

# Software Requirements Specification for Online Car Rental System

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For more information please visit on website: <https://www.tbilisirentcar.ge>

## **Date of submission**

June 10, 2015

June 10, 2015

Mr. Shah Mostafa Khaled

Assistant Professor

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Subject: **Submission of the term paper on online car rental system.**

Dear Sir

Please accept this term paper that you have assigned for the course Management Information System. The study will involve investigating and relating different functional, operational and technical requirement of a dedicated web application for online car rental system. Through this study, we will be able to obtain a deeper insight and perform real-world application of the various concepts that you have taught us in the class.

Lastly, I would be thankful once again if you please give your judicious advice on our effort.

Sincerely yours,

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## Executive Summary:

This report was commissioned on us to investigate and relate different functional, operational and technical requirement of a dedicated web application for online car rental system. This System will facilitate the functioning of web-based Rental Car store. Each type of car should have a different rental fee per day. Rental fee depends on number of day, brand and how fast the car runs. The system should have the following functionalities:

**Rent:** The system equipped to answer Customer's inquiries about the availability and rental fee of various "types" of cars for certain dates in the future. When the customer makes a decision about the "Type "of car and the Dates, the system should be able to "Reserve" or "Earmark "the requested type of car for requested dates. The customer should be given a "Confirmation Number".

**Pick Up:** The system process a Car Pick Up. Customer walks in and supplies either the confirmation number, or name. The system should pull up all the reservation information about this customer. The customer is then asked to supply a drivers 'license.

**Return:** The system process a return. The system should record the date, time and processed by. Depending on these parameters, the system calculate the final rental amount.

## Acknowledgements

By the Grace of ALMIGHTY ALLAH we have completed our term paper on the documentation of Software Requirements Specification for an online car rental system.

A special thanks to our course instructor Mr. Shah Mostafa Khaled Sir for his supervision throughout the working time. He helped us a lot by sharing his valuable knowledge with us.

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## 1 Introduction

Transport facility is a matter of headache for those people who do not have any personal transport in Dhaka city. On occasions like Wedding, Vacation, house shifting, and tour outside Dhaka and on many other situations they feel the necessity of a vehicle to sort out the problems. So if it is possible to design or develop a web based application for availing transport whenever and wherever possible, then it will be beneficial for both renter and transport provider. Now a days, by some clicks only, we can get whatever you want at home. We already know about the online shopping, e-banking etc. Similarly, The Car Rental System is the online facility to book cars online within few clicks only. Some people can not afford to have a car, for those people this system becomes very helpful. This system includes various cars, as per the customer order and comfort, it place the order and deliver the car as per the location within the area. For travelling a long distance, booking can be done via internet service only.

### 1.1 Document Purpose

The advancement in Information Technology and internet penetration has greatly enhanced various business processes and communication between companies (services provider) and their customers of which car rental industry is not left out. This E-Car Rental System is developed to provide the following services:

#### 1.1.1 Enhance Business Processes:

To be able to use internet technology to project the rental company to the global world instead of limiting their services to their local domain alone, thus increase their return on investment (ROI).

#### 1.1.2 Online Vehicle Reservation:

A tools through which customers can reserve available cars online prior to their expected pick-up date or time.

#### 1.1.3 Customer's registration:

A registration portal to hold customer's details, monitor their transaction and used same to offer better and improve services to them.

#### 1.1.4 Group bookings:

Allows the customer to book space for a group in the case of weddings or corporate meetings (Event management).

### 1.2 Problem Statement

A car rental is a vehicle that can be used temporarily for a fee during a specified period. Getting a rental car helps people get around despite the fact they do not have access to their own personal vehicle or don't own a vehicle at all. The individual who needs a car must contact a rental car company and contract out for a vehicle. This system increases customer retention and simplify vehicle and staff management.

### 1.3 Product Scope

This project traverses a lot of areas ranging from business concept to computing field, and required to perform several researches to be able to achieve the project objectives. The area covers include:

- Car rental industry: This includes study on how the car rental business is being done, process involved and opportunity that exist for improvement.
- PHP Technology used for the development of the application.
- General customers as well as the company's staff will be able to use the system effectively.
- Web-platform means that the system will be available for access 24/7 except when there is a temporary server issue which is expected to be minimal.

### 1.4 Aims & Objectives

Specific goals are –

- To produce a web-based system that allow customer to register and reserve car online and for the company to effectively manage their car rental business.
- To ease customer's task whenever they need to rent a car.

## 2 Overall Description

### 2.1 Product Perspective:

#### 2.1.1 Existing system function:

A car rental is a vehicle that can be used temporarily for a period of time with a fee. Renting a car assists people to get around even when they do not have access to their own personal vehicle or don't own a vehicle at all. The individual who want to rent a car must first contact the car rental company for the desire vehicle. This can be done online. At this point, this person has to supply some information such as; dates of rental, and type of car. After these details are worked out, the individual renting the car must present a valid Identification Card.

Most companies throughout the industry make a profit based on the type of cars that are rented. The rental cars are categorized into economy, compact, compact premium, premium and luxury. And customers are free to choose any car of their choice based on their purse and availability of such car at the time of reservation.

Car Rental System gives car rental service for both foreign and local customers. This organization carries out its daily work by providing; their service to the customers using manually system. The organization uses a manual system for reserving, renting, register and to keep record of all the rental activities and customer information. The detailed existing system functions are listed as follows -

- During car reservation the customers reserve a vehicle by making a phone call to the organization; otherwise he/she is expected to go to the organization to make reservation.
- During renting a car the customer personal information, payments status and rent agreements are filled in the car rent agreement form in order to hold legal contract between the customer and organization for renting the vehicle.
- The organization normal work time schedule is from 1:30am – 6:00pm; therefore the organization gives services for ten and half hours a day.
- The organization makes a general report about the rented cars once at the end of the month and generates a report.

### 2.1.2 Product functionality:

Car Rental System provides the features for booking a car online. It includes several functionalities describes as below:

#### 2.1.2.1 Car Rental Management:

It provides car reservation facility online. Customer can visit the website and check for various cars. If they are feasible with requirement, then booking can be done.

#### 2.1.2.2 Checking For Availability:

Employee can check for the availability of the car. He/she maintains the database of car. If no any car is available it is the responsibility of the employee to provide alternative options.

#### 2.1.2.3 Payment system:

Administrator/owner of the applications responsible for payment to the employee. Order cancellation, order finalize, these all activities are done by the administrator of the application.

#### 2.1.2.4 Maintenance Manager:

If any car requires maintain ace like repair or replacement of any parts, then maintenance manager maintain the data about that. Payment of maintenance are done by the administrator of the application.

## 2.2 Benefits of Online Car Rental Services

- This online car rental solution is fully functional and flexible.
- It is very easy to use.
- This online car rental system helps in back office administration by streamlining and standardizing the procedures.
- It saves a lot of time, money and labor.
- Eco-friendly: The monitoring of the vehicle activity and the overall business becomes easy and includes the least of paper work.
- The application acts as an office that is open 24/7.
- It increases the efficiency of the management at offering quality services to the customers.
- It provides custom features development and support with the application.

## 2.3 Users and Characteristics:

### 2.3.1 Admin:

- Admin can login to the system.
- Verify the car information database.
- Generate price strategy.
- Handle the payment system.
- Finalize the order.
- Cancel the order.

### 2.3.2 Employee:

- It updates the database.
- Give information to the customer about the car.
- Provides the alternatives.
- Maintain contacts.

### 2.3.3 Maintenance Manager:

- It checks for the maintenance.
- Give to the maintenance.
- Give information to the admin.
- Update the database.

### 2.3.4 Customer:

- Customer can login to the system.
- Visit the website.
- Place the order.
- Cancel the order.

## 2.4 Operating Environment:

### 2.4.1 Server Side:

**Processor:** Intel® Xeon® processor 3500 series

**HDD:** Minimum 500GB Disk Space

**RAM:** Minimum 16GB

**OS:** Windows 8.1, Linux

**Database:** SQL Server 2014 (SQL14)

**Application:** XAAMP, phpmyadmin

#### 2.4.2 Client Side (minimum requirement):

**Processor:** Intel Dual Core

**HDD:** Minimum 80GB Disk Space

**RAM:** Minimum 1GB

**OS:** Windows 7, Linux

### 2.5 Design and Implementation Constraints

- The application will use php, Ajax, javascript, jQuery and css as main web technologies.
- HTTP and FTP protocols are used as communication protocols. FTP is used to upload the web application in live domain and the client can access it via HTTP protocol.
- Several types of validations make this web application a secured one and SQL Injections can also be prevented.
- Since Car Rental system is a web-based application, internet connection must be established.
- The Car Rental System will be used on PCs and will function via internet or intranet in any web browser.

### 2.6 User Documentation:

There will be no user manuals, online helps or tutorials as it is made as simple as web beginners can also use it easily with best web GUI functionality.

### 2.7 Assumptions and Dependencies:

#### 2.7.1 Regularity Policies:

Each center user has account created and authenticated by admin. This Website can be accessible within company's intranet and other user can see the all details about the franchisee. Each user has to first login itself to present him/her after entry in franchisee. This will be done automatically.no user can share their username and password to each other.

### 2.7.2 Hardware Limitations:

There is no limitation in the operating system in which Car Rental System will work. However, the Car Rental System and the database will work on a server that needs to be always online. Users can access the system with any internet browser.

## 3 Inception

### 3.1 Introductions

Inception is the beginning phase of requirements engineering. It defines how does a software project get started and what is the scope and nature of the problem to be solved. The goal of the inception phase is to identify concurrence needs and conflict requirements among the stakeholders of a software project. To establish the groundwork we have worked with the following factors related to the inception phases:

- Identifying Stakeholders
- Recognizing multiple viewpoints
- Working towards collaboration
- Asking the First Questions

### 3.2 Identifying Stakeholders

Stakeholder refers to any person or group who will be affected by the system (web site) directly or indirectly. Stakeholders include end-users who interact with the system and everyone else that may be affected by its installation. To identify the stakeholders we consulted with expected user, existing employees and owners.

- What functionalities are you expecting to see in E-CAR RENTAL website?
- What kind of information to be available to the outsiders?
- What do you think about the security issues of the website?
- What problems do you face now, that you want to automate?
- If you demand for any personal profile what information do you want there?
- How do you want to communicate with other users?
- How do you want to access your result and its visibility to others?
- [External] What information you want to know?
- [Admin] Describe the internal system of E-CAR RENTAL.

Concluding thoughts on Stakeholders, We identified following stakeholders for our Web site:

- User (internal/external)
- Requirements engineer
- Developer
- Designer



- E-CAR RENTAL staffs

### 3.3 Recognizing multiple view points

We collect these view points by discussing with the project super visor, all kind of user, teachers, students from E-CAR RENTAL, University of Dhaka.

User (both internal and external)

- User friendly system
- Secure
- Availability of information
- Meaningful interaction

Web site designer

- Design whole system with efficient manner.
- Provide high definition with minimum graphics resolution.

Web site developer

- Develop system within minimal cost (cost of time)
- Best effort, easy development tools ☞ Make Fastest & Secure website

E-CAR RENTAL staffs

- User friendly system
- Availability of information
- Highest security in login and payment information

### 3.4 Working towards collaboration

Every stakeholder has their own requirement. In this step, we merged these requirements.

We followed following steps to complete the task:

- Identify the common and conflicting requirements.
- Categorize the requirements.
- Take priority points for each requirement from stakeholders and on the basis of these voting prioritize the requirements.
- Make final decision about the requirements.

### 3.5 Common requirements

- User friendly and efficient system.
- Easy to operate.
- Secure system
- Accounts maintenance
- Light weighted website
- Search engine
- Individual result showing

### 3.6 Conflicting Requirements

- Private IP access

We finalized following requirements for the system by categorizing and prioritizing the requirements.

### 3.7 Final Requirements

- User friendly and efficient system
- Easy to operate
- Restrict (limited) access to outsider / user who hasn't signup

### 3.8 Asking the First Questions

We set our first set of context-free questions focuses on the stakeholders, overall project goals and benefits. The questions are mentioned above. These questions helped us to identify all stakeholders, measurable benefit of the successful implementation and possible alternatives to custom software development. Next set of question helped us to gain a better understanding of problem and allowed the stakeholders to voice his or her perception about the solution. The final set of question focused on the effectiveness of the communication activity itself.

### 3.9 Group meeting:

1.

Date: 1 February, 2015

Place: E-CAR RENTAL office,

Subject: Identifying Stakeholders

Members: All members

## **2.**

Date: 15 February, 2015

Place: E-CAR RENTAL office,

Subject: Collecting requirements from the stakeholders

Members: All members

## **3.**

Date: 28 February, 2015

Place: E-CAR RENTAL office,

Subject: Discussion on requirements

Members: All members

### **3.10 Conclusion**

Inception phase helped us to establish basic understanding about our web site, identify the people who will be benefited if our web site becomes successful, define the nature of our web site and establish a preliminary communication with our stakeholders.

## 4 Specific Requirement

### 4.1 External Interface Requirements

#### 4.1.1 User Interfaces:

- All the users will see the same page when they enter in this website. This page asks the users a username and a password.
- After being authenticated by correct username and password, user will be redirect to their corresponding profile where they can do various activities.
- The user interface will be simple and consistence, using terminology commonly understood by intended users of the system. The system will have simple interface, consistence with standard interface, to eliminate need for user training of infrequent users.

#### 4.1.2 Hardware Interfaces:

- No extra hardware interfaces are needed.
- The system will use the standard hardware and data communication resources.
- This includes, but not limited to, general network connection at the server/hosting site, network server and network management tools.

#### 4.1.3 Application Interfaces:

**OS:** Windows 7, Linux

**Web Browser:** The system is a web based application; clients need a modern web browser such as Mozilla Firebox, Internet Explorer, Opera, and Chrome. The computer must have an Internet connection in order to be able to access the system.

#### 4.1.4 Communications Interfaces:

- This system use communication resources which includes but not limited to, HTTP protocol for communication with the web browser and web server and TCP/IP network protocol with HTTP protocol.
- This application will communicate with the database that holds all the booking information. Users can contact with server side through HTTP protocol by means of a function that is called HTTP Service. This function allows the application to use the data retrieved by server to fulfill the request fired by the user.

## 4.2 Functional Requirements:

These are statements of services the system should provide, how the system should react to particular inputs, and how the system should behave in particular situations. It specifies the application functionality that the developers must build into the product to enable users to accomplish their tasks.

### 4.2.1 Reservation:

- The system must allow the customer to register for reservation.
- The system shall allow the customer to view detail description of particular car.
- The system must notify on selection of unavailable cars while reservation.
- The system shall present an option for advanced search to limit the car search to specific categories of car search.
- The system must allow the customers to select specific car using different search category while reservation.
- The system must view list of available car during reservation.
- The system shall allow the customers to cancel reservation using reservation confirmation number.
- The system shall allow the employee to update reservation information.
- The system shall allow the employee to view reservations made by customers.
- The system shall presents information on protection products and their daily costs, and requests the customer to accept or decline regulation terms during reservation.
- The system must be able to provide a unique reservation conformation number for all successfully committed reservations.
- The system must be able to display reservation summary for successfully committed reservation.

### 4.2.2 Log in:

- The system should allow manager to login to the system using their username and password.
- The system should allow employee to login to the system using their username and password.
- The system shall allow the manager to create new user account.
- The system shall allow manager to change account password.

- The system shall allow staff to change account password.
- The system shall allow staff to logout.
- The system shall allow manager to logout.

#### 4.2.3 Car:

- The system should allow staff to register new cars.
- The system shall allow staff to select cars in the list.
- The system shall allow customer to select cars in the list.
- The system shall allow staff to Search cars by specific record.
- The system shall allow customer staff to Search cars by specific record.
- The system shall allow staff to update information of the car in need of modification.
- The system shall allow staff to display all lists of car.
- The system shall allow staff to display all available car.
- The system shall allow customer to display all available car.
- The system shall allow staff to display all rented car.
- The system shall allow staff to display all off duty car.

#### 4.2.4 Rent:

- The system shall allow staff to register customers into rental list.
- The system shall allow staff to update about customer rent record details in the rental list.
- The system shall be able to save all changes made on the customer rent list.
- The system shall allow staff to select customer rent record by specific search category.
- The system shall allow staff to search rent record of customers using specific categories.
- The system shall allow staff to display customers, who rent cars.
- The system shall allow staff to display all customers rent record.
- The system must provide printable summary for successful committed rent.

## 5 Other Non-functional Requirements

Non-functional requirements, as the name suggests, are requirements that are not directly concerned with the specific services delivered by the system to its users. They may relate to emergent system properties such as reliability, response time, and store occupancy. Alternatively, they may define constraints on the system implementation such as the capabilities of I/O devices or the data representations used in interfaces with other systems. Non-functional requirements, such as performance, security, or availability, usually specify or constrain characteristics of the system as a whole.

### 5.1 Usability:

The system provides a help and support menu in all interfaces for the user to interact with the system. The user can use the system by reading help and support.

### 5.2 Security:

The system provides username and password to prevent the system from unauthorized access. The staffs' password must be greater than eight characters. The subsystem should provide a high level of security and integrity of the data held by the system, only authorized personnel of the company can gain access to the company's secured page on the system; and only users with valid password and username can login to view user's page.

### 5.3 Performance:

The system response time for every instruction conducted by the user must not exceed more than a minimum of 10 seconds. The system should have high performance rate when executing user's input and should be able to provide response within a short time span usually 50 second for highly complicated task and 20 to 25 seconds for less complicated task.

### 5.4 Availability:

The system should always be available for access at 24 hours, 7 days a week. Also in the occurrence of any major system malfunctioning, the system should be available in 1 to 2 working days, so that business process is not severely affected.

### 5.5 Error handling:

Error should be considerably minimized and an appropriate error message that guides the user to recover from an error should be provided. Validation of user's input is highly essential. Also the standard time taken to recover from an error should be 15 to 20 seconds.

### 5.6 Ease of use:

Considering the level of knowledge possessed by the users of this system, a simple but quality user interface should be developed to make it easy to understand and required less training.



## 6 Activity Diagram for placing the order

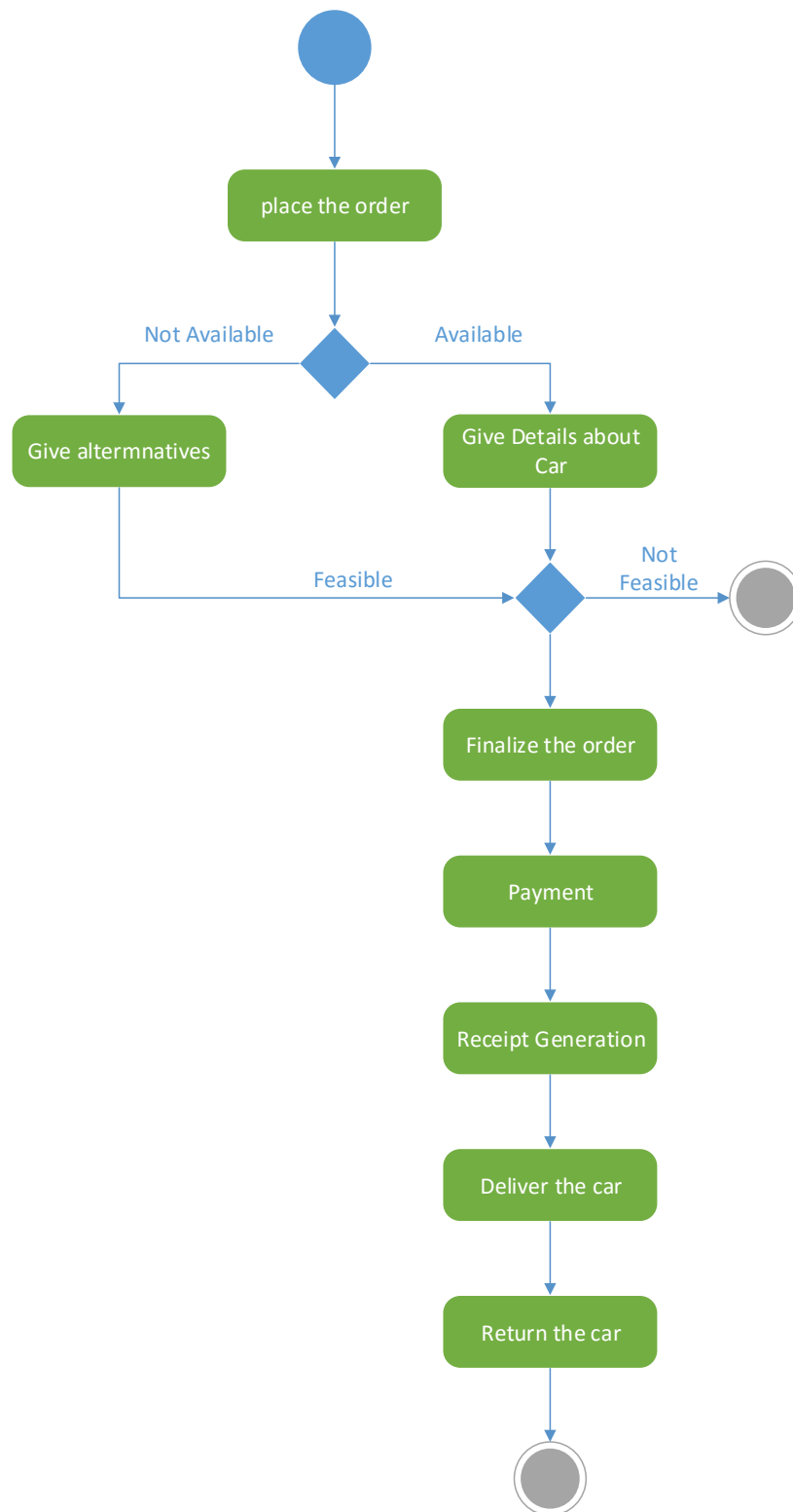


Figure 6-1: Activity Diagram of the system

## 6.1 Member Registration

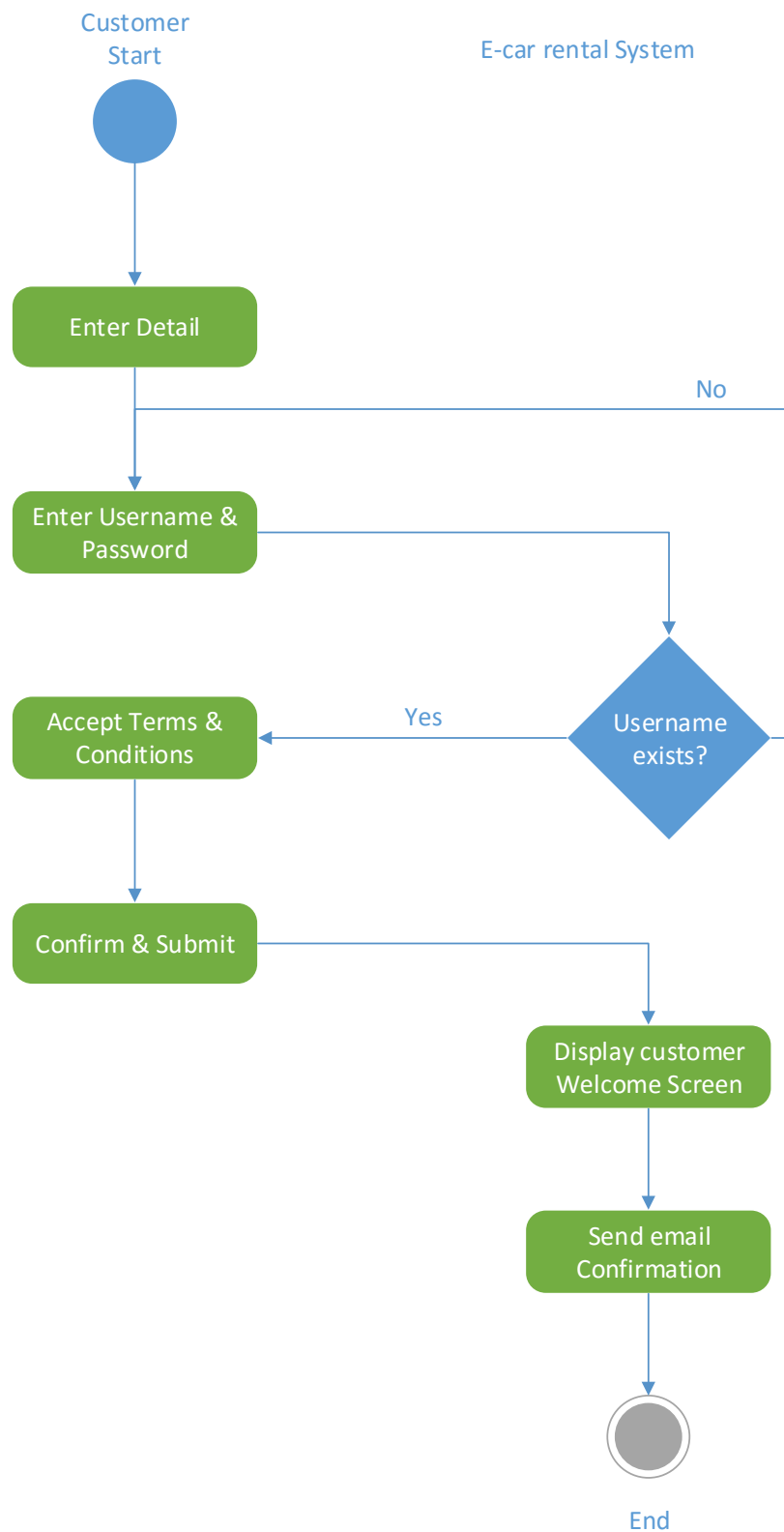


Figure 6-2: Member Registration

## 6.2 Profile Modification

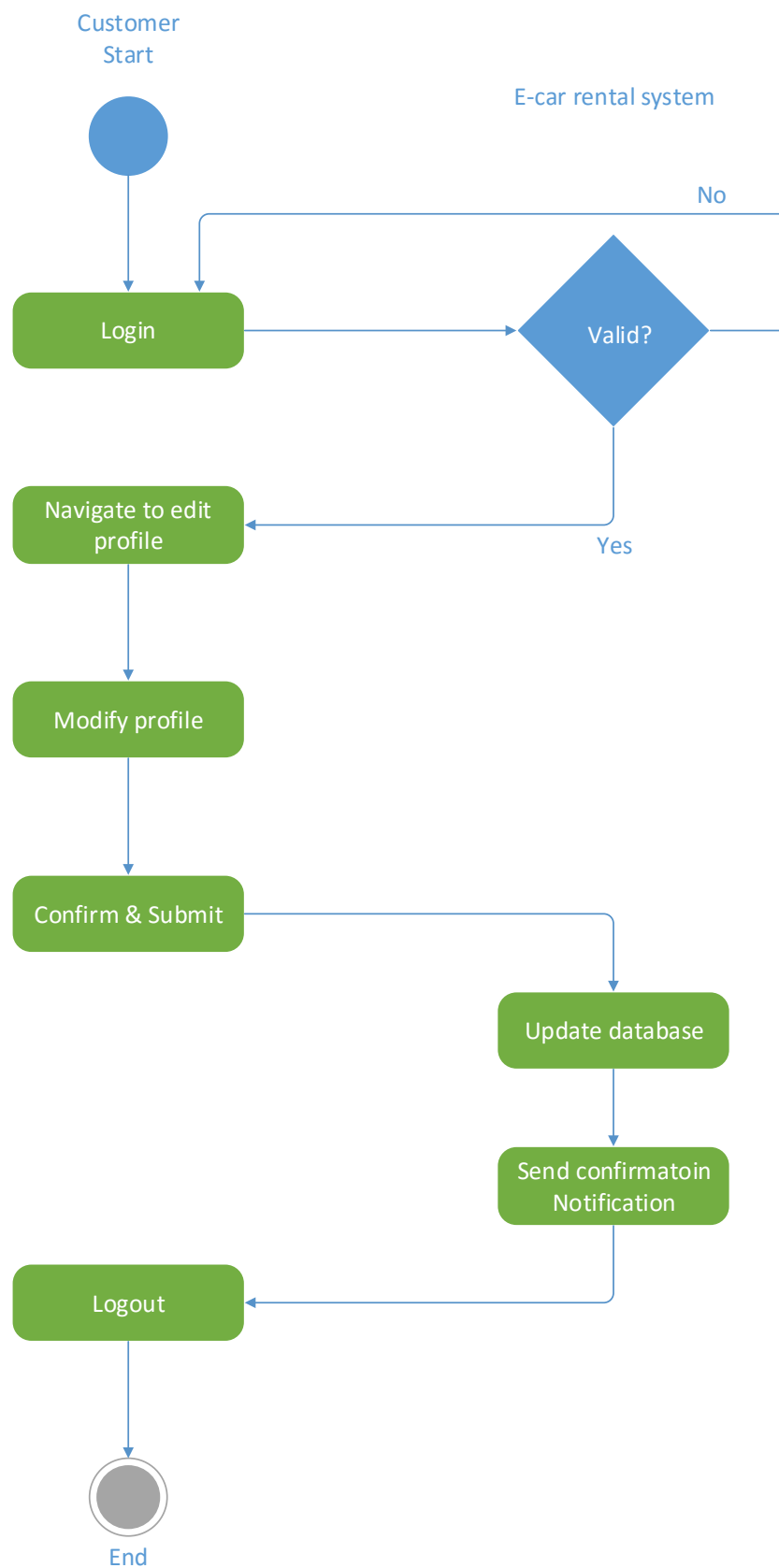


Figure 6-3: Profile Modification

### 6.3 Reservation of Car

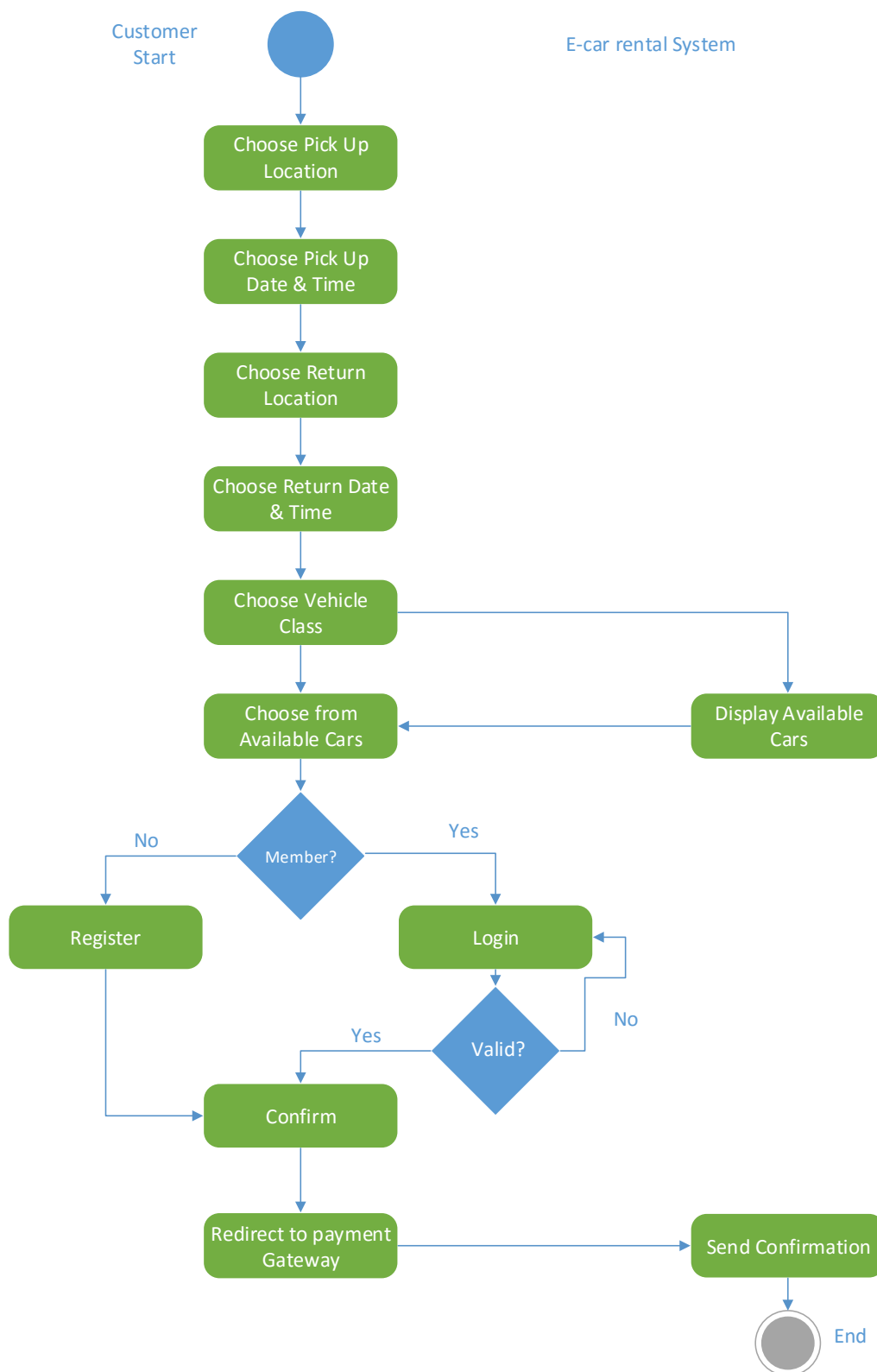


Figure 6-4: Reservation of Car

## 6.4 Customer Feedback

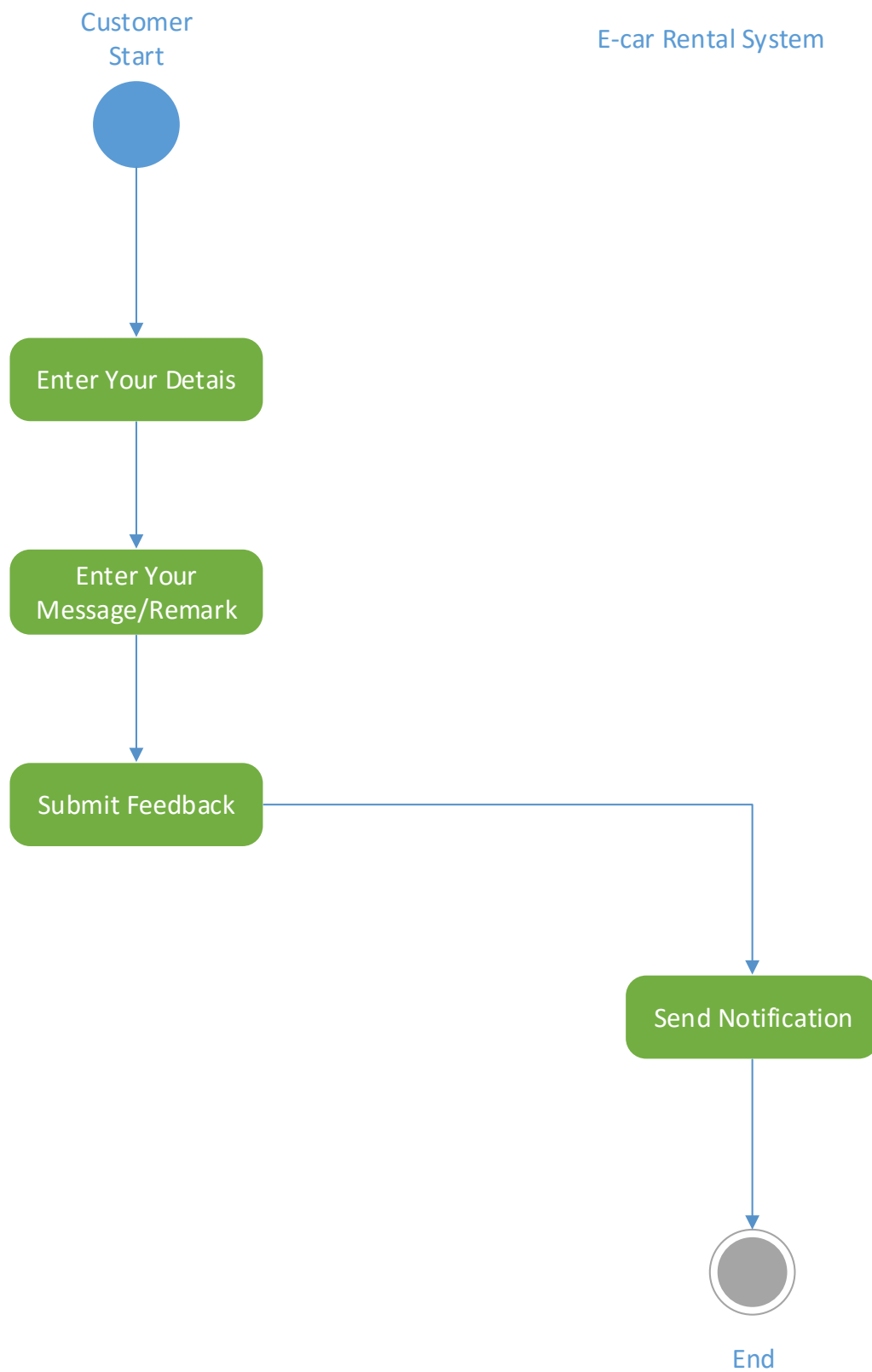


Figure 6-5: Customer Feedback

## 6.5 Payment of Car Rent

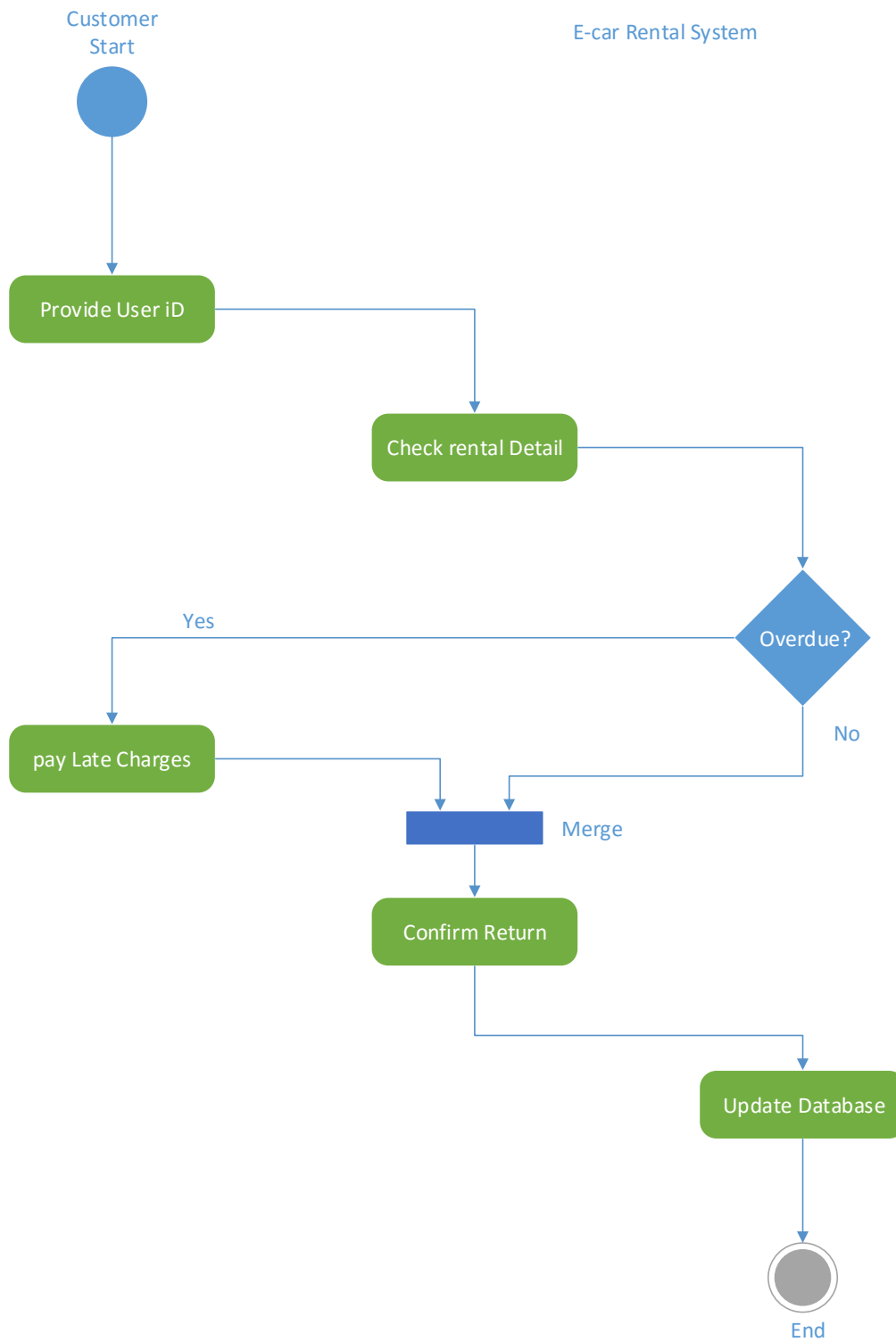


Figure 6-6: Payment of Car Rent

## 6.6 Adding a New Car

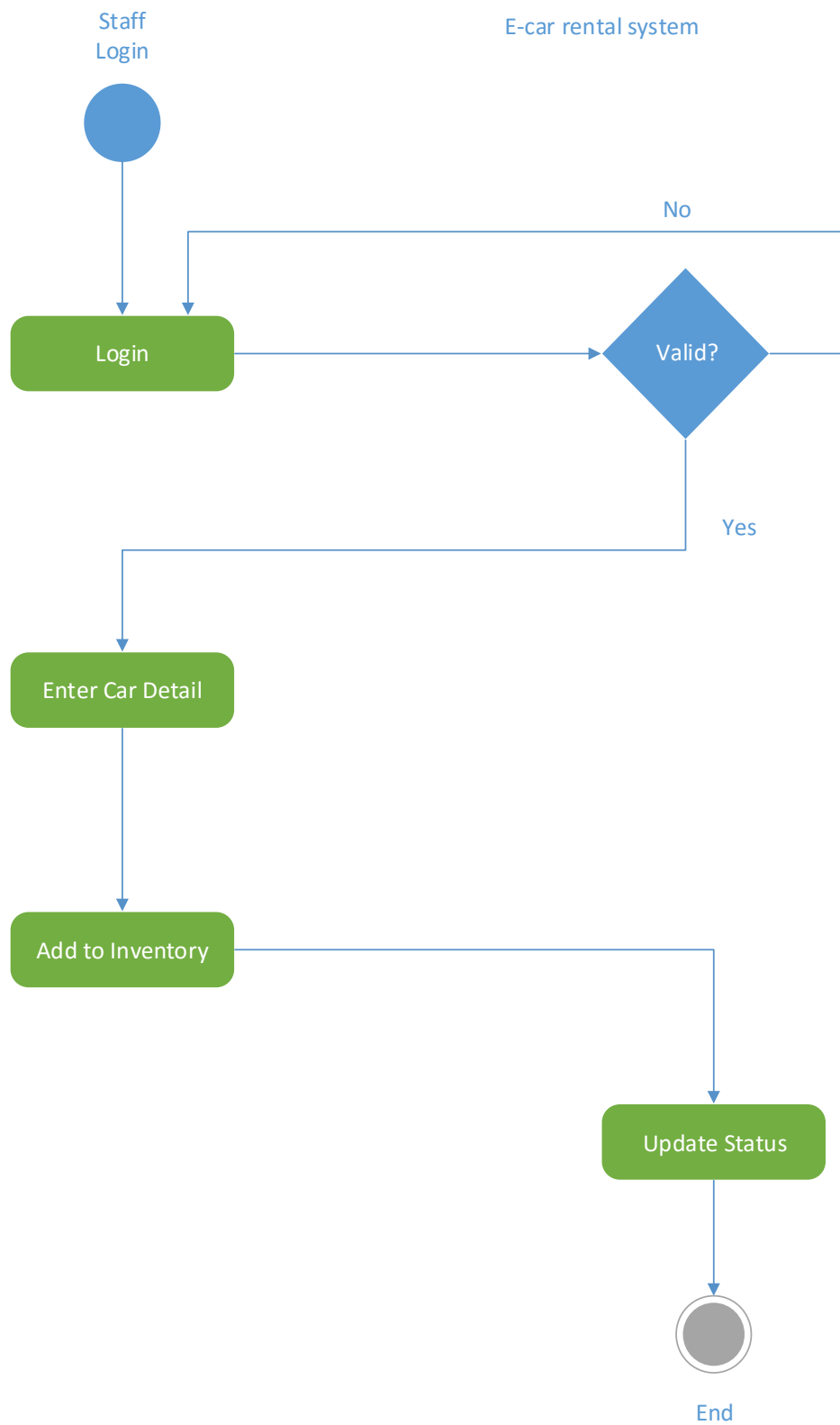


Figure 6-7: Adding a New Car

## 6.7 View Report

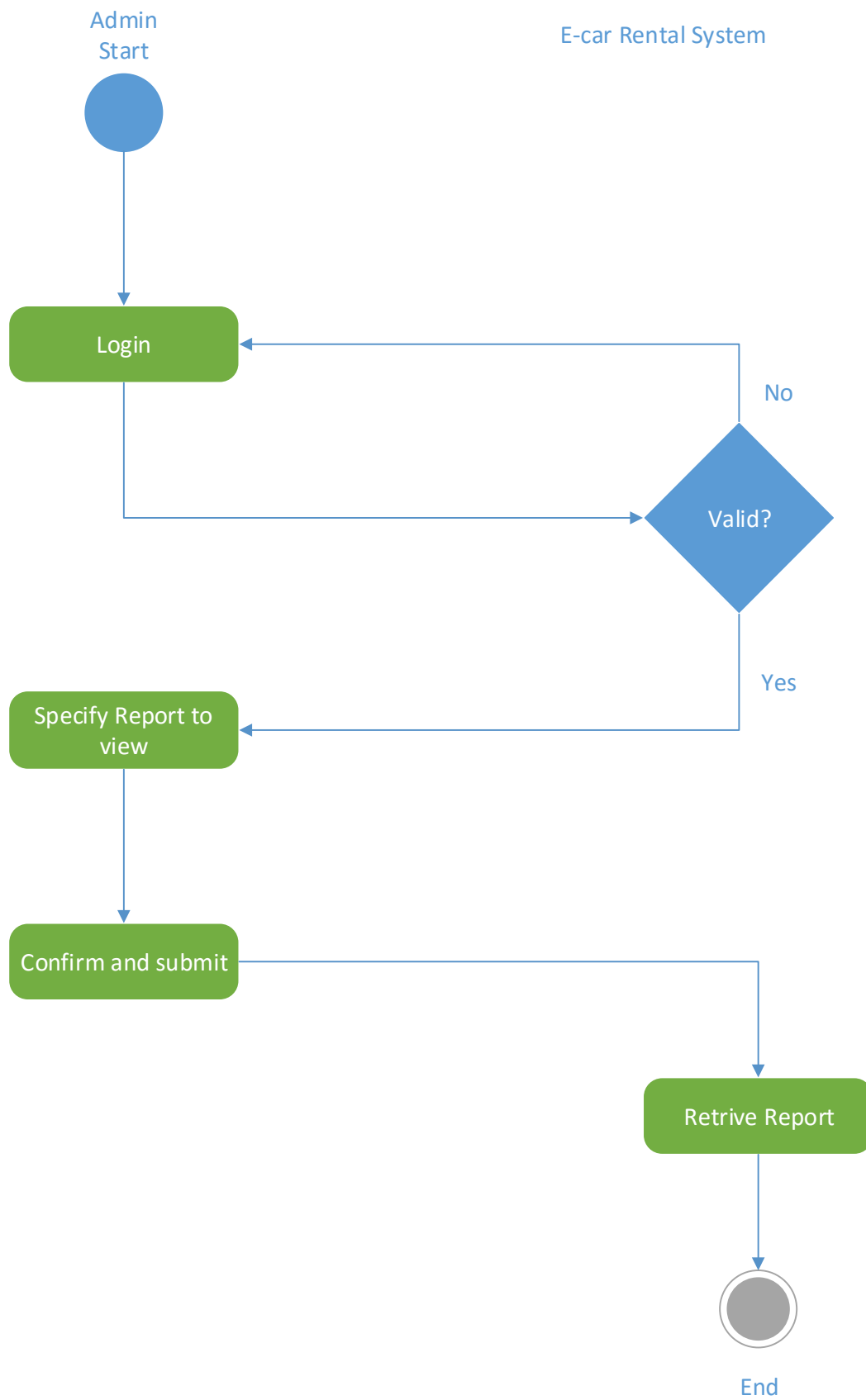


Figure 6-8: View Report



## 7 Actors and Use Case description

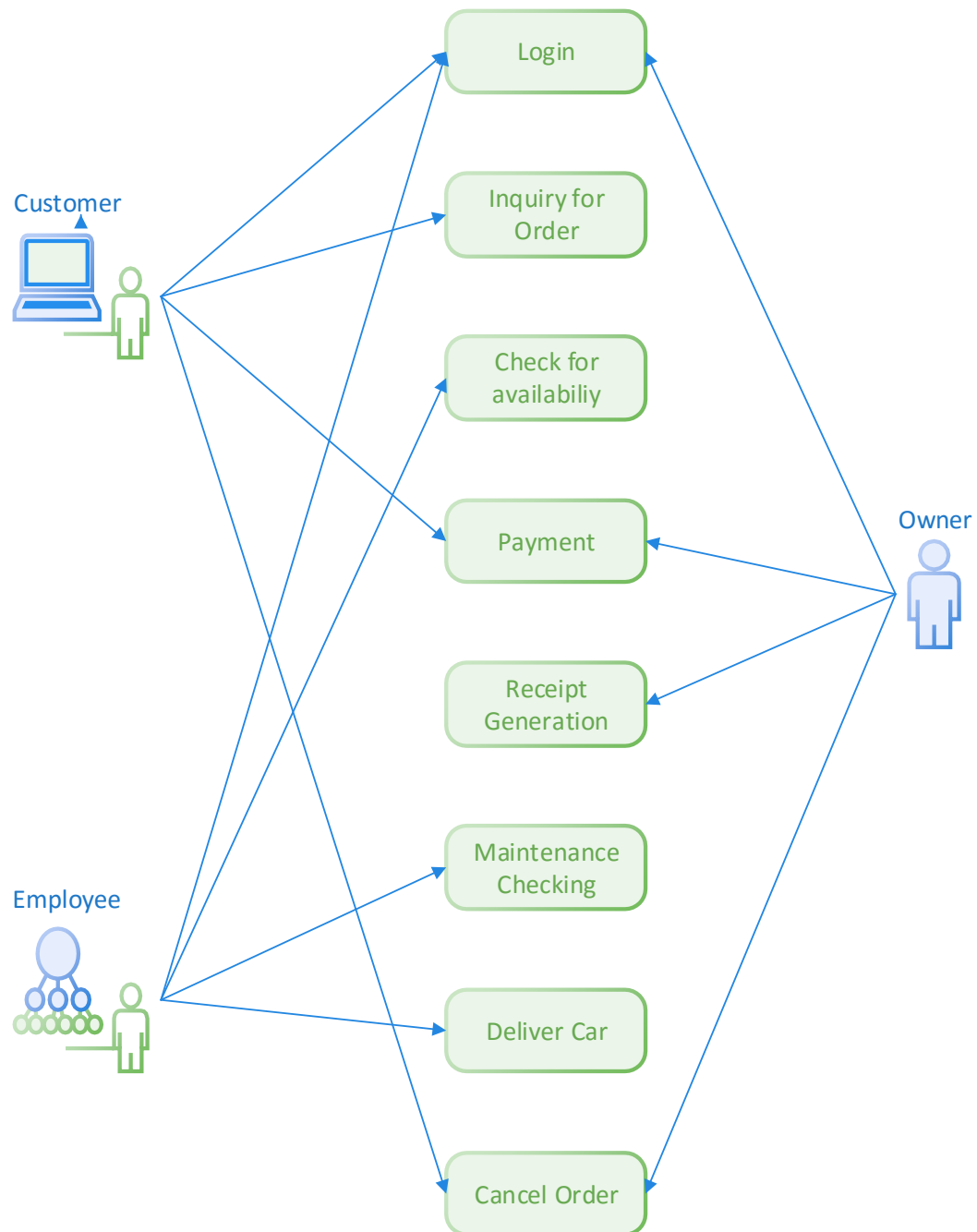


Figure 7-1: Use-case Diagram

Actor and use case description shows the detail description of interaction between the actors and their use cases. The description enables to have a proper understanding of how actor interacts with the system through their use cases.

## 7.1 Customer

### 7.1.1 Register as member

This use case describes the activities of the customer to register online and become a member. Customer's details are required as part of the registration. Login detail is automatically sent to the customer after successful registration.

### 7.1.2 Make reservation

This use case enable customer to search and make reservation. Non-register customer will be directed to register before their reservation can be confirmed. Notification is automatically send to the customer after the task is completed.

### 7.1.3 Return car

This use case describes the event of customer returning the car borrowed, the use case extends "process rental" use case from the staff actor.

### 7.1.4 Give feedback

This use case is used by the customer to provide feedbacks/comment to the company; a confirmation notification will be send to the customer once a feedback has been submitted.

## 7.2 Staff

### 7.2.1 Add new car

This use case is used by the staff to add new car to the company's fleet database. Staff will need to login to activate this use case.

### 7.2.2 Update car details

This use case is used by the staff to edit and modify car details whenever there is new renewal (insurance, road tax). It allows the company to keep up-to-date record of their fleet.

### 7.2.3 Reply to customer's feedback

This use case describes the event by which staff sends reply to customer's earlier feedback. It depends on 'give feedback' use case from the customer.

### 7.2.4 Process rental

This use case described the event by which staff updates the system when customer pick up or when returning car.

## 7.3 Admin

### 7.3.1 Add new staff

This use case describes the event by which Admin add new staff detail to the company's staff database. It is invoke whenever a new staff join the company.

### 7.3.2 View report

This use case is used by the Admin to view transaction report.

## 8 Swim Lane Diagram

The swim lane flowchart differs from other flowcharts in that processes and decisions are grouped visually by placing them in lanes. Parallel lines divide the chart into lanes, with one lane for each person, group or sub process. Lanes are labelled to show how the chart is organized.

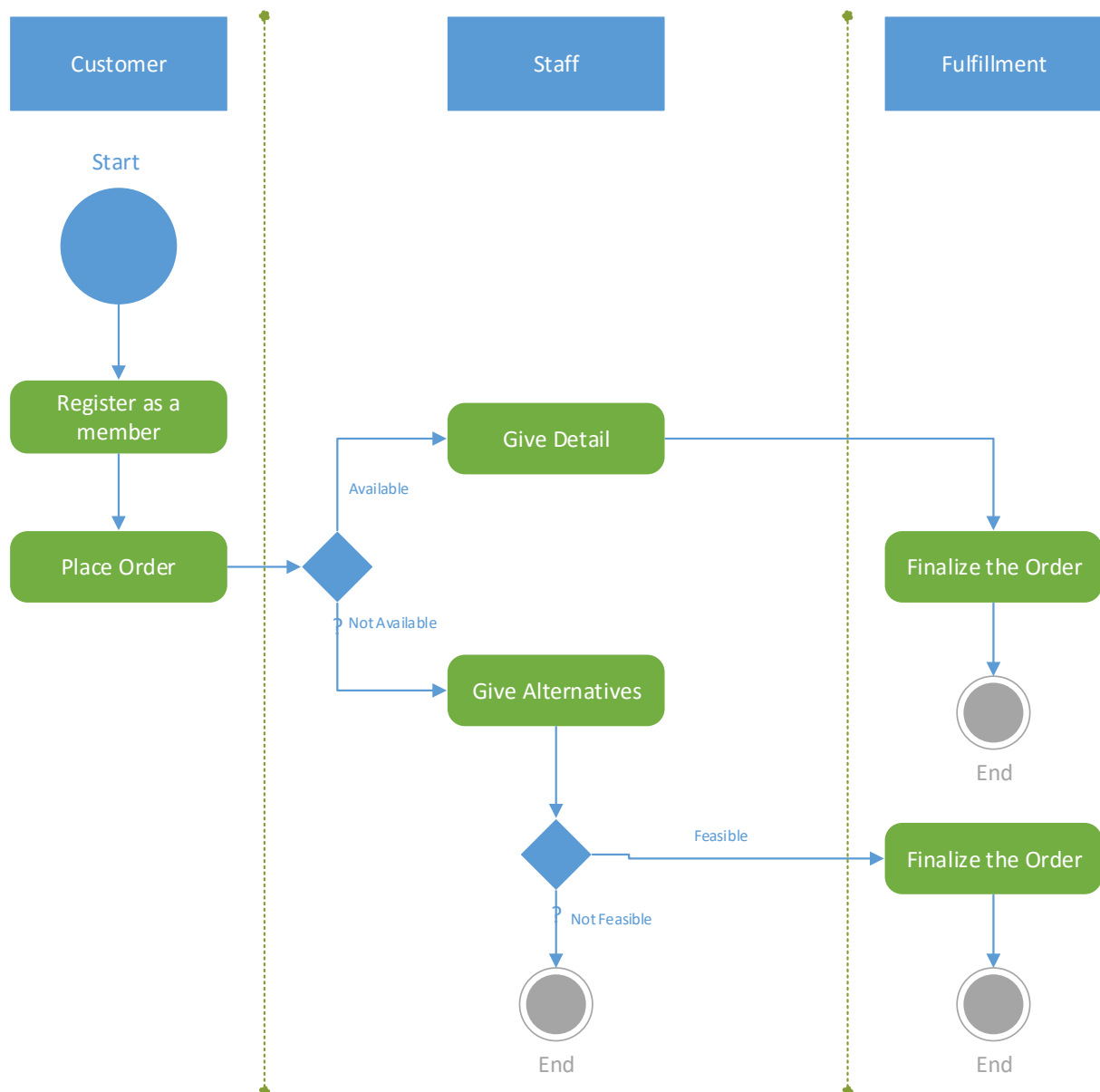


Figure 8-1: Swim Lane Diagram

## 9 Sequence Diagram:

Sequence diagrams are used to demonstrate the behavior of objects in a use case by describing the objects and the messages they pass. It provides a graphical representation of object interactions over time. Sequence diagrams show an actor, the objects and components they interact with in the execution of a use case. One sequence diagram represents a single Use Case 'scenario' or events. Sequence diagrams show the flow of messages from one object to another, and as such correspond to the methods and events supported by an object.

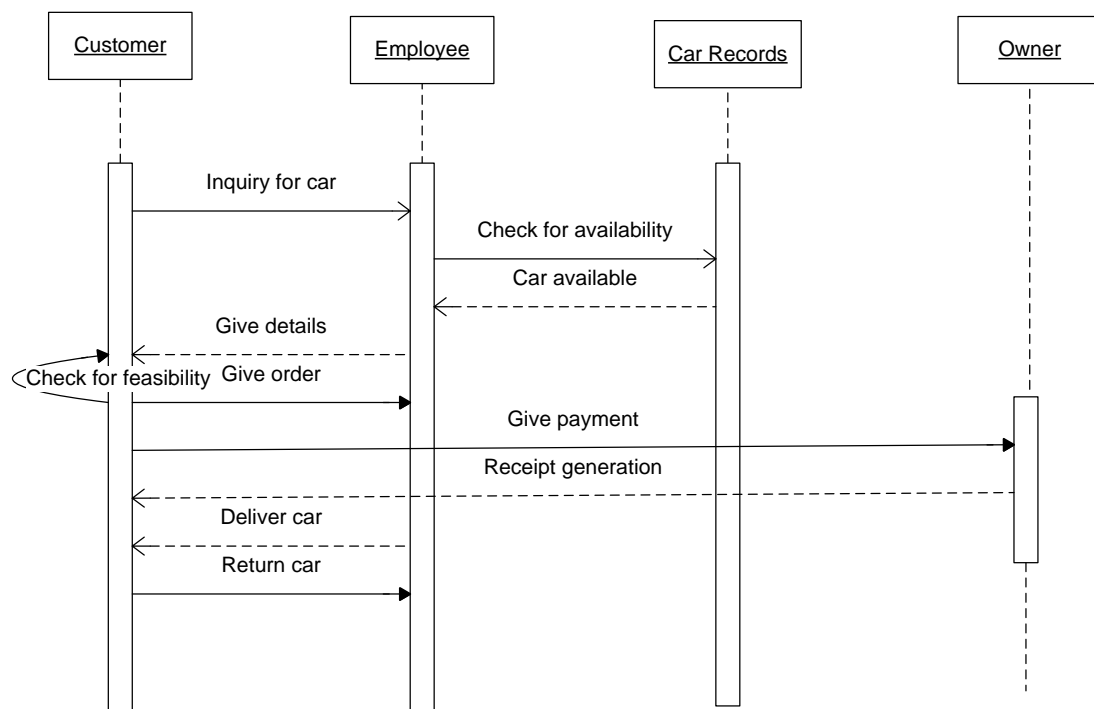


Figure 9-1: Sequence Diagram

## 10 Entity–relationship model

The entity relationship diagram describes the relationship between entities, cardinality and their attributes. Entity–relationship model (ER model) is a data model for describing the data or information aspects of a business domain or its process requirements, in an abstract way that lends itself to ultimately being implemented in a database such as a relational database. The main components of ER models are entities (things) and the relationships that can exist among them. In here we provide a description of entities with all their attributes. Describing entity name, business definition for the entities and there attribute and domain.

### 10.1 Entity Description:

*Table 10-1: Entity Description*

Entity Name	Business definition
Employee	This entity is responsible to store Employee information in the database.
Customer	Attribute stores customers' details information in the database, in order to identify the customer.
Car	This entity is stores the information of the vehicle in the database.
Reservation	This stores information about the reservations made by a customer.
Rent	This stores rental information of the vehicle, payments
Maintenance	This checks for repairing and replacing.
Payment	This produce payment and rent the car.

## 10.2 E-R Diagram

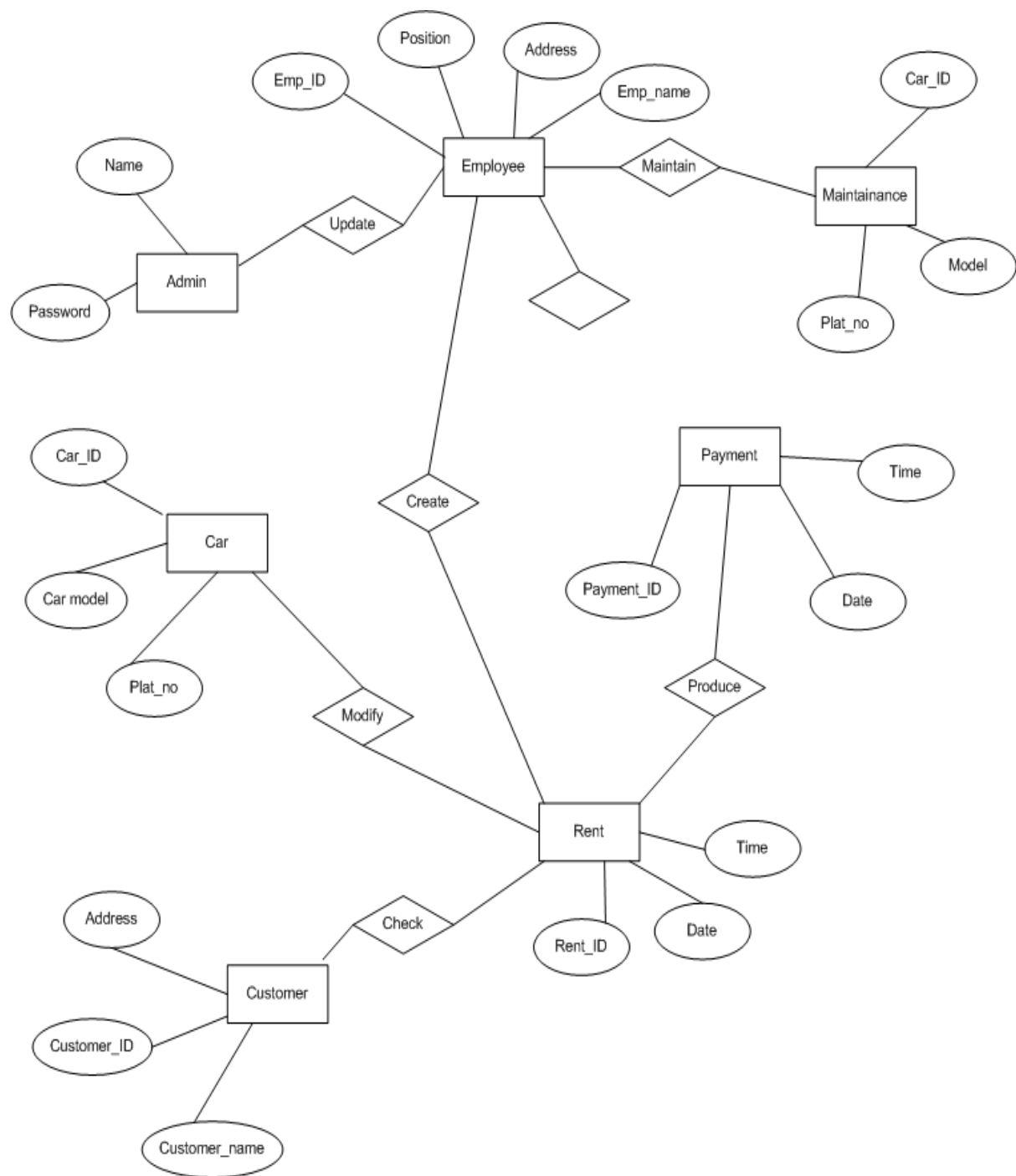


Figure 10-1: E-R Diagram

## 11 Data flow diagram

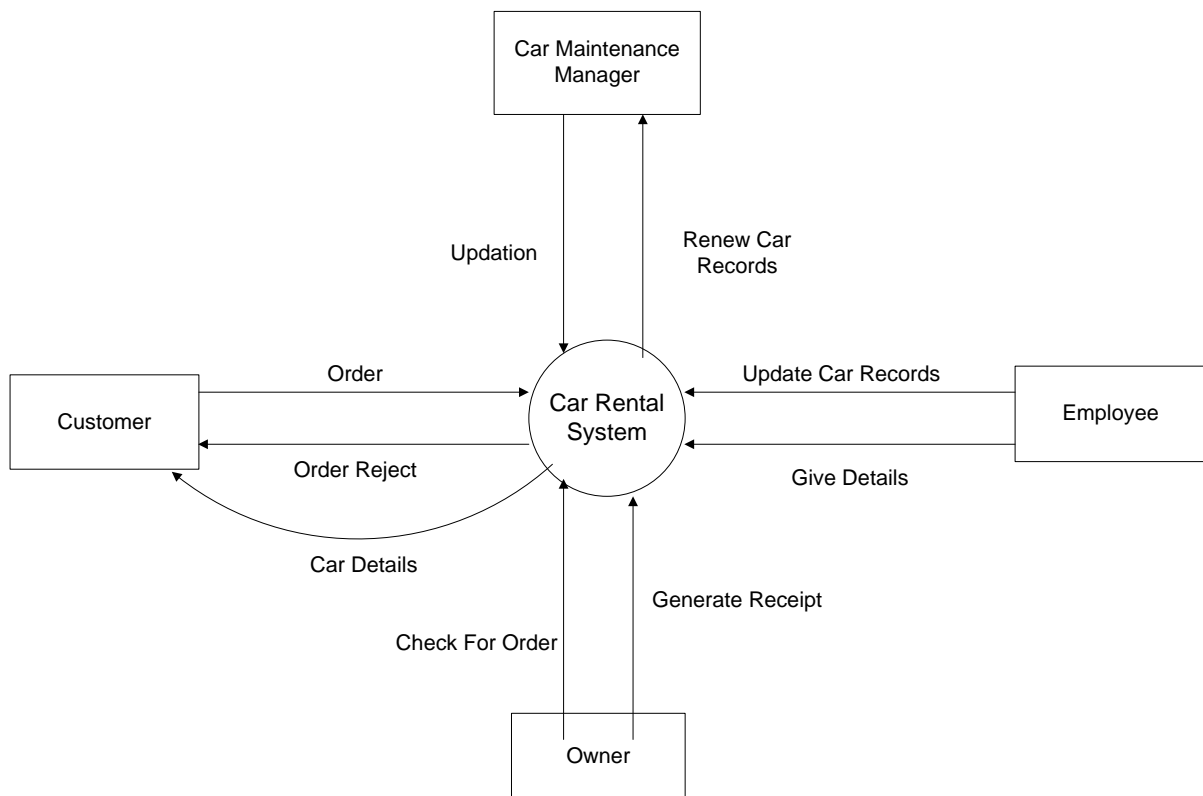


Figure 11-1: Data flow diagram

- The Customer (a source of information) sends in an order.
- The system then sends out an invoice data flow.
- Employees update car records and give details to the car rental system.
- Car maintenance manager gets information about cars from the system, update the renewed records.
- The owner check for order and generates report.
- This is a top-level view of the information flow in and out of the system.



## 12 Conclusion

Car rental business has emerged with a new goodies compared to the past experience where every activity concerning car rental business is limited to a physical location only. Even though the physical location has not been totally eradicated; the nature of functions and how these functions are achieved has been reshaped by the power of internet. Nowadays, customers can reserve cars online, rent car online, and have the car brought to their door step once the customer is a registered member or go to the office to pick the car. The web based car rental system has offered an advantage to both customers as well as Car Rental Company to efficiently and effectively manage the business and satisfies customers' need at the click of a button.

## 13 Bibliography

1. System, Online. 'Online Car Rental System'. Academia.edu. N.p., 2015. Web. 9 June 2015.
2. Scribd.com, Online. '49930505 Car Rental System Project Report'. N.p., 2015. Web. 9 June 2015.
3. Scribd.com, Online. 'Car Rental System Documentation'. N.p., 2015. Web. 9 June 2015.
4. Freelancer, Online. 'Project Documentation Car Rental Company Software Development Freelancers and Jobs - Freelancer'. N.p., 2015. Web. 9 June 2015.
5. Slideshare.net, Online. 'Zook Car Rental System Project'. N.p., 2015. Web. 9 June 2015.
6. Kaewman, Sasitorn. 'Online Decision Support System of Used Car Selection using K-Nearest Neighbor Technique'. IJFCC (2012): 164-166. Web.
7. Wikipedia, Online. 'Use Case Diagram'. N.p., 2015. Web. 9 June 2015.
8. Wikipedia, Online. 'Activity Diagram'. N.p., 2015. Web. 9 June 2015.
9. Tutorialspoint.com, Online. 'UML - Activity Diagrams'. N.p., 2015. Web. 9 June 2015.
10. Wikipedia, online. 'Swim Lane'. N.p., 2015. Web. 9 June 2015.
11. Mindtools.com, Online. 'Swim Lane/Rummler-Brache Diagrams: Mapping and Improving Processes in Your Organization'. N.p., 2015. Web. 9 June 2015.
12. Laudon, Kenneth C, and Jane Price Laudon. Management Information Systems. Upper Saddle River, NJ: Prentice Hall, 2000. Print.
13. Menkus, Belden. 'Car Rental Chain Former Owners Charged With Computer Frauds'. Computer Fraud & Security Bulletin 1993.3 (1993): 3-4. Web.
14. Li, Zhang. 'Design And Realization Of Car Rental Management System Based On AJAX+SSH'. Information Technology J. 12.14 (2013): 2756-2761. Web.