



FINAL PROJECT REPORT



Railway
management
system

Table of Contents

I. Project Background	3
1. Topic	3
2. People	3
3. Scope.....	5
4. Progress	6
5. Future directions	7
II. Application Design and Implementation	9
1. ERD	9
2. Relational schema	11
3. Database creation	12
4. Application features	12
6. Queries:	21 7.
Application Link:	24

I. Project Background

1. Topic

Railway transportation has the advantage of carrying large numbers of passengers as well as handling huge amounts of commodities for transporting over long distances with, especially, affordable price options for customers compared with aircraft. However, the way to manage the railway system is what we are inspired by and look forward to exploring and learning the traffic system. In the project, the railway management system will be designed with an entity relationship model, specifically with the relational model which is based on the dataset. Managing this system by creating a well-structured database might have several challenges and difficulties. Hence, The purpose of this project is endeavouring to control, record the data efficiently either for customer's information, the infrastructure such as tracks, tunnels, stations as well as keep track of the railway trip. Forming a well-design structure in the railway management system project will help us improve the capability of data management, creating a stable system, and smooth maintenance. Furthermore, we named our group as '4-Tech' which means 'For Technology' or can be understood as four members for technology.

2. People

- **Name: Huynh Van Anh**

Student ID: s3836320

Email: s3836320@rmit.edu.vn

Interest in the topic: The railway management system is our topic for this project with the principal reason for our choice is all my team members, including me, find curious and intrigued by this topic. Railway traffic is not familiar to the vast majority of Vietnamese people due to its low population in traffic means. However, The Ho Chi Minh City Metro (Ho Chi Minh City urban railway project) was planned, constructed in 2012, and scheduled for 2021. For that reason, creating and developing a railway management system not only supports our team to gain knowledge but also strives to prepare for the advanced quality of railway management in Vietnam.

Relevant Skills: teamwork, communication, researching and aggregating information, negotiation, and persuasion, leadership, core skills (adapt to the requirements of IT). Role: Team leader, setting the timeline and dividing tasks, writing reports, checking the canvas's requirements, making plans. Relating to the role of the application, I am responsible for the database structure and design by using online tools, which is Lucidchart.

- **Name: Tran Duy Long**

Student ID: s3752375

Email: s3752375@rmit.edu.vn

Interest In The Topic: Public transportation systems such as air travel, railway or sea transport are vast and complex. Henceforth, it is crucial to develop a database to keep everything in place and on track. Particularly, as Vietnam's economy booming with the first development of the new urban railway and improvement in heavy rail transit, a railway management system is a

vital component to ensure the newly built and current infrastructure can be operated smoothly and efficiently.

Relevant Skills: Teamwork, communication, researching, programming in Python and Java, statistical analysis.

Role: Report integrity, grammar, correctness and clarity of the project. Besides that, my responsibility is the database designer, which provides a well-structured system of the project by devising Relational and ERD diagrams using LucidChart.

● **Name: Pham Gia Nguyen**

Student ID: s3819521

Email: s3819521@rmit.edu.vn

Interest in the topic: The reason I value and choose the Railway management system topic is that it is modern transportation that can carry massive passengers and travel in such a far distance as well as providing a comfortable experience. Unlike aircraft, rail transport not only has the expense for the ticket much lesser and more reasonable but it also uses for carrying the freight, which can reduce the payment for the company. Another useful feature is that it can be implemented inside the city as a means of transportation to reduce traffic jams, avoiding gas emissions as well as advance people's lives.

Relevant skills: Researching information, communication, teamwork, designing the platform, firm algorithms.

Role: Writing reports and checking the formation of the report, including fixing grammar errors and references. About the application, I am the back-end developer, which insert the data and convert the diagram into the SQL code along with debugging during coding.

● **Name: La Tran Hai Dang**

Student ID: s3836605

Email: s3836605@rmit.edu.vn

Interest in the topic: In the process of industrialization and modernization of the world in general and Vietnam in particular, transport infrastructure plays an essential role in promoting the economic development of each country. Today in several developing countries, including Vietnam, urban rail is always a topic that both the government and investors are very interested in because it brings many benefits to the whole country. However, for an urban railway transport system to function correctly, it is necessary to develop an information system with intricate details about the schedule as well as relevant information direct support to the most effective operation.

Relevant skills: Critical thinking, teamwork, communication skill, programming skills, analysis, and problem-solving.

Role: Responsible for detailing the report, modify the risk of the railway management system, and suggest the solution to solve those problems. As a back-end developer, importing the data, fixing errors, and converting MySQL language to Oracle language by using online tools is my role.

3. Scope

	Priority	Features	Descriptions
IN SCOPE	Features For Staff		
	High	Ticket and information registration form	Staff can enter new passengers' information and register tickets that are name, national ID, contact information, etc.
		Ticket information page	Staff can search and edit information of tickets if needed
		Trip management section	To manage as well as displaying trains' information such as captains, departure or arrival time, destinations, etc.
	Medium	Application layout organisation	Organising the webpage into sections for more convenient and effective navigation.
		Staff information section	The section includes all of the staff background information, username and password, etc.
		Station information board	Display status, address, location, opening and closing time.
		Seat information section	To display, edit and add available seat information by carriages.
		Carriage information section	To display, edit or add carriage information by train.
		Statistical Report	This section shows statistical information for the managers that are tables, charts and summary of monthly performance. Information can be search, filter and sort
	Low	Login/Logout page	Restrict access for staff only
		Account authorisation	Admin can control access of staff by providing authorisation to certain individuals.
OUT SCOPE		Report system	For passengers to report or complain about unpleasant experience so that the railway service can improve
		Maintenance screen	Screen to inform the maintenance event id for staff and maintenance message for passengers.
		Route Management	To manage information of routes
		Staff department, position, and job history	To manage more detailed information of staff

		Features for passengers	For users to navigate the platform as well as interact with the railway service
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After many weeks we have updated the scope by moving a few functions into the out scope section as we realised the features are unfeasible and would result in redundancy. Such functions are route management and some information regarding staff. For route management, we recognised that it is unnecessary to keep track of the components since the route's existence stays constant and their operations are controlled by a different system. Secondly, we have managed to trim down the bulky staff data schema as it dawned on us that certain information is managed by other systems, redundant if included in a railway management system.

Furthermore, the group has decided to focus solely on the functions for staff, moving passengers' to out-scope. This action is to simplify the project within the time limitation of the course and to improve the overall quality of the application.

Outcome

After a period of 2 months, the project was concluded with most of the features stated in the scope having completed. The team has designed and developed successfully a database with multiple tables, so that data of different subjects can be efficiently and effectively stored as well as displayed in tables in relevant sections. Besides that, the application is also able to perform CRUD tasks on the subjects, enabling the users to manage the data in the database conveniently. Aside from data management, the application can generate a report page and a dashboard with informative visualisations to help users keeping track of the changes in data and development trends of the railway system. Last but not least, authentication and authorisation have also been implemented to restrict access to certain individuals and protect the data.

4. Progress

There are some modifications related to the Project's timeline due to the adjust in making plan during our studying time. Referring to the previous timeline, we are in the stage of designing and constructing the main sections. Parts of our work are completely progress, however, for the final advanced products, some sections have been replaced or dropped. This schedule will illustrate more detail.

TIMETABLE					
WEEK	Duration	Start	Finish	Assign to	Note
<i>Building the Ticket and information registration</i>	4 weeks	30/11/2020	21/12/2020	Long	
<i>Design the Ticket + Passengers information page + Ticket booking section</i>	4 weeks	30/11/2020	21/12/2020	Dang	

<i>Building Train and Trip management section.</i>	4 weeks	30/11/2020	21/12/2020	Van Anh + Nguyen	
<i>Building the Seats + Carriages information navigation</i>	2 weeks	22/12/2020	5/1/2021		
<i>Building Scope: Medium</i>					
<i>Insert data for all these tables</i>	2 weeks	22/12/2020	5/1/2021	All team member	
<i>Design the Dashboard, Query section</i>	2 weeks	22/12/2020	5/1/2021	Dang	Display in table
<i>Design the Staff information section + Statistical Report</i>	2 weeks	22/12/2020	5/1/2021	Van Anh	
<i>Feedback page</i>	2 weeks	22/12/2020	5/1/2021	Nguyen	
<i>Building Scope: Low</i>					
<i>Sign up/Sign in/Sign out page</i>	1 weeks	6/1/2021	13/1/2021	All team	

We attempt to retain the timeline in scope from the most essential to the least important as well as keep the deadline and people performing each task.

What has changed:

- Instead of building a homepage for customers to book tickets, we focus more on upgrading the information management system for tickets, customers, trains for Staff.
- We replace the Route table with the Trip table because it is more convenient to query.
- Carriage is also new data for information systems.
- Data Insert also takes a large amount of time compared to the old plan.

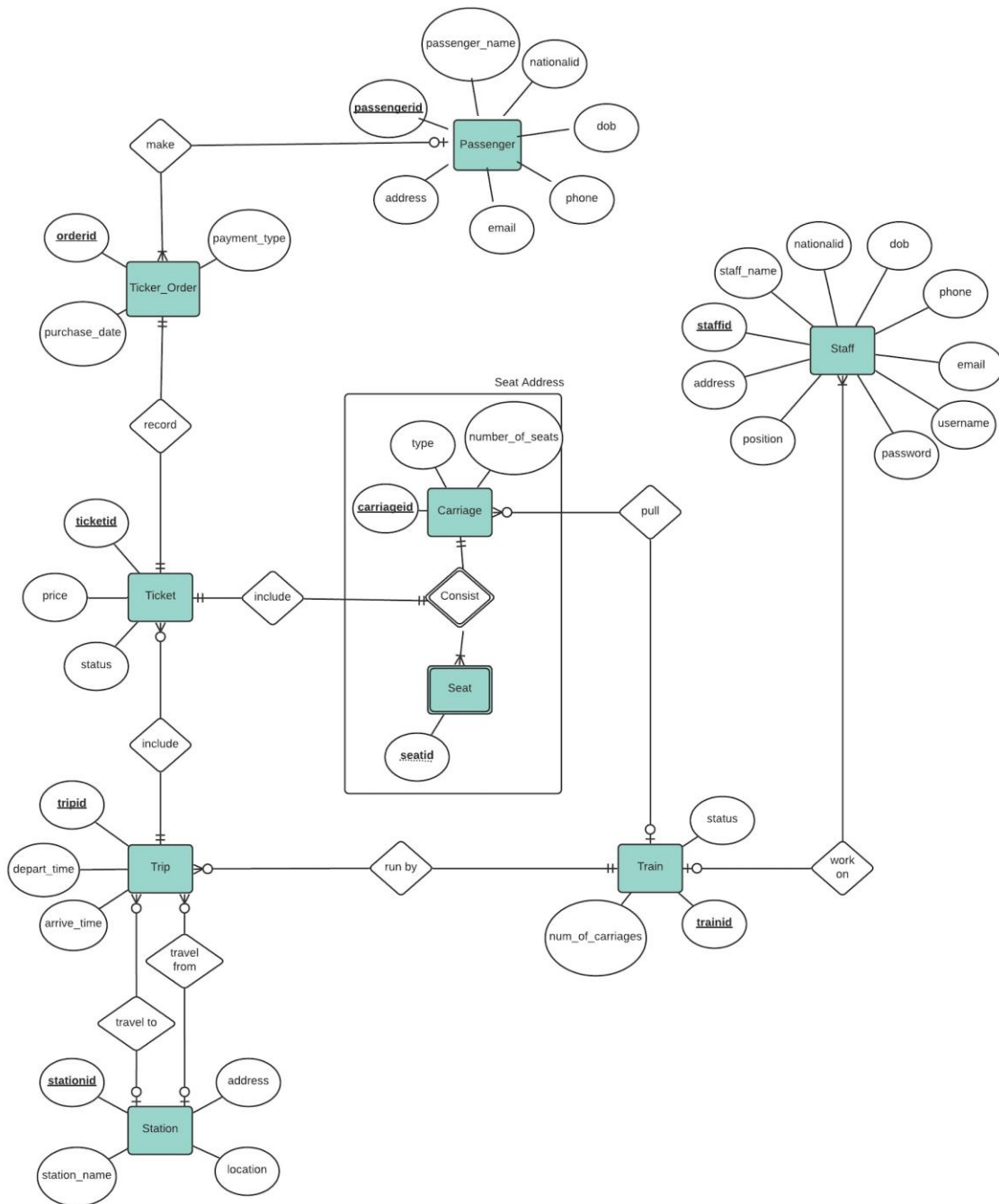
5. Future directions

In the field of information technology, there is no perfect system including a database system. In the project of designing a database for the railway management system, our whole team had a specific plan for each stage for each specific feature of the railway management system. During the project's implementation, we cannot avoid the limitations, which are the challenges we need to improve and develop a highly realistic railway system. In the later stages of the project, in the future we have many directions to improve the project with a high quality and full range of features required for an effective railway management system including technical and non-technical.

- One of the directions that our team has set for the next phase of the project is to research and come up with solutions to implement out of scope of the project. Extensive ticketing features and database statistics are required for users including railroad operators and passengers, who will book train tickets through the online booking system. This section is considered to develop and upgrade the system of user interface more efficiently and convenient.
- For the technical future direction of the railway management system project, our team will continue to develop databases including report systems, maintenance screen, route management, staff department, position and job history, features for passengers sections on the Oracle Application Express (Oracle APEX) platform. These system features that our team plan to implement in the future require database programming techniques through the Oracle programming language and some user interface programming techniques on the Oracle APEX. It can be said that these technical requirements are not too difficult and complex, but they require the whole team to spend time researching and coming up with suitable solutions for each function of the system so that it brings a significant effect.
- In the future, our team not only has technical orientation to programming, but also plans to develop work capabilities using special diagrams, ER Diagrams. It can be seen that the relationship between the database tables is very important to help users easily query related data. Not only the railway management system project but also all projects that work directly to the database, a diagram is indispensable if one wants to create a useful and logical system. We will focus on developing the system's activity database outlines through the method of using the ER diagram to represent relational schema relationships. Our team will continue to study what is a highly logical diagram from which to easily connect to the existing system, edit and release a useful railway system management database.

II. Application Design and Implementation

1. ER Diagram



Entity Relationship Diagram of Railway Management System

As visualised in the entity-relationship diagram, the entity Passenger will maintain personal information of the customer, which are distinct ID, name, national ID, date of birth, phone number, email and address. Furthermore, each customer when booking one or multiple train tickets, at the same will make one or many Ticket_Order.

Ticket_Order will record and archive information of the purchase and transaction that are the dissimilar order ID, day of purchase and payment method. Furthermore, each order will also include the information regarding a Ticket that passengers intend to purchase.

Every Ticket will have a unique ID, price and status. Status is to determine and distinguish between the tickets that have been purchased and those that remain available. Besides that, in a ticket, information of Trips and Seat Address are also displayed.

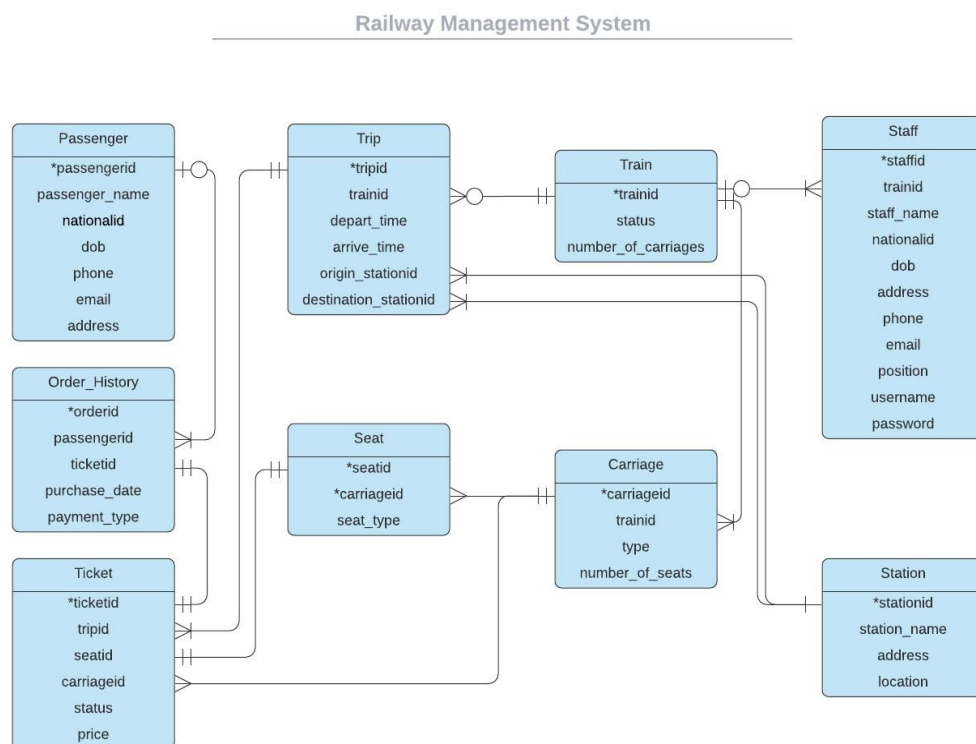
Each trip will have its own ID for convenience of management, depart time and arrival time. Moreover, a trip will also require information of Station in order to register the station of origin and destination. The information of each station such as distinct ID, station names, location and addresses are correspondingly logged and maintained.

Regarding the Seat Address, it is an aggregation of carriage and seat as seat is a weak entity and is inseparable from a carriage. Henceforth, a seat ID requires a carriage ID to form a complete address of Seat Address. A carriage, in addition, maintains other attributes being type and number of seats it consists of.

One or multiple carriages can be attached to and pulled by a train, though not always. Each train can be used for many trips and are distinguished by their ID, along train status and numbers of carriages.

Finally, each train will have numerous staff assigned to work on. Staff personal information is registered and recorded which are ID as primary key, name, national ID, date of birth, email, phone number and address, plus with position, username and password.

2. Relational schema



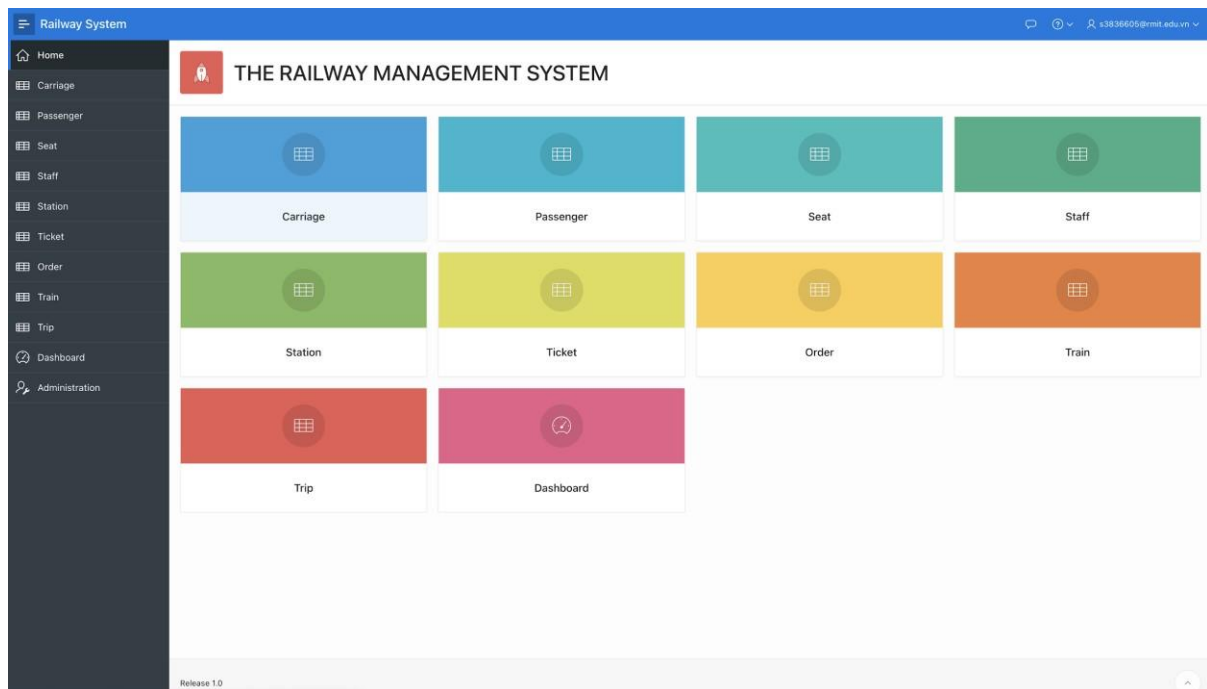
- Passenger(passengerid, passenger_name, nationwide, dob, phone, email, address)
- Order_History(orderid, **Passenger.passengerid** passengerid, **Ticket.ticketid** ticketid, purchase_date, payment_type)
- Ticket(ticketid, **Trip.tripid** tripid, **Seat.seatid** seatid, **Carriage.carriageid** carriageid, status, price)
- Trip(tripid, **Train.trainid** trainid, depart_time, arrive_time, **Station.stationid** origin_stationid, **Station.stationid** destination_stationid)
- Seat(seatid, **Carriage.carriageid** carriageid, seat_type)
- Carriage(carriageid, **Train.trainid** trainid, type, number_of_seats)
- Train(trainid, status, number_of_carriages)
- Staff(staffid, **Train.trainid** trainid, staff_name, nationalid, dob, address, phone, email, position, username, password)
- Station(stationid, station_name, address, location)

3. Database creation

- *Oracle database creation file is attached when we submit it to RMIT Canvas.*

4. Application features

The application is a prototype and an interface to manage a railway system. With this application, information of subjects involved in the system will be listed out. The subjects included are: Passenger, Ticket, Order, Staff, Seat, Carriage, Train, Station and Trip. Additionally, a dashboard is available to visualize and report insights to users. In each section, various actions can be done to manage data in the database and are described in detail below.



P.1: Homepage of the application

1. Viewing and managing data of Railway Management Application

By using this application, staff are able to view all information of each entity of the system. The information of the ticket can include: the entity's ID, relevant information, and other IDs of relating entities. The IDs will serve as relationships for query and create complete queries and views, comprehensible for a non-technical user. Accessing this section is straightforward and can be accessed as following:

- From Homepage (as seen in picture P.1 above), users can navigate directly to the section by clicking on the according icon.
- Another more global method to access the sections is to navigate the side menu (As shown on the far-left side in picture P.1).

In each section, various actions can be done to manage information about the subject such as: Creating new instances, searching for existing instances, editing information and deleting instances.

- Create new instances:

Q

▼

Go

Actions

▼

Reset

Create

	Trip ID ↑	Train ID	Depart Time	Arrive Time	Origin Station ID	Destination Station ID
<div><div></div><div></div></div>	TR01	T03	01/JAN/2021 08:30	01/JAN/2021 17:10	ST01	ST02
<div><div></div><div></div></div>	TR02	T01	02/JAN/2021 09:30	02/JAN/2021 19:10	ST02	ST03
<div><div></div><div></div></div>	TR03	T02	03/JAN/2021 10:30	04/JAN/2021 06:10	ST03	ST04
<div><div></div><div></div></div>	TR04	T03	04/JAN/2021 11:30	05/JAN/2021 07:10	ST04	ST03
<div><div></div><div></div></div>	TR05	T01	05/JAN/2021 12:30	06/JAN/2021 00:10	ST03	ST02

1 - 5

Step 1: To create a new instance, users can click the Create button located on the top right corner of the table. Once clicked, a form will appear acquiring necessary information for an instance.

Trip
✕

Tripid

Trainid

▼

Depart Time

📅

Arrive Time

📅

Origin Stationid

▼

Destination Stationid

▼

Cancel

Create

Step 2: Users can start filling in necessary information. After all information is filled in, the new subject can be created by clicking Create, or discard by clicking Cancel or the X icon on the top right corner of the form.

- Edit and deleting instances:

Trip
✕

Tripid

TR01

Trainid

T03

▼

Depart Time

1/1/2021

📅

Arrive Time

1/1/2021

📅

Origin Stationid

Ha Noi

▼

Destination Stationid

Vinh

▼

Cancel

Delete

Apply Changes

Step 1: Both tasks can be performed by navigating to the subject that users intend to make change.

Step 2: Then click on the Edit icon to open the panel where information about an existing instance is displayed.

Step 3: Users can then make changes to the data by replacing current information.

Step 4: Confirm by clicking Apply Changes located at the bottom right. Besides that, to delete the data, users can simply click the red Delete button at the bottom left.

As new data are entered and current data changed by the users, constraints are set up to ensure the integrity and consistency of the database. For instance, national ID and phone numbers must comply with national format or certain fields must contain completely unique data. If the input by the users violates the constraints of the application, the form will not be submitted and, instead, errors will be highlighted to notify the users.

In addition, tasks regarding displaying the data are available, which are filtering, sorting, grouping and generating visualizations. These features are to create a convenient environment for the users to quickly extract insights and manage the data. To access the functions simply:

Step 1: navigate to the data table and click on the Action button located to the right of the search bar.

Step 2: A menu will drop down and users can choose the intended action.

2. Report

The report is the aggregate report and summarizes the tables' data values in the railway management system illustrated by detailed tables. The purpose is for the manager to have an overview of the data so that it can undoubtedly be summarized as well as implement strategic directions in the future.

The screenshot displays the 'Railway System' dashboard. The left sidebar contains navigation links: Home, Carriage, Passenger, Seat, Staff, Station, Ticket, Order, Train, Trip, and Dashboard (selected). The main content area is titled 'Dashboard' and contains four widgets:

- Trip Details:** A table with columns: Tripid, Trainid, Depart Time, Arrive Time, From Station, and To Station. It lists 5 trips (TR01 to TR05).
- Available Seats of each Carriage:** A table with columns: Carriageid, Count(s.carriageid), and Trainid. It lists 8 carriages (CR01 to CR08).
- Available Ticket:** A table with columns: Ticketid, Trainid, Seatid, Carriageid, Carriage Type, and Price. It lists 5 tickets (T01 to T05).
- Number of Ticket Sale by Month:** A chart showing ticket sales by month.

The bottom of the dashboard shows a Windows taskbar with various application windows open, including 'Application: 135195', 'Edit: Page 20', 'Session', 'View: Debug', 'Debug', 'Page Info', 'Quick Edit', and 'Theme Roller'.

- **Trip Details**

Display all trips available corresponded with Depart Time (start) and Arrive Tim (end), name of two Stations for each Trip.

Trip Details

Tripid ↑≡	Trainid	Depart Time	Arrive Time	From Station	To Station
TR01	T03	1/1/2021	1/1/2021	Ha Noi	Vinh
TR02	T01	1/2/2021	1/2/2021	Vinh	Da Nang
TR03	T02	1/3/2021	1/4/2021	Da Nang	Sai Gon
TR04	T03	1/4/2021	1/5/2021	Sai Gon	Da Nang
TR05	T01	1/5/2021	1/6/2021	Da Nang	Vinh

1 - 5

- **Available Seats of Each Carriage**

The table displays the seats that are currently still available for purchase in each carriage. The number of seats is counted and grouped by carriage ID and train ID for viewers to identify the number of carriages.

Available Seats of each Carriage

Carriageid ↑≡	Count(s.carriageid)	Trainid
CR01	1	T01
CR02	1	T01
CR03	3	T02
CR04	5	T02
CR05	5	T02
CR06	4	T03
CR08	5	T03

1 - 7

- **Available Tickets**

The Available Tickets present list of tickets have not sold yet with Trainid, Seatid, Carriage Id, CarriageType and Price. It supports our Staff to check which tickets are available for Passenger in the process of booking tickets.

Carriage Type ↑≡	Total
Business	9
Passenger	7
Sleeper	4

1 - 3

- **Number of tickets sold by month**

The number of tickets sold by month tables assist the administrator to observe aggregation of their Railway business.

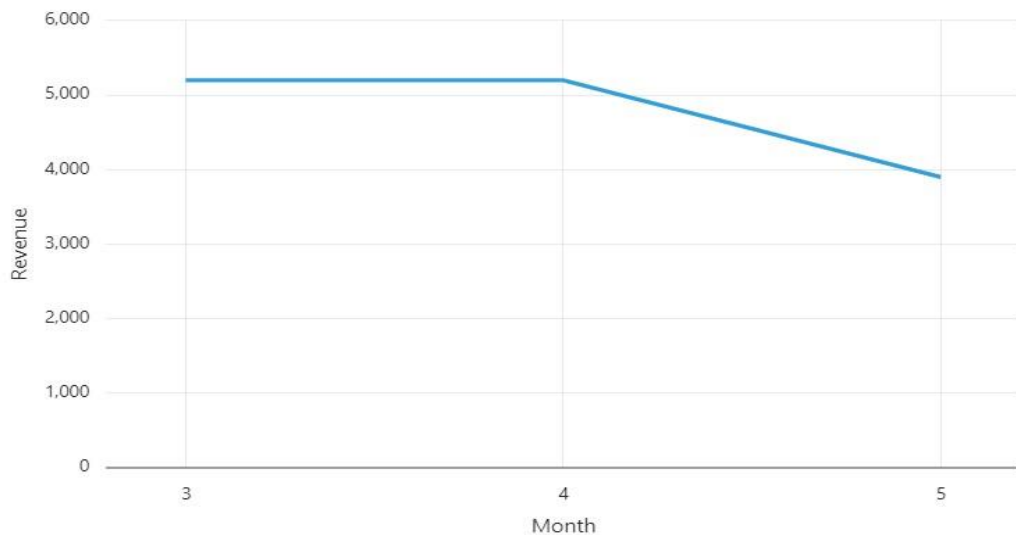
Year	Month	Quantity	Monthly Recurring Revenue
2021	03	1	1300
2021	01	3	5600
2020	05	3	3900
2020	04	4	5200
2020	03	4	5200

1 - 5

3. Dashboard

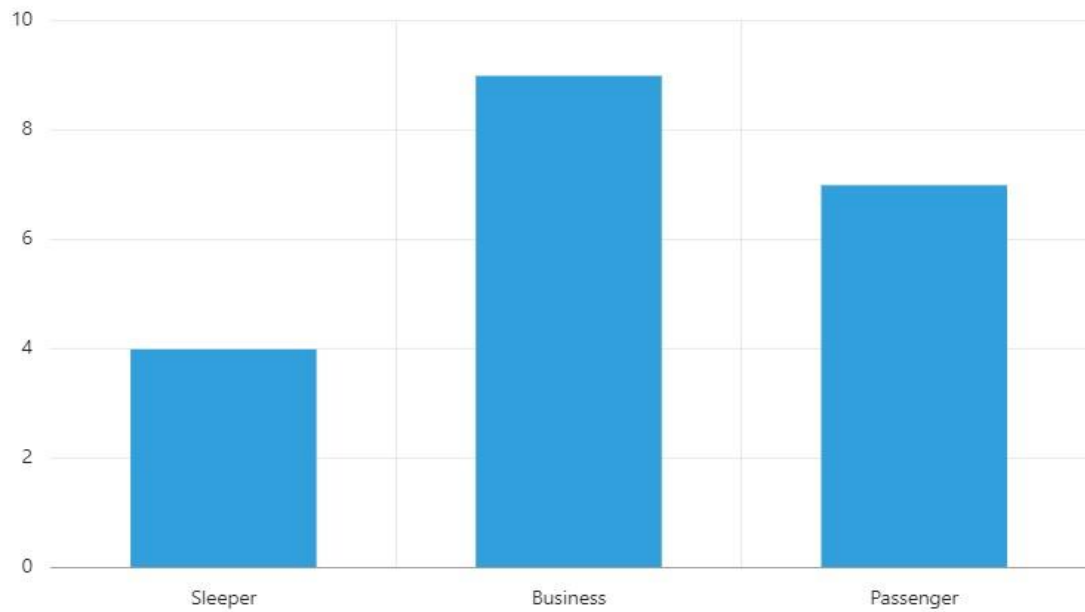
- **Monthly Recurring Revenue - 2020**

The line chart below shows the revenue every month in the year 2020. Statistical graphics visualize the data change by month. Currently, the chart only contains 3 month for demonstrating the data.



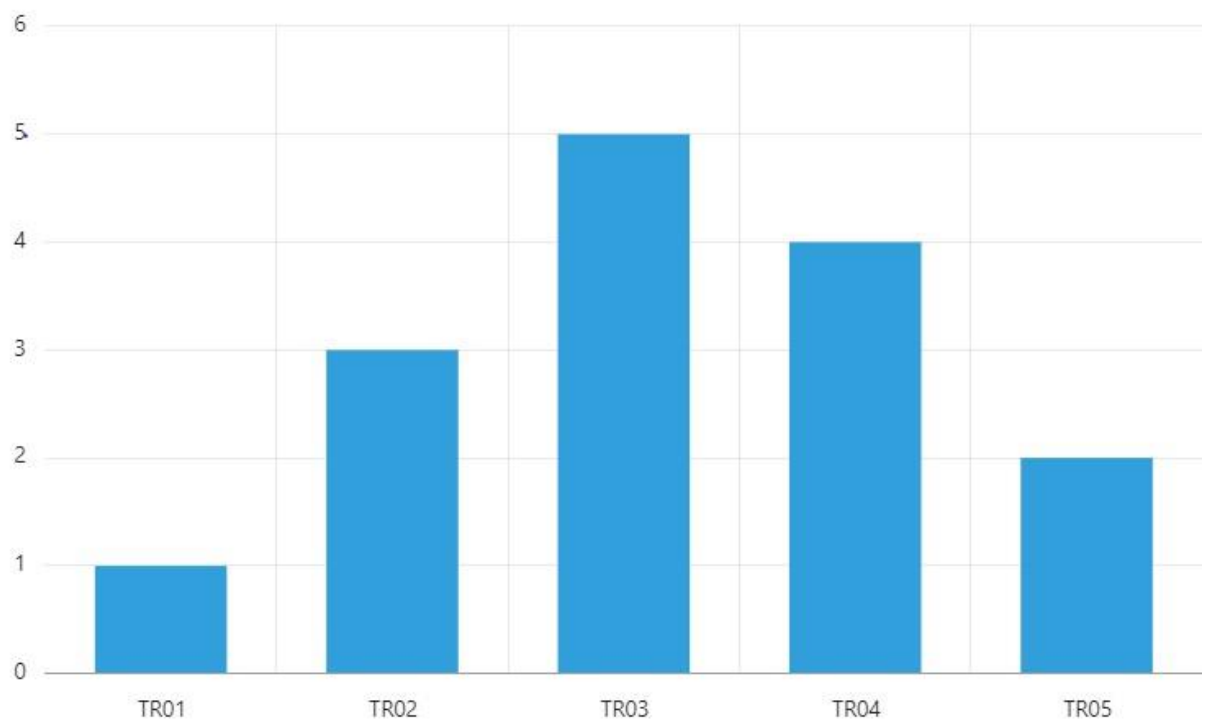
- **Available Seats by Carriage Type**

The bar chart represents the type of carriage bought by the customers. The staff as well as the manager can see the highest and lowest type of the carriage with this type.



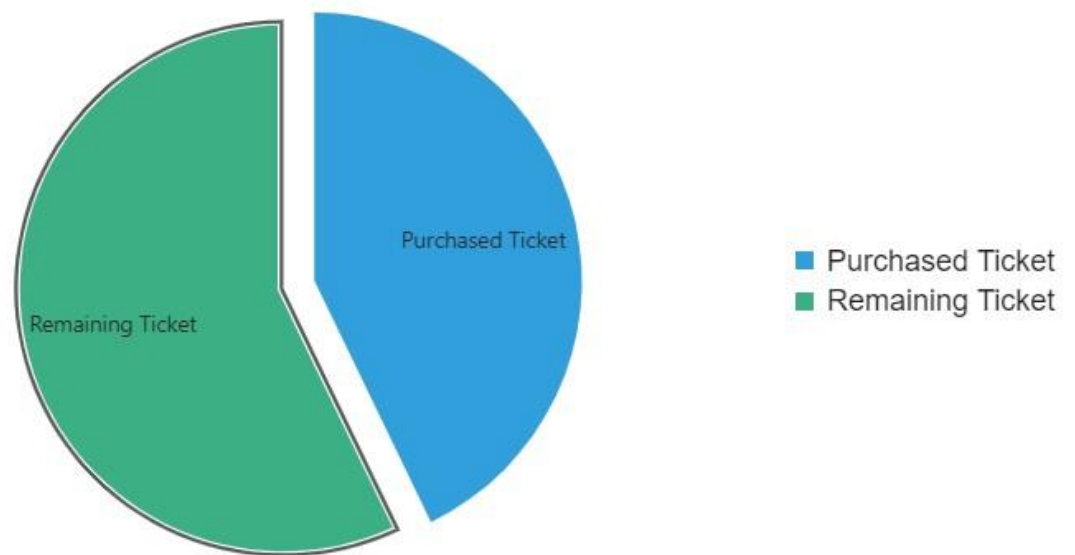
- **Number of Passengers by Trip**

The bar chart illustrates the quantity of the customers for each trip. From the chart, the manager can easily know the highest quantity of customers for the trip as well as the one.



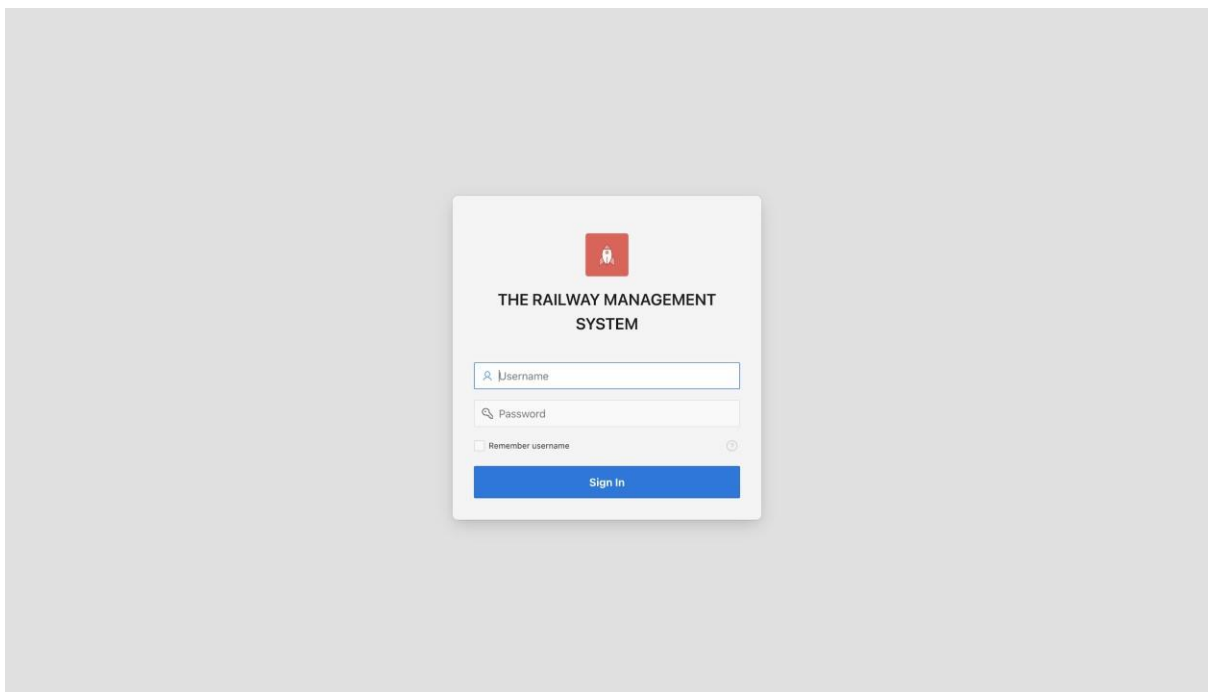
- **Ticket Status**

The pie chart shows the quantity of the purchased ticket and the remaining ticket of all the current systems. This kind of chart can illustrate the quantity of the data more efficiently.



4. Log in/Log out the Railway Management Application

Users who have the authorization to access our Railway Application are able to log-in and logout whenever entrance. The Railway Management Application automatically prompts users to execute the log-in process again when they exit the application.



5. Authorization for Reader, Contributor and Administrator

Administration can authorize for Reader, Contributor and Administrator the Railway Application:

- Readers can only view, they cannot add as well as modify the information.
- Contributors can add data, modify the information.
- Administrators can design, share and adjust everything of the Application.

To execute the Scope, the Administrator have to follow these steps:

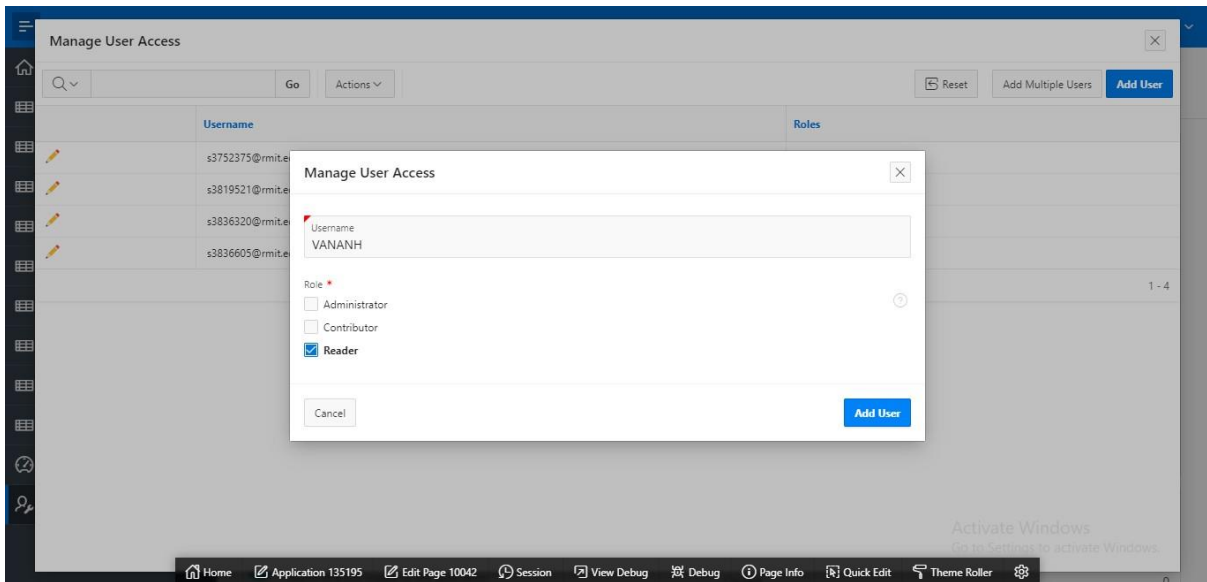
Step1: The administrator have to log-in the Application then go to the “**Manage Users and Groups**” Page

For example: Create an account have a **username: VANANH** ; **password: 1234567z**.

Step2: After filling all the information needed, the administrator logs in to the Railway Management Application for Authorization step. The administrator selects the **User icon** on the right side.

User Role	Count
Administrator	4
Reader	1
Contributor	0


Step 3: After the User icon is selected, the screen displays the Table below. Administrator selects the “**Add User**” button.

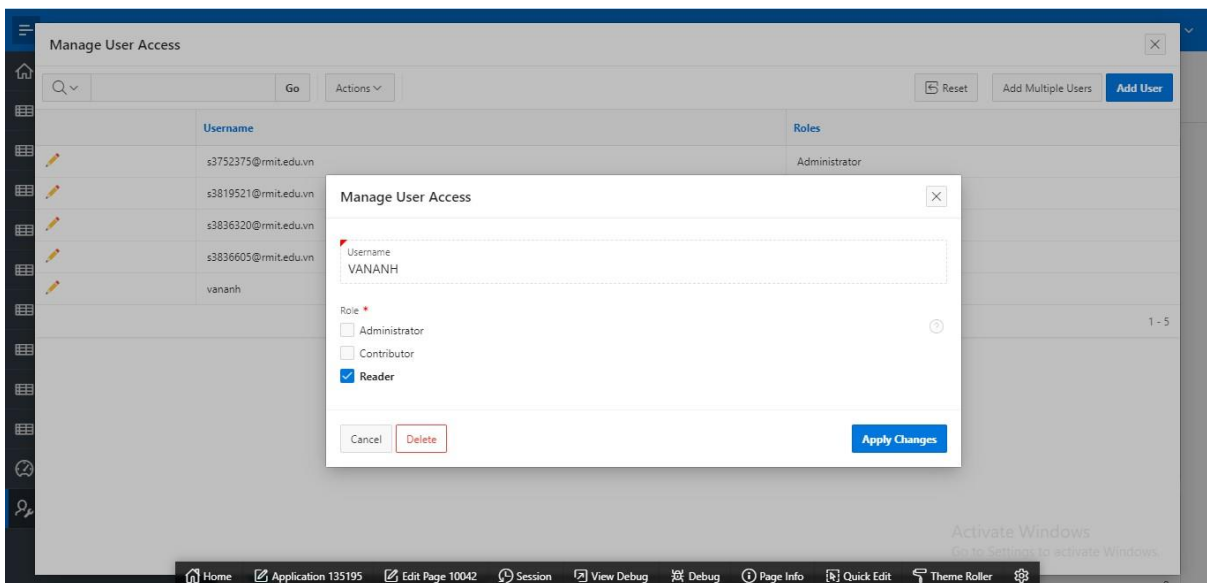


Administrators fill the Username and then choose the Role they want to share.

Eg: In here, I fill username : VANANH and select the Role is Reader.

Optional Step:

Administrator can also modify all accounts they have shared by selecting the  before the username.



6. Queries:

This is one of the queries we did against the Oracle database platform. Most of these queries our team used to represent graphically on the Dashboard page, the data tables on the Reports page of the railway management system application. These queries can provide a railway system manager with an overview of relevant information about the system and can be readily added and edited to user, train, and trip, number of tickets sold or purchased data:

```

-- Trip Details
SELECT T.tripid, T.trainid, T.depart_time, T.arrive_time,
S1.station_name from_station, S2.station_name to_station
FROM Trip T
    LEFT JOIN Station S1 ON S1.stationid = T.origin_stationid
    LEFT JOIN Station S2 ON S2.stationid = T.destination_stationid;

-- Available Seats of each Carriage select cr.carriageid,
count(s.carriageid), cr.trainid from Seat s, Ticket tk, Carriage cr
where (tk.seatid = s.seatid and tk.carriageid = s.carriageid and
cr.carriageid = tk.carriageid and (s.seatid, s.carriageid) not in (
select tk.seatid, tk.carriageid
                                from Ticket_order t,
Ticket tk
                                where tk.ticketid =
t.ticketid)) group by
cr.carriageid, cr.trainid;

-- Number of Ticket Sale by Month select to_char(T.purchase_date,
'YYYY') Year, to_char(T.purchase_date, 'MM') Month, count(TK.ticketid)
Quantity, sum(Tk.price) Monthly_Recurring_Revenue from ticket_order T,
ticket Tk where Tk.ticketid = T.ticketid
group by to_char(T.purchase_date, 'YYYY'), to_char(T.purchase_date,
'MM')
order by to_number(to_char(T.purchase_date, 'YYYY')) desc,
to_number(to_char(T.purchase_date, 'MM')) desc;

-- Available Seats by Carriage Type
select c.carriage_type, count(c.carriage_type ) as Total from
seat s, ticket tk1, carriage c where tk1.seatid = s.seatid and
tk1.carriageid = s.carriageid and
c.carriageid = tk1.carriageid and (s.seatid, s.carriageid) not in (
select tk.seatid, tk.carriageid
                                from ticket_order t,
ticket tk
                                where tk.ticketid =
t.ticketid) group by
c.carriage_type;

-- Monthly Recurring Renevue (Line Chart) select
to_number(to_char(T.purchase_date, 'YYYY')) Year,
to_number(to_char(T.purchase_date, 'MM')) Month, count(TK.ticketid)
Quantity, sum(Tk.price) Monthly_Recurring_Revenue from ticket_order

```

```
T, ticket Tk where Tk.ticketid = T.ticketid and
to_char(T.purchase_date, 'YYYY') = '2020' group by
to_number(to_char(T.purchase_date, 'YYYY')),
to_number(to_char(T.purchase_date, 'MM')) order by
to_number(to_char(T.purchase_date, 'MM'));
```

```
-- Available Seats by Carriage Type (Bar Chart) select
c.carriage_type, count(c.carriage_type ) as Total from seat s,
ticket tk1, carriage c where tk1.seatid = s.seatid and
tk1.carriageid = s.carriageid and
c.carriageid = tk1.carriageid and (s.seatid, s.carriageid) not in (
select tk.seatid, tk.carriageid
                                from ticket_order t,
ticket tk
                                where tk.ticketid =
t.ticketid) group by
c.carriage_type;
```

```
-- Number of Passenger by Trip (Bar chart) select Tr.tripid
Trip, count(Tko.orderid) "Number of Passengers" from Trip Tr,
Ticket_order Tko, Ticket Tk
where Tko.ticketid = Tk.ticketid and Tk.tripid = Tr.tripid group
by Tr.tripid;
```

```
-- Ticket Status (Pie Chart) select
'Purchased Ticket',count(*) Total from
ticket_order T, ticket Tk where
Tk.ticketid = T.ticketid union
select 'Remaining Ticket',count(*) as Name from
ticket Tk
where Tk.ticketid not in (select T1.ticketid from ticket_order T1)
```

7. Application Link:

Link: <https://apex.oracle.com/pls/apex/s3819521/r/project45/login>

Username: long_nguyen

Password: 12345678z. (notice that remember the dot - "." character)