanka.

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### TrainMart - Monthly Season Report

for the month of MM,YYYY

No. of users joined this month	Total users	No. of users joined previous month	Increase/Decrease from last month

This report was generated on YYYY-MM-DD

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## **Conclusion**

The aim of undertaking this project was to develop a Mobile application that would allow allows users to pay for train tickets by scanning QR code, without having to wait for long time periods, wasting their time and even sometimes missing trains altogether. The application was developed using Android Studio with Java language, with Firebase as the backend database. The developed application provides a convenient way to both sellers and customers to carry out their purchasing activities online.

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