

**ITCS-6112-**  
**091**  
**FALL-2022-Group 11- TERM PROJECT**  
**CAR RENTAL MANAGEMENT SYSTEM**

We formed a group of five members and named our group the Car Rental Management Team. We as a team are having collective goals and the biggest factor that helps us in working as a team is clear communication. We have Defined roles and responsibilities assigned to each member of the group.

Rachana Goli ( 801273486 ) Shravan  
Naidu Gollu (801318790 )  
Sai Rithwik Reddy ( 801275495 )  
Sai Anish Chowdary Bezawada ( 801312402 )  
Konuganti Vamshi Reddy ( 801306984 )

**TEAM MEMBERS INTRODUCTION:**

**Rachana:**

A Computer Science Graduate Student at UNC Charlotte, who yearns for tech skills and gains acquaintance with various facets. As a high school student, I reveled in learning about programming languages such as Java and PHP and later my attention grew more towards Python, Machine learning and networking. I have always pictured myself working as a techie and enrolled for the Bachelor of Technology in computer science and engineering at MVSR Engineering College was the first big step. I am at the forefront of developing enterprise grade web applications for clients at Infosys Limited for two years after my undergrad.

**Shravan:**

I completed my bachelor's in computer science engineering and right after my education I got placed in TCS as a network automation engineer working for Cisco as a client. My role in Cisco is developing software applications for managing network devices and responsibilities involved developing automated applications that deliver critical upgrades on Cisco's wireless devices, run customized policy checks on devices and generate summaries that capture audit trails. As a computer science graduate student at UNC Charlotte, my interest towards software engineering made me choose the project on Car Rental Management with the knowledge of programming and software engineering designs.

**Rithwik:**

My interest towards computer science made me do the internship on Artificial intelligence at ENHISecure Pvt Ltd. Right after my undergraduate, I started my career as a computer science graduate student at UNC Charlotte with the passion for programming. I have hands-on experience on Python and MySQL. My experience on learning the concepts of software engineering helped me to choose the project on Car Rental Management. I hold certifications on Python and MySQL from HackerRank.

**Anish:**

I am a computer science student who has hands on experience on programming languages like c, c++, java, python, c#, HTML, java script. I have worked as a Data Engineer at Mindtree for a year. Trained on concepts like DOTNET, ASP.NET, then I was upskilled as a data engineer and trained on big data concepts. Working there made me acquire some knowledge on Azure data factory, apache spark, python. I worked on some of the live projects like online book sharing application, Blood cell classification model during undergraduate course. Hold certified certifications from Coursera in BOOTSTRAP4 and ANGULAR.

**Vamshi :**

During my under graduation, I worked on an intern project of full stack development using Python and MySQL and then worked on a real time monitoring system on object detection model. I worked on Intern project based on a light controlling system. I hold certifications on Deep Learning and Front End Web Development from Coursera. I am also certified with a Python proficiency gold badge from HackerRank. I also conducted a NEURAL FEVER workshop hosted by the computer science department during my under graduation. My passion towards programming made me choose the career for masters to learn and hands-on experience on Python and MySQL. Currently, I am pursuing my masters in computer science at UNC charlotte.

All the team members met face2face on and discussed the project details and working process to carry out smooth output at every stage of the project.

We as a team has come to agreement in some aspects such as

- Most of the time we decided to communicate face2face, otherwise it would be zoom calls and through text.
- The timings of our meetings would be mostly Saturday and Sunday as everyone is available on weekends and some weekdays when there is any holiday and everyone is available to meet.
- We made every meeting mandatory as we will be discussing all the important details and all the aspects at different phases of the project.
- We will be planning to meet in university or at one of the team members place to discuss face2face otherwise we will be doing it through zoom calls. The time of meeting varies with availability and the work to be done at that particular phase.
- At every meeting each member discusses all the concepts they have studied regarding the project and performs knowledge sharing to the team members

- As of now all the team members are going to work on all the parts of the project and every one will get involved at each step of the project. As of now team management is to be done by Rachana, Programming is done by Shravan and Vamshi, Documentation is done by Anish, and presentation is done by Rithwik.
- We have decided all the submission process will be done by our team leader Rachana with the help of other team mates.
- If a teammate drops or misses any meeting due to some emergency, we will split the work among other teammates and make sure everything is completed before the submission date.

## **2. PROJECT PROPOSAL**

Nowadays, there are online car reservations which give much benefit to users. We are creating a web application where users can rent a car by uploading their driver's license when they need a car.

### **Intended use of the system:**

A rental service is a service in which customers arrive to request the hire of a rental unit. It is more convenient than carrying the cost of owning and maintaining the unit. A car rental or car hire agency is a company that rents automobiles for a short period of time for a fee whether in a few hours or a few days or week. It is an extended form of a rental shop, often organized with numerous local branches (which allow a user to return a vehicle to a different location), and primarily located near airports or busy city areas and often complemented by a website allowing online reservations.

Car rental agencies primarily serve people who have a car that is temporarily out of reach or out of service, for example travelers who are out of town or owners of damaged or destroyed vehicles who are awaiting repair or insurance compensation. Because of the variety of sizes of their vehicles, car rental agencies may also serve the self-moving industry needs, by renting RVs or trucks, and in certain markets other types of vehicles such as motorbikes may also be offered.

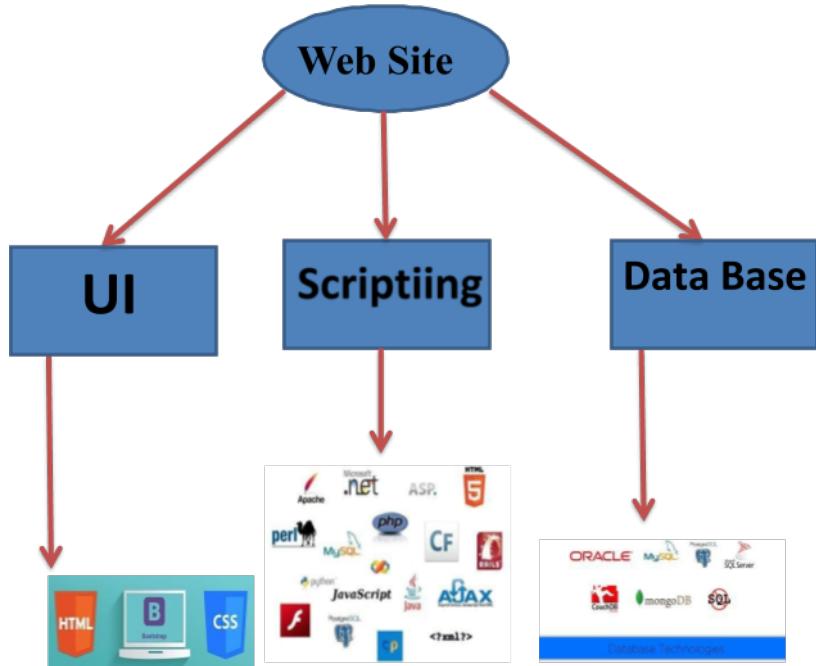
### **Overall functionality:**

A web application where users can rent a car by uploading their driver's license when they need a car. In the application we make the user login into the system with a valid driver's license and be able to book a vehicle according to his/her need. The login's will be of two types: i.e., the admin and the user. The admin login will enable the admin to input the cars available for the users who can take them as rent if required. The user login will help the user to login to the system and gives the user the choice to choose a car to rent from the cars that were made available by the admin. Admin can manage the car rentals, booking IDs and approve the reservation and monitor bookings whereas, the users will not have any access to the system related information other than the option to check the availability of the vehicles that can be rented. The system is a user-friendly interface which allows users to book and track the cars. If a vehicle is not available, the system sends a notification to the user whenever the vehicle is available. The system provides security to the users using their login functionality.

## Main components of the system:

Creating a web site requires multiple steps which includes the following

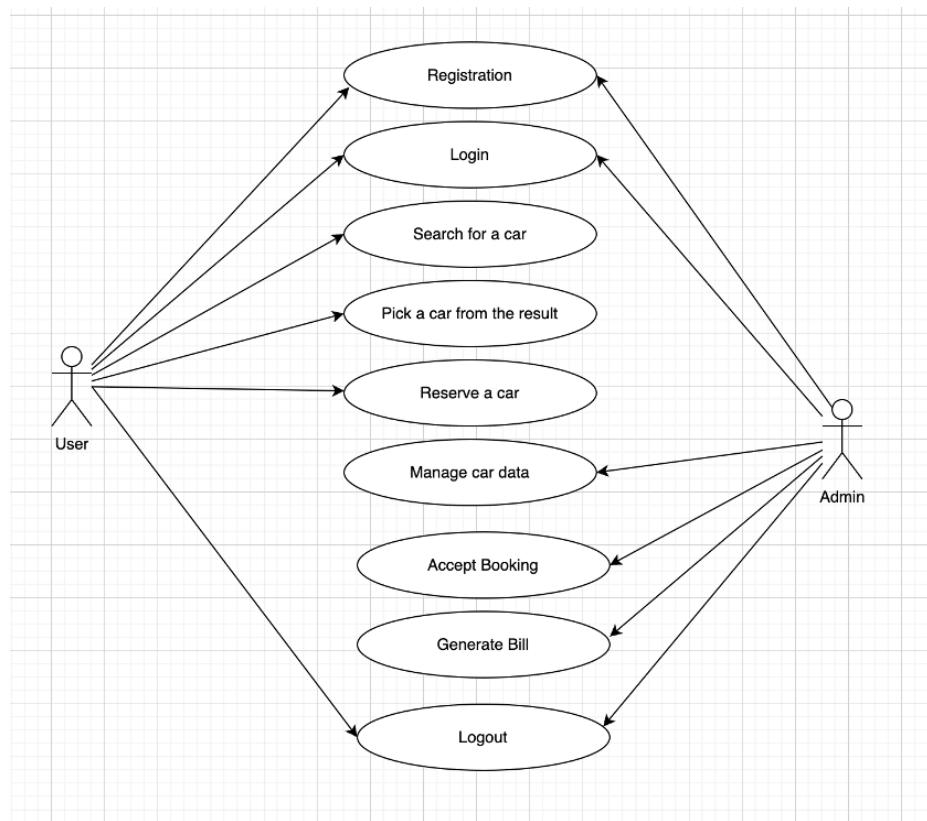
1. Creating a UI(User interface)
2. Scripting(Both at server end and client end)
3. Creating a backend or the database



Technologies that are mostly used to develop a User Interface are HTML, CSS, SASS, Bootstrap, Angular material. There are two scripting methodologies. Server-side scripting (This scripting is done at the server end), Client-side scripting: This scripting is done at the client end or the browser. The database contains the information about the users and the admin. To interact with the browser, HTML, CSS is used. A database is an organized collection of data. It is the collection of schemas, tables, queries, reports, views, and other objects. The data are typically organized to model aspects of reality in a way that supports processes requiring information.

# System Requirements

- UseCase Diagram:



- **Functional Requirements:** When users need a car, the website allows them to upload their driver's license and rent one. With a valid driver's license, the user must log into the software in order to book a vehicle that suits his or her needs. There will be two different types of logins: admin and user. The admin login will give the admin the ability to enter the cars that are accessible for users to rent, if necessary. The user login will assist the user in logging into the system and gives the user the option to select a rental car from the automobiles that the admin has made available. While users won't have access to any system-related information aside from the possibility to check the availability of the vehicles that can be hired, admin can manage car rentals, booking IDs, approve reservations, and monitor bookings. Users can reserve and track cars using the system's user-friendly interface. The system notifies the user when a car becomes available if one is not currently accessible. Using the login functionality, the system offers users security.

- **Describing Use case:** Firstly, to login into the system the user must register to the system and then login into the website to book a car. The user can then provide the details of the car that he wants to book and the place and date of the pick-up and search for the results. A user can select a car from the displayed results in the system and reserve a car to book. To rent a car, user need to make a bill payment and then logout of the system if needed. Admin needs to also possess an account in order to login into the system. So, the admin must first register and then login to the system. Admin can manage the booking and cars in the database. Admin can accept the booking of the user through which a user receives the confirmation of the booking. Admin can generate the bill and then logout if needed to secure his account from any misuse.

- **User Stories:**

1. As a user, I want to register so that I can login to the system.
2. As a user, I want to login so that I can book a car online
3. As a user, I want to search for a car so that I can select a car.
4. As a user, I want to select a car from the search result so that I can make a reservation.
5. As a user, I want to reserve a car so that I can use a rental car.
6. As an admin, I want to register so that I can login to the system.
7. As an admin, I want to login so that I can manage and administer the system.
8. As an admin, I want to manage car data so that the information on the system is up to date
9. As an admin, I want to accept booking so that user can book and pick up a car
10. As an admin, I want to generate bills so that the user can rent a car.
11. As a user, I want to logout as the registration is done or I am done using the system
12. As an admin, I want to logout so that my account is not misused once I am done using it.

- Pre and post conditions:

User story	Pre-conditions	Post-conditions
1	<ul style="list-style-type: none"> <li>○ User must have access to the system link to register</li> <li>○ User must be ready with the details to book a car</li> </ul>	<ul style="list-style-type: none"> <li>○ User must remember the credentials to login to the system</li> </ul>
2	<ul style="list-style-type: none"> <li>○ Users must remember the credentials to login to the system.</li> <li>○ Validation of the login credentials will lead user to book car</li> </ul>	<ul style="list-style-type: none"> <li>○ User is navigated to the dashboard and user can now provide the details to search for a car such as date on which he needs to rent a car, place to pick up a car etc.</li> </ul>
3	<ul style="list-style-type: none"> <li>○ User has to provide the details to search for a car such as date on which he needs to rent a car, place to pick up a car etc.</li> </ul>	<ul style="list-style-type: none"> <li>○ User can select the desired car from the list options displayed.</li> </ul>
4	<ul style="list-style-type: none"> <li>○ User can select the desired car from the list options displayed.</li> </ul>	<ul style="list-style-type: none"> <li>○ User can now reserve the car that he selected.</li> </ul>
5	<ul style="list-style-type: none"> <li>○ Admin can manage the user selected car data after logging into the admin portal.</li> </ul>	<ul style="list-style-type: none"> <li>○ Admin can now update the managed car's data.</li> </ul>
6	<ul style="list-style-type: none"> <li>○ Admin must have access to the system link to register</li> </ul>	<ul style="list-style-type: none"> <li>○ Admin must remember the credentials to login to the system</li> </ul>
7	<ul style="list-style-type: none"> <li>○ Admin must remember the credentials to login to the system.</li> <li>○ Validation of the login credentials will lead admin to manage the application.</li> </ul>	<ul style="list-style-type: none"> <li>○ Admin is navigated to the admin dashboard.</li> </ul>
8	<ul style="list-style-type: none"> <li>○ Admin can view the list of bookings and accept each booking.</li> </ul>	<ul style="list-style-type: none"> <li>○ Booking is accepted by the admin and then a bill is generated.</li> </ul>

9	<ul style="list-style-type: none"> <li><input type="radio"/> Admin can generate a bill for the rented car.</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Bill is generated</li> </ul>
10	<ul style="list-style-type: none"> <li><input type="radio"/> Admin can logout</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Admin is logged out</li> </ul>

- Logging in to the system requires authentication internally checking for valid email ID and password for that account. This user story might be too complex to take up and can be decomposed into smaller user stories like email validation, password characters validation etc.

- Nonfunctional requirements:***

- Application is developed by creating a UI using HTML, CSS, Bootstrap.
- Scripting is done from user and client side.
- A database needs to be created to manage and organize the data.

- Glossary**

Word	Meaning
rent	Loan a car for limited term
Car rental price	Amount to be paid to rent a car
Customer verification	Validating customer ID
Opening hours	Hours to pick up or drop off car
Security deposit	Amount that is paid for security purposes in case of any damage to the car
Roof luggage carrier	Space for luggage storage on the top of car

## **User Story:**

### **EPIC - 1:**

- 1.1 I wish to utilize my email address and password to register as a new user on the web application.
- 1.2 I want to be able to sign in to the web app with my email address and password as an existing user.
- 1.3 I should be able to view the landing page as a user after successfully logging in.
- 1.4 I should be able to log out of the application as a user.

### **EPIC - 2:**

- 2.1 I should be able to look for a Car using the web app's search function as a user.
- 2.2 As a user, I should have the option to filter cars by category, size, price and capacity.

### **EPIC - 3:**

- 3.1 I should be able to click on a Car title to go to the Car details page.
- 3.2 I ought to be allowed to add Cars to the online application as an administrator.

### **EPIC - 4:**

- 4.1 I should be allowed to alter the car details, such as price as an administrator.
- 4.2 I should be allowed to enable the notification option for the availability of the cars.
- 4.3 I shouldn't be able to add or modify booking details in the online application as a user.

### User Story with relative size and priority:

Stry	User Story	Size	Label
1.1	I wish to utilize my email address and password to register as a new user on the web application	3	Low
1.2	I want to be able to sign in to the web app with my email address and password as an existing user	5	Medium
1.3	I should be able to view the landing page as a user after successfully logging in.	5	High
1.4	I should be able to log out of the application as a user.	3	Low
2.1	I should be able to look for a Car using the web app's search function as a user.	5	High
2.2	As a user, I should have the option to filter cars by category, size, price and capacity.	5	Medium
3.1	I should be able to click on a Car title to go to the Car details page.	3	Low
3.2	I ought to be allowed to add Cars to the online application as an administrator.	8	High
4.1	I should be allowed to alter the car details, such as price as an administrator.	5	Medium
4.2	I should be allowed to enable the notification option for the availability of the cars.	8	High
4.3	I shouldn't be able to add or modify booking details in the online application as a user.	8	High

## **Sprint 1:**

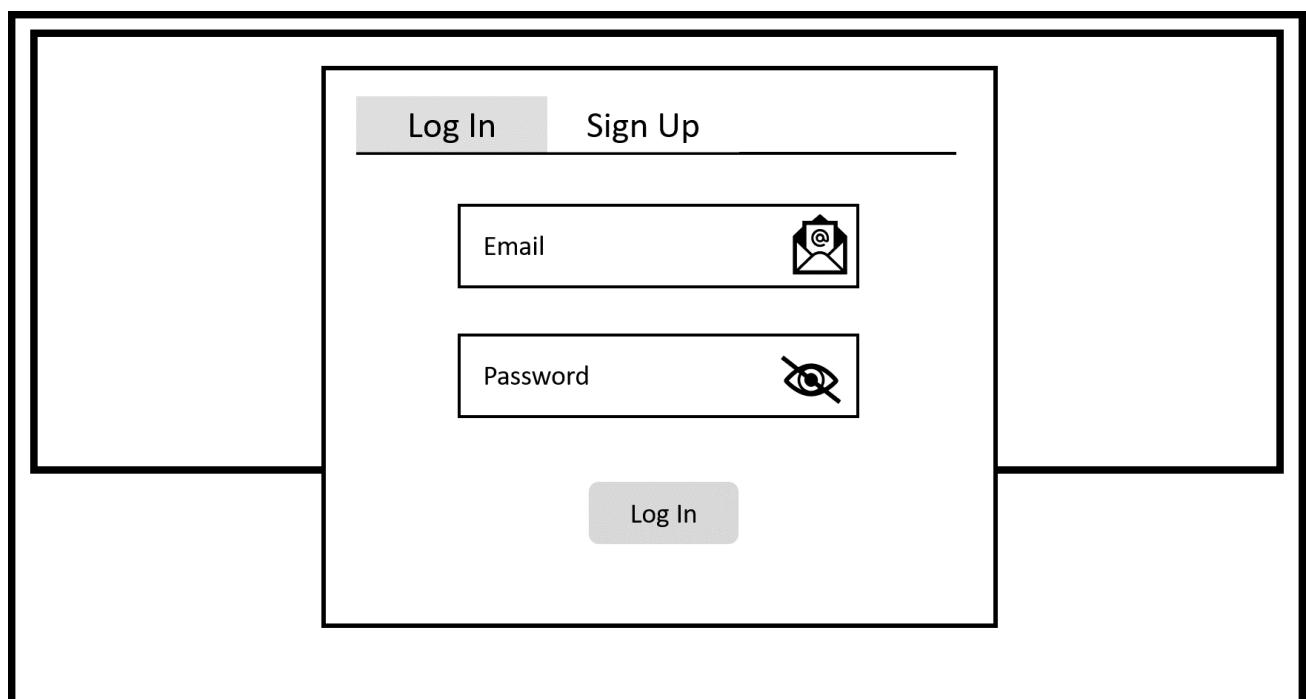
### **User Story implemented:**

1. I wish to utilize my email address and password to register as a new user on the web application
2. I want to be able to sign in to the web app with my email address and password as an existing user
3. I should be able to view the landing page as a user after successfully logging in.
4. I should be able to log out of the application as a user.

### **Functionality implemented on the completion of Sprint 1:**

1. New users will be able to sign-up.
2. Returning users will be able to login.
3. After login, the user will be navigated to the landing page.
4. Users will be able to search a car using the search bar.
5. Users will be able to log out.

### **Key features of the user interface and sketches**



Log In      Sign Up

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Username 

Email 

Password 

Confirm Password 

Sign up

New Booking

Select City  
Select City 

Travel Date 

Select Car  
Select Car 

Select Destination City 

Availability  
Select Time 

More than 4 passengers?

Roof Luggage Carrier:  Required  Not Required

License Copy:

## SPRINT REPORT 1

### System Functionalities:

- The main functionalities of the user side were implemented at the end of the sprint1. This implementation includes the user sign up and registration and adding them to the database (which is explained more in the sprint 3).
- This accepts the users email address and password to login to the account. If the account is not found, it asks the user to create a new account with the user details.
- If the user enters the wrong credentials for more than three times, the account gets locked and then the user needs to contact the administrator.
- The user needs to logout from the account once they complete their bookings.
- The sprint1 also includes the functionalities of the admin side.
- The admin functionalities include the management of bookings and availability of cars and managing the accounts.

### User Stories Implementation:

- We have successfully implemented user stories 1,2 and 3 which includes the above functionalities in the current Sprint.
  - UserStory1:
    - Creating a signup page showing email and password fields.
  - UserStory2:
    - Registering using Email id and password for new user.
  - UserStory3:
    - Creating a logout page after the user completed his booking.

### Changes Made to the user stores:

- No changes were made to the current user stories and no break down performed on the user stories. There are no new user stories added to the current sprint and the all the mentioned user stories were added to the product backlog document as these are the main functionalities required to run the application.

### Lessons Learned:

- In this sprint, we tried to implement the login functionalities of both the user and the administrator. This is the main task for the application to run successfully as it requires to login to the page and then proceed with the bookings. This needs to be implemented with prior care as it contains all the login details of the user, and the admin needs to keep track of all the accounts without any loss.

User Stories needs to be implemented:

- The admin needs to have a report of the users account creation.
  - Pre: The user tries to create account using more than one account.
  - Post: The admin shows error when the user tries to login using same name, email, and phone number.
- The admin locks or unlocks the account if the user account is locked.
  - Pre: The user account is locked.
  - Post: The admin has the rights to unlock the account.
- Account verification during account login
  - Pre: Direct login using email and password.
  - Post: After the credential the user must accept the security verification to login to the account.

Next Sprint:

- In the next sprint, we will try to implement the main booking dashboard page after logging to the system which includes both the user and admin functionalities.

## SPRINT REPORT 2

System Functionalities:

- The functionalities of the dashboard were implemented at the end of the sprint2. This implementation includes creation of the dashboard page which helps the user to book the cars based on their requirements and gets to know if the car is available or not.
- In this page, the user books the cars and then also searches for the car availability based on the user's choice.
- Once the car selection is completed, the user proceeds with the car booking page where the user selects the timing and date of travel. Then the user proceeds to the payment page where the user tries to pay using the card.
- Once the booking is completed, the user receives the receipt to the registered phone number and the email id.
- The user has an option to cancel the booking before 24 hrs. If it exceeds the user is charged with the extra fee.
- In the dashboard, the user can see the current and previous bookings.
- If the car is not available, the dashboard gives an option to notify once the car is available.
- The dashboard has an option to filter the cars depending on the capacity, price, and rating.
- The admin has the right to manage the dashboard.
- The admin has the right to manage the car bookings by adding or removing the car from the dashboard.
- The admin also verifies the user identification before assigning the car to the

user. User Stories Implementation:

- We have successfully implemented user stories 4 and 5. These stories were implemented in the current sprint.
  - UserStory4:
    - Creating a dashboard page for managing the booking.
  - UserStory5:
    - Providing access to admin to add or manage the cars from the dashboard.

Changes Made to the user stores:

- No changes were made to the current user stories and no break down performed on the user stories. There are no new user stories added to the current sprint and all the mentioned user stories were added to the product backlog document as these are the main functionalities required to run the application.

Lessons Learned:

- In this sprint, we learned the main functionalities of the dashboard and how it works and how user and admin use the dashboard for the car booking. We learnt the ways to create the dashboard and make changes in dashboard based upon the requirements.
- User Stories needs to be implemented:
  - The admin tries to add the posts about the cars whenever a new car is added.
    - Pre: Fails to post when a new car is released
    - Post: The dashboard pops up a post whenever a new car is added.
  - The user needs to export the car reports.
    - Pre: User unable to export the car reports.
    - Post: The user has right to export the car report before booking.
  - The user tries to apply coupon before payment
    - Pre: The user tries to apply coupon more than once.
    - Post: The admin should allow user to add coupon only once per account.

Next Sprint:

- In the next sprint, we try to show the functionalities of the database which will be handled by the admin.

## SPRINT REPORT 3

### System Functionalities:

- In this report, the functionalities include admin managing the databases.
- In the back end, the database contains all the details of the user.
- The admin has the right to add or remove the user from the database.
- If the admin wants to remove the user from the database, it should be prior notified to the user.
- The database contains the name, address, phone number, insurance, identification of the user.
- Once the account is created, the details of the user are saved in the database.
- The admin then verifies and then sends an approval mail to user.
- The dashboard is directly connected to the database.

### User Stories Implementation:

- We have successfully implemented user stories 6. These stories were implemented in the current sprint.
  - User Story 6:
    - Creating a database and providing access to the admin.

### Changes Made to the user stores:

- No changes were made to the current user stories and no break down performed on the user stories. There are no new user stories added to the current sprint and the all the mentioned user stories were added to the product backlog document as these are the main functionalities required to run the application.

### Lessons Learned:

- In this sprint, we learned how admin manages the databases and how the user data is stored in the database.

### User Stories needs to be implemented:

- No more new user stories are implemented in this current sprint as this is the backend maintaining the databases by the administrator. All the user stories implemented in this sprint covers the overall functionalities of the databases.

Next Sprint:

- This is the last sprint and there are no more user stories left unimplemented in the backlog that we decided to work on
- We are also not considering adding any user stories to the backlog.

# User Manual

## Steps needed to deploy the application:

- Car Rental Management System is a web application which can be launched on a computer or a mobile phone easily with the connection of internet to the system.
- A URL is required to access the web page to the user which contains:
  - A protocol: https://
  - domain: [www.domain.com/](http://www.domain.com/)
  - path: login  
(https://www.domain.com/login)
- User needs to enter the correct URL in the system's search engine, and it can be redirected to the car rental management home screen.

## Main Features:

- When users need a car, the car rental management website allows them to upload their driver's license and rent one. With a valid driver's license, the user must log into the software to book a vehicle that suits his or her needs. There will be two different types of logins: admin and user. The admin login will give the admin the ability to enter the cars that are accessible for users to rent, if necessary. The user login will assist the user in logging into the system and gives the user the option to select a rental car from the automobiles that the admin has made available. While users won't have access to any system-related information aside from the possibility to check the availability of the vehicles that can be hired, admin can manage car rentals, booking IDs, approve reservations, and monitor bookings. Users can reserve and track cars using the system's user-friendly interface. The system notifies the user when a car becomes available if one is not currently accessible. Using the login functionality, the system offers users security.
- Car Rental Management provides the following features:
  - Online web application: The application can be available online which can be easily accessed using a web URL
  - User Authentication: Car Rental Management allows user to first authenticate and after entering correct credentials, user can go through the login page and enter home page.
  - Admin Authentication: Car Rental Management allows admin to first authenticate and after entering correct credentials, admin can go through the login page and enter home page.
  - Search required Cars: User can use the search engine and enter the dates he needs car and filter out the cars needed.

- Upload Driver's license: User can upload a driver's license and get authorization to book a car.
- Book a Car: User can then select a car and book the car which he/she is willing to rent for.

## System Walk-through:

Initially the user needs to sign up/ create an account in the system inorder to book a car.

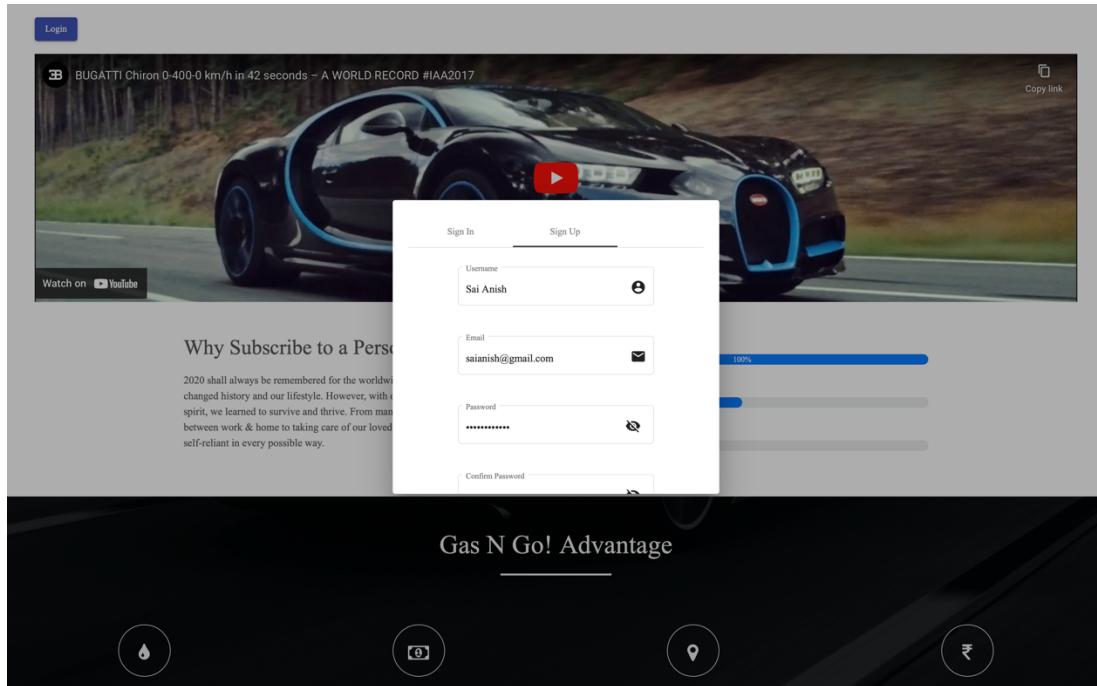


Fig 1. Sign up Page

Once the user signs up with the required details, he can log in to the system.

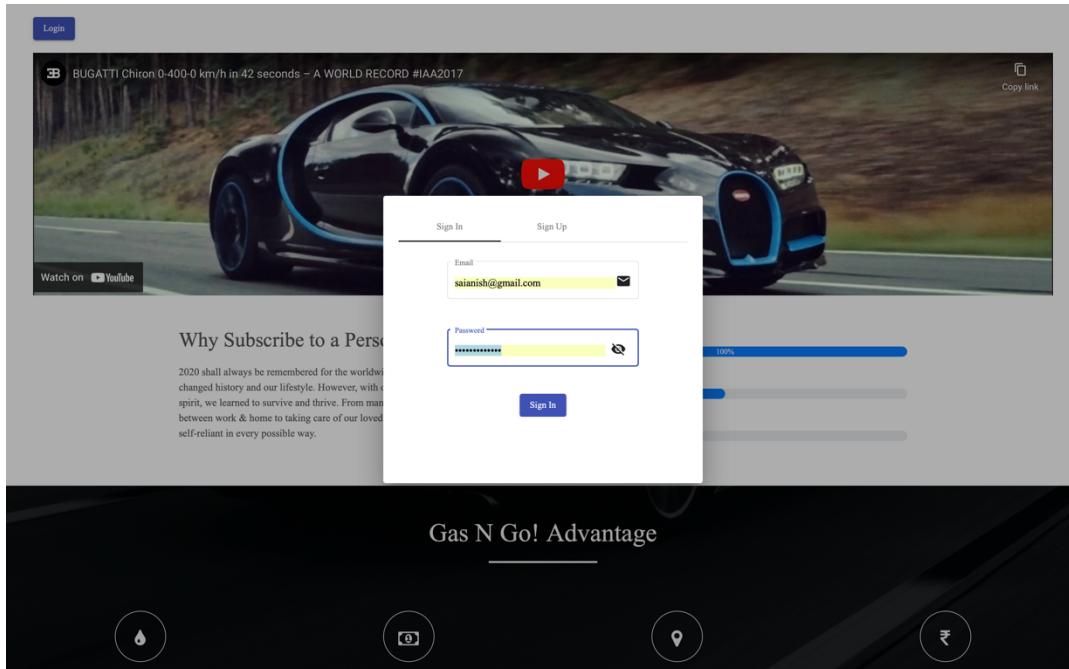


Fig 2. Login Page

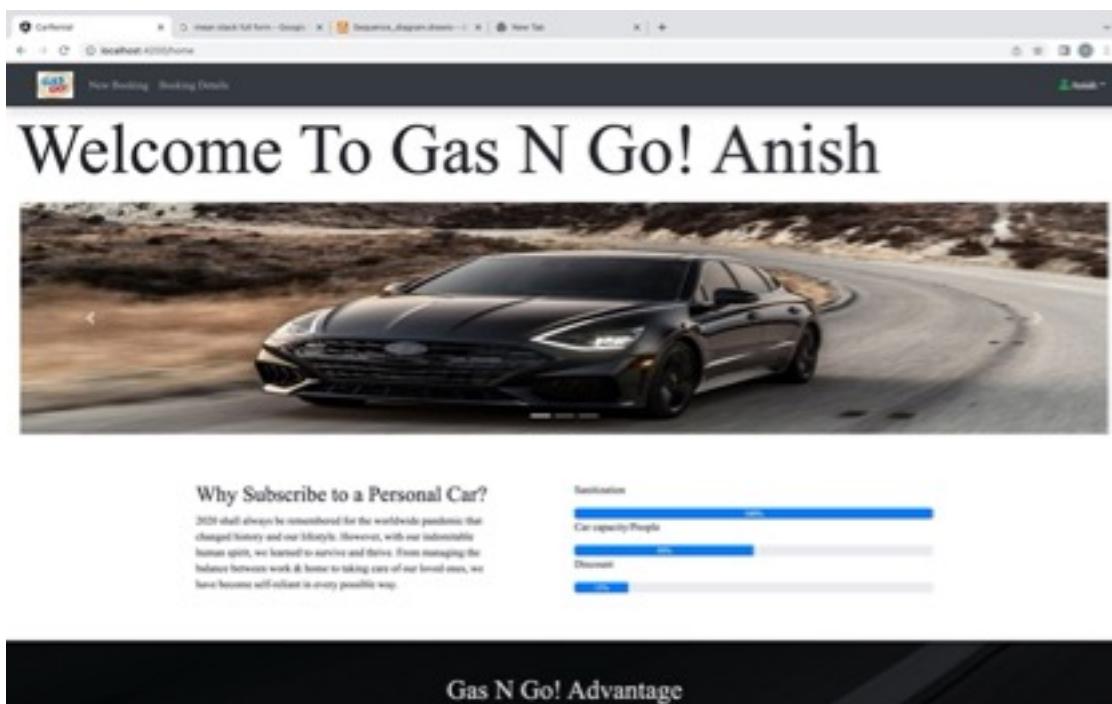


Fig 3. User Dashboard

Here the user can select the required card from the available list of cars in the system by filling some details about when they want the car and on which date and time

The screenshot shows a 'New Booking' page with the following fields:

- Travel Type:** Round Trip (selected) or One Way.
- From City:** Charlotte.
- To City:** Raleigh.
- Travel Date:** 11/29/2022.
- Select Car:** Ford Fusion.
- Availability:** 6:00 AM.
- Roof Luggage Carrier:** Required (radio button selected).
- More than 4 passengers?** Checked (checkbox selected).
- Upload License Copy:** Buttons for 'Select Image' and 'Upload'.
- Action Buttons:** 'Submit' and 'Clear'.

Fig 4: New Booking page

After booking the car, user can find the booked car details from the expansion panel data as below:

The screenshot shows an 'Expansion Panel Data' section with the following information:

Table Data	Expansion Panel Data
saniash@gmail.com	
Car : Maruti Swift	
Time : 7:00 AM	
From Place : Greensboro	
To Place : Charlotte	

Fig 5: Booking Details

## System Walk-through:

Initially the user needs to sign up/ create an account in the system inorder to book a car.

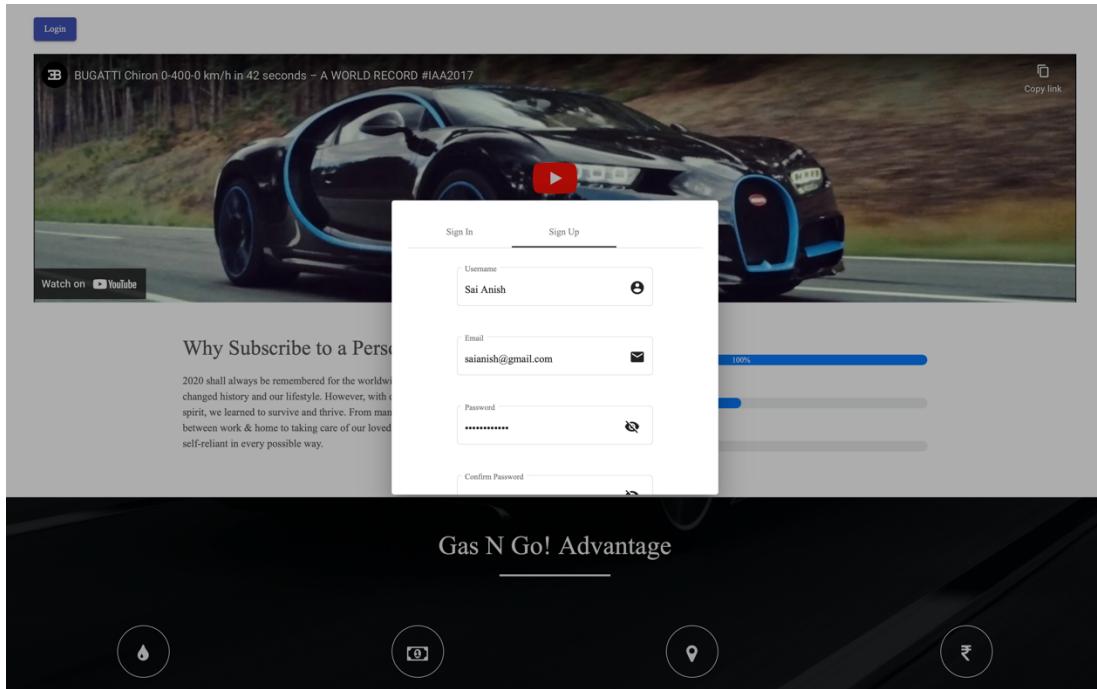


Fig 1. Sign up Page

Once the user signs up with the required details, he can log in to the system.

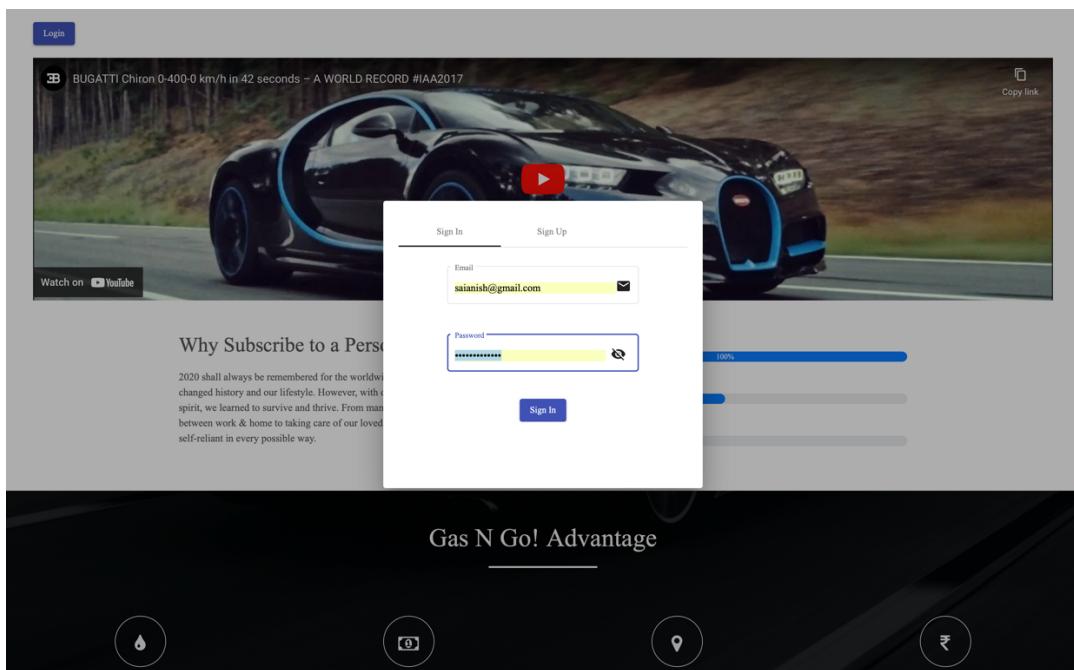
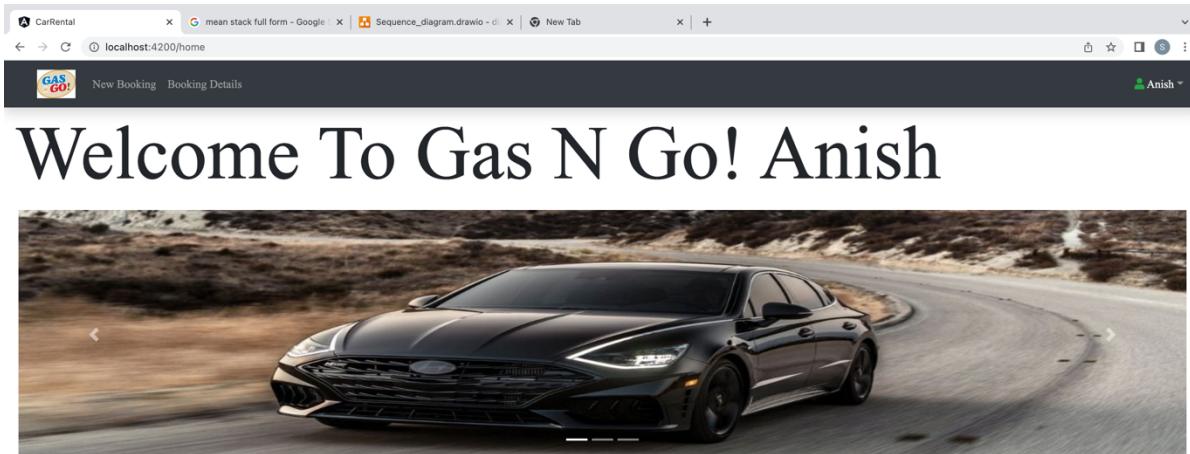


Fig 2. Login Page

Once the user logged in successfully, he can get into the home page, new booking page, booking details page and profile page.



Gas N Go! Advantage

Fig 3. User Dashboard

Here the user can select the required card from the available list of cars in the system by filling some details about when they want the car and on which date and time

Fig 4: New Booking page

After booking the car, user can find the booked car details from the expansion panel data as below:

Table Data	Expansion Panel Data
	<p>satwik@gmail.com</p>
	<p>Car : Tata Tiago Time : 01:00 PM From Place : Chennai To Place : Mumbai</p>
	<p>satwik@gmail.com</p>

Fig 5: Booking details