TUGVAN

Final Year Project Session

2020-2024

A project submitted in partial fulfilment of the
COMSATS University Degree Of
BS in Computer Science (CUI)

Department of Computer Science

COMSATS University Islamabad, Lahore Campus

11 March 2024

Project Detail

Type (Nature of project)	[✓] **D**evelopment [] **R**esearch [] **R&D**			
Area of specialization	Software Development			
Project Group Members				
Sr.#	Reg. #	Student Name	Email ID	*Signature
(i)	FA20-BCS-030	Muneeb Rasheed	Fa20-bcs-030@cuilahore.edu.pk	Muneeb
(ii)	FA20-BCS-050	Hamza Naveed	Fa20-bcs-050@cuilahore.edu.pk	Hamza
(iii)	FA20-BCS-057	Talha Riaz	Fa20-bcs-057@cuilahore.edu.pk	Talha

*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

Plagiarism Free Certificate

This is to certify that, I am Muneeb S/o Rasheed, group leader of FYP under registration no CIIT/FA20-BCS-030/LHR at Computer Science Department, COMSATS University Islamabad, Lahore Campus. I declare that my FYP proposal is checked by my supervisor and the similarity index is % that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

Date: 09-12-2023 Name of Group Leader: Muneeb Rasheed Signature: Muneeb

Name of Supervisor: M. Usman Akram Co-Supervisor (if any): _____

Designation: Assistant Professor Designation: _____

Signature: _____ Signature: _____

Name of HOD: _____

Signature HOD: _____

Abstract

"TugVan" is a user-friendly website designed to help people when their vehicles, such as cars, bikes, or even bicycles, get damaged or break down on the road. TugVan is designed to provide a modern solution for unexpected breakdowns, making your journeys safe and more convenient. Here's how it works: if your vehicle has a problem, you can go to the "TugVan" website and select any of the services which you want regarding your vehicle and tell it where you are and where you want to go. The website then shows you a list of companies that can help you. You can pick one based on how much it costs.

Once you choose a company, you share your contact information and explain what's wrong with your vehicle. Behind the scenes, computer algorithm figures out which type of vehicle is best to tow your vehicle safely and quickly.

But that's not all! "TugVan" also offers special discounts called vouchers that you can use to pay less for the towing service, making assistance not only efficient but also affordable. These discounts are managed by the website's administrators. Plus, "TugVan" helps in urgent situations, making sure you get help quickly if you need it.

It also has a Mobile application for the Company use where the checks it's status and the biddings along with that It also tells about the status of the Customer regarding its service.

In short, "TugVan" makes it easy to get help when your vehicle has problems on the road. It's like having a friendly assistant that connects you to the right help and even offers you discounts, making your journeys safer.

Acknowledgement

Our team has put a lot of effort into this project, and we appreciate the guidance, consideration, and support from COMSATS University Lahore, as well as the ongoing supervision of Muhammad Usman Akram. We sincerely appreciate their continued leadership, support, and welcoming attitude. This project could not have started without your sincere support and guidance.

Table of Contents

Table of Contents

1 Introduction

This section presents the complete introduction of the system, The complete overview of the system includes system goals and objectives and its scope. It gives us the reasoning how the system is a market-fit product in the presence of current vehicle problems. System limitations are also discussed below.

1.1 Introduction

Introducing "TugVan", an innovative project that explores how we deal with vehicle problems or troubles on the road. In this introduction, we'll explain what "TugVan" is all about, its vital objectives, and how it plans to make your roadside experiences more efficient and less stressful.

In our daily lives, we depend on vehicles like cars, bikes, 4x4s, and even bicycles to get around. But sometimes, these vehicles break down or run into problems while we're on the road. That's where "TugVan" steps in, aiming to provide a modern and hassle-free solution.

TugVan project is very important for us because they help when vehicles break down and the roads are rough. TugVan provides reliable towing services across the State, which is very useful in busy cities. Using a simple website and being affordable, TugVan solves the problem of not having enough support when your vehicle stops working. This not only helps people but also boosts the transport business, creates more jobs, and makes things better for everyone.

In short, TugVan makes it easy to get help when your vehicle has problems on the road. It's like having a friendly assistant that connects you to the right help and even offers you discounts, making your journeys safer. By providing a comprehensive, efficient, and affordable roadside assistance service, TugVan aims to transform how we handle vehicle breakdowns and improve overall transportation reliability. And is also efficient for the Company usage as it give them a reliable Mobile application.

1.2 Objectives

TugVan's primary objectives include providing a user-friendly platform for individuals to request towing assistance quickly and efficiently. Our primary goal is to provide seamless access to people experiencing vehicle problems on the road. To help. To achieve this, we prefer a user-friendly interface and an efficient algorithm that simplifies the process. Users should be able to easily provide important information - their current location, desired destination, and details about your vehicle. This will enable the algorithm to quickly identify suitable towing options based on location and cost efficiency, ensuring a quick and efficient response. The project aims to enhance the overall experience of dealing with vehicle issues, making it safer and more convenient.

The Projects Aim and Objectives listed:

1.2.1 Aims:

The Aims of our project is listed here.

1. Efficient Assistance: Provide a platform for quick and efficient assistance to those facing vehicle breakdowns.
2. Enhanced Safety: Safety of persons preferably combined with proper towing services.
3. User-Friendly Interface: Develop an intuitive, easy-to-use interface to facilitate a seamless user experience.
4. Optimize Technology: Using technology to improve the process of connecting troubled customers to towing services.
5. Cost-Effective Solutions: Offer cost-effective solutions for customers through voucher system integration.

1.2.2 Objectives:

The objectives of our project are listed here.

1. Algorithm Development: Develop an intelligent algorithm to identify suitable towing options based on location and cost efficiency.
2. User Input Streamlining: Streamline the process of providing important information for customers such as location, destination, and vehicle details.
3. Administrator Functionality: Implement an administrator-managed company registration system to enhance control and monitoring.
4. Emergency Response: Integrate the feature for faster assistance in emergency situations to increase user satisfaction.
5. Database and Company Management: Develop a robust database system to effectively manage company details and vehicle capabilities.
6. Seamless Payment Process: Integrate a seamless payment process that allows customers to pay online or choose cash-on-delivery.
7. User Notification System: Implement a notification system to update customers on their booking status and expected arrival times.
8. Feedback and Improvement Mechanism: Establish a mechanism to collect user feedback and suggestions for continuous improvement of the platform.

These aims and objectives collectively guide the development and implementation of the TugVan project, ensuring a comprehensive and effective solution for roadside assistance.

1.2.3 How it works

Imagine your vehicle has an issue, and you need assistance. You visit the "TugVan" website select the assistance or service which you need and then tell it where you are and where you want your vehicle to be taken. Then, you'll see a list of companies that can help you. You can choose the one that suits you best, maybe based on their prices. Once you've made your choice, you share your details and explain what's wrong with your vehicle to the chosen company.

Behind the scenes, clever computer programs (we call them algorithms) help decide which type of vehicle is best to tow your vehicle, depending on the problem. This helps things go smoothly and safely.

But "TugVan" isn't just for you; it's for towing companies too. We also created a Mobile application for them where they will show their statuses and the biddings and much more. They can join our website and become part of the team. And here's a bonus for you: "TugVan" gives you special discounts through vouchers, which are like coupons you can use to save money when you get help.

We know that sometimes you can't wait, especially in urgent situations. That's why "TugVan" can quickly respond to your requests when time is crucial. Our admins are here to make sure everything runs smoothly.

In Short, "TugVan" is on a mission to change how we deal with vehicle problems on the road. It wants to make your journeys safer, more convenient, and stress-free, whether you're driving a car, riding a bike, or using any other vehicle.

1.3 Problem Statement

In state, despite the increasing dependence on personal vehicles, there is a significant challenge related to the lack of an organized and effective system for addressing roadside defects. The absence of an organized platform to access quick and reliable towing services is quite a problem for people facing vehicle problems. TugVan aims to solve this problem by establishing a user-friendly and nationwide solution, bridging the gap between stranded customers and reliable towing services. This fulfils an important need in the Pakistani context, ensuring that people can get help quickly and efficiently during roadside emergencies.

1.4 Assumptions and Constraints

Assumptions: TugVan assumes that towing companies are willing to join the platform for a collaborative network, and users are willing to adopt a digital solution to request roadside assistance. The project assumes the availability of a responsible management team to facilitate seamless operations.

Constraints: TugVan recognizes potential barriers such as varying response times from towing companies, geographic limitations to service coverage, and the need for internet access for users to use the platform.

1.5 Project scope (what and what not to consider)

The following points can describe what the system will perform and what features it will not be able to provide.

1.5.1 In Scope:

The scope of the TugVan project primarily focuses on the development of a robust and user-friendly platform for towing services. The platform will allow users to quickly request towing assistance without the need for prior registration. User will select the Service which he/she needs. Then the user will enter their vehicle type as well as their pickup and destination locations, which will trigger an intelligent algorithm to recommend suitable towing companies based on location and cost-effectiveness.

Additionally, voucher systems managed by administrators will be integrated to provide cost savings opportunities to customers. The project will include an admin panel for efficient management of towing companies, enabling features such as registration, editing, and deletion. The administrator will also monitor the voucher system and handle urgent requests, ensuring a smooth towing experience for customers. The focus is on streamlining the towing process, increasing customer satisfaction and effectively managing the network of towing companies.

1.5.2 Out of Scope:

TugVan is dedicated exclusively to towing assistance, ensuring that vehicle owners receive prompt and efficient help when faced with a breakdown. Unlike services that offer direct involvement in vehicle repairs, TugVan focuses solely on connecting users with reliable towing companies to manage the transportation of their disabled vehicles.

One of the standout features of TugVan is its commitment to extending coverage beyond the typical geographic limits set by individual towing companies. By partnering with a wide network of service providers, TugVan ensures that users can access towing assistance even in remote or underserved areas. This expansive reach provides peace of mind for drivers, knowing that help is available no matter where they encounter trouble on the road. Moreover, TugVan aims to guarantee uniform response times across all towing companies within its network. Acknowledging that various external factors, such as traffic conditions, weather, and distance, can affect response times, TugVan employs sophisticated algorithms and real-time data analysis to optimize dispatching and routing. This approach helps to minimize delays and ensures that users receive timely assistance, regardless of the circumstances.

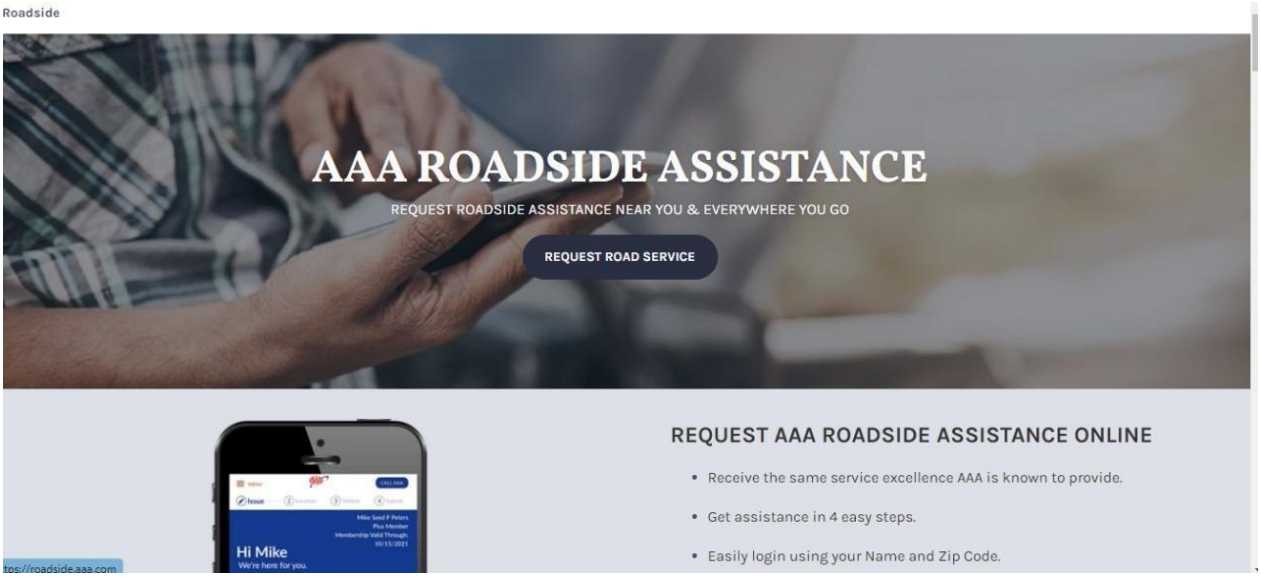
2 Requirements Analysis

This chapter provides a comprehensive and impactful analysis of comparable systems currently available, highlighting their similarities with our system's features. It also succinctly outlines both the functional and non-functional requirements of our system.

2.1 Literature Review of Existing Systems in Practice

The Literature Review brings an extensive yet effective analysis of all the similar existing systems and comparison of our system features with the existing systems.

2.1.1 AAA Roadside Assistance Application (1)

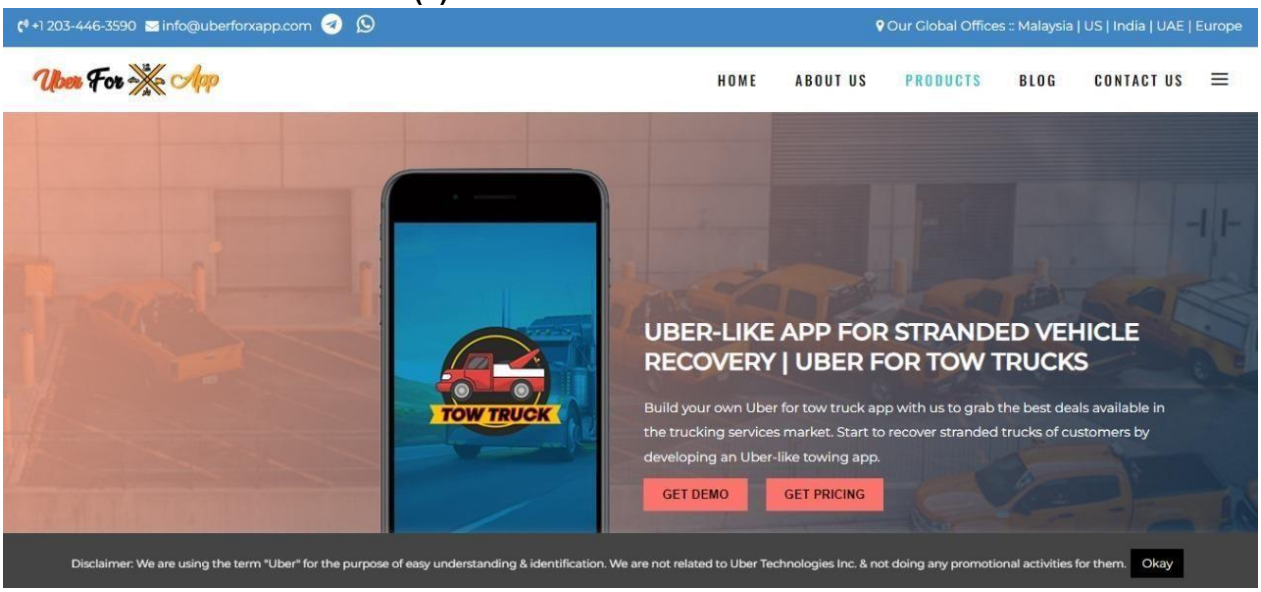


Offers a huge array of basic roadside assistance services, including towing, battery jump-starts, and flat tire assistance. Users can request help by sharing their location and vehicle details.

But it does not include.

1. Lack of innovative features beyond basic roadside assistance services.
2. Absence of an integrated voucher system or administrator-managed company registration.

2.1.2 Uber Tow Truck Service (2)

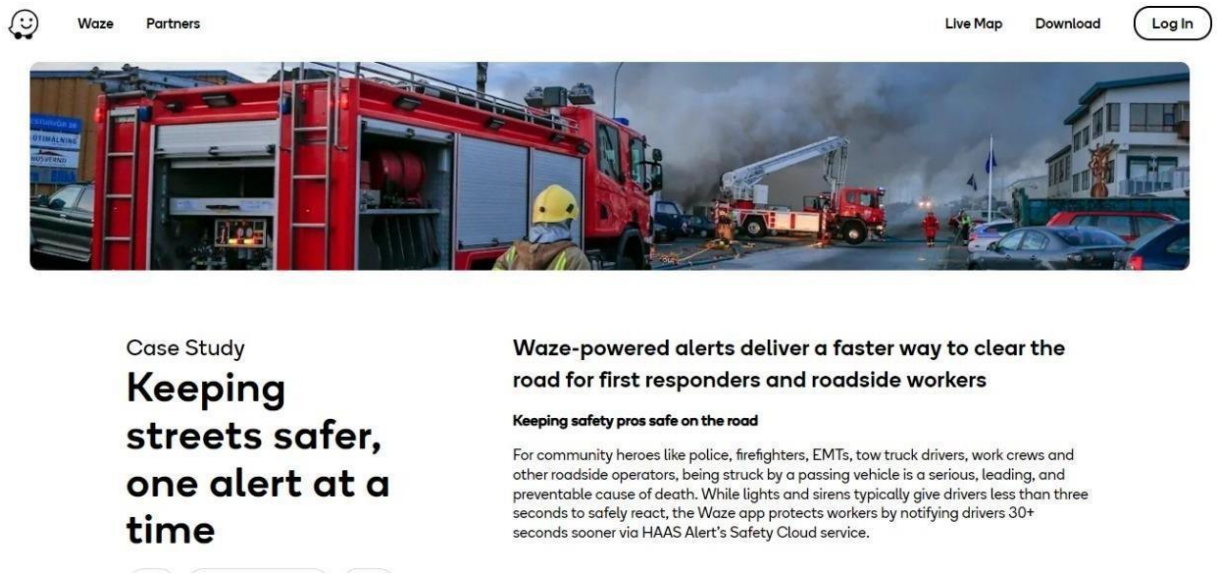


Allows users to request tow truck services through the Uber app in select cities, providing a convenient option for immediate vehicle towing.

But it does not include.

1. Primarily focused on offering towing services, lacking diverse roadside assistance options.
2. Missing features such as voucher systems or advanced administrative controls for towing companies.

2.1.3 Waze Roadside Assistance (3)

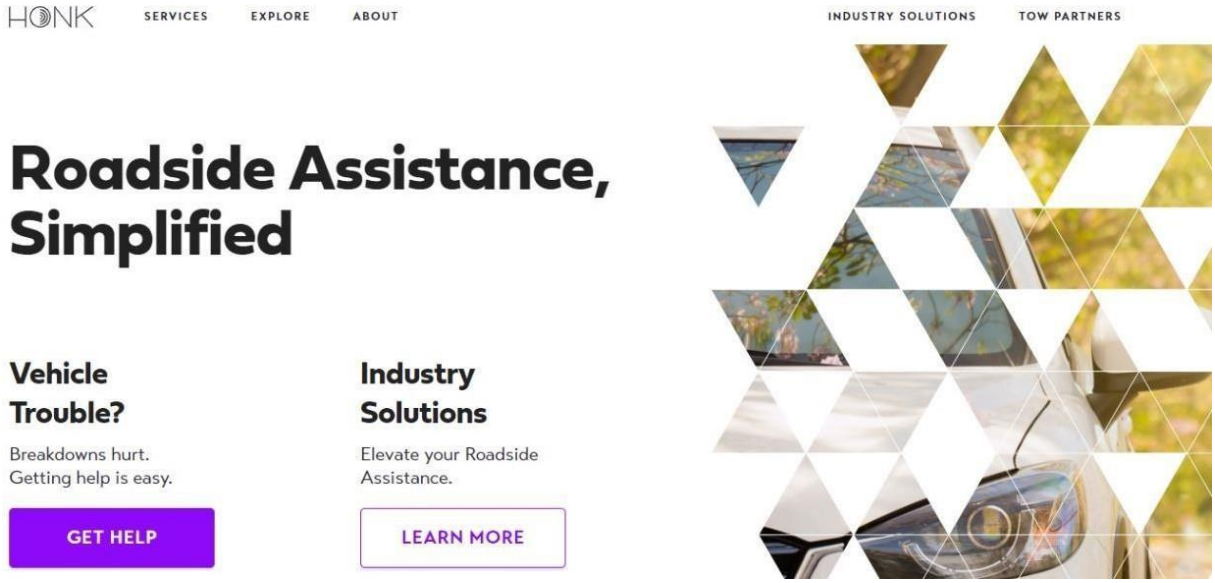


Integrates a feature enabling users to report roadside incidents and request assistance from nearby community members or service providers.

But it does not include.

1. Reliance on user-generated reports and community assistance, potentially compromising reliability.
2. Potential absence of administrative control or a voucher system.

2.1.4 HONK - Roadside Assistance App (4)

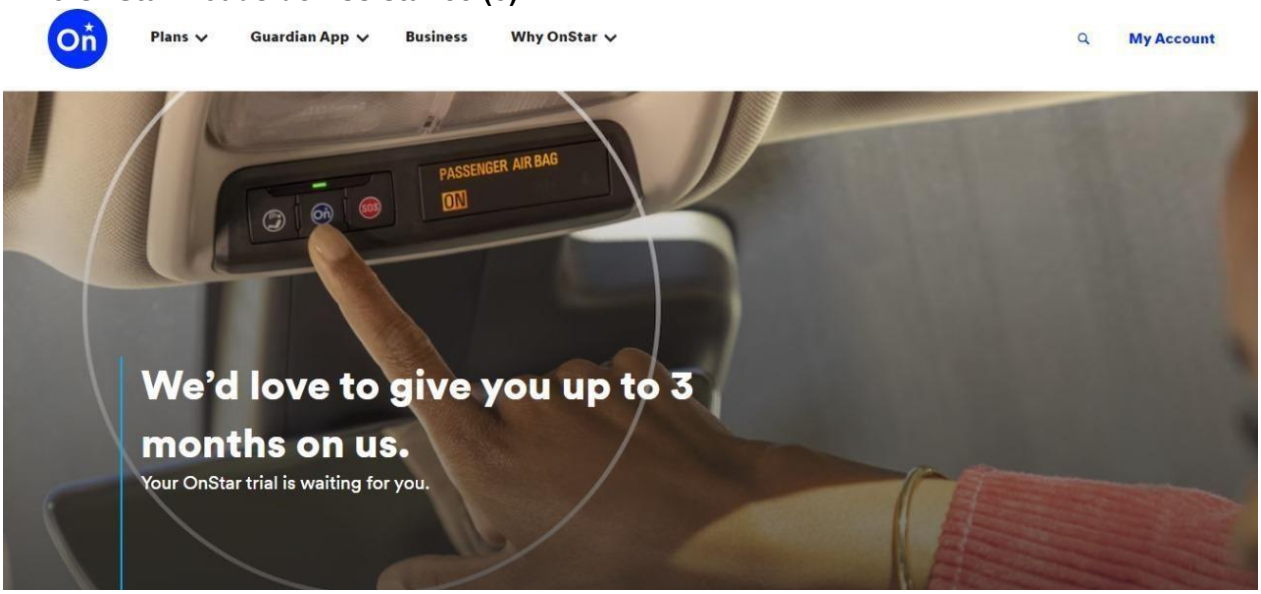


Connects users to a network of tow truck providers offering towing, jump starts, and fuel delivery services.

But it does not include.

1. Lack of advanced administrative features for towing companies.
2. Absence of a managed voucher system for customer cost-saving benefits.

2.1.5 OnStar Roadside Assistance (5)



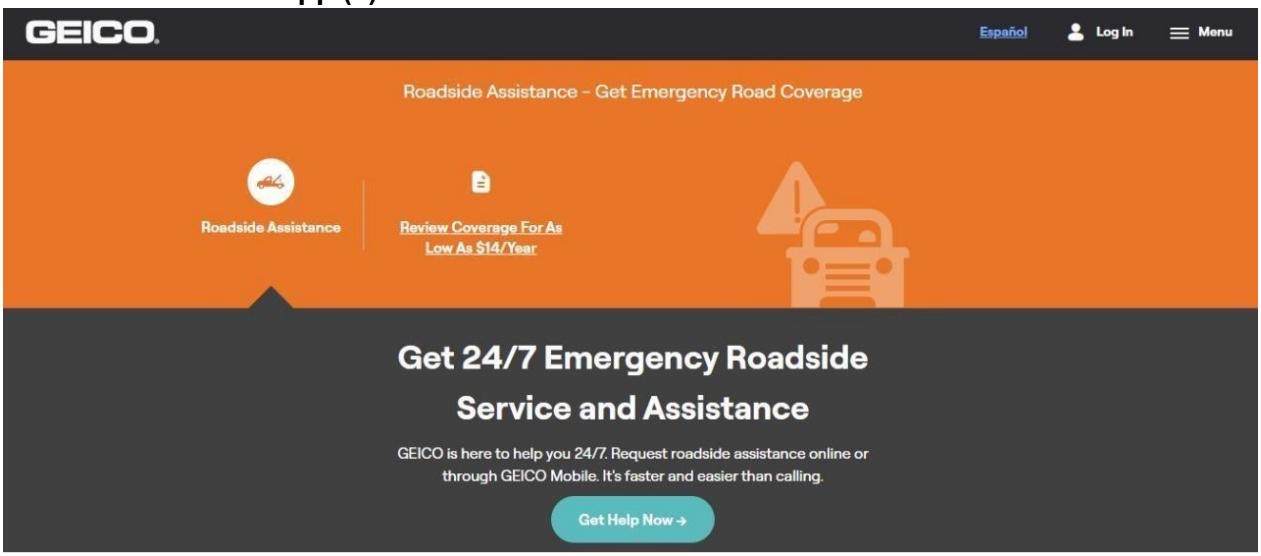
Equipped in vehicles, it allows users to request immediate help for flat tires or breakdowns by pressing a button.

But it does not include.

1. Limited accessibility, confined to vehicles equipped with OnStar technology.

2. Lack of administrative controls or voucher systems.

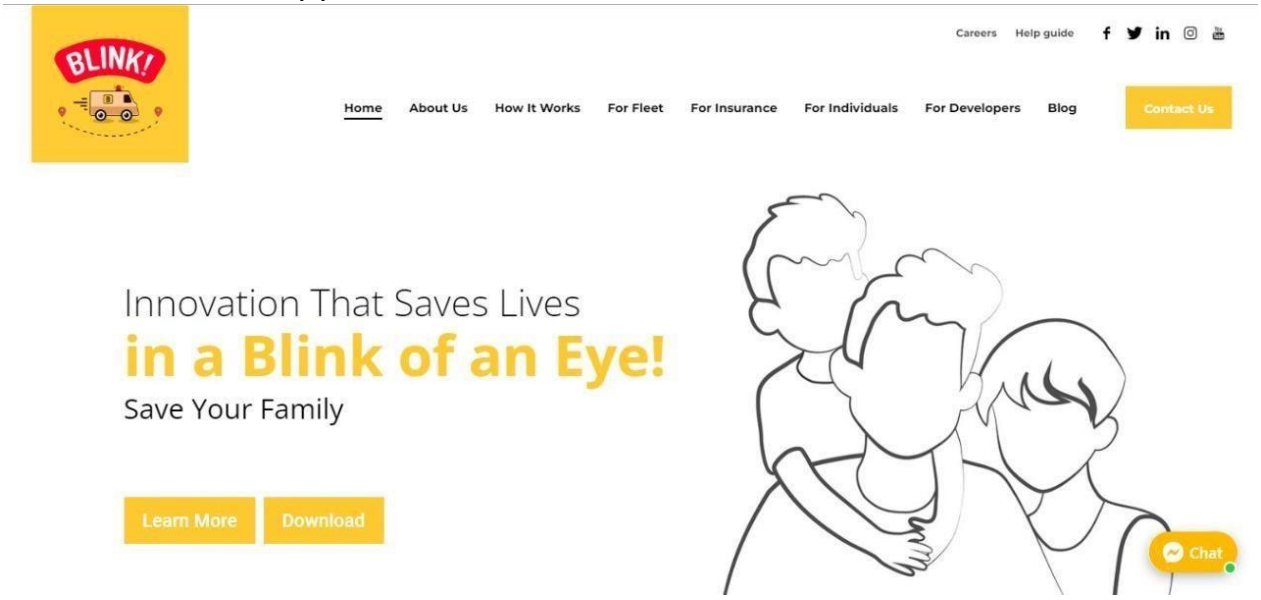
2.1.6 GEICO Mobile App (6)



Provides roadside assistance services allowing users to report issues and receive aid from nearby service providers. **But it does not include.**

1. Potential absence of an integrated administrator-managed company registration system.
2. Lack of voucher systems for enhanced control and cost-saving benefits.

2.1.7 Blink Roadside (7)



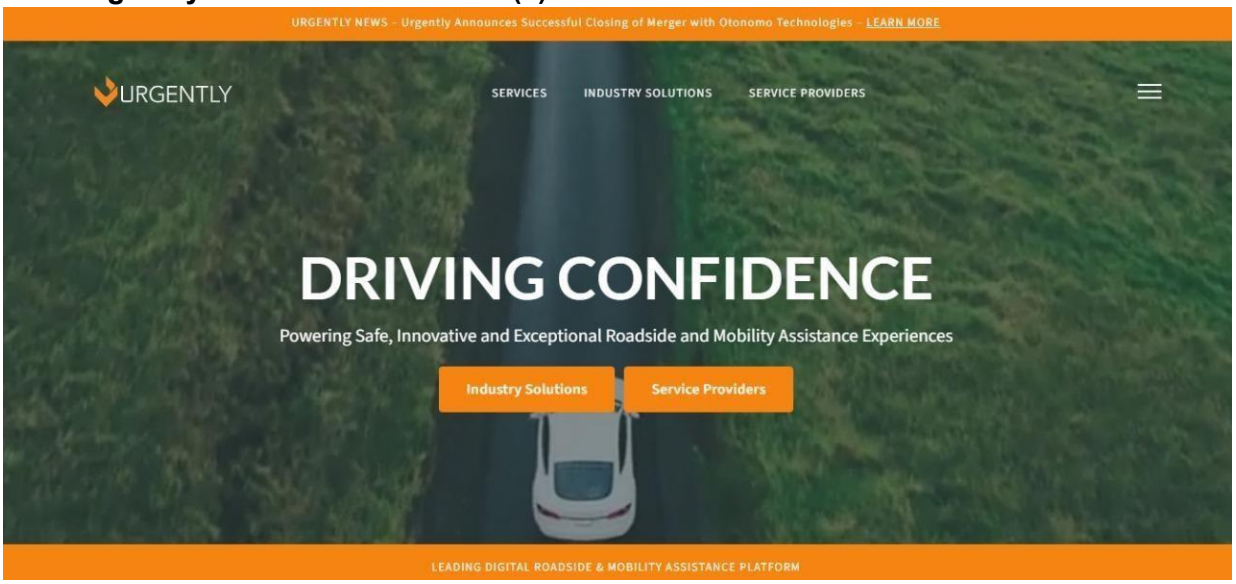
Connects users with tow truck and roadside assistance services through an app for quick assistance during vehicle problems.

But it does not include.

1. Potential lack of specialized administrative controls.

2. Absence of a managed voucher system for customers.

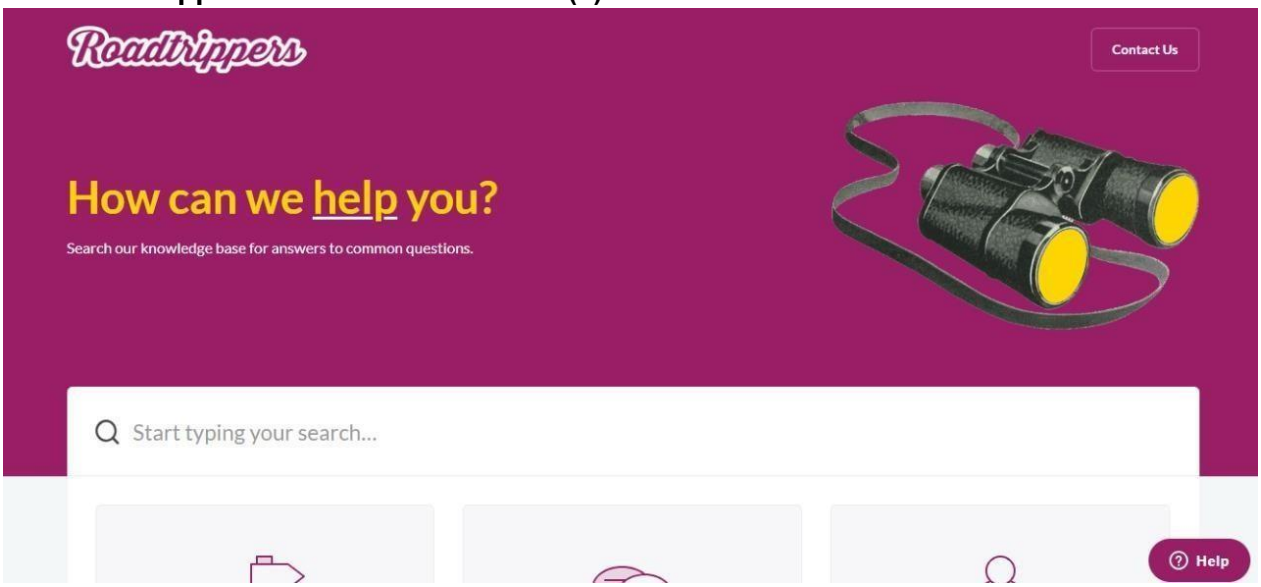
2.1.8 Urgent.ly Roadside Assistance (8)



Offers on-demand roadside assistance services like towing, flat tire changes, and fuel delivery through a mobile app. **But it does not include.**

1. Potential lack of advanced features like an integrated voucher system.
2. Potential absence of comprehensive administrative controls for towing companies.

2.1.9 Roadtrippers Roadside Assistance (9)

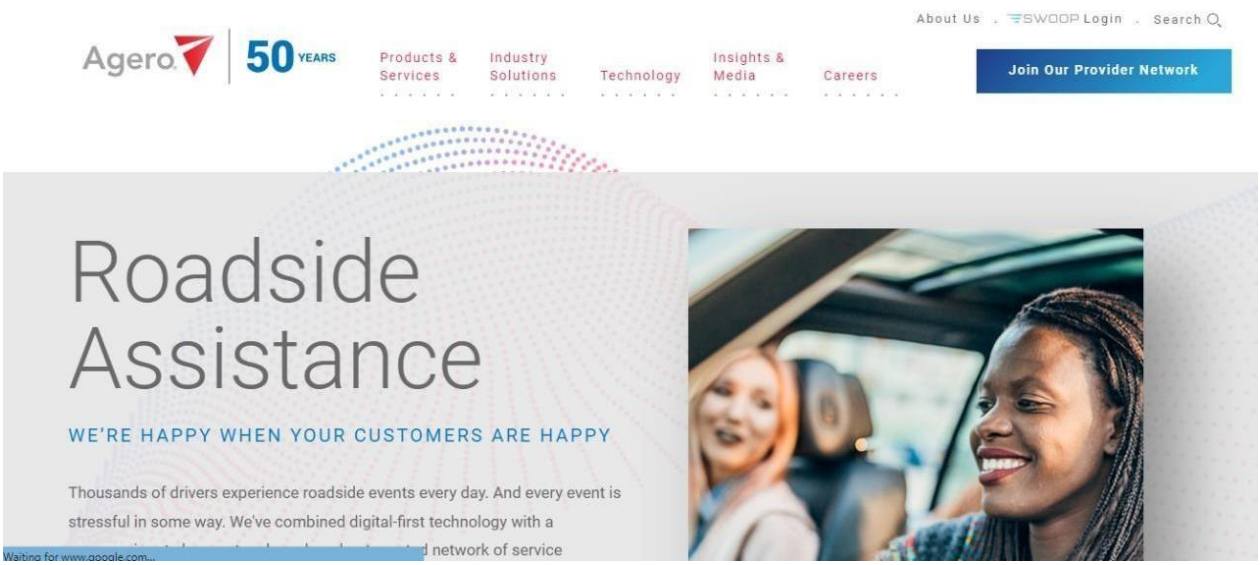


Provides roadside assistance services catering to travelers, offering towing and support during trips.

But it does not include.

1. Potential lack of advanced features such as an integrated voucher system.
2. Potential absence of administrative controls for towing companies.

2.1.10 Agero Roadside Assistance (10)



Provides roadside assistance and emergency dispatch services for vehicles, including towing and vehicle diagnostics.

But it does not include.

1. Potential lack of advanced administrative controls for towing companies.
2. Potential absence of a managed voucher system for cost-saving benefits to customers.

In contrast to these existing systems, TugVan stands out due to its innovative features such as an administrator-managed company registration system, integrated voucher system, and a comprehensive approach to address specific needs and challenges in the field of roadside assistance. These features aim to provide a seamless and user-centric experience during vehicle breakdowns, offering enhanced control, efficiency, and cost-saving benefits for both customers and towing companies.

2.2 Stake Holder List

Stakeholders are the people that have direct or indirect interaction with the system.

Following stakeholders are involved in our system:

1. Developers
2. Project Supervisor
3. COMSATS University Islamabad (Lahore Campus)
4. Company
5. Customer
6. Admin

2.3 Requirements Elicitation

Requirement elicitation is a process of gathering the functional and non-functional requirements of the system. It actually encompasses all the requirements of the actual system to be developed.

2.3.1 Functional Requirements

2.3.1.1 FR01 Company Registration

ID	Name	Description
FR01	Company Registration	TugVan should allow towing companies to register on the platform. During registration, companies provide essential details, such as company name, contact information, and authentication credentials. This ensures that authorized towing services become part of the TugVan network.

2.3.1.2 FR02 Company Login:

ID	Name	Description

FR02	Company login	Towing companies should have a secure login mechanism to access their dedicated TugVan accounts. This login feature ensures that registered companies can manage their services, view assistance requests, and utilize platform functionalities securely.

2.3.1.3 FR03 Company Logout:

ID	Name	Description
FR03	Company Logout	The Companies shall be able to logout from their account

2.3.1.4 FR04 Company Authentication

ID	Name	Description
FR04	Company Authentication	TugVan should implement authentication mechanisms to ensures that only authorized towing companies can access their accounts. This includes secure login procedures, authentication, or methods to protect against unauthorized access.

2.3.1.5 FR05 Company Dashboard

ID	Name	Description
FR05	Company Dashboard	TugVan's Company dashboard is a comprehensive tool for companies to manage requests, company operations like new requests, upcoming, urgent, pricing, and managements.

2.3.1.6 FR06 Booking

ID	Name	Description

FR06	Booking	TugVan ensures a smooth and user-friendly booking experience, allowing customers to easily enter details, including location, type of vehicle issue, and towing company's capacity. Algorithm ensures that user requests are matched with the most suitable towing service. Select towing services, and confirm assistance requests.

2.3.1.7 FR07 Company Listing

ID	Name	Description
FR07	Company Listing	TugVan presents a listing of registered towing companies, names, service area, and capacities. This listing allows users to make informed choices when requesting towing assistance.

2.3.1.8 FR08 Filter and Search

ID	Name	Description
FR08	Filter and Search	TugVan provides users with filters and a search functionality to easily find specific towing companies or services. This feature enhances user experience by facilitating quick and targeted searches based on preferences.

2.3.1.9 FR09 User Dashboard

ID	Name	Description
FR09	User Dashboard	TugVan offers a user-friendly dashboard for individuals to manage their requests, view the status of ongoing assistance, and access relevant information.

2.3.1.10 FR10 Discounts and Vouchers

ID	Name	Description
FR10	Discount and vouchers	TugVan involves a system for generating and applying special discounts or vouchers. These discounts enhance the affordability of towing services for users, promoting cost-effective solutions.

2.3.1.11 FR11 Secure Payment Gateway

ID	Name	Description
FR11	Secure Payment Gateway	TugVan integrates a secure payment gateway to facilitate simple and secure transaction between users and towing companies. This ensures that financial transactions on the platform are protected and trustworthy.

2.3.1.12 FR12 Email Notification

ID	Name	Description
FR11	Email Notification	TugVan implements a booking confirmation email notification to keep customers informed when their towing assistance request is confirmed

2.3.1.13 FR13 Admin Login

ID	Name	Description
FR13	Admin login	The administrator shall be able to login to their account using their credentials.

2.3.1.14 FR14 Admin Logout:

ID	Name	Description

FR14	Admin Logout	The administrator shall be able to logout.

2.3.1.15 FR15 Admin Dashboard

ID	Name	Description
FR15	Admin Dashboard	TugVan's admin dashboard is a comprehensive tool for administrators to manage user requests, oversee towing company operations, and control overall system content.

2.3.1.16 FR16 Fleet Management

ID	Name	Description
FR16	Fleet Management	The system administrator shall be able to add a new Vehicle type by providing image, Vehicle type name. The system administrator shall be able to view, edit and delete Vehicle types.

2.3.1.17 FR17 Services

ID	Name	Description

FR16	Services	TugVan Provides different services for your assistance which will help you regarding to your incident here are the names of the services (Tire fitter, wrong fuel, battery replacement, Windscreen replacement, key lost car recovery, Mobile servicing, DPF Cleaning).

2.3.1.18 FR17 Tracking

ID	Name	Description
FR17	Tracking	TugVan include tracking module through which customer can track their booking and get information about their booking Status.

NON-FUNCTIONAL REQURIMENTS

2.3.1.19 NFR01 User-Friendly Interface

ID	Name	Description
NFR01	User-Friendly Interface	Tugvan prioritizes a user-friendly interface to enhance the overall experience for both users and towing companies. This includes intuitive navigation, clear layouts, and easy access to key functionalities.

2.3.1.20 NFR02 Security

ID	Name	Description
NFR02	Security	Tugvan places a high emphasis on security, ensuring that user data, login credentials, and financial transactions are protected.

2.3.1.21 NFR03 Performance Optimization

ID	Name	Description
NFR03	Performance Optimization	Tugvan is designed for optimal performance, ensuring quick response times to user requests and efficient assistance coordination.

2.3.1.22 NFR04 Scalability

ID	Name	Description
NFR04	Scalability	Tugvan is built to be scalable, accommodating an increasing number of users and towing companies as the platform grows. Scalability measures ensure that the system can handle a growing user base without compromising performance.

2.3.1.23 NFR05 Reliability

ID	Name	Description
NFR05	Reliability	Tugvan is committed to providing a reliable platform, minimizing downtime and ensuring continuous service availability.

2.3.1.24 NFR06 Data Management

ID	Name	Description
NFR06	Data Management	The platform should have robust database management to handle company listings, user information, and other relevant data efficiently.

2.3.1.25 NFR07 Compatibility

ID	Name	Description
NFR07	Compatibility	Tugvan ensures compatibility across devices and browsers, allowing users and towing companies to access the platform seamlessly from various devices.

2.3.1.26 NFR08 Readability

ID	Name	Description
NFR08	Readability	Tugvan prioritizes readability in its interface design, using clear and legible fonts, appropriate color contrasts, and well-organized layouts.

2.3.1.27 NFR09 Performance Monitoring

ID	Name	Description

NFR09	Performance Monitoring	Tugvan involves performance monitoring tools to track and analyse the platform's performance.

2.3.2 Requirements Traceability Matrix

Functional Requirements	Actor	Requirement Description	Use Case Description	Use Case Diagram	Activity Diagram	Sequence Diagram	Test Case No
2.3.1.1 Company registration	Admin	TugVan should allow towing companies to register on the platform.	1	1	1	1	4
2.3.1.2 Login	Admin & Company	Towing companies should have a secure login mechanism to access their dedicated TugVan accounts.	3	2	2	2	2
2.3.1.5 Company Dashboard	Company	Company dashboard is a comprehensive tool for companies to manage requests, company operations like new requests, upcoming, urgent, pricing, and managements.	4	5	3	4	1

2.3.1.6 Booking	User	TugVan ensures a smooth and user-friendly booking experience, allowing customers to easily enter	6	8	4	3	18
		details, including location, type of vehicle issue, and towing company's capacity.					
2.3.1.7 Company listing	Admin	TugVan presents a listing of registered towing companies, names, service area, and capacities.	2	4	5	5	17
2.3.1.9 User Dashboard	User	TugVan offers a user-friendly dashboard for individuals to manage their requests, view the status of ongoing assistance, and access relevant information.	8	7	7	7	14

2.3.1.10 Discount	Admin	TugVan involves a system for generating and applying special discounts or vouchers.	9	9	8	8	5
2.3.1.11 payment	User	TugVan integrates a secure payment gateway to facilitate simple and secure transaction	10	10	9	9	24

		between users and towing companies.					
2.3.1.12 Notify	Admin & User	TugVan implements a booking confirmation email notification to keep customers informed when their towing assistance request is confirmed	7	11	10	10	27

2.3.1.15 Admin dash	Admin	TugVan's admin dashboard is a comprehensive tool for administrators to manage user requests, oversee towing company operations, and control overall system content.	11	12	12	12	1
2.3.1.17 Tracking	Customer	TugVan include tracking module through which customer can track their booking and get information about their booking Status.	5	3	11	11	21

2.4 Use Case Descriptions:

Add the use case Id, Name, Actors, Description, pre and post conditions, event flow, alternative flow, and exception (if any) to the use case description so that all functional required behaviour is clearly displayed.

2.4.1 Company Registration

Use Case Id	1
Use Case Name	Company Registration
Actors	Company, Database
Description	This Use case describe that TugVan should allow towing companies to register on the platform. During registration, companies provide essential details, such as company name, contact information, and authentication credentials.
Pre-condition	Companies is to be registered.

Post-Condition	Companies registered in the databases and became a part of TugVan network.
Normal flow of Events	• Companies will be registered. • Users can view the Company and their services. • User selects Companies payment processes. • Selected Vehicle can reach Company.
Alternative Flows	• No search Query
Exceptions	Company can be registered through admin if the details have some issues admin will reject them.

2.4.2 Company Listing

Use Case Id	2
Use Case Name	Company Listing
Actors	User
Description	TugVan presents a listing of registered towing companies, including their names, service areas, and capacities. This listing enables users to make informed decisions when requesting towing assistance.
Pre-condition	Towing companies are registered, and their details are available in the database.
Post-Condition	Users can access and view the listing of registered towing companies through the TugVan platform.
Normal flow of Events	• User accesses the TugVan platform and navigates to the company listing section. • The system retrieves information from the database regarding registered towing companies. • The system displays a comprehensive list containing company names, service areas, and towing capacities. • Users browse through the listing to evaluate different towing companies. • Based on their preferences or requirements, users select a towing company from the list.
Alternative Flows	• No registered towing companies are found in the database.

Exceptions	• In case of no registered towing companies, the system displays a message indicating the absence of available listings. • If technical issues occur during data retrieval or display, the system shows an error message prompting users to try again later.

2.4.3 Company Login

Use Case Id	3
Use Case Name	Company Login
Actors	Company, Database
Description	Towing companies should have a secure login mechanism to access their dedicated TugVan accounts. This login feature ensures that registered companies can manage their services, view assistance requests, and utilize platform functionalities securely.
Pre-condition	Towing companies are registered in the TugVan system.
Post-Condition	Company successfully logged into their dedicated TugVan account.
Normal flow of Events	• Company accesses the TugVan login page. • Company enters their registered email/username and password. • System verifies the entered credentials against the database. • If the credentials are valid, the company gains access to their TugVan account.
	• The company can manage their services, view assistance requests, and use platform functionalities.
Alternative Flows	If the entered credentials are incorrect, the system prompts the company to re-enter the correct credentials or reset the password.
Exceptions	In case of system errors or technical issues preventing login, the company may not be able to access their account.

2.4.4 Company Dashboard

Use Case Id	4
Use Case Name	Company Dashboard
Actors	Company, Database

Description	The Company Dashboard enables registered companies to perform various actions related to managing bookings, pricing, vehicles, and accounts. It includes functionalities such as handling new requests, urgent requests, completed and canceled requests, managing pricing based on location, vehicle management (addition, editing, deletion), and accessing and updating company information and documents.
Pre-condition	The company is logged into the system.
Post-Condition	Company successfully manages bookings, pricing, vehicles, and account information within the platform.
Normal flow of Events	• Company logs into the dashboard. • View and manage new booking requests. • Process urgent booking requests if any. • Manage completed booking requests. • Handle canceled booking requests. • Set and adjust pricing based on different locations. • Add new vehicles to the company's profile. • Edit existing vehicle details. • Delete vehicles from the company's fleet. • Access and update company information. • Manage and upload necessary company documents.
Alternative Flows	• If there are no new, urgent, completed, or canceled booking requests, the respective sections remain empty. • In case of no changes in pricing by location, the existing pricing structure remains unchanged.
	• If there are no vehicles to manage, the vehicle management section displays a message indicating no vehicles added yet. • If no updates or changes are required in the company's information or documents, the information remains unchanged.
Exceptions	• If there are system errors or issues, the Company Dashboard may temporarily be inaccessible. • Insufficient permissions or incorrect authentication might restrict certain actions within the dashboard. • In case of incomplete or inaccurate company details, the system might prompt for necessary corrections before updating the information.

2.4.5 Tracking

Use Case Id	5
Use Case Name	Tracking

Actors	User
Description	There is a Tracking module which takes the Booking Id and then tells what's the status of your request
Pre-condition	Checks whether the booking is done or not
Post-Condition	Status will show that tells that the Booking is under consideration or not
Normal flow of Events	• Users note their booking Id. • User check through the ID about their status. • User checked his/her status.
Alternative Flows	• If the status is not shown your request is not correct
Exceptions	• If there are no completed or canceled booking requests, the respective sections remain empty.

2.4.6 Booking

Use Case Id	6
Use Case Name	Booking
Actors	User, Database
Description	TugVan ensures a smooth and user-friendly booking experience, allowing customers to easily enter details, including location, type of vehicle issue, and towing company's capacity. An algorithm ensures that user requests are matched with the most suitable towing service. Users select towing services and confirm assistance requests.
Pre-condition	User is on the TugVan platform and requires towing services.
Post-Condition	User's assistance request is confirmed and matched with a suitable towing service provider.

Normal flow of Events	• User accesses the TugVan platform. • User enters location details. • User specifies the type of vehicle issue. • User provides additional information regarding the towing company's capacity or preferences. • Algorithm matches the user's request with suitable towing service providers. • User selects a towing service provider from the list of matched options. • User confirms the assistance request.
Alternative Flows	None specified
Exceptions	• In case of technical issues with the platform, the user may not be able to complete the booking process. • If there are no available towing service providers based on the user's specified criteria, the system notifies the user accordingly.

2.4.7 Email Notification

Use Case Id	7
Use Case Name	Email Notification
Actors	User, Server
Description	Tugvan implements a booking confirmation email notification to keep customers informed when their towing assistance request is confirmed.
Pre-condition	User submits a towing assistance request, and it gets confirmed by the system.
Post-Condition	An email notification is sent to the user confirming the booking of towing assistance.
Normal flow of Events	• User submits a towing assistance request through the Tugvan platform. • The system processes the request and confirms the towing assistance booking. • The system triggers email notification generation. • The email notification is sent to the user's provided email address.
Alternative Flows	• If the user's email address is invalid or missing, the system generates an error and does not send the notification. • In case of technical issues or system failure during the notification sending process, the system logs the error for investigation and does not send the notification.

Exceptions	• If the towing assistance request cannot be confirmed by the system due to invalid details or other issues, no email notification is sent. • If the user cancels the request before confirmation, the email notification is not generated.

2.4.8 User Dashboard

Use Case Id	8
Use Case Name	User Dashboard.
Actors	User, database
Description	TugVan provides a user-friendly dashboard that enables individuals to effectively manage their requests, monitor the status of ongoing assistance, and access pertinent information.
Pre-condition	The user must be logged in to access the dashboard.
Post-Condition	The user interacts with and utilizes the dashboard features successfully.
Normal flow of Events	• User logs into the TugVan platform. • Upon successful login, the user accesses the dashboard interface. • The dashboard displays options to manage requests, including viewing, editing, or cancelling ongoing assistance. • The user interacts with the dashboard to check the status of their requests. • The dashboard provides access to relevant information related to towing services, guidelines, or support.
Alternative Flows	• If the user is not logged in, they are prompted to log in before accessing the dashboard. • In case of technical issues or maintenance, a notification is displayed to inform users about the unavailability of the dashboard temporarily.
Exceptions	• If there are connectivity issues or system failures, preventing access to the dashboard, an error message is displayed, and the user is encouraged to try again later. • Unauthorized attempts to access the dashboard prompt a security measure, denying entry and notifying the user to log in with valid credentials.

2.4.9 Vouchers and Discount

Use Case Id	9
Use Case Name	Vouchers and Discount
Actors	Admin, Database
Description	TugVan involves a system for generating and applying special discounts or vouchers. These discounts enhance the affordability of towing services for users, promoting cost-effective solutions.
Pre-condition	The system is operational and accessible to the Admin.
Post-Condition	Discounts or vouchers are generated and made available for application within
Normal flow of Events	• Admin accesses the voucher/discount generation system. • Admin inputs parameters for voucher/discount generation (e.g., discount percentage, expiration date, applicable services). • The system generates the voucher or discount based on the provided parameters. • Generated vouchers/discounts are stored in the database. • Users are notified or provided access to these vouchers/discounts. • Users apply vouchers/discounts during service acquisition.
Alternative Flows	• If the Admin encounters issues generating vouchers/discounts, they may review and revise the parameters for generation. • If there's a need for changes in the voucher/discount system, Admin may update the system configurations accordingly.
Exceptions	• If there are system errors during the generation or application of vouchers/discounts, the Admin may need to troubleshoot or rectify the issue. • In cases of fraudulent use or misuse of vouchers/discounts, the Admin may need to take corrective actions, such as revoking the voucher/discount or implementing additional security measures.

2.4.10 Payment

Use Case Id	10
Use Case Name	Payment
Actors	User
Description	TugVan integrates a secure payment gateway to facilitate simple and secure transactions between users and towing companies. This ensures that financial transactions on the platform are protected and trustworthy.

Pre-condition	User initiates a payment process for towing services.
Post-Condition	Payment is processed securely, and the transaction details are recorded in the TugVan system.
Normal flow of Events	• User initiates a payment for towing services through the TugVan platform. • TugVan system redirects the user to the integrated payment gateway for secure payment processing. • User provides payment details and authorizes the transaction. • Payment gateway verifies and processes the transaction securely. • Upon successful payment processing, the payment gateway sends a confirmation to the TugVan system. • TugVan system records the transaction details and updates the payment status as completed. • User receives confirmation of the successful payment and transaction details.
Alternative Flows	• If the payment authorization fails, the user is prompted to re-enter payment details or use an alternative payment method. • In case of system errors or connectivity issues with the payment gateway, the user is notified to try again later or use an alternative payment method.
Exceptions	• If the payment gateway experiences technical issues or is temporarily unavailable, the user is informed about the interruption, and the payment process is halted until the gateway is accessible again. • If fraudulent activity or irregularities are detected during payment processing, the transaction is flagged for further investigation, and appropriate measures are taken to ensure security and prevent unauthorized transactions.

2.4.11 Admin Dashboard

Use Case Id	11
Use Case Name	Admin Dashboard
Actors	Admin, Database
Description	TugVan's admin dashboard is a comprehensive tool for administrators to manage user requests, oversee towing company operations, and control overall system content.
Pre-condition	The admin must be authenticated and logged into the system.
Post-Condition	Changes made in the admin dashboard are saved in the database.

Normal flow of Events	• Admin logs into the TugVan system using valid authentication credentials. • Upon successful login, the admin is directed to the admin dashboard. • The dashboard displays various options and functionalities for managing user requests, overseeing towing company operations, and controlling system content. • Admin can view and manage user requests, including approvals and rejections. • Admin can monitor and analyze towing company operations, view company details, and services offered. • Admin can manage system content, including updates, additions, or removal of information. • Admin can perform administrative tasks such as user management, system configurations, etc. • The admin executes the necessary actions within the dashboard. • Upon completion of tasks, the admin logs out of the system.
Alternative Flows	• If the admin fails to log in with valid authentication credentials, access to the admin dashboard is denied. • In case of system errors or technical issues, the admin may encounter interruptions in accessing or performing tasks within the dashboard.
Exceptions	• Changes made by the admin might be subjected to validation or review processes before being implemented. • If there are critical errors or inconsistencies in the data entered by the admin, the system might prompt for corrections or reject the changes until they comply with system requirements.

2.4.12 Services

Use Case Id	12
Use Case Name	Services
Actors	User, database, service provider
Description	TugVan offers various assistance services such as tire fitting, wrong fuel removal, battery replacement, windscreen replacement, key lost car recovery, mobile servicing, and DPF cleaning. This use case describes how a user can request these services through the TugVan platform.
Pre-condition	The user must be logged in to request any service.

Post-Condition	The user successfully requests a service, and the service provider is notified to deliver the required assistance.
Normal flow of Events	• The user logs into the TugVan platform. • Upon successful login, the user navigates to the "Services" section. • The platform displays a list of available services: tire fitter, wrong fuel, battery replacement, windscreen replacement, key lost car recovery, mobile servicing, DPF cleaning. • The user selects the desired service from the list. • The user provides necessary details, such as the location of the vehicle and a brief description of the issue. • The platform calculates the estimated cost and shows the user a list of available service providers along with their ratings and prices. • The user selects a service provider based on their preference.
Alternative Flows	• If the user is not logged in, they are prompted to log in before accessing the "Services" section. • If the selected service provider is unavailable, the user is notified and prompted to select an alternative provider. • In case of technical issues or maintenance, a notification is displayed to inform users about the temporary unavailability of the service request feature.
Exceptions	• Login Failure: The user is unable to log in due to incorrect credentials or server issues. • Service Unavailability: The selected service is currently unavailable due to high demand or no available service providers in the area. • Incomplete Service Request: The user fails to provide all necessary details for the service request. • Network/Server Error: A network or server error occurs while the user is trying to submit a service request.

2.5 Use Case Diagram

Use case design explains the functionality of the system with the help of actors and use cases. Use cases are the functions or the actions that the system performs.

2.5.1 Company Registration

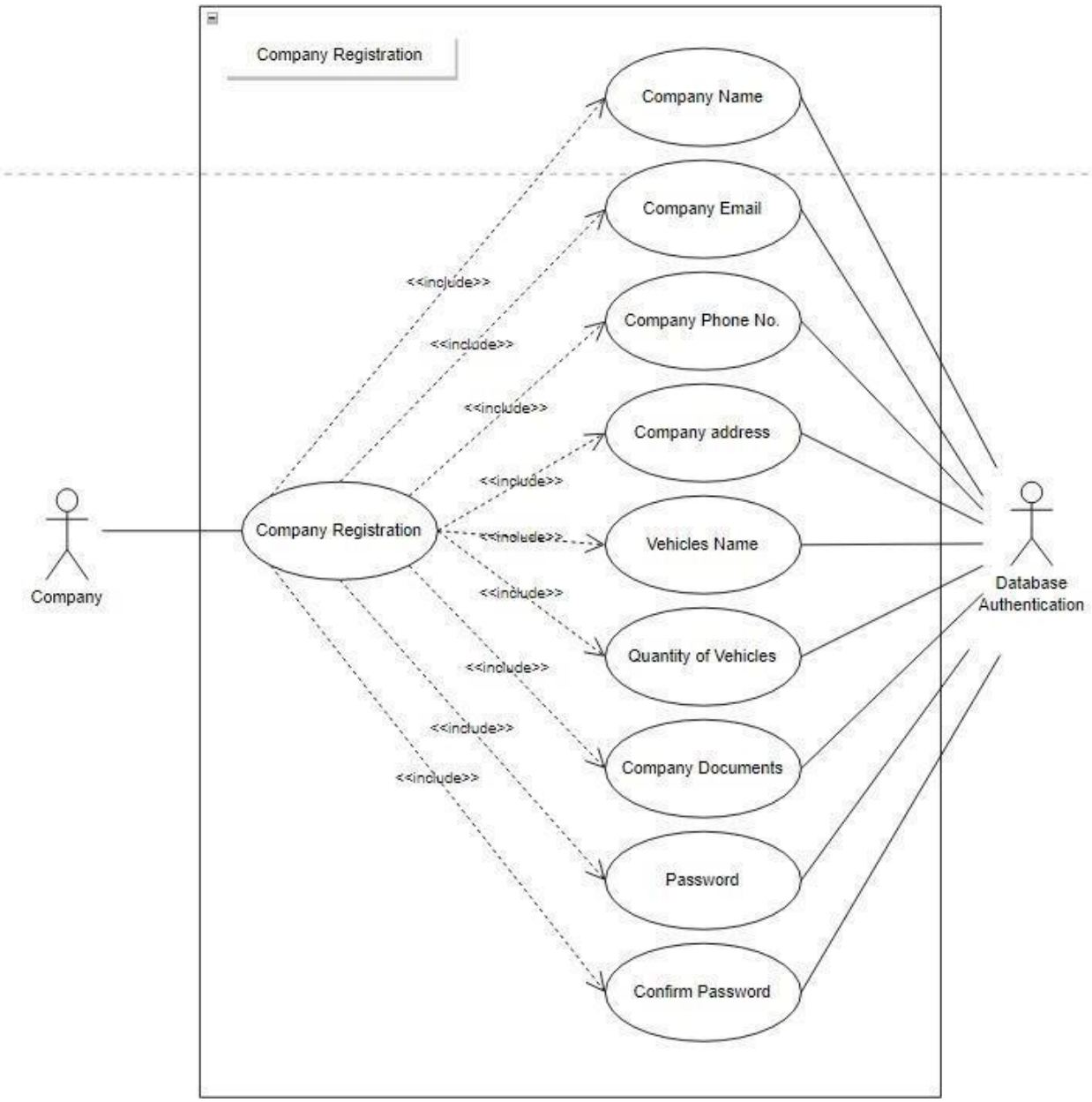


Figure 1Use Case Diagram: Company Registration

2.5.2 Login

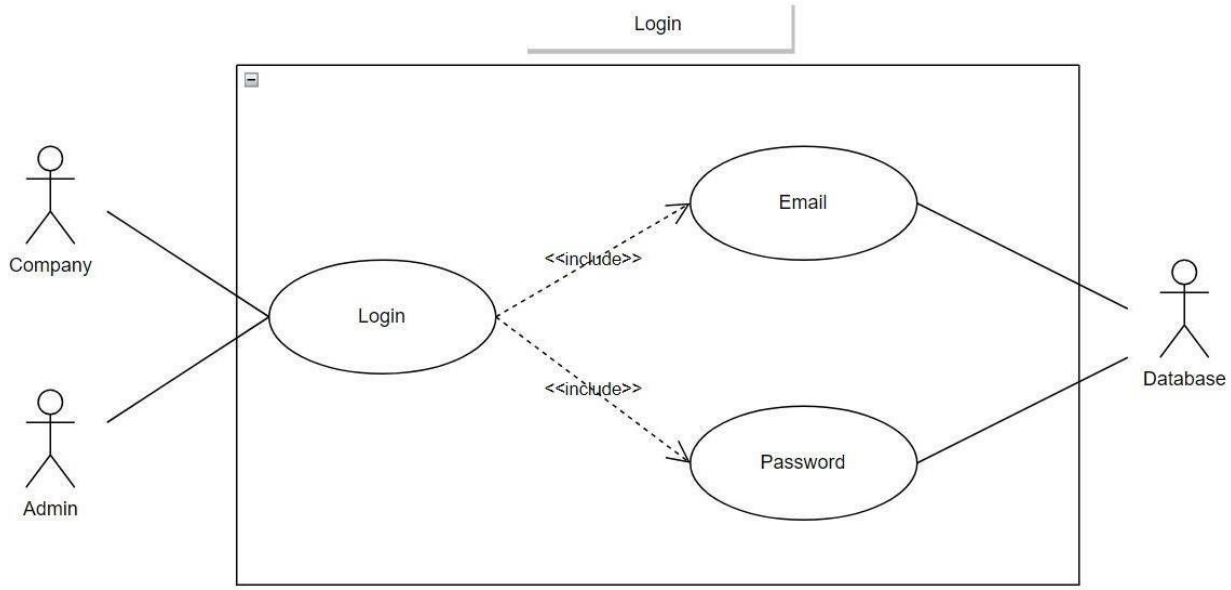


Figure 2Use Case Diagram: Login

2.5.3 Tracking

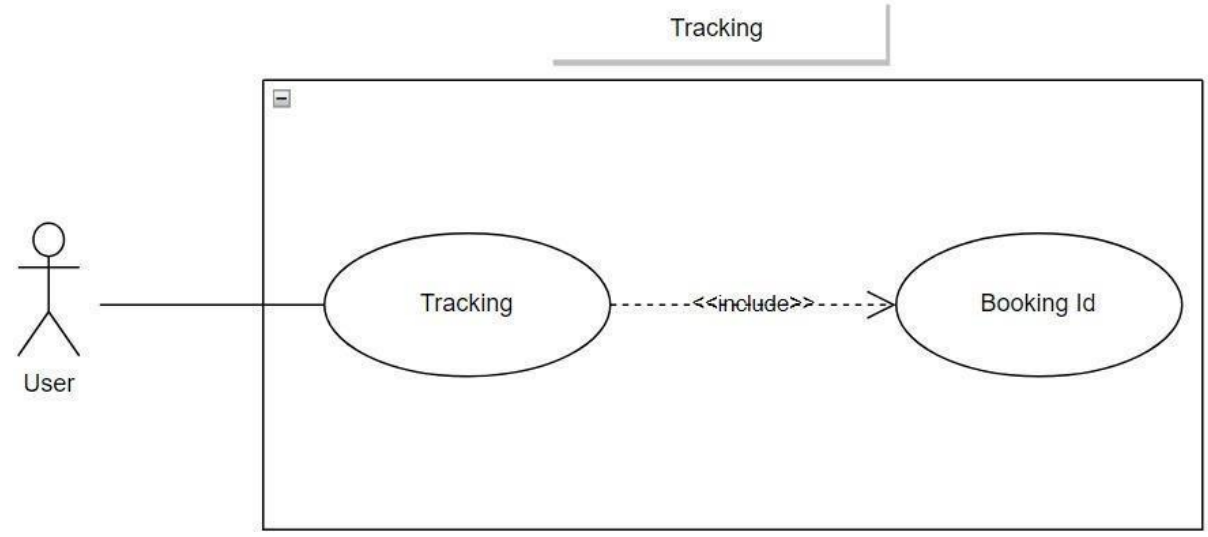


Figure 3Use Case Diagram: Tracking

2.5.4 Company Listing

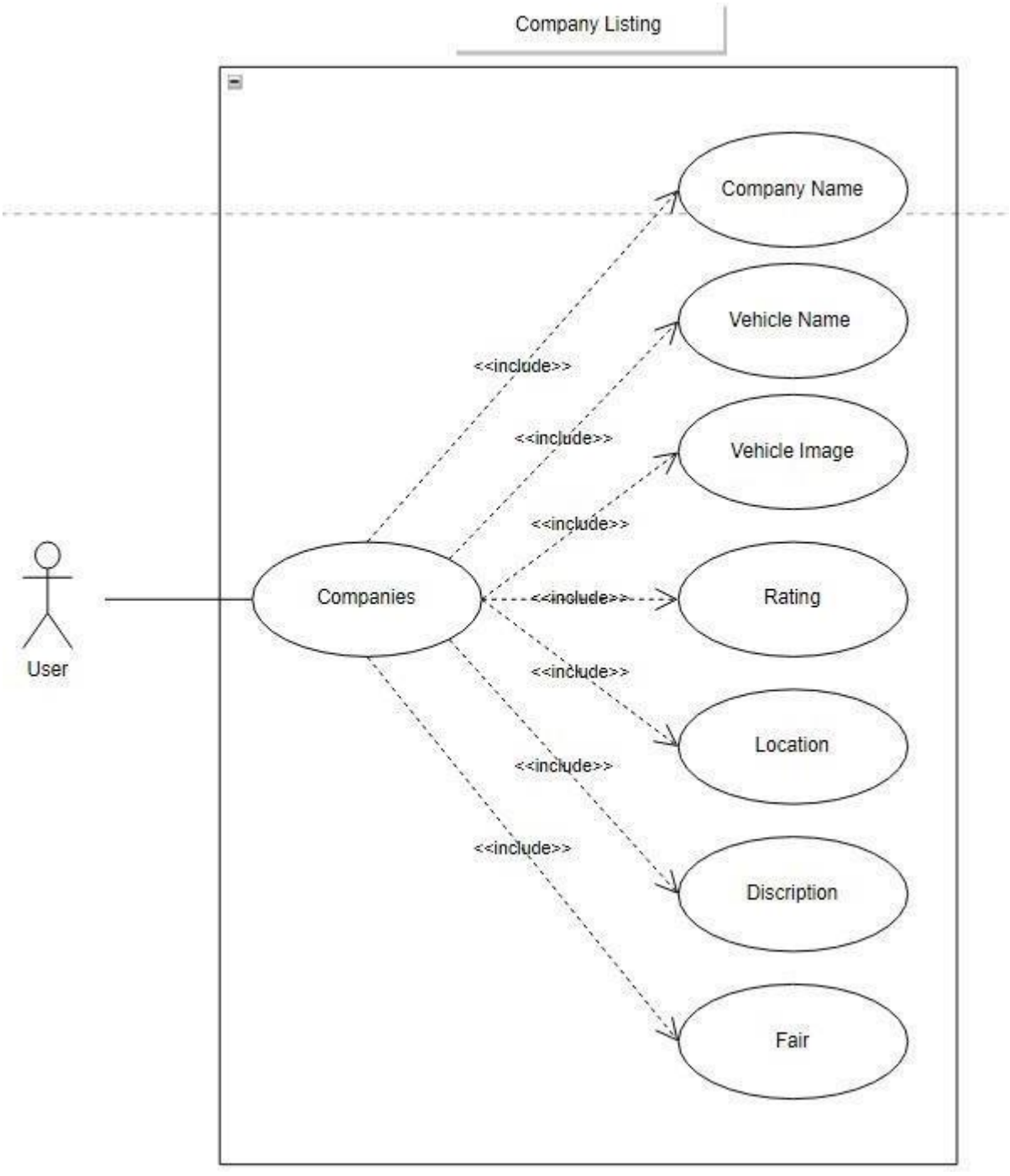


Figure 4Use Case Diagram: Company Listing

2.5.5 Company Dashboard

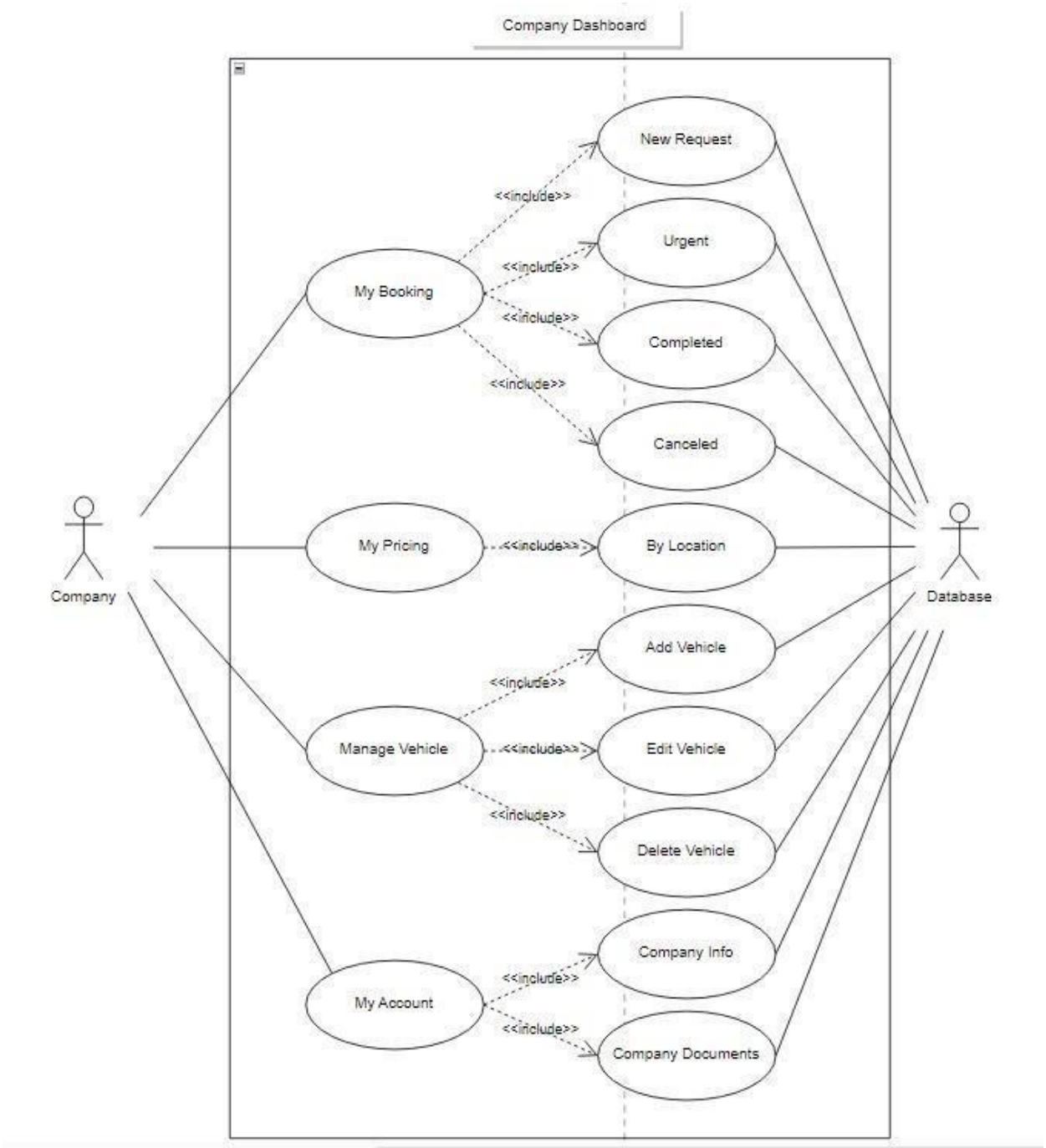


Figure 5Use Case Diagram: Company Dashboard

2.5.6 Search/Filter

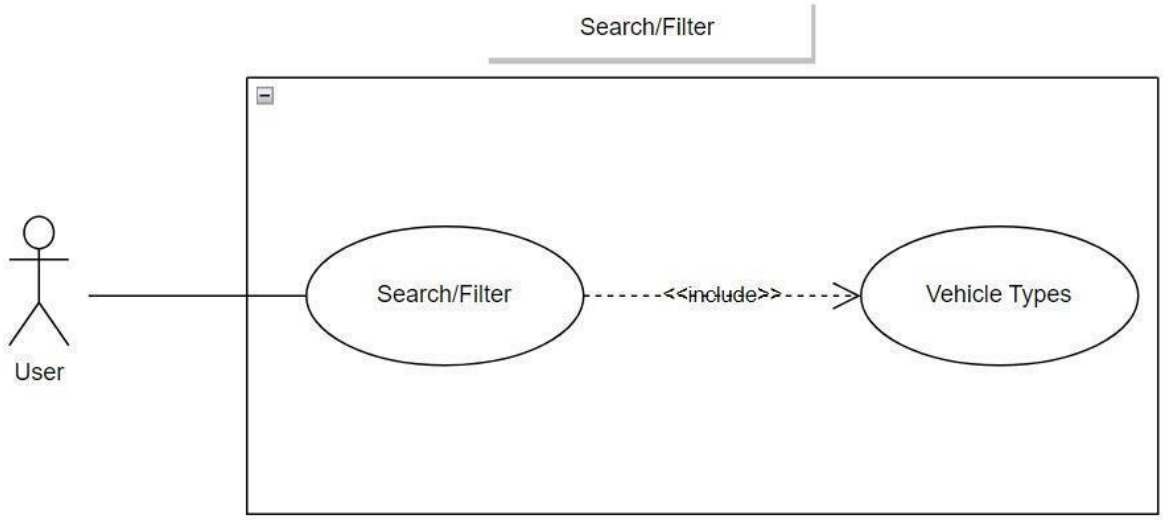


Figure 6Use Case Diagram: Search and Filter

2.5.7 User Dashboard

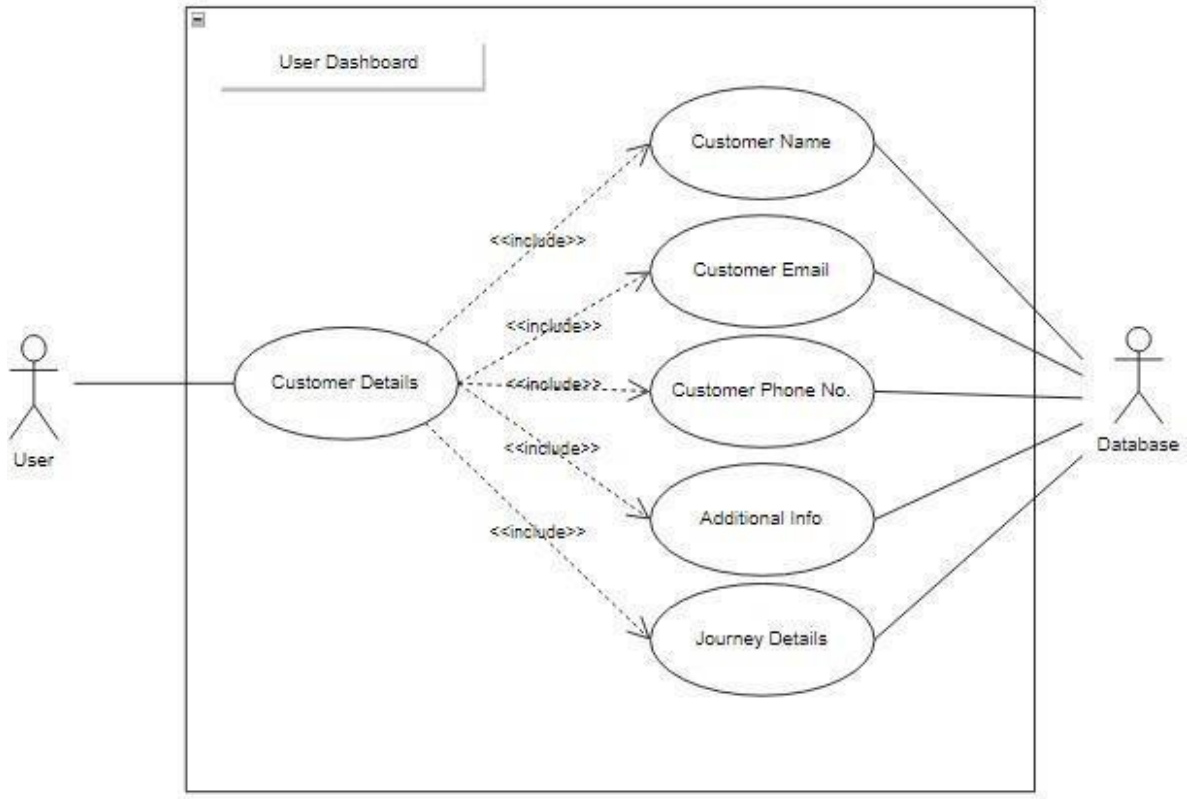


Figure 7Use Case Diagram:User Dashboar

2.5.8 Booking

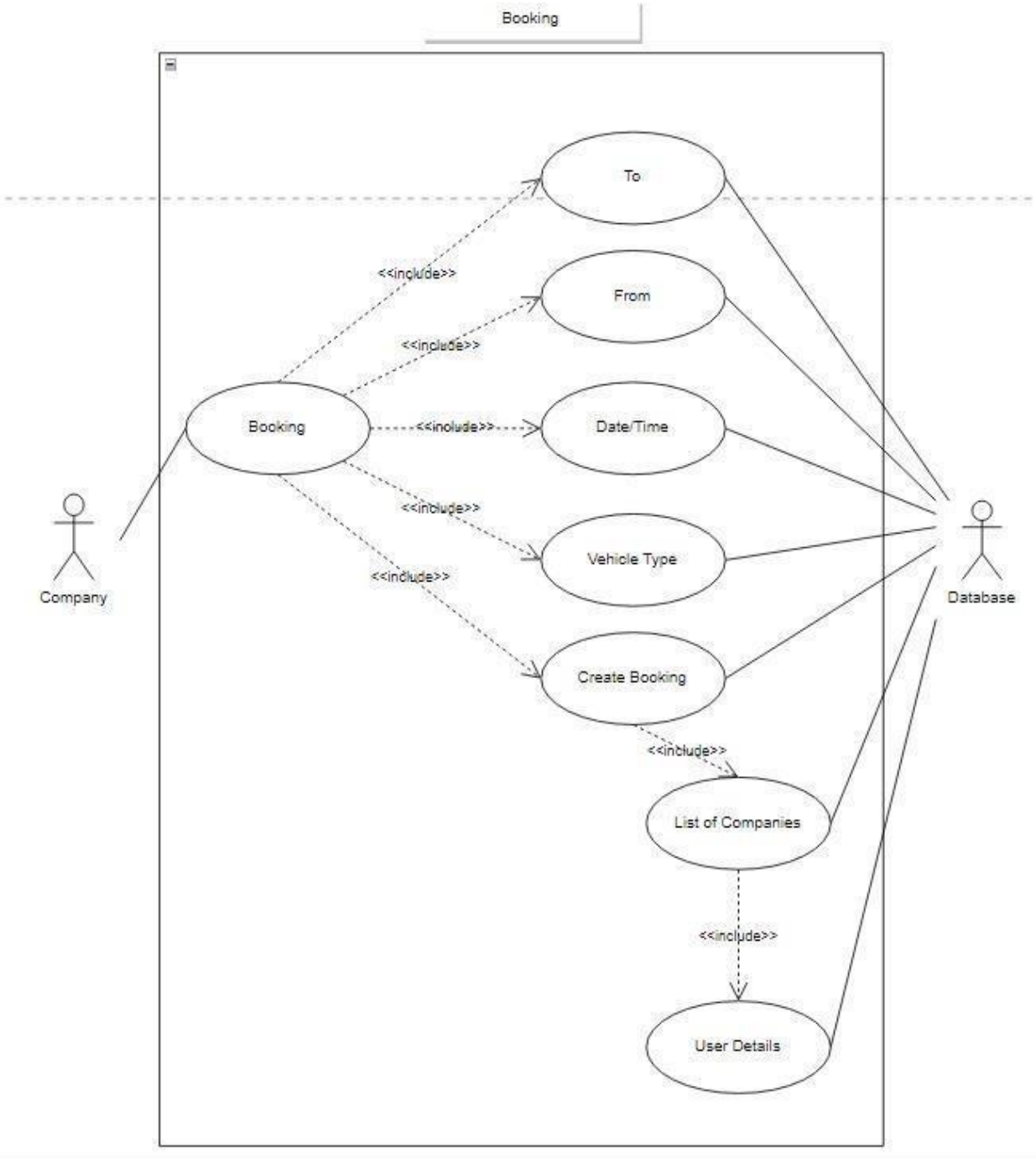


Figure 8Use Case Diagram: Booking

2.5.9 Voucher/Discounts System

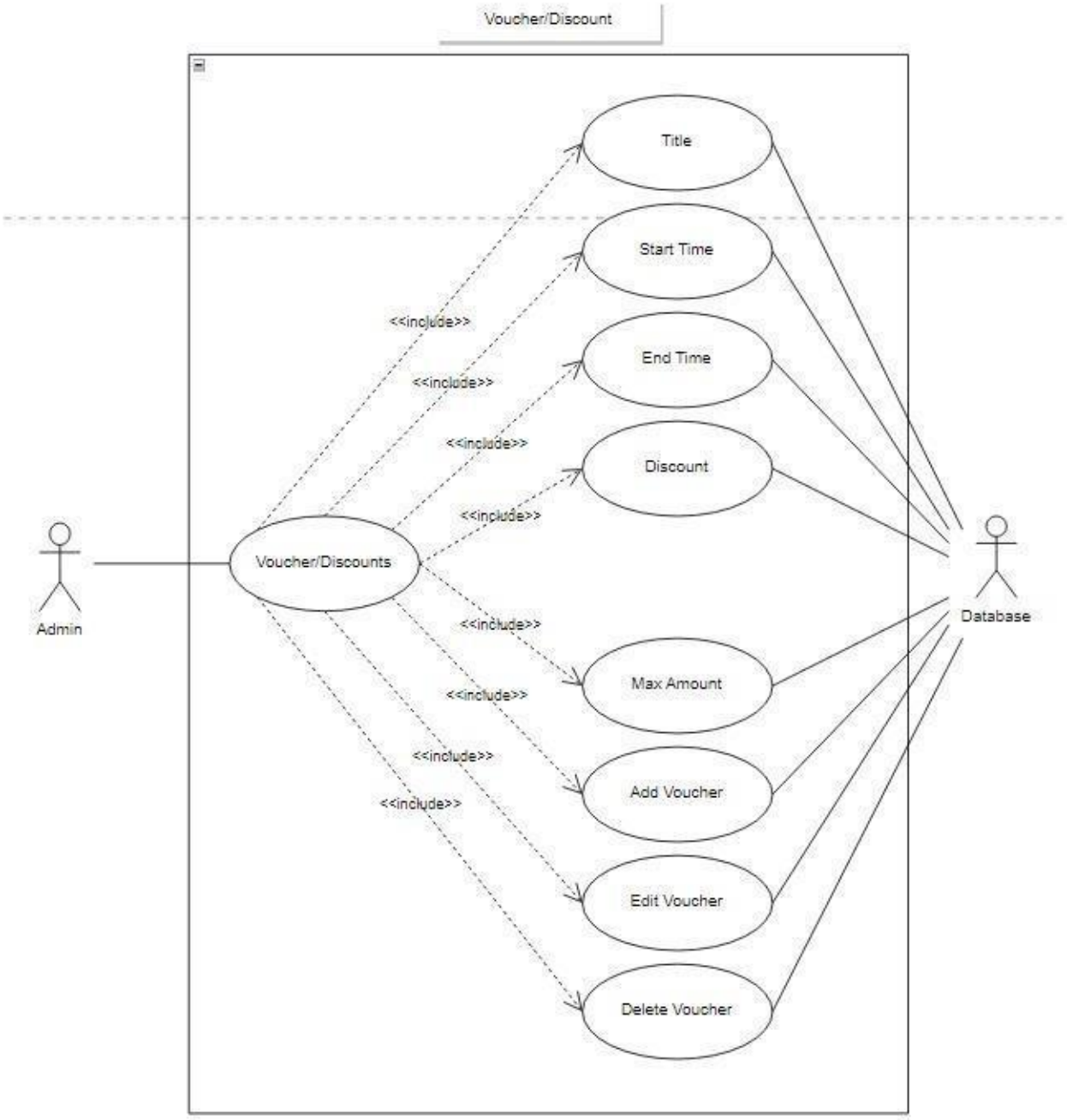


Figure 9Use Case Diagram: Voucher and Discount

2.5.10 Secure Payment Gateway

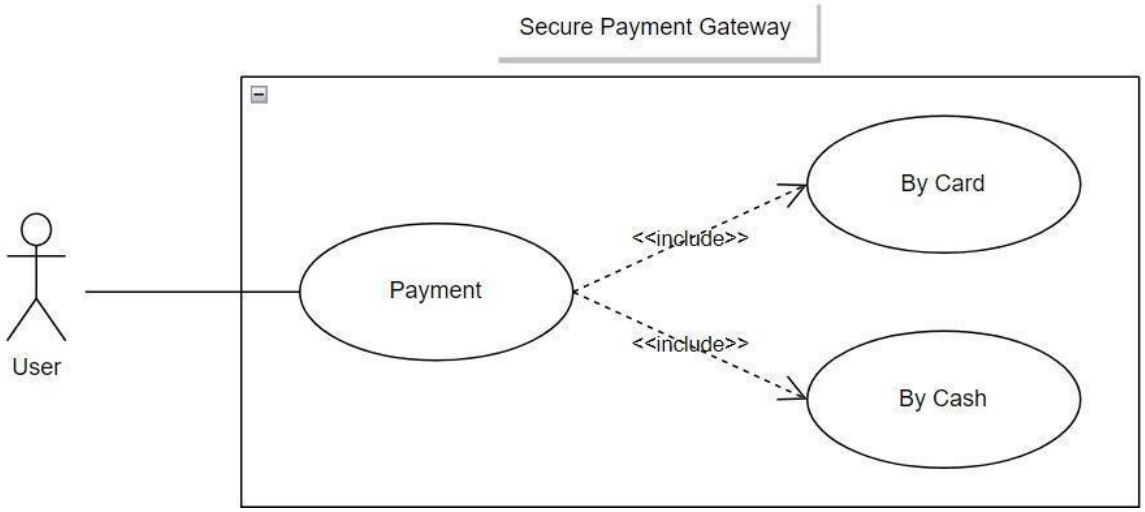


Figure 10Use Case Diagram: Secure Payment Gateway

2.5.11 Email Notification

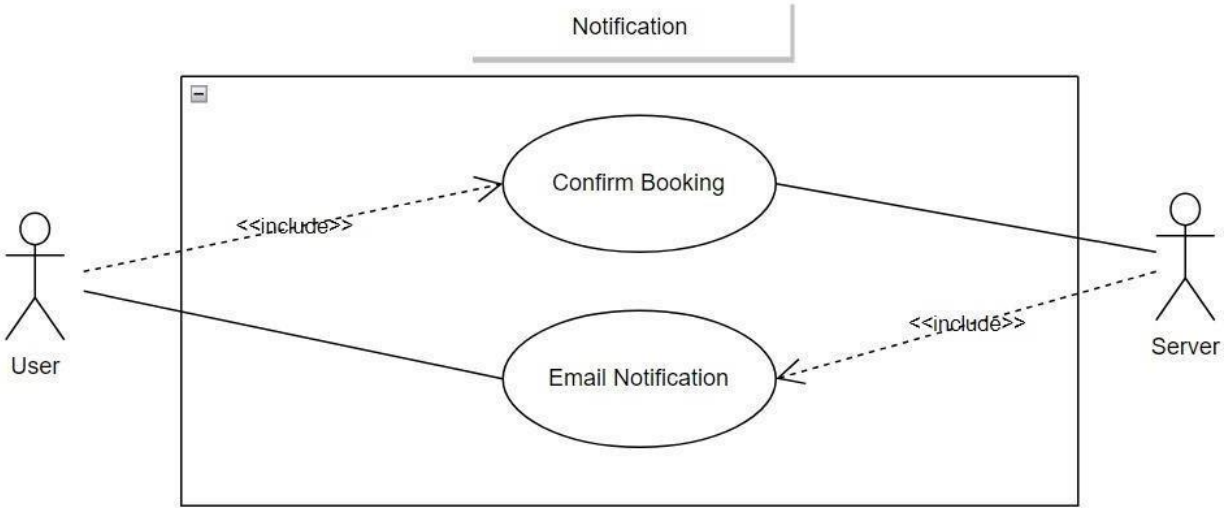


Figure 11Use Case Diagram: Notification

2.5.12 Admin Panel

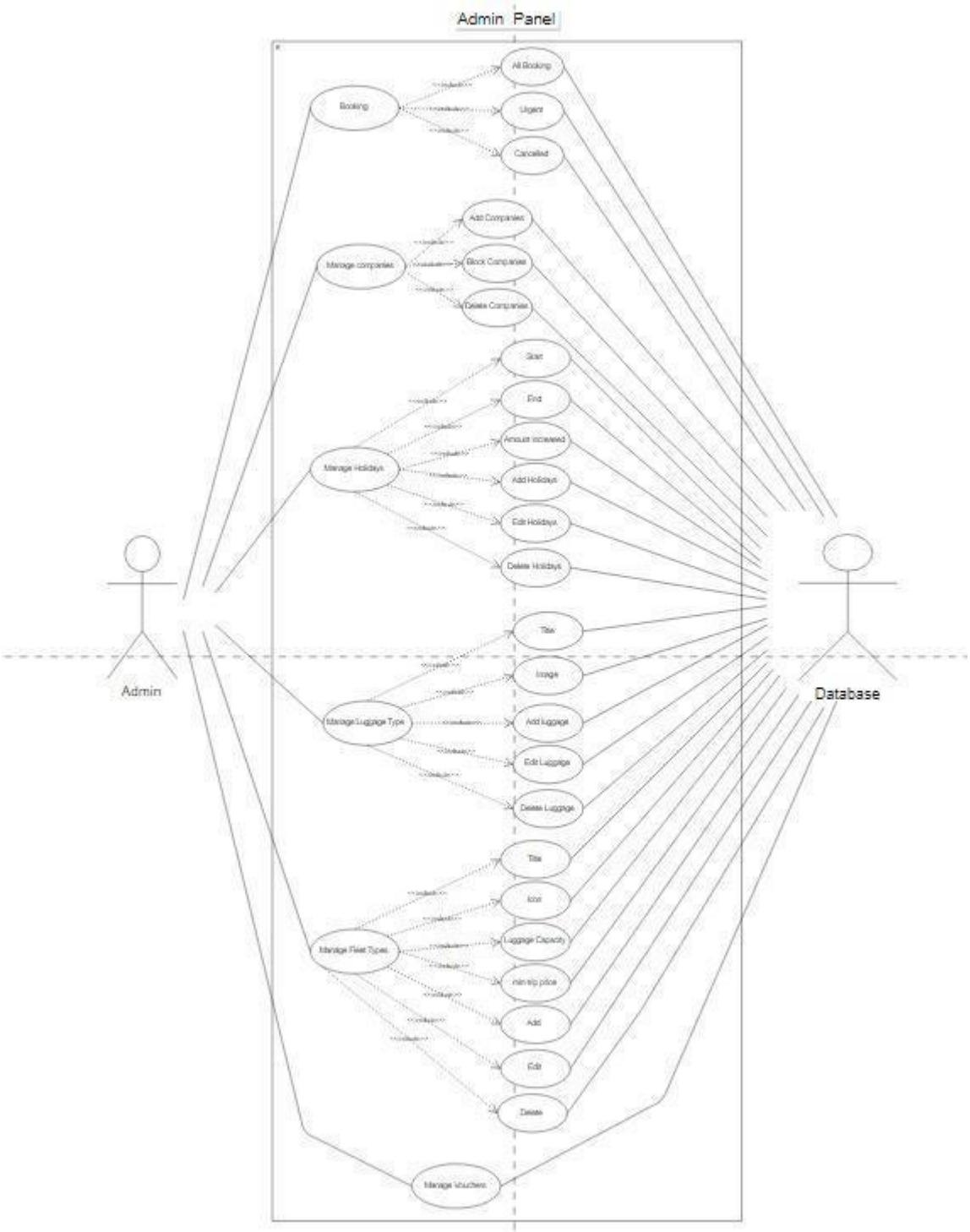


Figure 12Use Case Diagram: Admin

2.5.13 Services

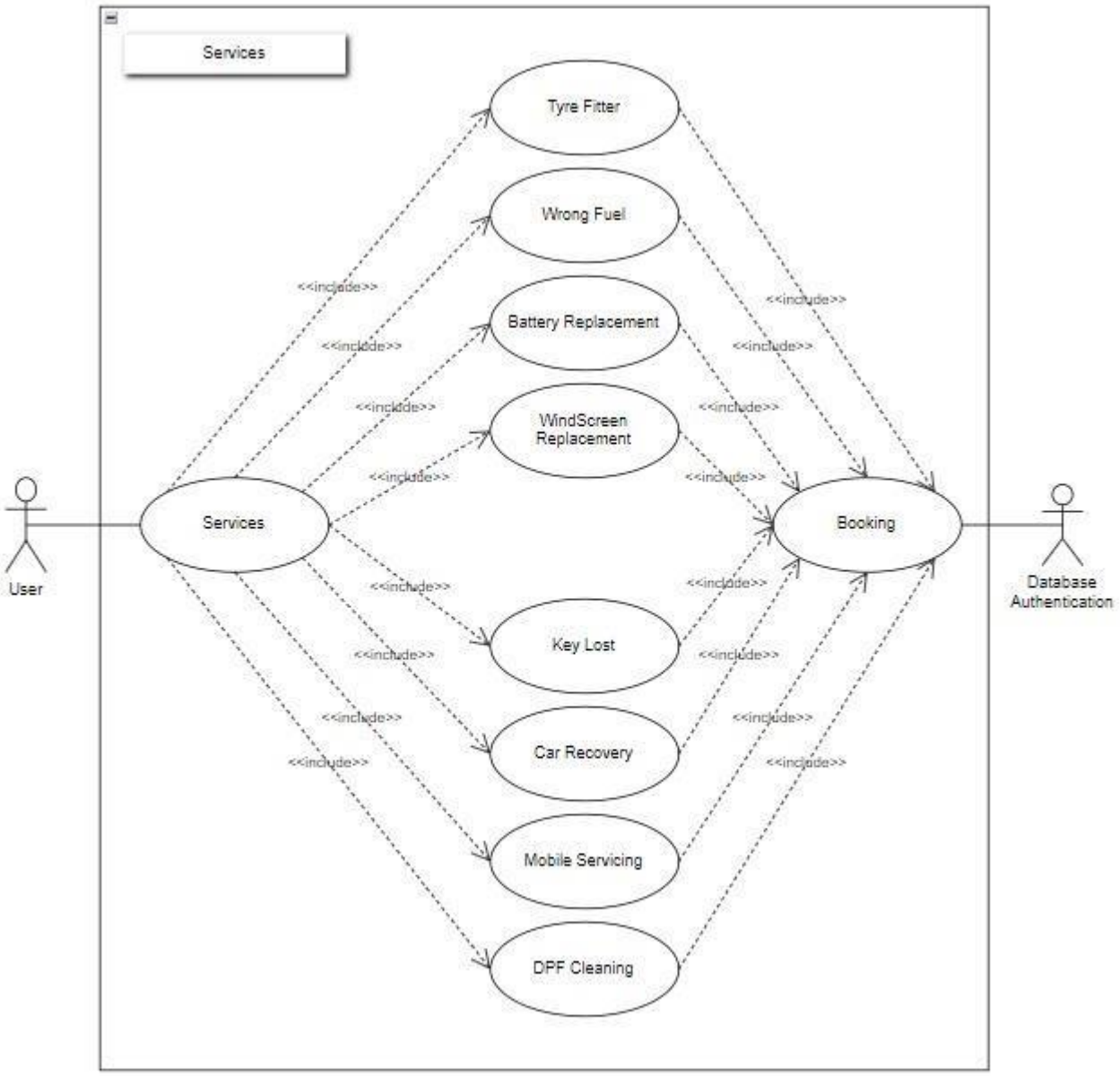


Figure 12Use Case Diagram: Services

2.6 Software Development Lifecycle

Name of the Process Model

Agile Process Model with Scrum Methodology

The SDLC model that we have selected for our project is Agile Model of Software Development. The whole project work will be done iteratively by completing the

proposed modules. Agile model is a well-known and proven industry famous development model for efficient and timely software systems development.

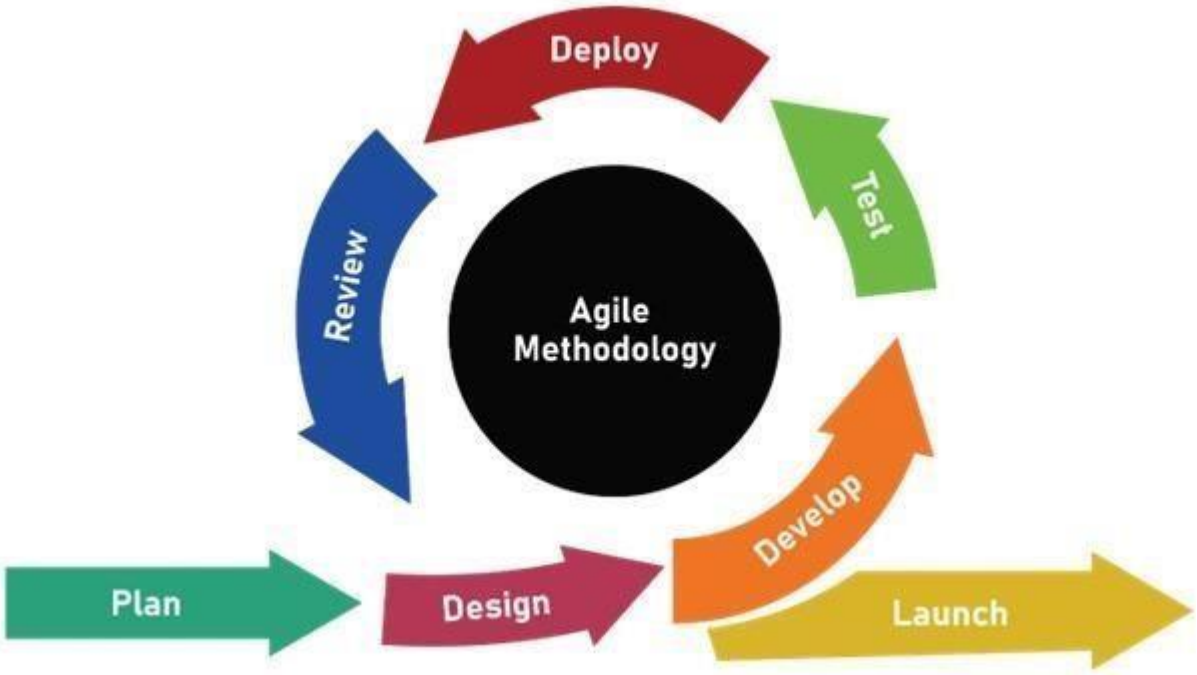
The agile model is based on adaptive techniques of software development unlike other development life cycles such as waterfall which is famous for its rigid and predictive development techniques.

Following are the steps in which the Agile Software Development Model will be applied to our project.

➢ Requirements Elicitation and Analysis
➢ Prototyping
➢ Development
➢ Bugs / issues tracking and removal. ➢ Deployment

Reason:

Scrum's incremental and iterative development methodology, which offers flexibility and adaptability to changing requirements, makes it the best choice for the TugVan FYP project. It encourages working together and consistent loops of feedback, which makes it easier to communicate and share knowledge. The FYP objectives of showcasing progress and demonstrating functional software increments are aligned with Scrum's emphasis on delivering value during each sprint. It enables ongoing project-wide learning, improvement, and modification. The flexibility of the Scrum framework allows for customization to the unique requirements and limitations of the FYP, resulting in efficient project management and increased learning opportunities.



3 System Design

This chapter consists of all the diagrams that are used to visually show the system with its normal flow of events, interaction among the components and all the actors involved in the system.

3.1 Work-Breakdown Structure

Work Breakdown structure is a diagrammatic method of breaking down a project into smaller parts or components. The first phase in our project is requirement gathering which further divides into requirement elicitation, requirement documentation and requirement validation. The requirement elicitation further deeps down to requirement understanding. Secondly, design and architecture phase initiates which is divided into requirement analysis, system design documentation, system use case design and modules identification. After the requirement gathering phase has been completed, development starts which deals with the development of the system modules. Testing of the system starts after the development phase. System and integration testing is performed on the system. After performing the testing, the system is deployed.

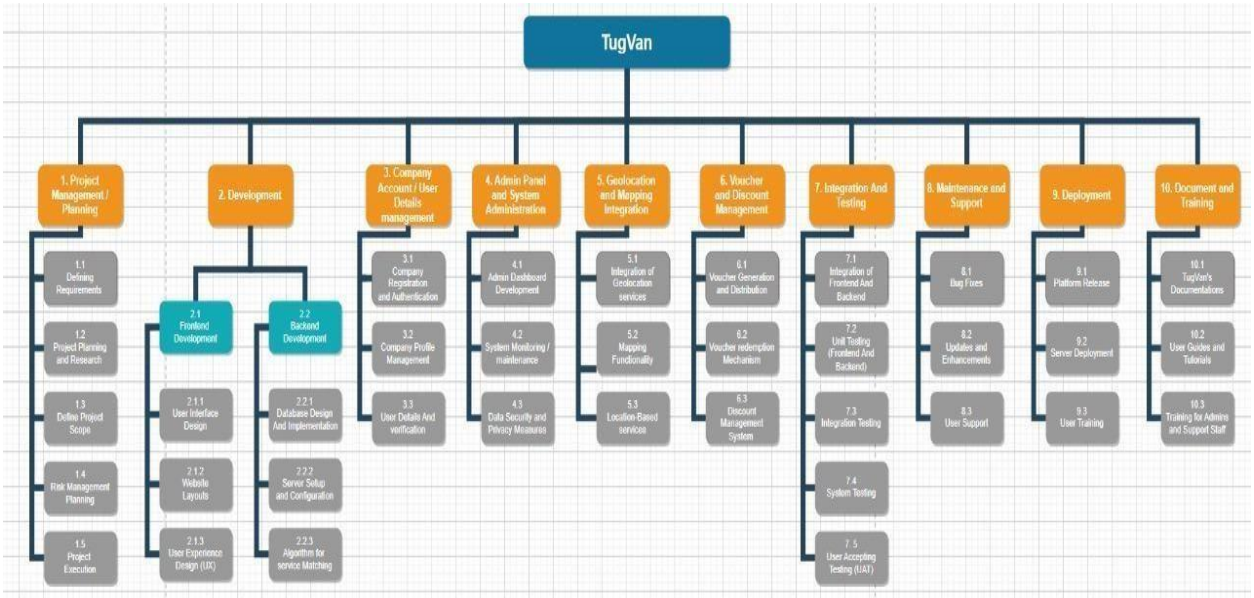


Figure 13Work-Breakdown Structure

3.2 Activity Diagram

Activity diagram helps us to understand the complete processes and activities of the system. It includes a starting node, end node, decision node, connectors, fork and merge symbol.

3.2.1 Company Registration

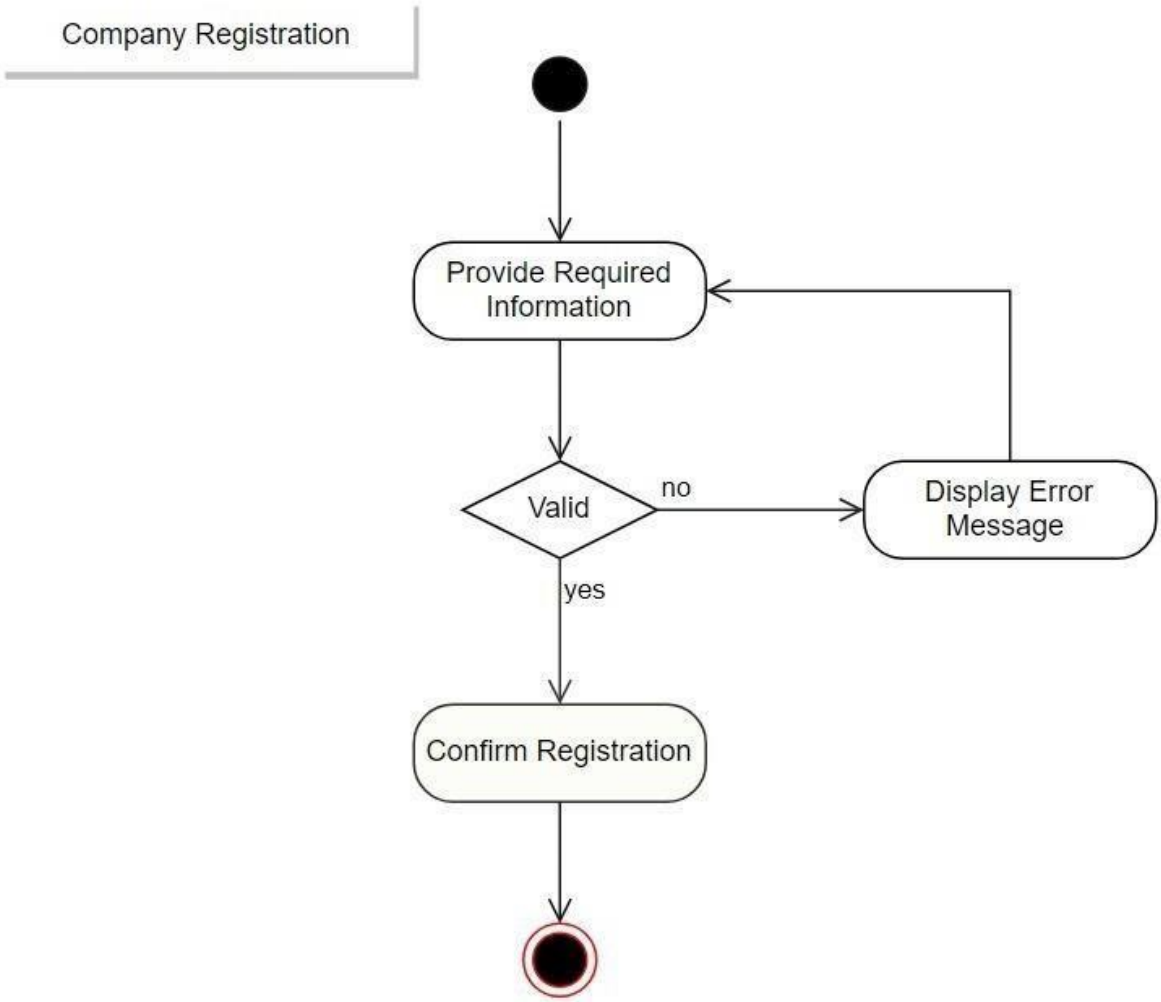


Figure 14 Activity Diagram: Company Registration

3.2.2 Login

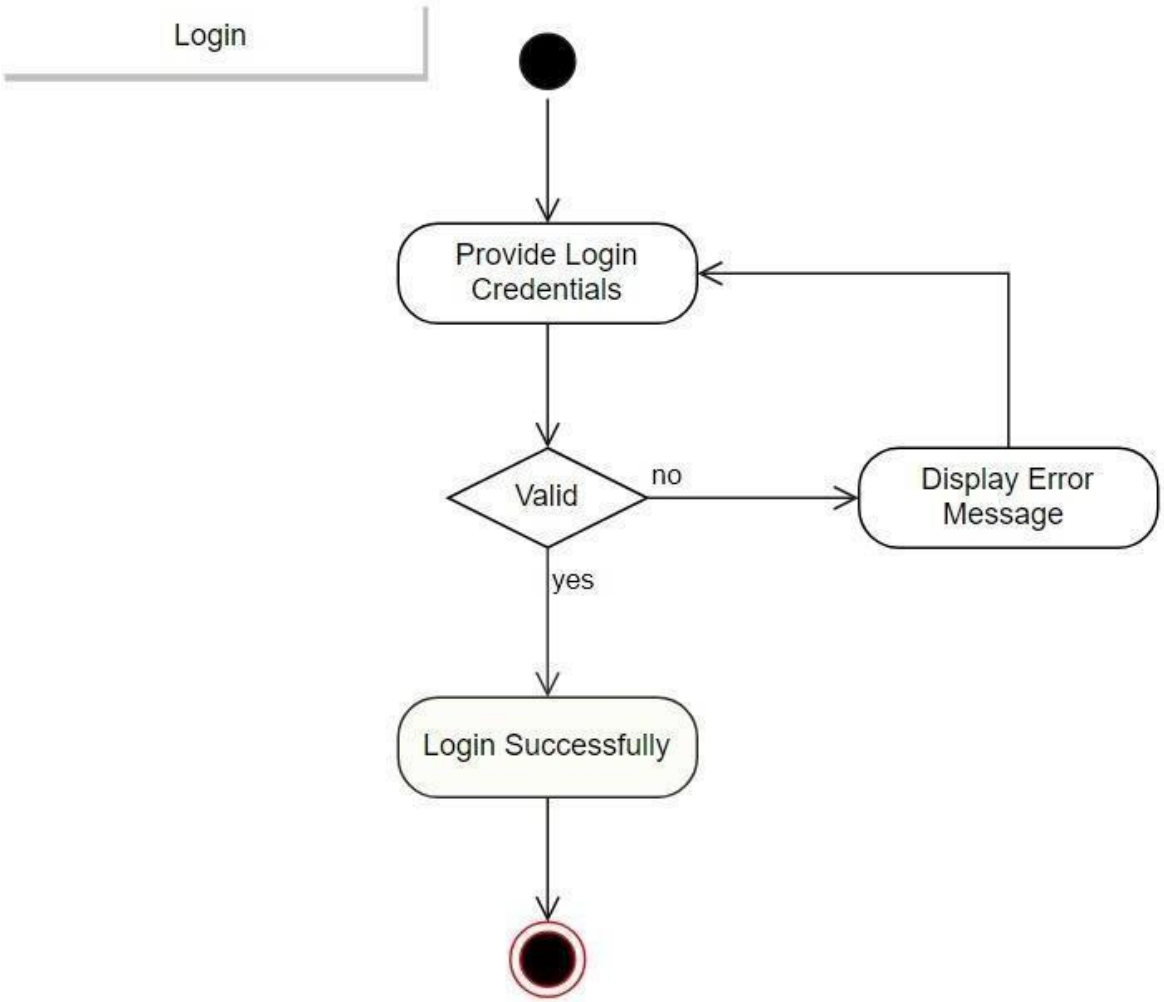


Figure 15 Activity Diagram: Login

3.2.3 Company Dashboard

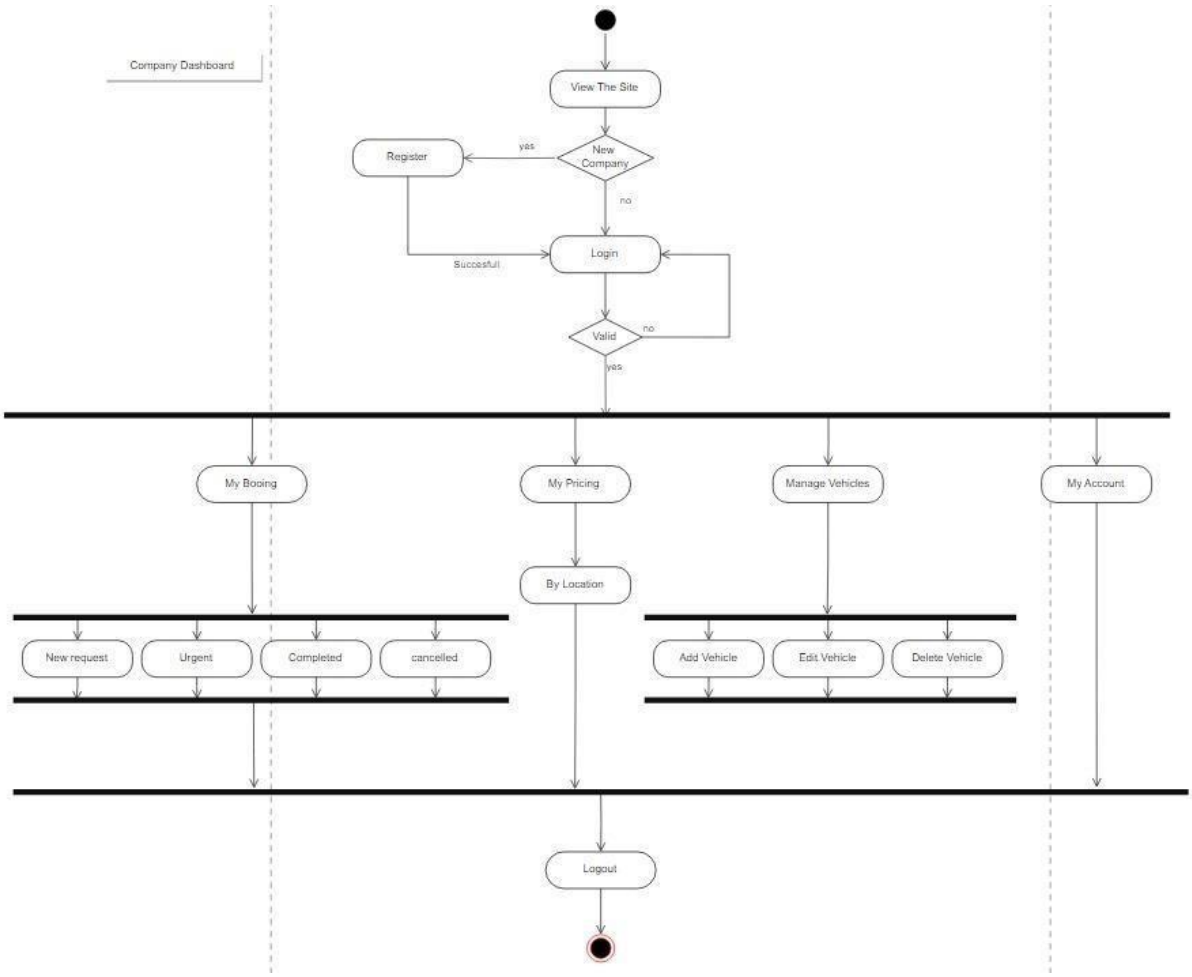


Figure 16 Activity Diagram: Company Dashboard

3.2.4 Booking

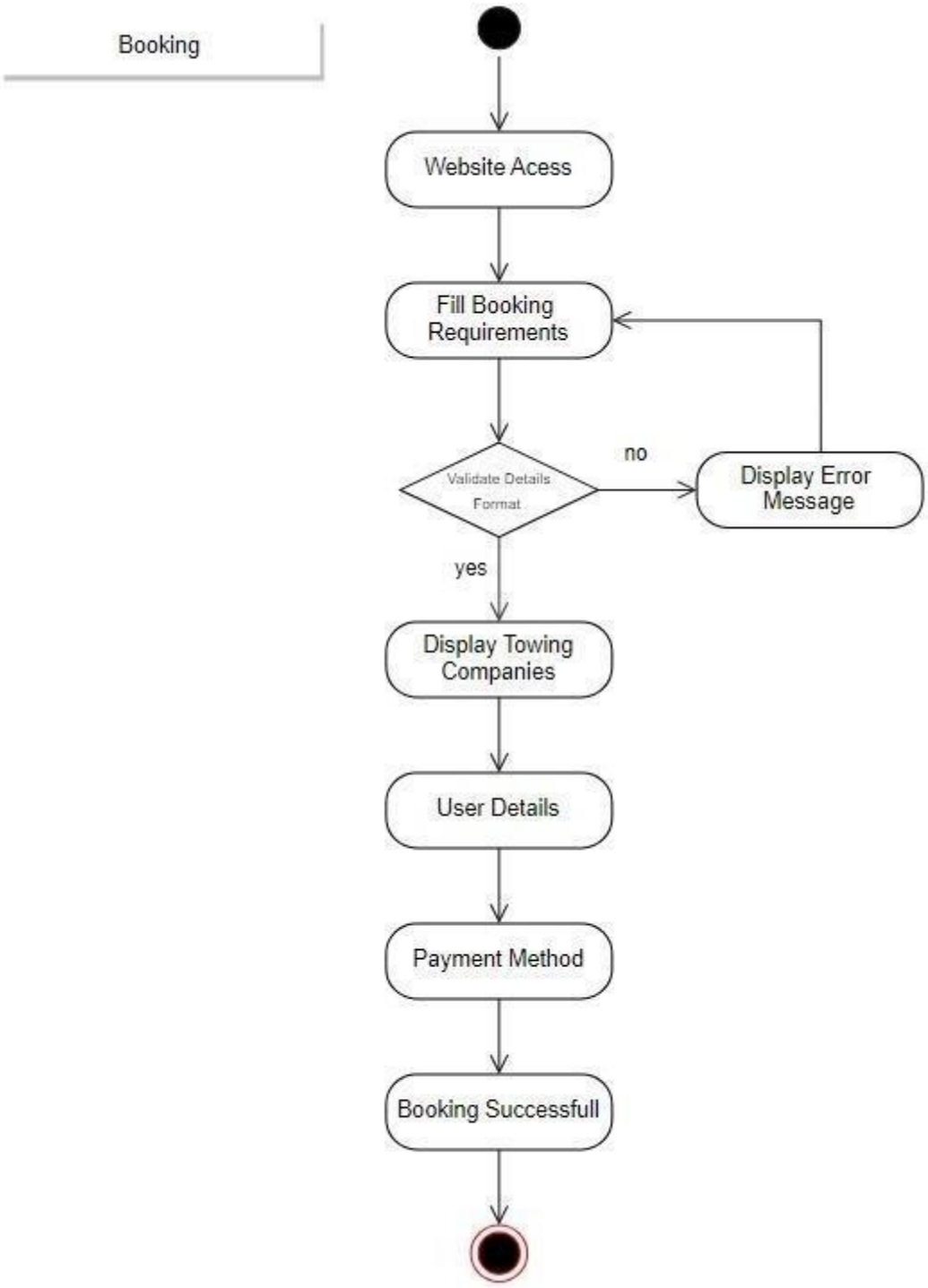


Figure 17 Activity Diagram: Booking

3.2.5 Company Listing

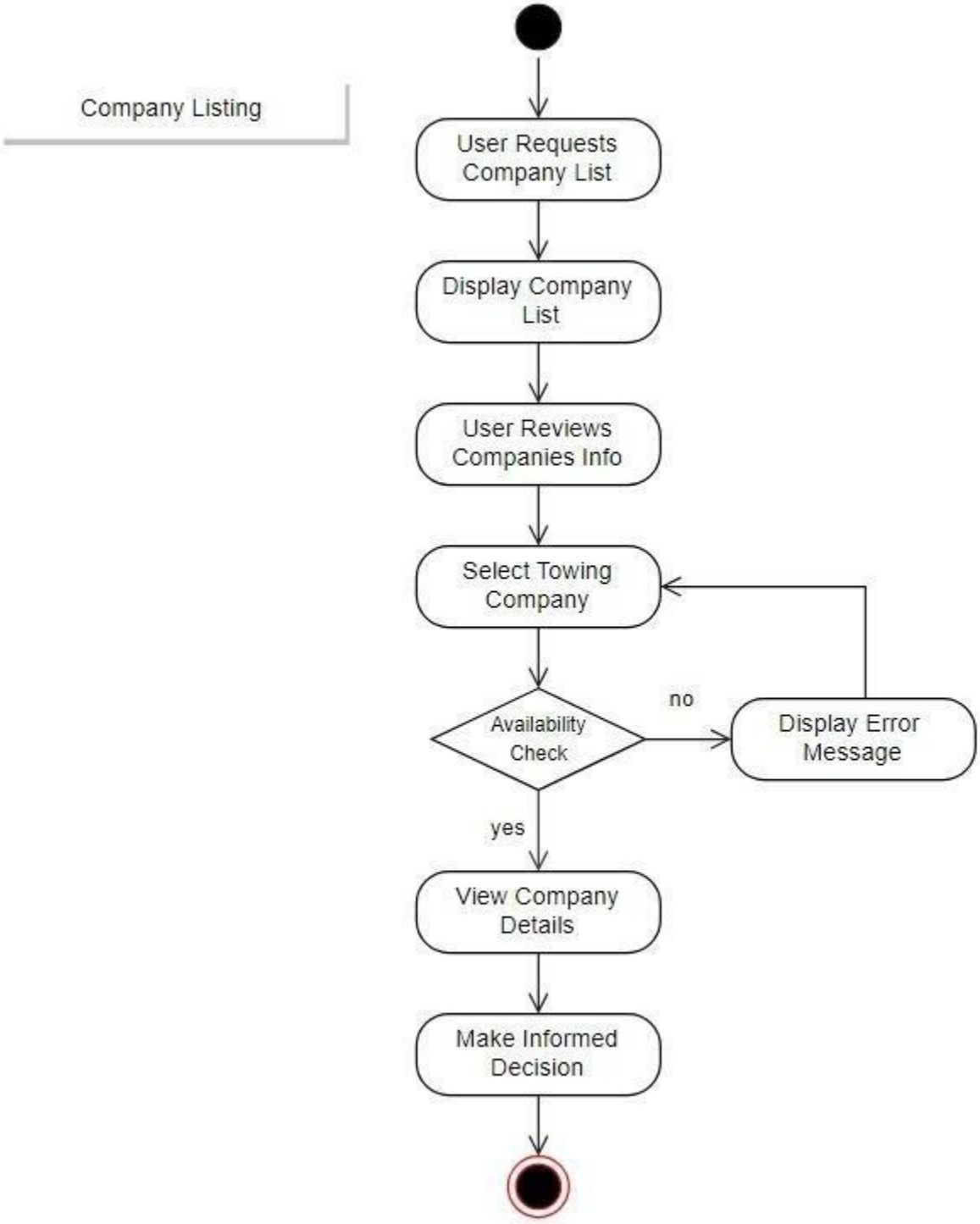


Figure 18 Activity Diagram: Company listing

3.2.6 Search/ Filter

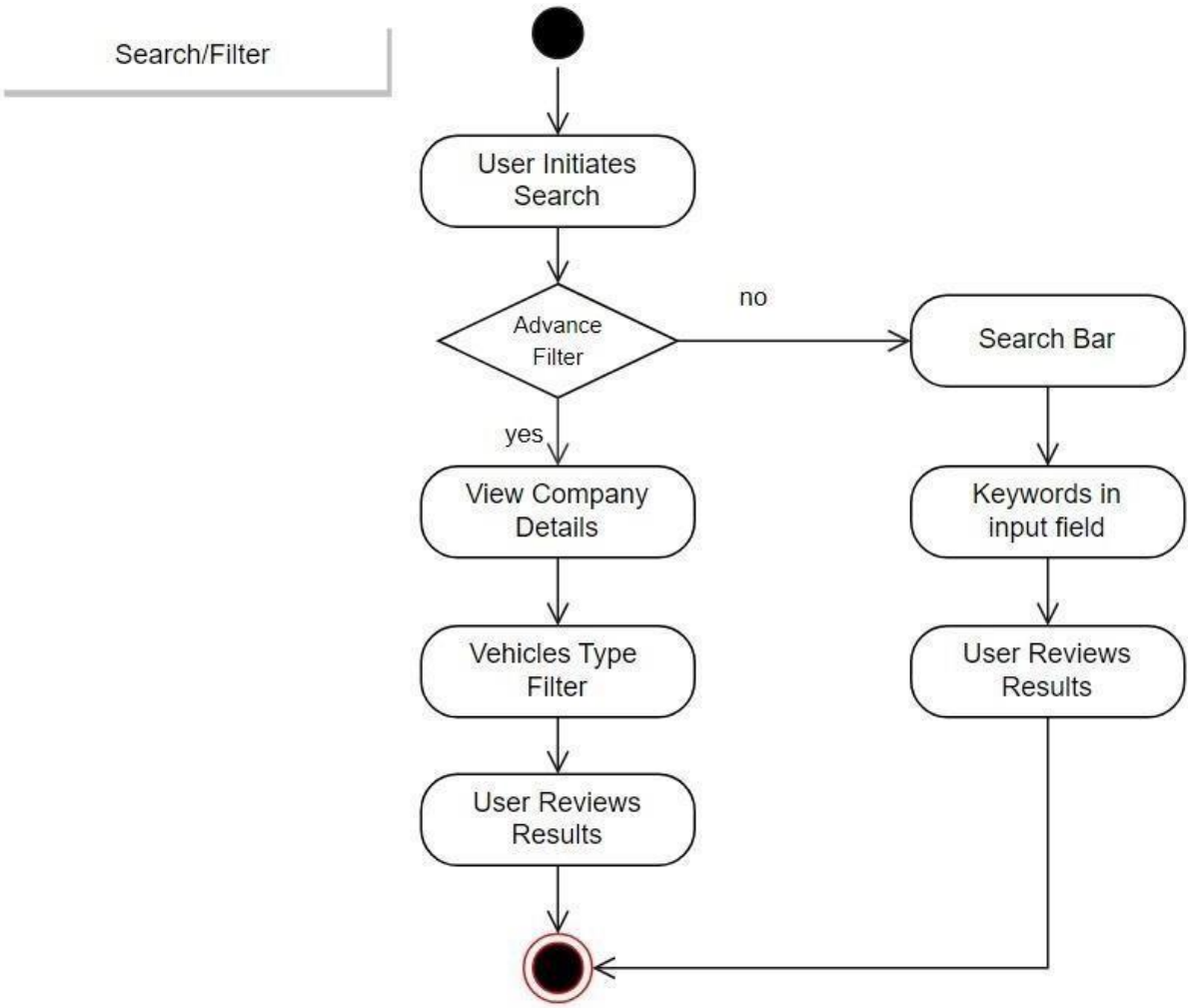


Figure 19 Activity Diagram: Search and Filter

3.2.7 User Dashboard

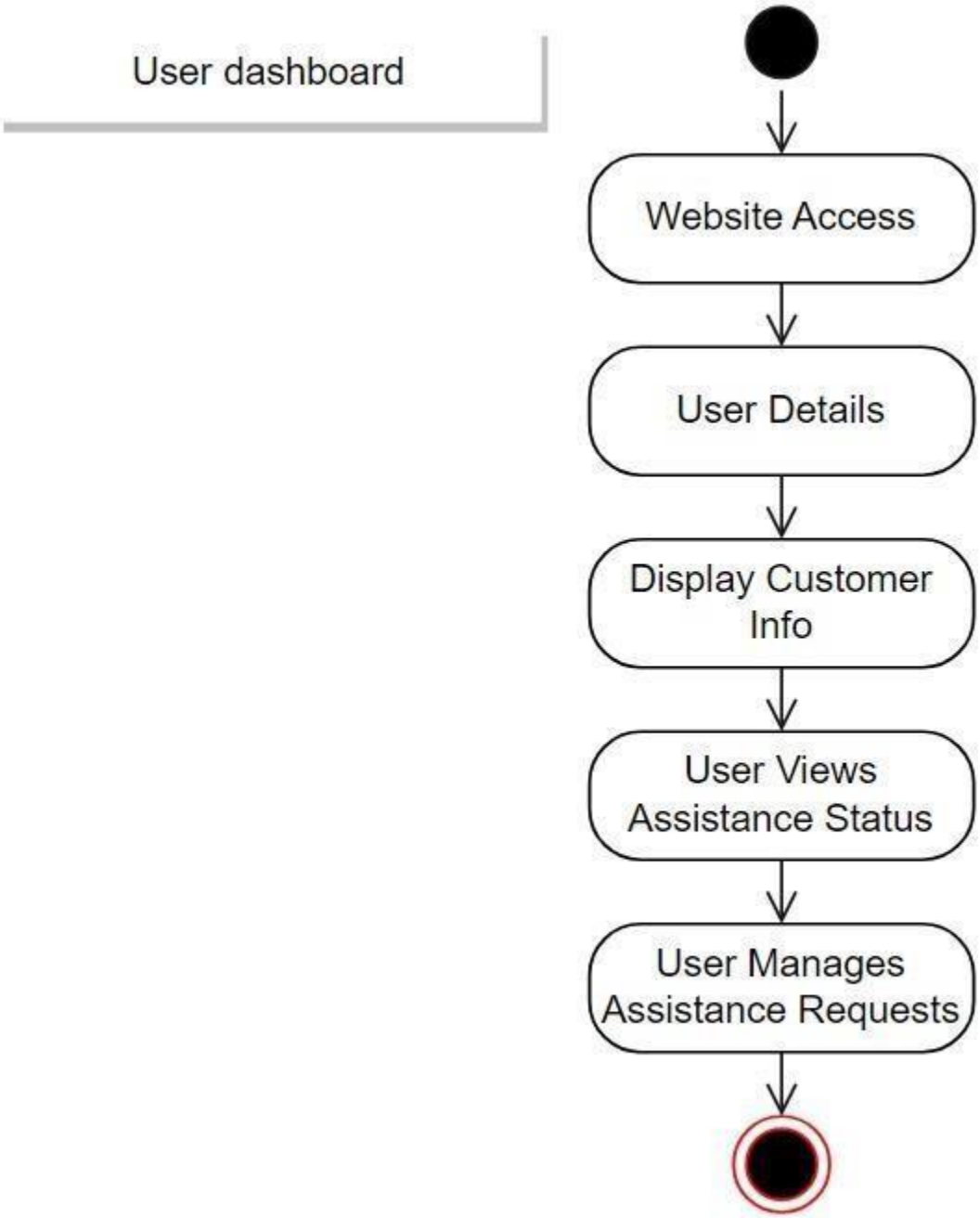


Figure 20 Activity Diagram: User Dashboard

3.2.8 Voucher/Discounts

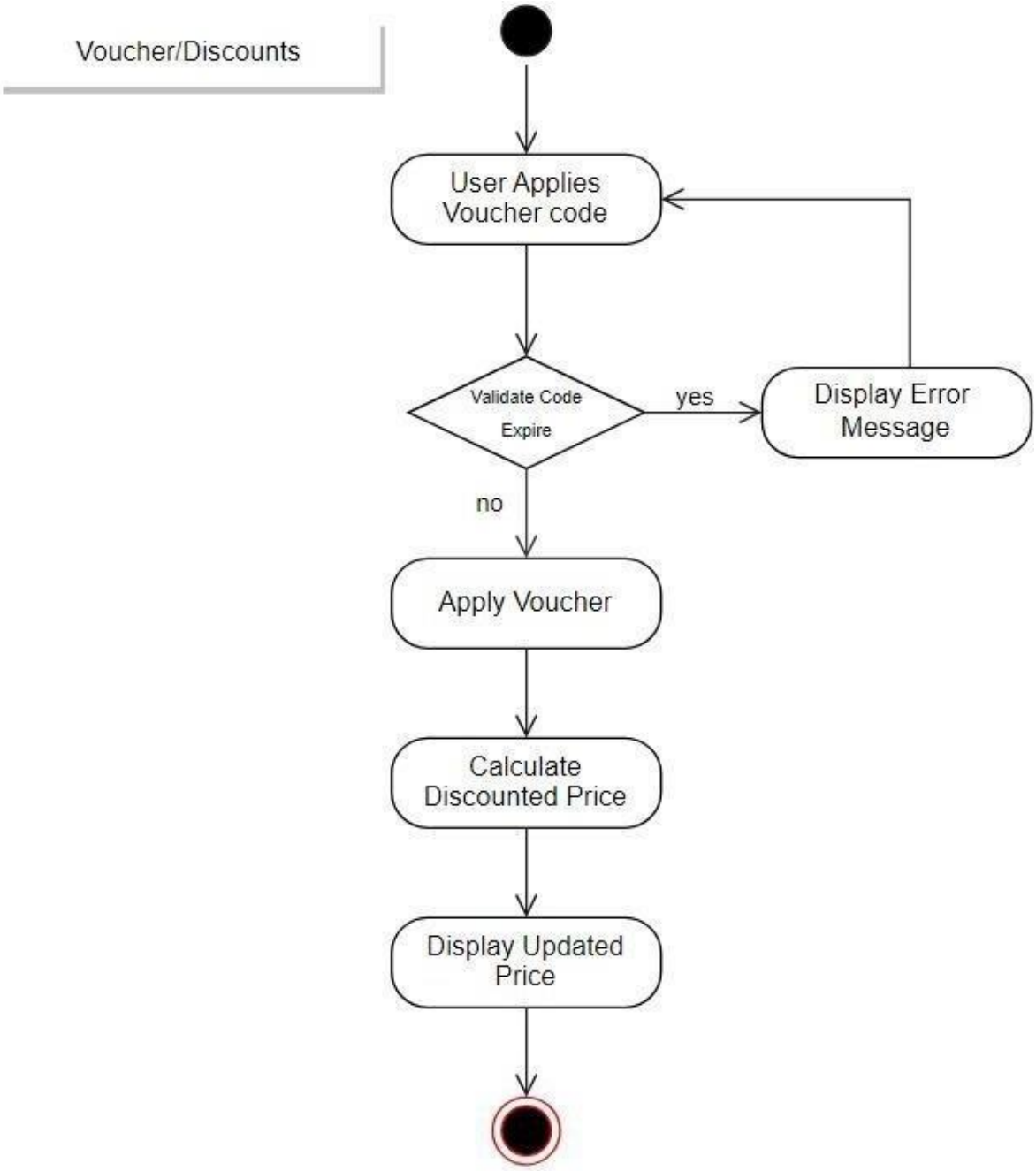


Figure 21 Activity Diagram: Voucher and Discount

3.2.9 Secure Payment Gateway

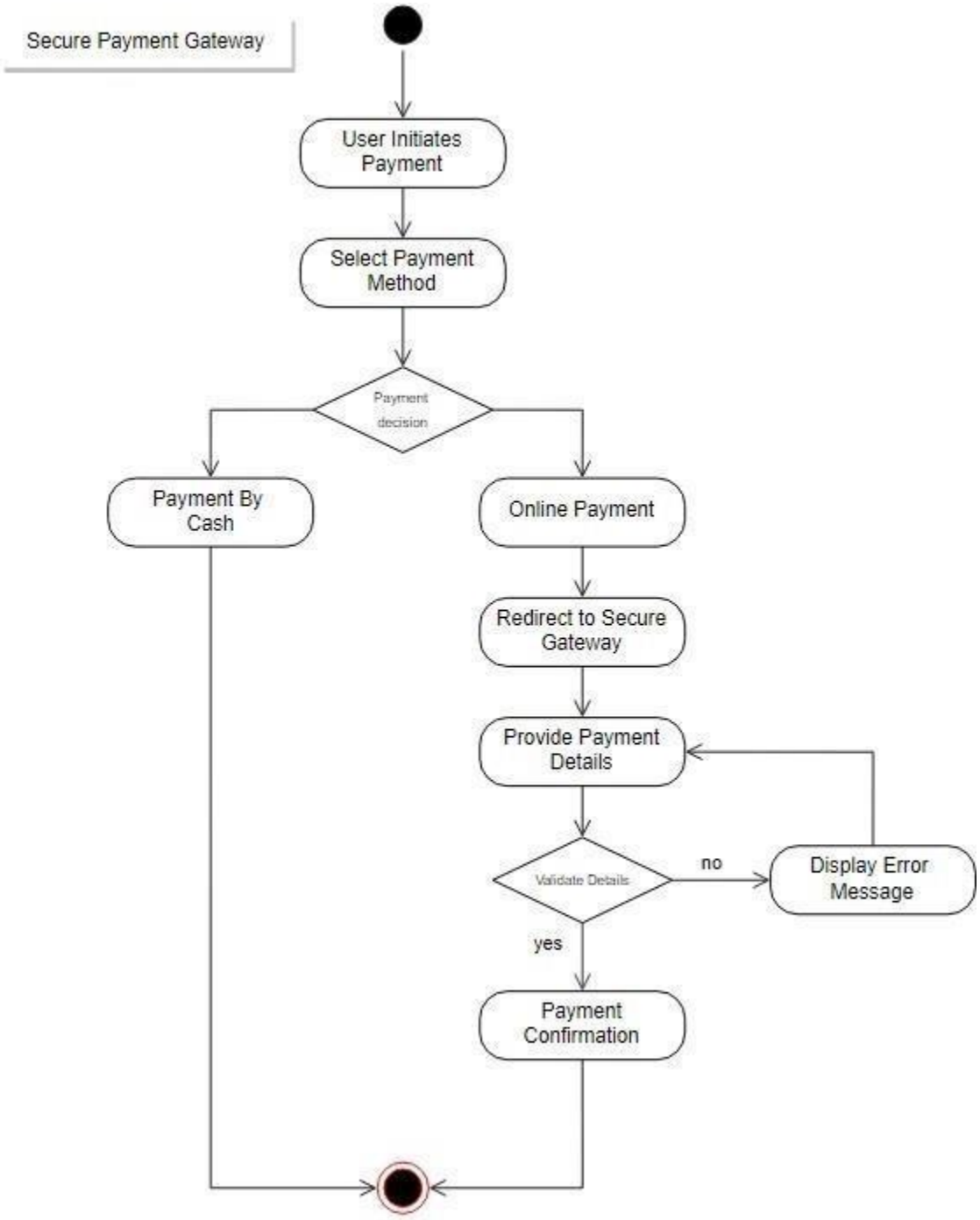


Figure 22 Activity Diagram: Secure Payment Gateway

3.2.10 Email Notification

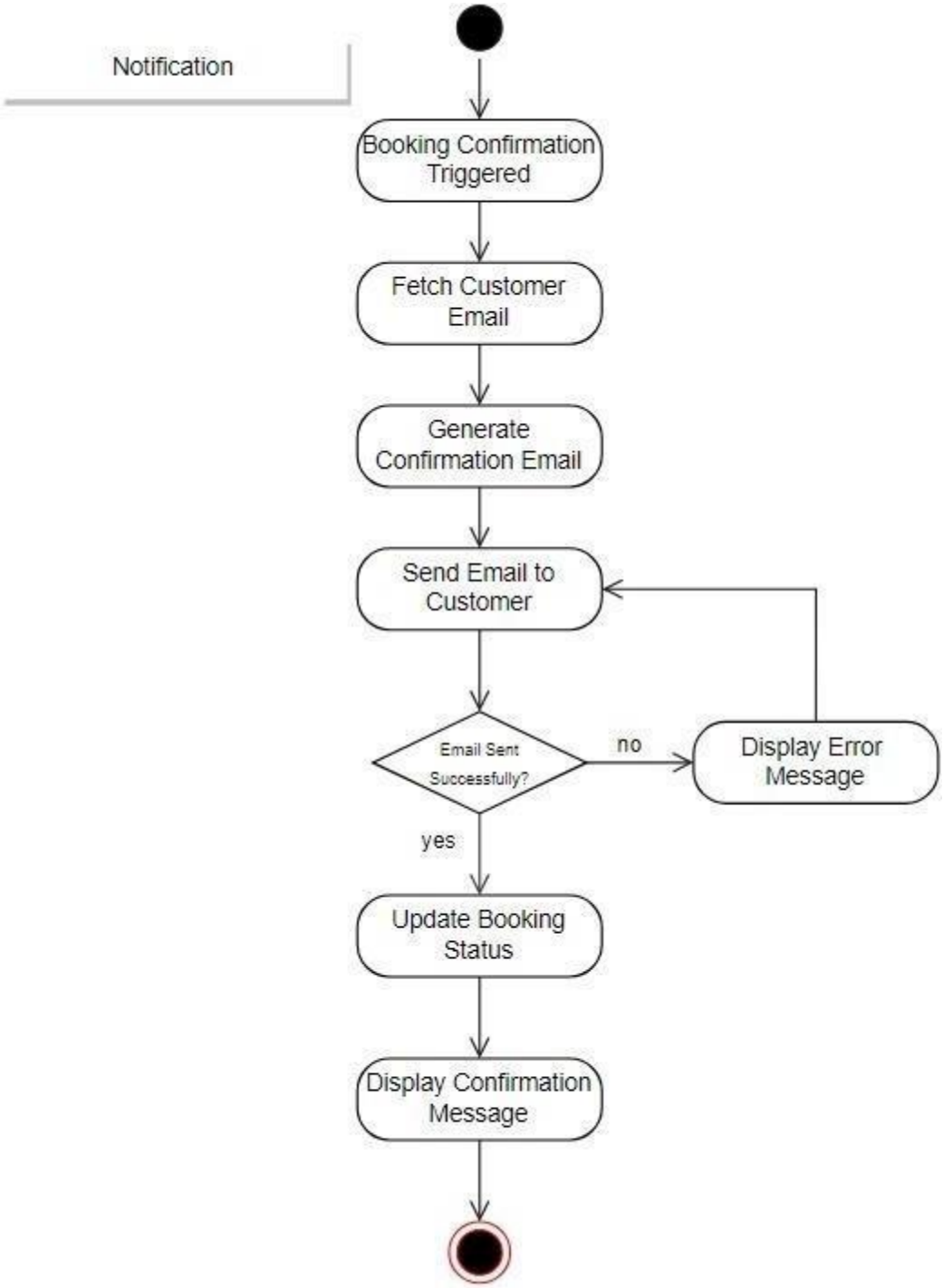


Figure 23 Activity Diagram: Email Notification

3.2.11 Tracking System

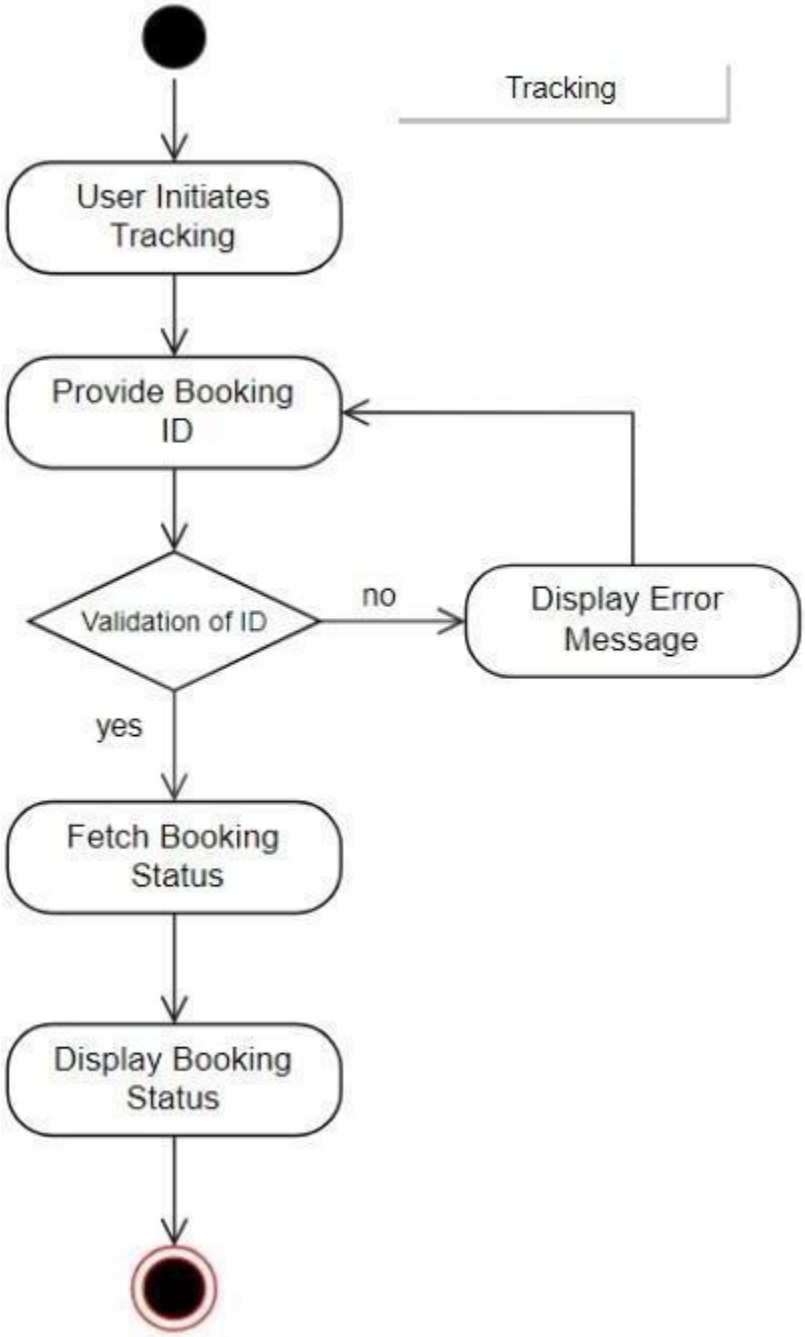


Figure 24 Activity Diagram: Tracking

3.2.12 Admin Panel

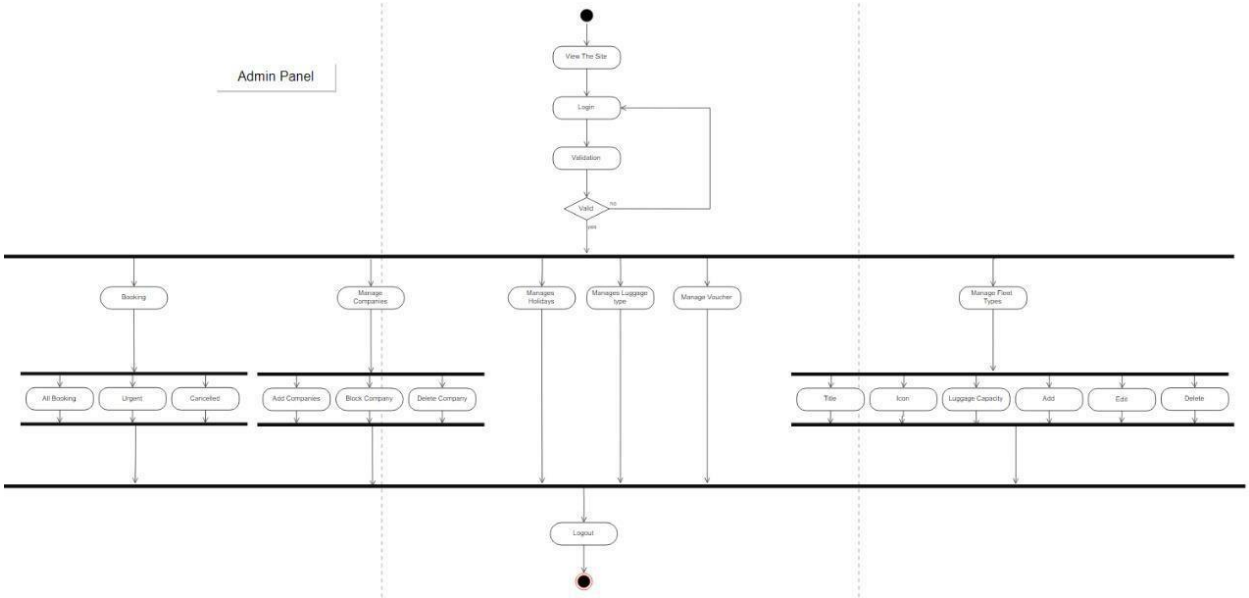


Figure 25 Activity Diagram: Admin

3.2.13 Services

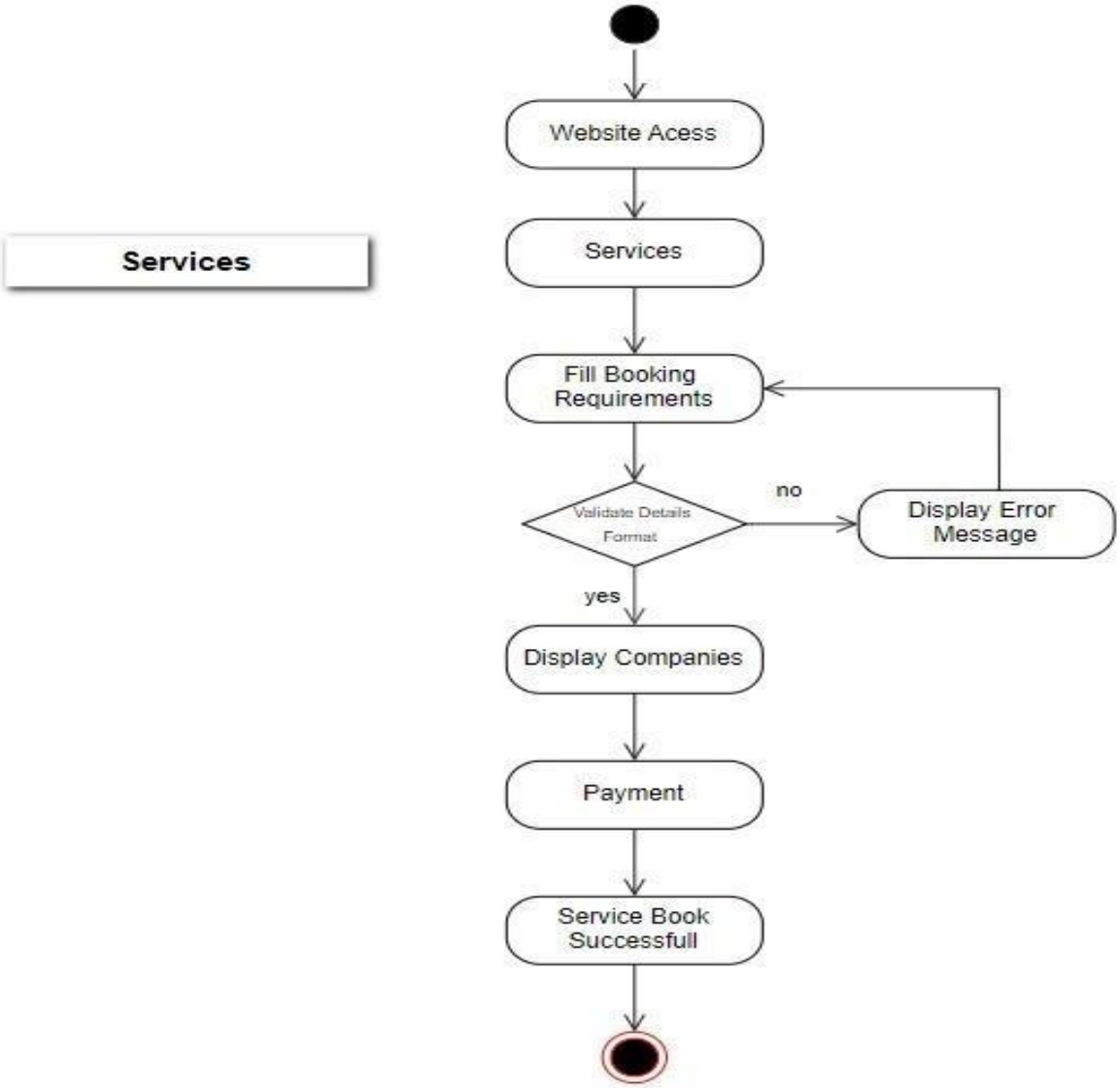


Figure 25 Activity Diagram: Services

3.3 Sequence Diagrams

Sequence diagram shows the interaction of the different system objects in a sequence with respect to time.

3.3.1 Company Registration

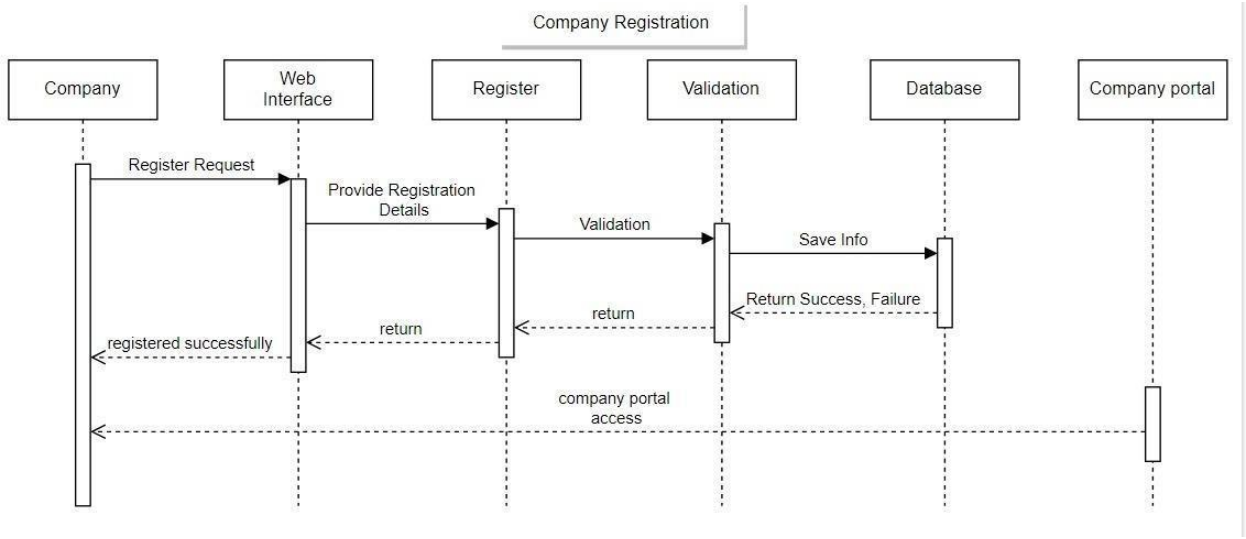


Figure 26 Sequence Diagram: Company Registration

3.3.2 Login

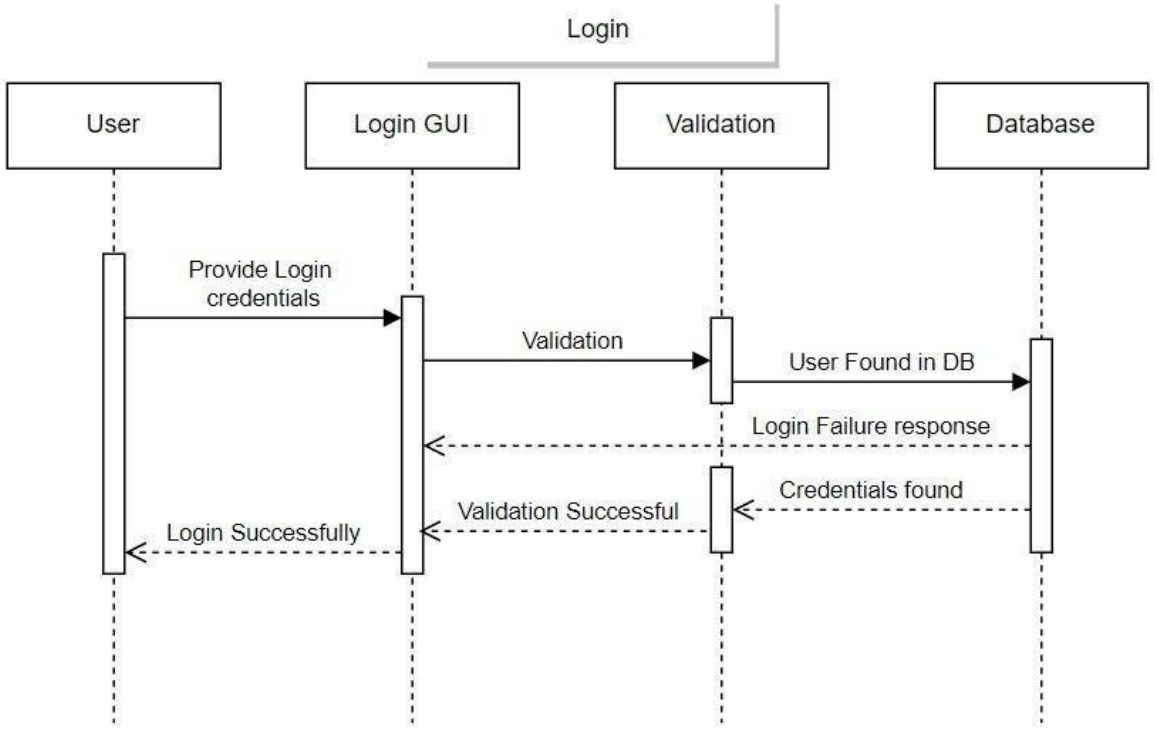


Figure 27 Sequence Diagram: Login

3.3.3 Booking

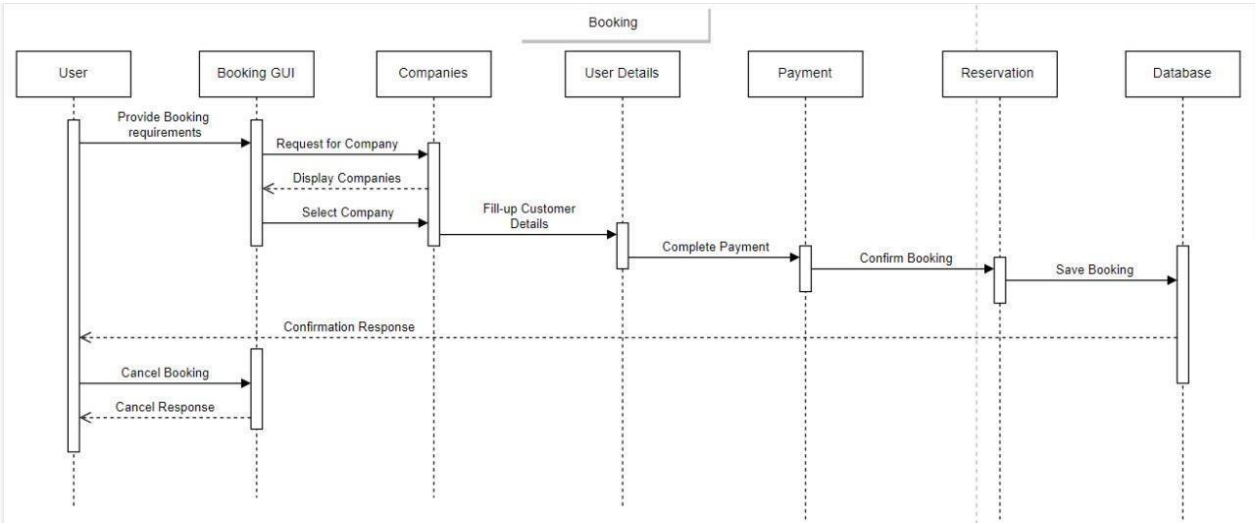


Figure 28 Sequence Diagram: Booking

3.3.4 Company Dashboard

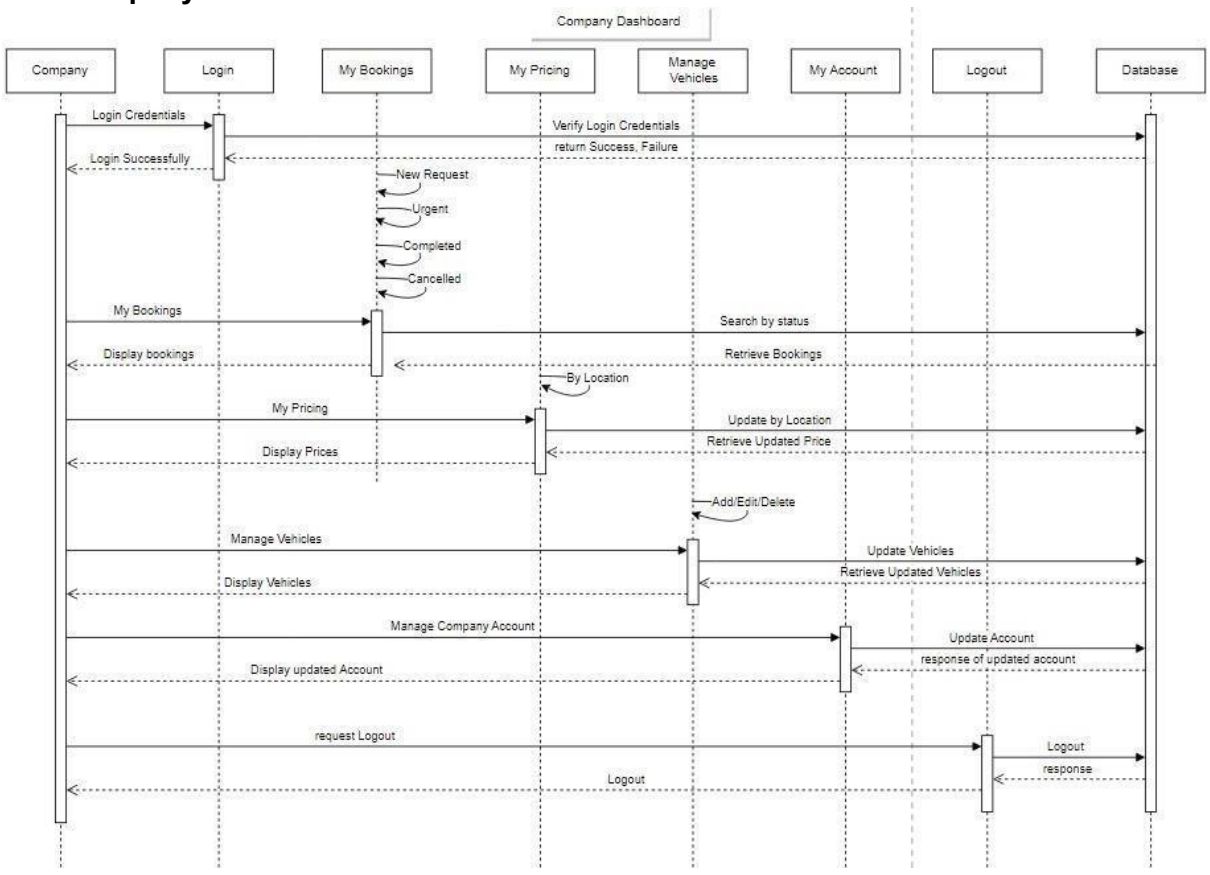


Figure 29 Sequence Diagram: Company Dashboard

3.3.5 Company Listing

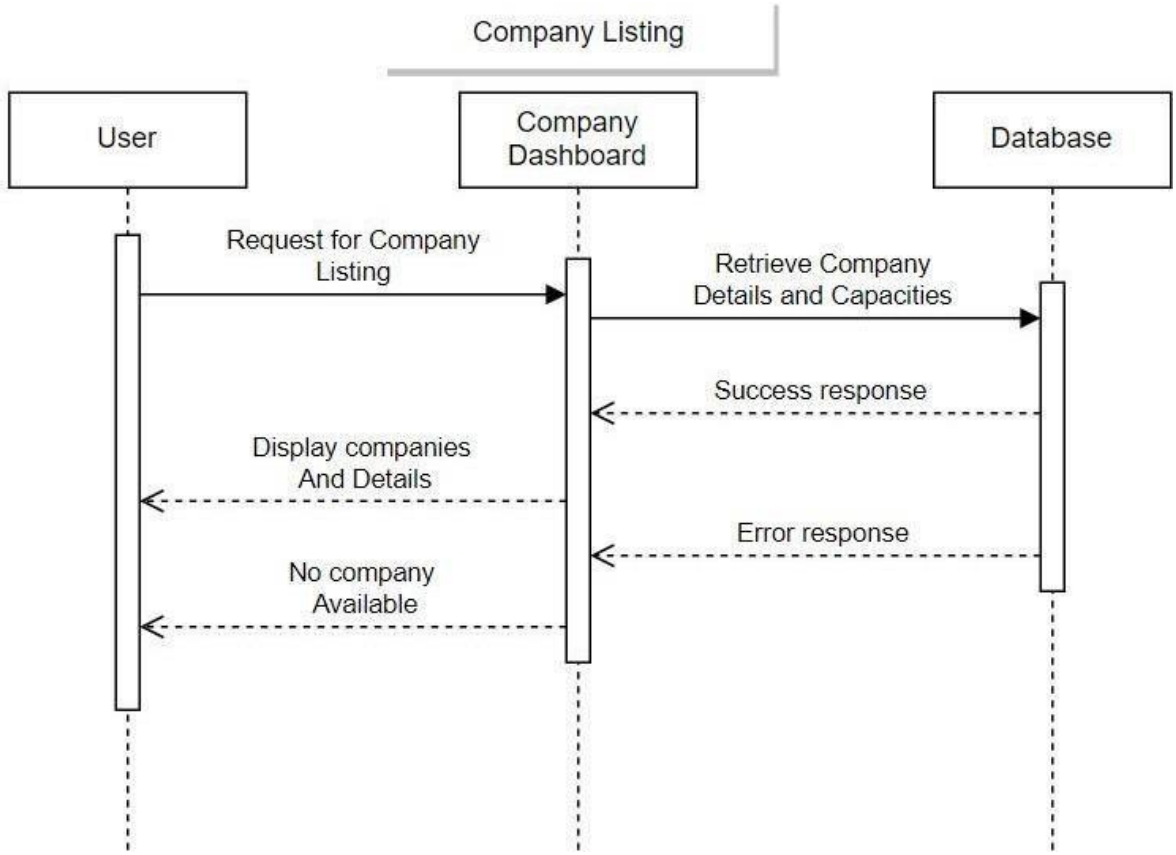


Figure 30 Sequence Diagram: Company Listing

3.3.6 Search/Filter

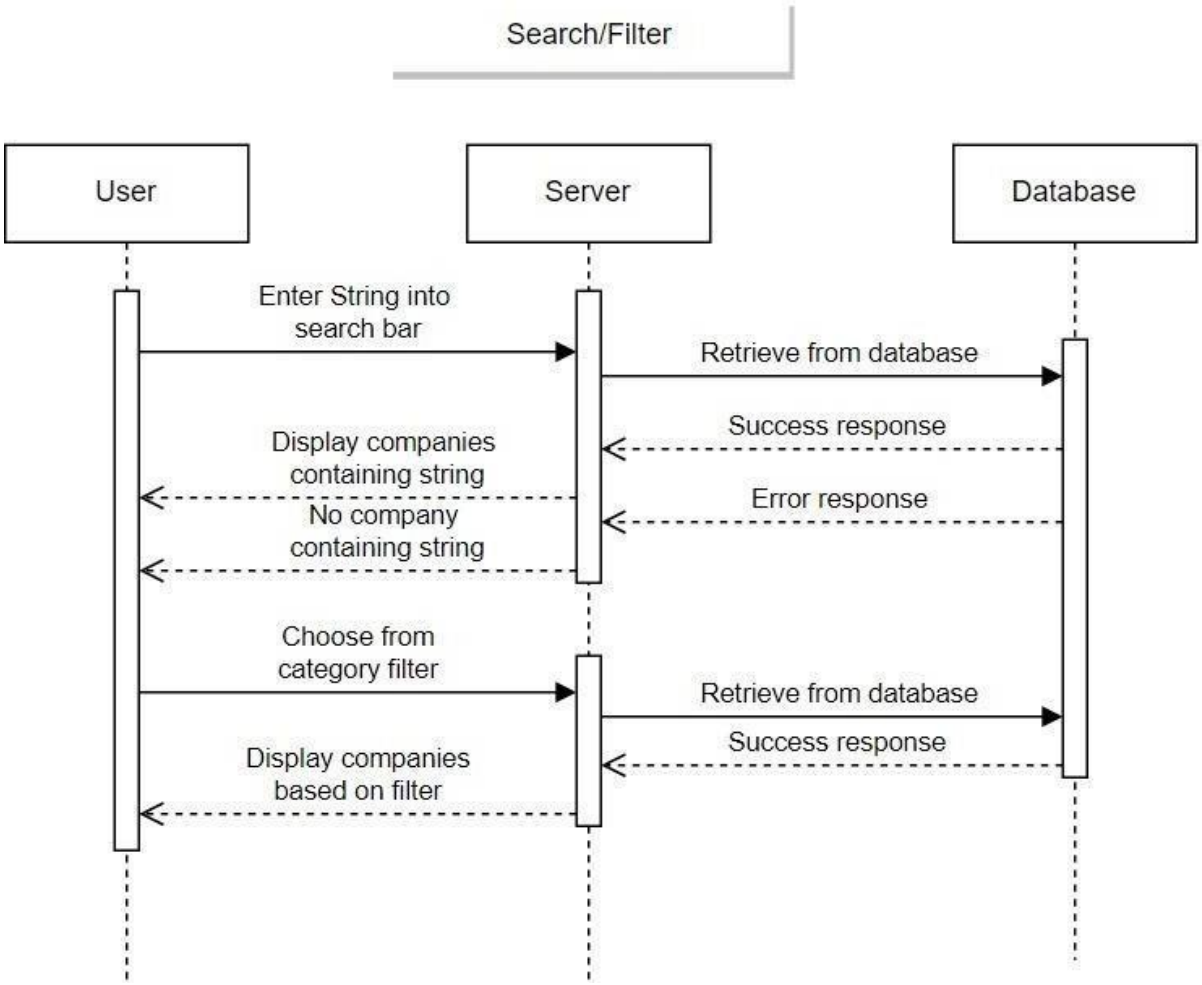


Figure 31 Sequence Diagram: Search and Filter

3.3.7 User Dashboard

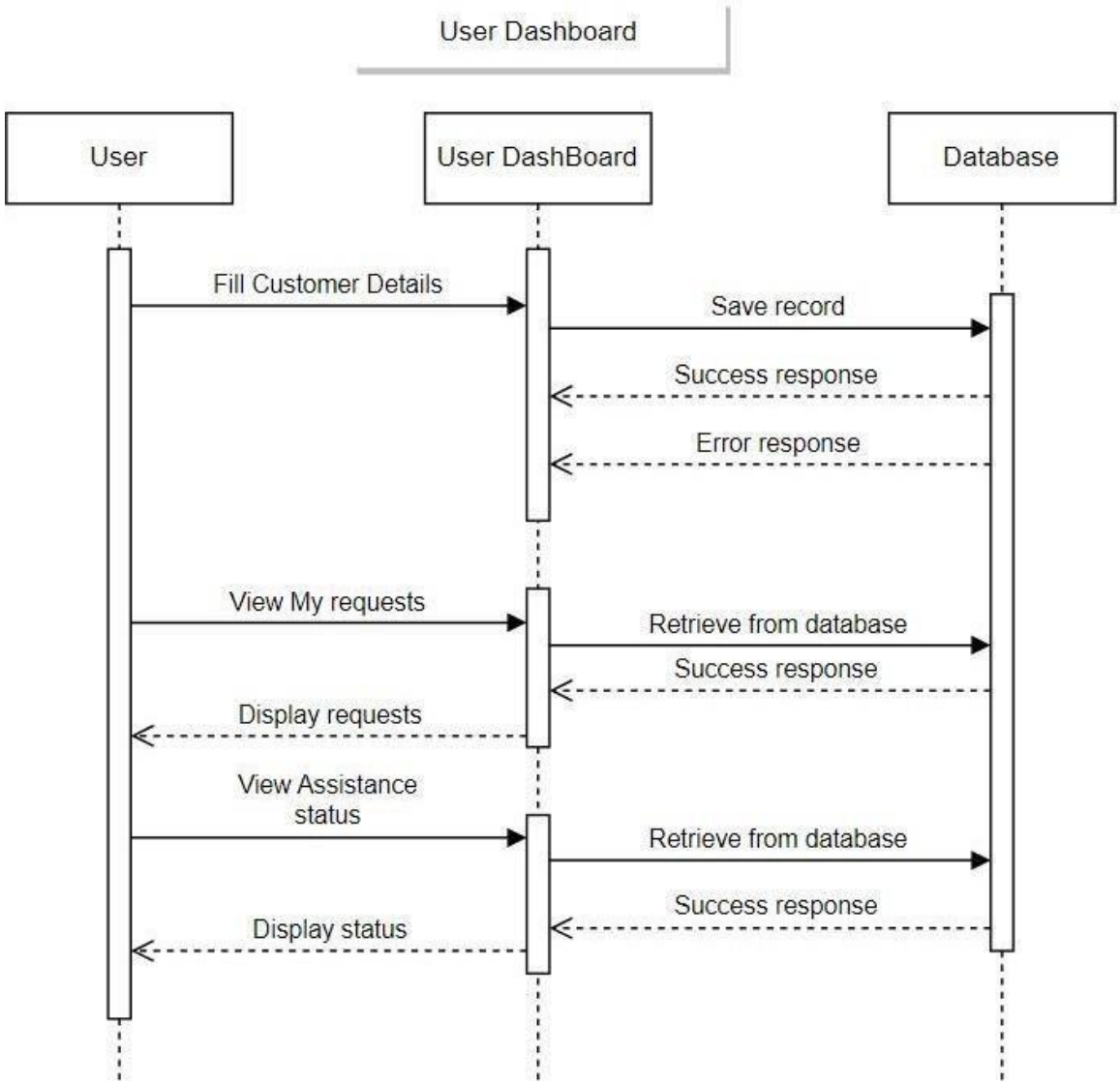


Figure 32 Sequence Diagram: User Dashboard

3.3.8 Voucher and Discounts

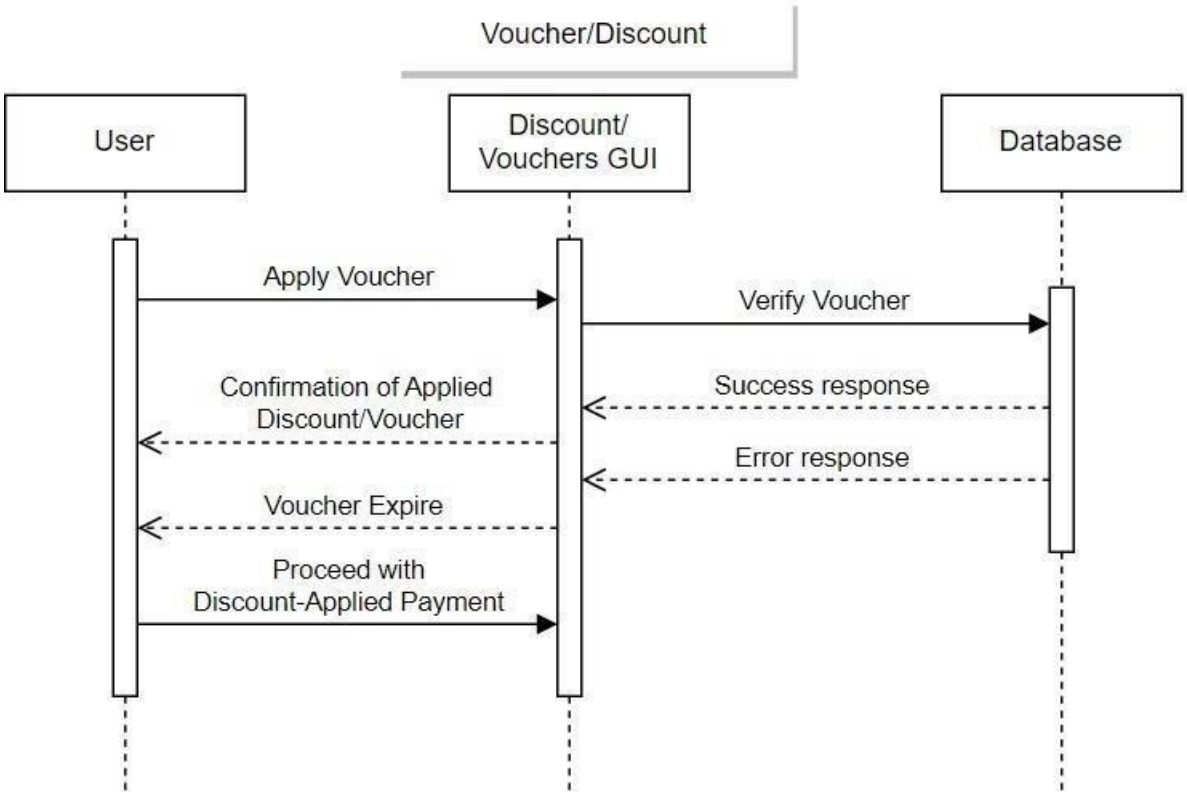


Figure 33 Sequence Diagram: Voucher and discount

3.3.9 Secure Payment Gateway

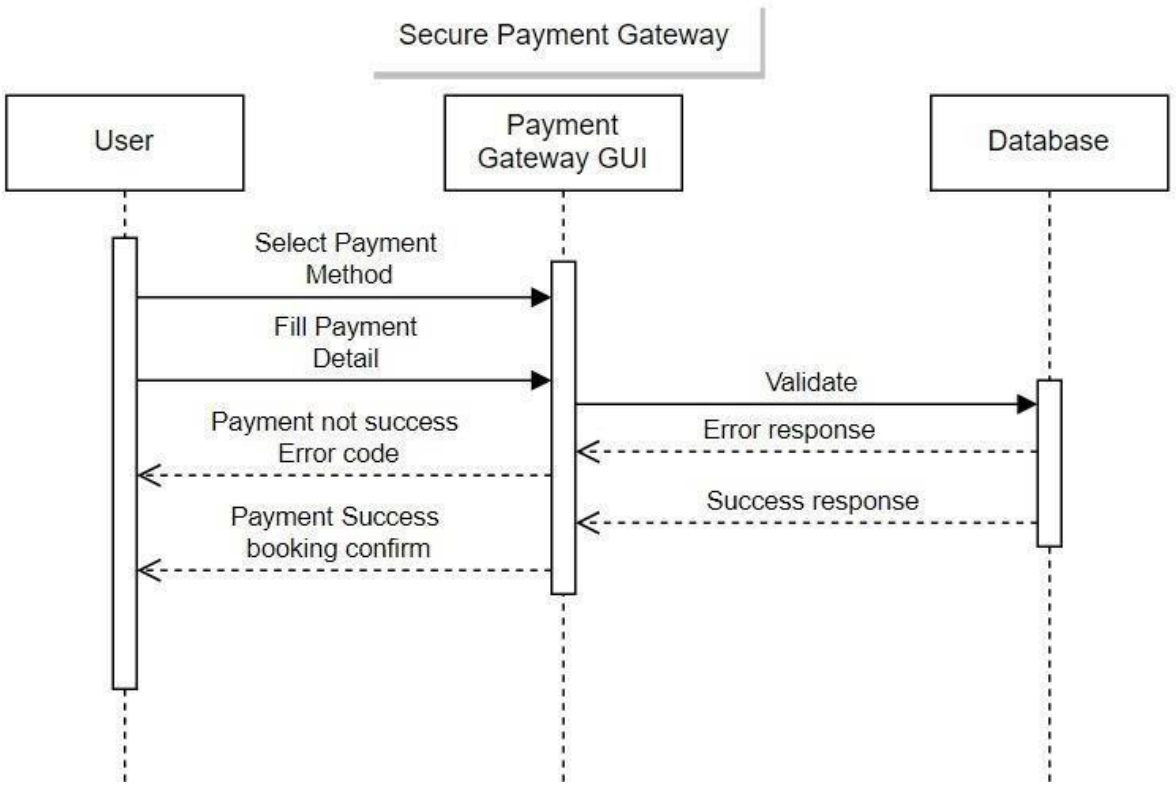


Figure 34 Sequence Diagram: Secure Payment Gateway

3.3.10 Notification

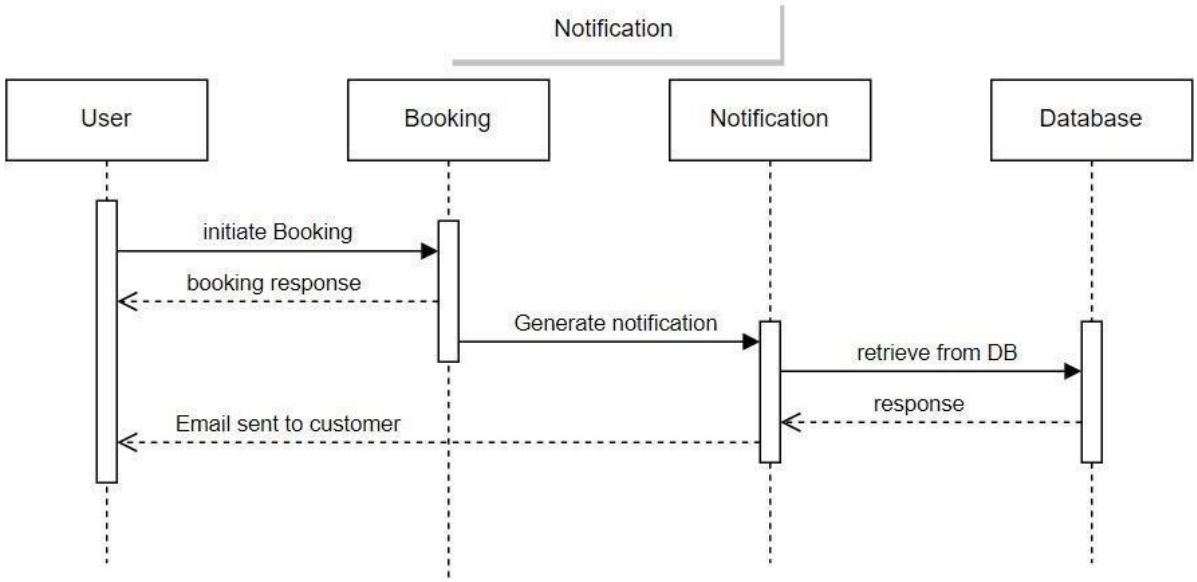


Figure 35 Sequence Diagram: Notification

3.3.11 Tracking

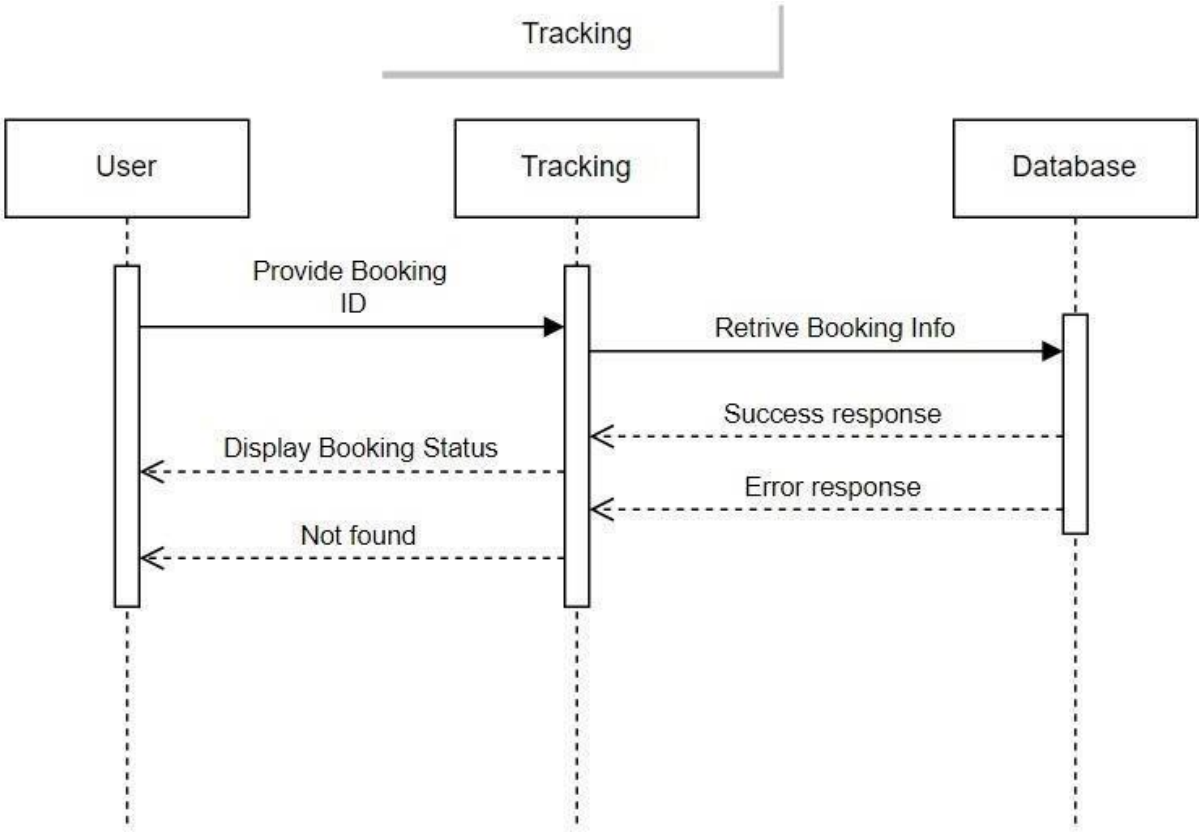


Figure 36 Sequence Diagram: Tracking

3.3.12 Admin Panel

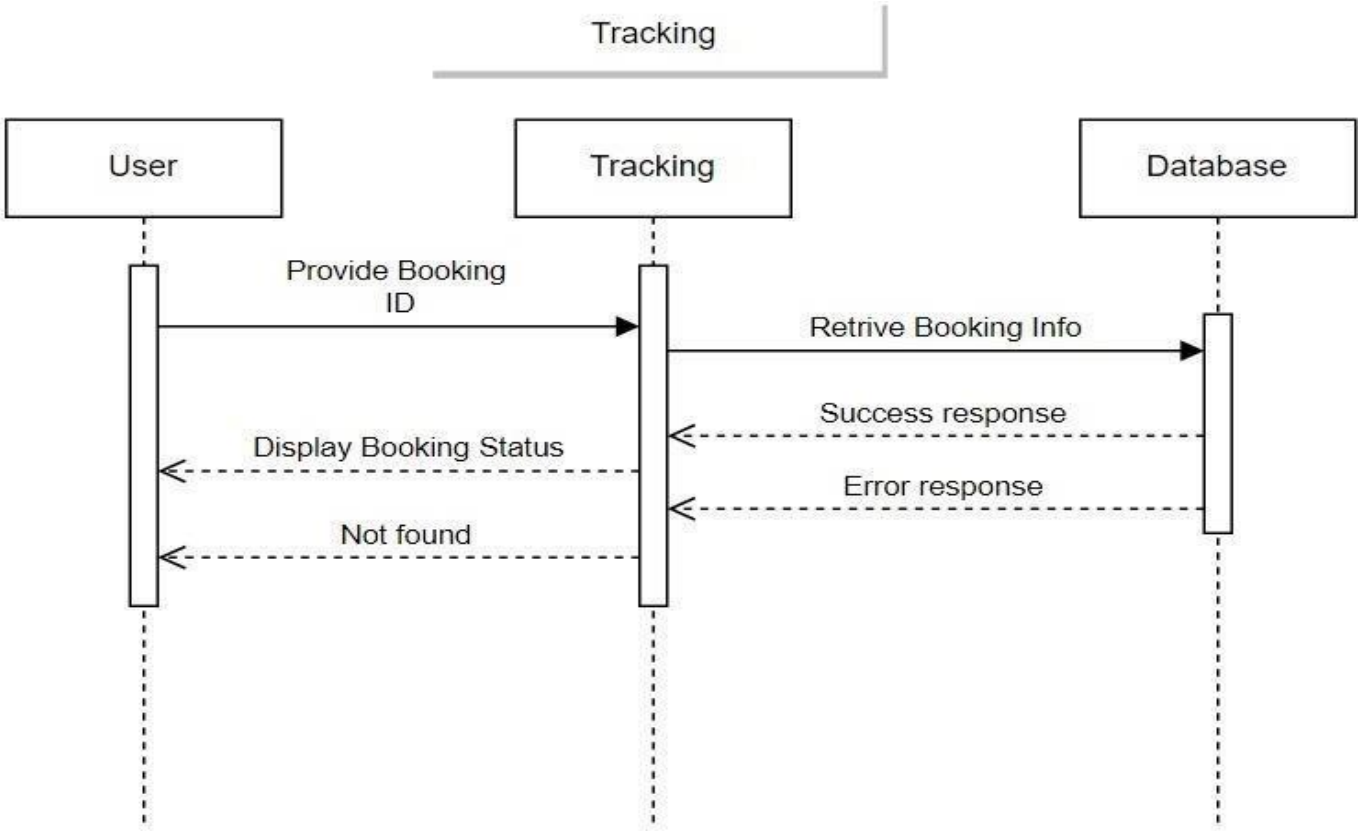


Figure 37 Sequence Diagram: Admin

3.3.13 Services

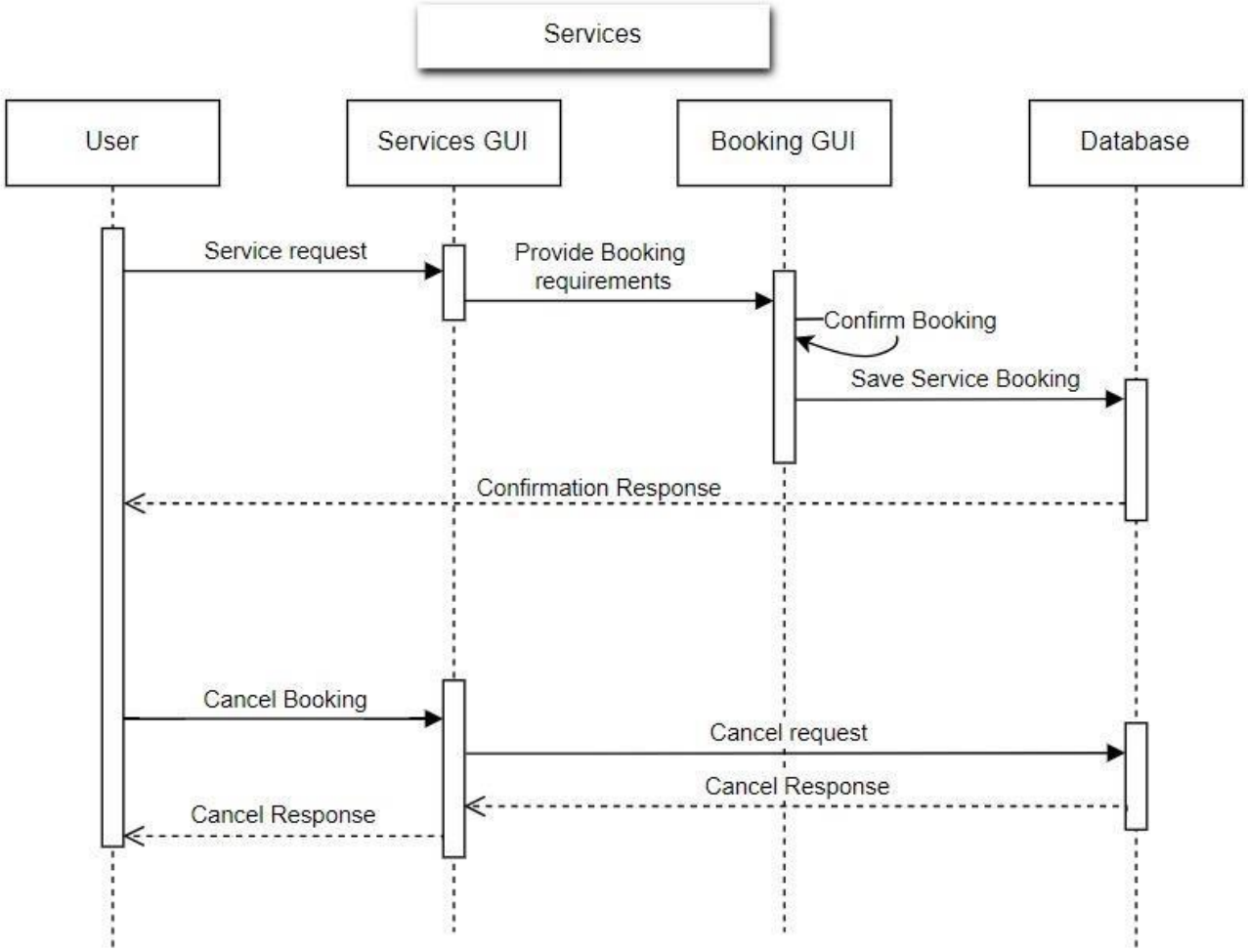


Figure 37 Sequence Diagram: Services

3.4 Project Architecture

React is currently the most widely used alternative on the market, so that is why we are making our project in it, and for that: The model-view-controller, or MVC, framework will be used. The controller will be engaged, the model updated, and the view refreshed if any changes are made because of the user interacting with the view. We'll use the Node.js programming language and the MongoDB database for the backend functionality. MongoDB will manage all the website's information, sending and receiving schemas and validating users by storing their data.

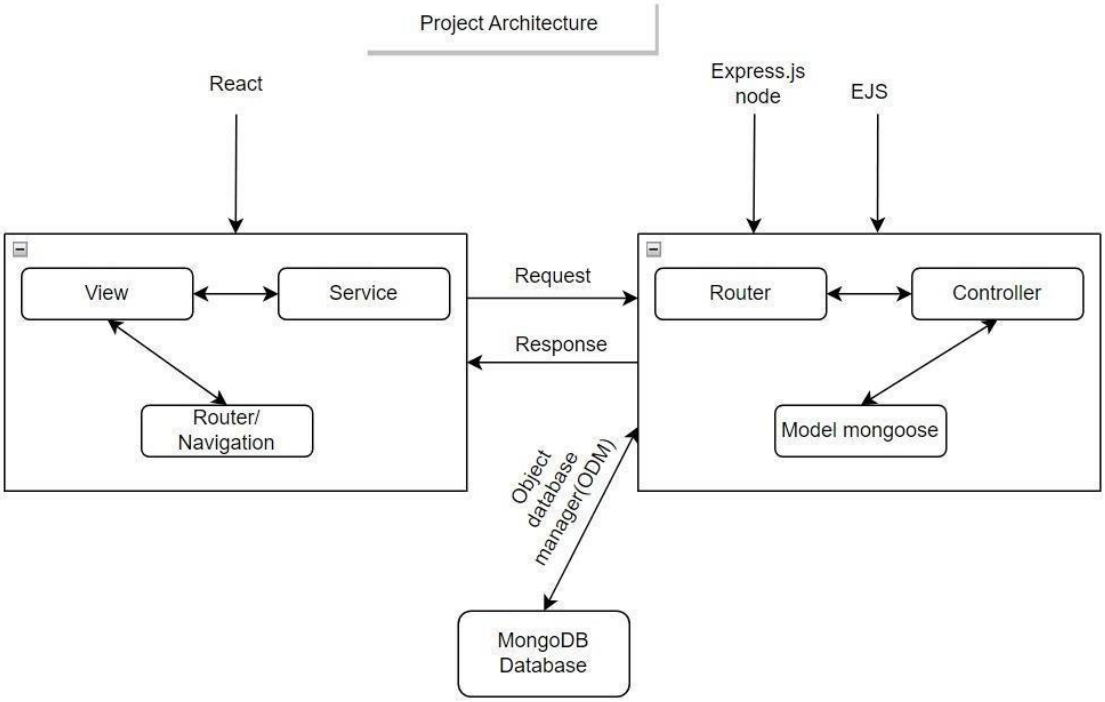


Figure 38 Project Architecture

3.5 Class Diagram

A class diagram is a very descriptive technique to model the classes in a system. It gives attributes of these classes plus the methods or functions of those classes. Interactions among the classes are represented by inheritance, aggregation, composition and association.

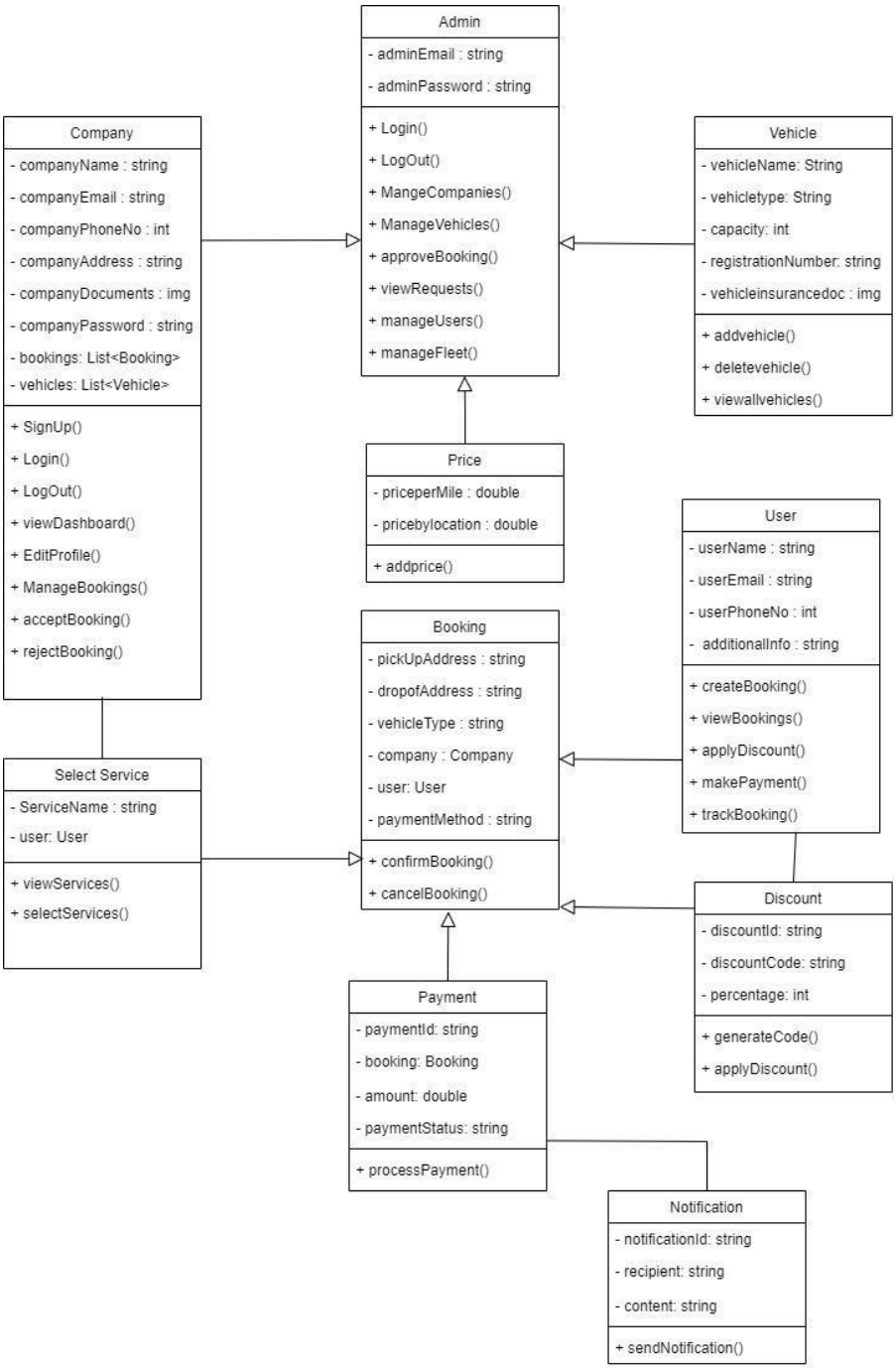


Figure 39 Class Diagram

3.6 Database Diagram

Database diagrams present different database tables and relationship among those tables. Relationship among those tables is one-to-one and one-to-many. Key at the end of the connector represents on-to-one and eight sign at the end of the connector represents one-to-many.

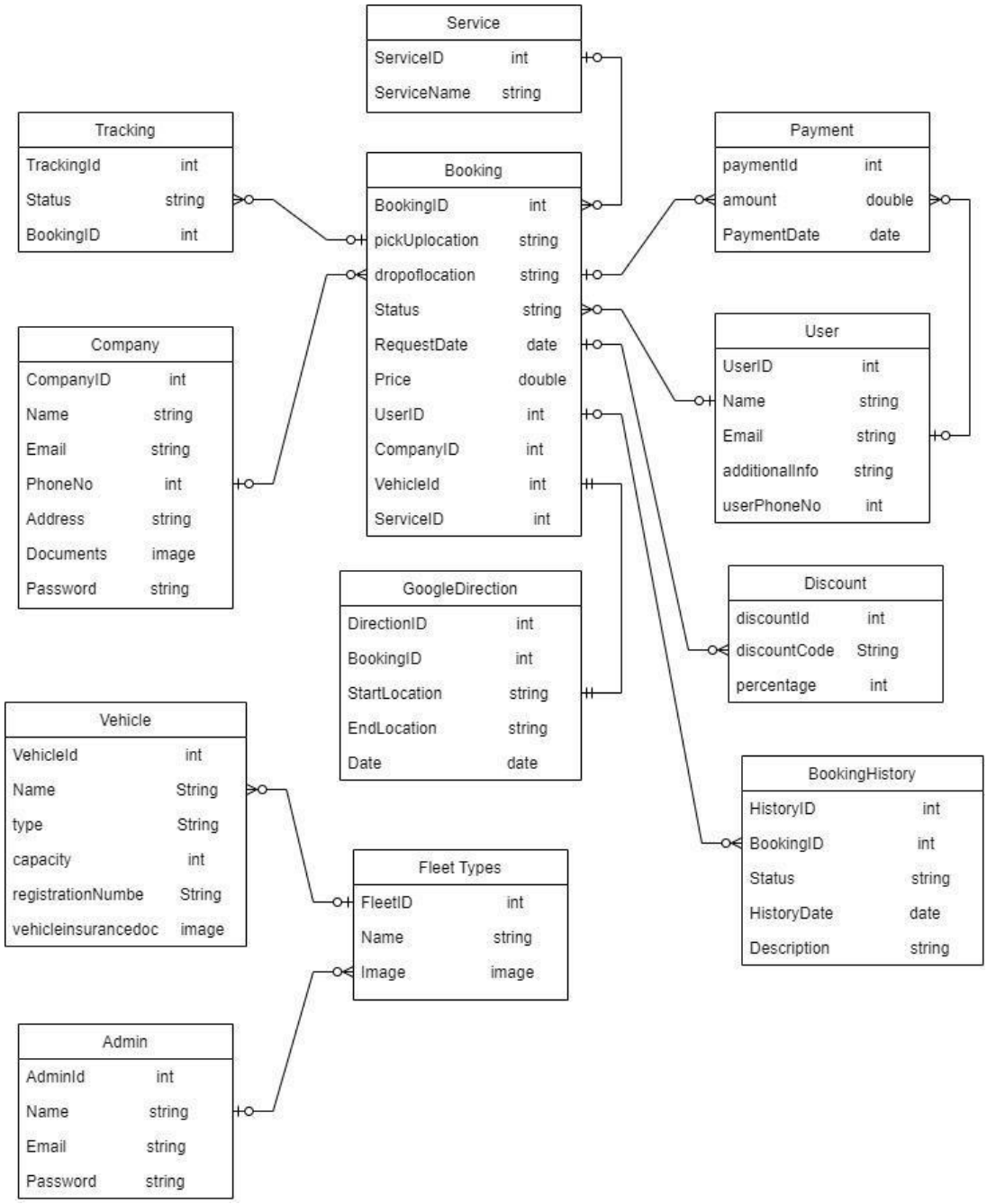


Figure 40 Database Diagram

3.7 Network Diagram (Gantt Chart)

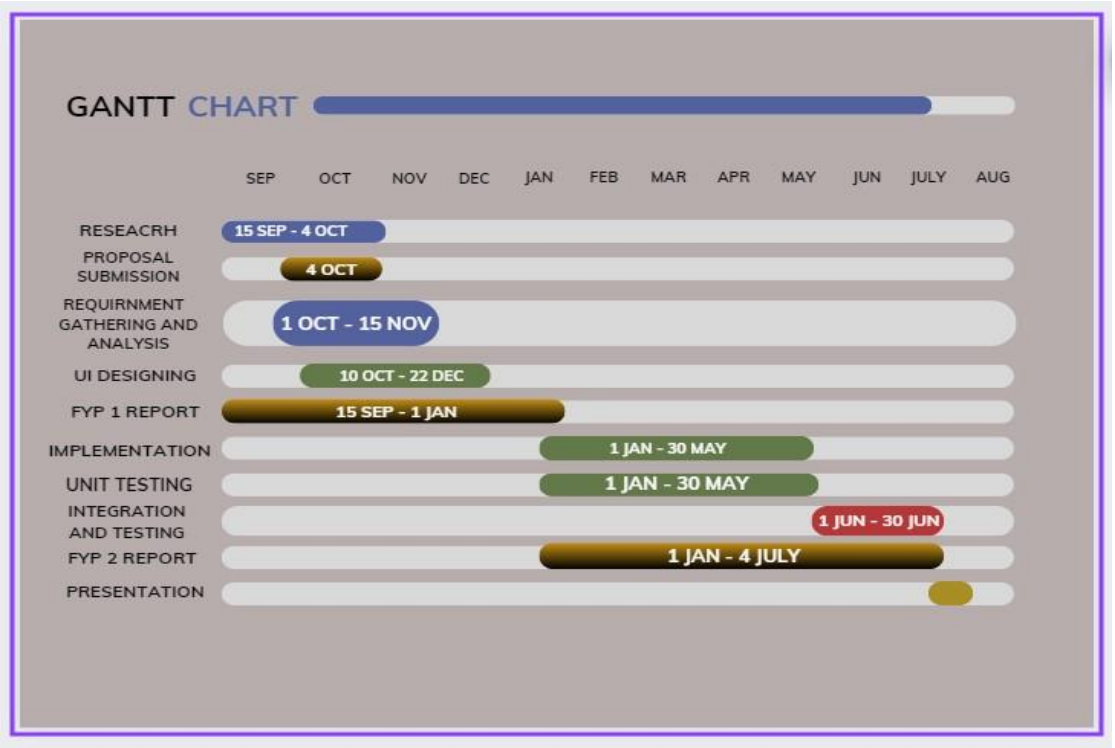


Figure 41Gantt Chart

3.8 Collaboration Diagram

3.8.1 Registration of Company

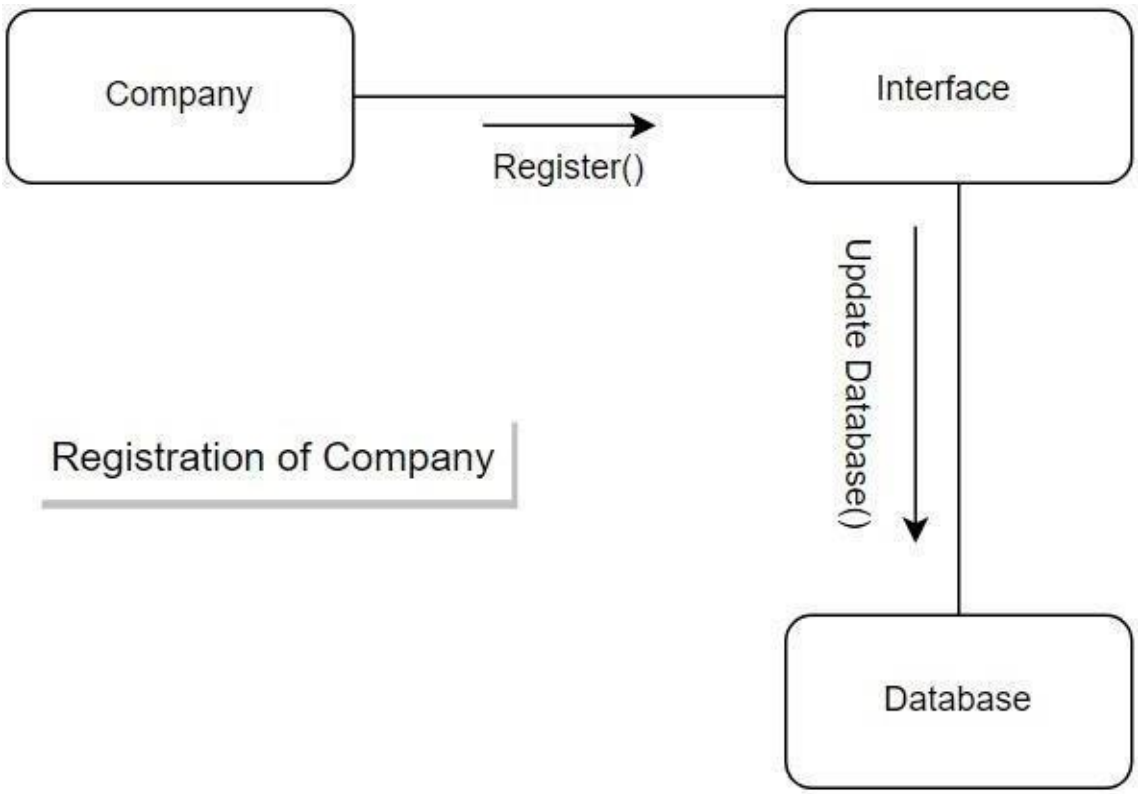


Figure 42 Collaboration Diagram: Company Registration

3.8.2 Login

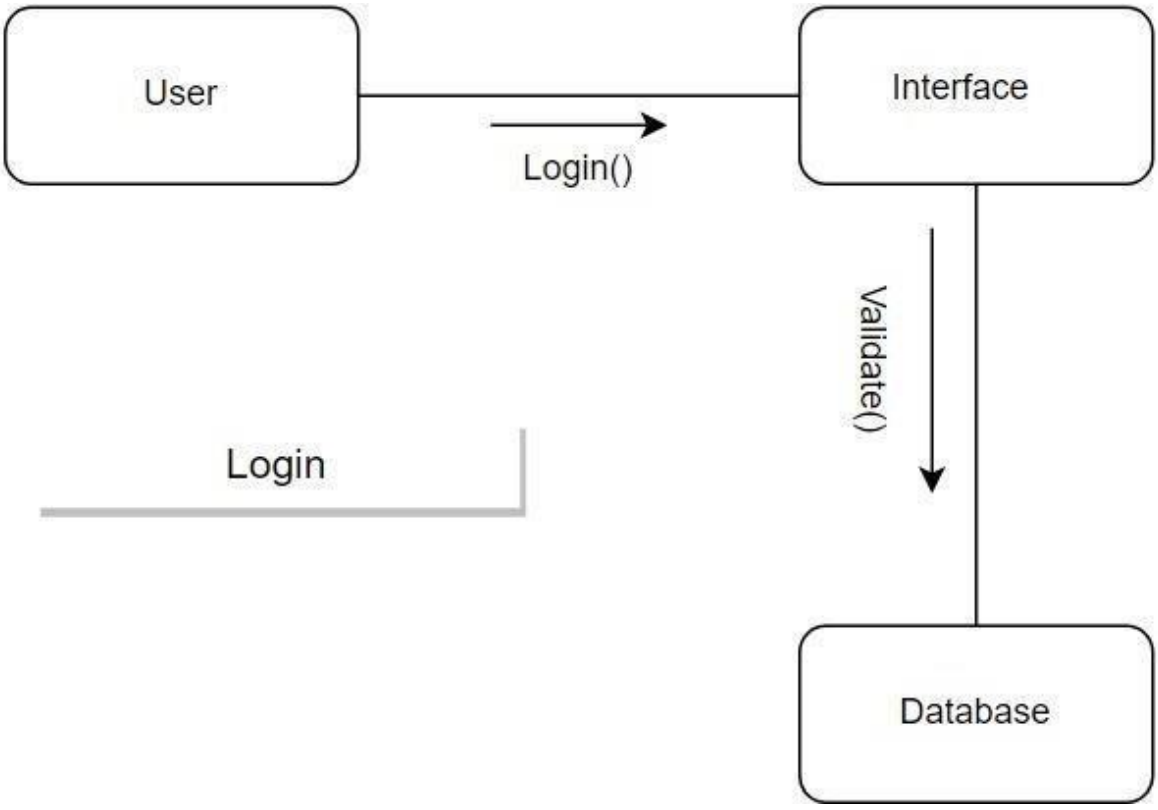


Figure 43 Collaboration Diagram: Login

3.8.3 Company Dashboard

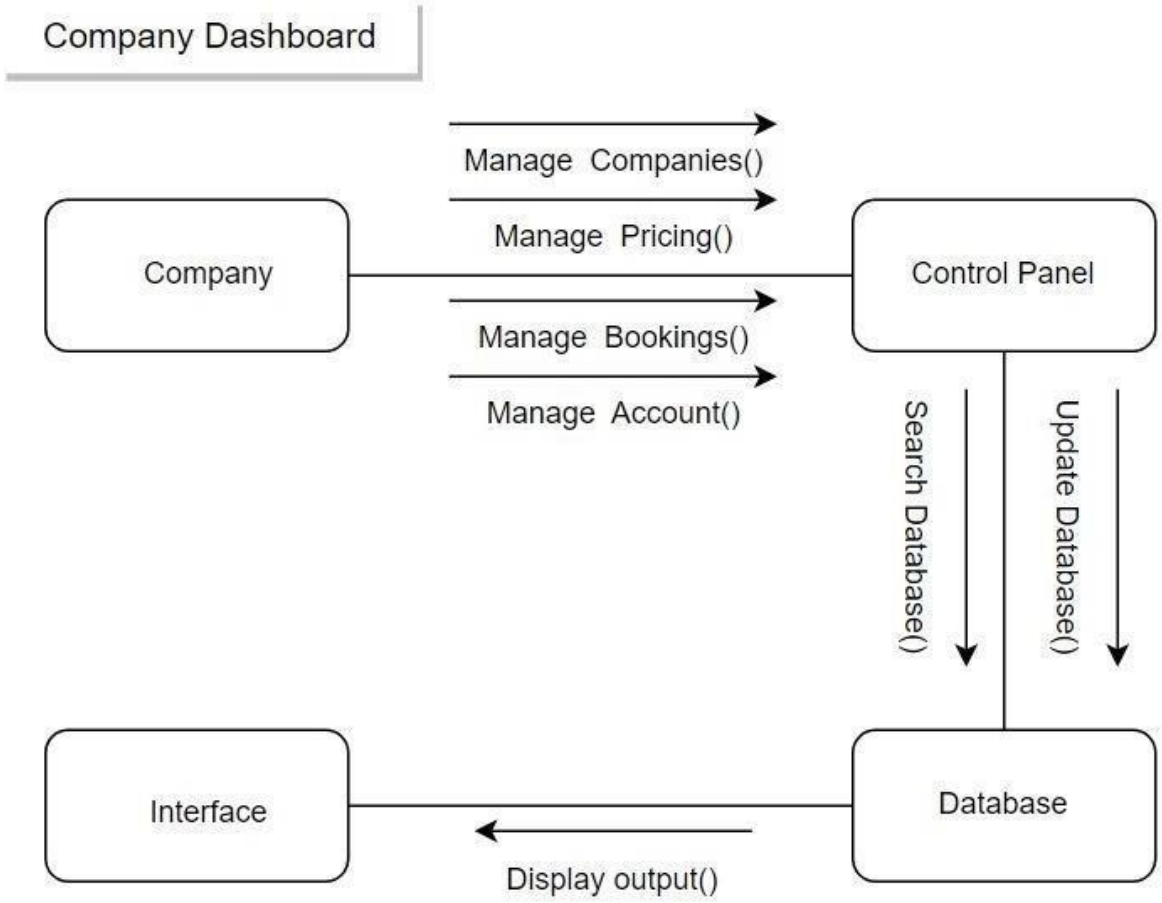


Figure 44 Collaboration Diagram: Company Dashboard

3.8.4 Booking

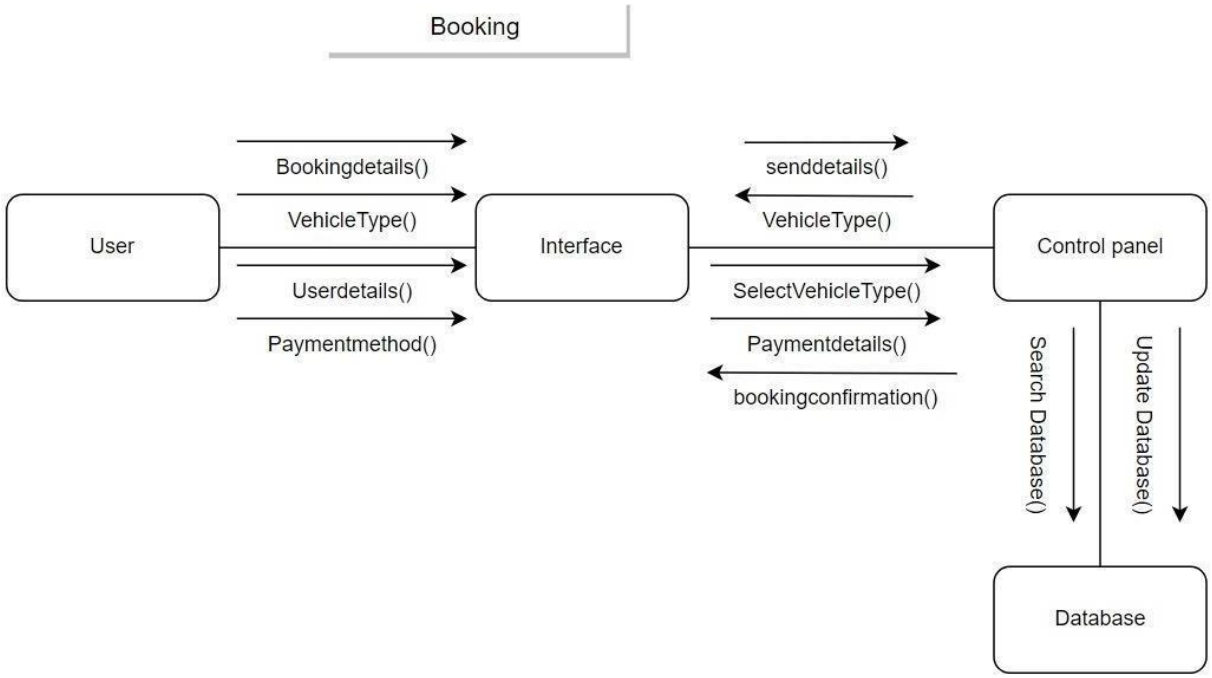


Figure 45 Collaboration Diagram: Booking

3.8.5 Company Listing

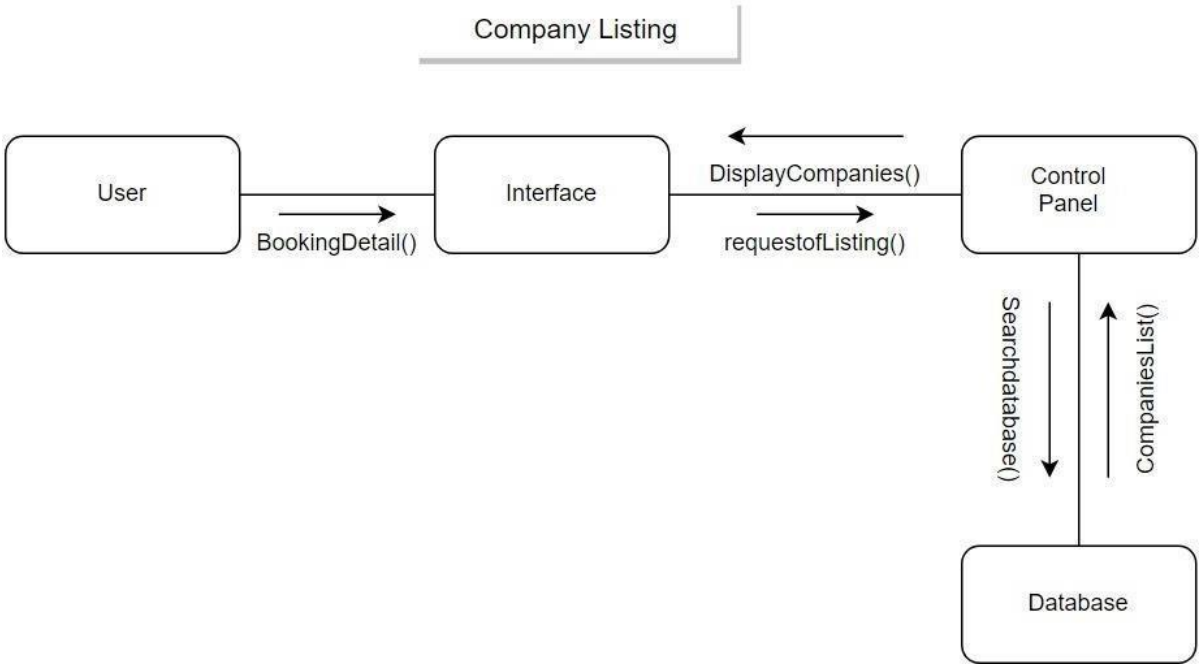


Figure 46 Collaboration Diagram: Company Listing

3.8.6 Filter

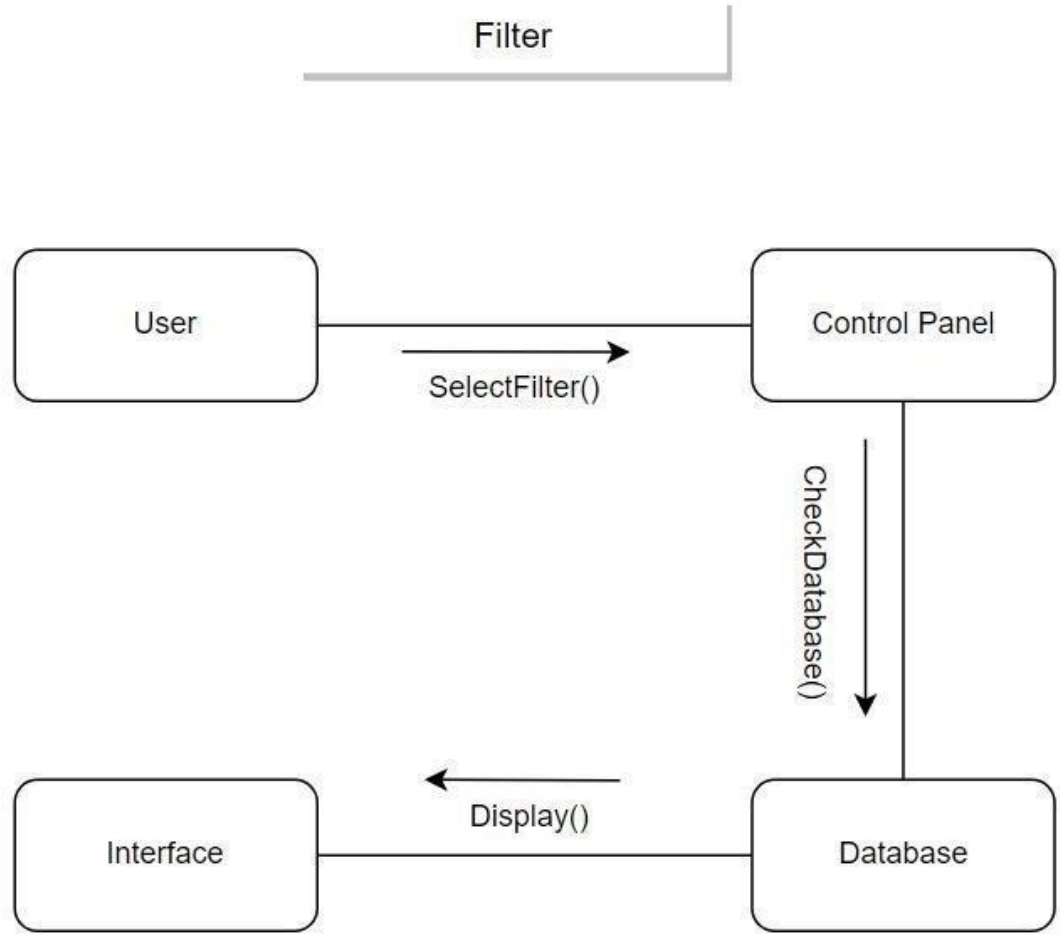


Figure 47 Collaboration Diagram: Filter

3.8.7 Search

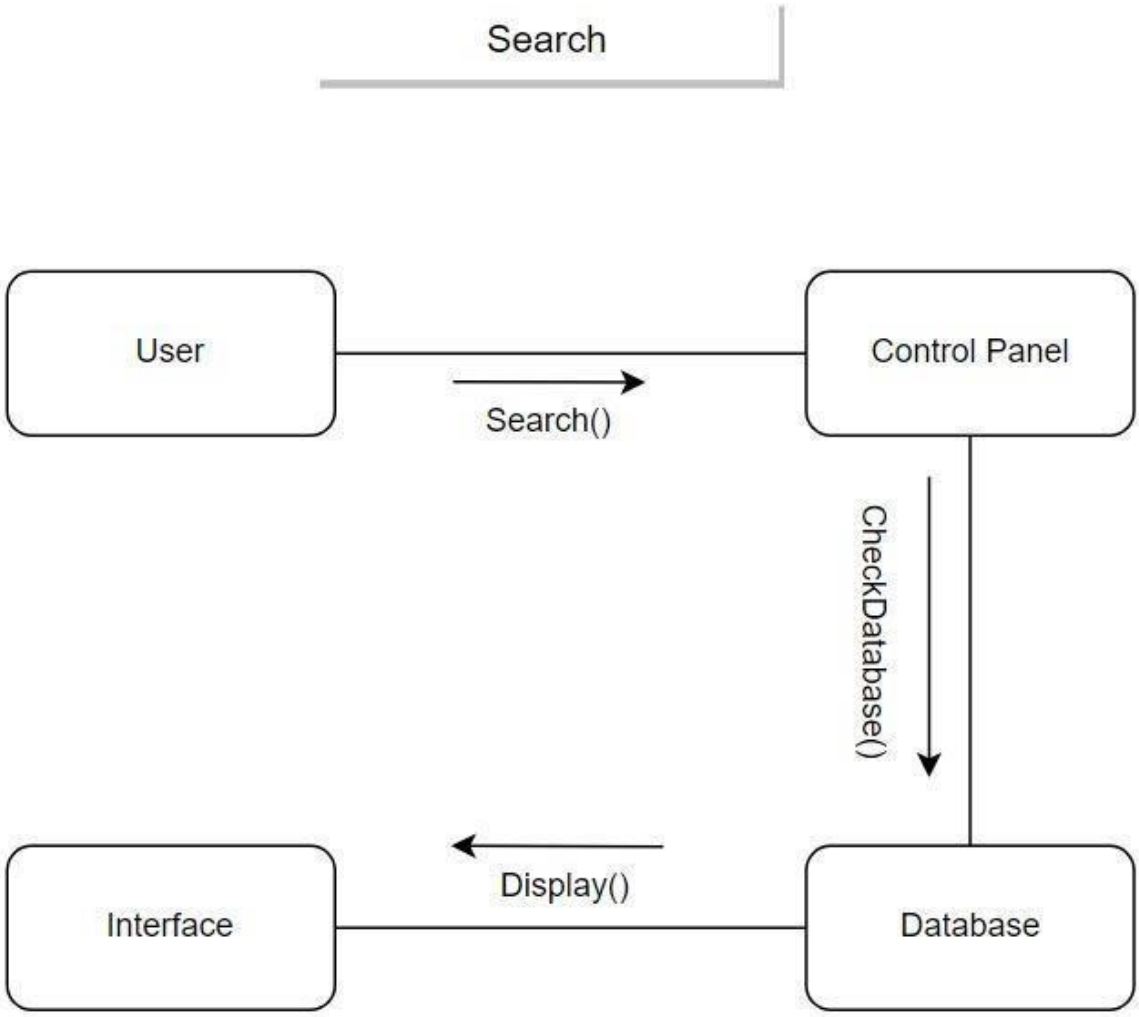


Figure 48 Collaboration Diagram: Search

3.8.8 User dashboard

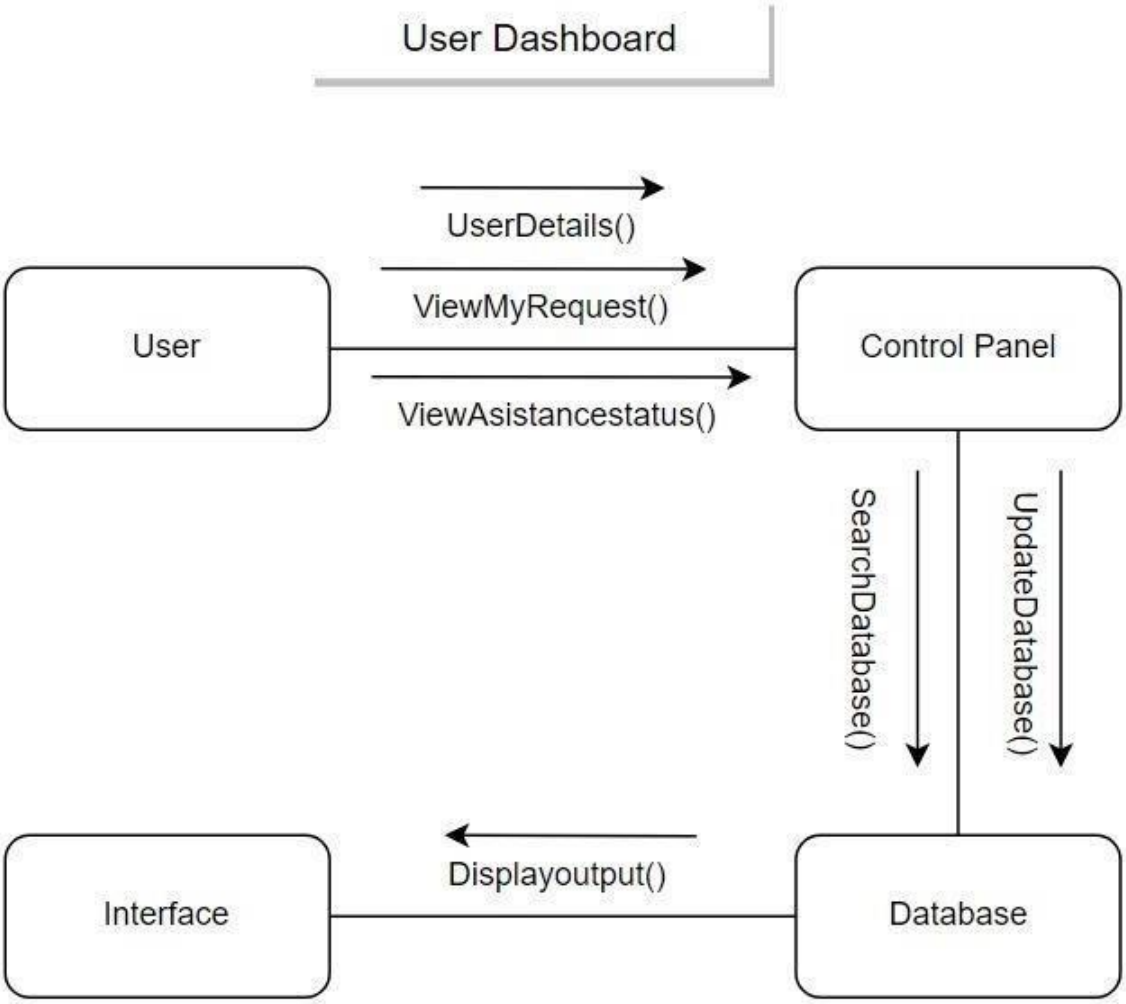


Figure 49 Collaboration Diagram: User Dashboard

3.8.9 Voucher and Discounts

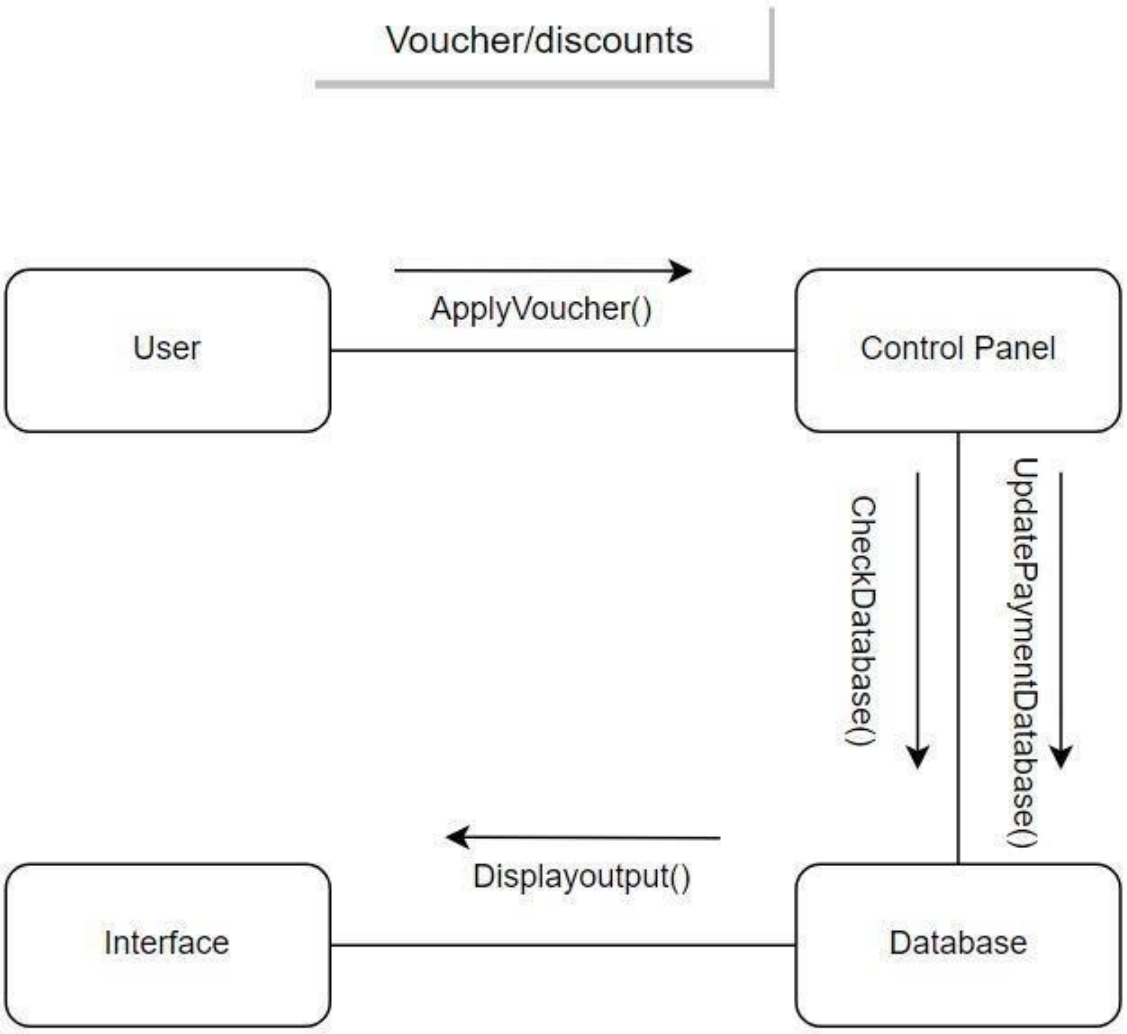


Figure 50 Collaboration Diagram: Voucher and Discount

3.8.10 Secure Payment Gateway

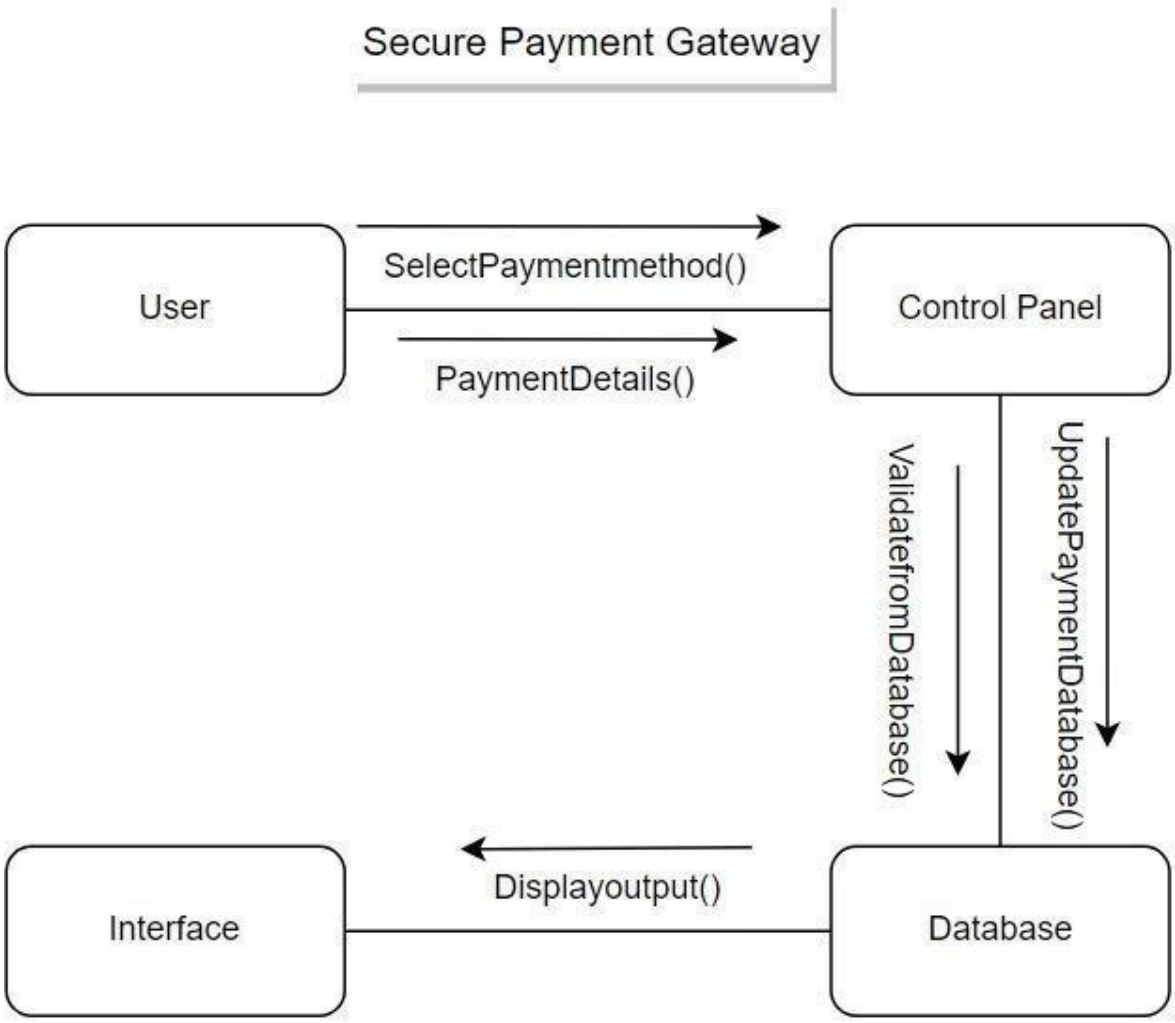


Figure 51 Collaboration Diagram: Secure Payment Gateway

3.8.11 Email Notification

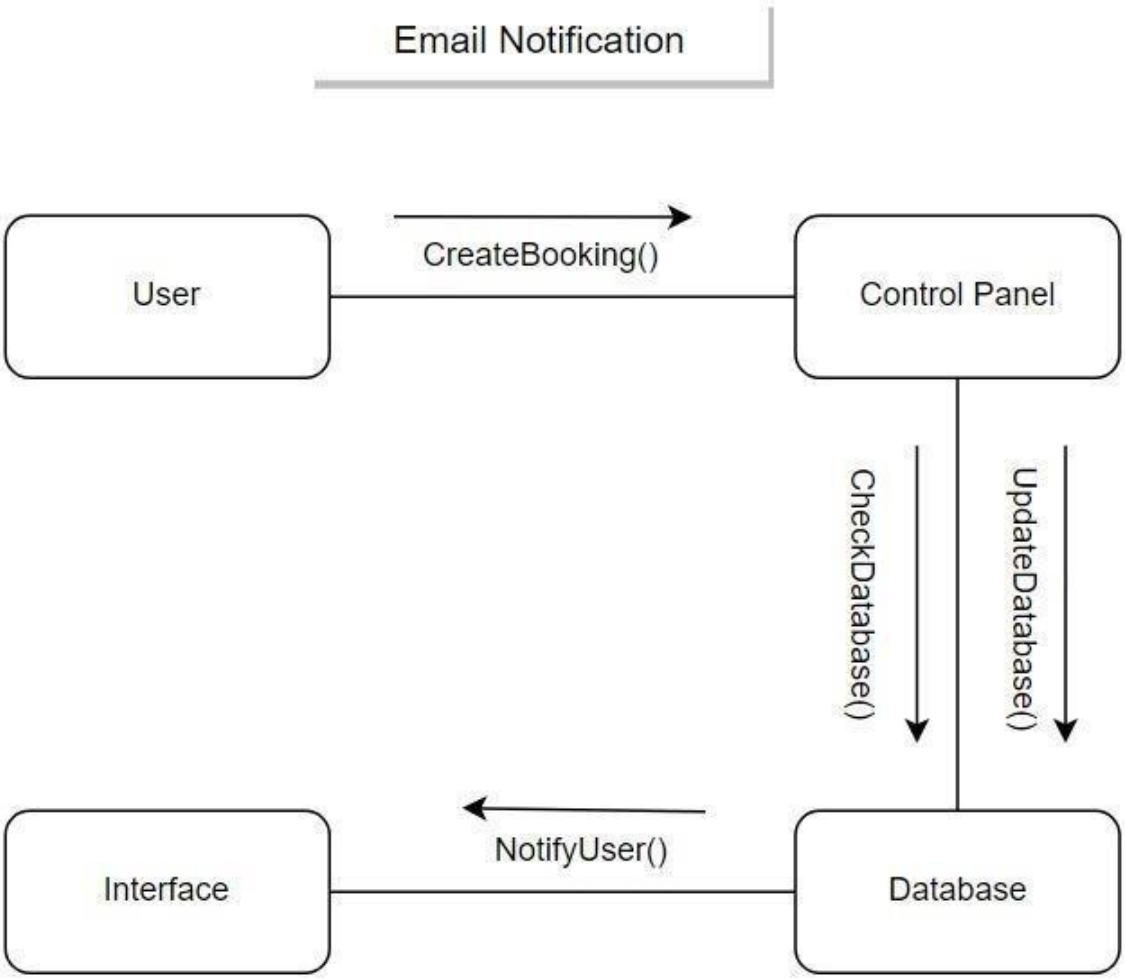


Figure 52 Collaboration Diagram: Email Notification

3.8.12 Tracking

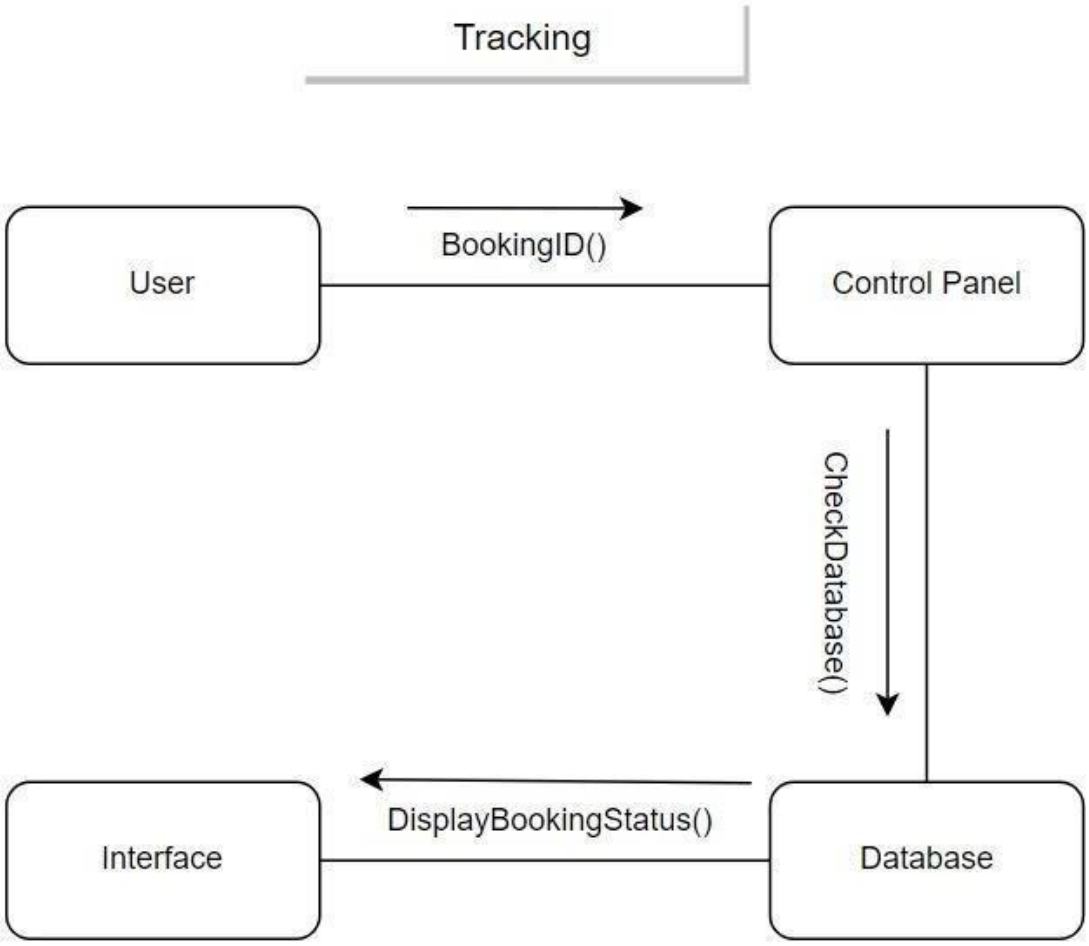


Figure 53 Collaboration Diagram: Tracking

3.8.13 Admin Panel

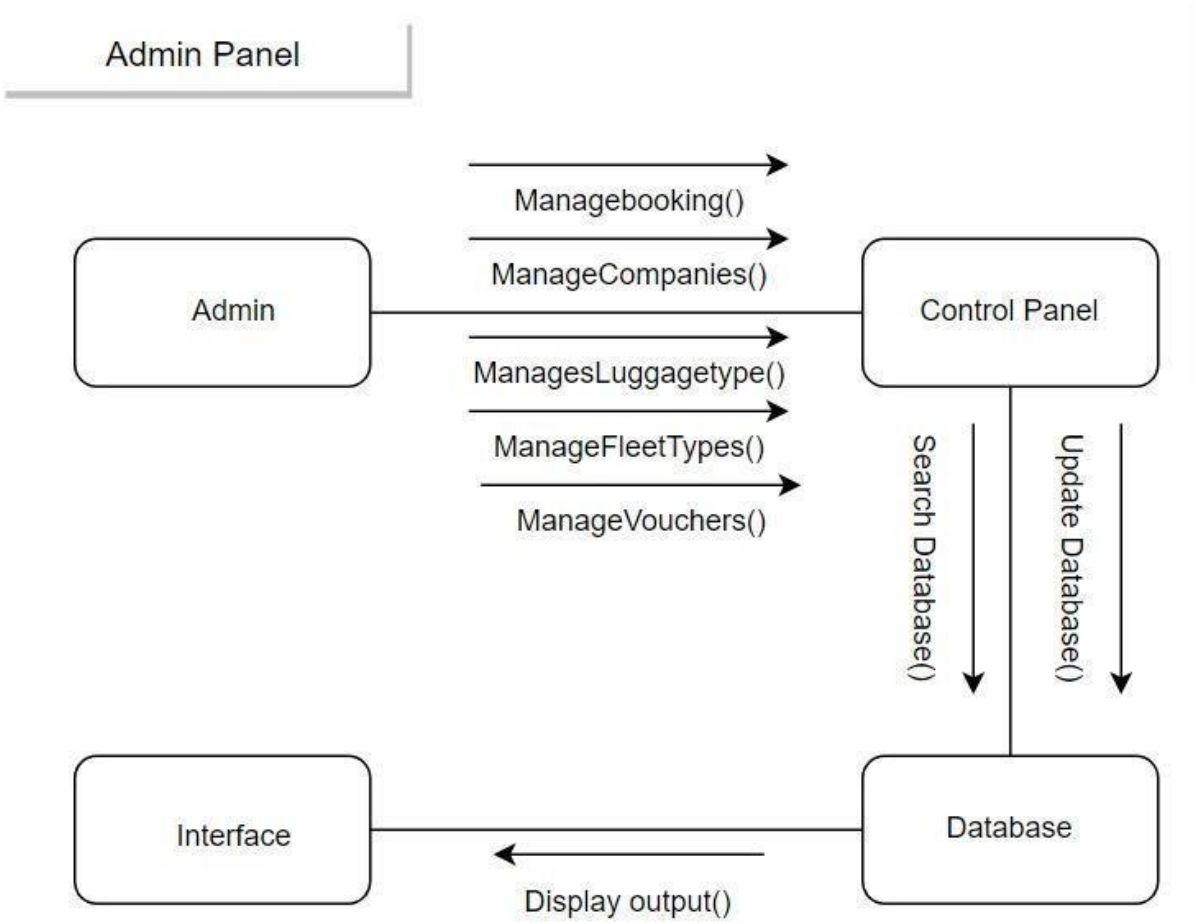


Figure 54 Collaboration Diagram: Admin

3.8.14 Services

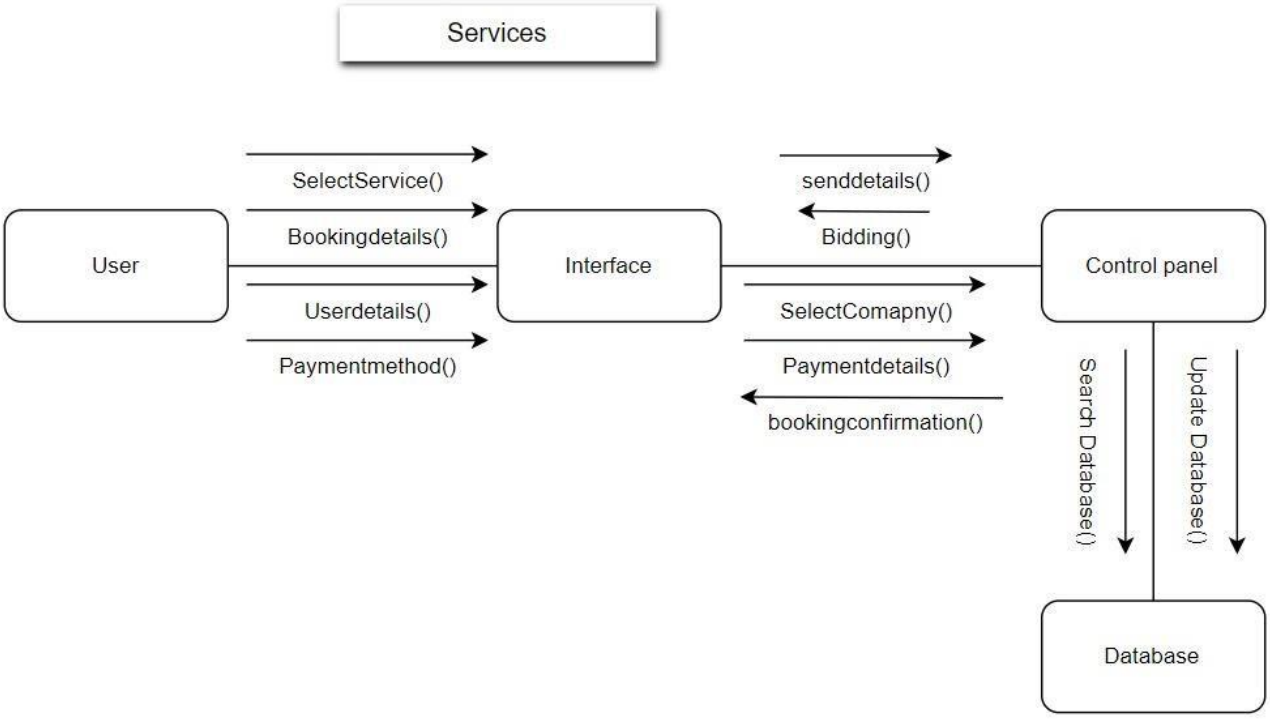


Figure 54 Collaboration Diagram: Services

4 System Testing

This chapter contains all the test cases that will be used to test the functionality of the system against above stated requirements. It will inspect the proper functioning of the system by telling how the system should behave after a particular action to be taken. Unit and integration testing is also stated in this chapter.

4.1 Test Cases

4.1.1 Admin Dashboard

Test Case ID	TC_01
Website Name	TugVan
Input Summary	Access admin dashboard URL

Output Summary Success: Admin dashboard loads successfully. Failure: Dashboard doesn't load	
Pre-Condition	Admin login credentials available
Post-Condition	Admin accesses the dashboard

4.1.2 Admin Authentication

Test Case ID	TC_ 02
Website Name	TugVan
Input Summary	Enter valid admin credentials
Output Summary Success:	
Redirected to the dashboard. Failure: Authentication error message displayed	
Pre-Condition	Admin login page loaded
Post-Condition	Admin successfully authenticated

4.1.3 Admin Enters Details to Login

Test Case ID	TC_ 03

Website Name	TugVan
Input Summary	Enter admin username and password
Output Summary Success: Logged in Failure: Incorrect credentials error message	
Pre-Condition	Admin login page loaded
Post-Condition	Admin logged in successfully

4.1.4 Admin Company Registration

Test Case ID	TC_ 04
Website Name	TugVan
Input Summary	Admin registers a towing company using valid details
Output Summary	
Success: Company registered. Failure: Registration error message displayed	
Pre-Condition	Admin logged in and company registration form available
Post-Condition	New company added to the system

4.1.5 Admin Creates Voucher Details

Test Case ID	TC_ 05
Website Name	TugVan
Input Summary	Admin creates voucher with specific details
Output Summary Success: Voucher created. Failure: Voucher creation fails	
Pre-Condition	Admin logged in and voucher creation interface available
Post-Condition	Voucher successfully created

4.1.6 Admin Can Check Urgent Calls

Test Case ID	TC_ 06
Website Name	TugVan
Input Summary	Admin accesses the urgent calls section

Output Summary Success: Urgent calls displayed. Failure: No urgent calls visible	
Pre-Condition	Admin logged in and on the urgent calls section
Post-Condition	Admin views urgent assistance requests

4.1.7 Admin Proceeds Urgent Calls Towards Companies

Test Case ID	TC_ 07
Website Name	TugVan
Input Summary	Admin assigns an urgent call to a specific towing company
Output Summary Success: Call assigned. Failure: Assignment error	
Pre-Condition	Admin logged in and on the urgent calls section
Post-Condition	Urgent call assigned to a towing company

4.1.8 Admin Adds Towing Vehicle

Test Case ID	TC_ 08
Website Name	TugVan
Input Summary	Admin adds a new towing vehicle with details
Output Summary Success: Vehicle added. Failure: Addition error	
Pre-Condition	Admin logged in and on the vehicle addition interface
Post-Condition	New vehicle added to the system

4.1.9 Admin Deletes Towing Vehicle

Test Case ID	TC_ 09
Website Name	TugVan
Input Summary	Admin deletes a towing vehicle from the system
Output Summary Success: Vehicle deleted. Failure: Deletion error	

Pre-Condition	Admin logged in and on the vehicle deletion interface
Post-Condition	Vehicle removed from the system

4.1.10 Admin Edits Towing Vehicle

Test Case ID	TC_ 10
Website Name	TugVan
Input Summary	Admin modifies details of an existing towing vehicle
Output Summary Success: Vehicle details updated. Failure: Update error	
Pre-Condition	Admin logged in and on the vehicle editing interface
Post-Condition	Vehicle details successfully edited

4.1.11 Admin Adds Towing Companies

Test Case ID	TC_ 11
Website Name	TugVan
Input Summary	Admin registers a new towing company with valid details

Output Summary Success: Company registered. Failure: Registration error	
Pre-Condition	Admin logged in and company registration form available
Post-Condition	New company added to the system

4.1.12 Admin Edits Towing Companies

Test Case ID	TC_ 12
Website Name	TugVan
Input Summary	Admin modifies details of an existing towing company
Output Summary Success: Company details updated. Failure: Update error	
Pre-Condition	Admin logged in and on the company editing interface
Post-Condition	Company details successfully edited

4.1.13 Admin Deletes Towing Companies

Test Case ID	TC_ 13

Website Name	TugVan
Input Summary	Admin deletes a towing company from the system
Output Summary Success: Company deleted. Failure: Deletion error	
Pre-Condition	Admin logged in and on the company deletion interface
Post-Condition	Company removed from the system

4.1.14 User Dashboard

Test Case ID	TC_14
Website Name	TugVan
Input Summary	Access user dashboard URL
Output Summary Success: User dashboard loads. Failure: Dashboard doesn’t load	
Pre-Condition	User login credentials available
Post-Condition	User accesses the dashboard

4.1.15 User Enters Location

Test Case ID	TC_15
Website Name	TugVan
Input Summary	User enters their current location
Output Summary Success: Location accepted. Failure: Location not recognized error	
Pre-Condition	User on the location input screen
Post-Condition	Location successfully submitted

4.1.16 User Selects Vehicle

Test Case ID	TC_16
Website Name	TugVan
Input Summary	User selects vehicle type from the available options
Output Summary Success: Vehicle selected. Failure: Vehicle selection error	

Pre-Condition	Vehicle selection screen displayed
Post-Condition	Vehicle type chosen by the user

4.1.17 User Views Towing Car List

Test Case ID	TC_17
Website Name	TugVan
Input Summary	User views the list of available towing companies
Output Summary Success: List displayed. Failure: List not shown or incomplete	
Pre-Condition	User on the towing company listing screen
Post-Condition	User views towing company list

4.1.18 User Selects Car for Services

Test Case ID	TC_18
Website Name	TugVan
Input Summary	User selects a towing company from the list

Output Summary Success: Company selected. Failure: Selection error	
Pre-Condition	User views the list of towing companies
Post-Condition	User selects a company for services

4.1.19 User Filters and Searches

Test Case ID	TC_19
Website Name	TugVan
Input Summary	User uses filters or search bar to find a specific towing company
Output Summary Success: Filtered/searched result shown. Failure: No result displayed	
Pre-Condition	User on the filtering/searching interface
Post-Condition	User successfully filters or searches for a company

4.1.20 User Can Book Cars According to Fares

Test Case ID	TC_20
Website Name	TugVan
Input Summary	User books a towing service based on fare details
Output Summary Success: Booking confirmed. Failure: Booking error	
Pre-Condition	User selects a towing company and enters vehicle details
Post-Condition	Booking confirmed and assistance requested

4.1.21 User Enters Details

Test Case ID	TC_21
Website Name	TugVan
Input Summary	User enters necessary details for towing service
Output Summary Success: Details submitted. Failure:	
Submission error	
Pre-Condition	User selects a towing service and is on the details input screen

Post-Condition	User details successfully submitted

4.1.22 User Enters Journey Details

Test Case ID	TC_22
Website Name	TugVan
Input Summary	User enters journey details for towing assistance
Output Summary Success: Journey details entered. Failure: Entry error	
Pre-Condition	User selects a towing service and is on the journey details input screen
Post-Condition	Journey details successfully entered

4.1.23 User Registration to Company

Test Case ID	TC_23
Website Name	TugVan
Input Summary	User registers with a towing company for future assistance
Output Summary Success: User registered.	

Failure: Registration error	
Pre-Condition	User selects a towing company and initiates registration process
Post-Condition	User successfully registered to the company

4.1.24 Payment Gateway

Test Case ID	TC_24
Website Name	TugVan
Input Summary	User proceeds with payment using the integrated gateway
Output Summary Success: Payment successful. Failure: Payment error	
Pre-Condition	User confirms booking and selects payment method
Post-Condition	Payment successfully processed

4.1.25 User Enters Vouchers if any.

Test Case ID	TC_25
Website Name	TugVan
Input Summary	User applies a voucher for discounted payment

Output Summary Success:	
Voucher applied. Failure: Voucher application error	
Pre-Condition	User selects payment and enters voucher code
Post-Condition	Voucher successfully applied to the payment

4.1.26 User Selects Payment Method

Test Case ID	TC_26
Website Name	TugVan
Input Summary	User selects preferred payment method (e.g., card, cash)
Output Summary Success: Method selected. Failure: Selection error	
Pre-Condition	User is on the payment method selection screen
Post-Condition	Payment method successfully chosen

4.1.27 User Makes Payment

Test Case ID	TC_27
Website Name	TugVan
Input Summary	User completes the payment process

Output Summary Success: Payment completed. Failure: Payment error	
Pre-Condition	User confirms booking, selects payment method, and clicks on "Make Payment"
Post-Condition	Payment successfully made

4.1.28 Tire Fitting

Test Case ID	TC_28
Website Name	TugVan
Input Summary	Selecting Tire Fitter Service
Output Summary: Success: User successfully submits a tire fitting service request. Failure: Tire fitting service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's tire fitting service request is processed by the system.

4.1.29 Wrong Fuel

Test Case ID	TC_29
Website Name	TugVan
Input Summary	Selecting Wrong Fuel Service
Output Summary: Success: User successfully submits a wrong fuel removal service request. Failure: Wrong fuel removal service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's wrong fuel removal service request is processed by the system.

4.1.30 Battery Replacement

Test Case ID	TC_30
Website Name	TugVan
Input Summary	Selecting Battery Replacement Service
Output Summary: Success: User successfully submits a battery replacement service request. Failure: Battery replacement service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's battery replacement service request is processed by the system.

4.1.31 Wind screen replacement

Test Case ID	TC_31
Website Name	TugVan
Input Summary	Selecting Windscreen Replacement Service

Output Summary: Success: User successfully submits a windscreen replacement service request. Failure: Windscreen replacement service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's windscreen replacement service request is processed by the system.

4.1.32 Key lost

Test Case ID	TC_32
Website Name	TugVan
Input Summary	Selecting Key Lost Service
Output Summary: Success: User successfully submits a key lost service request. Failure: Key lost service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's key lost service request is processed by the system.

4.1.33 Car recovery

Test Case ID	TC_33
Website Name	TugVan
Input Summary	Selecting Car Recovery Service
Output Summary: Success: User successfully submits a car recovery service request. Failure: Car recovery service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.

Post-Condition	User's car recovery service request is processed by the system.

4.1.34 Mobile Servicing

Test Case ID	TC_34
Website Name	TugVan
Input Summary	Selecting Mobile Servicing Service
Output Summary: Success: User successfully submits a mobile servicing service request. Failure: Mobile servicing service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's mobile servicing service request is processed by the system.

4.1.35 DPF Cleaning

Test Case ID	TC_35
Website Name	TugVan
Input Summary	Selecting DPF Cleaning Service
Output Summary: Success: User successfully submits a DPF cleaning service request. Failure: DPF cleaning service request cannot be submitted.	
Pre-Condition	User is logged into the TugVan platform.
Post-Condition	User's DPF cleaning service request is processed by the system.

4.2 Unit / Integration/ Acceptance Testing

4.2.1 Unit Testing

Unit testing is a process of testing small parts or units of our system. This test is performed before integrating the units into one large module.

Unit testing in our project are as follows

1. AdminSignIn()
2. AdminSignOut()
3. RegisterTowingCompany()
4. ViewTowingCompanyDetails()
5. AssignTowingCompanyToRequest()
6. EnableUrgentResponse()
7. EditBookingDetails()
8. EditTrackingDetails()
9. SearchTowingVehicle()
10. CreateCompanyProfile()
11. ViewAllVehicles()
12. EditCompanyProfile()
13. DeleteCompanyProfile()
14. AddTowingVehicle()
15. ViewAllTowingVehicles()
16. EditTowingVehicleDetails()
17. DeleteTowingVehicle()
18. CreateVehicleType()
19. ViewVehicleTypes()
20. EditVehicleTypeDetails()
21. DeleteVehicleType()
22. SetPricingZones()
23. SetPricingByMiles()
24. SetFixedAreaPricings()
25. SetPricingByTimeDuration()
26. SetPaymentGateway()
27. UserLogin()
28. UserSignUp()
29. UserLogout()
30. RequestTowingService()
31. ViewRequestDetails()
32. ManagePaymentDetails()
33. ViewPaymentHistory()
34. ViewUserProfile()

35. EditUserProfile()
36. CompanyLogout()
37. CompanyLogin()
38. UpdateAvailabilityStatus()
39. Notifications()
40. AcceptTowingRequest()
41. RejectTowingRequest()
42. ViewCompletedRequests()
43. ViewUpcomingRequests()
44. ViewCompanyProfile()
45. DealUrgentRequest()
46. TireFittingService()
47. WrongFuelService()
48. BatteryReplacementService()
49. WindScreenReplacement()
50. KeyLostReplacement()
51. CarRecoveryReplacement()
52. MobileServicing()
53. DPFCleaningServic()

4.2.2 Integration testing

Integration testing is a process of testing the complete module of the system after the units or smaller components have been integrated together.

Integration Testing will be conducted on:

• Admin Module

• Customer Module

• Company Module

4.2.3 Acceptance Testing

After the system has been developed, we will check that the functionality of the system is fully aligned with the above stated requirements.

5 Conclusion

5.1 Problem Faced and Lesson Learned

Throughout the development of TugVan, several challenges surfaced, proving instrumental in shaping our approach and strategies. One of the foremost hurdles involved the technical complexities inherent in designing an algorithm for efficient towing company matching. Balancing location, vehicle issues, and cost-effectiveness required extensive testing and continuous

refinement. This experience taught us the importance of iterative development, rigorous testing, and the need for adaptability in creating a robust and accurate matching system.

Encouraging user adoption presented another significant challenge. Convincing towing companies to join the platform and persuading users to adopt a digital roadside assistance solution demanded a user-centric approach. Offering incentives, ensuring a friendly interface, and building trust became pivotal in increasing adoption rates. It underscored the critical lesson that a seamless user experience and value proposition are key drivers in driving user engagement and platform adoption.

The variability in response times from towing companies due to external factors emerged as a persistent challenge. Addressing this required implementing measures to mitigate variations and managing user expectations realistically. It highlighted the importance of transparency and communication in setting accurate expectations for users.

From these challenges, vital lessons emerged. The adaptability to alter strategies based on user feedback and market dynamics was crucial. Prioritizing a user-centric approach in design and functionalities significantly enhanced user engagement and retention. Emphasizing continuous improvement through iterative testing, user feedback loops, and agile development methodologies ensured TugVan evolved to meet user needs effectively.

5.2 Project Summary

TugVan emerged as a groundbreaking roadside assistance platform aimed at transforming how individuals handle vehicle breakdowns. Offering a user-friendly website, it facilitated swift access to towing services across Pakistan. Key features included an emphasis on efficient assistance, enabling quick and user-friendly requests for help during emergencies. The platform's user-centric interface simplified the process, allowing users to provide essential information effortlessly.

Cost-effective solutions were integrated, making towing services affordable and accessible through voucher systems and optimized pricing. Leveraging technology, TugVan connected users with suitable towing services via an intelligent algorithm. The platform's success relied on continuous improvement and adaptation to user needs.

5.3 Future Work

Looking ahead, TugVan envisions expanding its coverage to encompass more regions within State, ensuring a wider reach for users across the country. Enhanced partnerships with towing companies and the incorporation of advanced tracking systems aim to optimize user experience and further improve response times.

Developed a mobile application for Company and In future Develop Mobile Application for user also that stands as a key future milestone, providing users with increased accessibility and convenience for assistance requests on the go. Exploring the integration of artificial intelligence (AI) to refine the matching algorithm further and promoting road safety awareness through educational campaigns represent significant future endeavors.

Additionally, community engagement initiatives are planned to foster trust among users and towing service providers. TugVan aims to evolve into a more comprehensive solution for roadside assistance by focusing on these areas of development. By prioritizing user needs and embracing technological advancements, TugVan seeks to elevate the overall roadside assistance experience for users and towing companies alike.

6 References

1. **AAA Roadside Assistance.** ***AAA Roadside Assistance Application.*** **[Online] 12 8 2023. https://cluballiance.aaa.com/automotive/roadside-service-provider/form.**

2. **Uber Tow Truck.** ***Uber Tow Truck Service.*** **[Online] 10 8 2023. https://uberforxapp.com/uber-for- tow-trucks/.**

3. **Waze.** ***Waze Roadside Assistence.*** **[Online] 9 7 2023. https://medium.com/waze/waze-community-powered-roadside-help-fdc70ecf9ec5.**

4. **HONK.** ***HONK-Roadside-Assistence.*** **[Online] 12 8 2023. https://www.honkforhelp.com/.**

5. **OnStar.** ***OnStar RoadSide Assistence.*** **[Online] 12 9 2023. https://www.onstar.com/services/roadside-assistance.**

6. **GEICO.** ***GEICO Mobile App.*** **[Online] 10 9 2023. https://www.geico.com/web-and-mobile/mobile-apps/.**

7. **Blink.** ***Blink Roadside.*** **[Online] 11 10 2022. https://blinkapp.net/.**

8. **Urgent.ly.** ***Urgent.ly Roadside Assistence.*** **[Online] 23 9 2023. https://www.geturgently.com/.**

9. **RoadTrippers.** ***Roadtrippers Roadside Assistence.*** **[Online] 12 11 2023. https://support.roadtrippers.com/hc/en-us.**

10. **Agero.** ***Agero Roadside Assistance.*** **[Online] 6 11 2023. https://www.agero.com/products-services/roadside-assistance.**

Turnitin plagiarism report

tugVan

ORIGINALITY REPORT

16%	9%	0%	15%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Higher Education Commission Pakistan Student Paper	5%
2	Submitted to Brownwood High School Student Paper	4%
3	Submitted to University of Birmingham Student Paper	4%
4	repository.cuilahore.edu.pk Internet Source	1%
5	www.coursehero.com Internet Source	1%
6	Submitted to University of Malaya Student Paper	<1%
7	Submitted to University of Greenwich Student Paper	<1%
8	Submitted to University of Western Ontario Student Paper	<1%
9	Submitted to Sunway Education Group Student Paper	<1%

How much of this submission has been generated by AI?

0%

of qualifying text in this submission has been determined to be generated by AI.

Caution: Percentage may not indicate academic misconduct. Review required.

It is essential to understand the limitations of AI detection before making decisions about a student's work. We encourage you to learn more about Turnitin's AI detection capabilities before using the tool.

Frequently Asked Questions

What does the percentage mean?

The percentage shown in the AI writing detection indicator and in the AI writing report is the amount of qualifying text within the submission that Turnitin's AI writing detection model determines was generated by AI.

Our testing has found that there is a higher incidence of false positives when the percentage is less than 20. In order to reduce the likelihood of misinterpretation, the AI indicator will display an asterisk for percentages less than 20 to call attention to the fact that the score is less reliable. However, the final decision on whether any misconduct has occurred rests with the reviewer/instructor. They should use the percentage as a means to start a formative conversation with their student and/or use it to examine the submitted assignment in greater detail according to their school's policies. **How does Turnitin's indicator address false positives?**

Our model only processes qualifying text in the form of long-form writing. Long-form writing means individual sentences contained in paragraphs that make up a longer piece of written work, such as an essay, a dissertation, or an article, etc. Qualifying text that has been determined to be AI-generated will be highlighted blue on the submission text.

Non-qualifying text, such as bullet points, annotated bibliographies, etc., will not be processed and can create disparity between the submission highlights and the percentage shown. **What does 'qualifying text' mean?**

Sometimes false positives (incorrectly flagging human-written text as AI-generated), can include lists without a lot of structural variation, text that literally repeats itself, or text that has been paraphrased without developing new ideas. If our indicator shows a higher amount of AI writing in such text, we advise you to take that into consideration when looking at the percentage indicated.

In a longer document with a mix of authentic writing and AI generated text, it can be difficult to exactly determine where the AI writing begins and original writing ends, but our model should give you a reliable guide to start conversations with the submitting student.