

Staff Transport and Travel Expense Management System

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2024**



Staff Transport and Travel Expense Management System

**A thesis submitted for the Degree of Master of
Information Technology**

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2024**



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Abstract

This document presents the development of the web-based Staff Transport and Travel Expense Management System, a solution designed to streamline and automate the process of requesting transport, welfare vehicles, taxis, and claiming travel expenses within an institution.

the manual processes are not only time-consuming but also inefficient, resulting in employees dedicating significant time and effort to navigate through these procedures. To address this challenge, a comprehensive understanding of user requirements was gathered, and a thorough analysis of the existing processes was conducted. Then based on the analysis the system was build

The Staff Transport and Travel Expense Management System leverages technologies such as Spring Boot, React, and Microsoft SQL Server to provide an efficient, user-friendly, and automated platform for managing transportation requests and travel expenses. This system promises to significantly enhance the efficiency and productivity of transport-related operations at an institution.

The reporting module provides a comprehensive analysis of various reports generated from the system. It encompasses detailed insights into vehicle-wise, department-wise, and bulk transport/welfare/taxi/claim request counts over different timeframes, enabling efficient resource allocation and strategic planning. Additionally, it highlights the significance of these reports in enhancing operational efficiency, optimizing resource utilization, and improving overall service delivery

The testing and evaluation section of this thesis outlines the meticulous process employed to ensure the reliability and functionality of the system. Through some testing methodologies such as unit/component testing during development and integration testing in the testing phase, the system's performance and accuracy were thoroughly observed. Additionally, user acceptance testing provided valuable feedback from end-users, validating the system's usability and alignment with user requirements. testing and evaluation section underscores the importance of systematic evaluation in identifying potential issues, optimizing system performance, and ultimately delivering a robust and user-friendly transport management solution.

Acknowledgment

I'd like to start by thanking my supervisor, Mr. Rasika Dayarathna. His constant encouragement, helpful guidance, and support were invaluable throughout my project. His feedback and suggestions were key in finishing the project and writing my thesis

I also wish to extend my sincerest thanks to staff members who are working in the Transport, Welfare, Admin, and IT departments of the Bank of Ceylon for their vital support given to me at the information gathering, understanding of the existing processes, planning, development, and evaluation stages of the system. Their support guides the way towards a well-built system.

Finally, I would like to thank my parents, and my dear friends for their encouragement, understanding, and support in the successful completion of this project.

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List of Abbreviations

AGM	Assistant General Manager
API	Application Programming Interface
BOC	Bank of Ceylon
CSS	Cascading Style Sheets.
CTB	Ceylon Transport Board
DMZ	Demilitarized Zone
GPS	Global Positioning System
HCM	Human Capital Management
HTML	Hypertext Markup Language.
HTTPS	Hypertext Transfer Protocol Secure
JPA	Java Persistence API
JS	Java Script
MIS	Management Information System
MS	Microsoft
MVC	Model View Controller Architecture
OS	Operating System
SMS	Short Message Service
SQL	Structured Query Language
SRS	Software requirements specification
UML	Unified Modeling Language

Chapter 1 - Introduction

1.1 Project Overview

The success of the institution is highly dependent on the motivation of the staff members. The staff members of the institutions are worked indefatigably to keep these successes over the years by putting in persistent effort day and night. Therefore, institutions provide more facilities to staff members to increase their motivation and loyalty to the institution. Institutions provide more facilities to their employees in various ways. Providing transport, welfare facilities, loans at low rates, accommodations, training, allowances, and bonuses are considered examples of those facilities. A transport facility is one of the major facilities provided by institutions to their employees. It will increase the productivity of both employees and the institutions. Because a lot of time is wasted when if the employee used public transport for traveling. Welfare is also good facilities that satisfy their employees by providing traveling, accommodations, and much more facilities at very lower rates.

Staff members who worked late at night can request transport from the institutions to their homes. Otherwise, they faced a lot of troubles when traveling to their homes at late night. If staff members use a taxi service institution has provided the facility to reimburse the amount base on some conditions

Most of the institutions' departments are centralized at the head office. All branches are managed by the head office. Also, provincial and regional offices are formed to make sure effective management. The branch network acts a major role in maintaining the institution's position and providing superb service to its customer base. Consequently, it is required for management and staff members to travel to various locations to ensure the seamless functioning of the institution. Those transportation requirements are provided by the transport division of the institution. Sometimes it has to hire taxi services as well once considering the situation.

Furthermore, the institution allows its staff members to utilize welfare vehicles at highly reasonable rates. It is very cheap compared to the normal rate. Vehicles are also very comfortable and staff members can use those vehicles for their trips.

Institutions provide such facilities to encourage and care for its employee. Also, those facilities must be well managed and all the employees can able to get these facilities equally without any favoritism or bias.

1.2 Motivation

Bank of Ceylon is the top financial institution in Sri Lanka. It has achieved a number of awards and continues to set challenges for banks in the country and worldwide. As a reputed bank, it always considers the well-being of its employees. As a staff member of the bank we are gain lot of advantages from these facilities. The following main reasons motivated me to design this kind of application to get more advantages from the facilities provided by the bank.

- **Problem with reservation of welfare vehicles**

The welfare vehicle is currently selected by a raffle draw. Because they don't have a system to do reservations online. The raffle draw is open each month twice for the staff members. They must fill out applications, get approvals from relevant parties, and apply for the draw. The welfare division do the raffle and selected a random winner for the vehicle. So the staff members cannot plan their journey until the vehicle is finalized. Sometimes top management and societies of the bank can directly request the vehicles and other staff members will be informed of this at the last moment. So they face very difficulties because of this. Also, the staff members can't view the availability of the vehicles, vehicle details, latest rates, and other information online. They had to visit the welfare division to get the information. Those are the main issues faced by staff members when going to reserve the welfare vehicle.

- **Problem with Request bank transport vehicles.**

Another main issue is requesting office transport for official work and late-night transport. This is also a manual and time-consuming process. Staff members who are willing to request a vehicle, first need to fill out a manual application. Then they had to get approvals from several levels and need to hand them over to the transport division. But at that time

all transport vehicles must be reserved. Most of the head office department people have to do some late night work, especially at month ends. If they are unable to reserve a vehicle at their earliest then they can not plan their work during these days. They have to waste a lot of time finding a vehicle

- **Request Taxi using bank quota**

If bank vehicles are not available then staff have to request third-party taxi services. Normally banks have agreements with third-party taxi services. Bank had some pre-ordered quotas. Every department had some portion from that quota. So the staff members have utilized that quota from the division's administrative unit. They had to request that permission at their earliest. But sometimes staff members have to complete urgent work within the day. Then it is very difficult to get a taxi from the quota. Once the request is received by the administration unit they have to validate the request. Then request must be approved by the manager. Once the payment approves, the payment must be initiated using the core bank system. The staff members and administration unit have to do a lot of paper works and have to access several systems to complete this task

- **Claim transport expenses**

If the department quota exceeds then members have to order a taxi service on their own and can able to claim the cost later. Sometimes staff members can go in their own vehicles and be able to claim the cost. This process is also a manual process. They had to fill out several application forms and need to submit them to the division head and administration unit. Then they pay the amount after approval using a different system. So admin users need to feed all the data to the other system to do the payments.

- **Analyzing and reporting**

Currently, there is no report module to view the overview picture. Therefore it is difficult to identify the areas which need to be enhanced. Always these analyses are based on the manual document and user feedback. it is difficult to get a clear image of the current situation.

1.3 Objectives

The main objective of this project is to develop the vehicle reservation and expenses claims process by providing a web-based application solution to staff members. This application will have for both clients and admin users functionalities.

Example of client functionalities

- Welfare vehicle reservation
- Institution vehicle reservations
- Request a taxi from the department taxi quota
- Request for traveling claims

Example of admin functionalities

- User access controllers
- Approvals
- Maintain Master details like list of vehicles, Details of vehicles, drivers, rates of vehicles

The system can show real-time information on availability, so they can book their vehicle accordingly.

Normally, branch users face more difficulties to access these facilities. Because they have to go to the head office and regional office especially when they try to utilize the welfare vehicle facility. This was also overcome after implementing this system.

Always system reduces human errors. So the whole process can run in a very accurate way. So the users don't need to worry about the workflow. The time taken to complete a process is reduced, resulting in increased efficiency and productivity.

The system is capable of performing a wide range of functions, reducing the need of multiple systems and increasing convenience and efficiency. (For example, administrative people don't need to use the core bank system to initiate payment)

The application promotes transparency by enabling all users to view and track bookings, providing increased visibility.

Provide facility to integrate with the institution active directory for login to the system (This is only available within the institution network)

The system minimizes the need for manual paperwork, reducing administrative burden, and enabling a more streamlined and efficient process.

This system allows users to make early vehicle bookings and by making a welfare vehicle reservation in advance, staff members can better plan their trips and it causes a more organized and efficient travel experience.

The system can provide reports and statics for management. They can get a better idea after analyzing the statics. The system also can provide necessary graphs. So they can get better decisions and improve the service.

Information security is a very important thing. When maintaining manual processes data can be lost or may be shared with unwanted people. So users can secure their data by using this system.

Data management is another important thing. Because every year the number of documents and records increases. So they can't keep all documents with them. Therefore, by using the system, this issue can be overcome.

Time will save on staff because most of the analyzing, and searching functions are automated using this system.

1.4 Background of the study

User experience was helpful in understanding and studying the existing process.. First had to identify all the stakeholders who interact with the current transport reservation process. It identified that stakeholders can be categorized into several roles. They are in several departments and in different positions. So it needed to arrange a few meetings and had to reserve some time to discuss with them. Using several requirement-gathering processes it can be able to identify the main process of the current system. Further, it can be able to study several documents and record books to analyze the current workflow. It received some of the following documents which helped to get a better idea and design the design of the new project.(Document are attached in Appendix A)

- Application form for the welfare raffle draw
- Application form for welfare vehicle request
- Application form for Travelling claims
- Application form for Taxi quota Request

Using the above document and the user experience, it captured the current process into diagrams. It was very helpful to design the system. Also all flows and stakeholders are categorized into several categories to simplify the system.

After that use the existing application on the internet related to this kind of reservation. Also, refer to some other type of application to get more ideas about business processes as well as technical knowledge. If we are developing a new system it must be automated as much as possible, user-friendly to help the user, and also it must improve the technical requirement such as security and high performance, etc.

Also had a few sessions with the IT department which gained more useful ideas and feedback in the technical aspect to design a better solution. Further had to study the current infrastructure of the IT division like servers, operating systems, and resources available to design the software. Also, refer to the internet and other resources to study new development technologies and the most common development technology currently use in the IT industry.

1.5 Scope of the Study

Currently, welfare vehicle reservation is fully done by the manual process. Also, administrative staff needs to use several systems to complete this process. For example, They must use the bank core system to initiate payment. It is a very time-consuming process. So this system will cover the vehicle search and reservations process, approvals process, claims, payment process, reporting areas, vehicle status like check-in and out, etc.

This application contains the following main modules

1. Welfare vehicle reservation
2. Institution transport vehicle reservation
3. Taxi Requesting
4. Traveling claims
5. Authorization and verification (Multi-level approvals) process
6. Payment process
7. Master details maintenance
8. Admin Role functionalities
9. Reporting and receipts

The following users will interact with the system

1. Institution Staff members
2. Division head for approval purposes
3. Division's administrative staff
4. Department head for approval purposes
5. Welfare division administrative users
6. Welfare division management users for approvals
7. Transport division administrative users
8. Transport division management users for approvals
9. Drivers of the institution.

The Institution may allocate CTB/Private owners buses to provide transport facilities to staff members daily from several areas. This facility is not managed by the proposed system. Institution's vehicle repair and maintenance management, and purchasing management, vehicle auctions are not included in this system. So it also hopes to provide an authorization facility using the institution AD system. There this system does not keep the credentials of the users within the system. The welfare division also provides a lot of welfare facilities. But only the transport reservations are managed by this system. Further institution employee details are kept in the institution HCM system and few necessary details will be kept within this system.

Chapter 2 -Background

2.1 Introduction

In this chapter the requirement gathering and analyst is discussed. Requirement are mainly gathered by analyzing the user experience. First had to identify all the stakeholders who interact with the current transport reservation process. Then most of the information are collected from those stakeholders by arranged meeting with them. It was able to collect lot of application forms and record books from these uses.it was very helpful to finalize the requirement. Most of the requirement is gathered at the initial stage. But it can be very when we continue.

Also similar systems were observed to get a much more understanding of the reservations systems. It was also very helpful when adding features to this new system. It will increase the user experience as well.

Also, this chapter contains the technical aspect of the application. Technologies used and utilization of the infrastructure also will be discussed within this chapter.

2.2 Requirement Analysis

2.2.1 Existing process

In the existing manual process, they use the application forms (Appendix A, Figure A.1) The requester has to use fill out those forms for each category. Once the requester initiate they had to hand over those forms to relevant departments.

If any staff member needs a welfare bus ,first they have to apply for the raffle draw. The welfare division uses that form for the raffle draw. So users need to fill this out and apply it to the raffle draw. Once the winner is selected they have to fill out the details form (Appendix A, Figure A.2) and have to submit it. All details go through several approval processes.

In that form, the requested has to fill in the details in the top area. The bottom part is used for administrative and approval staff.

If it is a working day five staff members have to get leave and must fill in the above details. At least 5 member must participate to get the welfare bus. This requirement is change from time to time. So the application must be able to change dynamically.

- **The existing process for reservation of welfare vehicle**

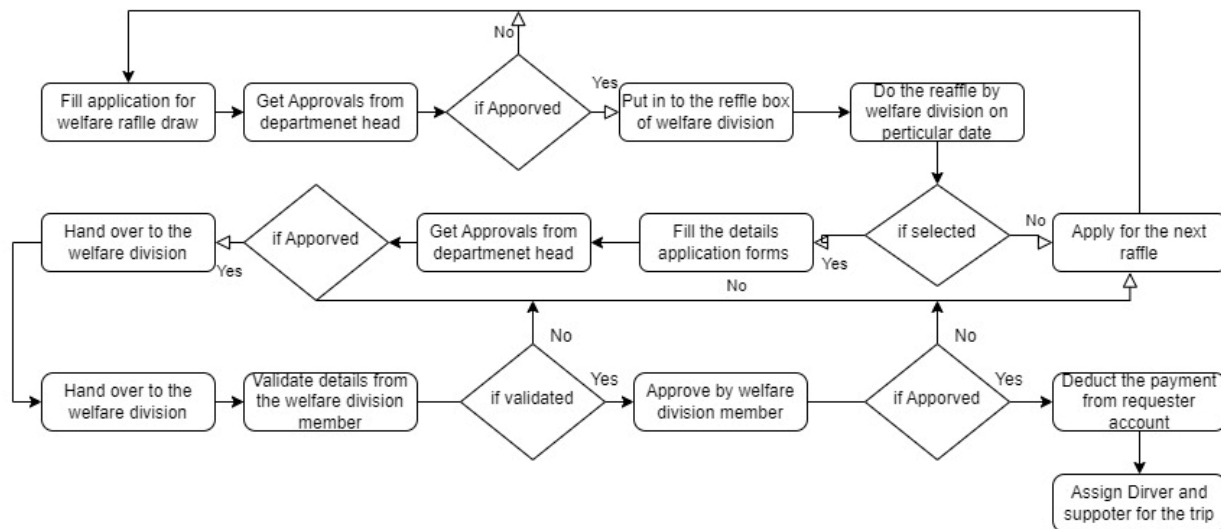


Figure 1-The existing process for reservation of welfare vehicle

- **The existing process for reservation bank vehicles for official works**

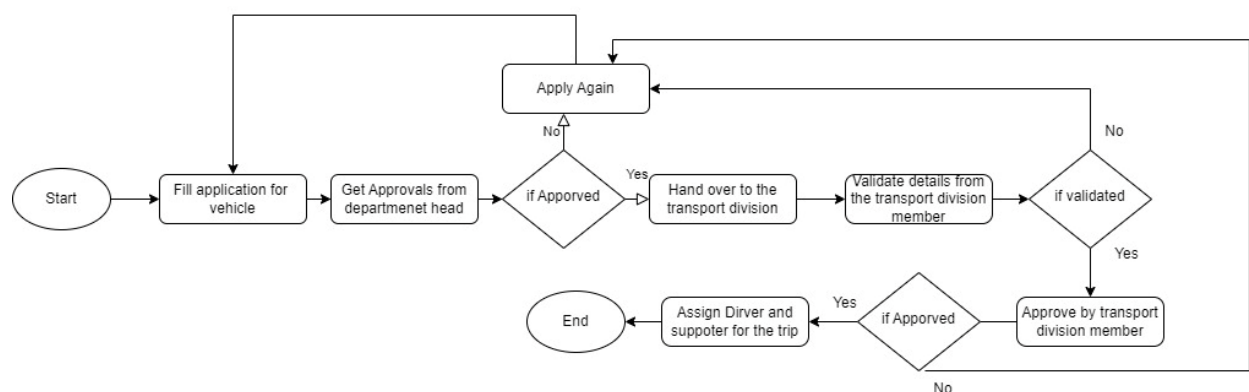


Figure 2-The existing process for reservation bank vehicles for official works

- Existing process flow of traveling claims

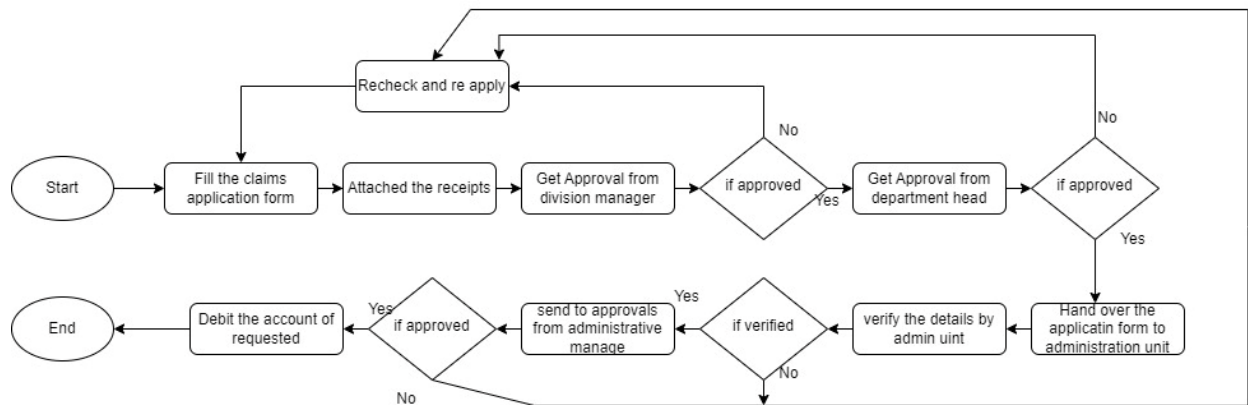


Figure 3-Existing process flow of traveling claims

The user must fill in the travel details on the above (Appendix A, Figure A.4 and Figure A.5). Those details are validated by administrative staff. There are a lot of conditions that must satisfy to obtain the claims. They have to go through several approval processes.

- Existing process flow of requesting a taxi

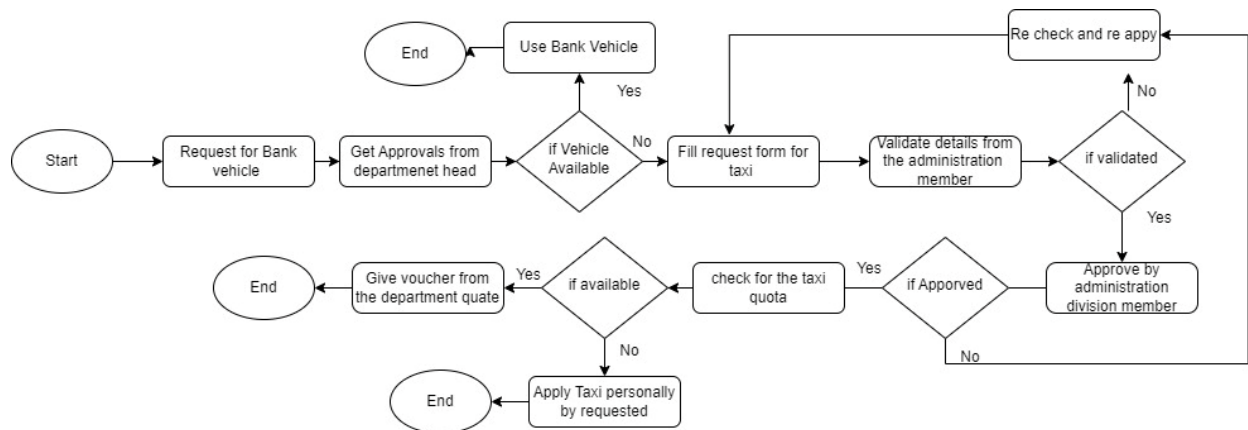


Figure 4-Existing process flow of requesting a taxi

The user must fill out the (Appendix A, Figure A.6) form to utilize a taxi from the department quota. Currently, the bank is registered with the Namdo taxi service. This agreement may change annually or over a period of time.

2.2.2 Requirement analyst using existing process

It can be identified following requirement by analyze above existing processes of the vehicle reservation.

- **Functional requirements (Main)**

1. User Registration and Authentication
 - a. AD login integration with the institution (In development environment it must have login authentication module)
 - b. User roles are handled within the system
2. Vehicle Availability, details, and Booking
 - a. Provide users with real-time information about available vehicles
 - b. Users can able to view the details of the vehicle. like seat capacity
 - c. Allow users to search, select, and book vehicles based on their requirements, specifying the desired dates
3. Reservation Management
 - a. Enable users to view, modify, and cancel their existing vehicle reservations. Handle conflicts or overlaps in bookings to ensure accurate availability management.
 - b. All must have validations
 - c. All requests must go through several approval levels
4. Driver/Vehicles Management

- a. the system involves drivers, provides functionality to manage driver/vehicle profiles, assign drivers to specific bookings, track their availability, and handle

5. Reporting and Analytics

- a. System must be able to generate reports, and visualizations based on the user requirement.

6. Notifications and Communication

- a. Admin users can view all the tasks within the systems

- **Non-functional requirements**

1. Usability

- a. The application must be user friendly
- b. Validation should be implemented. Users must be indicated when they enter the wrong values. Also, it must be capable of giving suggestions

2. Performance

- a. Multiple users must be able to access the system concurrently without any delays.
- b. Data retrieval must happen without any delays.

3. Security

- a. System should be accessed using a secured connection
- b. Outside users from the institution intranet cannot access the system.
- c. Database and application must have a backup plan (Daily DB backup must be there)
- d. Session control and when the system goes idle must be auto logout
- e. Sensitive data must be in encrypted format in the database

- **The following users will interact with the system**

1. Institution Staff members

- a. who are willing to request welfare vehicle
 - i. They can use the relevant module of the application and fill in the details
 - ii. Once they submit the form it will be available to the relevant division head for approval.
- b. Who is willing to receive an office transport vehicle for their official works
 - i. They can use the relevant module of the application and fill in the details
 - ii. Once they submit the form it will be available to the relevant division head for approval.
- c. Staff members who used taxi services and are willing to claim their traveling expenses
 - i. They can use the relevant module of the application and fill in the details
 - ii. Once they submit the form it will be available to the relevant division head for approval.

2. Division head for approval purposes

- a. They can log into the system and items to be approved will be listed for them

3. Division's administrative staff

- a. They can validate the entries entered by requesters
- b. View history details
- c. Can deduct payments for the requesters after approvals (Eg: For claims)
- d. Maintain master details
- e. Can view statistics and reports

4. Department head for approval purposes

- a. They can log into the system and items to be approved will be listed for them
 - b. Can view statics and reports
- 5. Welfare division administrative users
 - a. They can validate the entries entered by requesters
 - b. View history details
 - c. Maintain master details
 - d. Can view statics and reports
 - e. Can deduct payments for the requesters after approvals
- 6. Welfare division management users for approvals
 - a. They can log into the system and items to be approved will be listed for them
 - b. Can view statics and reports
- 7. Transport division administrative users
 - a. They can validate the entries entered by requesters
 - b. View history details
 - c. Maintain master details
 - d. Can view statics and reports
- 8. Transport division management users for approvals
 - a. They can log into the system and items to be approved will be listed for them
 - b. Can view statics and reports
- 9. Drivers of the institution
 - a. They can log and accept the rides
 - b. Can view the history

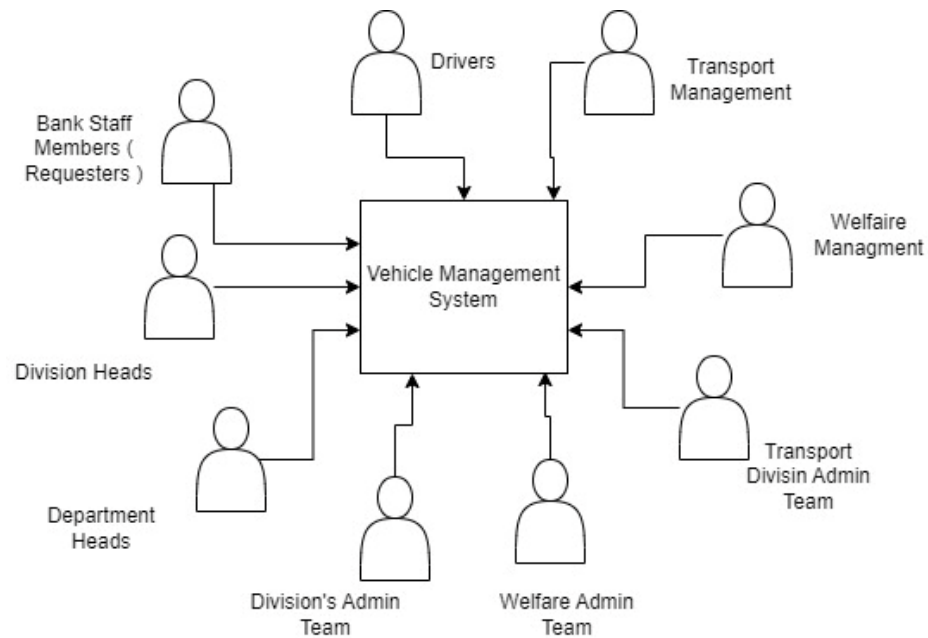


Figure 5-User Roles

- **Main user roles of the system**

1. Administrator or Superuser

This role has the highest level of access and privileges within the system. Administrators typically have the authority to manage user accounts, configure system settings, perform system maintenance, and access all features and data.

2. Manager Users

These users have the authority to reject/approve the request initiated by other users

3. Normal Users

This role represents the standard use of the system. Regular users have access to the features and data necessary to perform their assigned tasks.

4. Viewer or Read-only User

This role is granted limited access and is primarily focused on viewing information rather than performing actions. Read-only users can access data and reports but are not allowed to make changes or updates.

5. Customer or Client

In systems that involve customer interactions, this role represents individuals who use the system to access services, make reservations, etc

2.3 Review of Similar Systems

1. Planyo Vehicle Reservation System

<https://www.planyo.com/car-rental-reservation-system.php>

The below application mainly contains the customer module and the administrative module. Its concept was more close to the institution requirement. But when considering the cost and the institution specific requirement it is always better to develop new system internally.

Feature	Features	Limitations
Online Booking	Customers can view and book available vehicles online.	Not tailored for staff transport bookings or schedules.
Reporting & Analytics	Provides insights on booking trends, vehicle usage, and financial reports.	Lacks detailed reporting for staff transport expenses or cost optimization.
Integration with Third-Party	Can integrate with Google Calendar, payment gateways, and others.	May require additional development for specific enterprise systems integration.
Customization	Offers basic customization, such as custom pricing and availability settings.	Limited flexibility for very specific requirements, like staff transport and expense management.
Cost Considerations	Subscription and transaction-based pricing models available	Costs can accumulate based on usage; not ideal for companies with specific or fixed budgets for internal system

Table 1 - Features and limitations of Planyo system

2. HQ Rental

<https://hqrentalsoftware.com/>

This is also a better solution for vehicle reservations. But it also can't customize to fulfill the institution's requirement. But we can get better features and functionalities by referring that application.

Feature	Features	Limitations
Online Booking	Provides an easy-to-use platform for vehicle booking and managing reservations.	Lacks specific customization for staff transport systems.
Reporting & Analytics	Offers detailed reports on fleet usage, financials, and customer data, helping businesses optimize operations.	Reports are tailored for rentals, not employee transport and expense management.
Integration with Third-Party	Can integrate with Google Calendar, payment gateways, and others.	May require additional development for specific enterprise systems integration.
Customization	Offers basic customization, such as custom pricing and availability settings.	Cannot fully customize to meet unique institution requirements, particularly for staff transport and expense workflows.

Table 2 - Features and limitations of HQ Rental system

3. ScheduleBull

<https://schedulebull.com/en/car-rental-software>

Feature	Features	Limitations
Online Booking	Provides an interface for customers to book vehicles and view availability online.	Not specialized for handling employee-specific transport scheduling
Customization	Offers basic customization options, such as branded booking interfaces and adjustable pricing models.	Cannot be fully customized to meet the specific transport and expense management needs of a institution.

Table 3 - Features and limitations of ScheduleBull system

Appendix B provides more screens regarding similar applications.

2.4 Related Technologies

IT industry is updated rapidly. So the developing languages and tools are improving day by day. So it is always better to use newly stable technologies and architecture to develop new systems. It has more advantages in a lot of areas. Especially developing speed, easiness, performance, security, user-friendliness, etc.

Considering all the aspects it was decided to use the below technologies to develop this system.

- Application Type
 - Web base application
- Architecture
 - Servicer-oriented architecture
 - MVC Architecture.
- OS
 - Windows
- Servers
 - Tomcat server
- Front End
 - HTML,
 - CSS,
 - JQuery,
 - JavaScript,
 - React,
 - Node JS
- Back End
 - Srping Boot
 - Java
- Database
 - Microsoft SQL database
- IDE

- IntelliJ community edition

I used these technologies due to their robustness, scalability, and developer-friendly features, ensuring a seamless development process and high-quality end product

- Node.js

Facilitates server-side development with JavaScript.

Promotes codebase uniformity and reduces context-switching for developers.

- React and Next.js

Enable the creation of dynamic and interactive user interfaces.

Enhance user experience and engagement through seamless client-side rendering.

- Material-UI

Provides a library of pre-designed UI components.

Expedites development and ensures consistency in design across the application.

- Spring Boot

Offers robust backend support for API development.

Simplifies backend logic implementation and ensures scalability and reliability of the application.

Together, these technologies streamline development processes, foster code maintainability, and contribute to the overall success of the project.

2.5 Related Design Strategies

2.5.1 Service Oriented Architecture

Service-oriented architecture (SOA) is a design approach where software components, or services, are organized and integrated to support business processes. These services communicate with each

other over a network, typically using standardized protocols, to achieve specific tasks or functionalities.

In our system, we have implemented SOA by dividing functionality into modules, each offering services through APIs. The front-end application interacts with these APIs to fetch relevant data, with the APIs generated using Java Spring Boot and adhering to REST principles for seamless communication and interoperability.

Services are developed using controllers, models, and entity classes to facilitate the institution and management of data, business logic, and user interactions within the system.

SOA and REST principles offers numerous advantages, including modularity, scalability, interoperability, simplicity, and standardization.

- **Modularity:** SOA and REST allow breaking down systems into smaller, independent services, making them easier to develop, deploy, and maintain.
- **Scalability:** They support the growth of systems by enabling the addition or removal of services without affecting the overall architecture.
- **Interoperability:** SOA and REST use standardized protocols, fostering communication and integration between different systems and platforms.
- **Simplicity:** They promote straightforward design principles, making systems easier to understand, develop, and manage.
- **Standardization:** By adhering to established conventions and protocols, SOA and REST ensure consistency and compatibility across services and applications.

Chapter 3 – Design Architecture

3.1 Introduction

In this chapter, we take a close look at the tools, techniques, and smart approaches that were used to create a user-friendly Staff Transport Management System. We'll dive into how we figured out what was needed and how we planned everything using special diagrams that help us understand the big picture. These diagrams are like blueprints: Use Case diagrams, Sequence diagrams, and Class diagrams.

3.2 System Architecture

It needs to be considered a lot of areas when choosing the technologies and architecture for a system. Some of the areas are listed here which consider when choosing technology and architecture for the purposed system

- Server infrastructure of the institution
- Current IT industry standards
- Number of concurrent users and total accessing users
- Network architecture of the institution
- Maintainability of the system
- Timeline
- Flexibility

The below image shows the high-level network and server architecture of the system

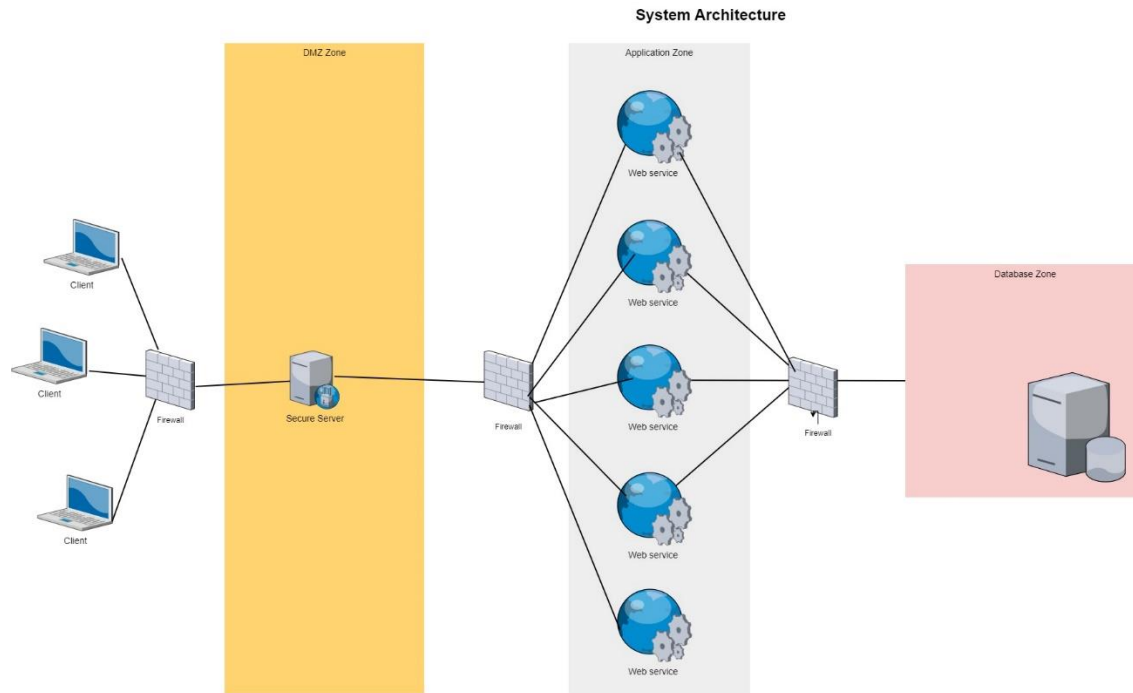


Figure 6-Server and network architecture of the system

Hosting application in a DMZ zone VM provides an added layer of security by segregating application from the internal network. This helps in protecting the application from external threats and unauthorized access.

Using separate application-level VMs allows for better resource management and scalability. Each VM can be optimized for specific application components, ensuring efficient utilization of resources and easier scalability as application grows.

By hosting the database in a separate DB layer VM, ensure that data is isolated and protected. This setup improves performance by dedicating resources specifically for database operations and allows for easier management and maintenance of the database system.

When considered the above architecture is can be distributed the application among several servers. So it is better to develop a system that can be split in to several modules/parts from the business perspective and the technical perspective. So our proposed system can be divided in the few sections as below. This is high-level divination.

- Front end

- This is contain the client part of the system.Users are interact with the system with this part. Mainly focus on the GUI part
- Back end
 - Business logic are exist here as APIs.APIs are hosted for each main modules.APIs will define to cover below modules
 - Admin
 - Welfare
 - Transport
 - Taxi
 - Claims
 - Security , Menus , Access
- Database
 - Microsoft SQL server is use as database

IT industry is updated rapidly. So the developing languages and tools are improving by be day. So it is always better to use newly stable technologies and architecture to develop new systems.It has more advantages in a lot of areas. Especially developing speed, easiness, performance, security, user-friendliness, etc.

3.3 UML Diagrams

3.3.1 Use case Diagrams

- Use case diagram for welfare vehicle reservation

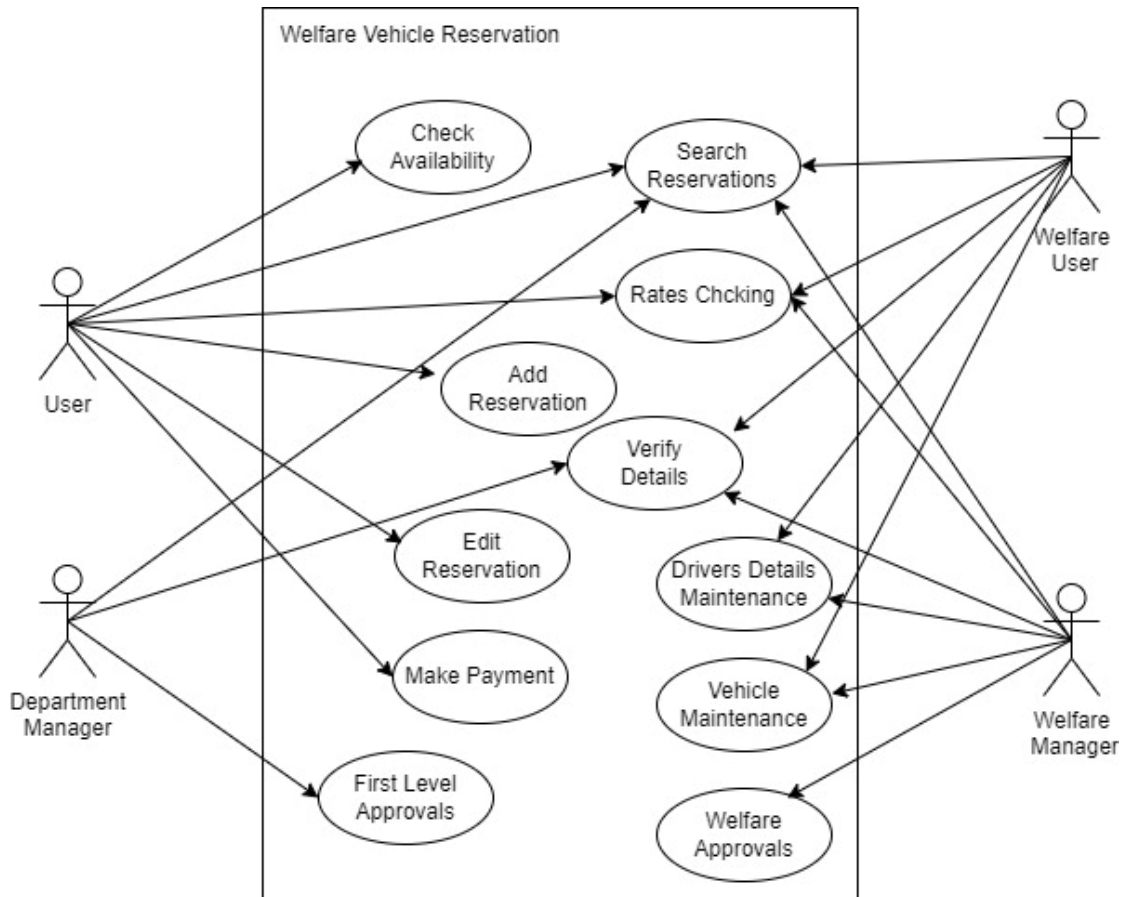


Figure 7- Use case narration for create new taxi request

3.3.2 User case narration

Use case narration for create new welfare vehicle reservation request

Use case name	Create new welfare vehicle reservation request	Use case Type Business Requirements: Submit new welfare vehicle reservation request to welfare division
Use case id	03	
Priority	High	
Source	Web Page – welfare Request DB Table – Trn_welfare_Request	
Primary Business Actor	Staff Member	
Other Participating Actors	Department Manager of the requester, Welfare User, Welfare Manager	
Other Interested Stakeholders	Administration User, Developer (IT users as supper user)	
Description	User submit a new request to the welfare division.	
Preconditions	• User has the required necessary privileges to submit a welfare vehicle request.(Preconditions will be define in database table and those are validate when initiate this) • User have to check the availability of the desired date or time.	
Trigger	User selects “Welfare Vehicle Request” function from the menu items.	
Typical course of events	1) Enter the required details of the request. 2) User have to select the Assistant General Manager and Deputy General Manager who will approve the request before submitting to welfare division.	
Alternative course	1) Application will display an error message if user have not entered any value for required field. 2) Application will display a success message after submitting new request.	
Post conditions	Request will be displayed for the selected Assistant General Manager and Deputy General Manager for their approval.	

Table 4 - Use case narration for create new welfare vehicle request

3.3.3 Sequence Diagrams

- Sequence diagram for create new welfare vehicle request

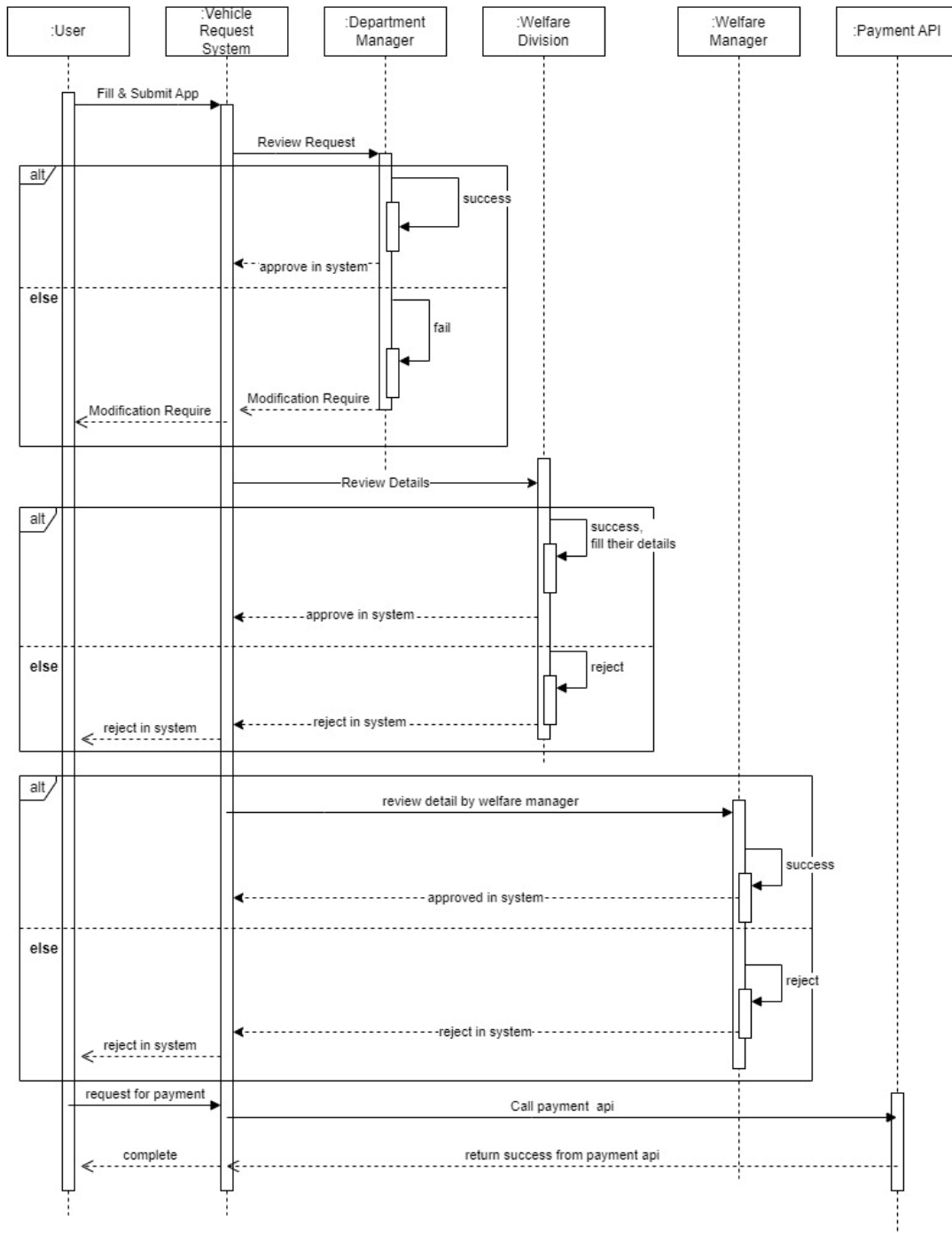


Figure 8- Sequence diagram for create new welfare vehicle request

3.3.4 Class Diagram

- Class diagram for the developed web application;

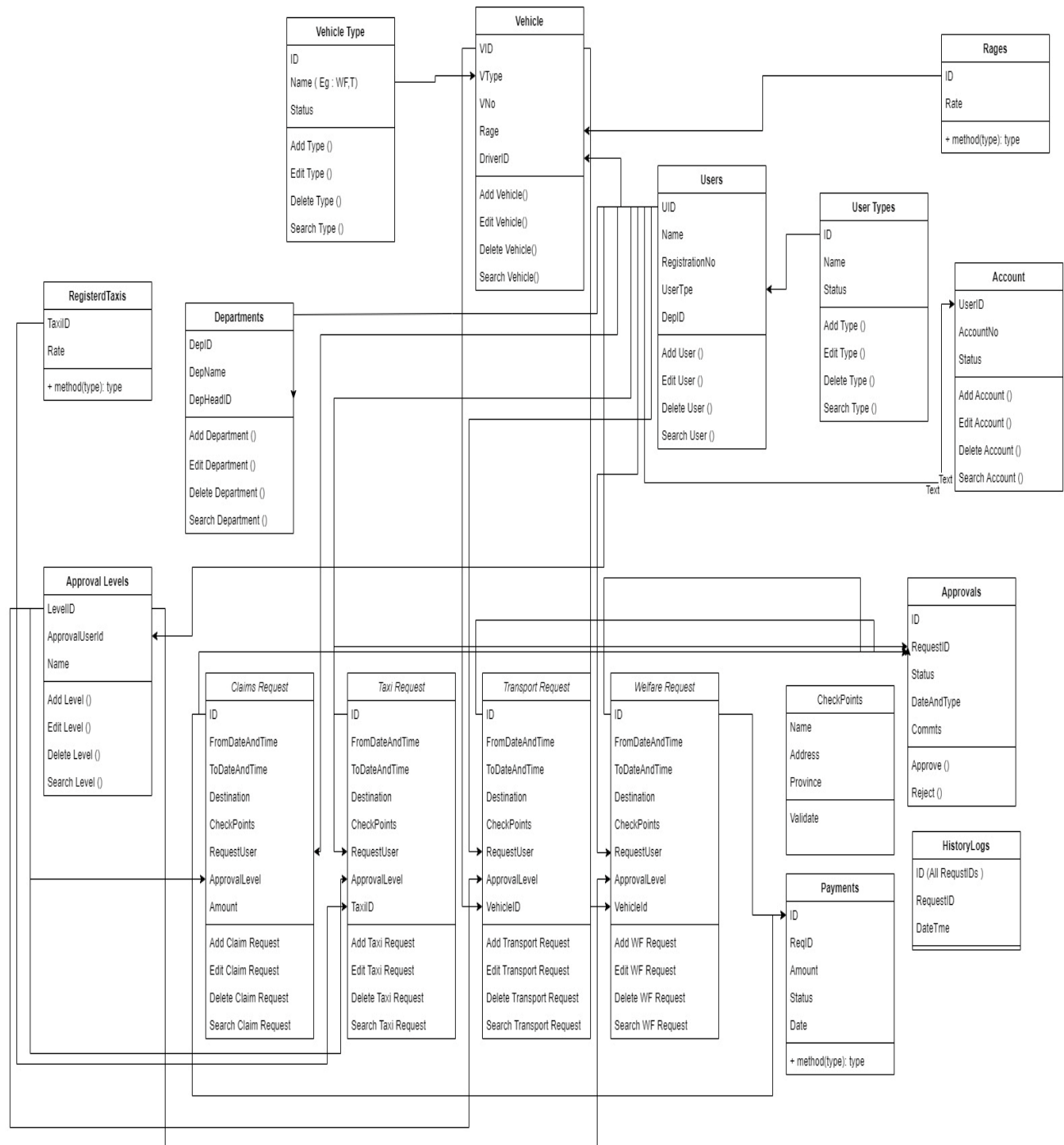


Figure 9-Class diagram of the web application

Other UML diagrams for the system are provided in Appendix B for reference.

Chapter 4 – Implementation Details

This application comprises three main sections: front-end, back-end, and database. It utilizes React for front-end GUI development, Spring Boot REST APIs for the back-end, and Microsoft SQL Server as the database server. Detailed implementations for each section are outlined below within their respective sections

4.1 GUI Features Implementations

The project utilizes a pre-defined React template to create a well-organized, user-friendly, and visually appealing graphical user interface (GUI). This template provides a foundational structure upon which additional features are built. As React is a component-based language, the initial steps involve implementing essential components. These components include, for example, lists, grids, text views, menus, headers, and footer sections.

4.1.1 Header Details

This section primarily displays logos, the system name, and login user details. Most of these details are obtained from the backend APIs, making a majority of the data dynamic.

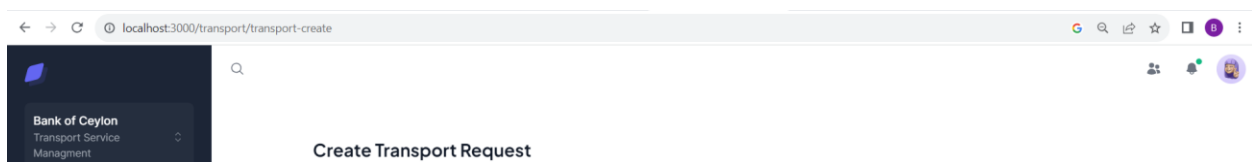


Figure 10 - Header Details Section

4.1.2 Dynamic menu items

After logging into the system, this menu adapts based on the access privileges of the logged-in user. It receives a JSON request from the backend and displays the menus accordingly. Therefore, the items in the menu will vary depending on the logged-in user's permissions.

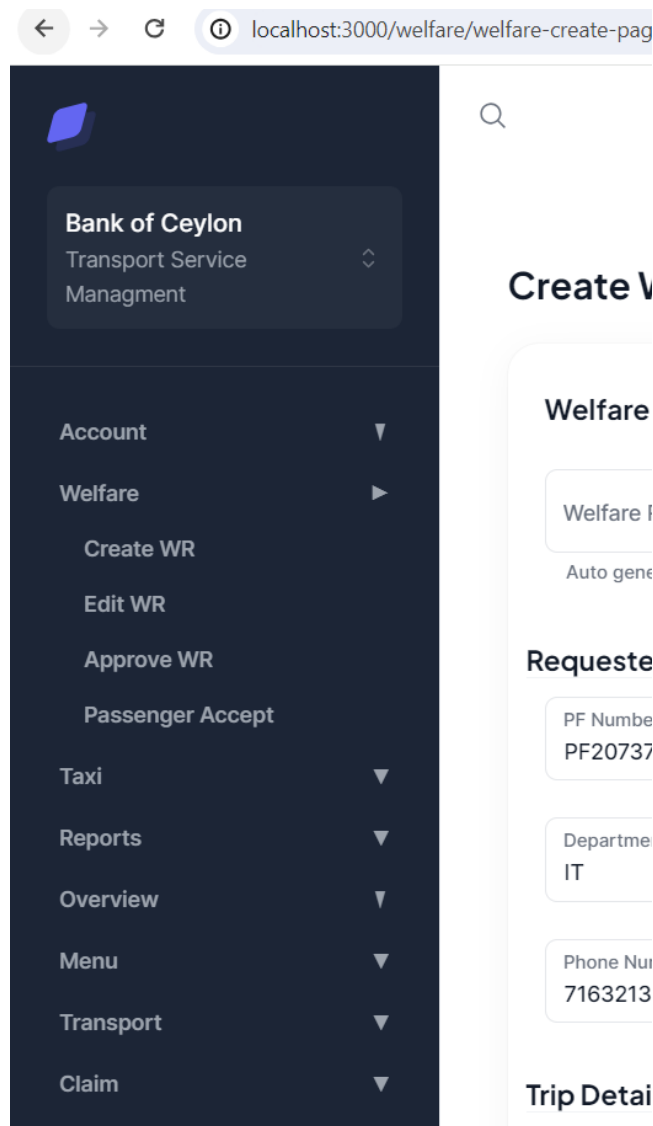


Figure 11 - Dynamic Menu Item

4.1.3 Footer section

This section can be use to show the details such as copy right details.

4.1.4 Body section

This is the primary section, serving as a component within the application. Users input relevant details here. Depending on the selected menu, this section loads as a component with various layouts. It also encompasses multiple components such as text boxes, date pickers, and grid views

Create Welfare Request

Welfare Request

Welfare Request Reference *

Auto generate

Requester Details

PF Number *
PF207375

name *
Saminda Jayakody

Department *
IT

Email Address *
saminda@boc.lk

Phone Number
716321349

Extension Number
16558

Trip Details

Figure 12 - Body Section

4.1.5 Components

Since React is a component-based language, we can define each part of the page as a component. This allows us to reuse these components throughout the application, ultimately saving a significant amount of time. Additionally, this approach enhances the overall appeal of the application.

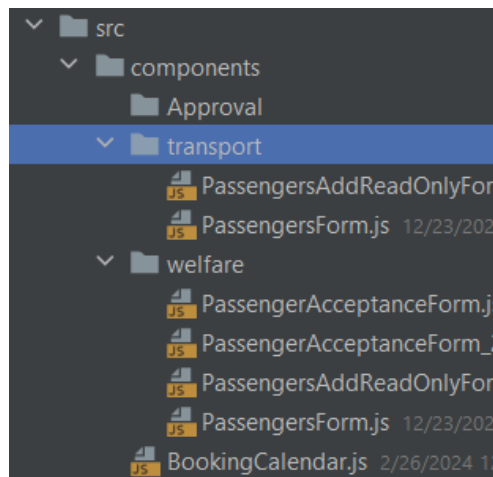


Figure 13 - Components

4.1.6 Error Messages

Every error message displayed in the application includes a unique error id for the easy reference of the users. Sample of the error messages displayed in the application is shown below.

Few error and validations messages are show below

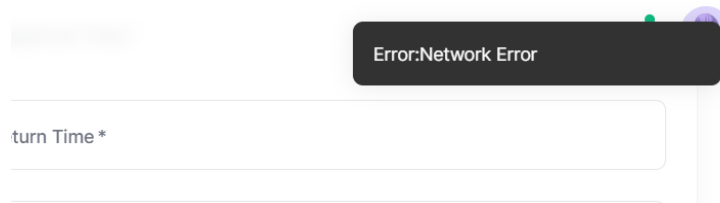


Figure 14 - Error Message

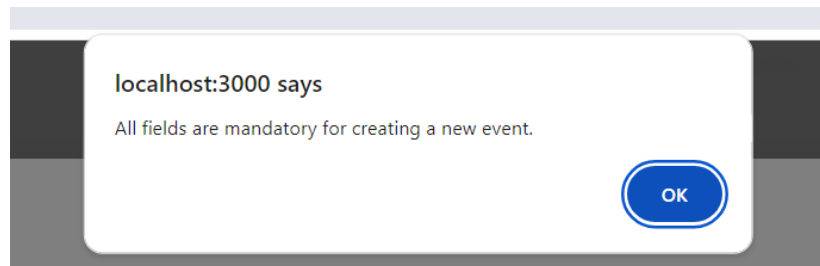


Figure 15 - Validation Message

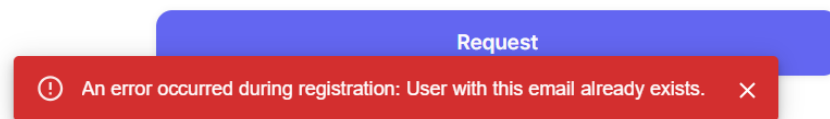


Figure 16- Validation Message

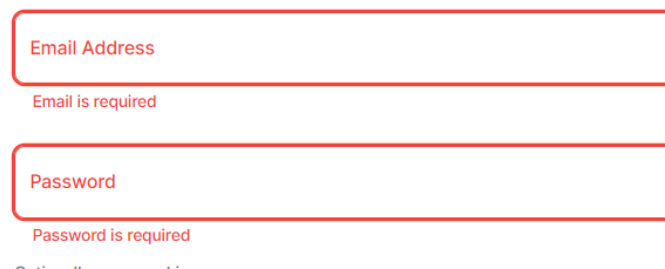


Figure 17 - Validation Message



404: The page you are looking for isn't here

Figure 18 - General Message

4.1.7 Interaction with back end

The front-end of the application consistently communicates with the back-end using JSON requests. This means that data and information flow seamlessly between the user interface and the server, allowing for efficient and effective data exchange and interactions.

Post request for save data

```
const handleSubmit = useCallback(
  async (event) => {
    event.preventDefault();
    try {
      // Send a POST request to the server
      const response = await Axios.post('http://localhost:8081/api_new/transportRequest', values);

      // Check if the request was successful (status code 200)
      if (response.status === 200) {
        // Data was successfully saved
        console.log('Data saved successfully:', response.data);
      } else {
        // Handle other status codes if needed
        console.error('Failed to save data:', response.status);
      }
    } catch (error) {
      // Handle errors here
      console.error('Error:', error);
    }
  },
  ,
```

Figure 19 - Sample post request for save data

Get request to retrieve data

```

useEffect(() => {
  // Function to fetch data from the API
  const fetchData = async () => {
    try {
      // Replace 'apiEndpoint' with the actual API endpoint URL
      const response = await fetch('http://localhost:8081/api_new/customers');
      if (!response.ok) {
        throw new Error('Failed to fetch data from the API.');
```

Figure 20 - Sample get request for retrieve data

4.2 API Modules implementations

The application's backend consists of several APIs, each dedicated to different core modules .Spring boot rest APIs are used to develop this modules. Consequently, we have the flexibility to host these APIs on the same server or distribute them across multiple servers, depending on the institution's network and server architecture. This approach offers several advantages, making modularization a strategic choice.

Scalability, Maintainability, Reusability, Parallel Development, Testing, Security, Flexibility, Collaboration, Troubleshooting, Performance are consider as few advantages of this modularity.

Below is the organize structure of the spring boot rest API

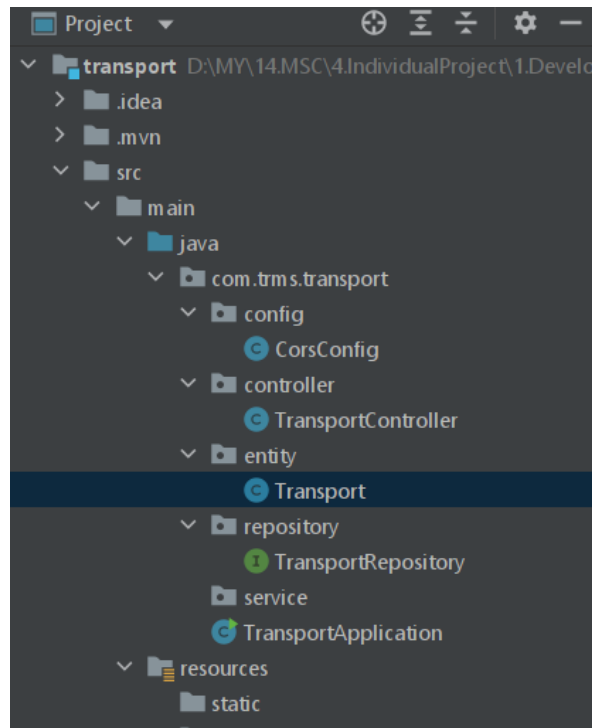


Figure 21 - Rest API folder structure

Controller – this contain the GET and POST methods

Entity – This have the entity classes witch match with the database tables

Repository – This is use for Java Persistence API. It is a Java specification for accessing, persisting, and managing data between Java objects and relational databases.

Service- Business logic can be implement here

Sample POST and GET Request are show below

http://localhost:8081/api_new/customers

GET

http://localhost:8081/api_new/customers

ParamsAuthorizationHeaders (6)BodyPre-request ScriptTestsSettings

Query Params

KEY	VALUE
-----	-------

BodyCookiesHeaders (8)Test Results

PrettyRawPreviewVisualizeJSON

```
1  {
2    "id": 1,
3    "name": "saminda",
4    "email": "saminda@boc.lk",
5    "destination": "Kandy",
6    "phone": 711234567,
7    "created_at": "2023-05-01"
8  },
9  {
10   "id": 2,
11   "name": "thilina",
12   "email": "thilin@boc",
13   "destination": "jaffna",
14   "phone": 1236533,
15   "created_at": "2023-09-04"
16 },
17 {
18   "id": 3,
```

Figure 22 - Sample Get Request

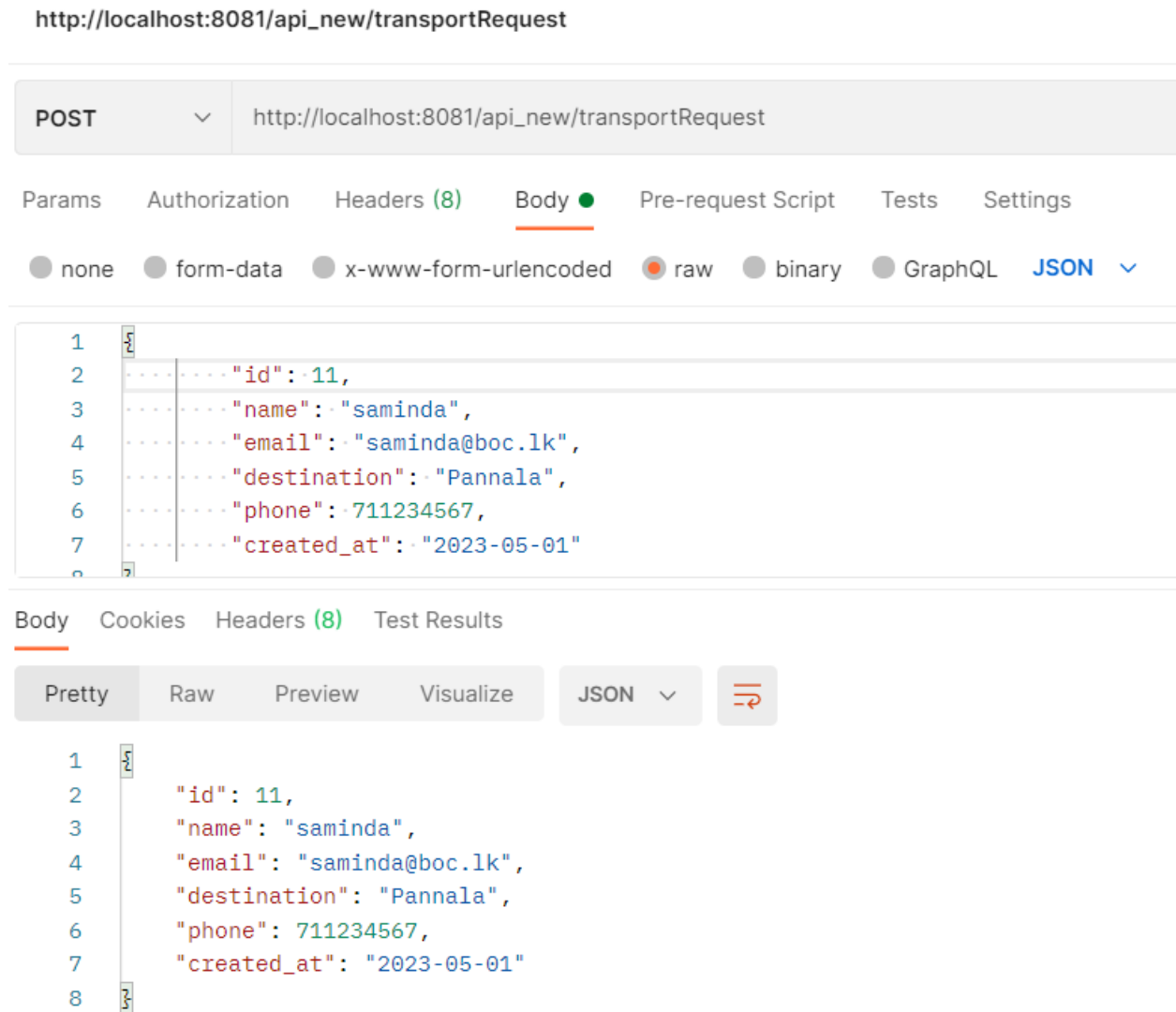


Figure 23 - Sample POST request

4.2.1 Security and access module

Methods and business logic related to security and user access are implement in this module as separate API

4.2.2 Master data modules

Methods and business logic related to master modules like maintained vehicles, rates are implement in this module as separate API

4.2.3 Transaction Request modules

Methods and business logic related to transaction request are implement in this module as separate API

4.2.4 Welfare vehicle request module

Methods and business logic related to welfare vehicle request are implement in this module as separate API

4.2.5 Taxi request module

Methods and business logic related to taxi request are implement in this module as separate API

4.2.6 Vehicle claims request module

Methods and business logic related to vehicle claims request are implement in this module as separate API

4.2.7 Payment modules

If the institution provides distinct, secure APIs for processing payments. These APIs can be integrated into our system using this module. However, it's important to note that we cannot use the actual production APIs during the development phase. Therefore, we must create sample payment APIs specifically for development purposes.

4.2.8 Interaction with database

This application employs the Java Persistence API (JPA) for seamless interaction with Microsoft SQL Server. JPA simplifies development, reduces code complexity, and effectively manages connection pools

4.3 Database implementation

The date dictionary is currently in the finalization stage, and the corresponding database and tables have been created in Microsoft SQL Database

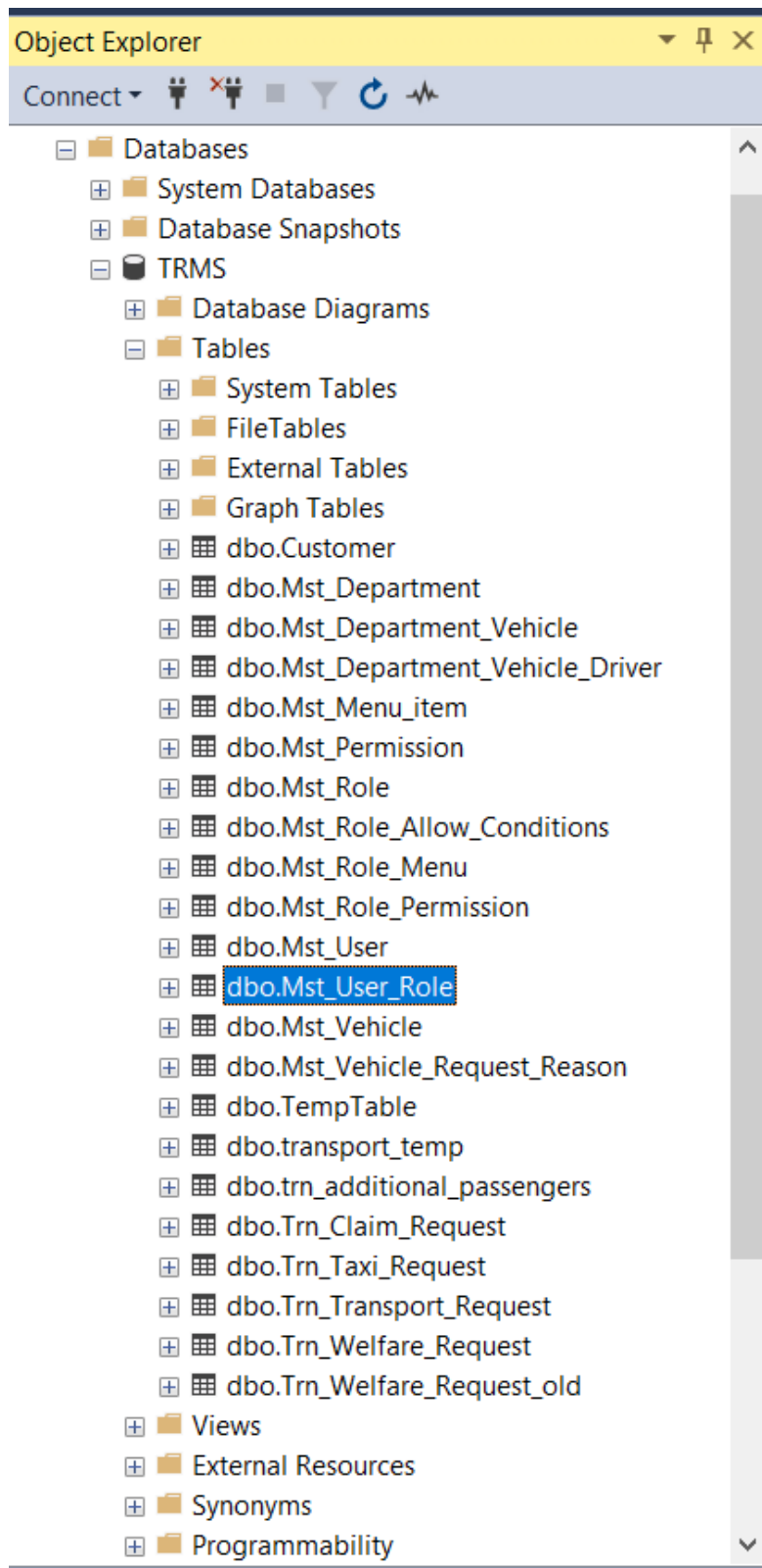


Figure 24 - Database structure

Chapter 5 – Testing and Evaluation

5.1 Introduction

Software testing is a careful process crucial for ensuring the quality and functionality of a developed application align with customer requirements. It serves to validate the application, uncovering potential issues that may impact performance and overall quality. This chapter outlines a detailed testing plan for the developed web application, carefully detailing the evaluation of the system. Through this evaluation, the aim is to confirm whether the project objectives were met satisfactorily by the development process. By employing various testing methodologies such as functional testing, non-functional testing, automated testing, and manual testing, efforts are made to identify and address any defects or problems in the software. Additionally, the significance of regression testing is emphasized to ensure previously fixed issues do not resurface. The goal is to deliver a high-quality application that meets user expectations and performs reliably in real-world scenarios.

5.2 System Testing

A thorough testing plan is crucial to ensure the software application meets high standards and functions as intended. Our method involves carefully testing each component of the system, including multiple APIs, front-end components (React), pages, and the database, and combining different testing techniques for a comprehensive evaluation.

Unit Testing

During development, individual parts of the system, including APIs, front-end components, and database operations, are tested separately. This allows for the examination of inputs and outputs to confirm their correctness. Attention is paid to each component to detect and resolve any issues early in the process.

Integration Testing

In the testing phase, various parts of the system, such as APIs, front-end components, and database interactions, are combined and tested together. This process assesses how well

they interact and identifies any potential connection issues. The objective is to ensure smooth integration and proper functioning of all components.

Testing Approach

A systematic approach is followed, starting with testing individual components, including APIs, front-end components, and database operations, and progressing to testing their integration. Once individual components are tested and issues addressed, integration testing begins. This process continues incrementally until all components are thoroughly tested together.

Implementation Strategy

Testing is conducted concurrently with development to optimize efficiency. For instance, APIs are tested individually, followed by testing of front-end components and database operations once APIs are finalized. As issues are resolved, testing progresses to pages containing multiple components. Modules with multiple pages are tested comprehensively to ensure overall system functionality.

5.2.1 Test Cases

Test cases used for testing the developed Transport Management System are shown below.

- Test Cases for Login

ID	Activity	Test Case Steps	Expected Result
1.1	Login with valid user account	URL : http://localhost:3000/auth/login	Should be able to view the login page
		Enter the username and password	Should be able to enter both fields
		Click on Continue button	User login should be successful
1.2	Login with valid username and empty password	URL: http://localhost:3000/auth/login	Should be able to view the login page
		Enter the username only	Should be able to enter fields
		Click on Login button	Error Message should be displayed.
1.3	Login with password and empty username	URL: http://localhost:3000/auth/login	Should be able to view the login page
		Enter the password only	Should be able to enter fields
		Click on Login button	Error Message should be displayed.
1.4	Login with empty username and empty password	URL: http://localhost:3000/auth/login	Should be able to view the login page
		Click on Login button	Error Message should be displayed.

Table 5 - Test cases for login

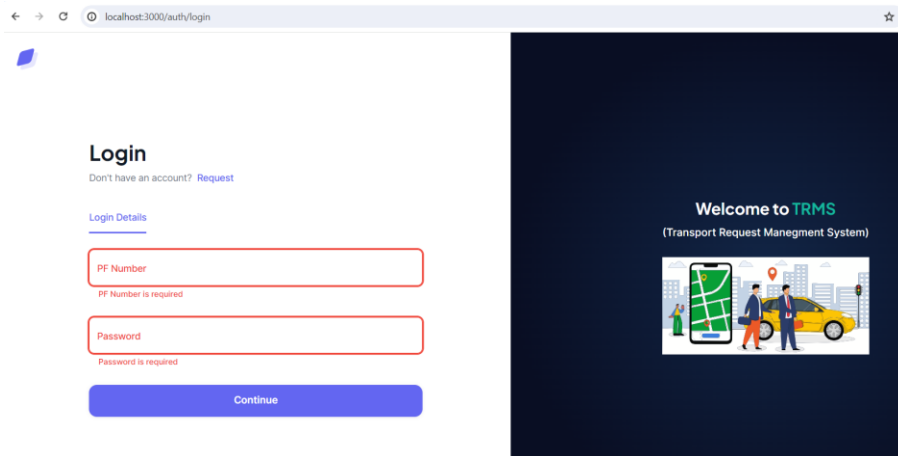


Figure 25- Login page validation

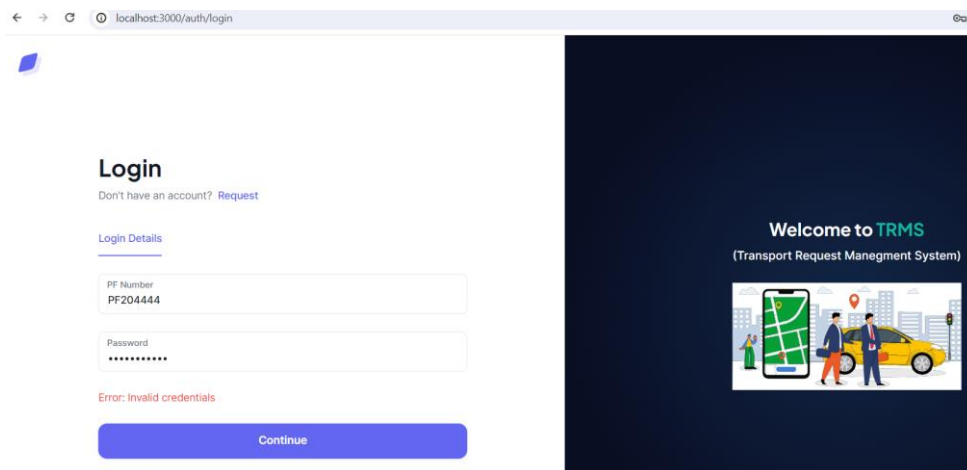


Figure 26-Validation Message

- Test Cases for User Registration

Users can request access to the application by completing the registration form. Once the form is successfully submitted, an authorized person will review the details and approve the request. Upon approval, users will be able to log into the system. (This is pre login feature)

ID	Activity	Test Case Steps	Expected Result
2.1	Request for new user	Click request button on pre login page	Registration Tab will focused
2.2	Check Validations	PF Number Field • Can't be empty • Already registered PF should not allow • Max length 8 Select Department • Must Select First Name Field • Can't be empty Last Name Field • Can't be empty Email Field • Can't be empty • Valid email number Account Number Field • Can't be empty • Integer fields • Max length 10 Mobile Number Field • Can't be empty • Characters not allowed • Integer fields • Max length 10 Extension Number Field • Can't be empty • Characters not allowed • Integer fields	Should display an error message if validation fails.

		Max length 10	
		Password Field	
		Can't be empty	
		Password Field	
		Can't be empty	
2.3	Request registration-Success	Enter valid values for all the fields Click on create user button	Request should be successfully submitted.
2.4	Request registration-Fail	Enter valid values for all the fields avoiding any mandatory field Click on create user button	Error Message should be displayed

Table 6 - Test cases for user registration

← → ↻ localhost:3000/auth/register

Request for register

Already have an account? [Log in](#)

PF Number Department *

First Name Last Name

Email Address Account No

Mobile Extension

Password Password Verify

Request

Welcome to TRMS
(Transport Request Manegment System)

Figure 27-User registration request form

localhost:3000/auth/register

Request for register

Already have an account? [Log in](#)

PF Number Department *

PF Number is required

First Name Last Name

First name is required Last name is required

Email Address Account No

Email is required Account No is required

Mobile Extension

Mobile is required Extension is required

Password Password Verify

Password is required

[Request](#)

Welcome to **TRMS**
(Transport Request Manegment System)

Figure 28-User registration validation

Detail test plan is mentioned in the Appendix E with all the other test cases and test results.

Detail test plan is mentioned in the Appendix F with all the other test cases and test results.

5.2.2 Testing Status

Test ID	Description	Pass / Fail
1.1	Login with valid user account	Pass
1.2	Login with valid username and empty password	Pass
1.3	Login with empty username and password	Pass
1.4	Login with valid empty username and empty password	Pass
2.1	Create new user screen	Pass
2.2	Check Validations	Pass
2.3	Create New User Profile– Success	Pass
2.4	Create New User Profile– Failed	Pass

Table 7 - Status of test cases

Detail test plan is mentioned in the Appendix F with all the other test cases and test results.

5.3 System Evaluation

Even though there are many ways to evaluate software, I decided to use a question-based method to look at the Staff Transport Request Management System. This method checks how the system looks, how easy it is to use, how helpful it is, how well it works, and how safe it is. By asking specific questions, we can understand how the system performs, including its appearance, usability, and overall experience.

The development of the system was carried out on office laptops and integrated with the head office network. Basic testing procedures were conducted within the development environment. Once the application was operational, users gained access to the development environment via a designated URL for testing purposes. Selected users from both IT and business divisions, including Welfare and Transport, were granted access to the system for a one two week period to familiarize themselves with its functionalities. Following this period, an evaluation form using google form was distributed to 25 staff members for feedback. Users were selected based on the criteria outlined in the following tables

Department	Number of users	Playing Roles
Transport	5	• Verify Users • Approval Users • Drivers
Welfare	5	• Verify Users • Approval Users • Drivers
IT	3	• Super Users • Requestors
Different Department users at Head Office	10	• Requestors, • Unit Administrators • Passenger
Security	2	• Gate pass Approvals

Table 8 - Feedback user selection

The questionnaire was structured to include multiple questions regarding the developed web application, prompting users to provide ratings for each aspect. By offering choices ranging from "Strongly Disagree" to "Strongly Agree," the collected data will facilitate easy analysis and evaluation of user feedback. This approach aims to comprehensively assess the system's performance and user satisfaction levels. A Google Form was prepared with questions covering the categories of Appearance, User-friendliness and Usefulness, Functionality, Security, and Data Safety. Some users required technical assistance when completing the evaluation, as they were not familiar with concepts such as security, performance, data safety, etc.

No	Criteria	Very Dissatisfied (1)	Dissatisfied (2)	Neutral (3)	Satisfied (4)	Very Satisfied (5)
	Appearance					
1	How visually appealing do you find the system's design?					
2	How easy was it to navigate through the system?					
3	How clear were the instructions and prompts provided by the system?					
4	How helpful were the error messages in guiding you when something went wrong?					
5	how much did you enjoy using the system?					
	User-friendly and usefulness					
6	How satisfied were you with the system's institution hierarchy?					
7	How would you rate the speed and responsiveness of the system while performing tasks?					
8	Did using the system make tasks quicker and easier compared to doing them manually?					
9	How helpful were the real-time reports provided by the system in making informed decisions?					
10	Did the system provide you with enough information to stay updated on the progress of your request?					
	Functionality					
11	How easy was it to book transport for different needs?					
12	Did the system cover all your transport needs effectively (Within the scope)?					
13	Could you rely on the system for all your transport bookings?					
14	Did the system's reports help in making transport-related decisions?					
15	how satisfied are you with the functionality of the system for managing staff transport?					
	Security and Data safety					
16	How confident are you in the system's security features?					
17	How effective are the system's controls in preventing errors?					
18	Were you satisfied with who can see the information in the system?					
19	How well did the system share request details with stakeholders while keeping data safe?					
20	How secure do you think the system's data protection measures are?					

Table 9 - Evaluation Questions

5.4 Analysis of the Results

Department	Users	Apperance					Userfriendly and usefulness					Functionality					Security and Data safety				
		Question 01	Question 02	Question 03	Question 04	Question 05	Question 06	Question 07	Question 08	Question 09	Question 10	Question 11	Question 12	Question 13	Question 14	Question 15	Question 16	Question 17	Question 18	Question 19	Question 20
IT	User 01	5	5	5	4	5	5	5	5	5	5	5	5	4	5	5	5	4	5	5	5
IT	User 02	5	5	5	5	5	4	5	5	5	5	5	4	5	5	5	4	5	4	5	4
IT	User 03	5	5	4	4	5	5	5	5	5	4	4	5	5	5	5	5	5	5	5	5
Transport	User 04	5	5	5	4	5	5	5	5	5	5	5	5	4	5	4	5	4	5	4	5
Transport	User 05	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	4	5	4	5	5
Transport	User 06	5	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	4	5	4	5
Transport	User 07	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5
Transport	User 08	5	4	5	5	5	4	5	5	5	5	5	5	4	5	5	5	5	5	4	4
Welfare	User 09	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	4	4	5
Welfare	User 10	5	4	4	5	5	5	4	5	5	5	4	4	5	5	5	4	4	5	5	5
Welfare	User 11	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	4	5	4	5
Welfare	User 12	5	5	5	4	5	5	5	5	5	5	5	5	4	5	5	4	5	5	5	4
Welfare	User 13	5	5	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
Security	User 14	5	5	4	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	4	5
Security	User 15	5	5	5	4	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5
Other Dep at HO	User 16	5	4	5	5	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	4
Other Dep at HO	User 17	5	5	5	4	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5
Other Dep at HO	User 18	5	4	5	4	5	5	5	5	5	5	5	5	4	5	5	5	4	5	5	5
Other Dep at HO	User 19	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	4	4	4	5	5
Other Dep at HO	User 20	5	5	4	4	5	5	5	5	5	5	4	5	4	5	5	5	5	5	5	5
Other Dep at HO	User 21	5	5	5	5	5	4	5	5	5	5	4	5	5	5	5	5	5	5	5	4
Other Dep at HO	User 22	5	5	4	4	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5	5
Other Dep at HO	User 23	5	5	5	4	4	4	5	5	5	5	5	5	4	5	5	5	5	5	4	5
Other Dep at HO	User 24	5	5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	4	5	5	5
Other Dep at HO	User 25	5	5	4	5	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5
Average Rating		5	4.8	4.72	4.56	4.92	4.76	4.92	5	4.92	4.96	4.8	4.76	4.64	4.92	4.88	4.76	4.64	4.8	4.72	4.8
Total Avereate For Section		4.8					4.912					4.8					4.744				

Table 10 - Evaluation Result

1. Overall rating

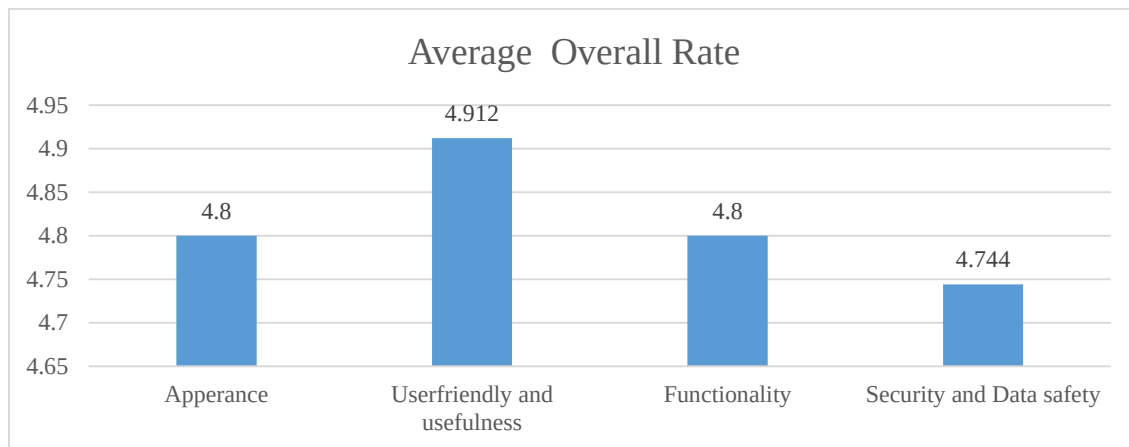


Figure 29 - Rating Summary for Overall Rates

The feedback indicates that users highly rate the overall user-friendliness and usefulness of the system, with users finding it easy to handle. However, there are suggestions for improvement in appearance, particularly regarding the login page's attractiveness. In terms of security, many users prefer the AD login due to the challenge of maintaining multiple passwords. Overall, functionality receives favorable ratings, but there is a request for additional transport-related features. This feedback provides valuable insights for further enhancements to the system.

2. Appearance

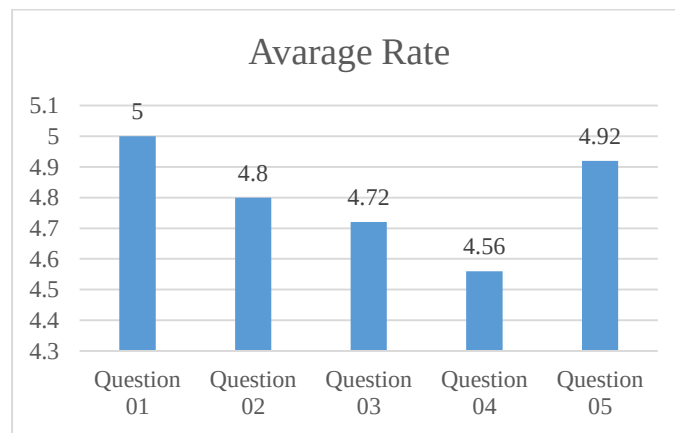


Figure 30 - Rating Summary for Appearance

The average user ratings suggest that the system's appearance is generally well-received. Users find the system's design visually appealing, and navigation through the system is rated positively. However, there is room for improvement in providing clearer instructions and error messages to users. Despite these areas for enhancement, users report a high level of enjoyment in using the system. These insights provide valuable guidance for refining the system's appearance and user experience.

3. User-friendly and usefulness

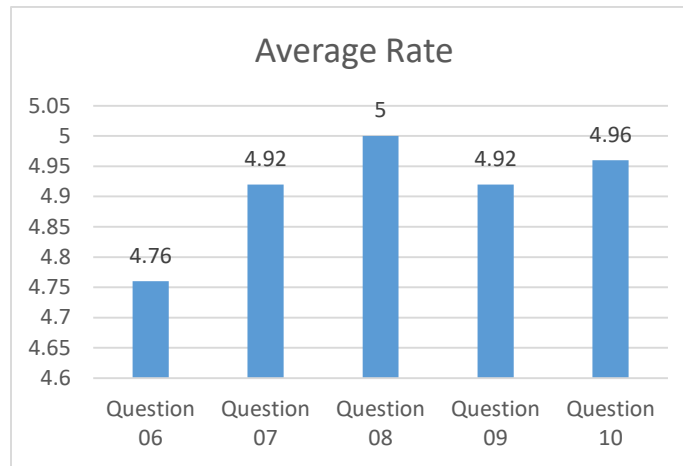


Figure 31 – Rating Summary for User Frondless

The data indicates that users highly rate the system's user-friendliness and usefulness. Users are satisfied with the system's organization hierarchy and find it quick and responsive when performing tasks. Additionally, the system significantly improves task efficiency compared to manual processes and provides helpful real-time reports for informed decision-making. Users also appreciate the system's ability to keep them updated on request progress. These insights highlight the system's effectiveness in enhancing user experience and supporting efficient workflow.

4. Functionality

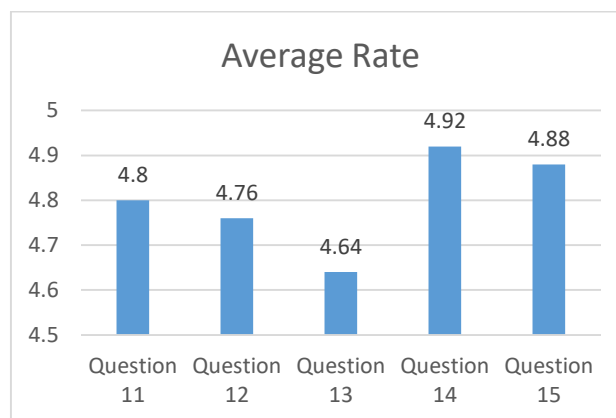


Figure 32- Rating Summary for Functionality

The functionality of the system for managing staff transport receives high ratings, indicating positive user experiences. Users find it relatively easy to book transport for various needs and express confidence in the system's ability to cover all transport requirements effectively within the defined scope. They also report a high level of reliance on the system for all transport bookings. Additionally, users appreciate how the system's reports assist them in making transport-related decisions, contributing to overall satisfaction with its functionality. These insights reflect the system's effectiveness in meeting user needs and enhancing the management of staff transport.

5. Security and Data safety

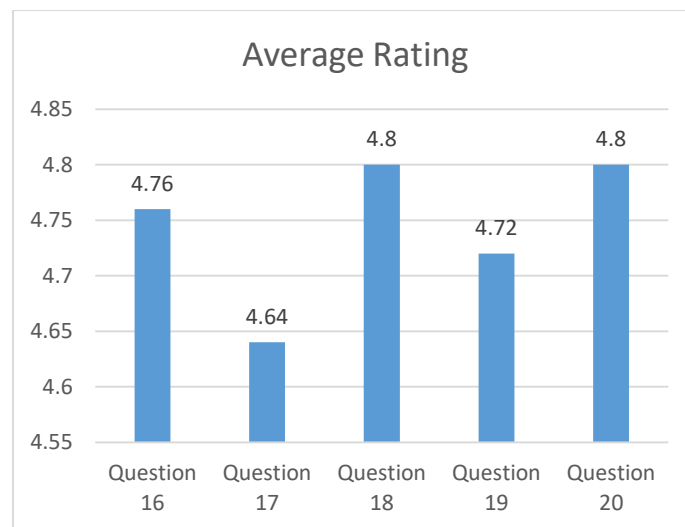


Figure 33- Rating Summary for Security And Data Safety

The security and data safety features of the system receive favorable ratings, with many users expressing confidence in its reliability. Users particularly appreciate the effectiveness of the system's controls in preventing errors and maintaining data security. Additionally, a majority of users prefer the AD login method, citing its convenience and ease of use. Despite this preference, users report satisfaction with the management of information visibility and the system's ability to share request details securely with stakeholders. Overall, users perceive the system's data protection measures as secure, indicating a high level of trust in its ability to safeguard sensitive information.

Chapter 6 – Conclusion

In conclusion, this thesis has addressed the challenges associated with staff transport management and has made significant progress in enhancing the efficiency and effectiveness of the existing process.

As mentioned in the earlier chapters, we identified various challenges in managing staff transport requests, such as booking difficulties, raffle draws for welfare vehicle bookings, lack of real-time information, excessive paperwork, delays in manual payments, travel planning issues, and security concerns. However, through the development and implementation of the Staff Transport Request Application, the system have effectively addressed these challenges.

The objectives outlined in the initial chapter have been successfully achieved. The application now features a user-friendly interface, simplifying booking and claims processes for various transport needs. It effectively meets the majority of the transport requirements outlined within the current phase's defined scope. Furthermore, the system currently incorporates role-based access control, ensuring that users have access to data and functions based on their assigned roles. Additionally, we plan to further enhance security by integrating AD in future updates, further safeguarding user data and functions based on their roles.

Looking ahead, there is significant potential for further improvements and enhancements to the application's functionality. These possibilities will be explored and discussed in the subsequent section.

When developing the transport request management system for institutions, we encountered several limitations. Firstly, compatibility issues were observed with certain web browsers, leading to challenges for users accessing the system. Additionally, technical constraints prevented the implementation of certain advanced features, such as real-time vehicle tracking. Furthermore, incomplete data availability hindered the system's ability to provide comprehensive trip insights and analytics. Concerns also arose regarding system security and scalability, particularly in handling a large volume of concurrent users. Despite these challenges, ongoing efforts are focused on enhancing user experience, addressing technical constraints, and fortifying system security to ensure smoother operations and improved performance in the future.

Overall, the Staff Transport Request Application has successfully addressed the initial challenges and has laid the foundation for continued improvements in staff transport management.

6.1 Future Work

Looking ahead, there is significant potential for further improvements and enhancements to the application's functionality. Plans for future development include integrating the application with HCM, Core Banking, and AD systems to streamline operations and improve data accuracy. Additionally, implementing audit logs will enhance data security and compliance measures. Adding management pages for all master details and introducing features such as AGM vehicle requests, branch transport, welfare, taxi, and claims facilities will further expand the application's capabilities. Moreover, integrating CTB buses season facility and enhancing reporting capabilities based on user requirements will provide valuable insights and improve decision-making processes. Implementing certification and security URL integration with HTTPS protocol will enhance data protection measures. Furthermore, incorporating notification features such as SMS and email alerts will improve communication and user engagement. Additionally, exploring the use of GPS mechanisms to monitor vehicles represents an advanced feature that will be considered once all basic and intermediate requirements are addressed. Finally, efforts will be made to reduce manual processes wherever possible to increase efficiency and productivity.

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Appendix A – Application forms of existing process

A.1 Application form for the welfare raffle draw

The Manager
Welfare Department
15th Floor.

Dear Sir,

REQUEST OF WELFARE VEHICLE

Please provide me a welfare vehicle for the following purpose. The required details are given below

Name: Mr./Ms.		PF No.		Grade	
Department / Branch :		Mobile No.		Ext. No.	
Date of request :		From:		To:	
Options Mark (A)	Friday, Saturday & Sunday	Saturday, Sunday & Monday		Tuesday, Wednesday & Thursday	
Purpose (X)	Pilgrimage	Dept. Annual Get-together		Picnic	
Mode of Vehicle (X)	26 Seater Dual A/C Bus			10 Seater Dual A/C Van	
Date Welfare Vehicles Previously Used :					
To ensure the validity of purpose, please mention if the purpose does not come under above categories (If husband and spouse are working in the Bank, both are entitle for one journey for six months)					

Date _____ Signature of Applicant _____ Manager / Head of Department _____

Figure 34 -Application form for the welfare raffle draw

A.2 Application form for welfare vehicle request – Page 1

APPLICATION FOR HIRE OF WELFARE BUS / VAN
(BOC Employee)

Name : Mr./Mrs./Miss:
PF No/Pension No: Office Dept: Designation:
Purpose : Picnic/Pilgrimage/ Annual Get together/Funeral/Wedding.....
Places of Travel To:
Distance (Kilometers to be covered):
Departure: From (Vehicle Starting Address):
Departure : Date : Time :
Return Trip : Date : Time : (Reaching time)
From.....Via.....
Account No. (S/A, C/A):
Place where the bus will be garaged at Nights (Nearest Branch): (1).....
(2)..... Number of persons traveling:
I, Mr./Mrs./Misshereby undertake full responsibility of the Bank bus/Van from the time the vehicle is hired to me up to the time of its return to the Bank.
I agree that the Bank will not be responsible for any delay or non-availability of vehicle due to breakdown, accident, damage, injury, etc. and take the vehicle at my own risk.
Further I do hereby authorize the Bank to recover any shortfall directly from my C/A or S/A and if any excess to be credited to the same account, after calculation of the actual payment made / to be made by me.
Date: Signature:
Contact No Ext No
Manager / Head of Dept. to countersign and Rubber Stamp
FOR OFFICE USE ONLY
Approx. Number of kilometers to be covered:
Total Amount paid: Rs.
Entered by : Checked by:
Date Date

Figure 35 -Application form for welfare vehicle request – Page 1

A.3 Application form for welfare vehicle request – Page 2

Bank of Ceylon,
Date:

Welfare Officer,
Bank of Ceylon
Head Office

I confirm that the under mention employees are on leave
(Full day / half day other) on:

	Name	PF No./ Pension No.	Branch/Dept;	Signature
1				
2				
3				
4				
5				

Manager / Head of Department /
Pensioners' Association's Secretary

(Rubber Stamp)

Figure 36 Application form for welfare vehicle request – Page 2

A.4 Application form for Travelling claims - Page 1

BANK OF CEYLON
BOC
Bankers to the Nation

ගමන් වියදම් ඉල්ලුම් TRAVELLING CLAIM

නිලධාරියාගේ නම
Name of Officer :

අ. අ. අංකය P.F. No.

ප්‍රවේශය :-
Grade : එකතුවූ දීමනාව Combined Allowance රු.

දෙපාර්තමේන්තුව/ගබඩාව :-
Department/ Branch : යැපීම් දීමනාව Subsistence Allowance රු.

ගමන යන ස්ථානය/ගබඩාව :-
Branch/ Station of travel :

රාජකාරි ගමන යන කාරණය සහ ඒ සඳහා
බලය දුන් අය හා එහි යෙදුම
Purpose of official travel and
Authority given with reference }

අ. ගමන් වියදම් (විස්තර පසු පිටුවේ) A. Transport Allowance (details overleaf)

ආ. යැපීම් හා නවාතැන් දීමනාව හෝ එකතුවූ දීමනාව B. Subsistence and lodging or Combined Allowance
ඉල්ලුම් කරන මුළු ගණන අයදුම් එවන්න ඉල්ලුම් Claim if any

Total Amount of claim in words :

රු.	Rs.	ය.පි.	Cts.

මුද්‍රා අත්තිකාරම Amount of Advance

මුද්‍රා යුතු ණය Amount of Balance due

එකතුව Total

රු.	Rs.	ය.පි.	Cts.

කාර්යාලීය ප්‍රයෝජනය සඳහා පමණික
For office use only.

ඉල්ලුම් අංකය Claim No.

පරීක්ෂා කොට අනුමත කළ
Examined and passed
අත්සන බී Signature "B"

ගෙවීම අනුමත කළ
Passed for payment
අත්සන ඒ Signature "A"

මෙහි ඇති ඉල්ලුම් මුදල මා විසින් සිංදුව වෙනුවෙන් කරන ලද ගමන් පිළිබඳ සිදුවීම්
ප්‍රකාශයක් බවත්, අයකොට ඇති ගණන් සිංදුවේ පටහැරවීම් අනුකූල බවත් සහතික කරමි.

I certify this claim contains a correct statement of the travelling Performed by me on bank
service and are in accordance with the Bank's Regulations.

දිනය Date

ඉල්ලුම් කළ අයගේ අත්සන
Signature of Claimant

දිනය Date

අනුමත කළ කළමනාකරු/දෙපාර්තමේන්තු ප්‍රධානියා
Approved by Manager/Head of Department

ගබඩාව/කාර්යාලය Branch/Office

ගෙවුම් අණවුම Payment Order to	සංකේත අංකය Code No.	දිනය Date
කර-වැය ගිණුම විශේෂ දීමනා "ඒ" Debit-charges Account Special Allowance "A" and pay		
ඉල්ලුම් කළ අයගේ නම Name of Claimant	අ. අංකය : P.F. No.	
ඉල්ලුම් කළ දිනය Date Claimed	මුද්‍රා අත්තිකාරම Advance Taken	
ඉල්ලුම් අංකය Claim No.	ඉතිරි මුදල Balance	
ගණන අයදුම් Amount in words	රු. Rs.	

ප්‍රමුඛ අනුමත කළ "B" Authorised Officer, "B"

ප්‍රමුඛ අනුමත කළ "A" Authorised Officer "A"

Form No. 10038 - Shan Printers

Figure 37 Application form for Travelling claims - Page 1

A.5 Application form for Travelling claims - Page 2

Details of Journey

සඳහා ලබන කොටසක් සම්පූර්ණ කර ගන්න
Received Cash

මගේ නම මුළුතැන්
Surname & Initials _____

දෙපාර්තමේන්තු
Dept. _____

අත්සන
Usual Signature _____

වෙනම වාර්තාවක් සම්පූර්ණ කර ගන්න
විස්තරයක් සහ බර පිරවිය යුතුයි
Registered number make and weight of Motor Car should be stated if journey is undertaken by motor car registered under the name of the employee.

අධිකාරී විසින් පිරවීමට තෝරා දෙනු ලබන ඉල්ලුම් සහ අවධානය යොමුවිය යුතුයි.
Receipts in support of expenses should be submitted with the claim wherever necessary.

Allowance Claimed *Meal ☐ *Subsistence ☐ *Combined ☐

දිනය Date	දින Day	මාර්ගගත Time of Road Departure	මාර්ගගත Arrival	මාර්ගගත Starting Place	මාර්ගගත Destination	මාර්ගගත Mode Travelled & Class if any	මාර්ගගත Fare / Cost	මාර්ගගත No. of Km Travelled	* අවසරය Allowance
Notes	Rs.	Cts.							
Rs. 5000									
Rs. 2000									
Rs. 1000									
Rs. 500									
Rs. 100									
Rs. 50									
Rs. 20									
Rs. 10									
Coins									
Total									

විස්තරය සඳහා
Explanatory Remarks :

එකතුව
Total _____

Signature of Claimant

BOCSUPP/S 211224

Figure 38-Application form for Travelling claims - Page 2

A.6 Application form for Taxi quota Request

Serial No	Contact No

NAMDO VEHICLE REQUISITION FORM

1. Name & Designation of the Officer Requesting Namdo Transport Voucher :

2. Destination & Route

3. Date & Time

4. Purpose

5. Voucher No

6. Number of vouchers required : One way / Return
7. Reason for requesting

8. Name & Signature of the Officer Authorizing the Namdo Transport Voucher :
 Name : _____ Signature : _____

Approved

 Assistant Director - IT

Figure 39-Application form for Taxi quota Request

A.7 Application form for the transport vehicle request Part A

 BANK OF CEYLON Bankers to the Nation		VEHICLE REQUISITION		Date _____	
Serial No. 219285				FOR USE OF TRANSPORT DEPT	
Branch / Dept. _____		Code. _____		TIME REQUEST RECEIVED	
Name, Grade of Officer using & responsible for vehicle _____		No. of Persons Travelling _____		Vehicle No _____	
Starting From _____				Driver _____	
Destination & Route _____				Transport Officer's Signature & Date _____	
Starting time & date : _____				FOR USE OF SECURITY DEPT	
Schedule time & date of return : _____					
Purpose _____				Out Date _____ Time _____	
		Officer's Signature _____		JSO's Signature _____	
Approved / Recommended by _____		Approved by _____		Out Date _____ Time _____	
AGM () _____		DGM DATE _____		JSO's Signature _____	

Figure 40-Application form for the transport vehicle request Part A

A.7 Application form for the transport vehicle request Part B

[illegible]

Figure 41- Application form for the transport vehicle request Part B

Appendix B – Review of Similar Systems

B.1 Planyo Vehicle Reservation System

The screenshot displays the Planyo Vehicle Reservation System interface. At the top, there is a navigation bar with the Planyo logo, links for PRICING, INTEGRATIONS, and CONTACT, and user options for MY ACCOUNT, SIGN OUT, and ENGLISH. A search bar is also present. The main header reads "Car Rental Planyo DEMO - Make reservation" with buttons for "Reservation search" and "Make reservation".

On the left, a sidebar menu lists various options: Dashboard, Reservations, Schedule, Availability, Customer list, Subscription, Quick Setup, Site settings, Cars, Reports, Integrate with my website, Scan QR Code, Message Inbox, and Help.

The central area features a calendar for February and March 2023. Below the calendar, a table shows the availability status for different vehicle types: Economic, Family, Motorbike, Sport, SUV, and Van/Camper. The table uses color-coded cells to indicate availability: green for Available, yellow for Partly available, red for Reserved, and grey for Unavailable. A legend at the bottom of the table explains these colors.

Below the calendar, the "Reservation details" section includes a dropdown menu for "Car*" and a "Make reservation" button. A note indicates that fields marked with an asterisk are required.

Figure 42-Planyo Vehicle Reservation System

The screenshot displays the Planyo Vehicle Reservation System interface. On the left, a "Find your car" form allows users to search for vehicles by specifying pick-up and return dates, price per day, and pick-up/return locations. A "SEARCH" button is provided at the bottom of the form.

The main area features a large banner with the text "Planyo booking system for CAR, MOTORBIKE, VAN, CAMPER rentals." and a subtext stating "This is a Planyo demo site, all vehicles are fictional, feel free to test the reservation system." Below the banner, there are three buttons: "CARS", "WHY PLANYO", and "GET STARTED".

Below the banner, there are three vehicle listings:

- Economic**: A small white car. Price: From CHF 30.00/day. Features: Petrol, Luggage: 3, Seats: 4.
- Family**: A white minivan. Price: From CHF 35.00/day. Features: Luggage: 8, Seats: 7, Gear: Automatic.
- Motorbike**: A dirt bike. Price: From CHF 30.00/day. Features: Licence cat.: A, Category: Enduro.

Figure 43-Planyo Vehicle Reservation System-2

B.2 HQ Retal

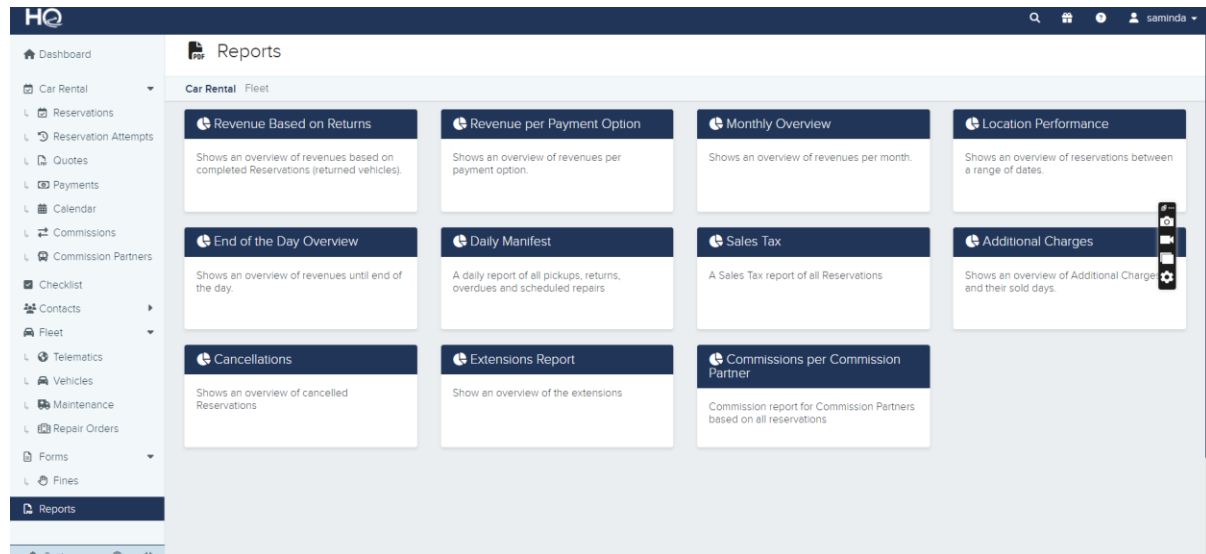


Figure 44-HQ Retal

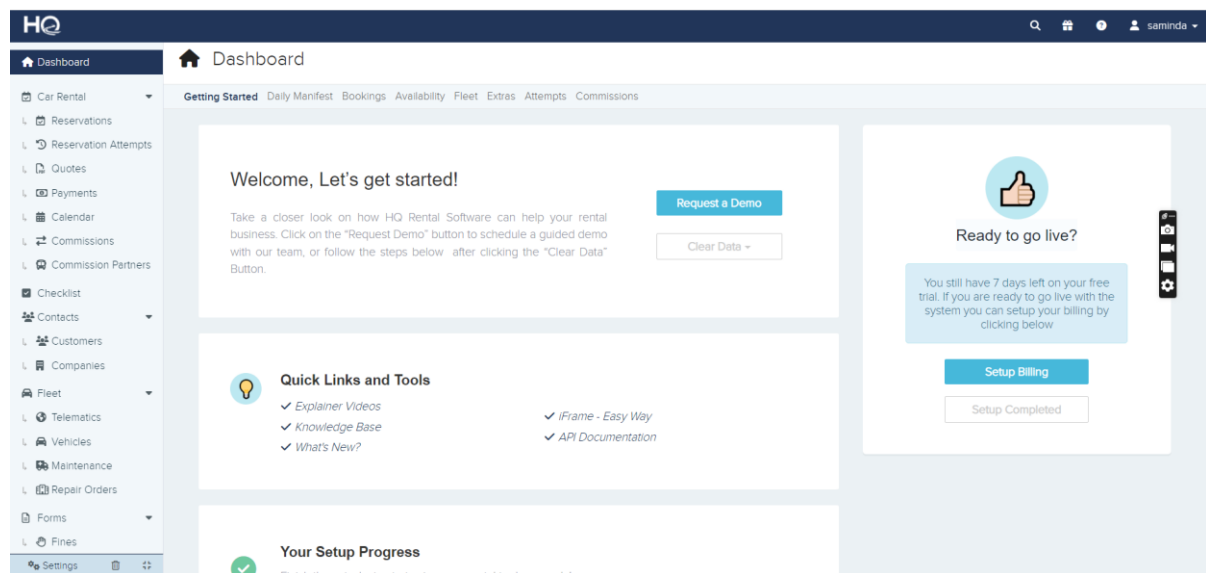


Figure 45-HQ Retal

B.3 ScheduleBull

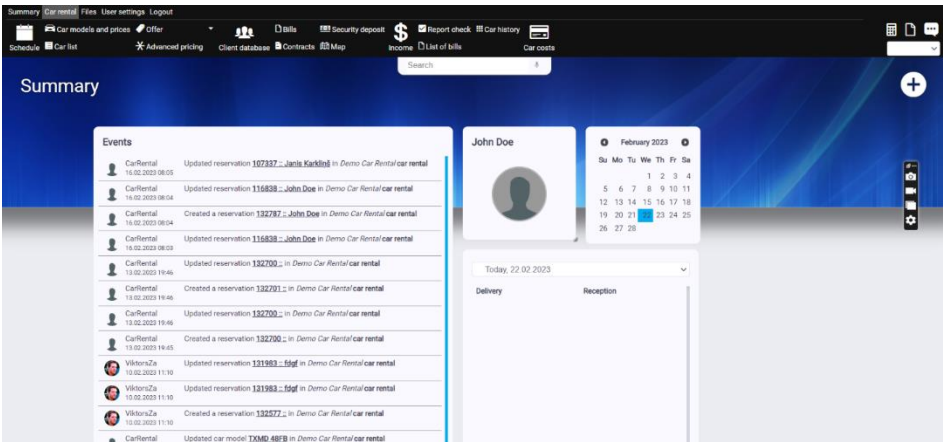


Figure 46-ScheduleBull

Appendix C – UML Diagrams

C.1 Use case Diagrams

Module wise use case diagrams for the five major modules in developed system.

- Use case diagram for transport vehicle reservation

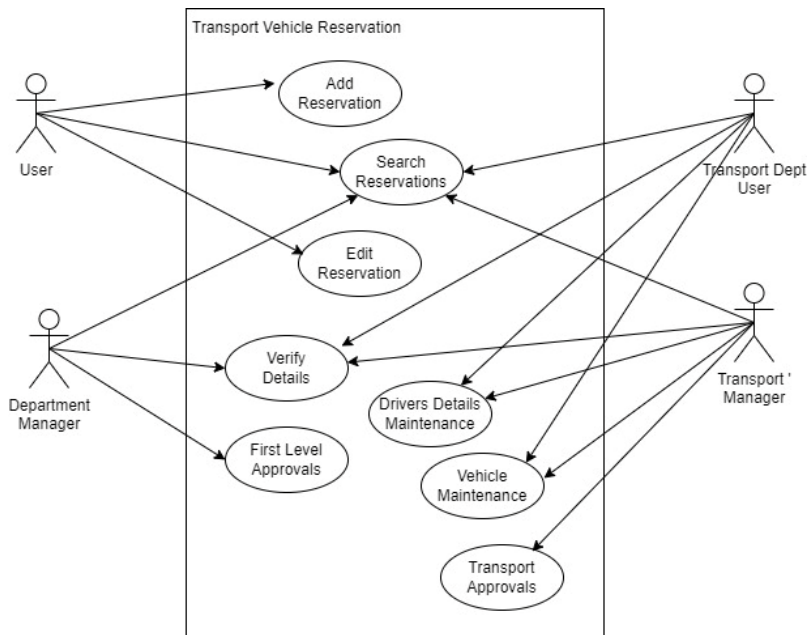


Figure 47- Use case diagram for transport vehicle reservation

- Use case diagram for taxi request from departmet quota

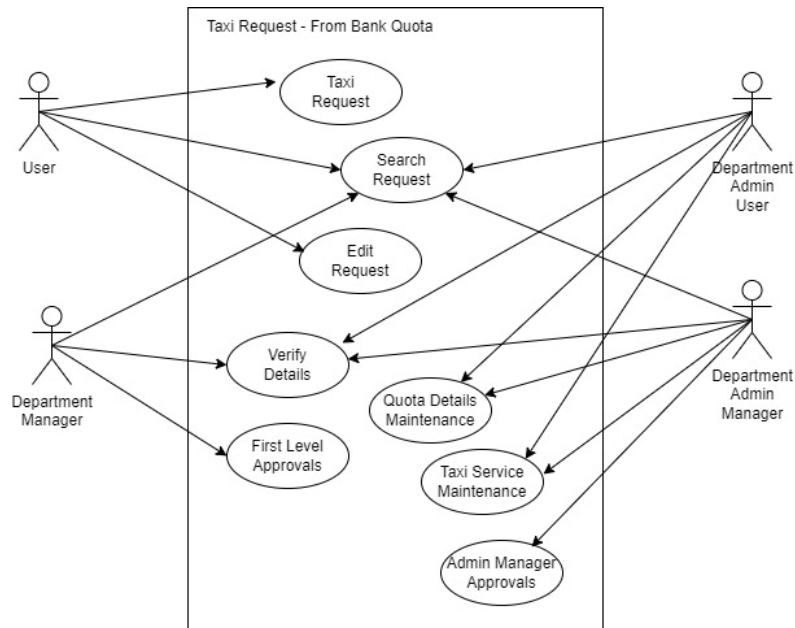


Figure 48- Use case diagram for taxi request from departmet quota

- Use case diagram for travalling claims

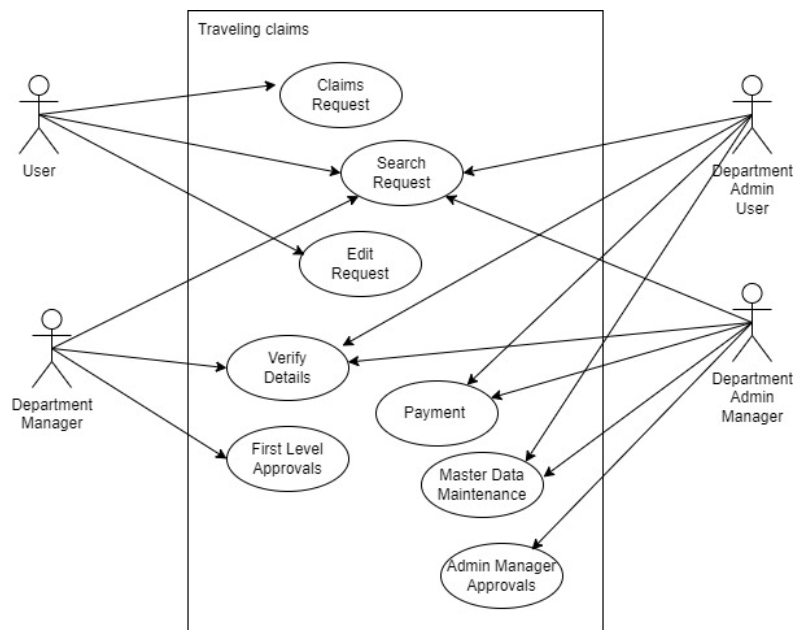


Figure 49 - Use case diagram for travalling claims

C.2 Use case narrations

Use case narrations for the main use cases in the above use case diagrams are shown below.

- Use case narration for login

Use case name	Login	<u>Use case Type</u> Business Requirements: Prevent unauthorized access and authenticate user.
Use case id	01	
Priority	High	
Source	Web Page – Login DB Table – Mst_User, Mst_Session	
Primary Business Actor	All Users	
Other Participating Actors		
Other Interested Stakeholders	Developer (IT users as supper user)	
Description	Validate the username and the password entered by the user and grant access to the web application.	
Preconditions	User can enroll with the system by requesting access.Then system will generate user Id with the employees registration number (PF Number) and default password.Then user can log using default details and can change the password in first login. In production environment user can then log to system using AD login credentials.	
Trigger	User send request to login by pressing the login button	
Typical course of events	1) User enter the username and password 2) Click on the Login button.	
Alternative course	Error message will be displayed for the invalid username or password entered by the user.	
Post conditions	Application will create a session and redirect the user to the home page.	

Table 11 - Use case narration for login

Use case narration for create new user profile with access features

Use case name	Create new user profile with access features	Use case Type Business Requirements: New user will be required to access the web application and features must be available as per the user type
Use case id	02	
Priority	High	
Source	Web Page – User Creation DB Table – Mst_User , Mst_User_Permission	
Primary Business Actor	User itself	
Other Participating Actors	Manager from Admin Department	
Other Interested Stakeholders	Developer (IT users as supper user)	
Description	Create user profile for the new users who will required to access the web application.Grant the functional access for the particular user ID	
Preconditions	User must have access to the system (IP and Port access)	
Trigger	Fresh user has to navigate to request(Register) page in pre login	
Typical course of events	1) User must enter the all required fields 2) Click on the save button.	
Alternative course	1) Application will display an error message if user have not entered any value for required field. 2) Application will display an error message if the users provident fund (PF) number already exists in the application. 3) Application will display a success message after creating the new user profile.	

Table 12 - Use case narration for create new user profile

- Use case narration for transport vehicle reservation

Use case name	Create new transport vehicle reservation request	Use case Type Business Requirements: Submit new Transport vehicle reservation request to Transport division
Use case id	04	
Priority	High	
Source	Web Page – Transport Vehicle Request DB Table – Trn_Transport_Request	
Primary Business Actor	Staff Member	
Other Participating Actors	Department Manager of the requester, Transport division User, Transport division Manager	
Other Interested Stakeholders	Administration User, Developer	
Description	User submit a new request to the transport division for receive the transport vehicle	
Preconditions	• User has the required necessary privileges to submit a transport vehicle request.(Preconditions will be define in database table and those are validate when initiate this) • User have to check the availability of the desired date or time.	
Trigger	User selects “Transport Vehicle Request” function from the menu items.	
Typical course of events	1) Enter the required details of the request. 2) User have to select the Assistant General Manager and Deputy General Manager who will approve the request before submitting to transport division.	
Alternative course	1) Application will display an error message if user have not entered any value for required field. 2) Application will display a success message after submitting new request.	
Post conditions	Request will be displayed for the selected Assistant General Manager and Deputy General Manager for their approval.	

Table 13 - Use case narration for create new transport vehicle request

- Use case narration for taxi request

Use case name	Create new taxi request	Use case Type Business Requirements: Submit new taxi request to desired division administration department
Use case id	05	
Priority	High	
Source	Web Page – Transport Vehicle Request DB Table – Trn_Taxi_Request	
Primary Business Actor	Staff Member	
Other Participating Actors	Department Manager of the requester, Administrator user of the department	
Other Interested Stakeholders	Developer (IT users as supper user)	
Description	User submit a new request to the admin division for taxi request	
Preconditions	• User has the required necessary privileges to submit a transport vehicle request. (Preconditions will be define in database table and those are validate when initiate this) • Quota must not be exceeded for the department.	
Trigger	User selects “Taxi Request” function from the menu items.	
Typical course of events	1) Enter the required details of the request. 2) User have to select the Assistant General Manager and Deputy General Manager who will approve the request before submitting to administration unit.	
Alternative course	1) Application will display an error message if user have not entered any value for required field or for incorrect data. 2) Application will display a success message after submitting new request.	
Post conditions	Request will be displayed for the selected Assistant General Manager and Deputy General Manager for their approval.	

Table 14 - Use case narration for create new taxi request

- Use case narration for travelling claims

Use case name	Create new travelling claims request	Use case Type Business Requirements: Submit new travelling claims request to desired division administration department
Use case id	06	
Priority	High	
Source	Web Page – Transport Vehicle Request DB Table – Trn_Travelling_Claims_Request	
Primary Business Actor	Staff Member	
Other Participating Actors	Department Manager of the requester, Administrator user of the department	
Other Interested Stakeholders	Developer (IT users as supper user)	
Description	User submit a new request to the admin division for taxi request	
Preconditions	• User has the required necessary privileges to submit a transport vehicle request. (Preconditions will be define in database table and those are validate when initiate this) • Quota must not be exceeded for the department.	
Trigger	User selects “Taxi Request” function from the menu items.	
Typical course of events	1) Enter the required details of the request. 2) Upload necessary documents. 3) User have to select the Assistant General Manager and Deputy General Manager who will approve the request before submitting to Administration unit.	
Alternative course	1) Application will display an error message if user have not entered any value for required field or for incorrect data. 2) Application will display a success message after submitting new request.	
Post conditions	Request will be displayed for the selected Assistant General Manager and Deputy General Manager for their approval.	

Table 15 - Use case narration for create new travelling claim request

B.3 Sequence Diagrams

Sequence diagrams for the main use cases in the above use case diagrams are shown below.

- Sequence diagram for login

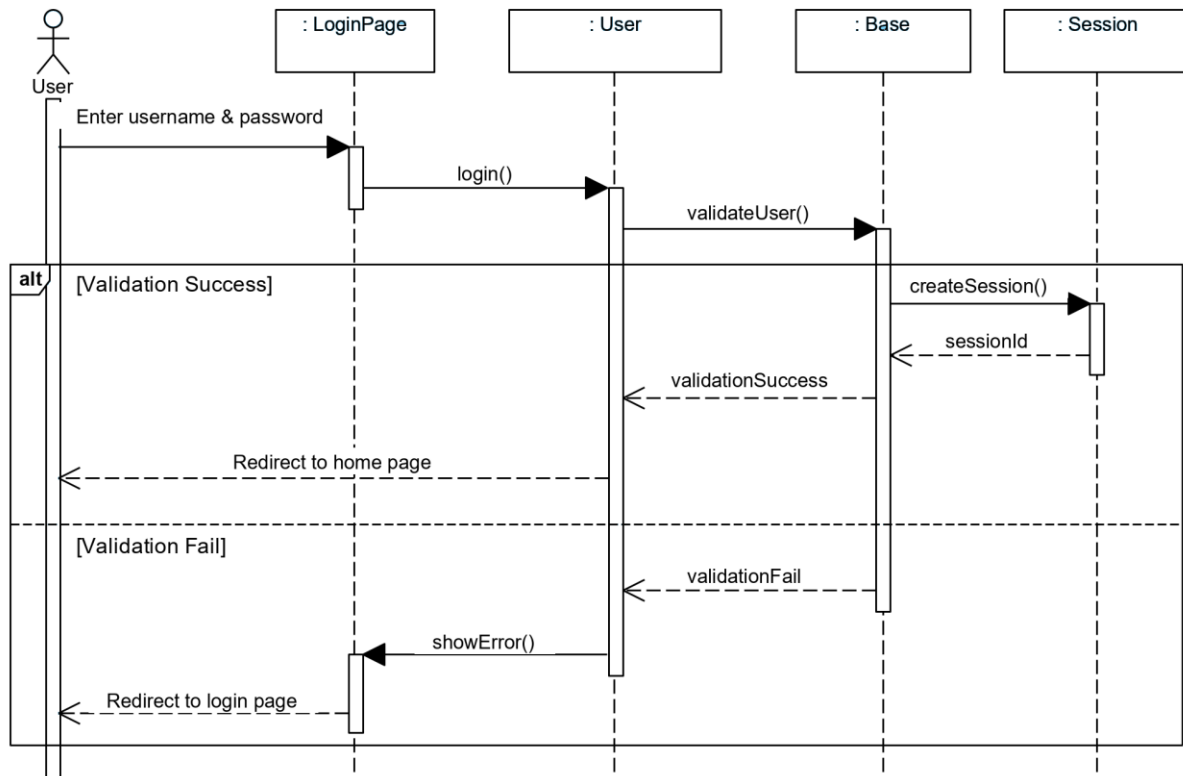


Figure 50 - Sequence diagram for login

- Sequence diagram for create transport vehicle request

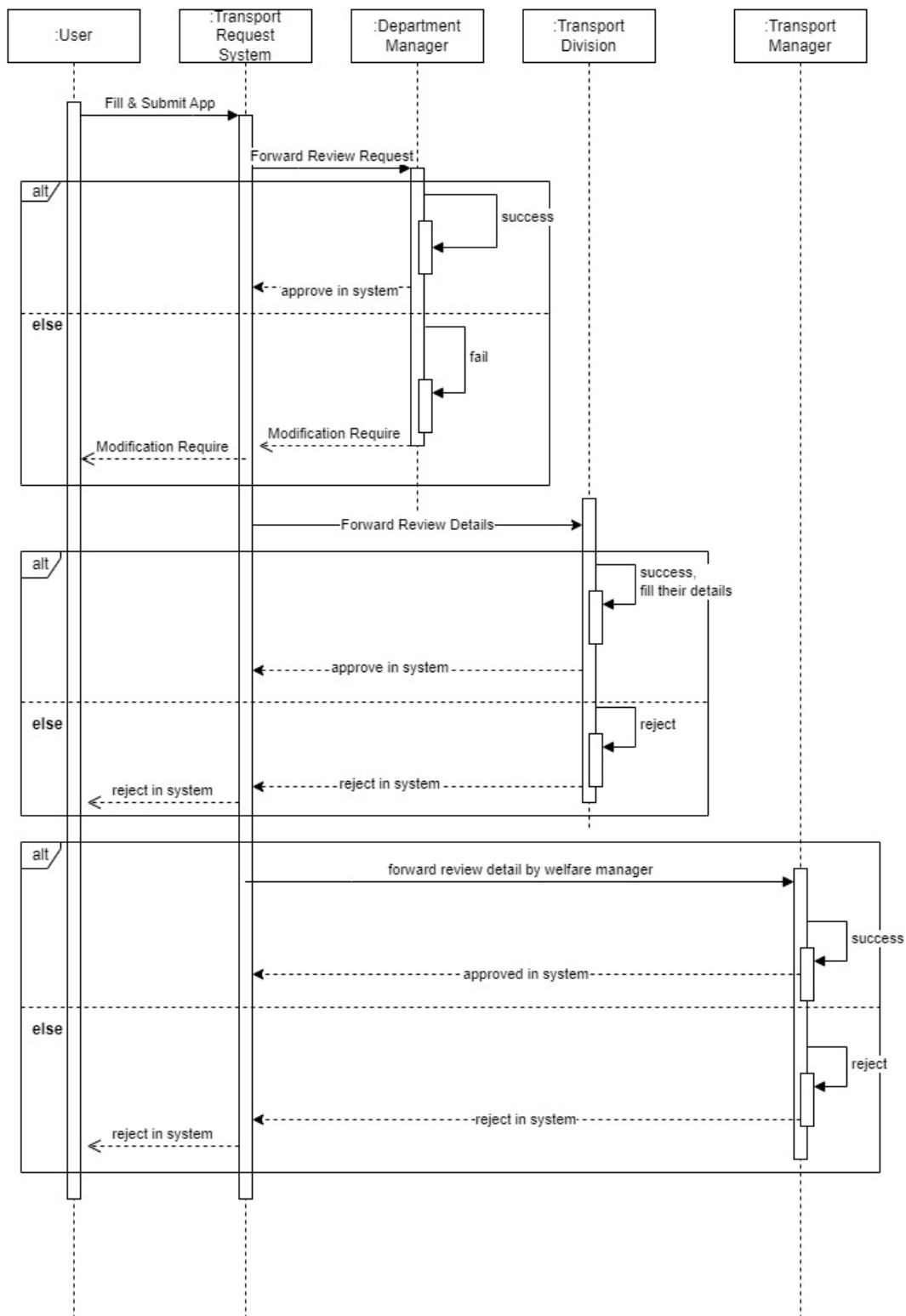


Figure 51 - Sequence diagram for create transport vehicle request

- Sequence diagram for create new taxi request

Request Taxi from the department quota

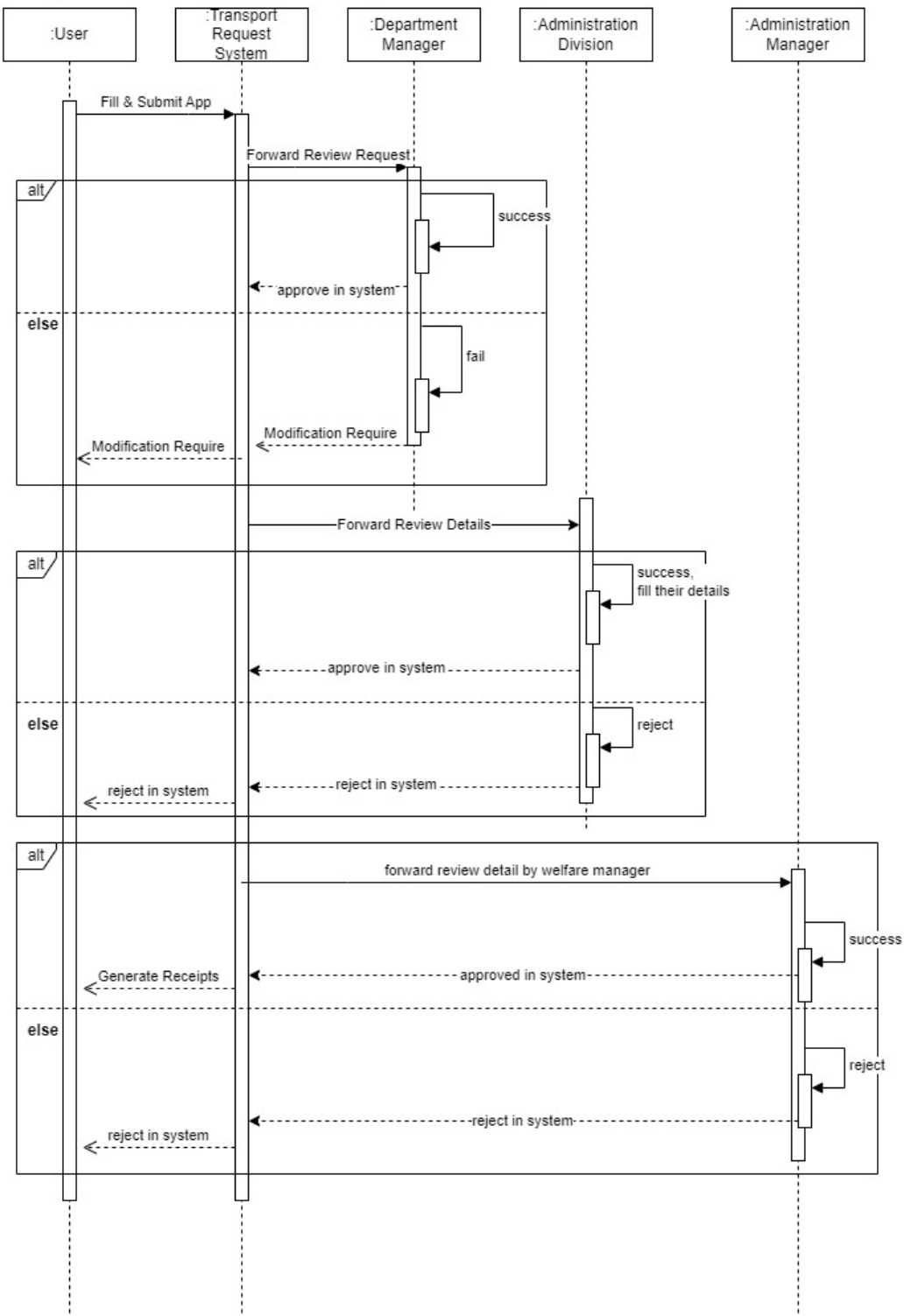


Figure 52 - Sequence diagram for create new taxi request

- Sequence diagram for create new travelling claim request

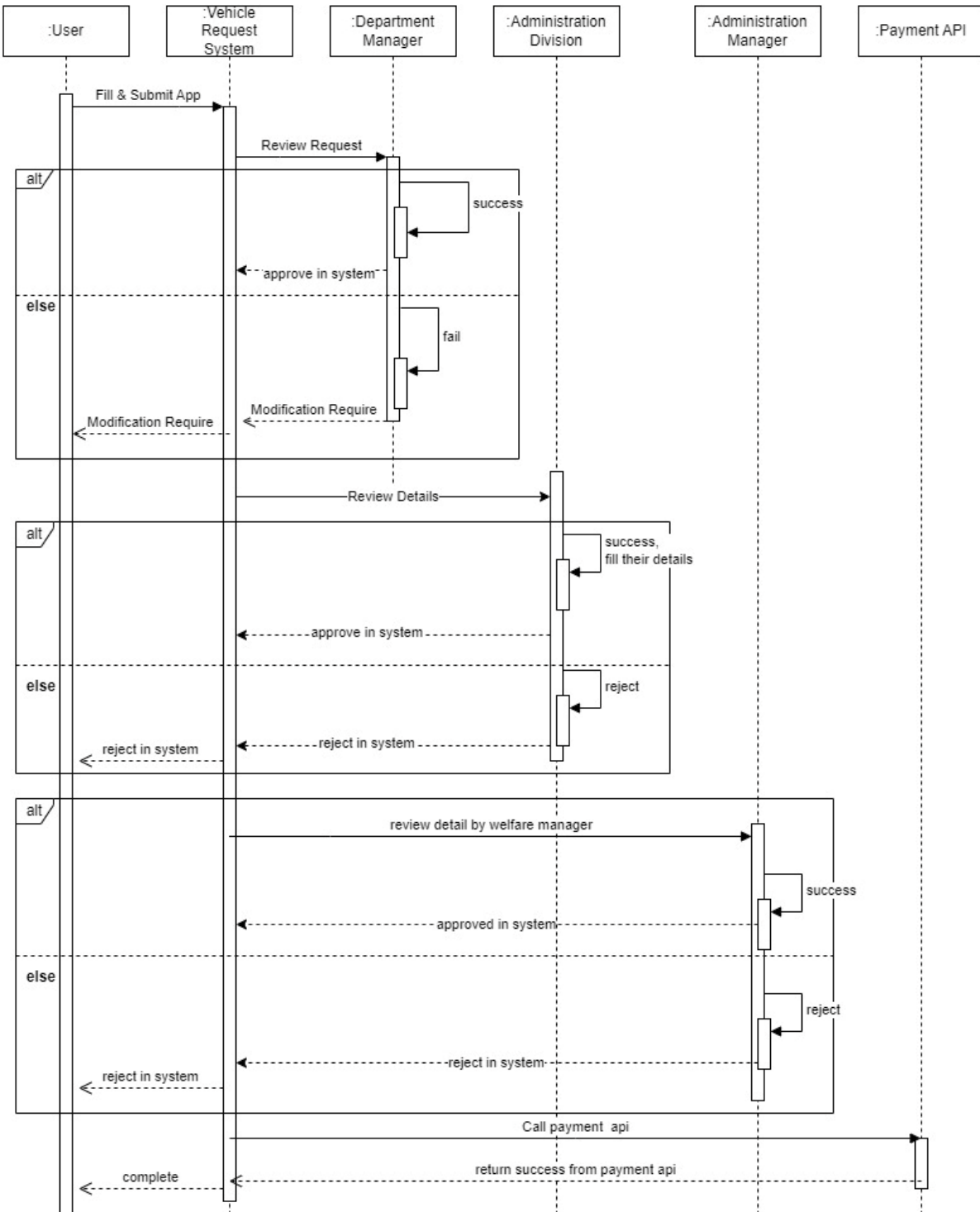


Figure 53 - Sequence diagram for create new travelling claim request

Appendix D – MIS Reports

D.1 Introduction

The MIS Reports module within the Transport Management System for the institution plays a pivotal role in providing essential insights and data-driven analysis for informed decision-making. MIS Reports, which stands for Management Information System reports, are automatically generated by the developed application based on user-defined criteria.

These reports serve as a foundation for the efficient operation of the institution's transportation services, catering to various needs such as providing transportation for employees during late hours, facilitating welfare vehicle bookings at minimal cost, and managing taxi payment reimbursements.

The significance of MIS reports cannot be overstated, as they are integral to optimizing processes, maximizing service delivery to employees, and minimizing unnecessary costs. Senior management within the institution relies heavily on these reports to gain valuable insights into transportation operations, enabling them to make strategic decisions that enhance efficiency and effectiveness.

This chapter will delve into the types and layouts of MIS reports utilized within the system, providing comprehensive examples and demonstrations of their functionalities. Through the MIS Reports module, the institution can harness the power of data analytics to drive continuous improvement and excellence in its transportation management practices.

D.2 Transport Request Module

- **Vehicle wise total request for the period**

The "Vehicle wise total request for the period" report offers crucial insights into vehicle utilization over the past six months. It details the total number of requests handled by each

vehicle, aiding in resource allocation and operational efficiency. The report enables transportation managers to identify vehicles with high demand for efficient deployment and those underutilized for potential reallocation. Additionally, it facilitates performance evaluation, cost management, and proactive service planning through trend analysis. Overall, it plays a pivotal role in optimizing fleet management and enhancing transportation operations.

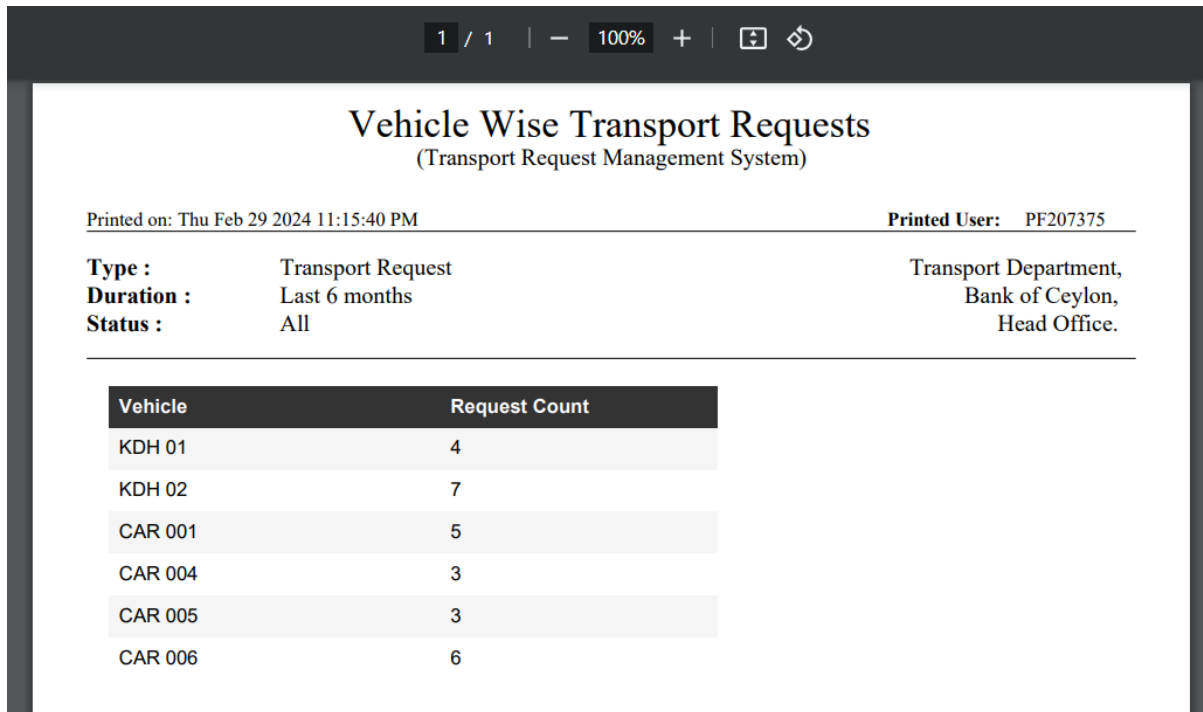


Figure 54 - vehicle wise request count

- **Yearly, Monthly, vehicle wise request count**

The report detailing yearly, monthly, and vehicle-wise request counts is indispensable for transportation management. It provides a comprehensive overview of request patterns over time, aiding in strategic planning and resource allocation. By breaking down requests by year, month, and vehicle, the report enables managers to identify trends, anticipate demand fluctuations, and optimize scheduling and fleet management. Moreover, it facilitates performance evaluation, cost management, and proactive service planning through trend analysis. Ultimately, this report serves as a valuable tool for optimizing transportation operations and enhancing overall efficiency.

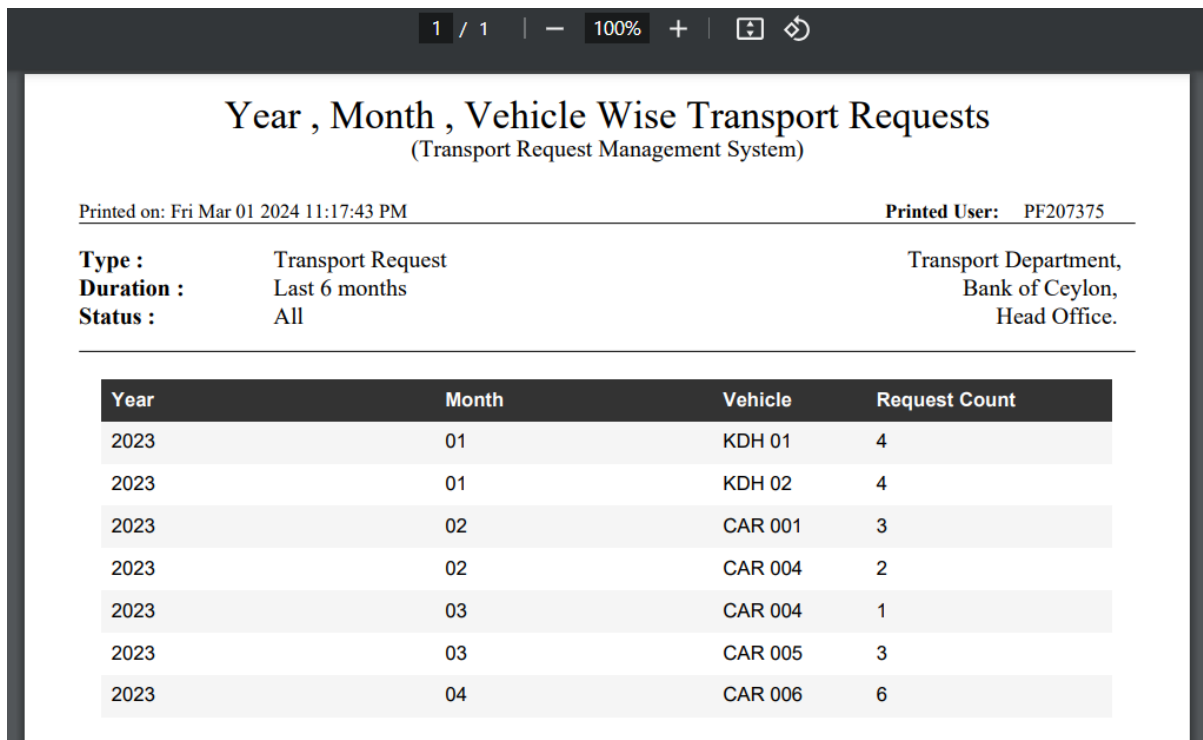


Figure 55 - Yearly, Monthly, vehicle wise request count

- **Yearly, Monthly, Department wise request count**

The report on yearly, monthly, and department-wise request counts is essential for effective resource management and strategic planning. By analyzing request data across different timeframes and departments, managers can identify trends, allocate resources efficiently, and anticipate service demands. This report provides valuable insights into the distribution of requests over time and across various departments, enabling informed decision-making and proactive adjustments to meet evolving needs. Additionally, it facilitates performance evaluation, cost management, and service planning by highlighting departmental trends and patterns.

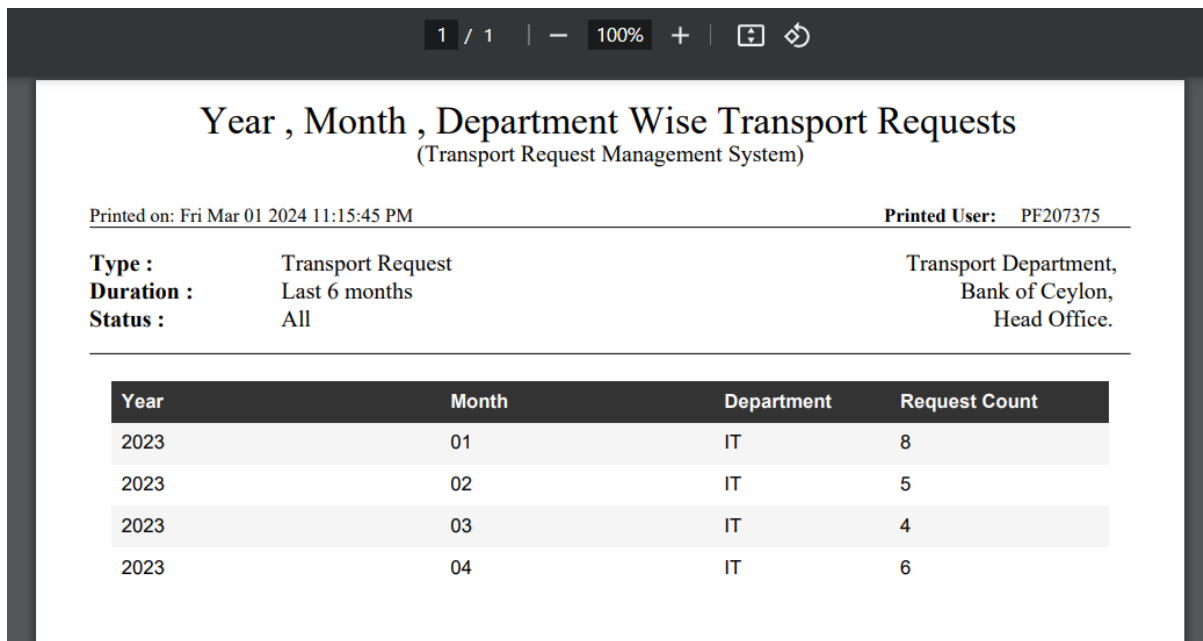


Figure 56 - Yearly, Monthly, Department wise request count

- **Yearly , Monthly , Vehicle wise total distance for the period**

The "Yearly, Monthly, Vehicle-wise Total Distance for the Period" report is advantageous for the institution 's transport division in several ways. It aids in optimizing operational efficiency through informed route planning and resource allocation based on historical distance data. The report enables effective cost management by identifying trends in vehicle usage, optimizing fuel consumption, and planning maintenance schedules. Additionally, it supports compliance efforts by tracking and reporting distance-related data, ensuring adherence to transportation regulations. Overall, the report enhances the transport division's capabilities in efficiency, cost control, compliance, performance evaluation, and strategic planning.

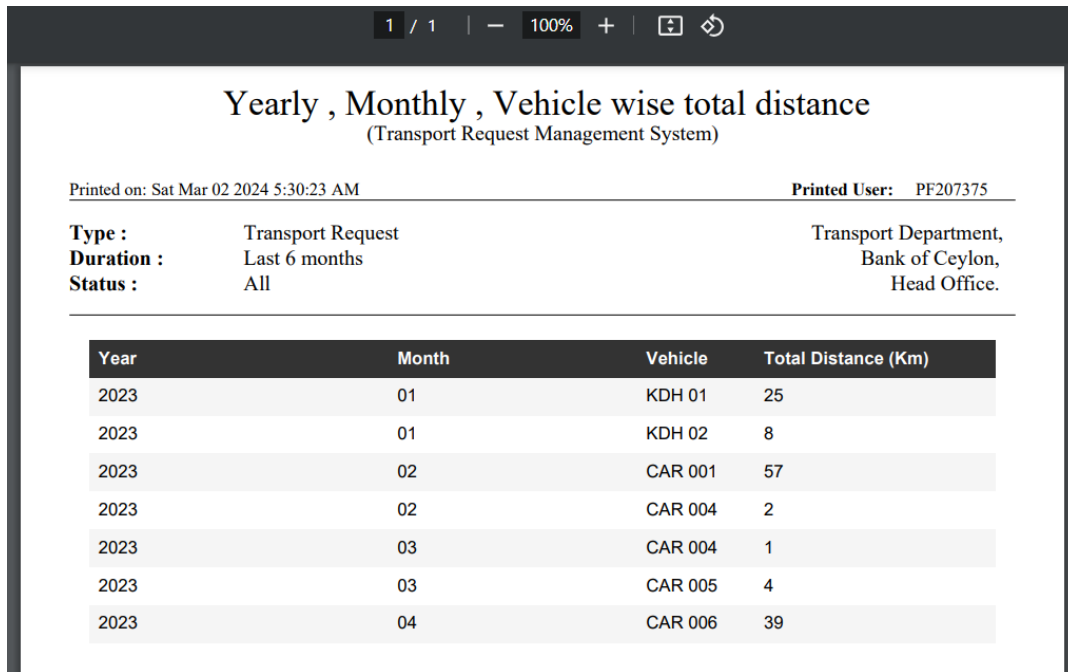


Figure 57 - Yearly, Monthly , Vehicle wise total distance for the period

- **Transport Request Bulk Report**

The Transport Request Bulk Report provides a concise summary of all transportation requests processed over the past six months, offering insights into demand patterns and usage trends.

Bulk Report (Transport Requests)

(Transport Request Management System)

Printed on: Thu Feb 29 2024 11:16:42 PM

Printed User: PF207375

Type : Transport Request
Duration : Last 6 months
Status : All

Transport Department,
Bank of Ceylon,
Head Office.

Reference Number	Requested Date	Requested By	Distance	Status
TRN202312200026180263	2023-01-01	PF207375	0	C
TRN202312221142430265	2023-01-01	PF207375	0	C
TRN202312222243290318	2023-01-01	PF207375	0	C
TRN202312222251240319	2023-01-01	PF207375	0	C
TRN202312231319330325	2023-01-01	PF207375	0	C
TRN202312241856270326	2023-01-01	PF207375	0	C
TRN202312282025050327	2023-01-01	PF207375	0	C
TRN202401202236590328	2023-01-01	PF207375	0	C
TRN202402102312270340	2023-02-03	PF207375	45	C
TRN202402102318470341	2023-02-03	PF207375	11	C
TRN202402110816590342	2023-02-03	PF207375	1	C
TRN202402110822040343	2023-02-03	PF207375	1	C
TRN202402110836510344	2023-02-03	PF207375	1	C
TRN202402110842410345	2023-03-04	PF207375	1	C

Figure 58 - Transport Request Bulk Report

Appendix E – User Manual

- **Register User**

Users interested in accessing system services must initiate a registration request.

1. Users need to fill in necessary details to complete the registration request.
2. Upon completion, users submit the registration request for review by the admin team.
3. The admin team reviews the submitted details and approves the registration request if satisfactory.
4. Users ensure all mandatory fields are filled before proceeding with their requests.

Request for register

Already have an account? [Log in](#)

PF Number	Department * IT
First Name	Last Name
Email Address	Account No
Mobile	Extension
Password	Password Verify
Request	

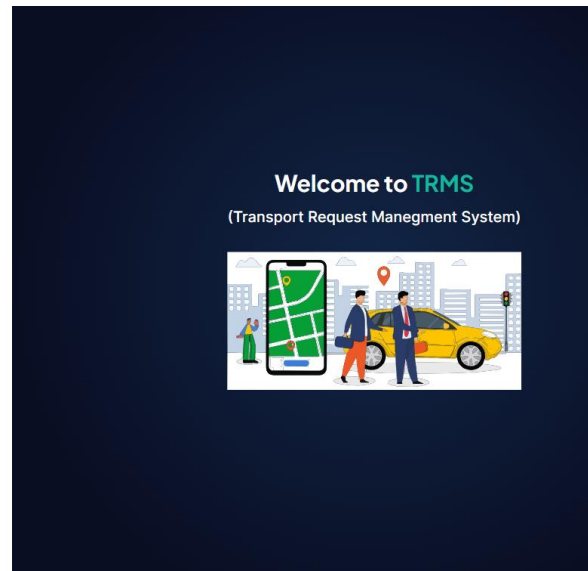


Figure 59- Requset Register Page

- **Login User**

1. Open your web browser and navigate to the login page of the system.

Localhost url : <http://localhost:3000/auth/login>

Login

Don't have an account? [Request](#)

Login Details

PF Number

PF207375

Password

.....

Continue

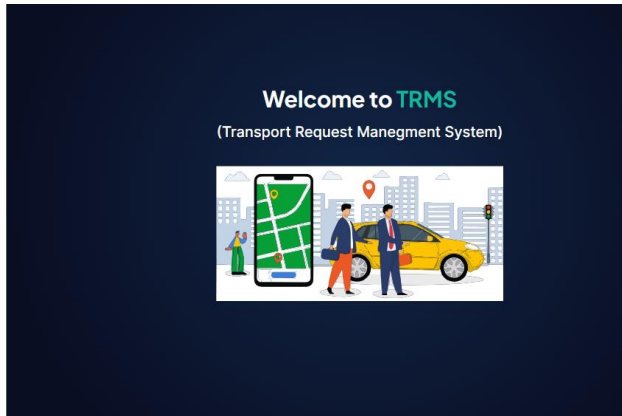


Figure 60 - Login page

2. In the designated field, input your username. This is typically provided to you during the registration process.
3. Enter your password in the corresponding field. Ensure accuracy and confidentiality when inputting your password.
4. Once both username and password are entered correctly, click on the "Login" button to proceed.
5. The system will authenticate your credentials and grant access if they match those stored in the system's database.
6. Upon successful login, you will be directed to the system's main dashboard or designated landing page, where you can access the system's functionalities and features

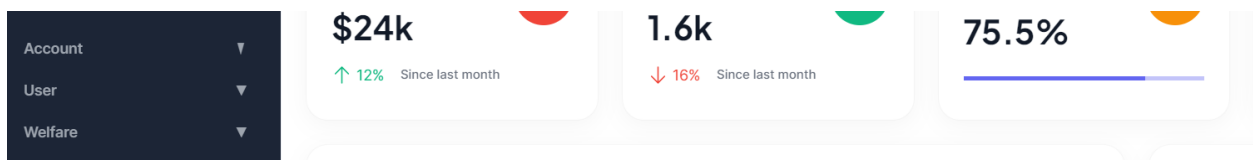


Figure 61 - Dashboard

- **Place Transport Vehicle request**

1. Registration and Authentication:

- Users must register in the system before accessing transport request functionalities.
- Upon registration, users are authenticated using their credentials.

2. Request Form:

- Users can access the transport request form after authentication using navigation panel.

Figure 62 - Menu and Transport request page

- The form includes fields for specifying trip details such as departure location, destination location, distance, etc.

Transport Request

Transport Request Reference *

Auto generate

Requester Details

PF Number *

PF207375

name *

Saminda Jayakody

Department *

IT

Email Address *

saminda@boc.lk

Phone Number

716321349

Extension Number

16558

Trip Details

Departure Location *

Destination And Route *

Distance (Km) *

Departure Date *

03/06/2024

Departure Time *

04:30

Schedule Return Date *

03/06/2024

Schedule Return Time *

22:30

Reason *

Function

Other Reason *

Passenger Count *

Comments

Save details

Figure 63 - Details of transport request page

- Mandatory fields are marked, and users must fill them accurately.
- Users can view and add bookings using the booking calendar feature.(This will show the current bookings base for the selected vehicle)

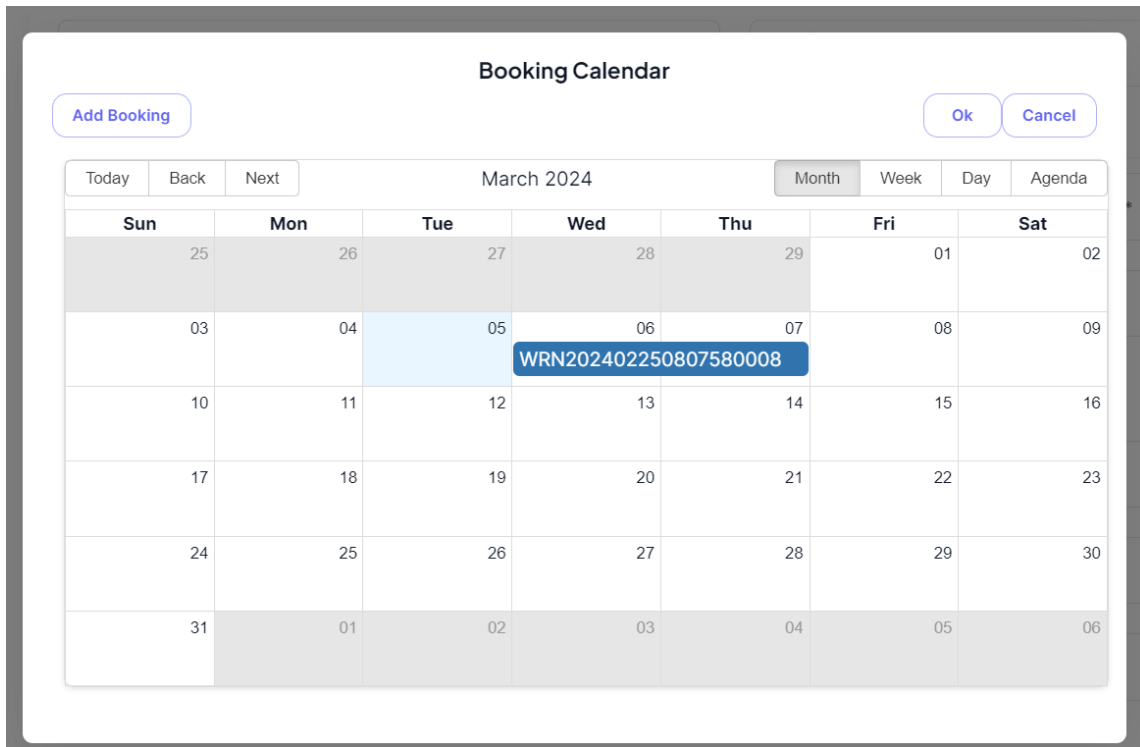


Figure 64 - Booking calendar

- The calendar allows users to select departure and return dates and times.
- Relevant validation is there to validate the entering dates and times

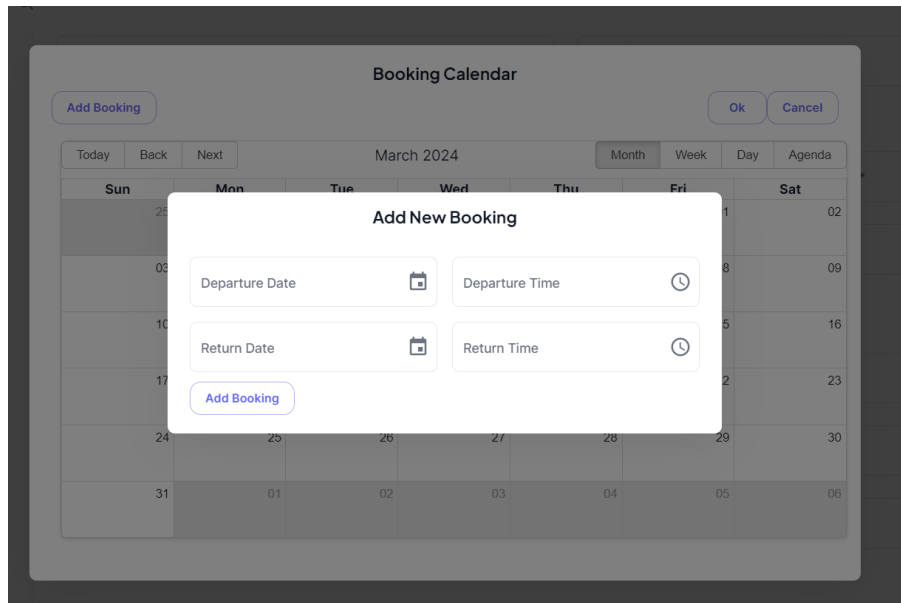


Figure 65 - Add new booking

3. Fill “on leave staff member” details:

- Users can add staff member details to the request form.
- Each passenger must provide their PF number then relevant name will be fetch.
(Relevant staff members must already register in the system)
- The form automatically calculates the total on leave passenger count based on the added details.

On Leave Staff Members

Add Passenger

MEMBER PF	NAME	ACTION
Passenger Count * 0		

Figure 66 - Passenger adding

4. Submission and Confirmation:

- After filling out the form and validation success, users can submit their welfare request details.
- Upon successful submission, users receive a confirmation message indicating that their data has been saved.

- **Place welfare vehicle request**

1. Registration and Authentication:

- Users must register in the system before accessing welfare request functionalities.
- Upon registration, users are authenticated using their credentials.

2. Request Form:

- Users can access the welfare request form after authentication using navigation panel.

The screenshot displays the 'Bank of Ceylon Transport Service Management' interface. On the left is a dark navigation sidebar with the following menu items: 'Account', 'User', 'Welfare' (which is expanded to show 'Create WR', 'Edit WR', 'Approve WR', and 'Passenger Accept'), and 'Passenger Accept'. The main content area is titled 'Create Welfare Request'. It contains a 'Welfare Request' section with a text input field for 'Welfare Request Reference *' and an 'Auto generate' button below it. Below this is a 'Requester Details' section with two input fields: 'PF Number *' containing the value 'PF207375' and 'name *' containing the value 'Saminda Jayakody'.

Figure 67 - Menu and welfare request page

- The form includes fields for specifying trip details such as departure location, destination location, distance, vehicle selection, etc.

Welfare Request

Welfare Request Reference *

Auto generate

Requester Details

PF Number *

PF207375

name *

Saminda Jayakody

Department *

IT

Email Address *

saminda@boc.lk

Phone Number

716321349

Extension Number

16558

Trip Details

Departure Location *

Places of Travel To *

Distance (Km) *

Vehicle *

Rosa Bus 01- Seats :15

Vehicle Rate *

0

Estimation Cost *

0

View / Add Booking

Departure Date *

Departure Time *

Return Date *

Return Time *

Reason *

Office Work

Other Reason *

On Leave Staff Members

Member PF *

Name *

Add Passenger

MEMBER PF	NAME	ACTION
Passenger Count * 0		
Comments		

Save details

Figure 68 - Details of welfare request page

- When vehicle select relevant rate and total estimate cost will auto calculate base on the total distance

111

- Mandatory fields are marked, and users must fill them accurately.
- Users can view and add bookings using the booking calendar feature. (This will show the current bookings base for the selected vehicle)

The screenshot displays a 'Booking Calendar' window. At the top left is an 'Add Booking' button. At the top right are 'Ok' and 'Cancel' buttons. Below these is a navigation bar with 'Today', 'Back', and 'Next' buttons, followed by the month 'March 2024'. To the right of the month are four view options: 'Month' (selected), 'Week', 'Day', and 'Agenda'. The main area is a calendar grid with columns for Sun, Mon, Tue, Wed, Thu, Fri, and Sat. The dates are arranged in rows. A booking is highlighted on Tuesday, March 5th, with a blue box containing the text 'WRN202402250807580008'. The calendar grid shows dates from 25 to 06, with some dates in greyed-out cells.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
25	26	27	28	29	01	02
03	04	05 WRN202402250807580008	06	07	08	09
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	01	02	03	04	05	06

Figure 69 - Booking calendar of welfare request

- The calendar allows users to select departure and return dates and times.
- Relevant validation is there to validate the entering dates and times

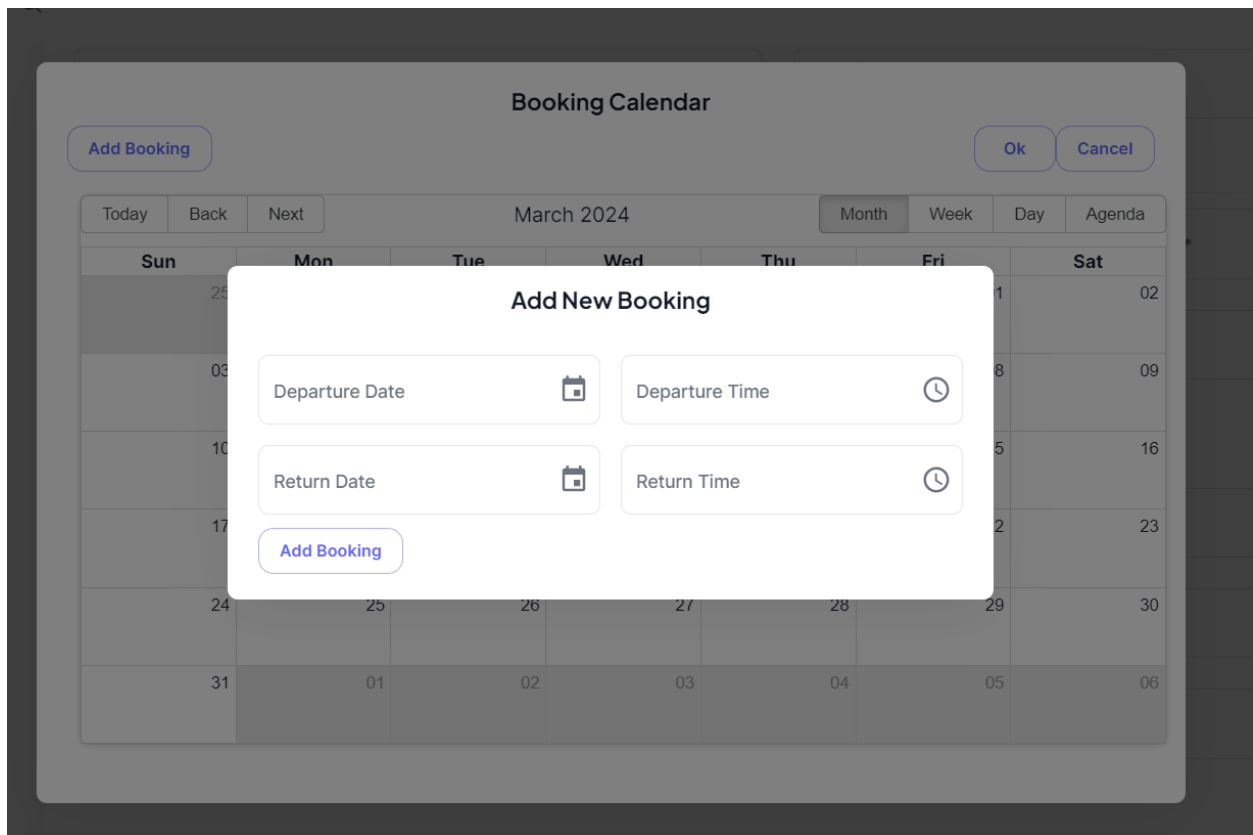


Figure 70 - Add new welfare request

3. Fill on leave staff member details:

- Users can add staff member details to the request form.
- Each passenger must provide their PF number then relevant name will be fetch. (Relevant staff members must already register in the system)
- The form automatically calculates the total on leave passenger count based on the added details.

On Leave Staff Members

MEMBER PF	NAME	ACTION
Passenger Count * 0		

Figure 71 - Add passenger for welfare trip

4. Submission and Confirmation:

- After filling out the form and validation success, users can submit their welfare request details.
- Upon successful submission, users receive a confirmation message indicating that their data has been saved.

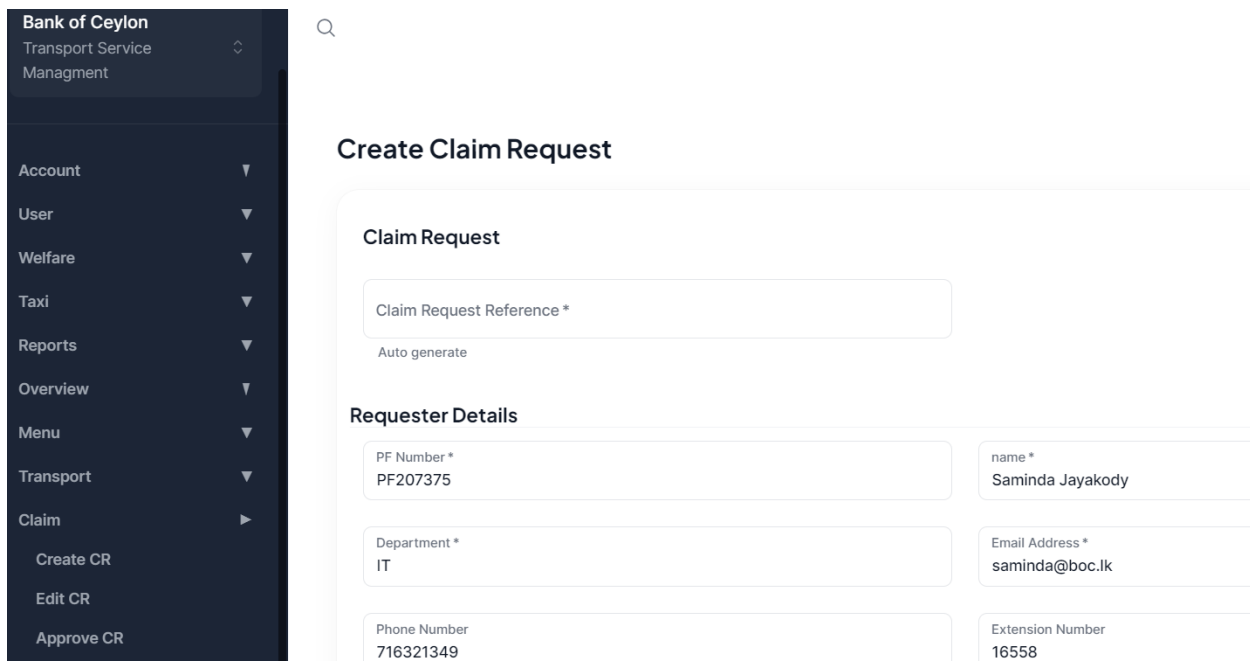
- **Place travelling claim request**

1. Registration and Authentication:

- Users must register in the system before accessing travelling claim request functionalities.
- Upon registration, users are authenticated using their credentials.

2. Request Form:

- Users can access the travelling claim request form after authentication using navigation panel.



Bank of Ceylon
Transport Service Management

Account ▼
User ▼
Welfare ▼
Taxi ▼
Reports ▼
Overview ▼
Menu ▼
Transport ▼
Claim ▶
 Create CR
 Edit CR
 Approve CR

Search

Create Claim Request

Claim Request

Claim Request Reference *

Auto generate

Requester Details

PF Number *	name *
PF207375	Saminda Jayakody
Department *	Email Address *
IT	saminda@boc.lk
Phone Number	Extension Number
716321349	16558

Figure 72 - Menu for claim request

- The form includes fields for specifying trip details such as departure location, destination location, amount, etc.

Create Claim Request

Claim Request

Claim Request Reference *

Auto generate

Requester Details

PF Number * PF207375	name * Saminda Jayakody
Department * IT	Email Address * saminda@boc.lk
Phone Number 716321349	Extension Number 16558

Trip Details

Departure Location *	Destination Location *	Distance (Km) *
Departure Date * 03/07/2024	Departure Time * 04:30	
Return Date * 03/07/2024	Return Time * 20:30	
Reason * Office Work	Other Reason *	

Claim Details

Claiming Amount *
0

Choose File

Upload File

Download File

Comments

Save details

Figure 73 - Details of claim request

- The user is required to input the claiming amount and upload a bill as proof to the system
3. Submission and Confirmation:
- After filling out the form and validation success, users can submit their travelling claim request details.
 - Upon successful submission, users receive a confirmation message indicating that their data has been saved.
- **Place Taxi request (Voucher Request)**
 1. Registration and Authentication:
 - Users must register in the system before accessing taxi request functionalities.
 - Upon registration, users are authenticated using their credentials.
 2. Request Form:
 - Users can access the taxi request form after authentication using navigation panel.

The screenshot shows a web application interface for the Bank of Ceylon Transport Service Management. On the left is a dark sidebar menu with the following items: 'Bank of Ceylon Transport Service Managment' (with a dropdown arrow), 'Account' (with a dropdown arrow), 'User' (with a dropdown arrow), 'Welfare' (with a dropdown arrow), 'Taxi' (with a right-pointing arrow), 'Create TXR', 'Edit TXR', and 'Approve TXR'. The main content area is titled 'Create Taxi Request'. It contains two main sections: 'Taxi Request' and 'Requester Details'. The 'Taxi Request' section has a text input field labeled 'Taxi Request Reference *' and a button below it labeled 'Auto generate'. The 'Requester Details' section has two text input fields: 'PF Number *' (containing the value 'PF207375') and 'name *' (containing the value 'Saminda Jayakody').

Figure 74 - Menu for taxi request

- The form includes fields for specifying trip details such as departure location, destination location, distance, etc.

Create Taxi Request

Taxi Request

Taxi Request Reference *
Auto generate

Requester Details

PF Number *
PF207375

name *
Saminda Jayakody

Department *
IT

Email Address *
saminda@boc.lk

Phone Number
716321349

Extension Number
16558

Trip Details

Departure Location *

Destination Location *

Distance (Km) *

☐ Two-way Trip

Departure Date *

Departure Time *

Return Date *

Return Time *

Reason *
Offk

Other Reason *

Figure 75 - Details of taxi request

3. Submission and Confirmation:

- After filling out the form and validation success, users can submit their travelling claim request details.
- Upon successful submission, users receive a confirmation message indicating that their data has been saved.

Appendix F – Test Cases (Common Scenarios)

- Below are the common test cases applicable to all types of requests, each of which is tested separately in its respective module.

ID	Activity	Test Case Steps	Expected Result
1.1	From Date To Date Validation	Valid Date-Time Range From Date-Time: 2024-03-01 08:00, To Date-Time: 2024-03-01 12:00	Validation Pass
		Invalid From Date-Time: From Date-Time: 2024-02-31 08:00, To Date-Time: 2024-03-01 12:00	Validation Fails, Error Message: "Invalid From Date-Time"
		Invalid To Date-Time: From Date-Time: 2024-03-01 08:00, To Date-Time: 2024-02-31 12:00	Validation Fails, Error Message: "Invalid To Date-Time"
		From Date-Time After To Date-Time: From Date-Time: 2024-03-02 12:00, To Date-Time: 2024-03-01 08:00	Validation Fails, Error Message: "From Date-Time should be before To Date-Time"
		Same From and To Date-Time: From Date-Time: 2024-03-01 08:00, To Date-Time: 2024-03-01 08:00	Validation Fails, Error Message: "From Date-Time should be before To Date-Time"
		Valid Date-Time Range with Same From and To Date: From Date-Time: 2024-03-01 08:00, To Date-Time: 2024-03-01 12:00	Validation Passes

		Leap Year Date-Time Validation: From Date-Time: 2024-02-29 08:00, To Date-Time: 2024-03-01 12:00	Validation Passes
1.2	Booking Calendar Validations	Valid Selection: User selects a valid date range within the allowed booking period. Select From Date: 2024-03-10, Select To Date: 2024-03-15	Booking Calendar updates to show the selected date range.
		Invalid Date Range User selects an invalid date range where the To Date is before the From Date. Select From Date: 2024-03-15, Select To Date: 2024-03-10	Error message appears indicating that the To Date must be after the From Date.
		Overlapping Booking User selects a date range that overlaps with an existing booking. Select From Date: 2024-03-10, Select To Date: 2024-03-20 (where 2024-03-15 to 2024-03-18 is already booked)	Error message appears indicating that the selected date range overlaps with an existing booking.
		Past Date Selection User tries to book for a past date, which is not allowed according to the booking policy.	Error message appears indicating that bookings for past dates are not allowed.

		Select From Date: 2024-02-20, Select To Date: 2024-02-25	
2.3	File Upload and Download:	User uploads a file to the system Select a file to upload.	File is successfully uploaded to the system
		Upload File Format Validation: User tries to upload a file with an unsupported format. (Eg : Exe)	Error message appears indicating that the selected file format is not supported for upload
		Upload File Size Limit User tries to upload a file exceeding the maximum file size limit.	Error message appears indicating that the selected file exceeds the maximum allowed size for upload.
		Download File User downloads a file from the system.	File is successfully downloaded to the user's device.
		Download Nonexistent File: User tries to download a file that does not exist in the system.	Error message appears indicating that the requested file does not exist.

Table 16 - Common test cases

Supervisor Confirmation