



# CS353 Project

CaRent

## Project Proposal

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# Introduction

As used car prices are getting higher everywhere in the world car rental systems are getting more and more popular. People need cars for business, travel and personal reasons; however, for some people, buying a car is not the ideal option. When these people need a car they use rental systems. These systems were being used before the age of the internet or computers but they were not as common. It is the accessibility that makes such systems popular. Nowadays, life is faster than it was in the past so, when a person needs a car they need to immediately get it. Car renting companies started to provide cars faster with the help of the Internet. The users can go online to the company's website and select a vehicle and a date to rent the vehicle. This action will also be recorded in the company's database automatically. Therefore, when there is a need to check the previous operations, they can just access them on the database.

## Description

In this project we are going to develop the database of a car rental system. The name of the project is "Carent". In "Carent" customers can rent trucks, and motorcycles as well as cars.

Registered users will be able to rent a vehicle after they have selected the type and model of the vehicle and the rental period. After the selection they will proceed to check out and pay for the service if they are capable of driving the selected vehicle according to their driver's license information. The customer can also put up an order for a vehicle that is not in their city. The vehicle would then be transported to the city of the customer's choice by an employee. After picking the rental period and receiving the car the customer still has the option to extend this rental period with extra payment. The rental system market is tough, so companies need to include a section for customer feedback and they try to improve themselves off of those feedbacks.

Unfortunately, driving a car is not always safe and even if it is rented an accident could still mean trouble. In the event of an accident a car expert who works in the company would check the car and determine the damage done on the vehicle. The customer would have to pay for this damage as well when they are returning the vehicle.

If there are ever too many customers for the company and not enough cars to satisfy them the branch managers are allowed to purchase new cars. If there are a sufficient number of cars but not enough employees to deliver them or even do paperwork, managers also have the authority to hire new employees. The new employees are selected between the people that apply for the job through the company website.

## Requirements

In this section, functional and non-functional requirements of the system are explained.

## Functional Requirements

The users of the system are customers, employees, branch managers and vehicle damage experts. The functionalities of the system from each users' perspective are categorized below.

### *Requirements for customers*

- Customers can register to the system with their name, national id or passport number, date of birth, nationality, address, phone number, email address, password and driving license information such as the licence type and when and where was the licence obtained.
- Customers can login to the system with their national id or passport number and their passwords.
- Customers can browse through all the vehicles such as cars, motorcycles, trucks available in different branches.
- Customers can filter what vehicle they want with different vehicle types, brands, transmission types, which branch they want the car from, kilometers of the vehicle, age of the vehicle and the daily rental price. Also, different vehicle types will have different search options. For example, if a truck option is selected, customers can filter out trucks based on how much weight they can carry. Specific vehicle types will have different technical options.
- Customers can reserve different vehicles in different branches by specifying the rental period (start and end date) if their driving experience and licence type allows them to drive the vehicle.
- Customers can request their desired vehicles to be transferred to a different branch if that branch does not already have a similar vehicle.
- Customers can extend the rental period if the vehicle is not reserved by another customer after the rental period end date.
- Customers can select and change which branch they are going to return the vehicle to. They can return the vehicle to any branch of the company.
- After the customers return the vehicles, the payment has to be made to the system with the payment value specified on the system. The payment value may not be equal to the rental price if the vehicle is damaged or returned later than the rental deadline.
- Customers can give feedback on the vehicle, the branch and the employees after they return the vehicles. The feedback will include a rating and further comments. A rating list of vehicles will be displayed on the system and all of the customers can see all of the ratings. The average rating of the vehicle will be visible on the vehicle information while trying to rent.
- Customers will have statuses such as regular, silver, gold and diamond depending on their rental history. For example, the customers will start from being a regular customer and if they rent a certain amount of vehicles without damaging them or returning them late, their status will be upgraded by the system. Depending on their status, they will receive additional discounts when renting a new vehicle. For example, silver customers will get 15%, gold customers will get 25% and diamond customers will get 35% discount while renting a vehicle.

- Customers can view their rent history and membership status from their profiles.

### ***Requirements for employees***

- Employees can login to the system using their employee id and password.
- Employees can check reservations by approving or declining them.
- Employees can update the current status of the vehicles when a vehicle is rented, is returned from rent, is on transfer to another branch, or is unavailable because of maintenance or damage repair.
- Employees can check if the payment has been made, and accept the vehicle return depending on the payment status.
- Employees can see the list of all the customers, all the previous vehicle transfers, all the previous customer requests, the history of previous damage reports, the history of all the vehicle rents, the list of all of the current rents and the list of all of the vehicles with their statuses without restriction to their branch.
- Employees can see the current locations of the vehicles on the map if a tracking device is attached to the vehicle.

### ***Requirements for managers***

- Managers can login to the system using their employee id and password.
- Managers can see the branch budget and have the permission to spend it on buying new vehicles and hiring new employees to their branch.
- Managers can see the list of information about all the employees in their branch, managers of other branches, and the information of all the vehicles.
- Managers can conduct performance measurement reports where they evaluate the employees' performances and can fire/keep the employees.
- Managers can set certain tasks to employees and can reward them (bonus payment, raise in monthly payments).
- When a vehicle is returned from rent, managers will assign one of the damage experts to check the vehicle and if there is damage, these experts will estimate the cost of the damage.

### ***Requirements for vehicle damage experts***

- Vehicle damage experts can login to the system using their employee id and password.
- Vehicle damage experts can issue damage reports if an employee has spotted any damage on returned vehicles. This report will include the location of the damage, brief description of the damage and estimated price of repair. When a damage report is issued on a vehicle, the status of the car is automatically changed to damaged/in repair and will not be available to rent.
- When a vehicle is returned from repair, vehicle damage experts will check the previous damage and if it is repaired properly, they can set the status of the car from in repair to available to rent.
- Damage experts can see the history of previous damage reports.

### ***Other requirements***

- Unregistered users can see the available jobs and apply to them through the website.
- Unregistered users can also view the list of available vehicles with all the information but they cannot rent them without registration.
- Unregistered users can also view the different locations of the branches as well as general information about the company.

## **Non-Functional Requirements**

### ***Usability***

- Any user that uses the website will be able to see vehicle models, their prices and branches. However, a branch manager account would use the site for more functionality such as adding a new vehicle or an employee to the system. The user interface for these functionalities should not be visible for a regular user because it would make the site more difficult to use.

### ***Reliability***

- The site has to be reliable because there are money transactions and the accounts also contain crucial information about the owner. To protect their personal information and manage their payments the users will use a password. The passwords will not be saved into the database as they are. A hash function will be applied to them and they will be saved as their hash forms.

### ***Extensibility***

- As mentioned previously, branch managers will be able to add new vehicles and employees to the database. So, if there is a need to extend the system it will be easily done by managers.

### ***Performance***

- The performance of the system is important as it should not be frustrating for users to meet their needs using the system. To improve the performance of the system, the database will be as optimized as possible.

## **Limitations:**

In this car rental system there are certain limitations to prevent inconsistencies and protect the logical flow of the system. The limitations are:

- A person can become a customer if only they have a driving licence, otherwise they can not rent vehicles.
- A customer can rent only one vehicle at one reservation.

- A customer can not make another reservation if they have an incomplete reservation, in other words if they have not returned the rented vehicle.
- If a customer requests a vehicle which is already reserved, the employee will decline this request.
- If a customer exceeds a certain number of damages at their reservations, the customer will not be able to rent again.
- If a customer cancels the reservation while the vehicle is already on transfer for his/her request, the transfer will stop and the vehicle will be returned to its original branch.
- A damage on a vehicle can be decided only by damage experts.
- A damage expert can not fill multiple damage reports for the same reservation.
- Every branch must have a manager.
- Only branch managers can evaluate employees and hire new ones.

## E/R Diagram:

