

**THE UNIVERSITY OF DANANG
DANANG UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INFORMATION TECHNOLOGY**

**GRADUATION PROJECT THESIS
MAJOR: INFORMATION TECHNOLOGY**

PROJECT TITLE:

**BUILD A CAR RENTAL SYSTEM
INTEGRATING AI CHATBOT**

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SUMMARY

Topic title: Build A Car Rental System Integrating AI Chatbot

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In the current context, the demand for car transportation for tourism and travel within Da Nang City is increasing, especially among families. However, owning a car is still financially challenging for many households. To address this need, my project focuses on developing a car rental website that provides a convenient and economical transportation solution for the residents of Da Nang.

This website will offer a variety of car rental services, including family cars, tourist cars, and luxury cars, to meet the diverse transportation needs of customers. A standout feature of the project is the integration of an intelligent AI chatbot, which helps advise and support customers regarding the services within the system effectively and quickly.

By combining diverse car rental services with advanced AI chatbot technology, I believe this website will deliver the best possible experience for customers. This is an ideal solution that makes car rental easier, more convenient, and more efficient than ever before, contributing to the improvement of transportation services in Da Nang City.

GRADUATION PROJECT REQUIREMENTS

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Class: 20TCLC_DT2

Faculty: Information and Technology

Major: Information and Technology

1. Topic title: Build A Car Rental System Integrating AI Chatbot
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5. Name of instructor:	Content parts:
Mai Văn Hà	

6. Date of assignment :/...../202.....

7. Date of completion :/...../202.....

Đà Nẵng, date month year 2024

Head of Division.....

Instructor

PREFACE

During my time studying at Danang University of Science and Technology, I received enthusiastic teaching, guidance, and assistance from the lecturers in the Faculty of Information Technology, as well as from all the faculty members of the university. I sincerely thank all the lecturers for imparting both professional knowledge and practical insights, which have greatly benefited me as I step into the world.

Furthermore, I would like to express my heartfelt gratitude to Mr. Mai Van Ha, MSc., from the Faculty of Information Technology – Danang University of Science and Technology, who has meticulously guided and assisted me, answered my queries, provided feedback, and created favorable conditions throughout the process of completing my graduation thesis. Thanks to his support, I was able to complete my thesis on schedule.

I am especially grateful to my family and friends for their unwavering encouragement, motivation, and support, both materially and spiritually, throughout my studies and the completion of this graduation thesis.

Despite my efforts to complete the thesis to the best of my ability, there may still be shortcomings. I hope for the understanding of my lecturers, and I eagerly look forward to receiving their feedback to further improve my work.

I sincerely thank you all.

ASSURANCE

I am Phạm Thành Công and I assure you that:

1. This graduation thesis is the result of my own research and work under the direct guidance of Mr. Mai Văn Hà.
2. All references used in this thesis are clearly cited with the author's name, publication date, and source.
3. If there are any instances of improper copying or violation of training regulations, I take full responsibility.

Student Performed

Phạm Thành Công

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INTRODUCTION

1. Purpose of implementing the topic

- Currently, there is a growing demand for family travel and transportation in Da Nang City, where the accessibility to car ownership remains limited for many households. Recognizing this need, I aim to establish a car rental website to cater to this demand. Additionally, the website will integrate a chatbot AI to provide customer assistance and guidance regarding the available services within the system.

2. Topic objective

- Build A Car Rental System that allows users to quickly search for and rent cars, while also enabling employees and administrators to manage available cars and user rentals efficiently.
- Build a Chatbot to provide instant support to users with the necessary information, allowing them to interact and receive answers to questions related to car rentals, booking processes, pricing, etc.

3. Scope and objects of research

- As a current resident living in Da Nang and for tourists with a need for reliable car rental services in Da Nang.

4. Research methods

- To complete this topic, the following tasks need to be done:
 - o Generating ideas for the project.
 - o Analyzing the project's usage requirements.
 - o Analyzing system design.
 - o Designing the database, and constructing the database structure.
 - o Designing the interface, and implementing functions.
 - o Testing, refining, and finalizing the product.
 - o Writing a summary report of the project and proposing future development directions.

5. Structure of the graduation project

- The thesis includes the following contents:
 - o Introduction
 - o Chapter 1: Theoretical Basis
 - o Chapter 2: System Analysis and Design

- Chapter 3: Implementation and Evaluation of Results
- Chapter 4: Conclusion
- References

Chapter 1: THEORETICAL BASIS

1.1. Overview of MongoDB

1.1.1. Introduction

MongoDB is an open-source database and a leading NoSQL database, used by millions of people. MongoDB is written in C++.

MongoDB Atlas is a concept associated with MongoDB and is understood as a database-as-a-service (DBaaS) solution. MongoDB Atlas offers functionality and costs that are very suitable for most businesses of various sizes.

NoSQL is an open-source database model introduced as an improved model in terms of features and speed compared to RDBMS database management systems. NoSQL uses JSON data with key-value pairs that can be processed quickly and achieve high performance, and can scale without being constrained by the locks as in SQL. Therefore, it is widely used today due to the flexibility it offers.

Collections in MongoDB are very flexible in structure, allowing data to be stored without adhering to a fixed schema. Related information is stored together for quick query access through the MongoDB query language.

1.1.2. Advantages

- The structure of an object is clear.
- No complex joins.
- Extremely scalable.
- Less schema; in MongoDB, a single collection can contain many different documents.
- Uses in-memory storage to keep the working set, allowing for faster data access. Updates are performed efficiently through in-place updates.

1.2. Overview of Next.js

1.2.1. Introduction

Next.js is a popular open-source React framework created by Vercel (formerly known as ZEIT). It enables developers to build server-rendered React applications with ease, providing a powerful set of tools and features to enhance both development and performance.

Next.js simplifies the process of building React applications by handling common tasks such as routing, server-side rendering, static site generation, and API integration. It allows developers to create dynamic web applications with a focus on performance and SEO optimization.

1.2.2. Features

- *Server-Side Rendering (SSR) and Static Site Generation (SSG)*
 - Next.js offers built-in support for both server-side rendering and static site generation. This allows pages to be pre-rendered on the server or at build time, improving load times and SEO.
- *API Routes*
 - Next.js provides a convenient way to create API endpoints using its API Routes feature. This allows developers to build full-stack applications with both frontend and backend logic in a single codebase.
- *File-Based Routing*
 - Next.js uses a file-based routing system, where the structure of the files in the pages directory corresponds to the application's routes. This intuitive approach makes it easy to manage and navigate through different pages in the application.
- *Automatic Code Splitting*
 - Next.js automatically splits the code at the page level, which means only the necessary code for the current page is loaded. This helps reduce the initial load time and improves the overall performance of the application.
- *Built-in CSS and Sass Support*
 - Next.js comes with built-in support for importing CSS and Sass files. Developers can also use CSS-in-JS solutions like styled components or Emotion.
- *Fast Refresh*
 - Next.js includes Fast Refresh, a feature that provides an improved development experience by enabling instant feedback and preserving component state when editing React components.

1.2.3. Advantages

- **Performance:** Next.js is optimized for performance with features like server-side rendering, static site generation, and automatic code splitting.
- **SEO Friendly:** Server-side rendering and static site generation improve SEO by allowing search engines to crawl and index pages more effectively.

- **Developer Experience:** With features like Fast Refresh, file-based routing, and built-in support for CSS and Sass, Next.js enhances the developer experience.
- **Flexibility:** Next.js supports both server-side rendering and static site generation, allowing developers to choose the best rendering method for their use case.
- **Scalability:** The framework's architecture and features like API Routes make it easy to build scalable applications.

1.3. Overview of Node.js

1.3.1. Introduction

Node.js is an open-source, cross-platform runtime environment that allows developers to execute JavaScript code on the server side. Created by Ryan Dahl in 2009, Node.js is built on the V8 JavaScript engine, the same engine used by Google Chrome. This powerful runtime environment extends the capabilities of JavaScript beyond the browser, enabling the development of high-performance server-side applications.

Node.js excels in handling asynchronous operations due to its event-driven, non-blocking I/O model. This makes it particularly well-suited for real-time applications such as chat applications, online gaming, and collaborative tools. Node.js uses a single-threaded event loop to handle multiple connections concurrently, allowing it to manage thousands of connections efficiently.

1.3.2. Features

- *Asynchronous and Event-Driven:*
 - Node.js processes multiple requests simultaneously without blocking, making it ideal for I/O-heavy operations.
- *Single-Threaded but Highly Scalable:*
 - Using a single-threaded event loop, Node.js can handle numerous connections with minimal overhead.
- *Fast Performance:*
 - Built on the V8 engine, Node.js compiles JavaScript directly into machine code, ensuring fast execution and high performance.
- *Rich Ecosystem:*
 - Node.js has a vast ecosystem of libraries and modules available through npm (Node Package Manager), facilitating rapid development.
- *Cross-Platform:*

- Node.js runs on various operating systems, including Windows, macOS, and Linux, making it versatile and widely accessible.
- *Full-Stack Development:*
 - With Node.js, developers can use JavaScript for both frontend and backend development, streamlining the development process.

1.3.3. Advantages

- *High Performance:*
 - Node.js is optimized for performance with its non-blocking I/O and fast execution via the V8 engine.
- *Scalability:*
 - The event-driven architecture allows for the efficient handling of a large number of simultaneous connections.
- *Efficient Development:*
 - The use of JavaScript for both client-side and server-side development simplifies the development workflow and enhances productivity.
- *Large Community and Ecosystem:*
 - Node.js benefits from a large and active community, providing extensive resources, libraries, and modules for various use cases.
- *Real-Time Applications:*
 - Ideal for building real-time applications such as chat apps, online gaming, and collaborative tools, thanks to its asynchronous nature.

1.4. Overview of Flask

1.4.1. Introduction

Flask is a lightweight, open-source web framework for Python, created by Armin Ronacher in 2010 as part of the Poccoo project. It is designed to be simple and flexible, allowing developers to create web applications with minimal overhead. Flask follows the WSGI (Web Server Gateway Interface) standard and is based on Werkzeug, a comprehensive WSGI web application library, and Jinja2, a powerful templating engine.

Flask is often described as a microframework because it provides the core essentials needed to get a web application up and running but leaves much of the architecture and additional features up to the developer. This design philosophy makes Flask highly extensible and suitable for both small projects and large-scale applications.

1.4.2. Features

- *Minimal and Flexible:*
 - Flask provides a core framework that is easy to extend with additional libraries and modules as needed, offering great flexibility..
- *Built-in Development Server and Debugger:*
 - Flask includes a built-in development server and an interactive debugger to facilitate rapid development and debugging.
- *RESTful Request Dispatching:*
 - Flask's routing system is designed to handle RESTful request dispatching, making it easy to develop APIs.
- *Extensible:*
 - Flask can be extended with numerous Flask extensions to add functionality such as form handling, authentication, database integration, and more.

1.4.3. Advantages

- *Simplicity and Ease of Use:*
 - Flask's straightforward design makes it easy for developers to get started quickly and understand the framework.
- *Flexibility:*
 - Flask does not enforce a specific project structure or dependencies, allowing developers to structure their applications as they see fit.
- *Extensibility:*
 - With a wide array of Flask extensions available, developers can easily add features such as database connectivity, form validation, and user authentication.
- *Lightweight:*
 - As a microframework, Flask has a small footprint, which can result in faster performance and lower resource consumption.
- *Active Community:*
 - Flask has an active and supportive community, providing extensive documentation, tutorials, and third-party libraries.

1.5. Overview of Restful-API

1.5.1. Introduction

A RESTful API is an architectural style for an application programming interface that uses HTTP requests to access and use data. That data can be used to GET, PUT, POST and DELETE data types, which refers to reading, updating, creating and deleting operations related to resources.

1.5.2. Main Components of a RESTful-API

A REST API fundamentally relies on three major elements:

- *Client:*
 - The client is the software code or application that requests a resource from a server.
- *Server:*
 - The server is the software code or application that controls the resource and responds to client requests for the resource.
- *Resource:*
 - The resource is any data or content, such as text, video and images, the server controls and makes available in response to client requests.

To access a resource, the client sends an HTTP request to the server. Client requests include four principal parts:

- HTTP method:
 - This details what should happen to the specified resource. The four fundamental HTTP methods are known as verbs. They are POST to create a new resource, GET to retrieve an existing resource, PUT to update or change an existing resource, and DELETE to delete a resource. As the table below shows, these HTTP verbs correspond to the Create, Retrieve, Update, and Delete methods or actions, which are referred to as CRUD.
- Endpoint:
 - The endpoint shows where the resource is located. It typically includes a Uniform Resource Identifier (URI). If the resource is accessed through the internet, the URI can be a URL that provides a web address for the resource.

- Header:
 - A header has the details needed to execute the call and handle the response. A request header might include authentication data, an encryption key, more details about the server location or access information and details about the desired data format needed for the response.
- Body:
 - The body contains relevant information to or from the server.

1.5.3. HTTP Methods

RESTful APIs use standard HTTP methods (GET, POST, PUT, DELETE, etc.) to perform actions on resources. Each method has a specific meaning:

- GET: Retrieve a representation of a resource.
- POST: Create a new resource.
- PUT: Update an existing resource or create a new one if it doesn't exist.
- DELETE: Remove a resource.
- PATCH: Partially update a resource.

1.6. Overview of chatbot AI

1.6.1. Introduction

A chatbot is a computer program designed to simulate conversation with human users, typically through text or voice interactions. Chatbots use natural language processing (NLP) and artificial intelligence (AI) techniques to understand and respond to user queries, providing assistance, information, or performing tasks based on the user's input.

Artificial intelligence chatbots are now an essential part of modern business. Unlike non-AI customer service technologies, they excel in providing personalized, real-time responses to users' questions. For example, AI chatbots can assist with product selections, schedule appointments, and handle various tasks like customer service inquiries and supply chain optimization that previously required human intervention. This is transforming the way that businesses engage with their audiences, as well as aspects of everyday life, such as drafting personal emails and facilitating online shopping experiences.

1.6.2. Features and Functionalities

- *Natural Language Understanding (NLU):*
 - Chatbots use NLU to comprehend user messages, extract intent, entities, and context from text inputs.
- *Response Generation:*
 - Based on the understanding of user input, chatbots generate appropriate responses, which can be pre-defined or dynamically generated.
- *Multi-turn Conversations:*
 - Chatbots maintain context across multiple turns of the conversation, allowing for more natural and engaging interactions.
- *Integration with External Systems:*
 - Chatbots often integrate with external systems, databases, APIs, or services to fetch information or perform actions requested by users.
- *Personalization:*
 - Chatbots can personalize responses based on user preferences, history, or other relevant data.
- *Analytics and Insights:*
 - Many chatbot platforms offer analytics and reporting capabilities to track user interactions, identify trends, and improve performance over time.
- *Cross-Platform Support:*
 - Chatbots can be deployed on various platforms and channels, including websites, messaging apps, social media platforms, and voice assistants.
- *Security and Compliance:*
 - Chatbots may implement security measures to protect user data and ensure compliance with privacy regulations.

1.6.3. Use Cases

- *Customer Service:*
 - Chatbots are commonly used for customer support, handling frequently asked questions, troubleshooting issues, and providing assistance.
- *E-commerce:*
 - Chatbots can help users find products, make purchases, track orders, and provide personalized recommendations.
- *Information Retrieval:*
 - Chatbots can answer queries, provide information on topics such as weather, news, or general knowledge, and act as virtual assistants.

- *Lead Generation and Sales:*
 - Chatbots can engage with users, qualify leads, and guide them through the sales process.
- *Internal Operations:*
 - Chatbots can be used for internal purposes within organizations, such as HR inquiries, IT support, or workflow automation.

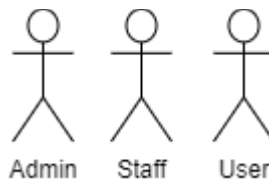
1.7. Conclusion

Chapter 1 provides readers with basic knowledge about the technologies used in the system. The detailed presentation of these technologies aims to help readers understand the development process and their application in this product. In the next chapter, we will delve into the analysis and design of the system, clarifying how these technologies have been implemented in the product development process.

Chapter 2: SYSTEM ANALYSIS AND DESIGN

2.1. System actors

- System actors include:
 - Admin: The system administrator.
 - Staff: The system staff.
 - User: The system user.



2.2. Business processes of the actors

2.2.1. Business processes of staff

- Profile management:
 - View and edit profile information
 - Change password
 - Login and logout
- User management:
 - View user list
 - View user details
 - Ban user
 - Unban user
- Car management
 - View car list
 - View car details
 - Create and update car
 - Disable and enable car
- Booking management
 - View booking list
 - Download car rental contract
 - Create car rental contract
 - Cancel booking
- Contract management
 - View contract list

- Download final contract
 - Create final contract
- Final contract management
 - View final contract list
- Coupon management
 - View coupon list
 - View coupon details
 - Create and update coupon
 - Delete coupon
- Driver's License management
 - View driver's license list
 - Verify driver's license
 - Cancel driver's license verification

2.2.2. Business processes of admin

- Admin has all the business processes of staff
- Additional processes:
 - Staff management:
 - View staff list
 - View staff details
 - Create and update staff information
 - Ban and unban staff account
 - Revenue management
 - View revenue statistics and the number of system users

2.2.3. Business processes of user

- Profile management:
 - View and edit profile information
 - Change password
 - Login and logout
 - Forgot password
- Car management:
 - Search and view car list
 - View car details
 - Add and remove favorite cars
 - View favorite car list
- Driver's license management
 - View driver's license details

- Register driver's license
- Update driver's license
- Booking management
 - Create booking
 - Make payment via VNPAY
 - View car rental history
 - Create and update ratings after car rental
- Chat with chatbot

2.3. System design

2.3.1. Use-case diagrams

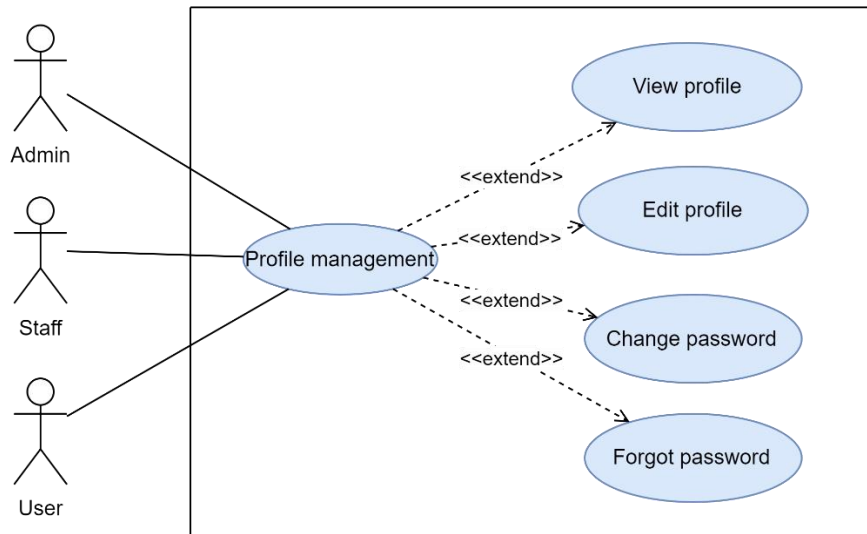
2.3.1.1. System use-case diagram

- The entire system use-case diagram is illustrated in the picture 2.1



Picture 2.1: The entire system use-case diagram

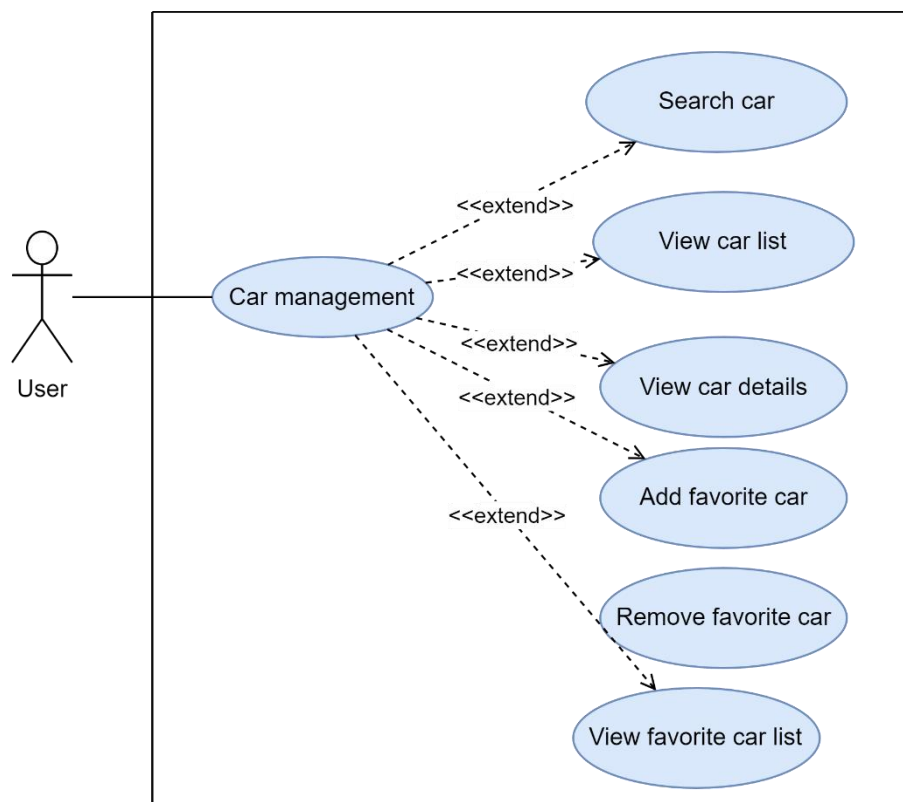
- The profile management use-case diagram of admin, user, staff is illustrated in the picture 2.2



Picture 2.2: The profile management use-case diagram

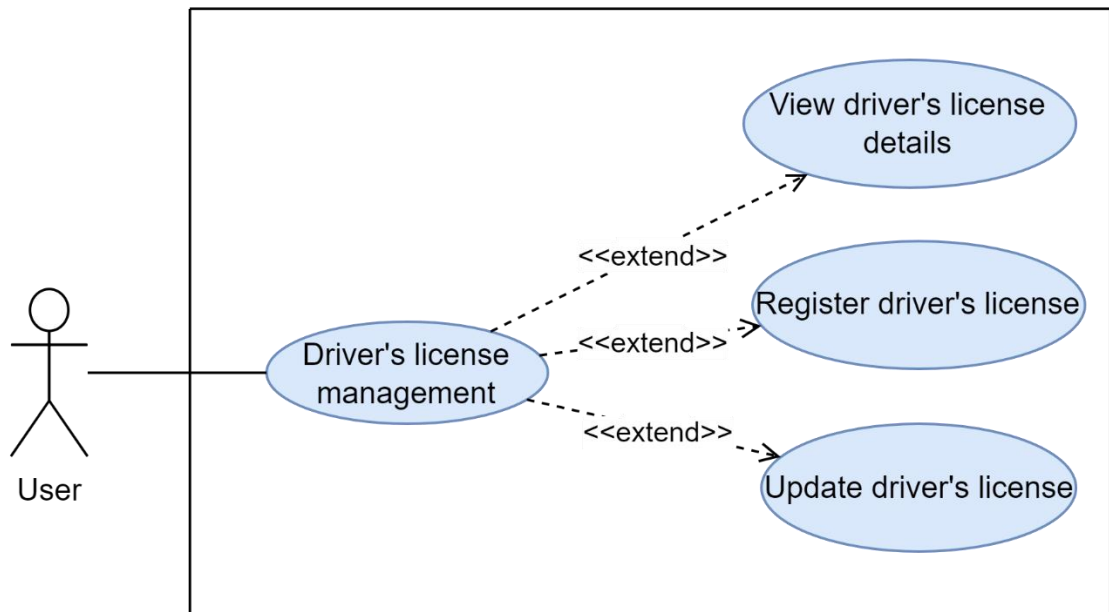
2.3.1.2. User use-case diagrams

- The car management use-case diagram of user is illustrated in the picture 2.3



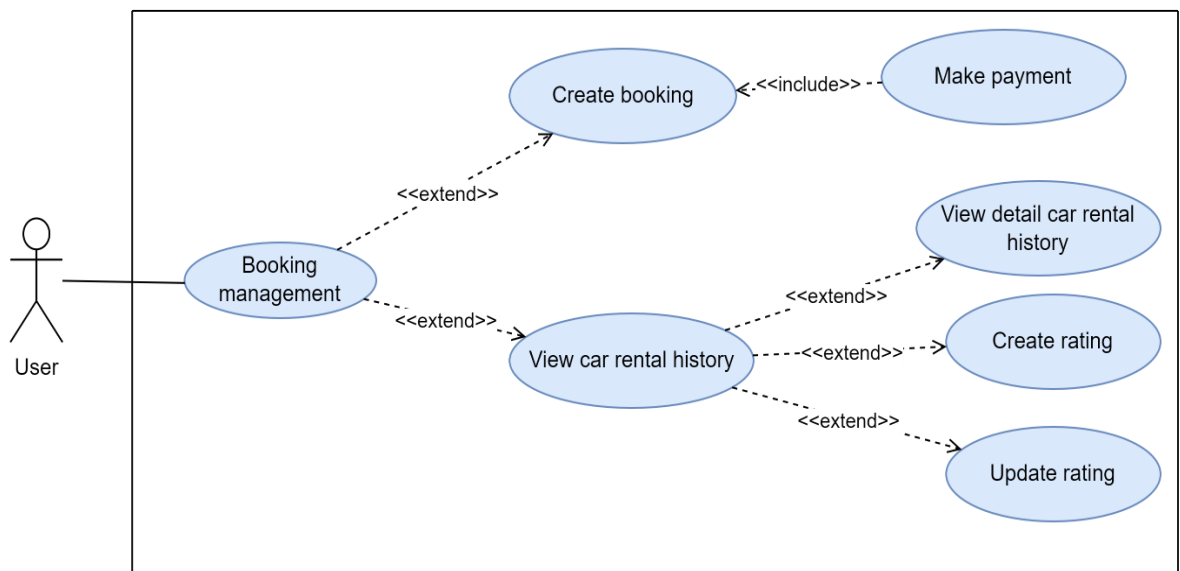
Picture 2.3: The car management use-case diagram of user

- The driver's license management use-case diagram of user is illustrated in the picture 2.4



Picture 2.4: The driver's license management use-case diagram of user

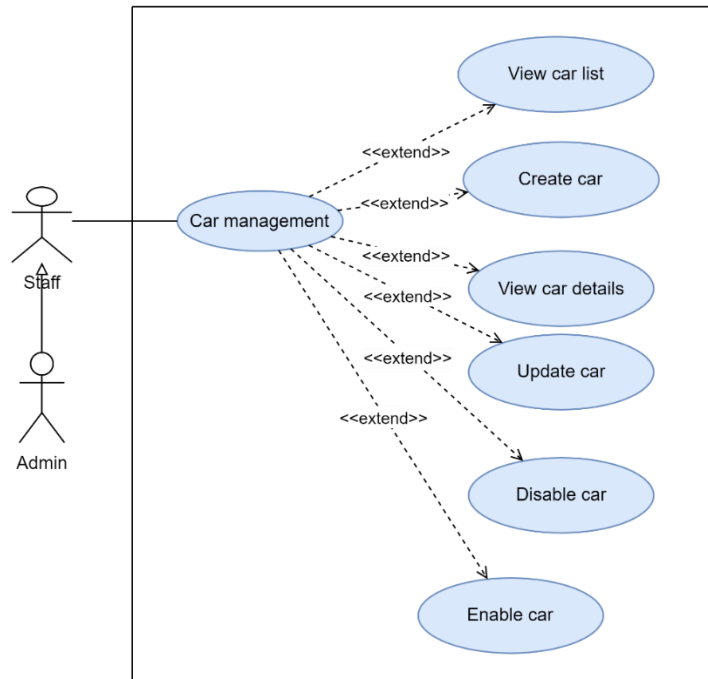
- The booking management use-case diagram of user is illustrated in the picture



Picture 2.5: The booking management use-case diagram of user

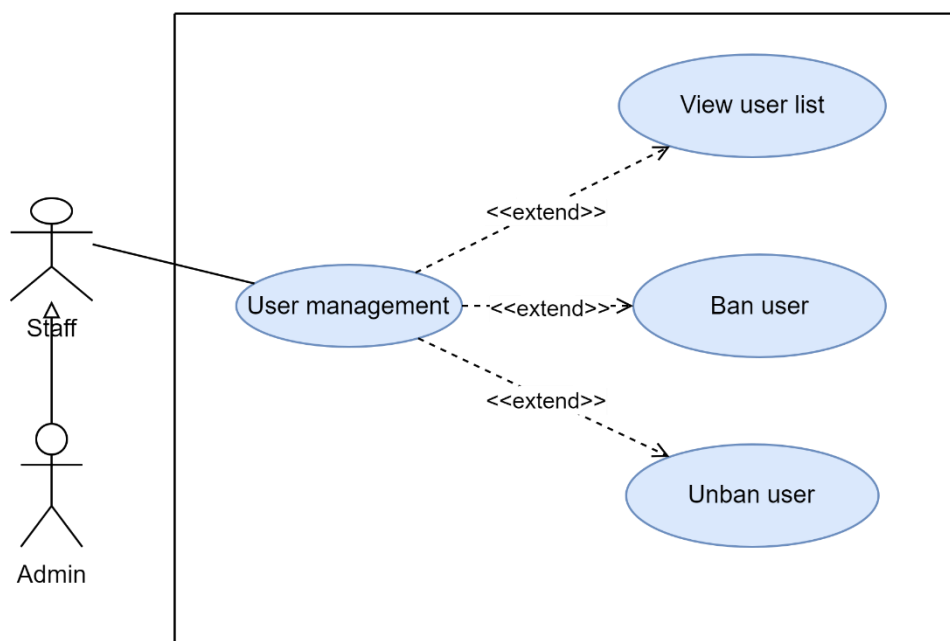
2.3.1.3. Admin and staff use-case diagrams

- The car management use-case diagram of staff and admin is illustrated in the picture 2.6



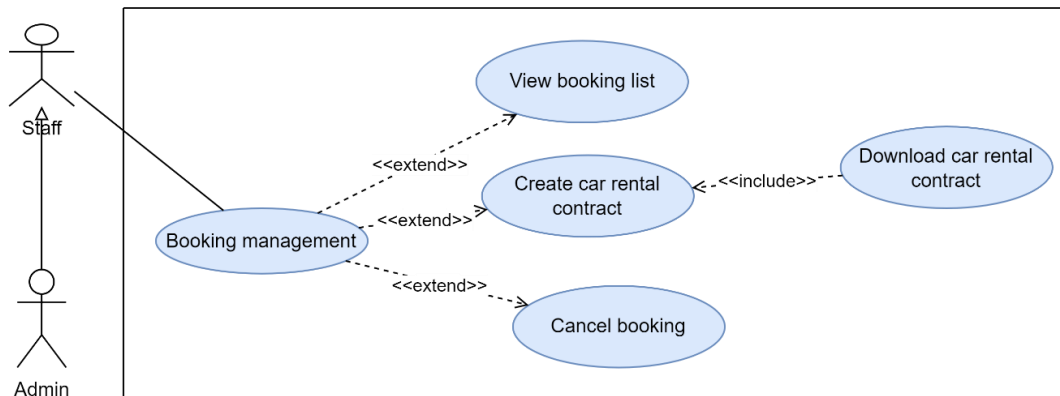
Picture 2.6: The car management use-case diagram of staff and admin

- The user management use-case diagram of staff and admin is illustrated in the picture 2.7



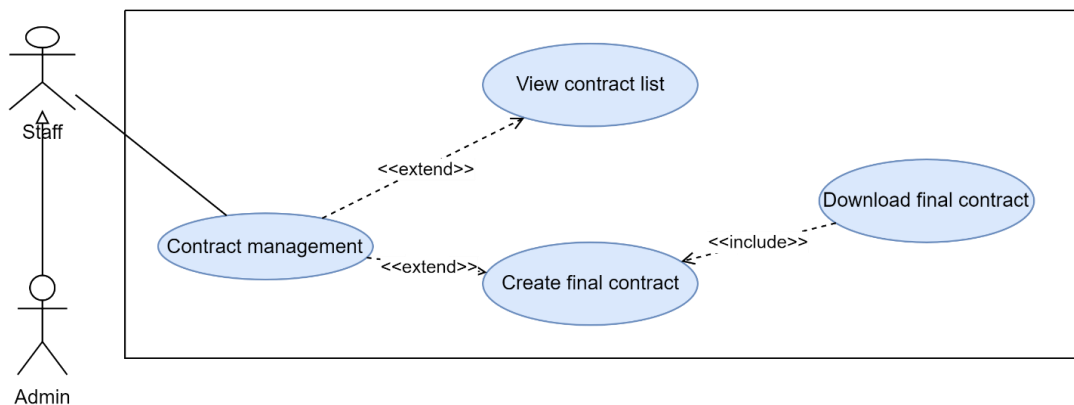
Picture 2.7: The user management use-case diagram of staff and admin

- The booking management use-case diagram of staff and admin is illustrated in the picture 2.8



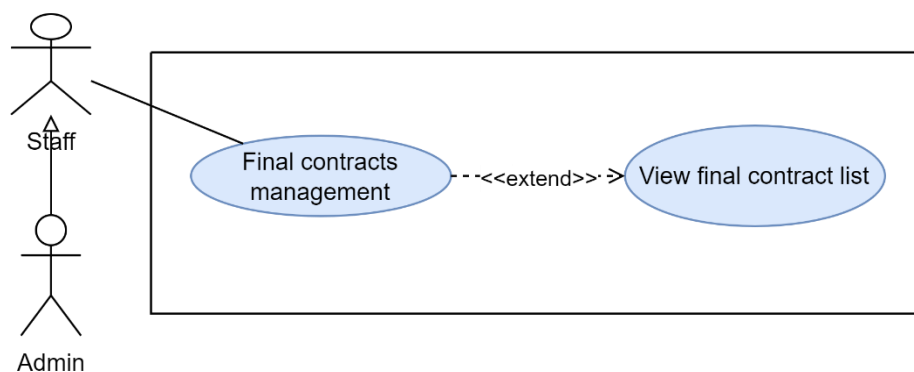
Picture 2.8: The booking management use-case diagram of staff and admin

- The contract management use-case diagram of staff and admin is illustrated in the picture 2.9



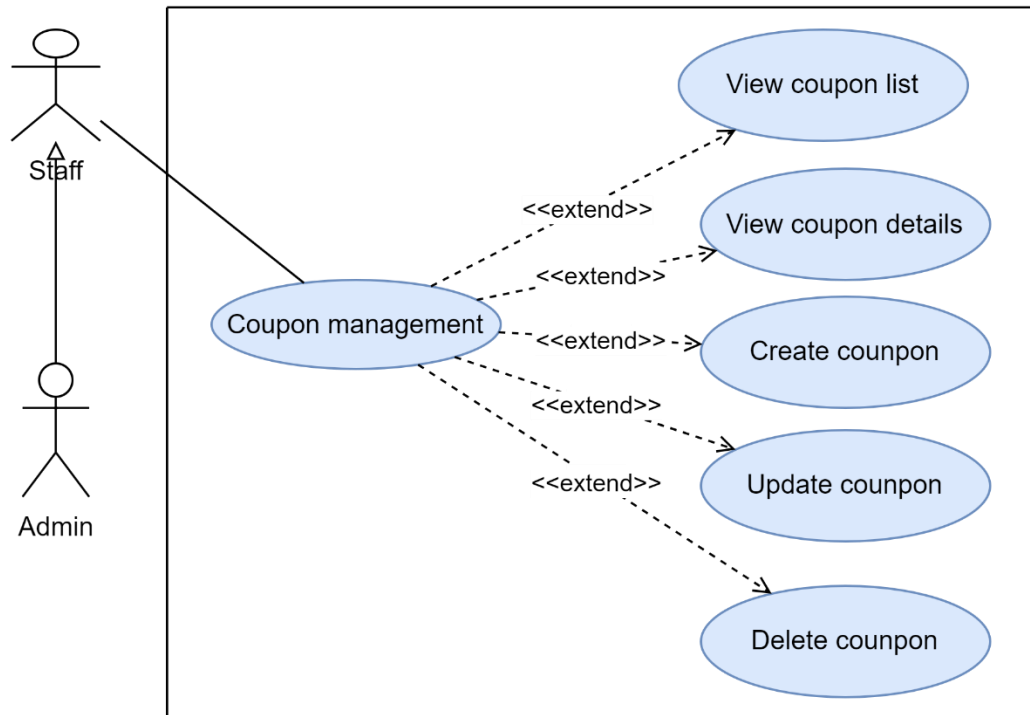
Picture 2.9: The contract management use-case diagram of staff and admin

- The final contract management use-case diagram of staff and admin is illustrated in the picture 2.10



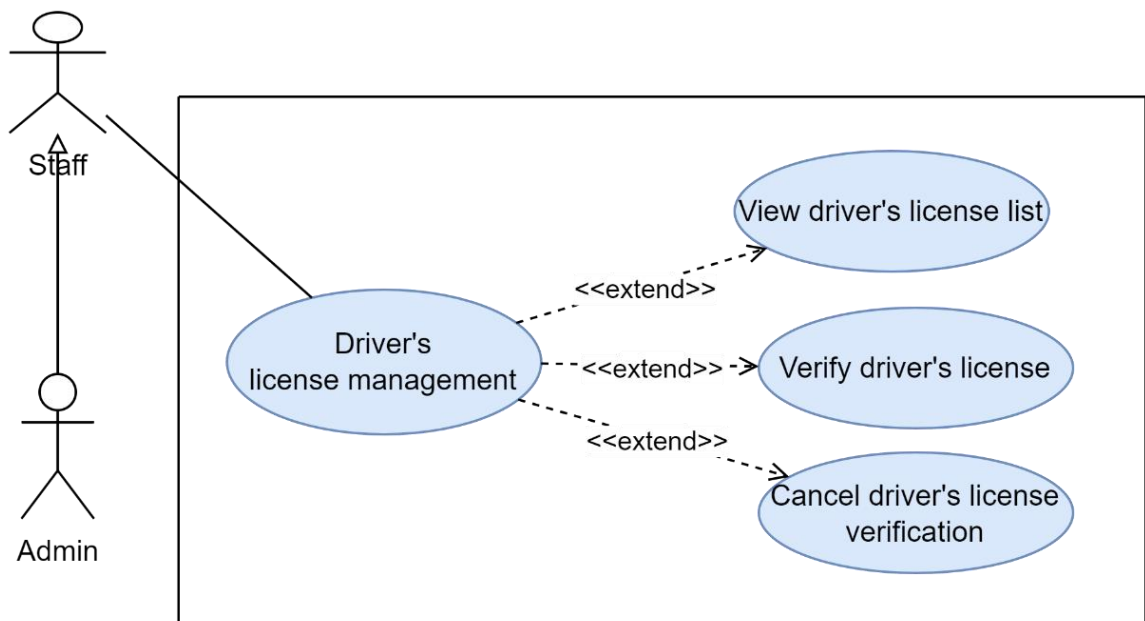
Picture 2.10: The final contract management use-case diagram of staff and admin

- The coupons management use-case diagram of staff and admin is illustrated in the picture 2.11



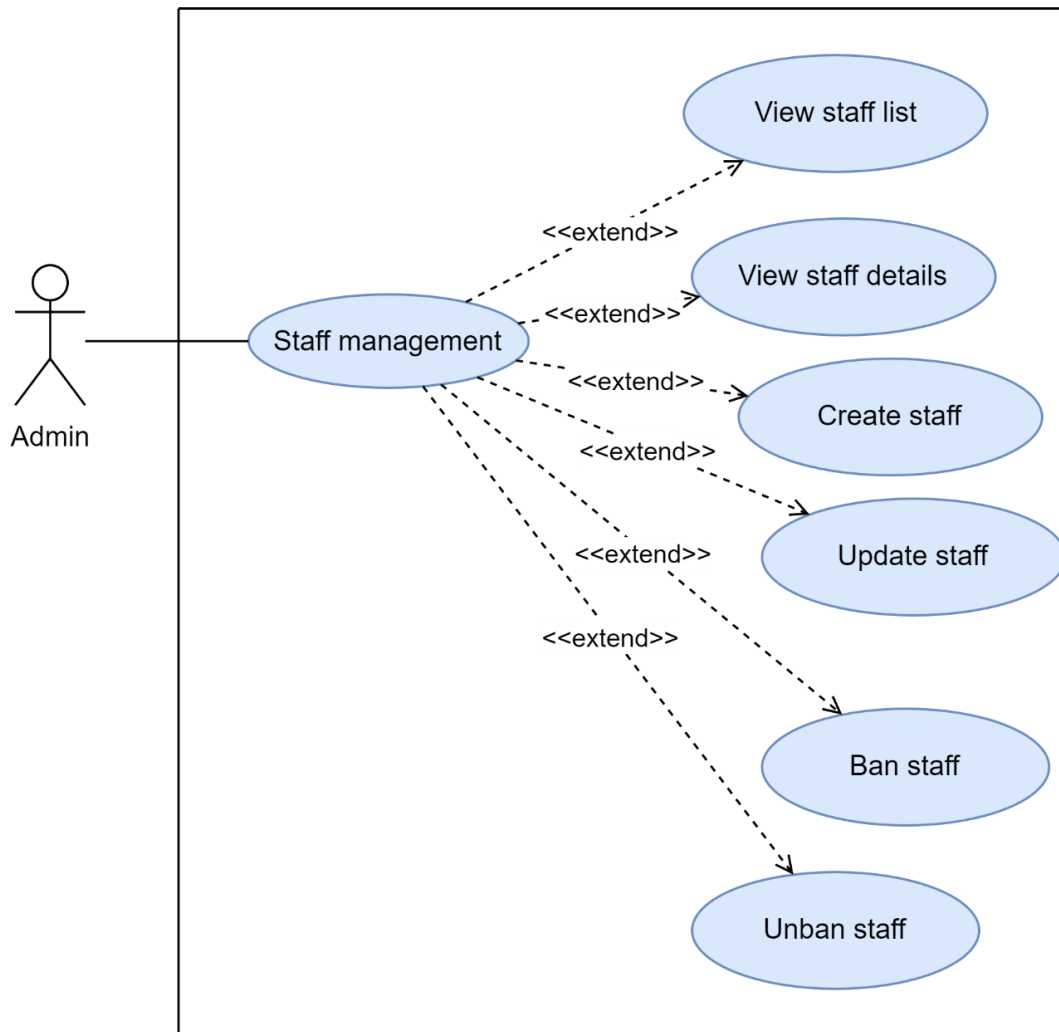
Picture 2.11: The coupons management use-case diagram of staff and admin

- The driver's license management use-case diagram of staff and admin is illustrated in the picture 2.12



Picture 2.12: The driver's license management use-case diagram of staff and admin

- The staff management use-case diagram of admin is illustrated in the picture 2.13

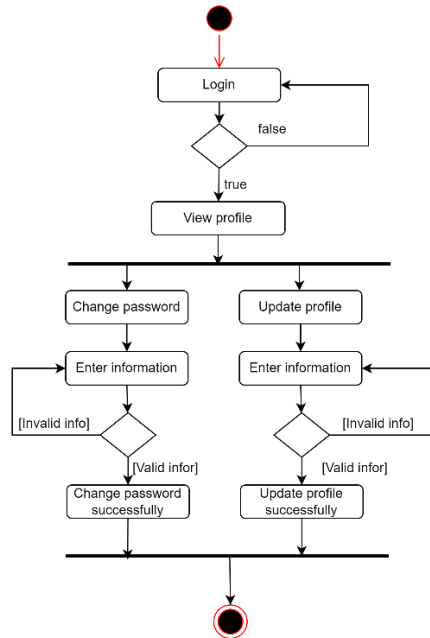


Picture 2.13: The staff management use-case diagram of admin

2.3.2. Activity diagram

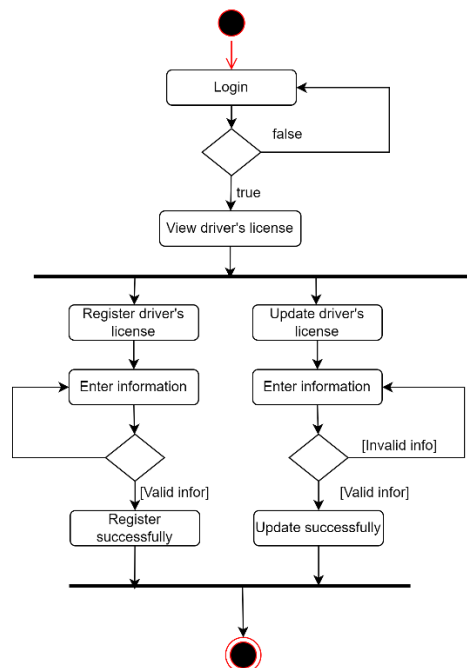
2.3.2.1. User activity diagram

- The profile management activity diagram of user is illustrated in the picture 2.14



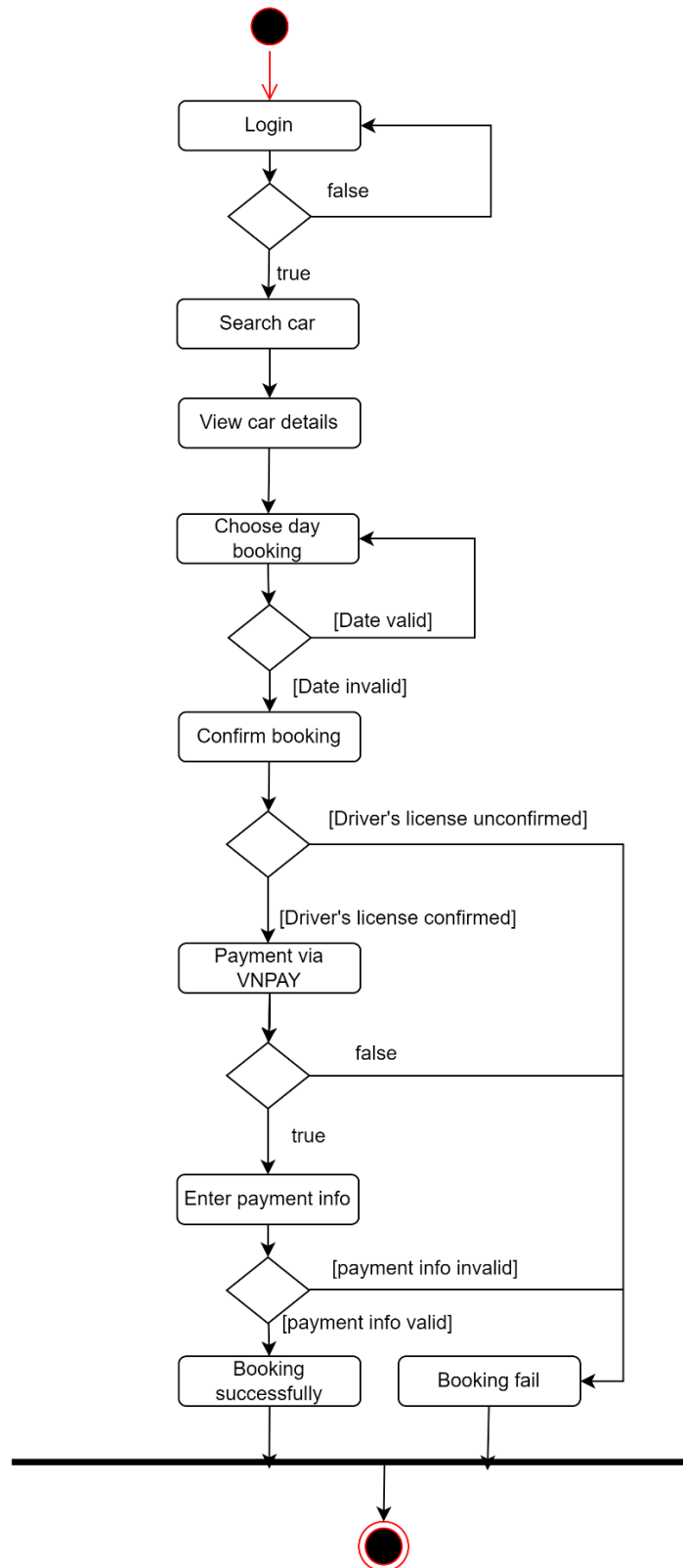
Picture 2.14: The profile management activity diagram of user

- The driver's license management activity diagram of user is illustrated in the picture 2.15



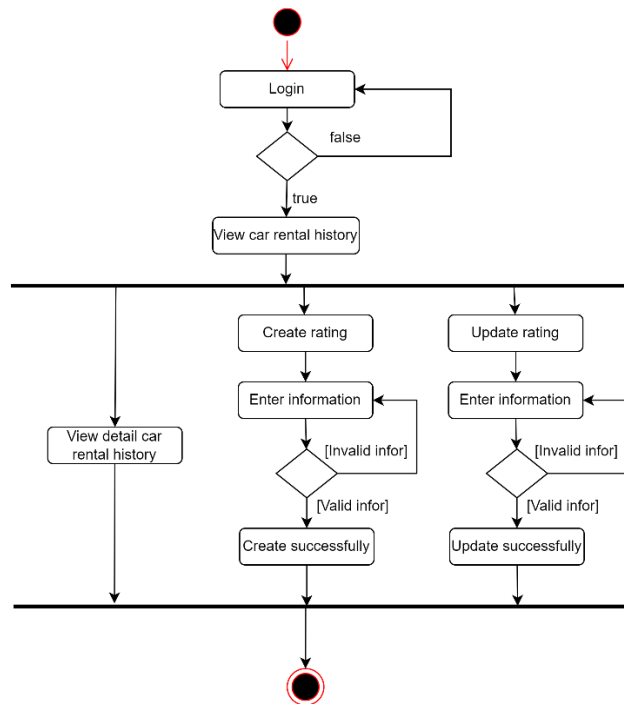
Picture 2.15: The driver's license management activity diagram of user

- The create booking and make payment activity diagram of user is illustrated in the picture 2.16



Picture 2.16: The create booking and make payment activity diagram of user

- The booking management activity diagram of user is illustrated in the picture 2.17



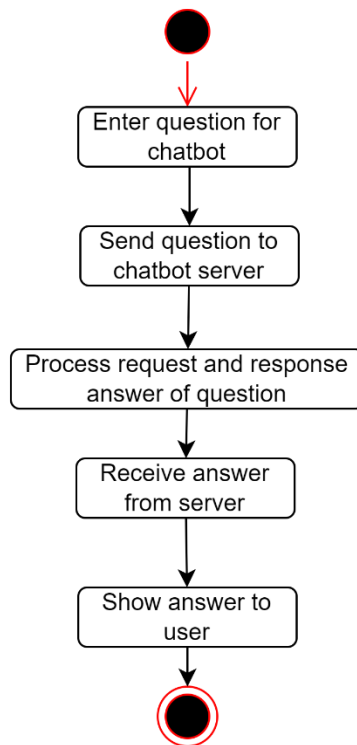
Picture 2.17: The booking management activity diagram of user

- The car management activity diagram of staff and admin is illustrated in the picture 2.18



Picture 2.18: The car management activity diagram of staff and admin

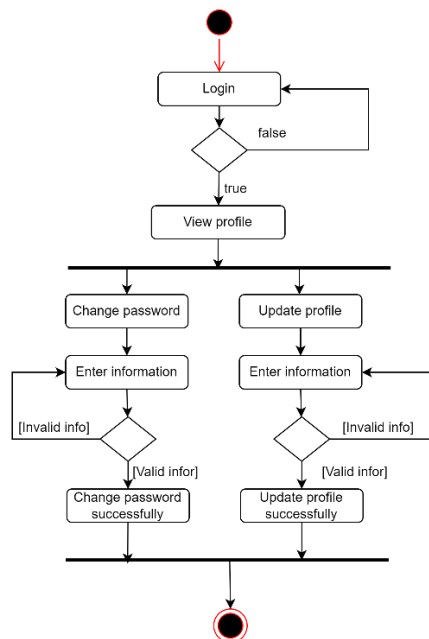
- The chat with chatbot activity diagram of user is illustrated in the picture 2.19



Picture 2.19: The chat with chatbot activity diagram of user

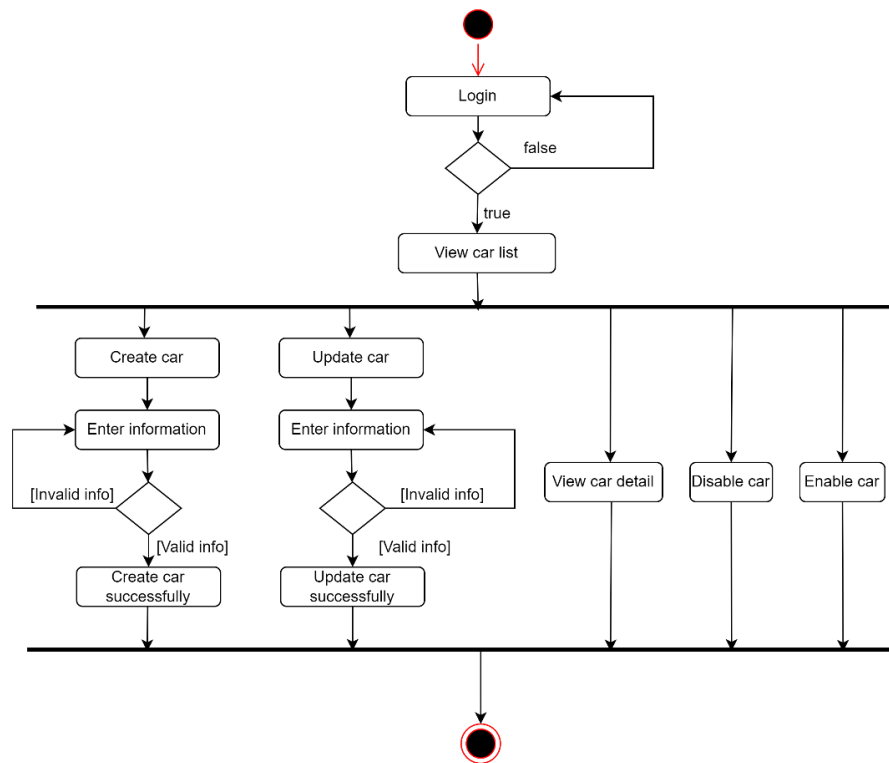
2.3.2.2. Admin and staff activity diagram

- The profile management activity diagram of staff and admin is illustrated in the picture 2.20



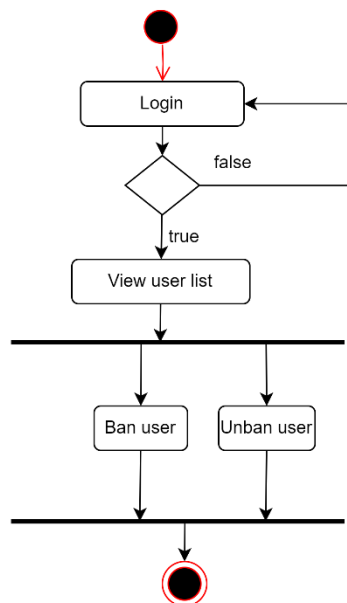
Picture 2.20: The profile management activity diagram of staff and admin

- The car management activity diagram of staff and admin is illustrated in the picture 2.21



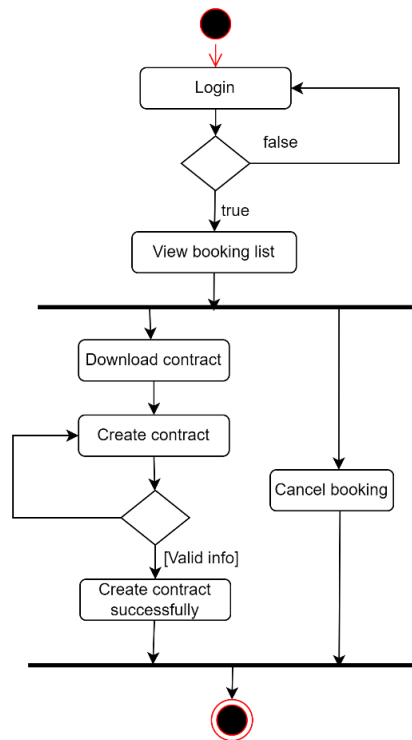
Picture 2.21: The car management activity diagram of staff and admin

- The user management activity diagram of staff and admin is illustrated in the picture 2.22



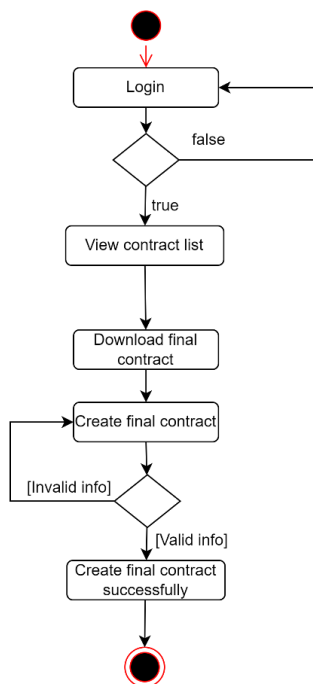
Picture 2.22: The user management activity diagram of staff and admin

- The booking management activity diagram of staff and admin is illustrated in the picture 2.23



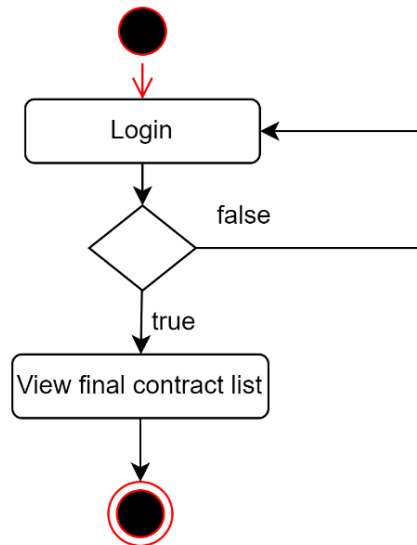
Picture 2.23: The booking management activity diagram of staff and admin

- The contract management activity diagram of staff and admin is illustrated in the picture 2.24



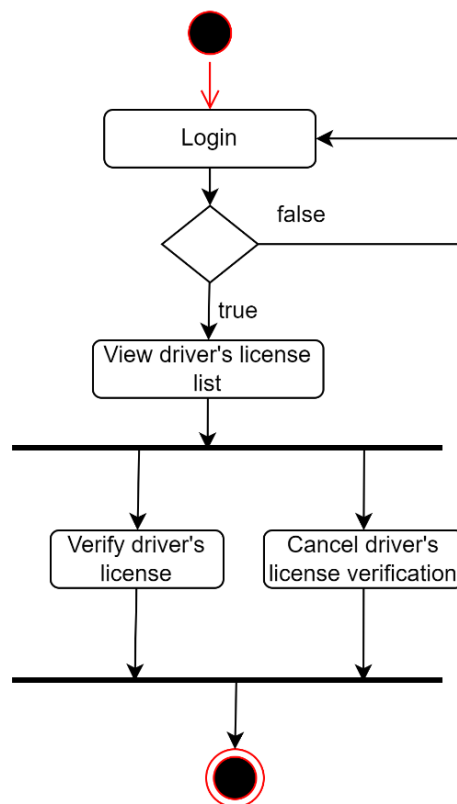
Picture 2.24: The contract management activity diagram of staff and admin

- The final contract management activity diagram of staff and admin is illustrated in the picture 2.25



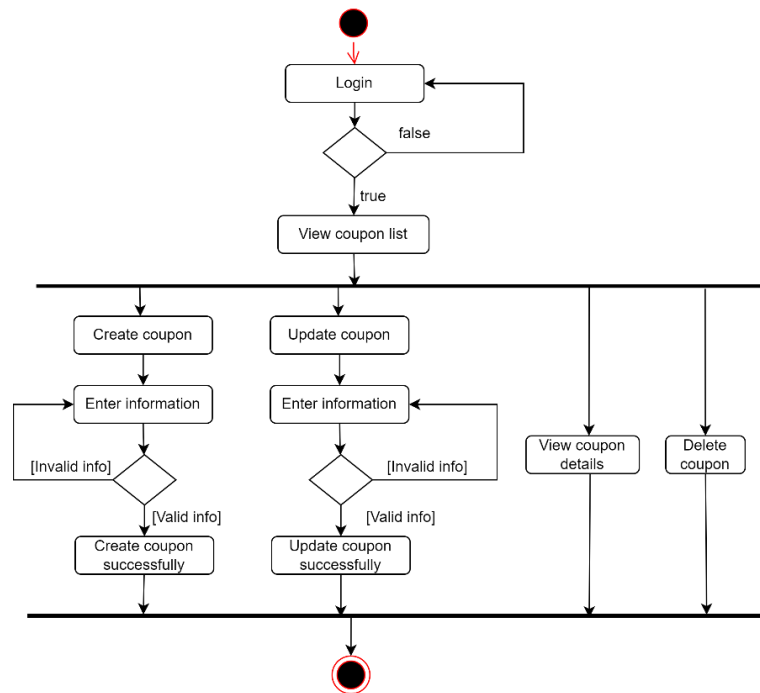
Picture 2.25: The final contract management activity diagram of staff and admin

- The driver's license management activity diagram of staff and admin is illustrated in the picture 2.26



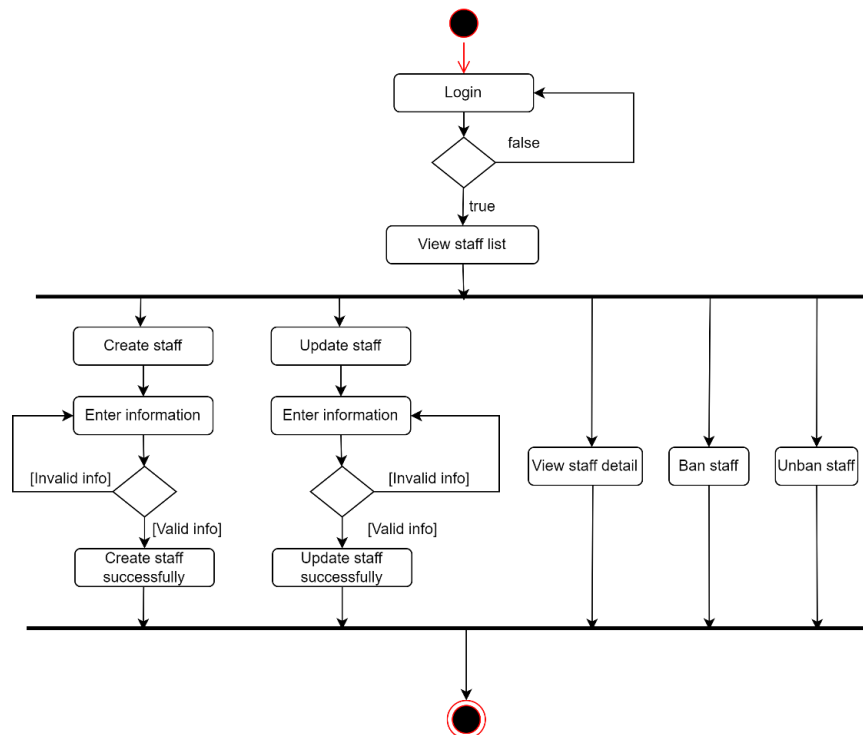
Picture 2.26: The driver's license management activity diagram of staff and admin

- The coupon management activity diagram of staff and admin is illustrated in the picture 2.27



Picture 2.27: The coupon management activity diagram of staff and admin

- The staff management activity diagram of admin is illustrated in the picture 2.28

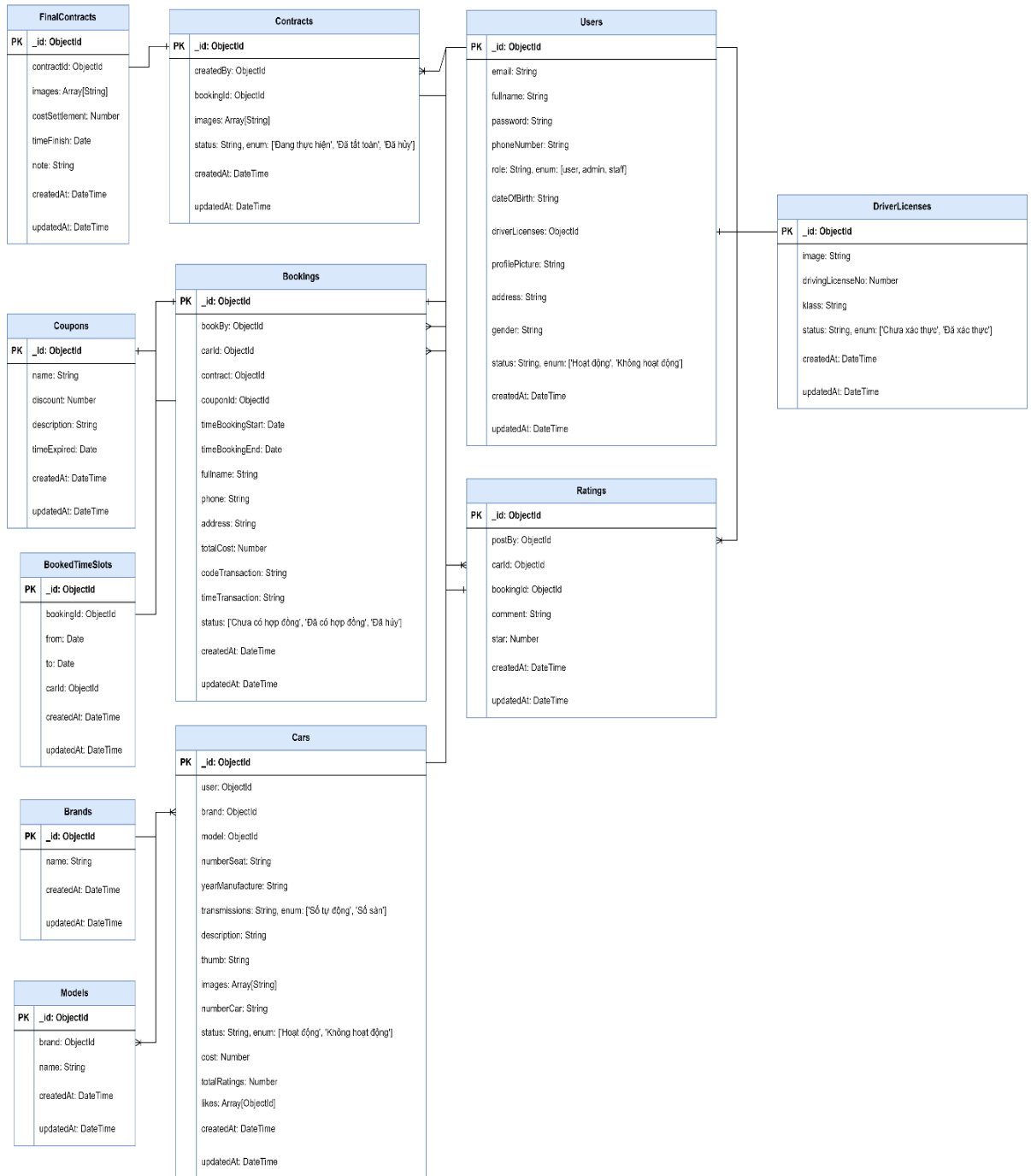


Picture 2.28: The staff management activity diagram of admin

2.4. Database design

2.4.1. ERD diagram

- The ERD diagram of the system is illustrated in the picture 2.29



Picture 2.29: The ERD diagram of the system

2.4.2. Table description

Table 2.1: Database description

#	Table	Description
1	Users	Store Users in the system: - Primary Key: + <code>_id</code>: Id of users - Database reference: + <code>driverLicenses</code>: Id of DriverLicenses - Other: + <code>email</code>: user's email + <code>password</code>: user's password + <code>profilePicture</code>: user's avatar + <code>dateOfBirth</code>: user's birthday + <code>phone</code>: user's phone numbers + <code>fullname</code>: user's name + <code>address</code>: user's address + <code>status</code>: user's status (“Hoạt động”, “Không hoạt động”) + <code>role</code>: differentiate users (“user”, “admin”, “staff”) + <code>gender</code>: user's gender + <code>created_at</code>: date created + <code>updated_at</code>: Updated date
2	Cars	Store Cars in the system: - Primary Key: + <code>_id</code>: Id of cars - Database reference: + <code>user</code>: Id of Users who created cars. + <code>brand</code>: Id of Brands + <code>model</code>: Id of Models + <code>likes</code>: Id of Users who liked car. - Other: + <code>numberSeat</code>: car seat number + <code>yearManufacture</code>: year of manufacture of the

		car + transmission: car transmission + description: detailed description of the car + thumb: thumbnail image + images: list of car photos + numberCar: license plates + cost: car rental price for one day + status: status of cars (“Hoạt động”, “Không hoạt động”) + totalRatings: total number of stars rated for the car + created_at: date created + updated_at: updated date
3	Brands	Store list of Brands of Cars in the system: - Primary Key: + _id: Id of brands - Other: + name: brand name of the car + created_at: date created + updated_at: pdated date
4	Models	Store list of models by car brand in the system: - Primary Key: + _id: Id of Models - Database reference: + brand: Id of Brands - Other: + name: name of car model + created_at: date create + updated_at: updated date
5	DriverLicenses	Store driver’s licenses information in the system: - Primary Key: + _id: Id of Driver Licenses - Other: + image: image of driver licenses

		+ drivingLicenseNo: driver's license code + klass: driving license classifications + status: driver's license status has been approved or not + created_at: date created + updated_at: Updated date
6	Bookings	Store booking information in the system: - Primary Key: + _id: Id of bookings - Database reference: + bookyBy: Id of Users who booking car + contract: Id of Contracts which rented + carId: Id of Cars which rented - Other: + timeBookingStart: rental start date + timeBookingEnd: rental end date + phone: contact information of the car renter + address: car delivery address + codeTransaction: trading code + timeTransaction: transaction time + fullname: name of the person renting the car + totalCost: total car rental + status: car rental status ('Chưa có hợp đồng', 'Đã có hợp đồng', 'Đã hủy') + created_at: date created + updated_at: updated date
7	Contracts	Store contracts information in the system: - Primary Key: + _id: Id of Contracts - Database reference: + createBy: Id of Users, who created contract + bookingId: Id of Bookings - Other:

		+ images: photo of the contract + status: the status of the contract has been performed or canceled ('Đang thực hiện', 'Đã tắt toán', 'Đã Hủy') + created_at: date created + updated_at: updated date
8	FinalContracts	Store contract settlement information in the system: - Primary Key: + _id: Id of FinalContract - Database reference: + contractId: Id of contract - Other: + images: photo of the contract settlement + timeFinish: settlement time + costSettlement: settlement cost + note: additional notes + created_at: date created + updated_at: updated date
9	BookedTimeSlots	Store the rental time of each car in the system: - Primary Key: + _id: Id of BookedTimeSlot - Database reference: + carId: Id of car + bookingId: Id of booking - Other: + from: rental start time + to: rental end time + created_at: date created + updated_at: updated date
10	Ratings	Store car rated information in the system: - Primary Key: + _id: Id of Ratings - Database reference: + postBy: Id of Users, who rated the car

		+ carId: Id of Cars, which rated + bookingId: Id of Bookings - Other: + comment: car comments + star: number of rating stars + created_at: date created + updated_at: updated date
11	Coupons	Store Coupon information in the system: - Primary Key: + _id: Id of Coupon - Other: + name: name of coupon + discount: discount percentage + description: information about discount codes + timeExpried: expired time + created_at: date created + updated_at: updated date

2.5. Conclusion

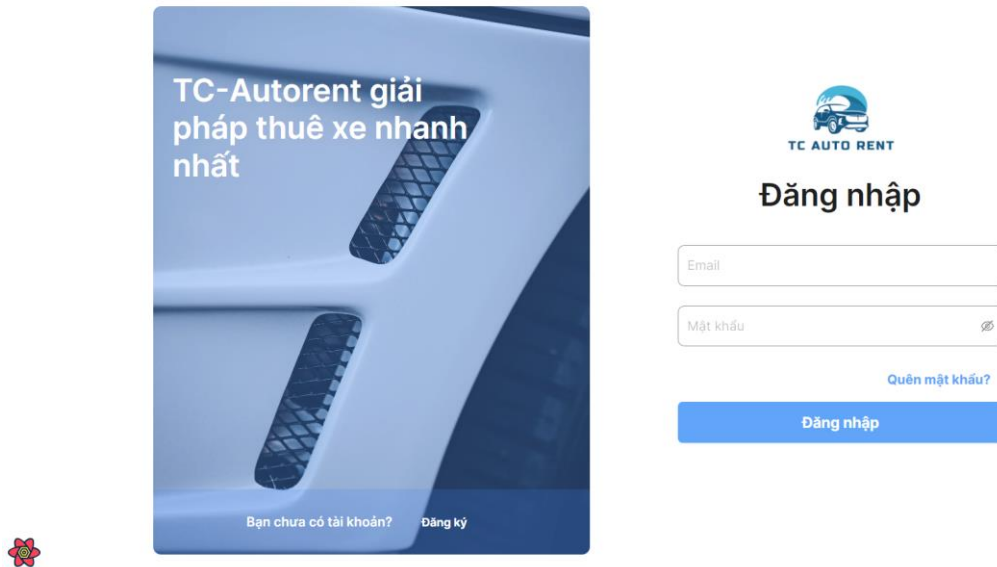
This chapter focuses on designing the car rental system. It includes system actors, use-case diagrams, activity diagrams and database design. Each section plays a crucial role in defining the system's operation, functionalities, and data structure.

Chapter 3: IMPLEMENTATION AND EVALUATION OF RESULTS

3.1. Functional Description and Achieved Results

3.1.1. User Functional Interface

3.1.1.1. Login



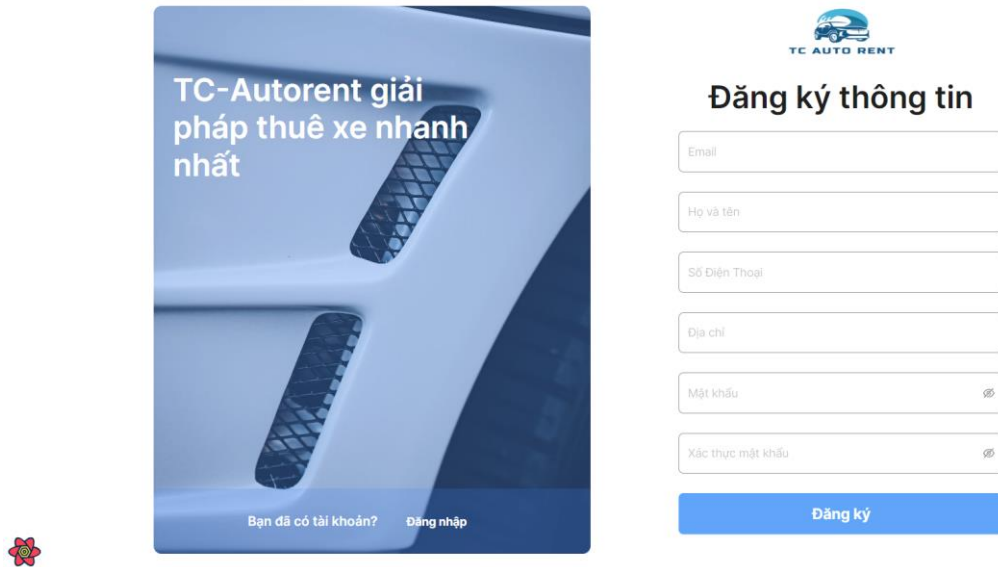
Picture 3.1: Login page

Table 3.1: Description of the login screen

Screen	The Login page		
Description	The Login page contains a form for users to log into the system.		
Screen Access	A Guest clicks on the login button on the homepage.		
Screen Content			
Item	Type	Data	Description
Email	Input		Email of the user account
Password	Input		The password of user account
Đăng nhập	Button		Button to login to the website
Screen Actions			
Action Name	Description	Success	Failure
Login	The user enters the email and password of the account, then	Login success to the system	Login data is incorrect with email, and password:

	click “Đăng nhập” button to login to the system		- System displays an error message: “Email hoặc mật khẩu không đúng”. <i>Fill in a valid email:</i> - Prevent submitting the login form. - The system displays an error message: “Không phải E-mail!”. <i>Fill invalid password:</i> - Prevent submitting the login form. - System display error message: “Phải có ít nhất một ký tự đặc biệt(@!>...), in hoa, thường, số!”.
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3.1.1.2. Register account



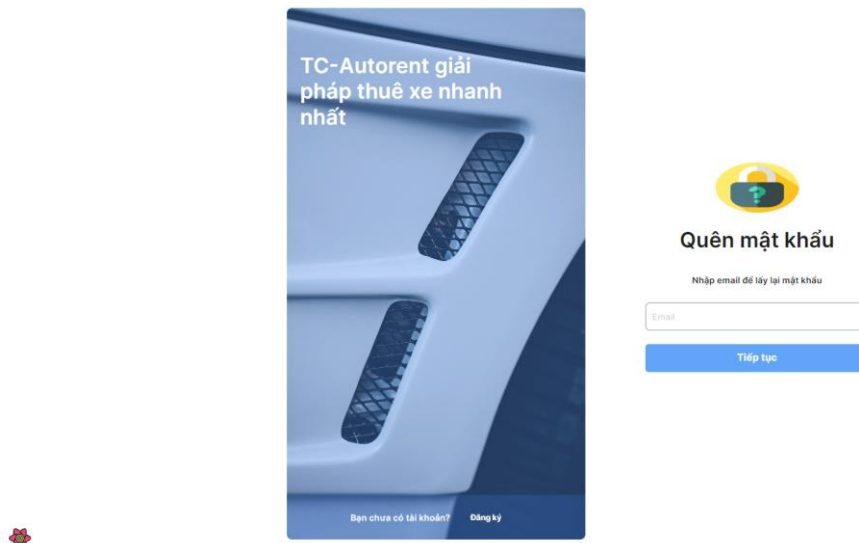
Picture 3.2: Register account page

Table 3.2: Description of the register account screen

Screen	The Register page		
Description	The Register page contains a form for users to register		
Screen Access	A Guest clicks on the register button on the homepage.		
Screen Content			
Item	Type	Data	Description
Email	Input		Email of the user account
Họ và tên	Input		Full name of the user
Số điện thoại	Input		Phone number of the user
Địa chỉ	Input		Address of the user
Mật khẩu	Input		Password of the user account
Xác thực mật khẩu	Input		Confirm the password of the user account
Đăng ký	Button		Registration button
Screen Actions			
Action Name	Description	Success	Failure
Register	Fill out the form with all necessary	Registration account successfully and	<i>The guest fills email already exists:</i>

	information including email, full name, phone number, address, password, and password confirmation, then click “Đăng ký” button to register an account	move to homepage	- The system displays an error message: “Email đã tồn tại”. <i>The guest fills in the invalid email, full name, phone number, address, password, and confirm password:</i> - Prevent submitting the register form - The system display error messages: + “Không phải E-mail!”. + “Họ và tên không được nhập số!”. + “Không phải số điện thoại!”. + “Độ dài mật khẩu từ 6 đến 40 ký tự!”. + “Mật khẩu bạn nhập vào không giống!”
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3.1.1.3. Forgot password

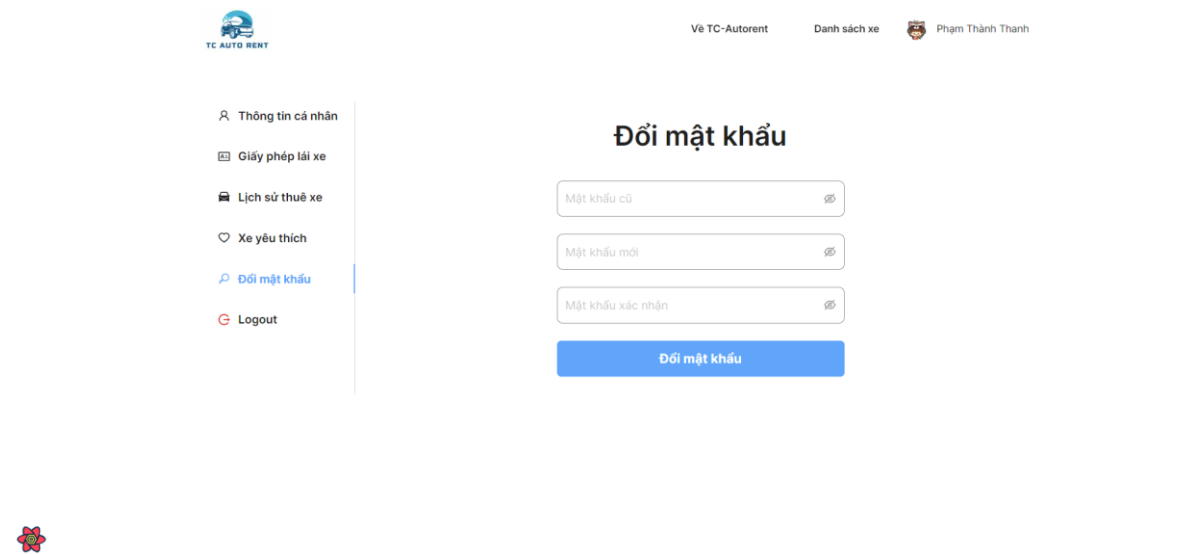


Picture 3.3: Forgot password page

Table 3.3: Description of the forgot password screen

Screen	The Forgot Password page		
Description	Reset password when Admin or Staff or User forgot their password		
Screen Access	Admin or Staff or User clicks on the forgot password link on the login screen.		
Screen Content			
Item	Type	Data	Description
Email	Input		Email of the account
Tiếp tục	Button		Click for send email instructions to reset the password
Screen Actions			
Action Name	Description	Success	Failure
Forgot password	Fill out the form with a valid email then click the “Tiếp tục” button to send email instructions to reset the password	Send an email instruction to reset the password	<i>Fill in an invalid email:</i> - System display error message: + “Không phải là E-mail” + Prevent submitting the form

3.1.1.4. Change password



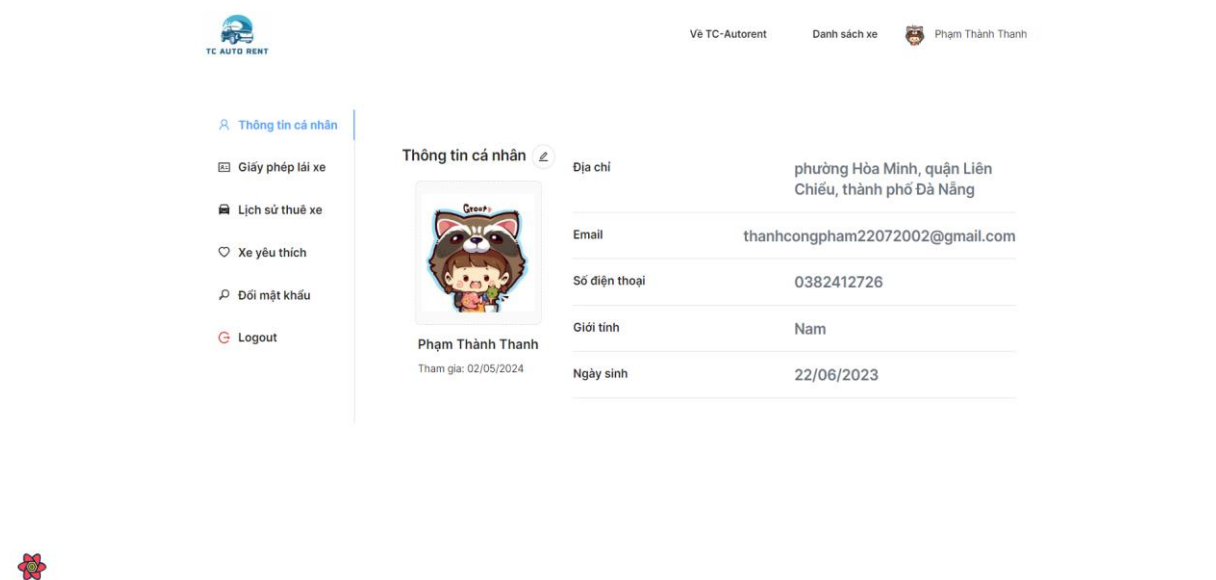
Picture 3.4: Change password page

Table 3.4: Description of the change password screen

Screen	The Change Password page		
Description	Change password when Users want to change new password.		
Screen Access	The user clicks on the change password tab on to profile screen.		
Screen Content			
Item	Type	Data	Description
Mật khẩu cũ	Input		The old password of a user account
Mật khẩu mới	Input		The new password of a user account
Mật khẩu xác nhận	Input		The confirmation new password of a user account
Screen Actions			
Action Name	Description	Success	Failure
Change password	Fill out the form with a current password, new password, and confirm password,	Change the password successfully and show the message “Cập nhật thành công”	<i>Old password is invalid:</i> - System display error message: + “Mật khẩu hiện tại

	then click the “Cập nhật” button to change user password		không đúng, vui lòng thử lại” <i>Confirm password data does not match with the new password:</i> - System display error message: + “Mật khẩu xác nhận không khớp”
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3.1.1.5. View user profile



Picture 3.5: View user profile page

Table 3.5: Description of the view user profile screen

Screen	The User profile page		
Description	View detailed user information		
Screen Access	The user clicks on the “Thông tin các nhân” tab on to profile screen.		
Screen Content			
Item	Type	Data	Description
Địa chỉ	Text		The address of the user account

Email	Text		The email of the user account
Số điện thoại	Text		The phone number of the user account
Giới tính	Text		The gender of the user account
Ngày sinh	Text		The date of birth of the user account
Screen Actions			
Action Name	Description	Success	Failure
View profile	The user clicks on the “Thông tin các nhân” tab on to profile screen	Display the personal information registered	None

3.1.1.6. Edit user profile

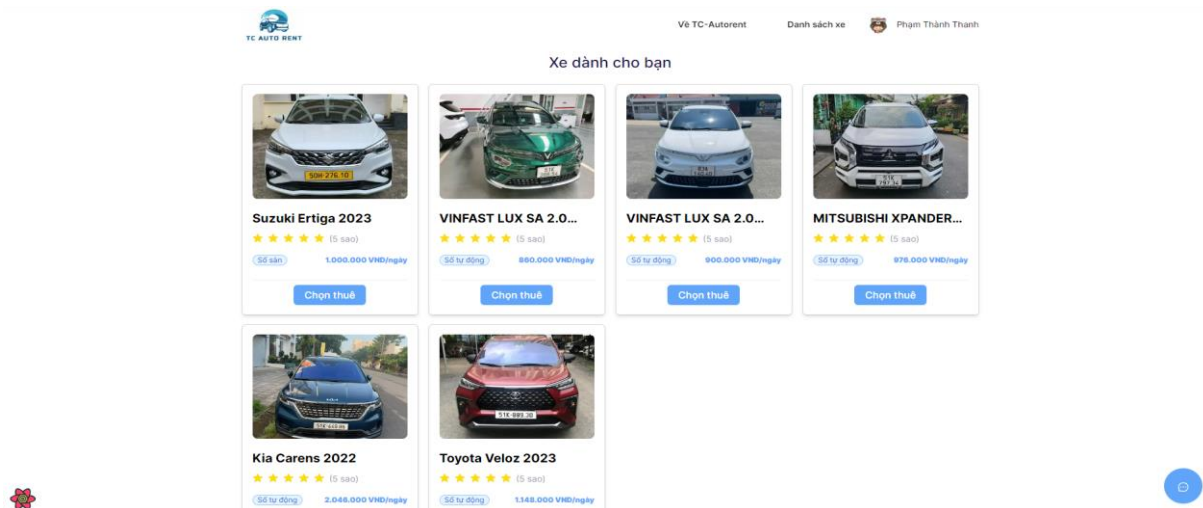
Picture 3.6: Edit user profile page

Table 3.6: Description of the edit user profile screen

Screen	The Edit user profile page		
Description	Edit user profile information		
Screen Access	The user clicks on the edit button beside the “Thông tin các nhân” in the “Thông tin cá nhân” tab		
Screen Content			
Item	Type	Data	Description

Họ và tên	Input		The full name of the user account
Địa chỉ	Input		The address of the user account
Ngày sinh	Date picker		The date of birth of the user account
Số điện thoại	Input		The phone number of the user account
Giới tính	Select box		The gender of the user account
Screen Actions			
Action Name	Description	Success	Failure
Confirm edit profile	The user enters valid information for update and clicks the button “Cập nhật” to update user profile information	Update profile successfully and the system show the message “Cập nhật thành công”	<i>Fill with invalid values:</i> - The system displays the message: + “Vui lòng nhập họ và tên” + “Vui lòng nhập địa chỉ” + “Vui lòng nhập ngày sinh” + “Vui lòng nhập số điện thoại”
Cancel edit profile	The user clicks on the “X” button to close the edit profile	Close form edit profile	None

3.1.1.7. View car list



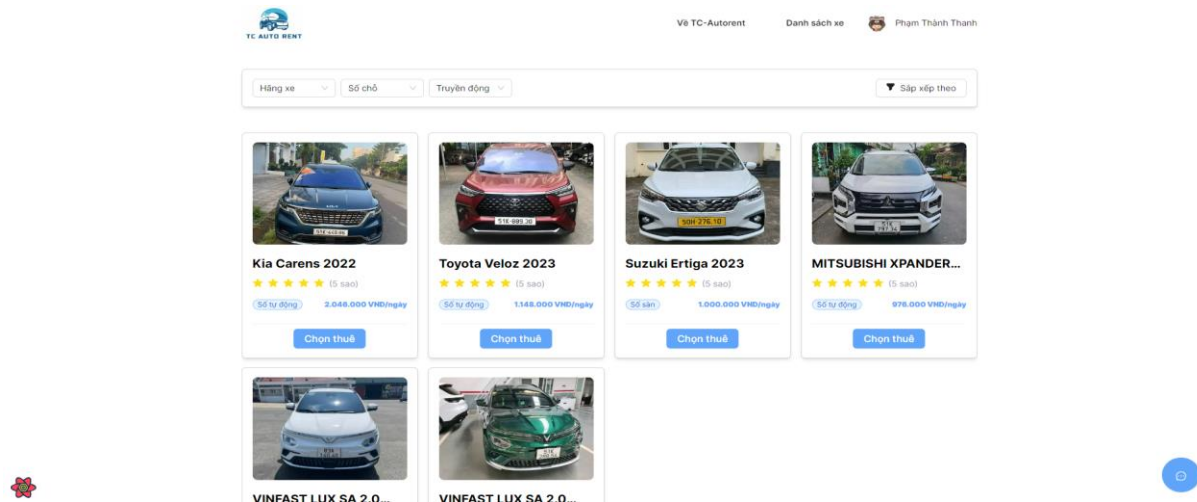
Picture 3.7:View car list page

Table 3.7: Description of the view car list screen

Screen	The View car list page		
Description	Show a list of available cars in the system for guests and user		
Screen Access	Access the homepage of the website		
Screen Content			
Item	Type	Data	Description
Name and year of manufacture	Text		The name of the car and year of manufacture
Star	Icon		The rating star of car
Car image	Image		The image of a car
Label	Text		The transmission of a car
Price	Text		The price per day of a car
Chọn thuê	Button		Click the button to move to the booking page
Screen Actions			
Action Name	Description	Success	Failure
View car details	The user clicks on “Chọn thuê” to move	Move to the car details page	None

	to the car details page	successfully	
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3.1.1.8. Search car



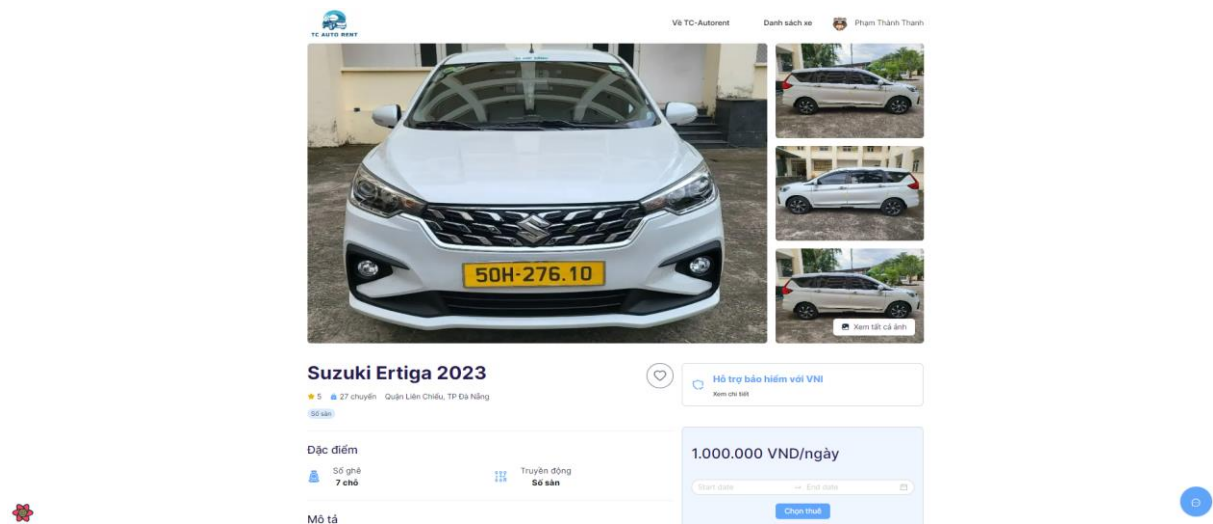
Picture 3.8: Search car page

Table 3.8: Description of the search car screen

Screen	The search car page		
Description	Show a page with options for search car		
Screen Access	Click the button “Tìm kiếm” on the home page		
Screen Content			
Item	Type	Data	Description
Hãng xe	Select box		The select box to select brands of the car
Số chỗ	Select box		The select box to select the number seat of the car
Truyền động	Select box		The select box to select the transmission of the car
Car image	Image		The image of a car
Label	Text		The transmission of a car
Price	Text		The price per day of a car
Chọn thuê	Button		Click the button to move to the booking page

Screen Actions			
Action Name	Description	Success	Failure
Search car	The user selects the option to search the car, the system displays the results of the option selected	Display search results	+ System display message: “No cars found”.
View car details	The user clicks on “Chọn thuê” to move to the car details page	Move to the car details page successfully	None

3.1.1.9. View car details



Picture 3.9: View car details page

Table 3.9: Description of the car details screen

Screen	The car details page		
Description	Show a car detail		
Screen Access	Click on the car on the home page or search page		
Screen Content			
Item	Type	Data	Description
Name and year of	Text		The name of the car and year of manufacture

manufacture			
Số ghế	Text		The number seat of the car
Truyền động	Select box		The transmission of the car
Car images	Image		The images of a car
Price	Text		The price per date of a car
Time booking	Date picker		The date picker allows users to choose the start and end times for booking
Chọn thuê	Button		Click the button to move to the booking page
Screen Actions			
Action Name	Description	Success	Failure
Booking car	+ The user clicks on the date picker to choose the start and end times for booking + The user clicks on the button “Chọn thuê” for move to booking page	Move to the car booking page successfully	<i>The system display the error message:</i> + “Khoảng ngày đã được thuê. Vui lòng chọn ngày khác!”
Add or remove your favorite car list	+ The user clicks on the heart icon to add/remove the car from the favorite car list	<i>The system displays a success message:</i> + “Đã thêm vào danh sách xe yêu thích” if add the favorite car + “Đã xóa khỏi danh sách xe yêu thích” if remove the favorite car	None

3.1.1.10. The booking car page

Picture 3.10: The booking car page

Table 3.10: Description of the booking car screen

Screen	The booking car page		
Description	Show detailed booking information		
Screen Access	The user chooses a valid date and clicks the button “Chọn thuê” on the car details page		
Screen Content			
Item	Type	Data	Description
Name and year of manufacture	Text		The name of the car and year of manufacture
Số ghế	Text		The number seat of the car
Truyền động	Select box		The transmission of the car
Car images	Image		The images of a car
Price	Text		The price per day of a car
Time booking	Date picker		The date picker allows users to choose the start and end times for booking
Phương thức nhận xe	Text		The address to pick up the car

Sử dụng mã giảm giá	Button		Click to show the modal to apply coupon for the booking
Tiếp tục	Button		Click to move to the confirm booking and choose an option for payment
Screen Actions			
Action Name	Description	Success	Failure
Confirm booking	+ The user clicks on the date picker to choose the edit start and end times for booking if necessary + The user clicks on the button “Tiếp tục” to move to confirm the booking page	Move to the confirm booking page successfully	<i>The system displays the error message:</i> + “Khoảng ngày đã được thuê. Vui lòng chọn ngày khác!” if edit the booking date and the date is booked

3.1.1.11. The confirm booking page

The screenshot displays the 'Confirm booking' page of the TC-AutoRent system. At the top, there's a navigation bar with the logo and user information. The main content area is a form titled 'Thủ tục thanh toán' (Payment procedure). It contains several input fields: 'Họ và tên' (Full name) filled with 'Phạm Thành Thành', 'Số điện thoại' (Phone number) filled with '0382412726', and 'Địa chỉ giao xe' (Delivery address) filled with 'K/7/7, đường Ngô Sĩ Liên, phường Hòa Minh, quận Liên Chiểu, thành phố Đà Nẵng'. Below these are 'Thời gian thuê xe' (Rental period) from '03-08-2024 17:15' to '04-08-2024 17:15' and 'Số tiền' (Amount) filled with '1000000'. To the right of the form, there's a section for 'Thanh toán' (Payment) with a radio button for 'Cổng thanh toán VNPayQR', a language selector with 'Tiếng việt' selected, and two buttons: 'Thanh Toán' (Pay) and 'Trở về thủ tục thanh toán' (Return to payment procedure). The footer contains contact details like phone number '0382412726', email 'carrentham2002@gmail.com', and address 'K/7/7 Ngô Sĩ Liên, phường Hòa Minh, quận Liên Chiểu, TP Đà Nẵng'.

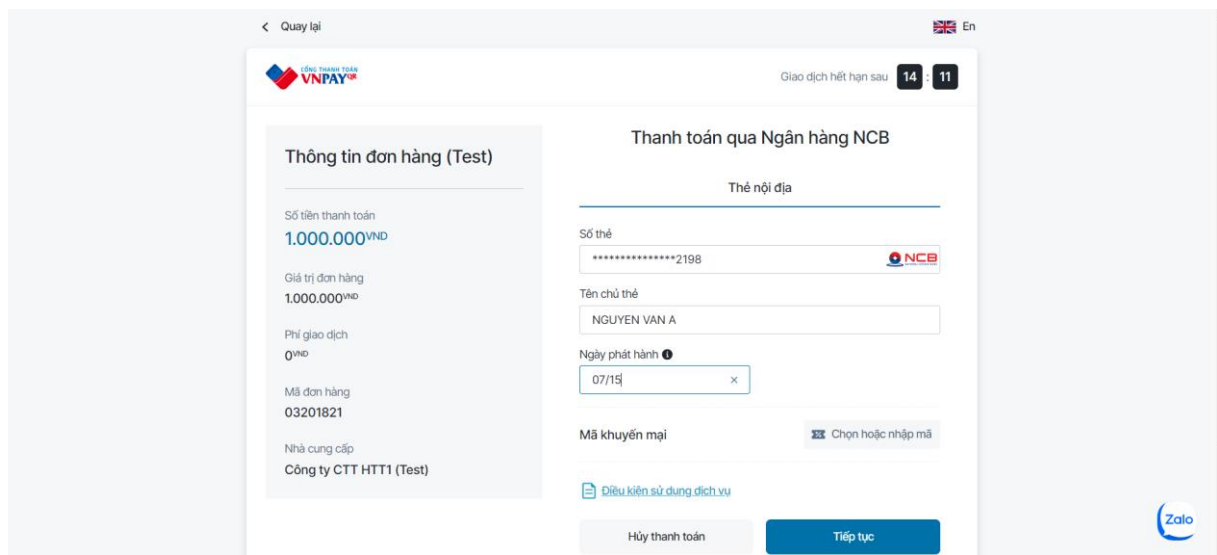
Picture 3.11: The confirm booking page

Table 3.11: Description of the confirm booking screen

Screen	The confirm booking page
Description	Confirm detailed booking information and make payment
Screen	The user views the detailed booking and clicks the “Thanh Toán”

Access	button to make a payment via VNPAY		
Screen Content			
Item	Type	Data	Description
Họ và tên	Input		The full name of the user booking the car
Số điện thoại	Input		The phone number of the user booking the car
Địa chỉ giao xe	Input		The address for the user pick up the car
Thời gian thuê xe	Date picker		The start and end times for booking
Số tiền	Input		The price of booking car
Thanh Toán	Button		Click the button “Thanh Toán” to move to the payment via VNPAY page
Phương thức nhận xe	Text		The address to pick up the car
Sử dụng mã giảm giá	Button		Click to show the modal to apply coupon for the booking
Tiếp tục	Button		Click to move to the confirm booking and choose an option for payment
Screen Actions			
Action Name	Description	Success	Failure
Confirm booking	+ The user clicks on the date picker to choose the edit start and end times for booking if necessary + The user clicks on the button “Tiếp tục” to move to confirm the booking page	Move to the confirm booking page successfully	<i>The system displays the error message:</i> + “Khoảng ngày đã được thuê. Vui lòng chọn ngày khác!” if edit the booking date and the date is booked

3.1.1.12. Make payment



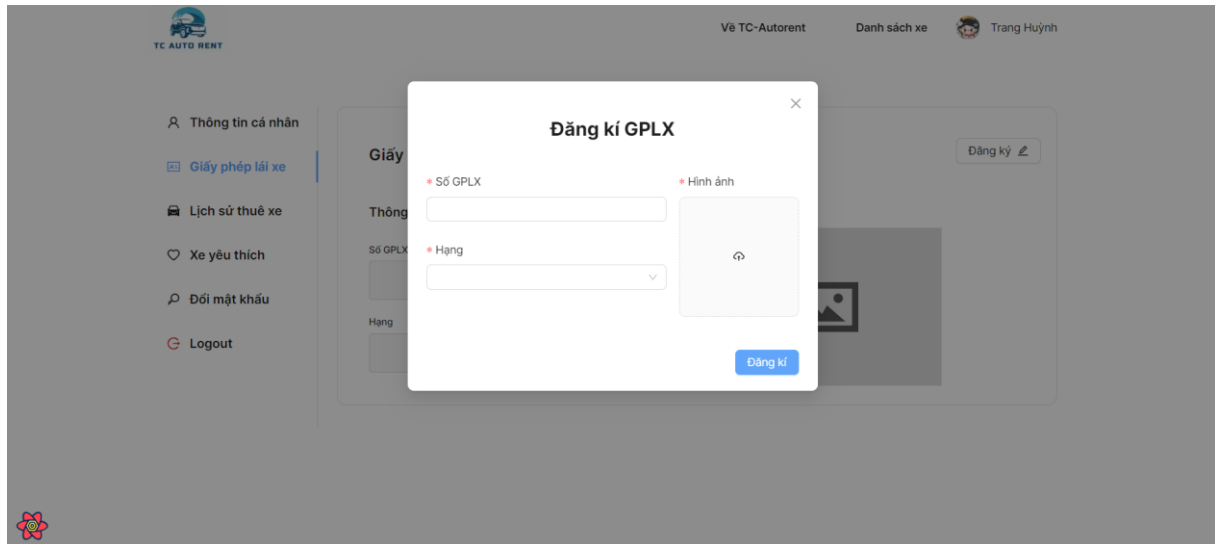
Picture 3.12: Make payment via VNPAY page

Table 3.12: Description of the make payment via VNPAY screen

Screen	The Make Payment page		
Description	Make payment via VNPAY		
Screen Access	The user chose time booking and clicked the “Thanh Toán” button to make payment via VNPAY		
Screen Content			
Item	Type	Data	Description
Số thẻ	Input		The number of credit card
Tên chủ thẻ	Input		The full name of the owner's credit card
Ngày phát hành	Input		The date published of the owner’s credit card
Tiếp tục	Button		Click the button to charge
Hủy thanh toán	Button		Click the button to cancel the payment
Screen Actions			
Action Name	Description	Success	Failure
Confirm payment	+ The user clicks on the button “Tiếp tục” to move to confirm	Move to the Enter OTP page	Payment failure

	the payment		
Cancel payment	+ The user clicks on the button “Hủy bỏ thanh toán” to cancel payment	Cancel payment and move to the cancel payment successfully page	None

3.1.1.13. Register for the driver's license



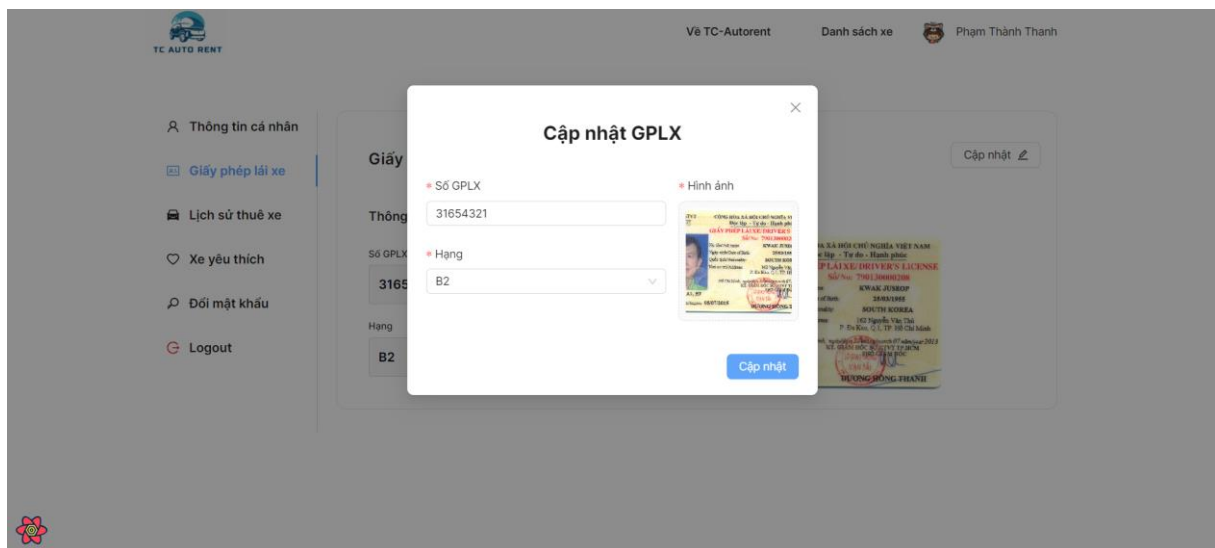
Picture 3.13: Register for the driver's license page

Table 3.13: Description of the register for the driver's license screen

Screen	Register for the driver’s license page		
Description	Register for the driver’s license authentication page		
Screen Access	The user clicks on button “Đăng ký” on the “Giấy phép lái xe” tab		
Screen Content			
Item	Type	Data	Description
Số GPLX	Input		The number of driver’s license
Hạng	Input		The class of driver’s license
Hình ảnh	Image		The image of driver's license
Đăng ký	Button		Click the button to register for the driver’s license
X icon	Button		Click the button to cancel the form
Screen Actions			

Action Name	Description	Success	Failure
Register driver's license	+ The user fills out all valid information, then clicks on the button “Tiếp tục” to register the driver's license	Register your driver's license successfully and the system shows a success message: + “Đăng ký thành công”	+ The user not enter information, the system shows the error messages: + “Số GPLX không được để trống” + “Hạng không được để trống” + “Hình ảnh không được để trống”
Cancel registered driver's license	+ The user clicks on the “X” icon to cancel the registered driver's license	Close the form for registering driver's license	None

3.1.1.14. Update for the driver's license



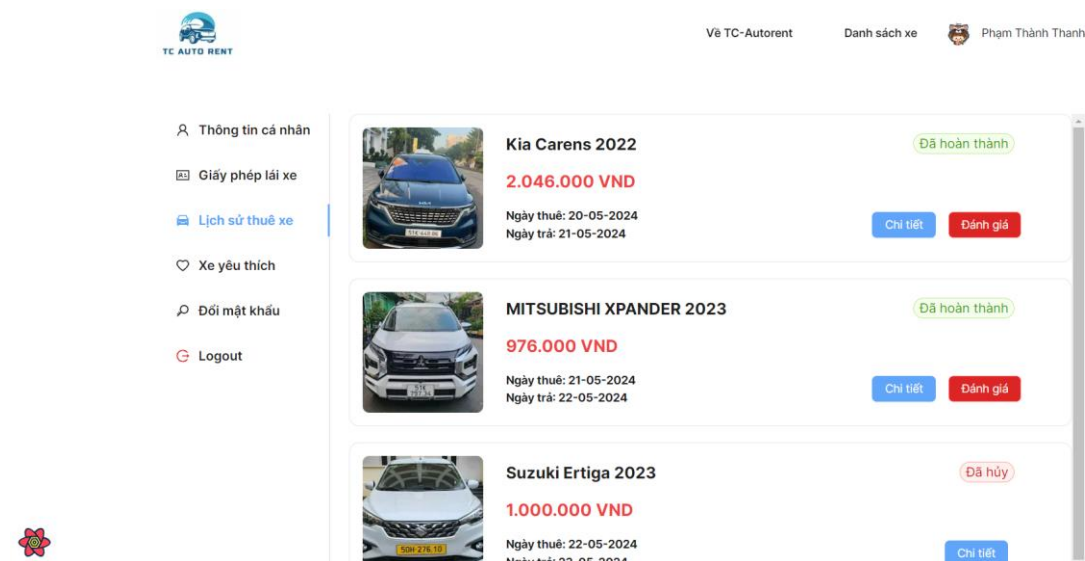
Picture 3.14: Update for the driver's license

Table 3.14: Description of the update for the driver's license screen

Screen	Update for the driver's license page
Description	Update for the driver's license authentication page
Screen Access	The user clicks on button “Cập nhật” on the “Giấy phép lái xe” tab

Screen Content			
Item	Type	Data	Description
Số GPLX	Input		The number of driver's license
Hạng	Input		The class of driver's license
Hình ảnh	Image		The image of driver's license
Cập nhật	Button		Click the button to update for the driver's license
X icon	Button		Click the button to cancel the form
Screen Actions			
Action Name	Description	Success	Failure
Update driver's license	+ The user fills out all valid information, then clicks on the button "Tiếp tục" to update the driver's license	Update your driver's license successfully and the system shows a success message: + "Cập nhật thành công"	+ The user not enter information, the system shows the error messages: + "Số GPLX không được để trống" + "Hạng không được để trống" + "Hình ảnh không được để trống"
Cancel registered driver's license	+ The user clicks on the "X" icon to cancel the updated driver's license	Close the form for updating driver's license	None

3.1.1.15. View car rental history



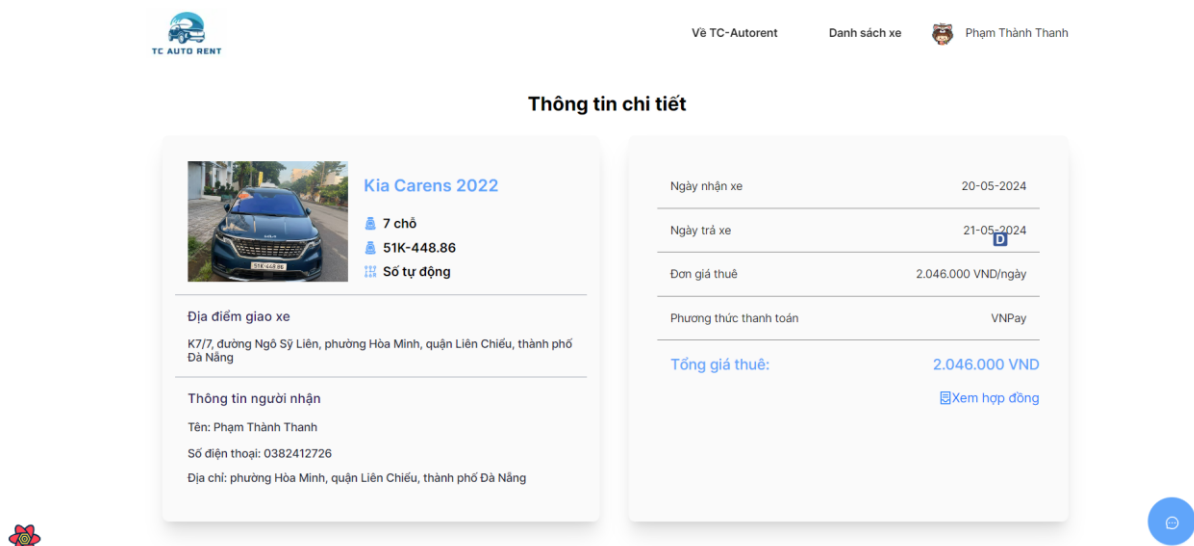
Picture 3.15: View car rental history page

Table 3.15: Description of the view car rental history screen

Screen	The car rental history page		
Description	View car rental history		
Screen Access	The user clicks on the “Lịch sử thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Name and year of manufacture	Text		The name of the car and year of manufacture
Car image	Image		The image of a car
Price	Text		The price rental car
Ngày thuê	Text		The start time for booking
Ngày trả	Text		The end time for booking
Status label	Text		The status of the booking
Chi tiết	Button		Click to move to the rented car detail page
Đánh giá	Button		Click to show the form for rating booking

Screen Actions			
Action Name	Description	Success	Failure
View rented car detail	+ The user clicks on the button “Chi tiết” to move to the rented car detail page	Move to the car rented car detail page successfully	The system display the error message: + “No car rented found”
Add or update the rating	+ The user clicks on the “Đánh giá” button to show the form for adding or updating the rating	The system shows a form for adding or updating the rating	The system display the error message: + “No car rented found”

3.1.1.16. View the rented car detail



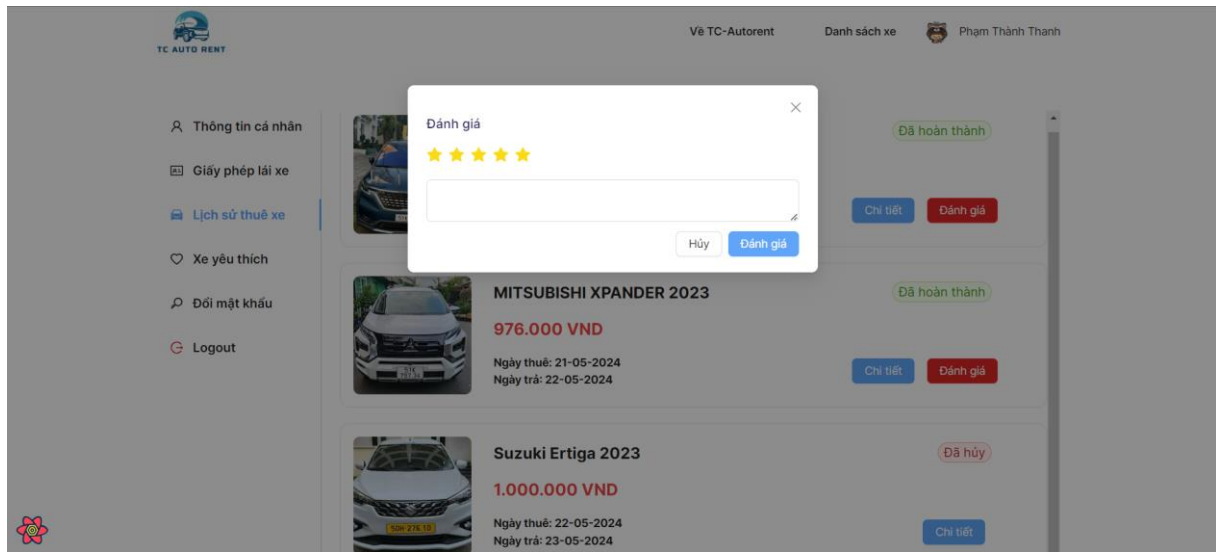
Picture 3.16: View the rented car detail page

Table 3.16: Description of the rented car detail screen

Screen	View the rented car detail page		
Description	View rented car detail		
Screen Access	The user clicks on the “Chi tiết” button on the “Lịch sử thuê xe” tab		
Screen Content			
Item	Type	Data	Description

Name and year of manufacture	Text		The name of the car and year of manufacture
Car image	Image		The image of a car
Price	Text		The price rental car
Ngày thuê	Text		The start time for booking
Ngày trả	Text		The end time for booking
Status label	Text		The status of the booking
Chi tiết	Button		Click to move to the rented car detail page
Đánh giá	Button		Click to show the form for rating booking
Screen Actions			
Action Name	Description	Success	Failure
View rented car detail	+ The user clicks on the button “Chi tiết” to move to the rented car detail page	Move to the car rented car detail page successfully	<i>The system display the error message:</i> + “No car rented found”
Add or update the rating	+ The user clicks on the “Đánh giá” button to show the form for adding or updating the rating	The system shows a form for adding or updating the rating	<i>The system displays the error message:</i> + “No car rented found”

3.1.1.17. Add rating



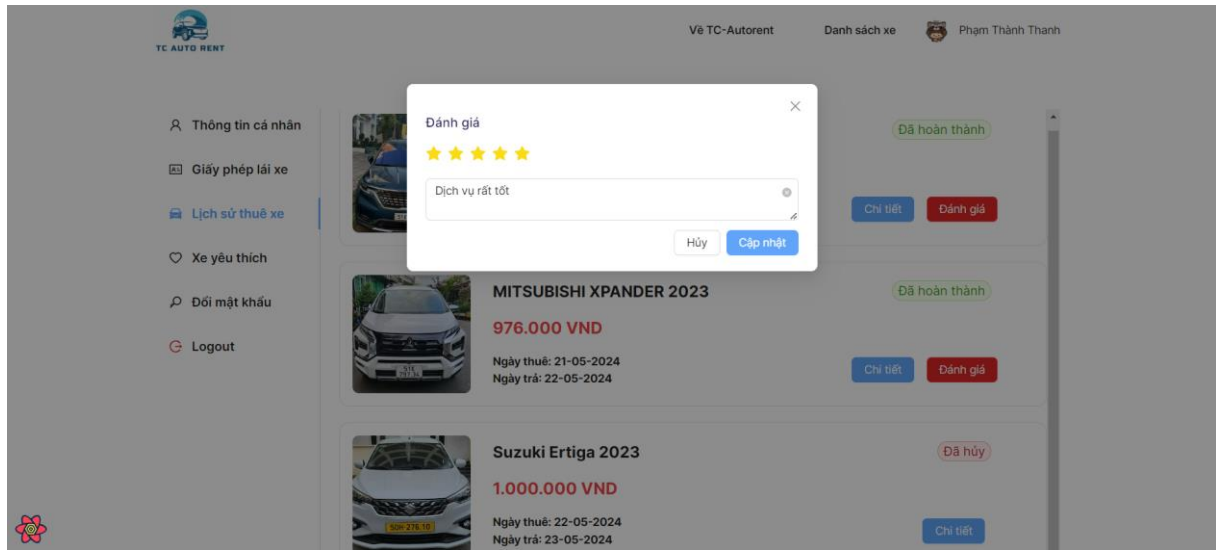
Picture 3.17: Add rating page

Table 3.17: Description of the add rating screen

Screen	Add rating page		
Description	Add rating after completing the rental car		
Screen Access	The user clicks “Đánh giá” button on “Lịch sử thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Star	Icon		The rating stars
Rating description	Input		The rating description
Đánh giá	Button		Click the button to add the rating
Hủy	Button		Click the button to close the rating form
Screen Actions			
Action Name	Description	Success	Failure
Add rating	+ The user chooses a rating star and enters the description, then clicks the “Đánh giá” button to add a rating	Add a rating successfully and the system shows a success message: + “Đánh giá thành	None

		công. Cảm ơn bạn đã đánh giá xe!”	
Close form	+ The user clicks on the “Hủy” button to close the form	Close the form successfully	None

3.1.1.18. Update rating



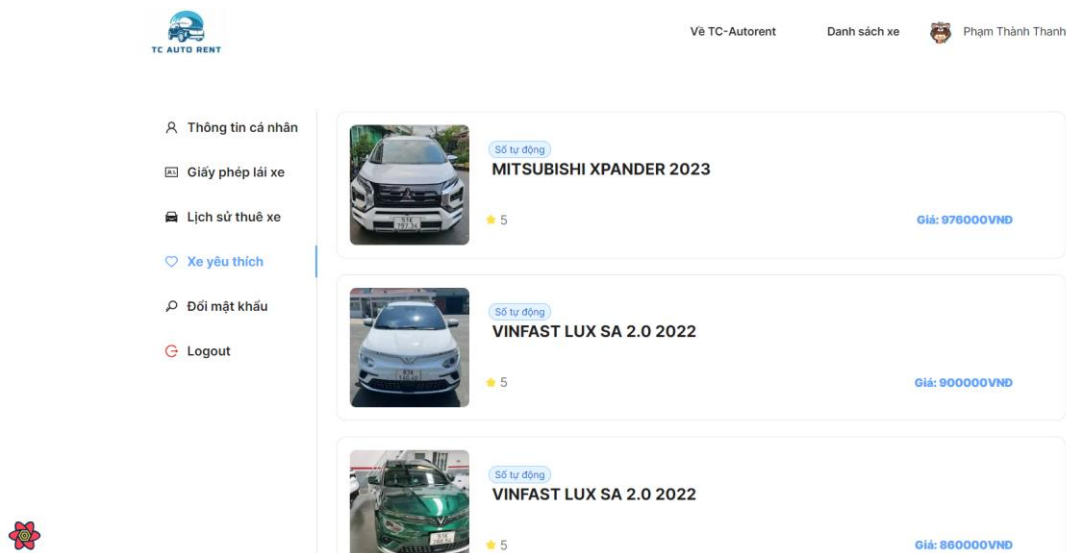
Picture 3.18: Update rating page

Table 3.18: Description of the update rating screen

Screen	Update rating page		
Description	Update rating after completing the rental car		
Screen Access	The user clicks “Đánh giá” button on “Lịch sử thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Star	Icon		The rating stars
Rating description	Input		The rating description
Đánh giá	Button		Click the button to update the rating
Hủy	Button		Click the button to close the rating form
Screen Actions			

Action Name	Description	Success	Failure
Update rating	+ The user chooses a rating star and enters the description, then clicks the “Đánh giá” button to add a rating	Update a rating successfully and the system shows a success message: + “Đánh giá thành công. Cảm ơn bạn đã đánh giá xe!”	None
Close form	+ The user clicks on the “Hủy” button to close the form	Close the form successfully	None

3.1.1.19. View the favorite car list



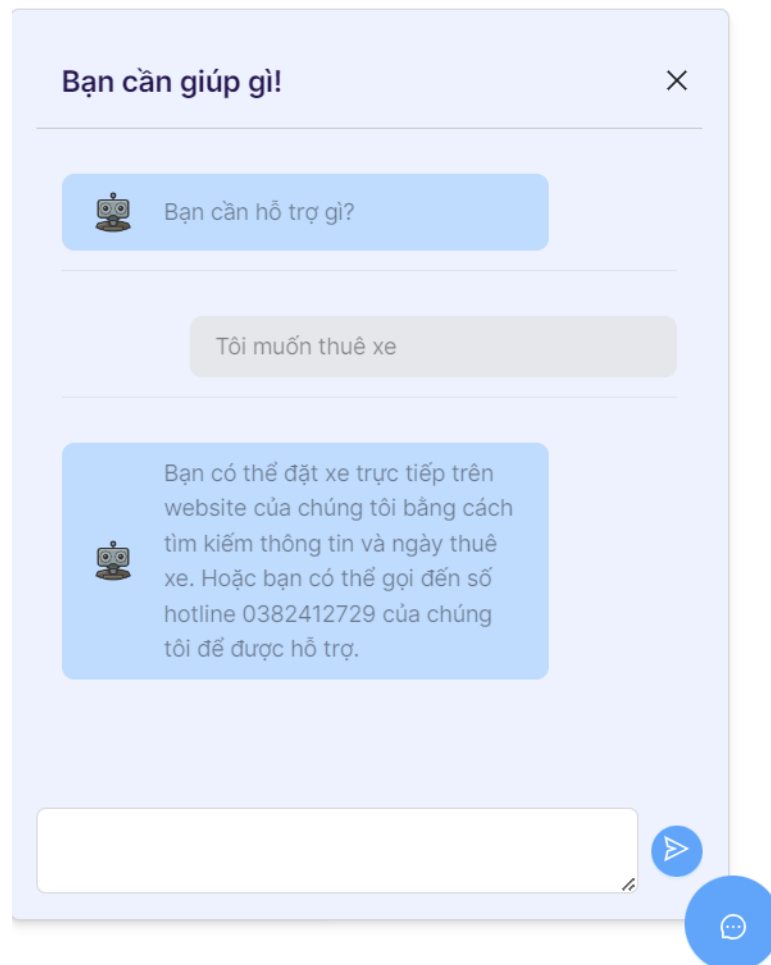
Picture 3.19: The favorite car list page

Table 3.19: Description of the favorite car list screen

Screen	The favorite car list		
Description	Show the favorite car list of the user		
Screen Access	Click on the “Lịch sử thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Name and	Text		The name of the car and year of

year of manufacture			manufacture
Star	Icon		The rating star of car
Car image	Image		The image of a car
Label	Text		The transmission of a car
Price	Text		The price per day of a car
Screen Actions			
Action Name	Description	Success	Failure
View detail car	The user clicks on a car image to move to the car details page	Move to the car details page	None

3.1.1.20. Chat with chatbot



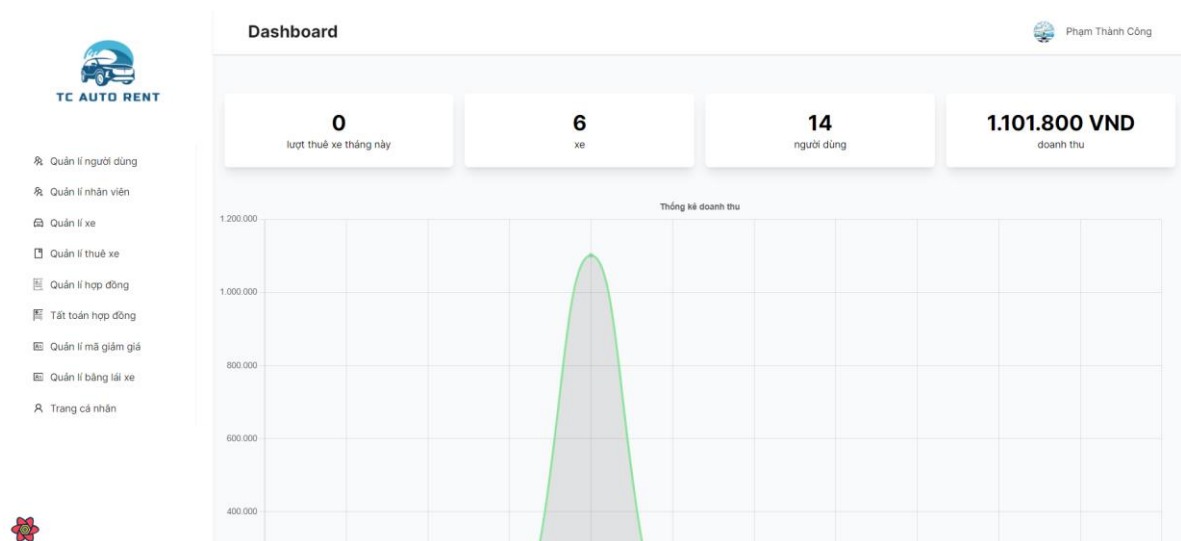
Picture 3.20: Chat with chatbot page

Table 3.20: Description of the chat with chatbot screen

Screen	Chat with chatbot form		
Description	Display a chatbot form that allows users to enter questions and receive answers.		
Screen Access	Click on the “Message” icon		
Screen Content			
Item	Type	Data	Description
Question	Input		A question to interact with AI
Send question	Button		Click to send a question to the chatbot server
Screen Actions			
Action Name	Description	Success	Failure
Chat	The user enters the question and clicks the send question button to send a question to the chatbot server	Receive the answer from the chatbot server and display the result for the user	None

3.1.2. Admin and Staff Functional Interface

3.1.2.1. Dashboard page

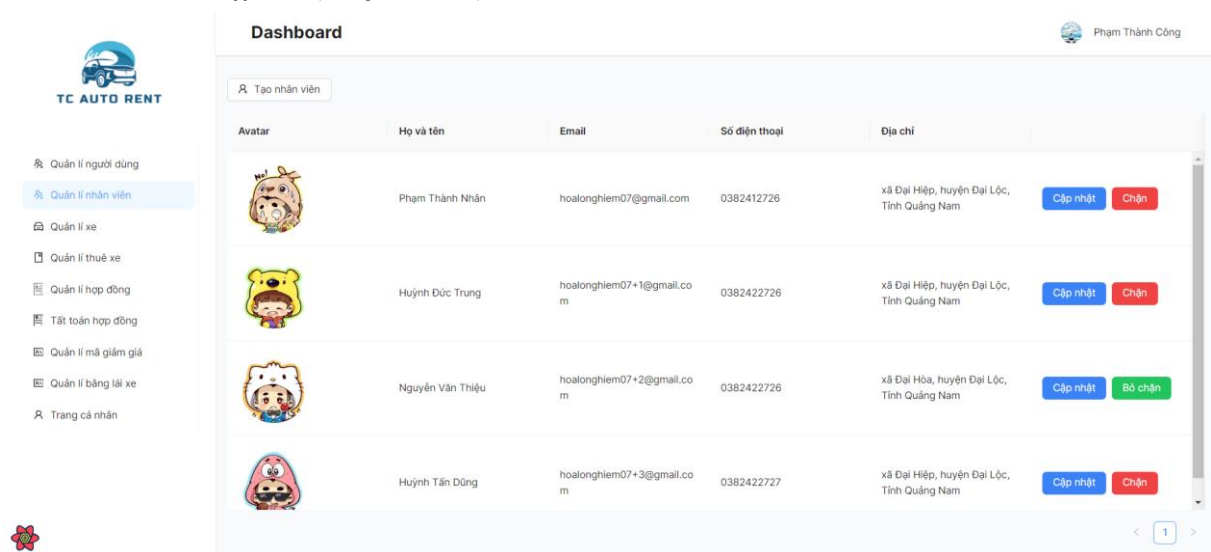


Picture 3.21: Dashboard page

Table 3.21: Description of the dashboard screen

Screen	Dashboard page		
Description	Display a dashboard page that allows admin and staff to view total cars, total bookings in the current month, total users, total revenue, and total revenue by month		
Screen Access	Click on the logo “TC AUTO RENT”		
Screen Content			
Item	Type	Data	Description
Number of car rentals this month	Text		The number of car rentals this month
Number of cars	Text		The number of cars in the system
Number of users	Text		The number of users in the system
Revenue	Text		The total revenue
Chart			The chart displays revenue by month

3.1.2.2. View staff list (only admin)



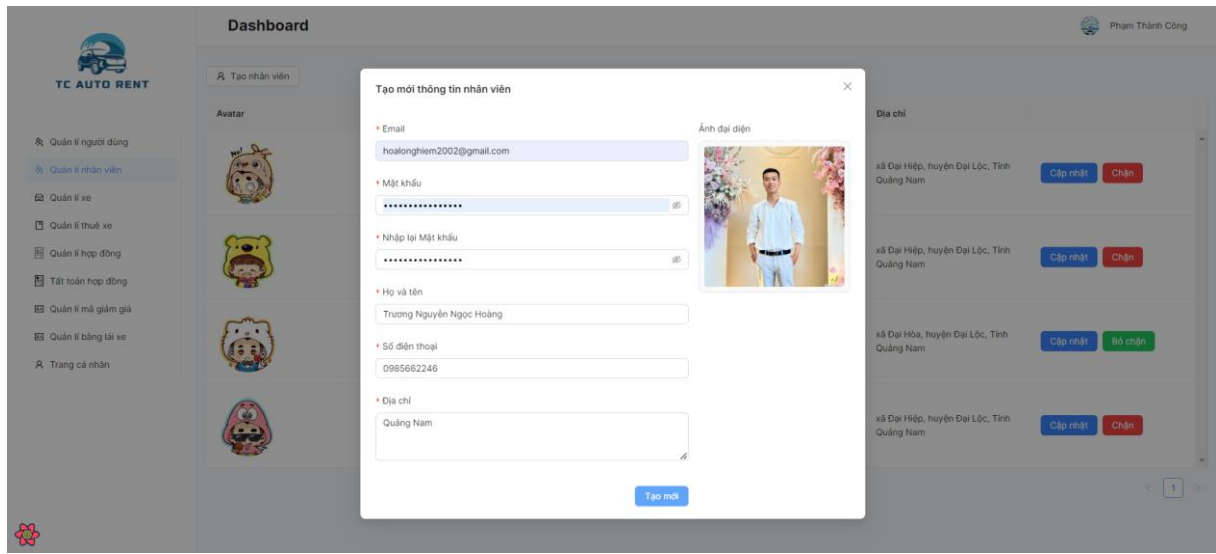
Picture 3.22: The staff list page

Table 3.22: Description of the staff list screen

Screen	View staff list		
Description	The admin can view a list of all staff		
Screen Access	The admin clicks on the “Quản lý nhân viên” tab		
Screen Content			
Item	Type	Data	Description
Avatar	Image		The avatar of the staff account
Họ và tên	Text		The full name of the staff account
Email	Text		The email of the staff account
Số điện thoại	Text		The phone number of the staff account
Địa chỉ	Text		The address of the staff account
Cập nhật	Button		Click the button to show the form for updated staff information
Chặn	Button		Click the button to ban the staff account
Bỏ chặn	Button		Click the button to unban the staff account
Screen Actions			
Action Name	Description	Success	Failure
Create a new staff	The admin clicks on the “Tạo nhân viên” button to show the form for creating a new staff	Show the form for creating a new staff	None
Update staff information	The admin clicks on the “Cập nhật” button to show the form for updated staff information	Show the form for updated staff information	None
Ban or Unban	The admin clicks the	Show the confirm	None

staff account	“Chặn” or “Bỏ chặn” button to show the confirm dialog to ban or unban staff account	dialog for admin successfully	
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3.1.2.3. Create staff (only admin)



Picture 3.23: Create staff page

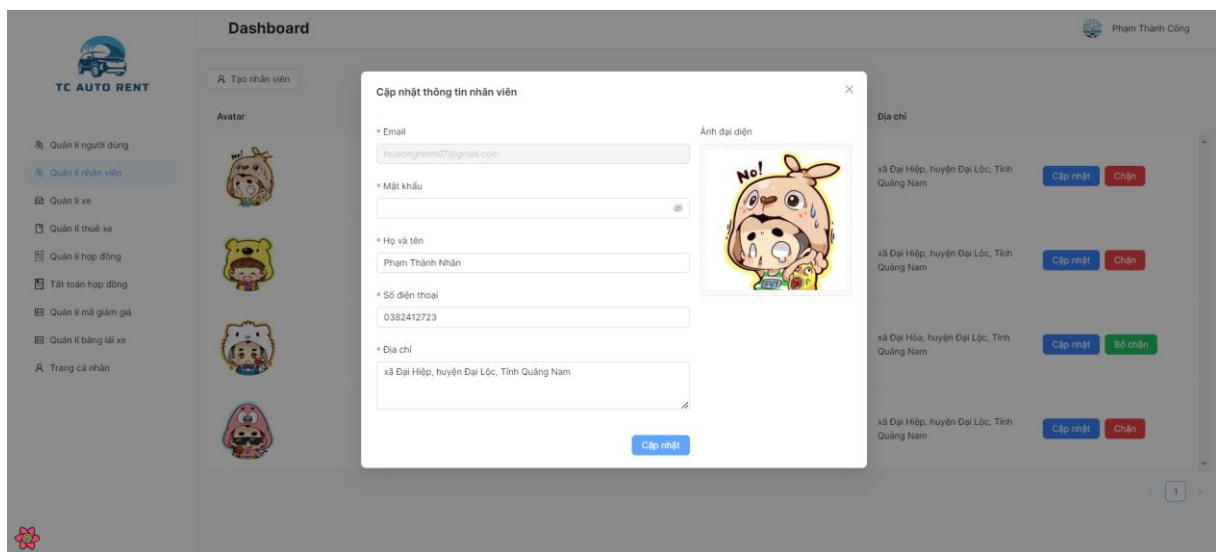
Table 3.23: Description of the create staff screen

Screen	Create a staff		
Description	The admin can create a new staff		
Screen Access	The admin clicks on the “Tạo nhân viên” button in the “Quản lý nhân viên” tab		
Screen Content			
Item	Type	Data	Description
Ảnh đại diện	Image		The profile picture of the staff account
Email	Input		The email of the staff account
Mật khẩu	Input		The password of the staff account
Nhập lại mật khẩu	Input		The confirmed password of the staff account
Họ và tên	Input		The full name of the staff account

Số điện thoại	Text		The phone number of the staff account
Địa chỉ	Text		The address of the staff account
Tạo mới	Button		Click the button to create a new staff
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Create a new staff	The admin fills out all valid information, then clicks on the “Tạo mới” button to create a new staff	Create a new staff successfully and the system shows the success message: + “Tạo mới thông tin nhân viên thành công”	<i>The admin fills email already exists:</i> - The system displays an error message: “Email đã được đăng ký, vui lòng thử lại”. <i>The admin fills in the invalid email, full name, phone number, address, password, and confirm password:</i> - Prevent submitting the form - The system display error messages: + “Không phải E-mail!”. + “Họ và tên không được nhập số!”. + “Không phải số điện thoại!”. + “Độ dài mật khẩu từ 6 đến 40 ký tự!”.

			+ “Mật khẩu bạn nhập vào không giống!” + “Hãy nhập địa chỉ!”
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.4. Update staff (only admin)



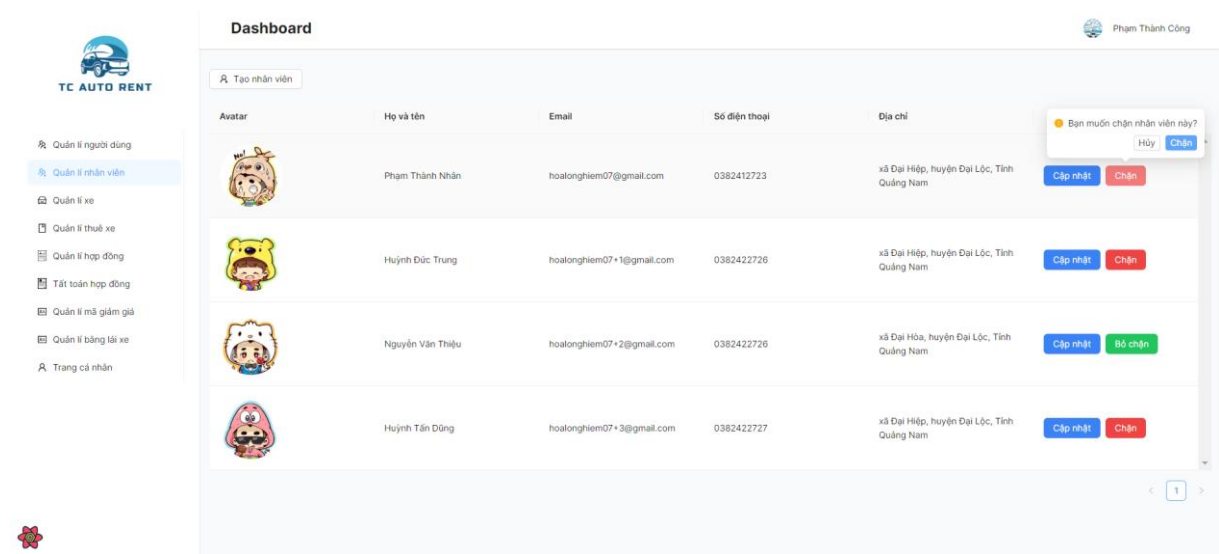
Picture 3.24: Update staff page

Table 3.24: Description of the update staff screen

Screen	Update the staff		
Description	The admin can update the staff		
Screen Access	The admin clicks on the “Cập nhật” button in the “Quản lý nhân viên” tab		
Screen Content			
Item	Type	Data	Description
Ảnh đại diện	Image		The profile picture of the staff account
Email	Input		The email of the staff account
Mật khẩu	Input		The password of the staff account

Họ và tên	Input		The full name of the staff account
Số điện thoại	Text		The phone number of the staff account
Địa chỉ	Text		The address of the staff account
Cập nhật	Button		Click the button to update a new staff
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Update staff information	The admin fills in all valid information that needs to be updated, then clicks on the “Cập nhật” button to update a staff	Create a new staff successfully and the system shows the success message: + “Cập nhật thông tin nhân viên thành công”	<i>The admin fills in the invalid email, full name, phone number, address, password, and confirm password:</i> - Prevent submitting the form - The system display error messages: + “Họ và tên không được nhập số!”. + “Không phải số điện thoại!”. + “Độ dài mật khẩu từ 6 đến 40 ký tự!”. + “Mật khẩu bạn nhập vào không giống!”. + “Hãy nhập địa chỉ!”
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.5. Ban or Unban staff account (only admin)



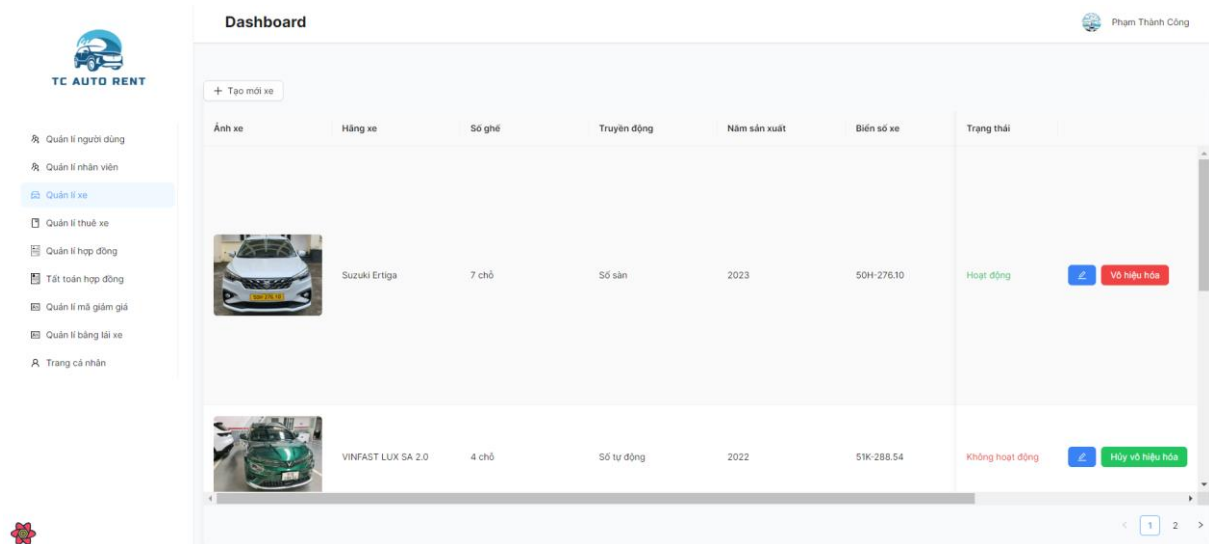
Picture 3.25: Ban or Unban staff account page

Table 3.25: Description of the ban or unban staff account screen

Screen	Ban or Unban staff account		
Description	The admin can ban or unban the staff account		
Screen Access	The admin clicks on the “Chặn” or “Bỏ chặn” button in the “Quản lý nhân viên” tab		
Screen Content			
Item	Type	Data	Description
Chặn	Button		Click the button to ban a staff account
Bỏ chặn	Button		Click the button to unban a staff account
Hủy	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
Ban the staff account	The admin clicks on the “Chặn” button to ban the staff account	Ban the staff account successfully, then the system shows a success message: “Chặn nhân viên	None

		<i>thành công”</i>	
Unban the staff account	The admin clicks on the “Bỏ chặn” button to unban the staff account	Unban the staff account successfully, then the system shows a success message: “ <i>Bỏ chặn nhân viên thành công</i> ”	None
Close the confirm dialog	The admin or staff clicks on the “Hủy” button to close the confirm dialog	Close the confirm dialog successfully	None

3.1.2.6. View car list



Picture 3.26: The car list page

Table 3.26: Description of the car list screen

Screen	View car list		
Description	The admin or staff can view a list of all car		
Screen Access	The admin or staff clicks on the “Quản lý xe” tab		
Screen Content			
Item	Type	Data	Description

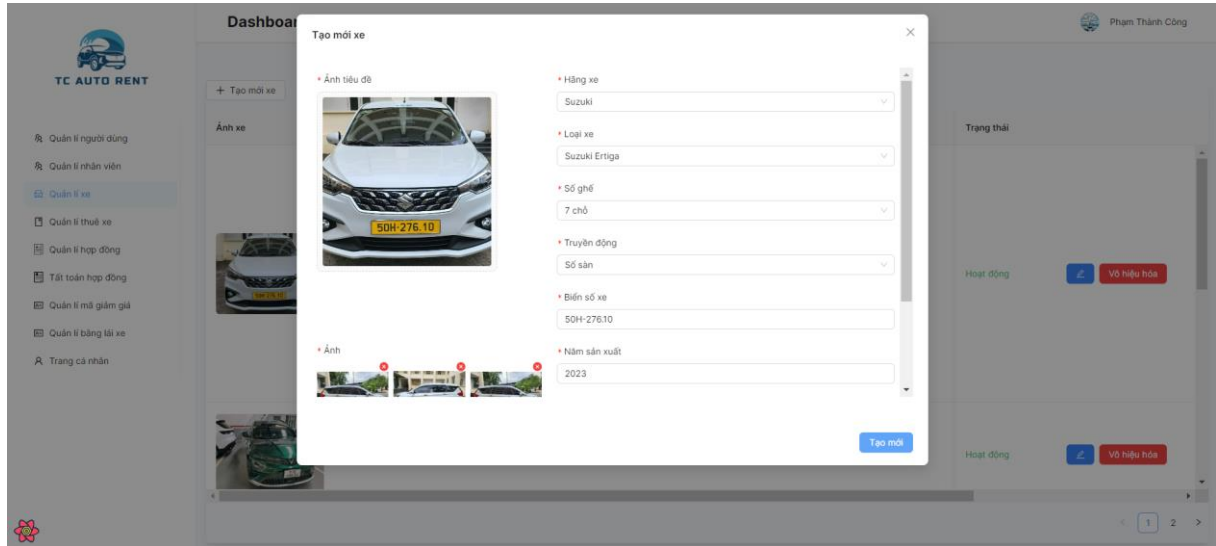
Ảnh xe	Image		The image of the car
Hãng xe	Text		The brand of the car
Số ghế	Text		The number seat of the car
Truyền động	Text		The transmission of the car
Năm sản xuất	Text		The year of manufacture of the car
Biển số xe	Text		The car number of the car
Mô tả	Text		The description of the car
Giá	Text		The price per day of the car
Trạng thái	Text		The status of the car (“Hoạt động”, “Không hoạt động”)
Edit icon	Button		Click on the button to show the form for updating the car
Vô hiệu hóa	Button		Click on the button to disable the car
Hủy vô hiệu hóa	Button		Click on the button to enable the car

Screen Actions

Action Name	Description	Success	Failure
Create a new car	The admin clicks on the “Tạo mới xe” button to show the form for creating a new car	Show the form for creating a new car	None
Update car information	The admin clicks on the edit icon to show the form for updated car information	Show the form for updated car information	None
Disable or enable the car	The admin clicks the “Vô hiệu hóa” or “Hủy vô hiệu hóa” button to show the confirm dialog to	Show the confirm dialog successfully	None

	disable or enable the car		
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3.1.2.7. Create a new car



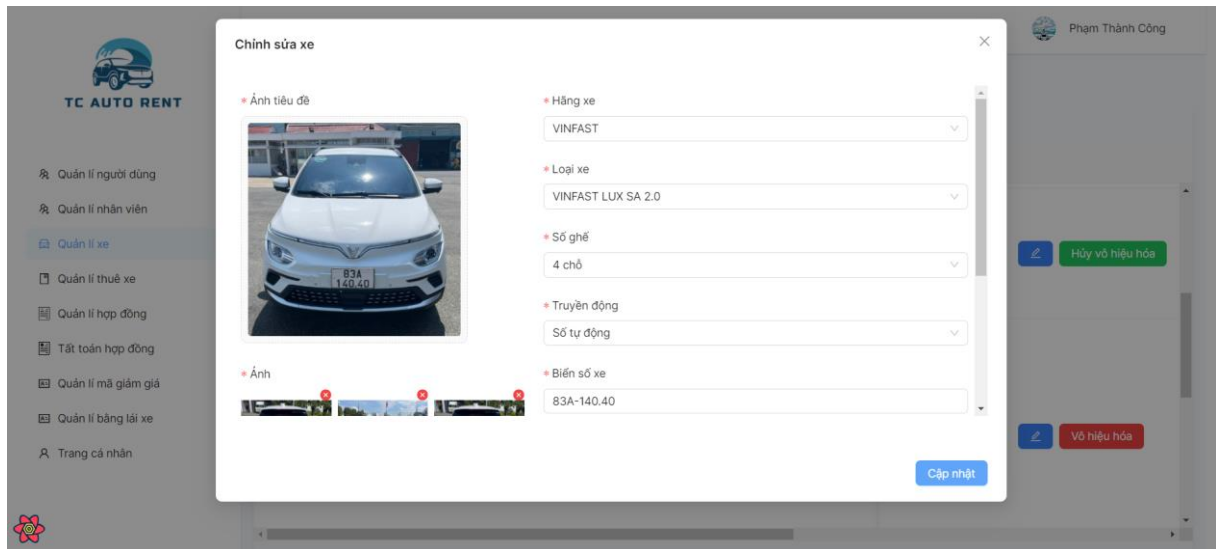
Picture 3.27: Create a new car page

Table 3.27: Description of the create a new car screen

Screen	Create a new car		
Description	The admin or staff can create a new car		
Screen Access	The admin or staff clicks on the “Tạo mới xe” button in the “Quản lý xe” tab		
Screen Content			
Item	Type	Data	Description
Ảnh tiêu đề	Image		The main image of the car
Ảnh	Image		The images of the car
Hãng xe	Select box		The brands of the car
Loại xe	Select box		The models of the car
Số ghế	Text		The number seat of the car
Truyền động	Text		The transmission of the car
Năm sản xuất	Text		The year of manufacture of the car

Biển số xe	Text		The car number of the car
Mô tả	Text area		The description of the car
Giá tiền thuê xe trong 1 ngày	Text		The price per day of the car
Tạo mới	Button		Click the button to create a new car
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Create a new car	The admin or staff fills out all valid information, then clicks on the “Tạo mới” button to create a new car	Create a new car successfully and the system shows the success message: + “Tạo xe thành công”	<i>The admin or staff fills in the invalid information:</i> - Prevent submitting the form - The system displays an error message with missing information for each field
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.8. Update car information



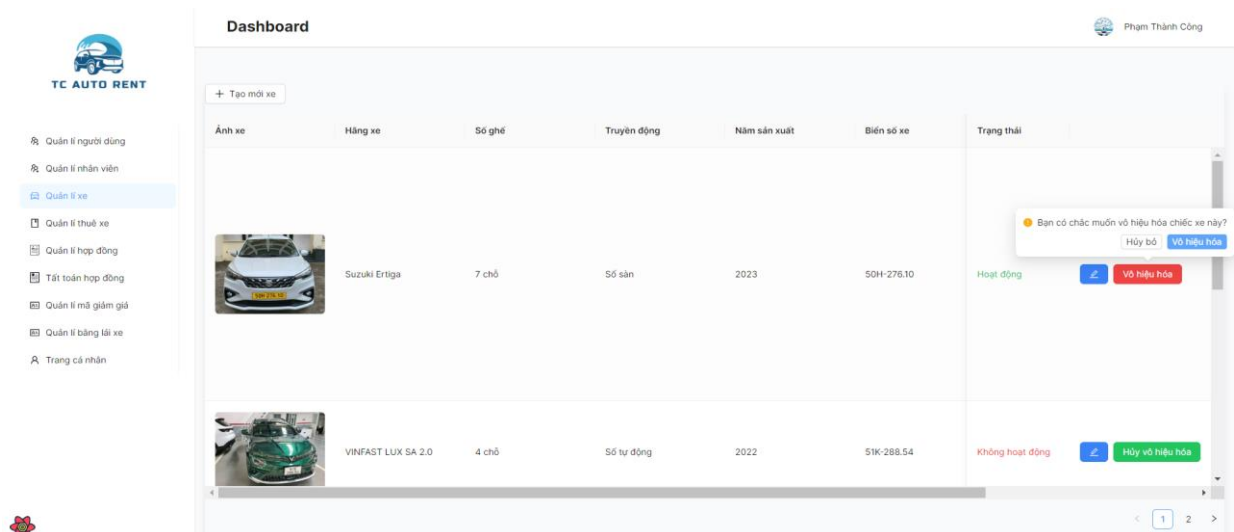
Picture 3.28: Update car information page

Table 3.28: Description of update car information page

Screen	Update car information		
Description	The admin or staff can update car information		
Screen Access	The admin or staff clicks on the edit icon in the “Quản lý xe” tab		
Screen Content			
Item	Type	Data	Description
Ảnh tiêu đề	Image		The main image of the car
Ảnh	Image		The images of the car
Hãng xe	Select box		The brands of the car
Loại xe	Select box		The models of the car
Số ghế	Text		The number seat of the car
Truyền động	Text		The transmission of the car
Năm sản xuất	Text		The year of manufacture of the car
Biển số xe	Text		The car number of the car
Mô tả	Text area		The description of the car

Giá tiền thuê xe trong 1 ngày	Text		The price per day of the car
Cập nhật	Button		Click the button to update car information
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Update car information	The admin or staff fills in all valid information that needs to be updated, then clicks on the “Cập nhật” button to update car information	Update car information successfully and the system shows the success message: + “Cập nhật thành công”	<i>The admin or staff fills in the invalid information:</i> - Prevent submitting the form - The system displays an error message with missing information for each field
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.9. Disable or Enable the car

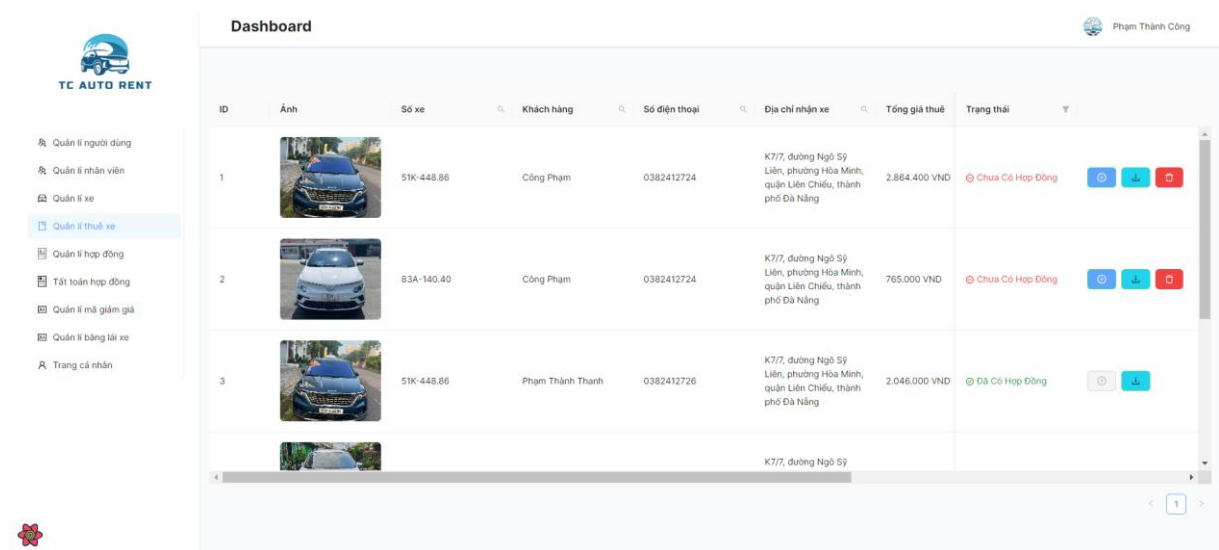


Picture 3.29: Disable or Enable the car page

Table 3.29: Description of Disable or Enable the car screen

Screen	Disable or enable the car		
Description	The admin or staff can disable or enable the car		
Screen Access	The admin or staff clicks on the “Vô hiệu hóa” or “Hủy vô hiệu hóa” button in the “Quản lý xe” tab		
Screen Content			
Item	Type	Data	Description
Vô hiệu hóa	Button		Click the button to disable the car
Hủy vô hiệu hóa	Button		Click the button to enable the car
Hủy bỏ	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
Disable the car	The admin or staff clicks on the “Vô hiệu hóa” button to disable the car	Disable the car successfully, then the system shows a success message: “Vô hiệu hóa xe thành công”	None
Enable the car	The admin or staff clicks on the “Hủy vô hiệu hóa” button to enable the car	Enable the car successfully, then the system shows a success message: “Hủy vô hiệu hóa xe thành công”	None
Close the confirm dialog	The admin or staff clicks on the “Hủy bỏ” button to close the confirm dialog	Close the confirm dialog successfully	None

3.1.2.10. View booking list



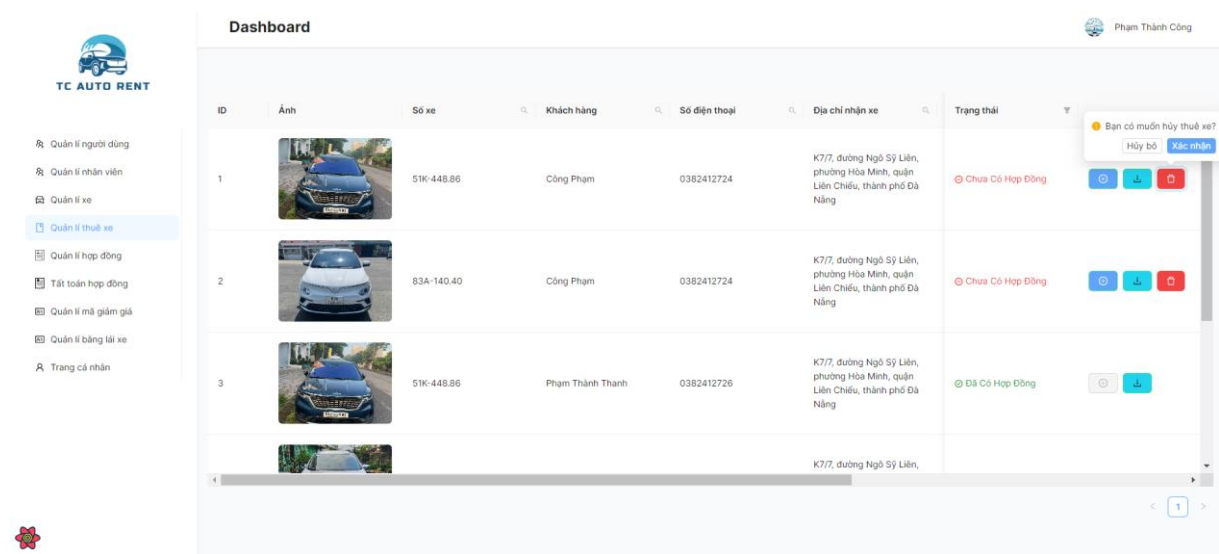
Picture 3.30: The booking list page

Table 3.30: Description of the booking list screen

Screen	View booking list		
Description	The admin or staff can view a list of all booking		
Screen Access	The admin or staff clicks on the “Quản lý thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Ảnh xe	Image		The image of the car
Số xe	Text		The car number of the car
Khách hàng	Text		The full name of the car renter
Số điện thoại	Text		The phone number of the car renter
Địa chỉ nhận xe	Text		The address to pick up the car
Tổng giá thuê	Text		The total price
Thời gian bắt đầu	Text		The start time for booking
Thời gian kết thúc	Text		The end time for booking
Mã giao dịch	Text		The transaction code

Trạng thái	Text		The status of booking (“Chưa có hợp đồng”, “Đã có hợp đồng”, “Đã hủy”)
Create icon	Button		Click on the button to show the form for creating a contract
Download contract file	Button		Click on the button to download the Word file of the contract
Trash icon	Button		Click on the button to cancel the booking
Screen Actions			
Action Name	Description	Success	Failure
Create contract	The admin or staff clicks on the Create icon to show the form for creating a contract	Show the form for creating a contract	None
Download contract	The admin or staff clicks on the download icon to download the Word file of the contract	Download the contract file successfully	None
Trash icon	The admin or staff clicks on the Trash icon to cancel the contract	Show the confirm dialog for canceling a contract	None

3.1.2.11. Cancel the booking



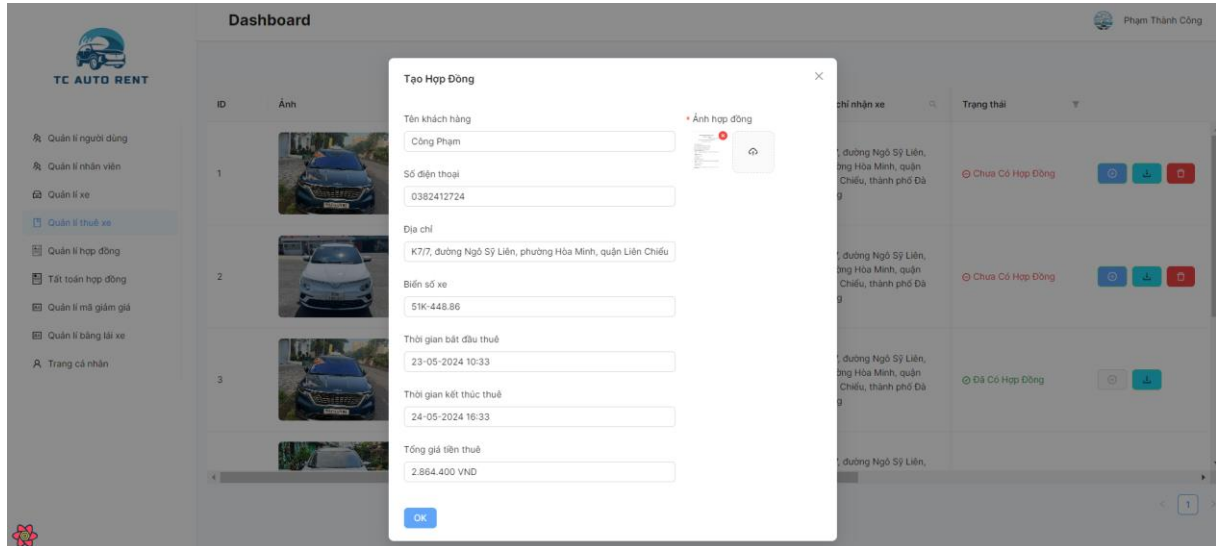
Picture 3.31: Cancel the booking page

Table 3.31: Description of cancel the booking screen

Screen	Cancel the booking		
Description	The admin or staff can cancel the booking		
Screen Access	The admin or staff clicks on the trash icon in the “Quản lý xe” tab when the booking is status “Chưa có hợp đồng”		
Screen Content			
Item	Type	Data	Description
Xác nhận	Button		Click the button to cancel the booking
Hủy bỏ	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
Cancel booking	The admin or staff clicks on “Xác nhận” button to cancel the booking	Cancel booking successfully, then the system shows a success message: “Hủy thành công”	Cancel booking failed, then the system shows an error message: “Hủy thất bại”
Close the confirm dialog	The admin or staff clicks on the “Hủy	Close the confirm dialog successfully	None

	bỏ” button to close the confirm dialog		
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3.1.2.12. Create the contract



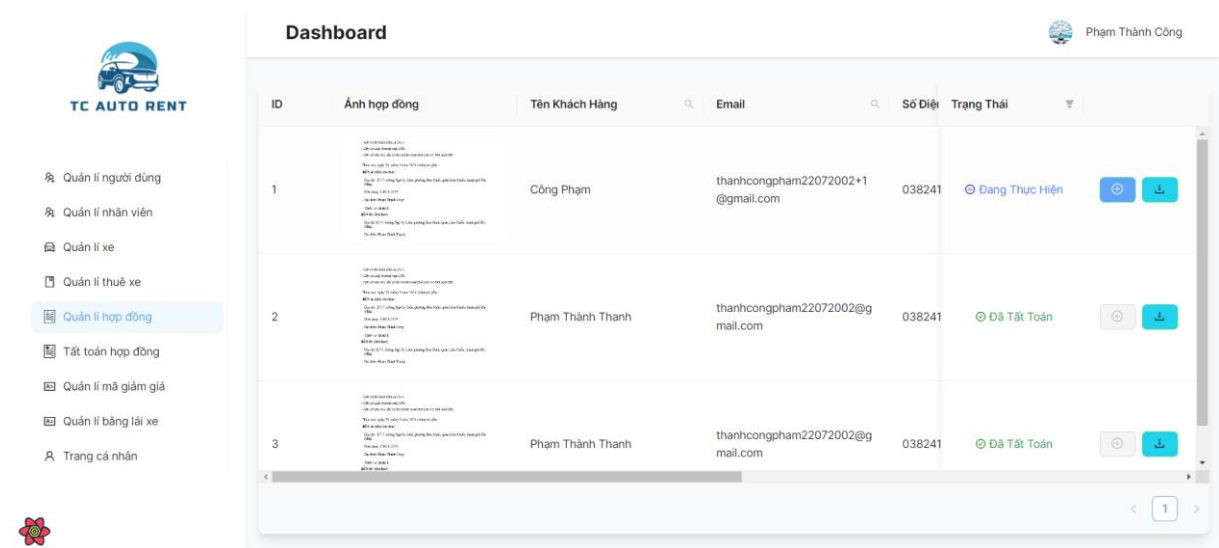
Picture 3.32: Create the contract page

Table 3.32: Description of create the contract screen

Screen	Create the contract		
Description	The admin or staff can create the contract		
Screen Access	The admin or staff clicks on the create icon in the “Quản lý thuê xe” tab		
Screen Content			
Item	Type	Data	Description
Ảnh hợp đồng	Image		The images of the contract
Tên khách hàng	Text		The full name of the car renter
Số điện thoại	Text		The phone number of the car renter
Địa chỉ	Text		The address to pick up the car
Biển số xe	Text		The car number for rental
Thời gian bắt đầu thuê	Text		The start time for booking
Thời gian kết	Text		The end time for booking

thúc thuê			
Tổng giá tiền thuê	Text		The total price
OK	Button		Click the button to create the contract
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Create a contract	The admin or staff fills out all valid information, then clicks on the “OK” button to create a contract	Create a contract successfully and the system shows the success message: + “Tạo hợp đồng thành công”	<i>If the admin or staff does not upload an image, the system displays an error message:</i> + “Hãy đăng ảnh hợp đồng lên!” <i>When creating a contract fails, the system displays an error message:</i> + “Có lỗi xảy ra, vui lòng thử lại!”
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.13. View contract list



Picture 3.33: Contract list page

Table 3.33: Description of contract list screen

Screen	View contract list		
Description	The admin or staff can view a list of contracts		
Screen Access	The admin or staff clicks on the “Quản lý hợp đồng” tab		
Screen Content			
Item	Type	Data	Description
Ảnh hợp đồng	Image		The image of the contract
Tên khách hàng	Text		The full name of the car renter
Email	Text		The email of the car renter
Số điện thoại	Text		The phone number of the car renter
Địa chỉ	Text		The address to pick up the car
Tổng số tiền	Text		The total price
Thời gian bắt đầu	Text		The start time for booking
Thời gian kết thúc	Text		The end time for booking
Trạng thái	Text		The status of booking (“Đang thực hiện”, “Đã tắt toán”)

Create icon	Button		Click on the button to show the form for creating a finalized contract
Download finalized contract file	Button		Click on the button to download the Word file of the finalized contract
Screen Actions			
Action Name	Description	Success	Failure
Create contract	The admin or staff clicks on the Create icon to show the form for creating a finalized contract	Show the form for creating a finalized contract	None
Download finalized contract	The admin or staff clicks on the download icon to download the Word file of the finalized contract	Download the finalized contract file successfully	None

3.1.2.14. Create the finalized contract

Picture 3.34: Create the finalized contract page (1)

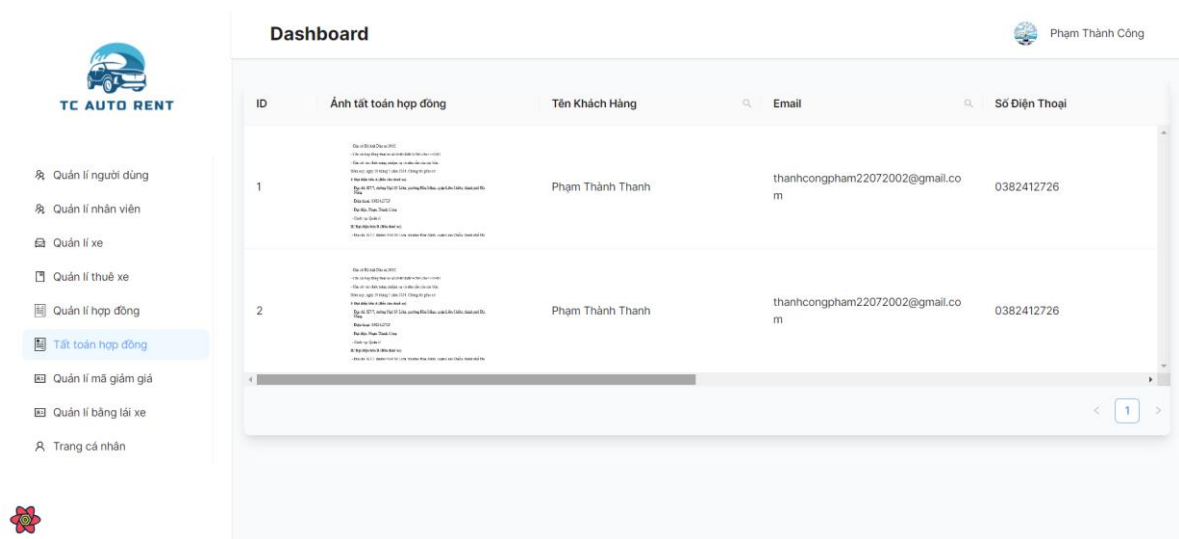
Picture 3.35: Create the finalized contract (2)

Table 3.34: Description of create the finalized contract screen

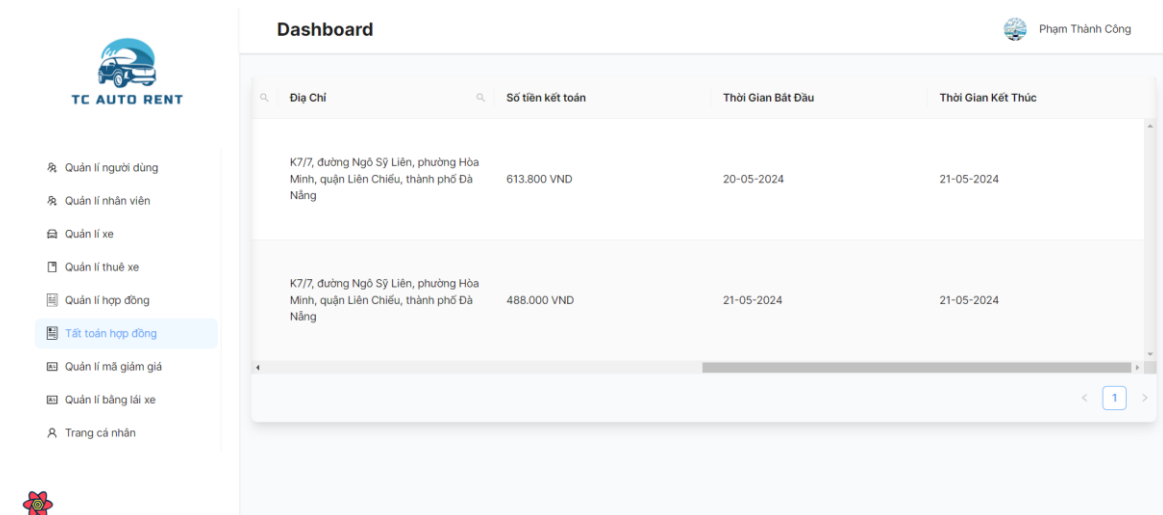
Screen	Create the finalized contract		
Description	The admin or staff can create the finalized contract		
Screen Access	The admin or staff clicks on the create icon in the “Quản lý hợp đồng” tab		
Screen Content			
Item	Type	Data	Description
Ảnh hợp đồng	Image		The images of the contract
Tên khách hàng	Text		The full name of the car renter
Số điện thoại	Text		The phone number of the car renter
Địa chỉ	Text		The address to pick up the car
Biển số xe	Text		The car number for rental
Thời gian bắt đầu thuê	Text		The start time for booking
Thời gian kết thúc thuê	Text		The end time for booking
Tổng giá tiền thuê	Text		The total price
Thời gian kết thúc thuê	Text		The real end time for booking

Giá trị kết toán hợp đồng	Text		The contract settlement value
Ghi chú	Text		The note for return the car ahead of time
OK	Button		Click the button to create the finalized contract
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Create a finalized contract	The admin or staff fills out all valid information, then clicks on the “OK” button to create a finalized contract	Create a finalized contract successfully and the system shows the success message: + “Tất toán hợp đồng thành công”	<i>If the admin or staff does not upload an image, the system displays an error message:</i> + “Hãy đăng ảnh tất toán hợp đồng lên!” <i>When creating a finalized contract fails, the system displays an error message:</i> + “Có lỗi xảy ra, vui lòng thử lại!”
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.15. View the finalized contract list



Picture 3.36: The finalized contract list (1)



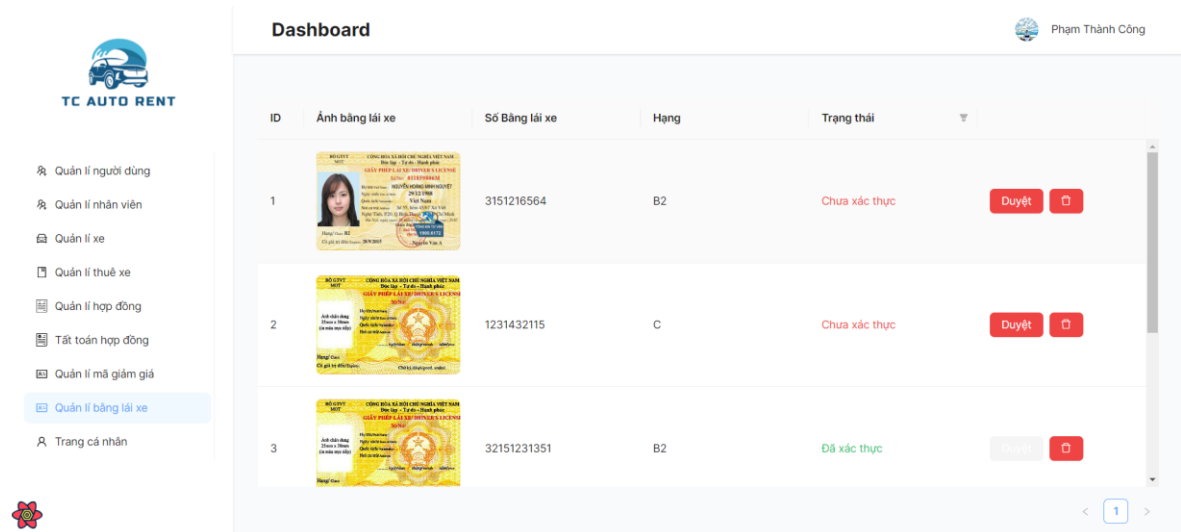
Picture 3.37: The finalized contract list (2)

Table 3.35: Description of the finalized contract list screen

Screen	View the finalized contract list		
Description	The admin or staff can view a list of finalized contracts		
Screen Access	The admin or staff clicks on the “Tất toán hợp đồng” tab		
Screen Content			
Item	Type	Data	Description
Ảnh tắt toán hợp đồng	Image		The image of the finalized contract
Tên khách	Text		The full name of the car renter

hàng			
Email	Text		The email of the car renter
Số điện thoại	Text		The phone number of the car renter
Địa chỉ	Text		The address to pick up the car
Số tiền kết toán	Text		The contract settlement value
Thời gian bắt đầu	Text		The start time for booking
Thời gian kết thúc	Text		The end time for booking

3.1.2.16. View driver's license list



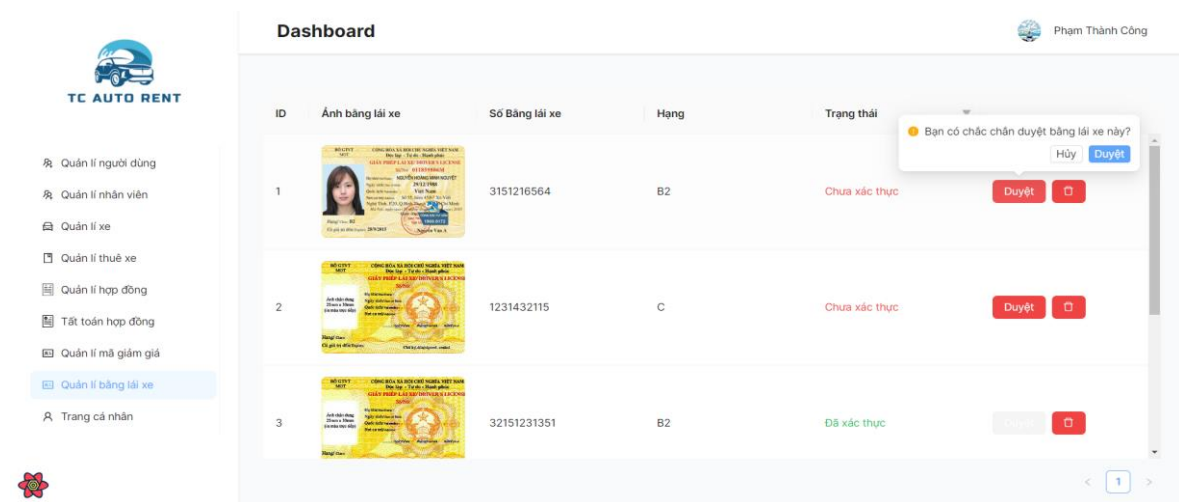
Picture 3.38: The driver's license list

Table 3.36: Description of the driver's license list screen

Screen	View the driver’s license list		
Description	The admin or staff can view a list of all driver’s license		
Screen Access	The admin or staff clicks on the “Quản lý bằng lái xe” tab		
Screen Content			
Item	Type	Data	Description
Ảnh bằng lái xe	Image		The image of the driver’s license

Số bằng lái xe	Text		The number of driver's license
Hạng	Text		The class of driver's license
Trạng thái	Text		The status of driver's license (“Đã xác thực”, “Chưa xác thực”)
Duyệt	Button		Click the button to show the confirm dialog to verify driver's license
Trash icon	Button		Click the button to show the confirm dialog to delete driver's license
Screen Actions			
Action Name	Description	Success	Failure
Verify driver's license	The admin or staff clicks the “Duyệt” button to show the confirm dialog to verify the driver's license	Show the confirm dialog successfully	None
Delete driver's license	The admin or staff clicks the trash icon to show the confirm dialog to delete the driver's license	Show the confirm dialog successfully	None

3.1.2.17. Verify driver's license



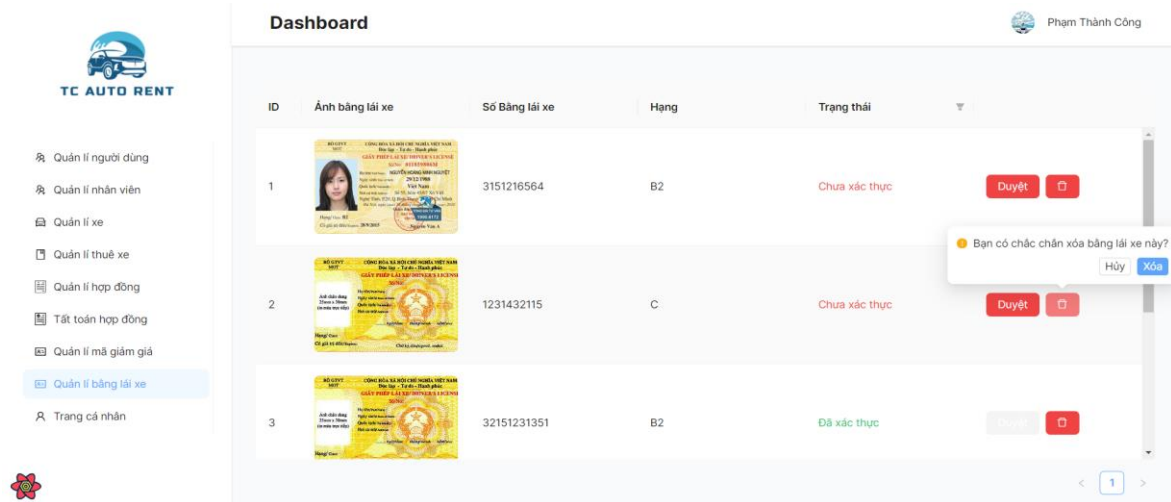
Picture 3.39: Verify driver's license page

Table 3.37: Description of verify driver's license screen

Screen	Verify driver’s license		
Description	The admin or staff can verify the driver’s license of the user		
Screen Access	The admin or staff clicks on the “Quản lý bằng lái xe” tab		
Screen Content			
Item	Type	Data	Description
Duyệt	Button		Click the button to verify the driver’s license
Hủy	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
The admin or staff clicks on the “Duyệt” button to verify the driver’s license	Verify driver’s license successfully, then the system shows a success message: “Duyệt thành công”	Verify driver’s license failed, then the system shows an error message: “Duyệt thất bại”	None
Close the confirm dialog	The admin or staff clicks on the “Hủy”	Close the confirm dialog successfully	None

	button to close the confirm dialog		
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3.1.2.18. Delete driver's license



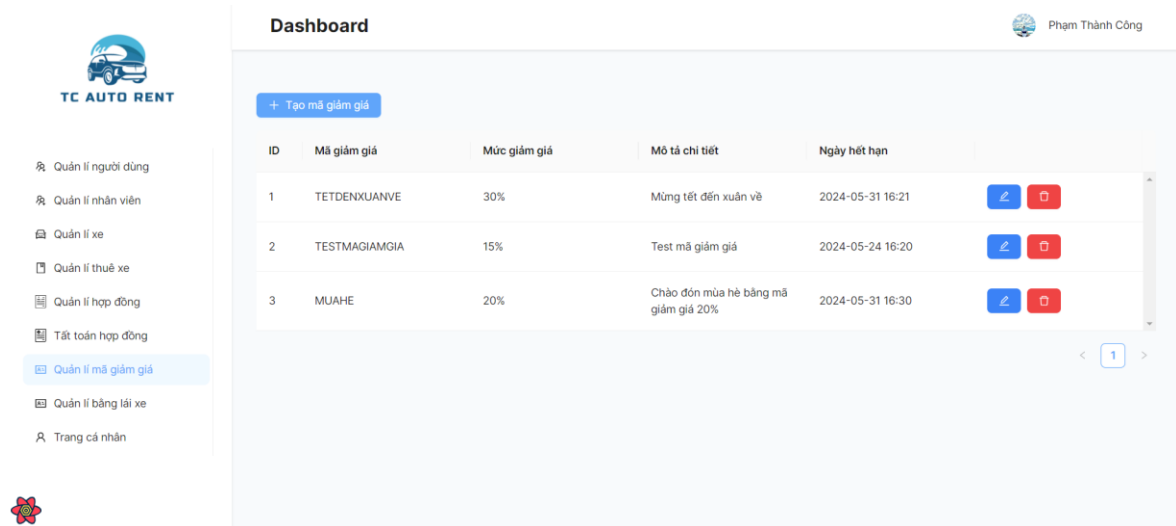
Picture 3.40: Delete driver's license page

Table 3.38: Description of delete driver's license screen

Screen	Delete driver’s license		
Description	The admin or staff can delete the driver’s license of the user		
Screen Access	The admin or staff clicks on the “Quản lý bằng lái xe” tab		
Screen Content			
Item	Type	Data	Description
Xóa	Button		Click the button to delete the driver’s license
Hủy	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
The admin or staff clicks on the “Xóa” button to delete the	Delete driver’s license successfully, then the system shows a success message: “Xóa	Delete driver's license failed, then the system shows an error message: “Xóa	None
delete the	message: “Xóa	thất bại”	

driver's license	thành công”		
Close the confirm dialog	The admin or staff clicks on the “Hủy” button to close the confirm dialog	Close the confirm dialog successfully	None

3.1.2.19. View the coupon list



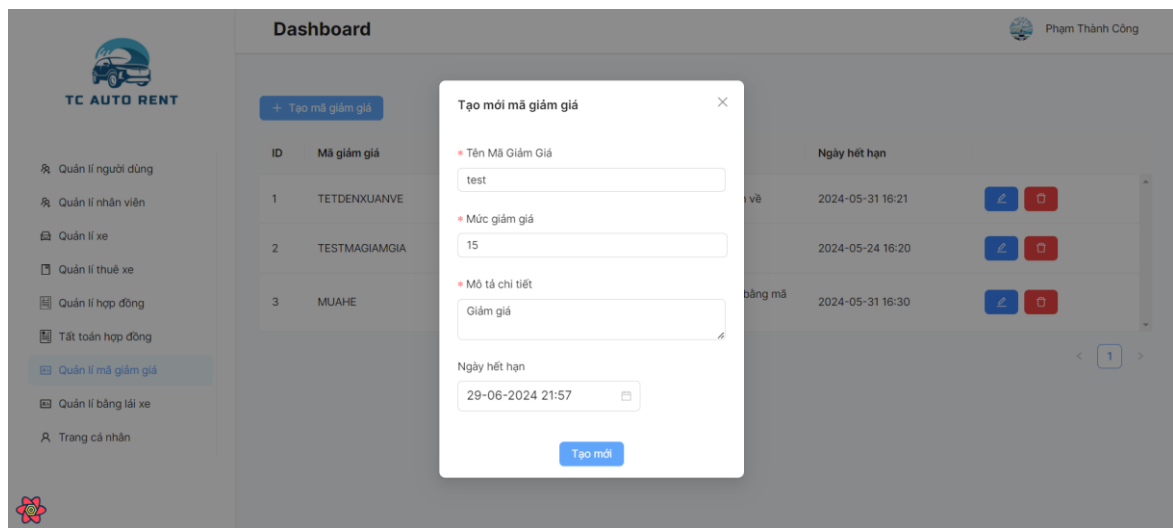
Picture 3.41: The coupon list page

Table 3.39: Description of the coupon list page

Screen	View the coupon list		
Description	The admin or staff can view a list of all coupon		
Screen Access	The admin or staff clicks on the “Quản lý mã giảm giá” tab		
Screen Content			
Item	Type	Data	Description
Mã giảm giá	Text		The name of the coupon
Mức giảm giá	Text		The discount on the coupon
Mô tả chi tiết	Text		The description of the coupon
Ngày hết hạn	Text		The expiration day of the coupon
Tạo mã giảm giá	Button		Click on the button to show the form for creating the coupon

Edit icon	Button		Click on the button to show the form for updating the coupon
Trash icon	Button		Click on the button to show the confirmed dialog for deleting the coupon
Screen Actions			
Action Name	Description	Success	Failure
Create a new coupon	The admin or staff clicks on the “Tạo mới mã giảm giá” button to show the form for creating a new coupon	Show the form for creating a new coupon	None
Update coupon information	The admin or staff clicks on the edit icon to show the form for updated coupon information	Show the form for updated coupon information	None
Delete coupon	The admin clicks the trash icon to show the confirm dialog to delete the coupon	Show the confirm dialog successfully	None

3.1.2.20. Create a new coupon



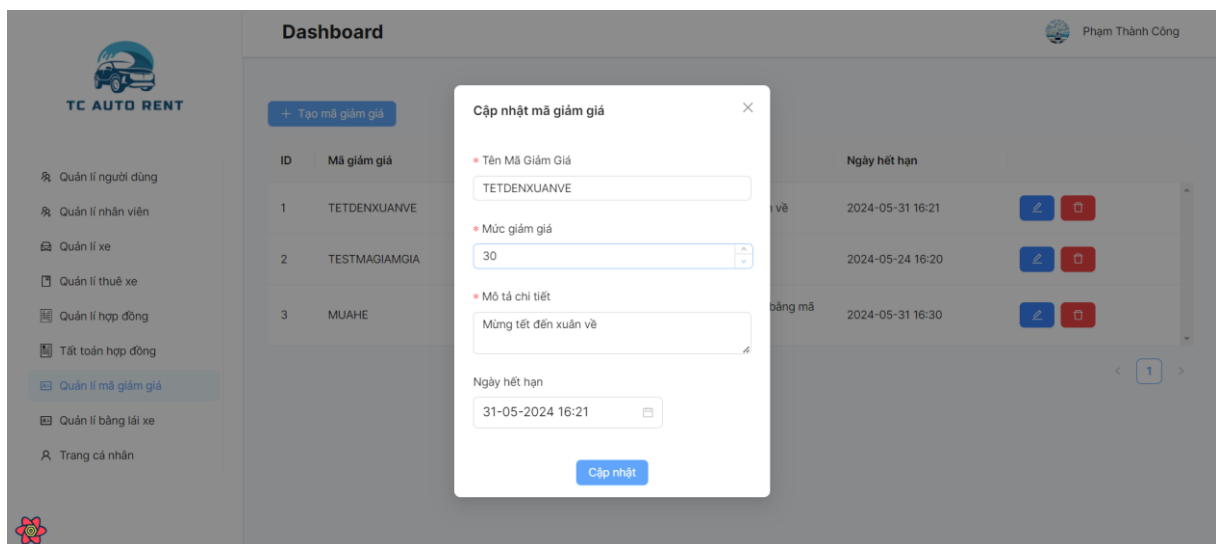
Picture 3.42: Create a new coupon page

Table 3.40: Description of create a new coupon page

Screen	Create a new coupon		
Description	The admin or staff can create a new coupon		
Screen Access	The admin or staff clicks on the “Tạo mới mã giảm giá” button in the “Quản lý mã giảm giá” tab		
Screen Content			
Item	Type	Data	Description
Tên mã giảm giá	Text		The name of the coupon
Mức giảm giá	Text		The discount on the coupon
Mô tả chi tiết	Text		The description of the coupon
Ngày hết hạn	Text		The expiration day of the coupon
Tạo mới	Button		Click the button to create a new coupon
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Create a new coupon	The admin or staff fills out all valid information, then	Create a new coupon successfully and the system shows the	<i>The admin or staff fills in the invalid information:</i>

	clicks on the “Tạo mới” button to create a new coupon	success message: + “Tạo mới mã giảm giá thành công”	- Prevent submitting the form - The system displays an error message with missing information for each field
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.21. Update the coupon



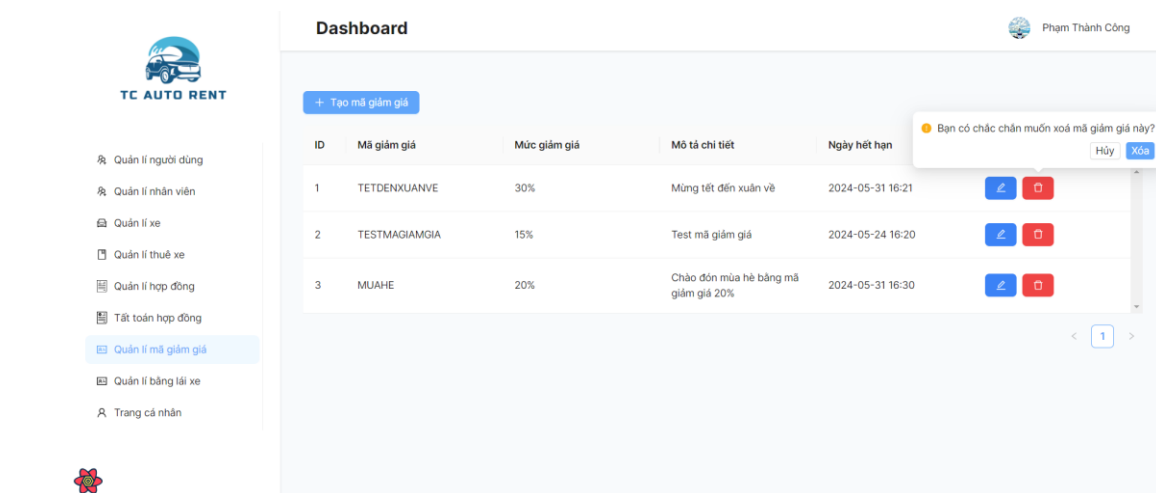
Picture 3.43: Update the coupon page

Table 3.41: Description of update the coupon page

Screen	Update the coupon		
Description	The admin or staff can update coupon information		
Screen Access	The admin or staff clicks on the edit icon in the “Quản lí mã giảm giá” tab		
Screen Content			
Item	Type	Data	Description
Tên mã giảm giá	Text		The name of the coupon

Mức giảm giá	Text		The discount on the coupon
Mô tả chi tiết	Text		The description of the coupon
Ngày hết hạn	Text		The expiration day of the coupon
Cập nhật	Button		Click the button to update coupon information
Close icon	Icon		Click the button to close the form
Screen Actions			
Action Name	Description	Success	Failure
Update coupon information	The admin or staff fills in all valid information that needs to be updated, then clicks on the “Cập nhật” button to update coupon information	Update coupon information successfully and the system shows the success message: + “Cập nhật mã giảm giá thành công”	<i>The admin or staff fills in the invalid information:</i> - Prevent submitting the form - The system displays an error message with missing information for each field
Close form	The admin clicks on the “X” icon to close the form	Close the form successfully	None

3.1.2.22. Delete the coupon



Picture 3.44: Delete the coupon page

Table 3.42: Description of delete the coupon page

Screen	Delete the coupon		
Description	The admin or staff can delete the coupon		
Screen Access	The admin or staff clicks on the trash icon in the “Quản lý mã giảm giá” tab		
Screen Content			
Item	Type	Data	Description
Xóa	Button		Click the button to delete the coupon
Hủy	Button		Click the button to close the confirm dialog
Screen Actions			
Action Name	Description	Success	Failure
Delete the coupon	The admin or staff clicks on the “Xóa” button to delete the coupon	Delete the coupon successfully, then the system shows a success message: “Xóa thành công”	Delete the coupon failed, then the system shows an error message: “Xóa thất bại”
Close the confirm dialog	The admin or staff clicks on the “Hủy” button to close the confirm dialog	Close the confirm dialog successfully	None

CONCLUSION

1. The achieved results

1.1 In terms of theory

- Mastered knowledge of system design and database management.
- Clearly understood the principles and methods of designing **A Car Rental System Integrating AI Chatbot**.
- Learned how to analyze system operations.
- Successfully applied theoretical principles to the design and implementation of the system.

1.2 In terms of application

- Successfully built a Car Rental System Integrating AI Chatbot with practical applications.
- Provided an intuitive and user-friendly interface.
- Met the management functions for users, employees, cars, bookings, ... for the admin and staff.
- Conveniently met the functions of searching, viewing car information, renting cars, online payment, ... for users.

2. Limitations

- In addition to the achieved results during the implementation of the project, the system still has some limitations:
 - o The project has not been deployed and tested on a large scale.
 - o The application has not been thoroughly tested for deficiencies.
 - o The Chatbot's dataset is not large enough to fully address all user queries.
 - o The website does not have a refund feature when a user cancels a booking.
 - o Due to limited time and practical experience, the problem analysis has been relatively comprehensive but has not fully described every aspect of the issue.

3. Future Development Directions

- Some research and development directions for the project could include:
 - o Scaling up the system and testing it in various environments.
 - o Integrating a refund feature to allow users to cancel bookings and receive refunds conveniently and automatically.

- Collecting and analyzing user queries to improve the efficiency and accuracy of the Chatbot.

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